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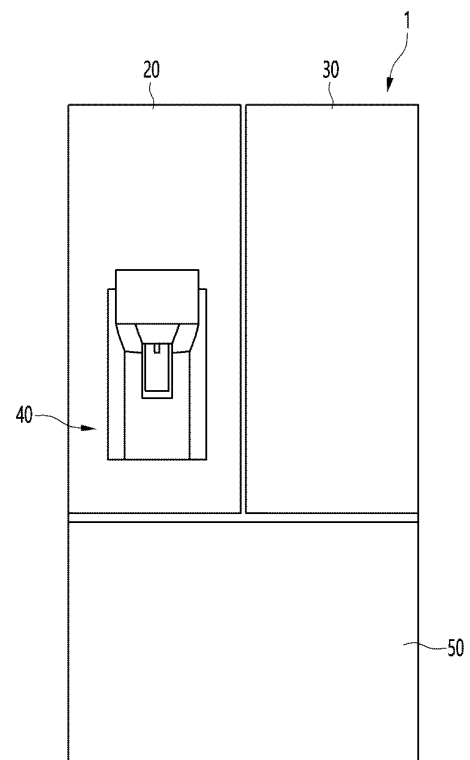
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(54) **REFRIGERATOR**

(57) A refrigerator includes an ice-making body including a circumferential portion configured to receive water. The circumferential portion defines a space configured to receive water. The refrigerator includes a bracket assembly providing a space for accommodating at least a portion of the ice-making body. The bracket assembly defines a cold-air flow path. The bracket assembly is also referred to as a flow duct. The bracket includes a first bracket facing a first surface of the ice-making body and a second bracket facing a second surface of the ice-making body.

FIG. 1A



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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a refrigerator.

BACKGROUND

[0002] A refrigerator is an appliance that may store food at a low temperature in an internal storage space shielded by a door. The refrigerator cools the inside of the storage space by using cold air, thereby keeping stored food in a refrigerated state or a frozen state.

[0003] In some examples, an ice maker for making ice is provided in a freezing space of the refrigerator. For example, the ice maker receives water supplied from a water supply source or a reservoir in a tray, and then cools the water to generate ice. The ice generated by the ice maker may be stored in an ice bin. The user may open a freezing space door, approach the ice bin, and take out the ice of the ice bin.

[0004] In some cases, where ice is formed hard, a child, an elderly person, or a consumer having weak teeth may feel discomfort when chewing the ice.

SUMMARY

[0005] The present application describes apparatus and method configured to generate chewable ice having reduced hardness.

[0006] The present application describes a refrigerator capable of manufacturing ice including strength to an extent that a consumer may chew and eat.

[0007] The present application describes a refrigerator capable of providing a tray including a peripheral surface in which ice is generated, and cooling water supplied to the peripheral surface to manufacture thin ice (ice in a first state).

[0008] The present application describes a refrigerator capable of providing a blade on one side of the tray to separate the thin ice from the peripheral surface and manufacture powdered ice (ice in a second state).

[0009] The present application describes a refrigerator capable of compressing the powdered ice to manufacture molded ice (ice in a third state) including a predetermined strength.

[0010] The present application describes a refrigerator in which an ice-making space or surface is formed on at least a portion of the circumferential surface (a first circumferential surface) of a tray so that ice-making performance at the tray can be improved.

[0011] The present application describes a refrigerator in which the tray is formed of a material including high thermal conductivity, for example, a metallic material, so that the tray can be rapidly cooled by supplied cold air.

[0012] The present application describes a refrigerator capable of stable operation of an ice maker by providing an ice-making bracket including at least one wall config-

ured to accommodate at least a portion of a tray that receives water.

[0013] The present application describes a refrigerator capable of smoothly supplying cold air to the ice maker by providing an ice-making bracket including at least one wall that forms a cold-air flow path toward the tray.

[0014] The present application describes a refrigerator including a bracket that supports the tray, such that the tray is stably and movably supported by the bracket.

[0015] The present application describes a refrigerator including a bracket including at least one wall that supports a power transmission device of a motor, so that power can be transmitted from the motor to the tray.

[0016] The present application describes a refrigerator including a blade for separating ice formed on the tray and an ice-making bracket including at least one wall on which the blade is mounted, so that the ice removal operation of the blade can be performed.

[0017] The present application describes a refrigerator including a first blade for separating ice formed on the circumferential surface (or circumferential wall) of the tray and an ice-making bracket including a wall on which the first blade is mounted, so that the ice removal operation can be carried out.

[0018] The present application describes a refrigerator including a second blade for separating ice formed on a side surface (or side wall) of the tray and an ice-making bracket including a wall on which the second blade is mounted, thereby preventing ice from growing in regions other than the ice-forming region and preventing restriction of movement (rotation) of the tray.

[0019] The present application describes a refrigerator in which the second blade is disposed in a space between both side walls of the tray and the ice-making bracket, so that ice frozen between the tray and first and second surfaces of the ice-making bracket can be effectively separated.

[0020] The present application describes a refrigerator capable of preventing a phenomenon in which driving of the tray is restricted due to ice restraint by providing the second blade.

[0021] The present application describes a refrigerator including an ice-making bracket including at least one wall to which a cold-air duct is coupled, so that cold air can be supplied into an internal space of the ice maker.

[0022] The present application describes a refrigerator including an ice-making bracket including at least one wall provided with a portion to which a water supply pipe is connected, so that water can be supplied into the internal space of the ice maker.

[0023] The present application describes a refrigerator including an ice-making bracket including at least one wall defining a water storage space, so that water to be supplied to the tray can be stored.

[0024] The present application describes a refrigerator including a reservoir for storing water, wherein at least a portion of the tray is disposed to be immersed in the reservoir so that water can be smoothly supplied to the

circumferential surface of the tray.

[0025] The present application describes a refrigerator including an ice-making bracket including at least one wall that supports a reservoir, so that water to be supplied to the tray can be stored.

[0026] The present application describes a refrigerator including a reservoir including an inlet opening through which water flows and an ice-making bracket including at least two walls that support both sides of the reservoir, wherein a width of the opening is greater than a width between the two walls, thereby preventing unwanted ice formation in a space between the reservoir and the ice-making bracket.

[0027] The present application describes a refrigerator including an ice-making bracket on which a heater is mounted, so that freezing occurring on a wall of the ice-making bracket supporting the reservoir can be prevented.

[0028] The present application describes a refrigerator in which a heater output at a portion where a cold-air duct is connected, with respect to a rotation axis of the tray, is greater than a heater output at an opposite portion, thereby preventing freezing at the ice-making bracket.

[0029] In some implementations, a refrigerator may include a tray including a peripheral surface (or a peripheral wall) receiving water. In some examples, a liquid other than water may be supplied to the peripheral surface.

[0030] The circumferential surface may form a space or surface in which water is stored.

[0031] The tray may be formed of a material including high thermal conductivity, for example, a metallic material, so that it can be rapidly cooled by supplied cold air.

[0032] The refrigerator may include an ice-making bracket that provides a space for accommodating at least a portion of the tray.

[0033] The ice-making bracket may define a cold-air flow path. The ice-making bracket may also be referred to as a "flow duct."

[0034] The ice-making bracket may include a first bracket facing a first surface of the tray and a second bracket facing a second surface of the tray.

[0035] The flow duct may be defined by coupling the first bracket and the second bracket.

[0036] The refrigerator may include a motor for providing driving force to the tray and a power transmission device for transmitting driving force of the motor to the tray, and the power transmission device may include a shaft or bar supported by the ice-making bracket.

[0037] The ice-making bracket may include a first bracket that forms at least a portion of the cold-air flow path and supports the tray.

[0038] The first bracket may include a first wall forming an insertion hole in which a shaft or bar of the motor is supported.

[0039] The first bracket may include a first wall forming a water supply pipe connection portion into which a water supply pipe is inserted.

[0040] The first bracket may include a second wall extending from the first wall and coupled to the second bracket.

[0041] The second wall may protrude from the first wall toward the second bracket and may form an end wall of the ice-making bracket.

[0042] The first bracket may include at least one wall defining a water storage space in which water is stored.

[0043] The first bracket may include a third wall including a surface on which a reservoir is seated. For example, the third wall may support a bottom wall of the reservoir.

[0044] The first bracket may include a fourth wall connected to the third wall and facing a first side surface of the reservoir.

[0045] The first bracket may include a water supply guide wall disposed below the water supply pipe in a gravity direction and configured to guide water supplied from the water supply pipe to the reservoir. For example, the water supply guide wall may extend obliquely with respect to the gravity direction.

[0046] The first bracket may include a fifth wall connected to the third wall and facing a second side surface of the reservoir. For example, the fifth wall may be disposed opposite to the fourth wall with the reservoir therebetween.

[0047] The refrigerator may include a first blade disposed outside the circumferential surface to scrape ice formed on the circumferential surface of the tray. For example, the first blade may be disposed adjacent to the circumferential surface so as to contact ice formed thereon.

[0048] The first blade may be disposed adjacent to one side surface of the reservoir.

[0049] The first blade may be connected to the fifth wall.

[0050] The first blade may be disposed at a position protruding toward the tray beyond an opening of the reservoir.

[0051] The tray may include a plurality of side walls connected to both ends of the circumferential surface, and the plurality of side walls may be spaced apart in a direction of a central axis of the tray.

[0052] The refrigerator may include a second blade disposed adjacent to at least one of the plurality of side walls and configured to remove undesired ice formed on the side wall.

[0053] The second blade may be installed on the ice-making bracket.

[0054] The second blade may be disposed between a side wall of the tray and one surface of the ice-making bracket.

[0055] A plurality of second blades may be provided. One of the plurality of second blades may be disposed between a first side wall of the tray and a first surface of the ice-making bracket, the first surface being formed on a wall of the first bracket.

[0056] Another of the plurality of second blades may be disposed between a second side wall of the tray and a

second surface of the ice-making bracket, the second surface being formed on a wall of the second bracket.

[0057] The ice-making bracket may include the second bracket connected to the first bracket. The second bracket may form at least a portion of the cold-air flow path.

[0058] The first bracket and the second bracket may guide a flow of cold air flowing around the tray.

[0059] One side of the first bracket may be open, and the second bracket may cover the open side of the first bracket.

[0060] The second bracket may form a space in which a power transmission device connected to the motor, for example, a gear assembly, is installed. The gear assembly may be accommodated in an internal space of the second bracket.

[0061] The refrigerator may include a heater installed on the ice-making bracket to prevent freezing of the ice-making bracket.

[0062] The heater may be disposed on a wall of the ice-making bracket.

[0063] The ice-making bracket may include both side surfaces facing both side walls of the tray, and the heater may be disposed on both side surfaces of the ice-making bracket.

[0064] The ice-making bracket may include a portion to which a cold-air duct is connected, and a density or output of the heater in a region closer to the portion may be greater than a density or output of the heater in a region farther from the portion.

[0065] With respect to a rotation axis of the tray, a density or output of the heater on a cold-air duct side may be greater than a density or output of the heater on an opposite side of the cold-air duct.

[0066] The refrigerator may include a reservoir including an opening through which water flows in and an ice-making bracket including at least two walls supporting both side surfaces of the reservoir.

[0067] A width of the opening may be equal to or greater than a width between the two walls, thereby preventing undesired ice formation in a space between the reservoir and the ice-making bracket.

[0068] The ice-making bracket may include a wall supporting the tray, and the wall of the ice-making bracket may include a portion forming the same plane as a wall of the reservoir, thereby preventing ice separated from the wall of the ice-making bracket from falling into the reservoir and freezing near a wall of the reservoir.

[0069] In one aspect of the present disclosure, a refrigerator may include: a cabinet forming a storage space; a door opening and closing the storage space; a tray movably provided in the cabinet or door and including a circumferential surface forming a space or surface for ice-making; and an ice-making bracket forming a space accommodating the circumferential surface of the tray and forming an opening through which cold air flows in.

[0070] The ice-making bracket may include a first bracket including a first wall supporting a central axis

of the tray, and a second bracket forming an accommodation space of the tray together with the first bracket and forming a through portion through which the central axis passes.

[0071] The first bracket may include a guide plate extending along the circumferential surface of the tray to guide cold air introduced through the opening to the circumferential surface of the tray, and the guide plate may protrude from the first wall toward the second bracket.

[0072] The first bracket may include a second wall protruding from the first wall and connected to the second bracket, and the second wall may define at least a portion of a cold-air flow path formed in the ice-making bracket.

[0073] The refrigerator may include a reservoir storing water to be supplied to the tray, and the ice-making bracket may include at least one wall supporting the reservoir.

[0074] The at least one wall may include a third wall protruding from the first wall toward the second bracket and on which the reservoir is seated.

[0075] The at least one wall may include fourth and fifth walls protruding from the first wall toward the second bracket, and the fourth and fifth walls may be disposed opposite each other with the reservoir therebetween.

[0076] The opening may be formed in the fourth wall.

[0077] The first wall may include a water supply pipe connection portion to which a water supply pipe is connected, and the fourth wall may include a water supply guide wall disposed adjacent to the water supply pipe and extending from the opening toward the reservoir.

[0078] The refrigerator may include a first blade disposed adjacent to the circumferential surface of the tray and contacting ice formed thereon as the tray moves, and the ice-making bracket may include a fifth wall to which the first blade is connected.

[0079] The refrigerator may include a reservoir storing water to be supplied to the tray, and the fifth wall may be disposed to face one surface of the reservoir.

[0080] The tray may include a side wall extending from an end of the circumferential surface, and the side wall may be disposed to face a second blade provided on the first bracket or the second bracket.

[0081] A plurality of second blades may be provided, one disposed between the first bracket and a first side wall of the tray, and another disposed between the second bracket and a second side wall of the tray.

[0082] The refrigerator may include a motor providing driving force to the tray and a power transmission device transmitting driving force of the motor to the tray, and the second bracket may form an accommodation space for the power transmission device.

[0083] The power transmission device may include a gear assembly.

[0084] The refrigerator may include a heater installed on the ice-making bracket to prevent freezing, and an output of one heater part disposed near the opening may be greater than an output of another heater part disposed

farther from the opening.

[0085] The first bracket may include at least two walls supporting both side surfaces of the reservoir, and a width of the opening may be equal to or greater than a width between the two walls.

[0086] In some examples of the present disclosure, a refrigerator may include: a cabinet forming a storage space; a door opening and closing the storage space; a tray provided in the cabinet or door and including a circumferential wall forming a space or surface for ice-making and a side wall connected to the circumferential wall; and an ice-making bracket disposed at one side of the tray and forming a space accommodating the circumferential surface of the tray and including a reservoir storing water to be supplied to the tray.

[0087] The ice-making bracket may include a first wall supporting a central axis of the tray, a second wall protruding from the first wall and on which the reservoir is seated, and third and fourth walls protruding from both ends of the second wall and disposed opposite each other with the reservoir therebetween.

[0088] A first blade for separating ice formed on the circumferential wall of the tray may be mounted on the third wall.

[0089] A first surface of the third wall may be disposed to face the reservoir, and a second surface of the third wall may have the blade mounted thereon.

[0090] The refrigerator may include a second blade installed on the first wall and disposed adjacent to the side wall to remove ice formed on the side wall.

[0091] The first wall may include a water supply pipe connection portion through which a water supply pipe passes, and the fourth wall may include a water supply guide wall contacting water discharged from the water supply pipe and guiding the water to the reservoir.

[0092] In some examples of the present disclosure, a refrigerator may include: a cabinet that defines a storage space, a door configured to open and close at least a portion of the storage space, an ice-making body provided at the cabinet or the door, the ice-making body comprising (i) a circumferential wall configured to receive water and to generate ice and (ii) a side wall connected to the circumferential wall, a reservoir disposed at one side of the ice-making body and configured to store water to be supplied to the ice-making body and a bracket that defines a space accommodating the circumferential wall of the ice-making body.

[0093] The bracket comprises a first wall that supports a central portion of the ice-making body, a second wall that protrudes from the first wall and supports the reservoir, and a third wall and a fourth wall that protrude from ends of the second wall and that are disposed opposite sides of the reservoir,

[0094] The refrigerator further comprises a first blade disposed at the third wall of the bracket and configured to separate the ice from the circumferential wall of the ice-making body.

[0095] The third wall has (i) a first surface facing the

reservoir and (ii) a second surface to which the first blade is mounted.

[0096] The refrigerator further comprises a second blade disposed at the first wall of the bracket and disposed adjacent to the side wall of the ice-making body, the second blade being configured to remove ice from the side wall of the ice-making body.

[0097] The refrigerator further comprises a water supply pipe configured to supply water to the reservoir, wherein the first wall comprises a water-supply-pipe connection portion that receives the water supply pipe, and wherein the fourth wall comprises a water supply guide wall configured to contact water discharged from the water supply pipe and to guide the water to the reservoir.

[0098] In some implementations, ice including a strength that allows a consumer to chew it may be produced, thereby increasing consumer satisfaction.

[0099] In some implementations, a tray including a circumferential surface on which ice is generated is provided, and water supplied to the circumferential surface is cooled so that thin ice (ice in a first state) may be produced.

[0100] In some implementations, a blade is provided at one side of the tray to separate the thin ice from the circumferential surface, thereby producing powdered ice (ice in a second state).

[0101] In some implementations, the powdered ice may be compressed to produce molded ice (ice in a third state) including a predetermined strength.

[0102] In some implementations, an ice-making space or surface is formed on at least a portion of the circumferential surface (a first circumferential surface) of the tray, thereby improving ice-making performance of the tray.

[0103] In some implementations, since the tray is formed of a material including high thermal conductivity, for example, a metallic material, the tray may be rapidly cooled by supplied cold air.

[0104] In some implementations, by providing an ice-making bracket including at least one wall configured to accommodate at least a portion of the tray that receives water, stable operation of the ice maker may be achieved.

[0105] In some implementations, by providing an ice-making bracket including at least one wall that forms a cold-air flow path toward the tray, cold air may be smoothly supplied to the ice maker.

[0106] In some implementations, by providing a bracket supporting the tray, the tray may be stably and movably supported by the bracket.

[0107] In some implementations, by providing a bracket including at least one wall supporting a power transmission device of a motor, power may be transmitted from the motor to the tray.

[0108] In some implementations, by providing an ice-making bracket including a blade for separating ice on the tray and at least one wall on which the blade is mounted, the ice removal operation of the blade may be performed.

[0109] In some implementations, by including a first

blade for separating ice formed on the circumferential surface (or circumferential wall) of the tray and a wall on which the first blade is mounted, the ice removal operation may be performed.

[0110] In some implementations, by including a second blade for separating ice formed on a side surface (or side wall) of the tray and a wall on which the second blade is mounted, growth of ice in regions other than the ice-forming region may be prevented and restriction of movement (rotation) of the tray may be prevented.

[0111] In some implementations, by disposing the second blade in a space between both side walls of the tray and the ice-making bracket, ice frozen between the tray and first and second surfaces of the ice-making bracket may be effectively separated.

[0112] In particular, by providing the second blade, a phenomenon in which driving of the tray is restricted due to ice restraint may be prevented.

[0113] In some implementations, by providing an ice-making bracket including at least one wall to which a cold-air duct is coupled, cold air may be supplied into an internal space of the ice maker.

[0114] In some implementations, by providing an ice-making bracket including at least one wall including a portion to which a water supply pipe is connected, water may be supplied into an internal space of the ice maker.

[0115] In some implementations, by providing an ice-making bracket including at least one wall defining a water storage space, storage of water to be supplied to the tray may be facilitated.

[0116] In some implementations, by providing a reservoir storing water and disposing at least a portion of the tray to be immersed in the reservoir, water may be smoothly supplied to the circumferential surface of the tray.

[0117] In some implementations, by providing an ice-making bracket including at least one wall supporting the reservoir, storage of water to be supplied to the tray may be facilitated.

[0118] In some implementations, by including a reservoir including an opening through which water flows and an ice-making bracket including at least two walls supporting both side surfaces of the reservoir, and forming a width of the opening to be greater than a width between the two walls, undesired ice formation in a space between the reservoir and the ice-making bracket may be prevented.

[0119] In some implementations, by including an ice-making bracket on which a heater is mounted, freezing occurring on a wall of the ice-making bracket supporting the reservoir may be prevented.

[0120] In some implementations, by forming a heater output at a portion where a cold-air duct is connected, with respect to a rotation axis of the tray, to be greater than a heater output at an opposite portion, freezing at the ice-making bracket may be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0121]

FIG. 1A is a front view showing an example of a refrigerator, and FIG. 1B is a view showing a state in which one door of the refrigerator is separated.

FIG. 2A is a perspective showing an example of a front of a first refrigerating space door, and FIG. 2B is a perspective view showing an example of a rear of the first refrigerating space door.

FIG. 3A is a view showing an example state in which a basket and a filter are separated from the first refrigerating space door, and FIG. 3B is a view showing an example state in which an ice-making space door and a cover member are separated from the first refrigerating space door.

FIG. 4 is a perspective view showing an example state of an ice maker disposed inside an ice-making space in an example state in which the ice-making space door is separated from the first refrigerating space door.

FIG. 5 is a view showing an example configuration of an ice maker and a door duct.

FIG. 6 is a front perspective view showing an example configuration of an ice maker and an ice-making space bracket.

FIG. 7 is a rear perspective view showing an example configuration of an ice maker and an ice-making space bracket.

FIG. 8 is an exploded perspective view showing an example configuration of an ice maker and an ice-making space bracket.

FIG. 9 is an exploded perspective view showing an example configuration of an ice-making part of an ice maker.

FIG. 10 is an exploded perspective view showing an example configuration of a tray assembly and a reservoir.

FIG. 11A is a view showing an example state when the tray assembly is at a first position.

FIG. 11B is a view showing an example state when the tray assembly is at a second position.

FIG. 12 is an exploded perspective view showing an example configuration of a compression part of an ice maker.

FIG. 13 is a perspective view showing an example configuration of a transfer pipe and a gear device.

FIG. 14 is a plan view showing an example configuration of a transfer pipe and a gear device.

FIG. 15A is a view showing an example state in which a piston is at a first position and ice de-iced from a tray assembly falls into a transfer pipe.

FIG. 15B is a view showing an example state in which a piston moves to a second position and ice of a transfer pipe is compressed by the piston.

FIG. 15C is a view showing an example state in which a piston moves to a third position and a trans-

fer guide device supplies ice to the transfer pipe.
 FIG. 15D is a view showing an example state in which a piston returns to a first position and the transfer guide device moves to an original position.
 FIG. 16 is a perspective view illustrating an arrangement of a tray and a blade.
 FIG. 17 is a side view illustrating an arrangement of a tray and a blade.
 FIG. 18 is a front perspective view illustrating an arrangement of a first bracket and first and second blades.
 FIG. 19 is a rear perspective view illustrating an arrangement of a first bracket and first and second blades.
 FIG. 20 is a front view showing an example of a first bracket.
 FIG. 21 is a front perspective view illustrating an arrangement of a gear bracket and first and second blades.
 FIG. 22 is a rear perspective view illustrating an arrangement of a gear bracket and first and second blades.
 FIG. 23 is a side view illustrating an example configuration of an ice-making part of an ice maker.
 FIG. 24 is a view illustrating an example configuration of an ice-making part and a compression part of an ice maker.
 FIG. 25 is a rear view showing an example of a first bracket, illustrating an example state in which a heater is installed on an ice-making bracket.
 FIG. 26 is a side cross-sectional view showing an example of an ice maker, illustrating an example state in which a heater is installed on an ice-making bracket.
 FIG. 27 is a cross-sectional view illustrating an example configuration of an ice-making part.

DETAILED DESCRIPTION

[0122] Hereinafter, some implementations of the present disclosure will be described in detail through example drawings. In adding reference numerals to components in each drawing, it should be noted that the same components are given the same numerals as much as possible even if displayed on different drawings. In addition, in describing implementations of the present disclosure, if it is determined that a detailed description of a related known configuration or function interferes with understanding of the implementations of the present disclosure, the detailed description thereof will be omitted.

[0123] FIG. 1A is a front view of a refrigerator, FIG. 1B is a view showing an example state in which one door of the refrigerator is separated, FIG. 2A is a perspective view viewed from a front of a first refrigerating space door, and FIG. 2B is a perspective view viewed from a rear of the first refrigerating space door.

[0124] FIG. 3A is a view showing an example state in

which a basket and a filter are separated from the first refrigerating space door, and FIG. 3B is a view showing an example state in which an ice-making space door and a cover member are separated from the first refrigerating space door.

[0125] Referring to FIGS. 1A to 3B, a refrigerator 1 may include a cabinet 10. The cabinet 10 may include a storage space. The refrigerator 1 may further include a door opening and closing the storage space. The door may be rotatably or movably connected to the cabinet 10.

[0126] The storage space may include a refrigerating space 18. The storage space may selectively or additionally include a freezing space 19. For example, FIG. 1B illustrates that the storage space includes the refrigerating space 18 and the freezing space 19. The refrigerating space 18 and the freezing space 19 may be partitioned by a partition wall.

[0127] The door may include refrigerating space doors 20 and 30 opening and closing the refrigerating space 18. The refrigerating space 18 may be opened and closed by one or more refrigerating space doors 20 and 30. The door may include a freezing space door 50 opening and closing the freezing space 19. The freezing space 19 may be opened and closed by one or more freezing space doors 50.

[0128] Hereinafter, an example in which the refrigerating space 18 is opened and closed by a first refrigerating space door 20 and a second refrigerating space door 30 will be described.

[0129] At least one of the first refrigerating space door 20 and the second refrigerating space door 30 may include a dispenser 40 for discharging water and/or ice. In some examples, depending on a type of refrigerator, it is also possible that the freezing space door 50 includes the dispenser 40.

[0130] At least one of the first refrigerating space door 20 and the second refrigerating space door 30 may include one or more ice makers 100.

[0131] Hereinafter, an example in which the ice maker 100 is provided in the first refrigerating space door 20 will be described. In some examples, it is also possible that an ice maker is provided in the second refrigerating space door 30 or the freezing space door 50. In this case, the dispenser 40 and the ice maker may be provided in the same door. Alternatively, an additional ice maker may also be provided in the refrigerating space 18 or the freezing space 19.

[0132] FIG. 1B illustratively shows that the refrigerator 1 is a bottom freezer type refrigerator, but unlike this, it is noted that the idea of the present disclosure may be equally applied to a side-by-side type refrigerator or a top-mount type refrigerator. In the case of the side-by-side type or the top-mount type refrigerator, a freezing space door may include an ice maker and a dispenser, or a refrigerating space door may include an ice maker and a dispenser.

[0133] The dispenser 40 may be disposed on a front surface of the first refrigerating space door 20. A part of

the dispenser 40 is recessed rearward to provide a space in which a container may be disposed.

[0134] The dispenser 40 may discharge ice generated by the ice maker 100. At least a part of the ice maker 100 may be positioned higher than the dispenser 40.

[0135] The first refrigerating space door 20 may include an outer case 21. The outer case 21 may form a front appearance. The first refrigerating space door 20 may include a door liner 70. The door liner 70 may be directly or indirectly connected to the outer case 21. The door liner 70 may open and close the refrigerating space 18.

[0136] In a state in which the outer case 21 and the door liner 70 are connected, an insulating space may be formed between the outer case 21 and the door liner 70. An insulating material may be provided in the insulating space. The insulating material may be formed by curing a foaming liquid injected from the outside. Alternatively, a vacuum insulating body may be provided in the insulating space. It is also possible that the insulating material and the vacuum insulating body are provided together in the insulating space.

[0137] The refrigerator 1 may include an ice-making space 25 providing a space in which ice is generated. The ice-making space 25 may, for example, be provided in the first refrigerating space door 20. The ice maker 100 may be disposed in the ice-making space 25. For example, the door liner 70 may form the ice-making space 25. The ice-making space 25 may be formed as one surface of the door liner 70 is recessed toward the outer case 21.

[0138] The first refrigerating space door 20 may further include an ice bin 500 in which ice generated by the ice maker 100 is stored. The ice stored in the ice bin 500 may be discharged to the dispenser 40. The ice bin 500 may be accommodated in the ice-making space 25 together with the ice maker 100. The ice bin 500 may be disposed below the ice maker 100.

[0139] For example, cold air generated by a cooler may be supplied to the ice-making space 25. That is, the cooler may be configured to supply cold air to the ice-making space 25. Alternatively, the cooler may be configured to operate to supply cold air to the ice-making space 25. In this manner, the ice-making space 25 may be cooled by an indirect cooling method using cold air. In some examples, the ice-making space 25 may be cooled by a direct cooling method, e.g., using a refrigerant pipe. In some examples, an ice-making body may be disposed in the ice-making space 25 and configured to receive water, where the ice-making body can be cooled directly or indirectly by a cooling medium such as refrigerant or cooled air. For instance, the cooling medium may contact the ice-making body and be configured to transfer heat from the ice-making body to thereby freeze water received in the ice-making body into ice.

[0140] The cooler may be configured to cool the ice-making space 25 by including at least one of a refrigerant cycle and a thermoelectric element. For example, cold air for cooling of the freezing space 19 may be supplied to the

ice-making space 25.

[0141] The refrigerator 1 may further include a supply flow path 16 guiding cold air of the freezing space 19 or cold air of a space in which an evaporator generating cold air for cooling of the freezing space 19 is disposed, to the first refrigerating space door 20. The refrigerator 1 may include a discharge flow path 17 guiding cold air discharged from the first refrigerating space door 20 to the freezing space 19 or the space in which the evaporator is disposed. The supply flow path 16 and the discharge flow path 17 may be provided in the cabinet 10. Cold air circulating through the supply flow path 16 and the discharge flow path 17 may flow by a fan, for example, disposed in the freezing space 19 or the space in which the evaporator is disposed.

[0142] A first opening 16a forming an end portion of the supply flow path 16 may be formed in an inner wall of the refrigerating space 18. Cold air of the supply flow path 16 may be discharged from the supply flow path 16 through the first opening 16a. A second opening 17a forming an end portion of the discharge flow path 17 may be formed in the inner wall of the refrigerating space 18. Cold air of the supply flow path 16 may flow into the discharge flow path 17 through the second opening 17a. The first opening 16a and the second opening 17a may be formed in one inner wall among a plurality of inner walls of the refrigerating space 18.

[0143] The first refrigerating space door 20 may include a cold-air inlet 75. When the first refrigerating space door 20 is closed, the cold-air inlet 75 may communicate with the supply flow path 16 through the first opening 16a. The first refrigerating space door 20 may include a cold-air outlet 76. When the first refrigerating space door 20 is closed, the cold-air outlet 76 may communicate with the discharge flow path 17 through the second opening 17a.

[0144] The cold-air inlet 75 may be formed on one side surface of the door liner 70. Although not limited, the one side surface of the door liner 70 is a surface facing an inner wall of the refrigerating space 18 in which the supply flow path 16 is disposed when the first refrigerating space door 20 is closed. The cold-air outlet 76 may be formed on the one side surface of the door liner 70. Although not limited, the one side surface of the door liner 70 is a surface facing an inner wall of the refrigerating space 18 in which the discharge flow path 17 is disposed when the first refrigerating space door 20 is closed.

[0145] The one side surface of the door liner 70 may include a first side surface portion 72 and a second side surface portion 74 including different widths in a front-rear direction. A width in the front-rear direction of the second side surface portion 74 may be formed greater than a width of the first side surface portion 72. At least one of the cold-air inlet 75 and the cold-air outlet 76 may be formed in the second side surface portion 74 of the door liner 70. The second side surface portion 74 may protrude further toward the refrigerating space 18 than the first side surface portion 72.

[0146] The first refrigerating space door 20 may in-

clude an ice-making space door 60 opening and closing the ice-making space 25. The ice-making space door 60 may be an insulating door in which an insulating material is provided inside. The ice-making space door 60 may be rotatably connected to the first refrigerating space door 20 by a hinge.

[0147] A first basket 62 capable of storing food may be provided in the ice-making space door 60. It is possible that a second basket 65 is provided in the first refrigerating space door 20. For example, the second basket 65 may be disposed below the first basket 62. A length in the front-rear direction of the second basket 65 may be shorter than a length in the front-rear direction of the first basket 62. The second basket 65 may overlap the dispenser 40 in the front-rear direction.

[0148] A component space 63 accommodating components may be formed in the first refrigerating space door 20. In the component space 63, at least one of a valve 68 adjusting flow of water, a filter, and a reservoir 69 storing water may be accommodated. The component space 63 may be formed by the door liner 70. Alternatively, the component space 63 may be formed by a separate wall connected to the door liner 70. The first refrigerating space door 20 may include a cover member 64 covering the component space 63. A holder 67 to which the filter is coupled may be provided in the component space 63.

[0149] The cover member 64 may include an opening 64a. Through the opening 64a, the filter may be coupled to the holder 67. The second basket 65 may cover the opening 64a. When the second basket 65 is separated, the opening 64a may be exposed. The holder 67 may be exposed through the opening 64a.

[0150] FIG. 4 is a perspective view showing an example state of an ice maker disposed inside an ice-making space in a state in which an ice-making space door is separated from a first refrigerating space door, and FIG. 5 is a view showing configurations of an ice maker and a cold-air circulation duct to the ice maker.

[0151] Referring to FIGS. 4 and 5, a refrigerating space door 20 may include an ice-making space 25 accommodating an ice maker 100. The refrigerating space door 20 may include a plurality of walls 80 defining the ice-making space 25.

[0152] The plurality of walls may constitute at least a part of the door liner 70.

[0153] The plurality of walls may include a lower wall 80a defining a lower portion of the ice-making space 25, an upper wall 80b defining an upper portion of the ice-making space 25, and two side walls 81 defining both side portions of the ice-making space 25. The plurality of walls may further include a front wall 80c defining a front surface of the ice-making space 25.

[0154] The lower wall 80a may include a take-out portion 84 for taking out ice stored in the ice bin 500 to the dispenser 40.

[0155] The ice maker 100 may be disposed between the upper wall 80b and the ice bin 500. For example, the

ice maker 100 may be disposed adjacent to the upper wall 80b.

[0156] A first duct 90 connected to the cold-air inlet 75 to supply cold air to the ice-making space 25 may be provided in the side wall 81. For example, the first duct 90 is embedded in the side wall 81 and may not be exposed to the ice-making space 25. The first duct 90 may extend upward from the cold-air inlet 75 to an upper portion of the refrigerating space door 20 in which the ice maker 100 is disposed. The first duct 90 can be referred to as a door duct.

[0157] The first duct 90 includes a duct discharged portion 91 discharging cold air, and cold air discharged from the duct discharged portion 91 may flow into a cold-air duct 400 of the ice maker 100.

[0158] A supply portion 82 guiding cold air to the cold-air duct 400 may be formed in the side wall 81. The duct discharged portion 91 is connected to the supply portion 82, and the cold-air duct 400 may be connected to the duct discharged portion 91 through the supply portion 82.

[0159] A return portion 83 for sending cold air of the ice-making space 25 to the cold-air outlet 76 may be formed in the side wall 81. For example, the return portion 83 may be formed at a height at which the ice bin 500 is disposed.

[0160] A second duct 95 may be connected to the return portion 83. The second duct 95 may include a duct inlet portion 96 introducing cold air discharged through the return portion 83. The duct inlet portion 96 may be directly or indirectly connected to the return portion 83. For example, the second duct 95 is embedded in the side wall 81 and may not be exposed to the ice-making space 25. The second duct 95 extends downward from the return portion 83 to a lower portion of the refrigerating space door 20, and may be connected to the cold-air outlet 76.

[0161] The ice maker 100 may include an ice-making part 200 performing an operation of receiving water, cooling the water in a tray assembly 240, and de-icing cooled ice.

[0162] The ice maker 100 may include a compression part 300 configured to transfer ice de-iced from the tray assembly 240 and recombine or compress transferred ice to manufacture ice in the third state. The ice in the third state may be ice including a predetermined thickness. The ice in the third state may have, for example, a cylindrical or polygonal column shape corresponding to an inner surface shape of a cylinder 360 or a discharge pipe 370 to be described later.

[0163] The ice maker 100 may include a cold-air duct 400 supplying cold air to the ice-making part 200. The cold-air duct 400 may be being disposed between the side wall 81 and the tray assembly 240 to be described later.

[0164] Hereinafter, a detailed configuration of the ice maker 100 will be described with reference to drawings.

[0165] FIG. 6 is a front perspective view showing an example configuration of an ice maker and an ice-making space bracket, FIG. 7 is a rear perspective view showing

an example configuration of the ice maker and the ice-making space bracket, and FIG. 8 is an exploded perspective view showing an example configuration of the ice maker and the ice-making space bracket.

[0166] Referring to FIGS. 6 to 8, an ice maker 100 may be installed in the ice-making space 25 of the refrigerating space door 20. The refrigerating space door 20 may include an ice-making space plate 85 forming at least a part of the wall 80 of the ice-making space 25. The ice-making space plate 85 may include the lower wall 80a and the front wall 80c.

[0167] The ice maker 100 may be supported by the front wall 80c of the ice-making space 25. The ice maker 100 may be coupled to the front wall 80c by a wall coupling portion 329. A plurality of wall coupling portions 329 may be provided on both sides of the ice maker 100. For example, the wall coupling portion 329 may be a fastening device provided in the compression part 300.

[0168] The ice maker 100 is supported on an upper portion of the front wall 80c, and the ice bin 500 may be disposed below the ice maker 100. The refrigerating space door 20 may include a take-out motor to provide driving force to discharge ice stored in the ice bin 500 to the dispenser 40.

[0169] The wall 80 of the ice-making space 25 may include a motor accommodating portion 86 surrounding the take-out motor. The take-out motor is connected to a gear assembly disposed in front of the front wall 80c, and when the gear assembly operates by driving of the take-out motor, an auger of the ice bin 500 operates so that ice may be taken out. The front wall 80c may include a through portion 87 through which a shaft connecting the gear assembly and the ice bin 500 passes. Ice discharged from the ice bin 500 may be discharged to the dispenser 40 through the take-out portion 84 of the lower wall 80a.

[0170] The ice maker 100 may include an ice-making part 200 including a first motor 210. The first motor 210 may be named an "ice-making motor" providing driving force to move a tray assembly 240 in order to move the tray assembly 240.

[0171] The ice-making part 200 may include ice-making brackets 220 and 230 forming a cold-air flow path. A cold-air duct 400 is connected to one side of the ice-making brackets 220 and 230, and cold air supplied through the cold-air duct 400 may flow through a cold-air flow path formed inside the ice-making brackets 220 and 230. The cold-air duct 400 may be defined as a "first cold-air duct", and the ice-making brackets 220 and 230 may also be defined as a "second cold-air duct".

[0172] The first motor 210 may be connected to the ice-making brackets 220 and 230.

[0173] The ice-making brackets 220 and 230 may include a first bracket 220 forming an accommodating space of the tray assembly 240. The cold-air duct 400 is connected to the first bracket 220, and cold air supplied through the cold-air duct 400 may flow into the accommodating space. The cold-air duct 400 may include an

inlet portion 420 connected to the supply portion 82 of the side wall 81.

[0174] The ice-making brackets 220 and 230 may include a second bracket 230 connected to the first bracket 220 and forming a cold-air flow path together with the first bracket 220. For example, one side portion of the first bracket 220 is opened, and the opened one side portion may be covered by the second bracket 230 so that a cold-air flow path may be formed therein.

[0175] The second bracket 230 may form an accommodating space in which a gear assembly 235 and 236 interworking by driving of the first motor 210 is accommodated.

[0176] The first bracket 220 and the second bracket 230 may be connected in a front-rear direction. The first motor 210 is connected to one side of the second bracket 230, and the gear assembly 235 and 236 may interwork by driving of the first motor 210. For example, the first motor 210 and the second bracket 230 may be disposed in the front-rear direction.

[0177] The ice-making space plate 85 may include a support wall 85a for supporting the ice-making part 200. The support wall 85a constitutes an upper portion of the ice-making space plate 85, and the ice-making part 200 may be supported on an upper portion of the ice-making space plate 85 through the support wall 85a.

[0178] The ice-making brackets 220 and 230 may include a plate coupling portion 229 supported by the ice-making space plate 85. For example, the plate coupling portion 229 is provided in the first bracket 220 and may be coupled to a coupling hole 88 formed in the support wall 85a.

[0179] For example, the plate coupling portion 229 may include a rib protruding from the first bracket 220. In some examples, the plate coupling portion 229 provided in the ice-making brackets 220 and 230 may be provided in various forms, for example, a boss or a fastening hole to which a fastening member is coupled. Correspondingly, the coupling hole 88 of the ice-making space plate 85 may also be provided in a form of a rib or a boss.

[0180] A plurality of plate coupling portions 229 may be provided at a plurality of points of the ice-making brackets 220 and 230.

[0181] The ice-making part 200 may include a reservoir 250 storing water. The reservoir 250 may supply water to the tray assembly 240.

[0182] The first bracket 220 may include a communication portion 221b guiding a water supply pipe 120 to supply water to the reservoir 250. The communication portion 221b may be formed on a surface of the first bracket 220 facing the front wall 80c.

[0183] For example, the water supply pipe 120 is inserted into the communication portion 221b, and at least a part of the water supply pipe 120 may extend into the ice-making brackets 220 and 230.

[0184] The ice maker 100 may include a compression part 300 including a second motor 310. The second motor

310 may be named a "compression motor" providing driving force to move a piston 335 for compressing or recombining ice. In some examples, the compression part 300 may be referred to as an ice-compressing assembly or ice-compression assembly.

[0185] The compression part 300 may include a first bracket 320 connected to the second motor 310. The first bracket 320 may support parts constituting the compression part 300.

[0186] The compression part 300 may include a discharge port 328 for discharging ice manufactured in the ice maker 100 to the ice bin 500. For example, the discharge port 328 is formed on a lower surface of the first bracket 320, and ice discharged through the discharge port 328 may fall into the ice bin 500.

[0187] The compression part 300 may include a cylinder 360 defining a movement space of ice (powder ice) generated in the ice-making part 200. Ice introduced into the cylinder 360 may be compressed or recombined by a reciprocating piston 335 into ice molded ice including a predetermined volume. The ice described herein may include frozen ice fragments or powder produced by mechanically separating a frozen ice body from the ice-making body and subsequently compressing the fragments or powder into a shaped ice piece. The ice fragments or powdered ice may have a water content and density suitable for the subsequent ice compressing or shaping operations described herein.

[0188] The compression part 300 may include a transfer pipe 340 provided at an inlet side of the cylinder 360 and configured to transfer ice (powder ice) discharged from the ice-making part 200 to the cylinder 360. A space for accommodating the powdered ice is formed inside the transfer pipe 340, and the powdered ice may move into the cylinder 360. In some examples, the compression part 300 includes a transfer passage or duct, and the transfer pipe 340 is an example of the transfer passage or duct.

[0189] The compression part 300 may include a discharge pipe 370 provided at an outlet side of the cylinder 360 and providing a predetermined resistance so that ice present in the cylinder 360 is compressed or recombined.

[0190] For example, to provide the resistance, the discharge pipe 370 may be formed such that a cross-sectional area decreases based on a direction in which ice moves.

[0191] The discharge pipe 370 may be made of an elastically deformable material, for example, a silicone material, to provide the resistance.

[0192] An outlet of the discharge pipe 370 is opened, and molded ice compressed or recombined while passing through the discharge pipe 370 may be discharged through the opened outlet of the discharge pipe 370.

[0193] The compression part 300 may include a cutter wall 380 disposed at a position spaced apart from the outlet of the discharge pipe 370 by a predetermined distance and interfering with molded ice discharged through the discharge pipe 370. The cutter wall 380 is

supported by the first bracket 320 and may be disposed adjacent to an upper side of the discharge port 328.

[0194] The cutter wall 380 includes an inclined surface facing the discharge pipe 370, and molded ice discharged from the discharge pipe 370 may be cut while interfering with the inclined surface. Then, the cut ice may fall into the ice bin 500 through the discharge port 328.

[0195] FIG. 9 is an exploded perspective view showing an example configuration of an ice-making part of an ice maker, FIG. 10 is an exploded perspective view showing an example configuration of a tray assembly and a reservoir, FIG. 11A is a view showing an example state when a tray assembly is at a first position, and FIG. 11B is a view showing an example state when the tray assembly is at a second position.

[0196] First, referring to FIGS. 9 and 10, the ice-making part 200 may include a tray assembly 240 forming an ice-making space.

[0197] The tray assembly 240 may include a tray 241 receiving water to perform ice-making. The tray 241 may be provided to be movable by receiving power from the second motor 310. For example, the tray 241 may be provided to be rotatable.

[0198] The tray 241 may include peripheral surfaces 242a and 242b forming a water storage space. The peripheral surfaces 242a and 242b may be including a cell for ice generation.

[0199] For example, the tray 241 may have a drum shape including a peripheral surface. The peripheral surface may form an outer circumferential surface of the drum. That is, the peripheral surfaces 242a and 242b may be extending in a circumferential direction to form the outer circumferential surface of the tray 241.

[0200] In some examples, the tray 241 may have a disk shape or a plate shape including both side walls and a peripheral surface. In some examples, the tray 241 may be referred to as an ice-making body or a rotating body having a disk shape, a plate shape, a fan shape, an arc shape, a cylindrical shape, etc.

[0201] The peripheral surfaces 242a and 242b may include a first peripheral surface 242a forming a water storage space. The first peripheral surface 242a may form at least a part of the outer circumferential surface of the tray 241. When the first peripheral surface 242a is at a position facing the reservoir 250, the first peripheral surface 242a may include a surface contacting water stored in the reservoir 250. In some examples, the first peripheral surface 242a may be referred to as a circumferential portion or a peripheral portion of the ice-making body (e.g., tray 241) configured to receive water.

[0202] The first peripheral surface 242a may be disposed adjacent to the first blade 280 so that ice generated on the first peripheral surface 242a contacts the first blade 280.

[0203] The first peripheral surface 242a may include at least one of a first part defining a recessed portion and a second part defining a protruding portion so as to increase a contact area of water cooling area. The first

part may include a recess 241a, and the second part may include a protrusion 241b.

[0204] When a recessed portion of the first peripheral surface 242a is viewed as a reference position, it may be understood that the first peripheral surface 242a includes the protrusion 241b, and when a protruding portion of the first peripheral surface 242a is viewed as a reference position, it may be understood that the first peripheral surface 242a includes the recess 241a.

[0205] Due to configurations of the recess 241a and the protrusion 241b, the first peripheral surface 242a may be including an uneven structure.

[0206] A plurality of recesses 241a and a plurality of protrusions 241b may each be provided. The plurality of recesses 241a and the plurality of protrusions 241b may have a structure in which they are alternately arranged. The recesses 241a may be recessed relative to the protrusions 241b. In some examples, the recesses 241a are defined at the peripheral surfaces 242a such that the protrusions 241b are formed between the recesses 241a. In some examples, the protrusions 241b are disposed at the peripheral surfaces 242a such that the recesses 241a are formed between the protrusions 241b.

[0207] The peripheral surfaces 242a and 242b may include a second peripheral surface 242b. When the second peripheral surface 242b is at a position facing the reservoir 250, the second peripheral surface 242b may include a surface that does not contact water stored in the reservoir 250.

[0208] The second peripheral surface 242b may be disposed relatively farther away from the first blade 280 so that ice formed on the second peripheral surface 242b does not come into contact with the first blade 280.

[0209] A distance center distance from a center of the tray 241 to the second peripheral surface 242b may be formed less than a distance center distance from the center of the tray 241 to the first peripheral surface 242a. For example, the second peripheral surface 242b may have a shape cut from an edge of the first peripheral surface 242a in a direction toward the center of the tray 241.

[0210] When the first peripheral surface 242a is at a position to be frozen by contacting cold air, the second peripheral surface 242b is disposed to face the reservoir 250. In some examples, since the second peripheral surface 242b does not contact water of the reservoir 250, the reservoir 250 may not be cooled by the tray 241 forming a low temperature. Accordingly, freezing of water stored in the reservoir 250 may be prevented.

[0211] At least one first peripheral surface 242a may be provided. For example, a plurality of first peripheral surfaces 242a are provided, and the second peripheral surface 242b may be disposed between the plurality of first peripheral surfaces 242a based on the circumferential direction of the tray 241.

[0212] At least one second peripheral surface 242b may be provided. For example, a plurality of second

peripheral surfaces 242b are provided, and the first peripheral surface 242a may be disposed between the plurality of second peripheral surfaces 242b based on the circumferential direction of the tray 241.

[0213] The tray 241 may include side walls 244 also referred to as side surfaces. The side wall 244 may include a portion extending in a radial direction of the tray 241.

[0214] A plurality of side walls 244, for example, two side walls 244, may be provided to form both side surfaces of the tray 241. The two side walls 244 may be disposed spaced apart in an axial direction of the second motor 310. The peripheral surfaces 242a and 242b may be formed between the two side walls 244.

[0215] The tray 241 may include an inner circumferential wall 244a connected to the side wall 244. The inner circumferential wall 244a is understood to form an inner circumferential surface of the tray 241, and may include a surface opposite to the peripheral surfaces 242a and 242b with respect to the side wall 244.

[0216] A bar 249 is coupled to the tray 241 as a "central shaft" of the tray 241. The bar 249 may have a non-circular shape.

[0217] The bar 249 may be disposed to pass through a central portion or a rotational center portion of the tray 241. The central portion of the tray 241 includes a central bracket 243, and the central bracket 243 may have a shape surrounding at least a part of the bar 249.

[0218] The bar 249 is coupled to gear assemblies 235 and 236, and may rotate in interworking with the gear assemblies 235 and 236. For example, the bar 249 may be integrally formed with the gear assemblies 235 and 236, or may be provided to be separable.

[0219] Another example is proposed. The bar 249 is removed, and a central shaft protruding from the gear assemblies 235 and 236 may be directly coupled to the central bracket 243 of the tray 241.

[0220] The tray 241 may include extension walls 243a extending from the central bracket 243 toward the side walls 244. The extension wall 243a may, for example, extend in a radial direction from the central bracket 243.

[0221] A plurality of extension walls 243a are provided, and the plurality of extension walls 243a may be disposed spaced apart from each other in a circumferential direction.

[0222] Directions will be defined. Throughout the specification, an "axial direction" means a direction in which a shaft of the first motor 210 or the second motor 310 extends, and a "radial direction" means a direction of a radius crossing the axial direction.

[0223] The tray 241 may form tray holes 245 (tray opening). The tray hole 245 may be a hole penetrating in the axial direction of the tray 241. Through the tray hole 245, cold air flows so that a cooling area of the tray 241 may increase.

[0224] The tray hole 245 may be a space defined by the central bracket 243, the plurality of extension walls 243a, and the inner circumferential wall 244a. A plurality of tray

holes 245 are formed, and the plurality of tray holes 245 may be disposed in a circumferential direction of the tray 241.

[0225] The tray assembly 240 may include tray covers 246 and 247 connected to the tray 241. The tray covers 246 and 247 may be provided on both side walls 244 of the tray 241.

[0226] The tray covers 246 and 247 are disposed to cover at least one side of the tray 241 and may function to prevent water of the reservoir 250 from flowing into the tray holes 245 of the tray 241.

[0227] The tray covers 246 and 247 may be made of a material including low thermal conductivity so that generation of ice is limited. For example, the material including low thermal conductivity may include a non-metal material. A plastic material may be proposed as an example of the non-metal material.

[0228] The tray cover 246 and 247 may include a first tray cover 246 provided on one side wall 244 of the tray 241. The first tray cover 246 may include a first cover wall 246a covering the one side wall 244 of the tray 241. A radial length or width of the first cover wall 246a may be formed greater than a radial length or width of the side wall 244 of the tray 241 so as to prevent water from flowing into the tray hole 245 of the tray 241.

[0229] The first tray cover 246 may include a first through hole 246b through which the central bracket 243 of the tray 241 passes. The first through hole 246b may be axially aligned with the central bracket 243 of the tray 241.

[0230] The first tray cover 246 may include a first extension wall 246c extending from the first through hole 246b toward the first cover wall 246a. The first extension wall 246c may extend in a radial direction to cover the extension walls 243a of the tray 241. The first extension wall 246c may be provided in a plurality corresponding to the extension walls 243a.

[0231] The first tray cover 246 may include a first inner circumferential wall 246d connected to the first cover wall 246a. The first inner circumferential wall 246d may be understood to form an inner circumferential surface of the first tray cover 246.

[0232] The first tray cover 246 may include a first cover fastening portion 246e protruding from the first inner circumferential wall 246d. The first cover fastening portion 246e may include a boss, and a predetermined fastening member may pass through the boss and be fastened to a second cover fastening portion 247e of the second tray cover 247. In some examples, the shape of the first cover fastening portion 246e is not limited thereto, and as long as it may be coupled to the second cover fastening portion 247e, it may also be provided in a shape of a rib or a locking protrusion.

[0233] The first tray cover 246 may include a first communication portion 246f communicating with the tray hole 245 of the tray 241. Cold air may pass through the tray hole 245 via the first communication portion 246f.

[0234] The tray covers 246 and 247 may include a

second tray cover 247 provided on the other side wall 244 of the tray 241. The second tray cover 247 may include a second cover wall 247a covering the other side wall 244 of the tray 241. A radial length or width of the second cover wall 247a may be formed greater than a radial length or width of the side wall 244 of the tray 241 so as to prevent water from flowing into the tray hole 245 of the tray 241.

[0235] A configuration of the second tray cover 247 is substantially similar to a configuration of the first tray cover 246. The second tray cover 247 may include a second through hole 247b corresponding to the first through hole 246b of the first tray cover 246.

[0236] The second tray cover 247 may include a second extension wall 247c corresponding to the first extension wall 246c of the first tray cover 246.

[0237] The second tray cover 247 may include a second inner circumferential wall 247d corresponding to the first inner circumferential wall 246d of the first tray cover 246.

[0238] The second tray cover 247 may include a second cover fastening portion 247e corresponding to the first cover fastening portion 246e of the first tray cover 246.

[0239] The second tray cover 247 may include a second communication portion 247f communicating with the tray hole 245 of the tray 241. Cold air may pass through the second communication portion 247f via the first communication portion 246f and the tray hole 245.

[0240] In some implementations, the first tray cover 246 and the second tray cover 247 may be one component of a "tray" in a broad sense. In this case, the tray assembly 240 may be referred to as a "tray", the tray 241 may be referred to as a "tray part", and the first and second tray covers 246 and 247 may constitute a part of the tray assembly 240.

[0241] In some implementations, the first and second tray covers 246 and 247 may not be provided, and the tray assembly 240 may be configured to include only the tray 241.

[0242] The ice-making part 200 may include the first bracket 220 forming a first accommodating space 220a for the tray assembly 240.

[0243] The first bracket 220 may include a first wall 221 supported by the ice-making space plate 85. The first wall 221 may be a wall shielding at least a portion of one side surface of the tray assembly 240.

[0244] In some examples, the first wall 221 may be disposed to support the tray 241. The first wall 221 may include an insertion hole 221a into which at least a portion of the tray 241 is inserted to support the tray 241. For example, the central bracket 243 of the tray 241 may be rotatably inserted into the insertion hole 221a.

[0245] The first wall 221 may include communication portion 221b guiding the water supply pipe 120. The water supply pipe 120 is inserted into the communication portion 221b, and at least a part of the water supply pipe 120 may be disposed in the first accommodating space

220a.

[0246] The first wall 221 may form at least a portion of a wall guiding flow of cold air introduced through the cold-air duct 400.

[0247] The ice-making part 200 may include a second wall 222 connected to the first wall 221. The second wall 222 is connected to an end portion of the first wall 221, for example, an upper end portion, and may protrude in a direction toward the first motor 210. The second wall 222 may form an upper end portion of the ice-making part 200.

[0248] The ice-making part 200 may include a third wall 223 connected to the first wall 221. The third wall 223 is connected to an end portion of the first wall 221, for example, a lower end portion, and may protrude in a direction toward the first motor 210. The third wall 223 may form a lower end portion of the ice-making part 200.

[0249] The ice-making part 200 may include a fourth wall 224 and a fifth wall 225 connected to the third wall 223. The fourth wall 224 is connected to one side of the third wall 223, and the fifth wall 225 may be connected to the other side of the third wall 223. For example, the fourth wall 224 and the fifth wall 225 may protrude at both ends of the third wall 223. In some examples, any one of the first to fifth walls that contacts the reservoir may be referred to as a supporting wall. For example, the third wall 223 may be a supporting wall that supports a bottom of the reservoir 250, and the fourth wall 224 and the fifth wall 225 may be extending walls protruding from the supporting wall.

[0250] The ice-making part 200 may include a second accommodating space 220b in which the reservoir 250 is placed. The second accommodating space 220b may be a space defined by the third wall 223, the fourth wall 224, and the fifth wall 225. The second accommodating space 220b may be formed below the first accommodating space 220a.

[0251] The reservoir 250 may include a case including a predetermined capacity, and a heater 255 provided in a wall of the case and providing heat so that water stored in the reservoir 250 is not frozen. The heater 255 may be named a "reservoir heater".

[0252] The ice-making part 200 may include a water supply guide wall 224a guiding water supplied from the water supply pipe 120 to the reservoir 250. The water supply guide wall 224a may form at least a portion of the fourth wall 224.

[0253] The water supply guide wall 224a may be disposed adjacent to a discharged portion of the water supply pipe 120, and may include an inclined surface guiding a flow of water discharged from the water supply pipe 120. The inclined surface of the water supply guide wall 224a may extend to be inclined with respect to a direction from the communication portion 221b toward the reservoir 250.

[0254] Water discharged from the water supply pipe 120 falls onto the inclined surface, and the fallen water flows downward at a low speed along the inclined surface

and may flow into the reservoir 250.

[0255] The ice-making part 200 may include a first blade 280 contacting ice made to separate ice made in the tray 241. The first blade 280 may be disposed adjacent to a rotation path of the tray 241. In particular, the first blade 280 may be disposed adjacent to the first peripheral surface 242a when the tray 241 rotates.

[0256] The first blade 280 may be provided in the fifth wall 225. For example, the reservoir 250 is disposed on an inner surface of the fifth wall 225, and the first blade 280 may be coupled to a surface of the fifth wall 225.

[0257] The ice-making part 200 may include a second blade 285 contacting frozen ice to separate frozen ice from the tray assembly 240.

[0258] The second blade 285 may be disposed adjacent to both side walls of the tray assembly 240 so as to scrape frozen ice on both side walls, that is, the first cover wall 246a and the second cover wall 247a.

[0259] A plurality of second blades 285 may be provided, and one second blade 285 may be provided in the first wall 221. Another second blade 285 may be provided in an outer wall of the second bracket 230, for example, an outer wall of the gear bracket 231.

[0260] The first blade 280 and the second blade 285 may be disposed at positions spaced apart from each other, for example, disposed opposite to each other based on a center of the tray assembly 240. With this configuration, it may be possible to prevent a cold-air flow path formed in the ice-making part 200 from being interfered with by the first and second blades 280 and 285.

[0261] In detail, cold air introduced through the cold-air duct 400 flows from an area in which the second blade 285 is disposed to an opposite area in which the first blade 280 is disposed based on the center of the tray assembly 240. If the first and second blades 280 and 285 are disposed in one side area based on the center of the tray assembly 240, there is a problem in that these blades act as flow-path resistance. In some implementations, by disposing the first and second blades 280 and 285 on both sides of the tray assembly 240, an effect of reducing resistance of cold-air flow may appear.

[0262] While the tray assembly 240 rotates, frozen ice contacting the second blade 285 is separated from the tray assembly 240, and the separated ice may flow into the reservoir 250.

[0263] So that ice separated by the second blade 285 may flow into the reservoir 250, the second blade 285 may be disposed at a position adjacent to the reservoir 250. For example, based on a height direction with respect to a ground supporting the refrigerator, the reservoir 250 is disposed below the tray assembly 240 and the second blade 285 may be disposed at a position lower than a center of the tray assembly 240.

[0264] In some examples, the second blade 285 may be disposed at a position overlapped in an up-down direction with respect to an opened upper end of the reservoir 250. The opened upper end of the reservoir 250 may be an end portion into which water flows.

[0265] A cold-air flow path through which cold air introduced from the cold-air duct 400 flows may be formed inside the first bracket 220. At least a portion of the cold-air flow path may be formed in the first accommodating space 220a.

[0266] The first bracket 220 may include a first opening 224b to which the cold-air duct 400 is coupled and which forms a cold-air inlet portion. The first opening 224b may be formed in a fourth wall 224 also referred to as a side wall of the first bracket 220. For example, the first opening 224b may be formed on a side on which the water supply guide wall 224a is provided, and may be disposed above the water supply guide wall 224a.

[0267] The first opening 224b and the reservoir 250 may be disposed opposite to each other based on the center of the tray 241. For example, the first opening 224b may be formed at a position higher than the center of the tray 241, and the reservoir 250 may be disposed at a position lower than the center of the tray 241. With such a configuration, it may be possible to prevent cold air introduced through the first opening 224b from directly flowing into the reservoir 250.

[0268] The ice-making part 200 may include a guide plate 226 disposed to guide cold air toward the circumferential surfaces 242a, 242b of the tray 241. The guide plate 226 may be provided on the first wall 221 and may be formed in a rounded shape corresponding to a curvature of the circumferential surfaces 242a, 242b.

[0269] A first portion of the guide plate 226 may be connected to the first wall 221, and a second portion may be connected to the second wall 222.

[0270] The guide plate 226 and the first opening 224b may be positioned opposite each other with respect to a center of the tray 241. Accordingly, air supplied to an outer circumferential surface of the tray 241 through the first opening 224b is guided by the guide plate 226 positioned opposite to the first opening 224b, thereby facilitating formation of a cold-air flow along the outer circumferential surface of the tray 241.

[0271] A space between the guide plate 226 and the first blade 280 may form a second opening 227 through which powdered ice separated from the tray 241 is discharged, and cold air guided by the guide plate 226 may be diffused into an ice-making chamber 25 through the second opening 227.

[0272] The ice-making part 200 may include a gear assembly 235, 236 interlocked with a first motor 210. The gear assembly 235, 236 may include a driving gear 235 connected to the first motor 210 and a driven gear 236 interlocked with the driving gear 235.

[0273] The number of gear teeth of the driving gear 235 is formed less than the number of gear teeth of the driven gear 236, so that the gear assemblies 235 and 236 may constitute a reduction gear. Accordingly, torque for rotating the tray assembly 240 may increase.

[0274] The ice-making part 200 may include the second bracket 230 accommodating the gear assemblies 235 and 236. The second bracket 230 may shield an

opened one side of the first bracket 220 to form a cold-air flow path within the ice-making bracket 220 and 230.

[0275] The second bracket 230 may include the gear bracket 231 supporting the gear assemblies 235 and 236. The gear bracket 231 includes a bracket wall 231a covering the opened one side of the first bracket 220, and the bracket wall 231a may form at least one surface of the cold-air flow path.

[0276] The gear assemblies 235 and 236 may be rotatably supported by the bracket wall 231a. A hole to which a shaft of the first motor 210 is connected is formed in a first center portion 235a of the driving gear 235, and the shaft of the first motor 210 may be supported by the bracket wall 231a through the hole.

[0277] The bar 249 may be connected to a second center portion 236a of the driven gear 236 through the bracket wall 231a. A hole to which the bar 249 is connected is formed in the second center portion 236a of the driven gear 236, and the bar 249 may be supported by the bracket wall 231a through the hole.

[0278] The first center portion 235a and the second center portion 236a may each include a bracket forming a hole.

[0279] The second bracket 230 may include a gear cover 232 connected to the gear bracket 231. The gear cover 232 may shield an opened one side of the gear bracket 231. The gear bracket 231 and the gear cover 232 may constitute a "gear housing".

[0280] For example, the gear cover 232 may be fastened to the gear bracket 231. The gear bracket 231 may include a first fastening portion 231b fastened to the gear cover 232, and the gear cover 232 may include a second fastening portion 232a fastened to the first fastening portion 231b. A predetermined fastening member may be coupled to the first fastening portion 231b and the second fastening portion 232a.

[0281] The gear bracket 231 may include a first coupling portion 231c fastened to the first bracket 220. The first bracket 220 may include a second coupling portion 222a fastened to the first coupling portion 231c. A predetermined fastening member may be coupled to the first coupling portion 231c and the second coupling portion 222a.

[0282] The gear cover 232 may be coupled to the first motor 210. The first motor 210 includes a fastening rib 215, and the gear cover 232 may include a fastening boss 237 coupled to the fastening rib 215. A predetermined fastening member may pass through the fastening rib 215 and be coupled to the fastening boss 237.

[0283] The gear cover 232 may include a first through portion 232b through which the shaft of the first motor 210 passes. The shaft of the first motor 210 may be coupled to the first center portion 235a of the driving gear 235 through the first through portion 232b. The first center portion 235a of the driving gear 235 may be rotatably supported by the first through portion 232b.

[0284] The gear cover 232 may include a second through portion 232c by which the second center portion

236a of the driven gear 236 is supported. The second center portion 236a of the driven gear 236 may be rotatably supported by the second through portion 232c.

[0285] When the first motor 210 rotates, the driving gear 235 and the driven gear 236 interwork, and the bar 249 connected to the driven gear 236 may rotate. According to rotation of the bar 249, the tray assembly 240 may rotate.

[0286] The operation of the tray assembly 240 will be described with reference to FIGS. 11A and 11B. FIG. 11A illustrates an example state in which the tray assembly 240 is at an ice-making position (a first position), and FIG. 11B illustrates an example state in which the tray assembly 240 is at a water-supply position (a second position).

[0287] Referring to FIG. 11A, based on driving of the first motor 210, the tray assembly 240 may be at the ice-making position. At the ice-making position, a first peripheral surface 242a of the tray 241 may not be immersed in the reservoir 250 and may be disposed in a first accommodation space 220a of the first bracket 220. For example, as illustrated in FIG. 11A, two first peripheral surfaces 242a may be disposed on both upper sides of the reservoir 250.

[0288] At the ice-making position, water supplied to the first peripheral surface 242a may be cooled by cold air supplied through the cold-air duct 400 and may undergo a phase change into thin ice. A state of ice cooled on the first peripheral surface 242a may be referred to as a first state or first state ice. The ice in the first state may be formed to a predetermined height on surfaces of a recess 241a and a protrusion 241b provided on the first peripheral surface 242a. The ice in the first state may be ice including a thin layer thickness.

[0289] When a predetermined time elapses at the ice-making position, the first motor 210 may be driven so that the tray assembly 240 rotates. For example, as illustrated in FIG. 11A, the tray assembly 240 may rotate counterclockwise.

[0290] During rotation of the tray assembly 240, when the first peripheral surface 242a is at a position where the first blade 280 is provided, the first blade 280 may contact ice formed on the first peripheral surface 242a. In the contact process, the ice may be separated from the first peripheral surface 242a and may be de-iced.

[0291] The de-iced ice may be introduced into the compression part 300, in particular into the transfer pipe 340. The de-iced ice may have a shape of powdered ice, and such a state of ice may be referred to as a second state or second state ice.

[0292] The de-icing process may be performed during a section in which the tray 241 makes one rotation (a 360-degree rotation), so that ice formed on the two first peripheral surfaces 242a may be separated by the first blade 280.

[0293] Meanwhile, in this process, the first peripheral surface 242a on which de-icing has been completed may further rotate and pass the water-supply position as illustrated in FIG. 11B. While passing the water-supply

position, water may be supplied to the first peripheral surface 242a.

[0294] In detail, the tray assembly 240 rotates counterclockwise from the position of FIG. 11A, de-icing is performed on the first peripheral surface 242a, and the tray assembly 240 moves to the position of FIG. 11B. In some examples, the first peripheral surface 242a is immersed in or contacted with water of the reservoir 250. Water that contacts the first peripheral surface 242a may remain on the first peripheral surface 242a due to surface tension.

[0295] Such a water-supply operation may be performed until water is supplied to the two first peripheral surfaces 242a. That is, when the tray assembly 240 makes one rotation from the position of FIG. 11A, the de-icing operation and the water-supply operation may be performed.

[0296] FIG. 12 is an exploded perspective view illustrating an example configuration of the compression part of the ice maker, FIG. 13 is a perspective view illustrating an example configuration of the transfer pipe and a gear device, FIG. 14 is a plan view illustrating an example configuration of the transfer pipe and the gear device, FIG. 15A is a view illustrating an example state in which the piston is at a first position and de-iced ice from the tray assembly falls into the transfer pipe, and FIG. 15B is a view illustrating an example state in which the piston moves to a second position and ice in the transfer pipe is compressed by the piston.

[0297] First, referring to FIGS. 12 to 14, the ice maker 100 may include a compression part 300 for compressing or recombining ice (powdered ice, ice in the second state) de-iced from the ice-making part 200.

[0298] The compression part 300 may include a second motor 310 for providing driving force. The second motor 310 may include a motor shaft 312.

[0299] The compression part 300 may include a pinion gear 315 coupled to the motor shaft 312 and rotating according to driving of the second motor 310. The pinion gear 315 may include a shaft coupling portion 314 coupled to the motor shaft 312.

[0300] The compression part 300 may include a rack gear 330 interworking with the pinion gear 315. The rack gear 330 may include a bar-shaped rack body 331 and a first gear 332 formed on the rack body 331 and interworking with the pinion gear 315.

[0301] The rack gear 330 may include a rail 334 guiding movement of the rack gear 330. For example, the rail 334 may be provided at a lower end portion of the rack body 331. The rail 334 may move along a rail groove 324a provided in a fastening wall 324 of the first bracket 320.

[0302] The compression part 300 may include a piston 335 that moves together with the rack gear 330. The piston 335 may include a portion extending in a direction corresponding to an extension direction of the rack gear 330, and may be provided to be capable of reciprocating motion. The piston 335 may move only up to an inlet side of the cylinder 360, or at least a portion of the piston 335 may move so as to be inserted into the cylinder 360.

[0303] For example, the piston 335 may have a substantially cylindrical shape corresponding to an internal shape of a second part 342 of the transfer pipe 340.

[0304] The compression part 300 may include a coupling bracket 336 provided at one side of the piston 335 and coupling the piston 335 and the rack gear 330. The coupling bracket 336 may be coupled to the rack body 331. The coupling bracket 336 may include a rack fastening portion 336a, and the rack body 331 may include a bracket fastening portion 331a. A predetermined fastening member may couple the rack fastening portion 336a and the bracket fastening portion 331a.

[0305] The compression part 300 may include a transfer pipe 340 forming an accommodation space 341a for ice in the second state powdered ice. The transfer pipe 340 may be disposed at an inlet side of the cylinder 360.

[0306] The transfer pipe 340 may include a first part 341 including the accommodation space 341a. The first part 341 may form an opening so that the ice in the second state may be introduced.

[0307] The transfer pipe 340 may include a second part 342 including an internal space communicating with the accommodation space 341a. The piston 335 may be inserted into the second part 342.

[0308] The second part 342 may have an inner diameter slightly larger than an outer diameter of the piston 335 so that the piston 335 may reciprocate in an inserted state. For example, the second part 342 may have a hollow cylindrical shape.

[0309] The second part 342 may be positioned below the transfer pipe 340 with respect to a gravity direction. Ice introduced into the first part 341 may move downward by the gravity and may be introduced into the internal space of the second part 342. The piston 335 may reciprocate in the internal space of the second part 342.

[0310] The transfer pipe 340 may be supported by the first bracket 320. The transfer pipe 340 may include a fastening portion 343 provided at the first part 341. The fastening portion 343 may be coupled to a transfer pipe fastening portion 321d of the first bracket 320 by a predetermined fastening member. By fastening the fastening portion 343 and the transfer pipe fastening portion 321d, an upper portion of the transfer pipe 340 may be stably supported by the first bracket 320.

[0311] A plurality of fastening portions 343 may be provided, and the plurality of fastening portions 343 may be provided at upper and lower portions of the transfer pipe 340. In FIG. 13, fastening portions 343a, 343b, and 343c are illustrated.

[0312] The transfer pipe 340 may include a protrusion 344, and the first bracket 320 may include a protrusion groove 321e accommodating the protrusion 344. The protrusion 344 may be provided at a lower position than the fastening portion 343, for example at the second part 342. After the protrusion 344 is inserted into the protrusion groove 321e for temporary assembly, the fastening portion 343 may be fastened to the transfer pipe fastening portion 321d.

[0313] The compression part 300 may include a lever 350 movably provided to guide movement of ice in the transfer pipe 340. For example, the lever 350 may be rotatably provided. The lever 350 may be referred to as a transfer guide device.

[0314] The lever 350 may include a rotation bar 351 forming a rotational center of the lever 350. The rotation bar 351 may be rotatably inserted into a bar support portion 345 of the transfer pipe 340. The bar support portion 345 may protrude from the first part 341 and may have a rib shape including a recessed groove into which the rotation bar 351 is fitted.

[0315] The lever 350 may include a plate 352 extending from the rotation bar 351. The plate 352 may be provided at a central portion of the rotation bar 351. The plate 352 may rotate about the rotation bar 351 so as to move into the transfer pipe 340.

[0316] The transfer pipe 340 may form an opening 341b through which the plate 352 passes. The plate 352 may move into or out of the transfer pipe 340 through the opening 341b.

[0317] The transfer pipe 340 may include a stopper 347 provided outside the opening 341b. The stopper 347 may have a shape bent along at least a portion of a circumference of the plate 352. The stopper 347 may prevent a movement distance of the plate 352 when the plate 352 moves outward from the transfer pipe 340. The plate 352 may move outward only to a position interfering with the stopper 347.

[0318] The plate 352 may include a rounded portion 352a extending with a predetermined curvature. A curved direction of the rounded portion 352a may correspond to a direction facing downward inside the transfer pipe 340.

[0319] By the rounded portion 352a, ice present inside the transfer pipe 340 may be pressed downward. Accordingly, ice present in the first part 341 may be moved to the second part 342 by the lever 350.

[0320] A hole 354 may be formed in the rounded portion 352a. The hole 354 is for preventing a situation in which ice introduced into the transfer pipe 340 is blocked by the rounded portion 352a and movement toward a lower portion of the transfer pipe 340 is restricted. Ice may move to a lower side of the rounded portion 352a through the hole 354.

[0321] The compression part 300 may include a spring 358 providing a restoring force to the lever 350. The spring 358 may be provided at one end among both ends of the rotation bar 351. For example, the spring 358 may include a torsion spring.

[0322] The spring 358 may provide a restoring force so that the lever 350 returns to the outside of the transfer pipe 340 when the linkage with the second gear 333 is released while the lever 350 has moved to the inside of the transfer pipe 340 through linkage with the second gear 333.

[0323] A spring support portion 351a may be provided on the rotation bar 351, and one side of the spring 358

may be supported by the spring support portion 351a.

[0324] The spring support portion 351a may protrude in a direction intersecting an extension direction of the rotation bar 351 at a position adjacent to both ends of the rotation bar 351. The restoring force of the spring 358 may be transmitted to the lever 350 through the spring support portion 351a.

[0325] The compression part 300 may include a third gear 355 transmitting power to the lever 350. The third gear 355 may be connected to the other end of the rotation bar 351. The other end may be an end opposite to the one end at which the spring 358 is provided.

[0326] The third gear 355 may engage with the second gear 333 provided on the rack gear 330. The second gear 333 may be positioned laterally of the first gear 332. The first gear 332 and the second gear 333 may be axially arranged on an upper surface of the rack body 331.

[0327] The first gear 332 may be configured to have gear teeth for a predetermined length in a direction from a first end toward a second end of the rack body 331, that is, toward the cylinder 360. The second gear 333 may be configured to have gear teeth for a predetermined length in a direction from the second end toward the first end of the rack body 331. The number of gear teeth of the second gear 333 may be less than the number of gear teeth of the first gear 332.

[0328] The compression part 300 may include the cylinder 360 disposed at an outlet side of the transfer pipe 340. Ice collected at a lower portion of the transfer pipe 340 may be moved into the cylinder 360 by the piston 335.

[0329] The cylinder 360 may also be constituting a portion of a transfer pipe in a broad sense in that it guides movement of ice. Accordingly, the transfer pipe 340 may be referred to as a first transfer pipe, and the cylinder 360 may be referred to as a second transfer pipe.

[0330] The compression part 300 may include a discharge pipe 370 provided at an outlet side of the cylinder 360 and providing a force for compressing or recombining ice transferred in the cylinder 360. For example, the discharge pipe 370 may be configured so that a cross-sectional area decreases in a direction in which ice is discharged.

[0331] The discharge pipe 370 may be formed of an elastically deformable material to provide resistance in a direction opposite to a transfer direction of ice. For example, the discharge pipe 370 may be formed of silicone.

[0332] Since the piston 335 presses one side of ice present in the cylinder 360 and resistance is provided on the other side by the discharge pipe 370, compression or recombination of powdered ice may be achieved. Compressed powdered ice may be formed into ice including a predetermined shape (third state, ice molded ice) and may be discharged through a discharged portion of the discharge pipe 370.

[0333] The molded ice discharged from the discharged portion may interfere with a cutter wall 380 spaced apart from the discharge pipe 370 by a predetermined dis-

tance, and in this process the molded ice may be cut. A distance between the discharge pipe 370 and the cutter wall 380 may be determined according to an ice size desired by a consumer. The cut molded ice may be introduced into an ice bin 500 through a discharge port 328 of the first bracket 320.

[0334] The compression part 300 may include compression brackets 320 and 327 for supporting the plurality of components described above.

[0335] The compression brackets 320 and 327 may include the first bracket 320 forming a first through-hole 321a through which the motor shaft 312 of the second motor 310 passes. The first bracket 320 may include a first wall 321 extending so as to face the ice-making space plate 85. For example, the first wall 321 may form a vertical wall extending in a vertical direction. The first through-hole 321a may be formed in the first wall 321.

[0336] The first bracket 320 may include a second wall 322 forming the discharge port 328. The second wall 322 may be connected to a lower end of the first bracket 320 and may extend in a direction away from the ice-making space plate 85. For example, the second wall 322 may form a horizontal wall extending in a horizontal direction.

[0337] The compression brackets 320 and 327 may include the second bracket 327 coupled to the first bracket 320. A space in which the rack gear 330 and the piston 335 are positioned may be formed between the first bracket 320 and the second bracket 327.

[0338] The first wall 321 may include a plurality of fastening portions.

[0339] The plurality of fastening portions may include a first fastening portion 321b coupled to a first fastening portion 328a of the second bracket 327. The first fastening portion 321b may protrude from the first wall 321 and may include a boss to which a fastening member is coupled. The first fastening portion 328a of the second bracket 327 may include a hole into which the fastening member is inserted.

[0340] The plurality of fastening portions may include a second fastening portion 321c coupled to a second fastening portion 328b of the second bracket 327. The second fastening portion 321c may be formed in a fastening wall 324 provided at a position spaced apart from the first wall 321 in a direction toward the second bracket 327. For example, the second fastening portions 328b and 321c may include holes. A predetermined fastening member may be fastened to the second fastening portions 328b and 321c.

[0341] An upper surface of the fastening wall 324 may include a guide surface guiding sliding of the coupling bracket 336. Since the coupling bracket 336 is supported on the guide surface, stable reciprocating motion of the rack gear 330 and the piston 335 may be achieved. The coupling bracket 336 may be disposed to be slightly spaced apart from the upper surface of the fastening wall 324.

[0342] The fastening wall 324 may include the rail groove 324a guiding movement of the rail 334 of the rack

gear 330. The rail groove 324a may be formed on a surface of the fastening wall 324 facing the rack gear 330 among a plurality of surfaces defining the fastening wall 324. At least a portion of the rail 334 may be fitted into the rail groove 324a, and the rail 334 may move along the rail groove 324a.

[0343] The second bracket 327 may include a bracket wall 327a covering at least a portion of the rack gear 330 and the piston 335. The bracket wall 327a may include a second through-hole 327b in which a central portion 315a of the pinion gear 315 is rotatably supported. For example, the central portion 315a may be inserted into the second through-hole 327b.

[0344] In some examples, a process in which powdered ice generated in the ice-making part 200 and supplied to the compression part 300 is compressed will be described with reference to FIGS. 15A to 15B.

[0345] A position of the piston 335 illustrated in FIG. 15A is defined as a first position. At the first position, the second motor 310 is in a stopped state, and the first motor 210 of the ice-making part 200 is driven so that powdered ice I1 may be supplied into the transfer pipe 340. The state of FIG. 15A may be maintained for a first predetermined time.

[0346] After the first predetermined time elapses, when the second motor 310 is driven in a forward direction, the piston 335 moves in a direction toward the cylinder 360 by engagement of the pinion gear 315 and the first gear 332 (forward movement of the piston), and in this process, as illustrated in FIG. 15B, powdered ice collected in a lower portion of the transfer pipe 340, that is, in the second part 342, is moved into the cylinder 360.

[0347] In FIG. 15B, the piston 335 is illustrated as moving only up to an inlet side of the cylinder 360. In some examples, at least a portion of the piston 335 may be inserted into the cylinder 360. A position of the piston 335 in FIG. 15B is defined as a second position.

[0348] In the state of FIG. 15B, when the second motor 310 is driven in a reverse direction, the piston 335 may move in a direction away from the cylinder 360 (rearward movement of the piston). The rack gear 330 moves together with the piston 335, and at an end of movement of the rack gear 330, the second gear 333 may engage with the third gear 355. Accordingly, the third gear 355 rotates clockwise based on FIG. 15C, and thus the lever 350 rotates clockwise about the rotation bar 351.

[0349] When the lever 350 rotates, the plate 352 and the rounded portion 352a move into the accommodation space 341a of the transfer pipe 340 and transfer powdered ice present in the transfer pipe 340. For example, ice present in an upper portion of the transfer pipe 340, that is, in the first part 341, may be pressed downward and moved toward a lower portion of the transfer pipe 340, that is, toward the second part 342. A position of the piston 335 in FIG. 15C is defined as a third position.

[0350] In the state of FIG. 15C, when the second motor 310 is driven in the forward direction, the piston 335 may move in a direction toward the cylinder 360. When the

rack gear 330 moves for movement of the piston 335, engagement between the second gear 333 and the third gear 355 is released, and by restoring force of the spring 358, the lever 350 moves to an upright position as illustrated in FIG. 15A. Then, the piston 335 may return to the first position.

[0351] By repeating the processes of FIGS. 15A to 15D, powdered ice may undergo compression or recombination within an internal space of the cylinder 360 and may be manufactured into molded ice I2, that is, ice in a third state or third state ice. When pressure sufficient to pass through the discharge pipe 370 is applied to the molded ice I2 by the piston 335, the molded ice I2 may be discharged through the discharge pipe 370. In some examples, the third state ice may be heated before being discharged from discharge pipe 370 and generate fourth state ice. In some examples, the temperature of ice may sequentially increase from the first state ice to the fourth state ice based on the locations of ice. For example, the first state ice on the ice-making body may have a first temperature, and the second state ice separated from the ice-making body may have a second temperature higher than or equal to the first temperature. The third state ice molded into shape at an inlet side of the cylinder has a third temperature higher than or equal to the second temperature, and the fourth state ice at an outlet side of the cylinder may have a fourth temperature higher than the third temperature.

[0352] Ice discharged from the discharge pipe 370 interferes with the cutter wall 380 and is cut to a predetermined size, and the cut ice may be introduced into the ice bin 500.

[0353] FIG. 16 is a perspective view illustrating an arrangement of a tray and blades, and FIG. 17 is a perspective view illustrating an arrangement of a tray and blades.

[0354] Referring to FIGS. 16 and 17, a tray assembly 240 may include a tray 241 forming a water storage space.

[0355] The tray assembly 240 may include a first tray cover 246 covering one of both side walls of the tray 241.

[0356] The tray assembly 240 may include a second tray cover 247 covering the other of both side walls of the tray 241.

[0357] Around the tray assembly 240, blades 280 and 285 for separating ice frozen in the tray assembly 240 from the tray assembly 240 may be provided.

[0358] A plurality of blades 280 and 285 may be provided, and the plurality of blades 280 and 285 may be disposed to face different walls of the tray assembly 240.

[0359] The blades 280 and 285 may include a first blade 280 disposed to face a circumferential wall 242a of the tray assembly 240.

[0360] The first blade 280 may be connected to a first bracket 220. For example, the first blade 280 may be installed on a fifth wall 225 of the first bracket 220. (see FIG. 18)

[0361] The first blade 280 may include a blade body

281 forming a fastening hole 280a to which a fastening member is coupled, and the fastening member may be fastened to the fifth wall 225 through the fastening hole 280a.

[0362] As another example of an installation position of the first blade 280, the first blade 280 may be installed on another component positioned around the tray assembly 240 as long as it faces the circumferential wall 242a of the tray assembly 240.

[0363] As a first example, the first blade 280 may be installed at another position of the first bracket 220, for example, on the first wall 221 or the second wall 222.

[0364] As a second example, the first blade 280 may be installed on the reservoir 250, for example, on an outer wall of the reservoir 250.

[0365] As a third example, the first blade 280 may be installed on a transfer tube 340 into which separated ice flows, for example, on an outer wall or an inner wall of the transfer tube 340.

[0366] The blades 280 and 285 may include a second blade 285 disposed to face side walls 246a and 247a of the tray assembly 240. The side walls 246a and 247a of the tray assembly 240 may include a first cover wall 246a of the first tray cover 246 and a second cover wall 247a of the second tray cover 247.

[0367] The second blade 285 may be connected to ice-making brackets 220 and 230.

[0368] The second blade 285 may include a blade body 286 forming a fastening hole 287 to which a fastening member is coupled, and the fastening member may be fastened to the ice-making brackets 220 and 230 through the fastening hole 287.

[0369] The second blade 285 may include a tip 288 extending from the blade body 286 toward the side wall of the tray assembly 240. The tip 288 may be disposed to face the side wall of the tray assembly 240.

[0370] The tip 288 may include an inclined surface so that the thickness thereof becomes thinner than that of the blade body 286 to facilitate scraping ice frozen on the side wall of the tray assembly 240.

[0371] A plurality of second blades 285 may be provided to be disposed at both sides of the tray assembly 240.

[0372] The plurality of second blades 285 may include one-side blade 285a connected to the first bracket 220 among the ice-making brackets 220 and 230. For example, the one-side blade 285a may be coupled to the first wall 221 of the first bracket 220.

[0373] The plurality of second blades 285 may include the other-side blade 285b connected to the second bracket 230 among the ice-making brackets 220 and 230. For example, the other-side blade 285b may be coupled to a bracket wall 231a of a gear bracket 231 of the second bracket 230.

[0374] The second blade 285 may be disposed obliquely with respect to the side wall of the tray assembly 240. For example, the blade body 286 of the second blade 285 may extend obliquely from a portion coupled

to the ice-making brackets 220 and 230 toward the side wall of the tray assembly 240.

[0375] Referring to FIG. 17, a first angle θ_1 formed between the first cover wall 246a of the first tray cover 246 and the other-side blade 285b may be an acute angle of 90 degrees or less. A second angle θ_2 formed between the second cover wall 247a of the second tray cover 247 and the one-side blade 285a may be an acute angle of 90 degrees or less.

[0376] As illustrated in FIG. 16, when the tray assembly 240 rotates clockwise about a central bracket 243, the side wall of the tray assembly 240 rotates in a direction approaching the second blade 285, and ice separated from the side wall may fall into the reservoir 250 disposed below the second blade 285.

[0377] For this purpose, when the tray assembly 240 is divided into two portions in an up-down direction with respect to the central bracket 243, that is, a portion close to the reservoir 250 and a portion far from the reservoir 250, the second blade 285 may be disposed at the side wall on the portion close to the reservoir 250.

[0378] As shown in FIG. 16, when the tray assembly 240 rotates clockwise, a first circumferential wall 242a of the tray assembly 240 rotates in a direction approaching the first blade 280, and ice separated from the first circumferential wall 242a may fall into a transfer tube 340 disposed below the second blade 285.

[0379] When defining a first extension line ℓ_1 extending the first cover wall 246a of the first tray cover 246 and a second extension line ℓ_2 extending the first cover wall 246a of the first tray cover 246, the first and second extension lines ℓ_1 and ℓ_2 may pass through an internal space of the reservoir 250.

[0380] The second blades 285a and 285b disposed adjacent to the first and second cover walls 246a and 247a may be disposed to overlap the internal space of the reservoir 250 above the reservoir 250. According to this configuration, ice separated from the first and second cover walls 246a and 247a by the second blades 285 may be introduced into the reservoir 250.

[0381] In some implementations, the tray assembly 240 has been described as including the tray 241 and the first and second tray covers 246 and 247. In some examples, the first and second tray covers 246 and 247 may be omitted, in which case the tray assembly 240 may include only the tray 241.

[0382] When the tray assembly 240 includes only the tray 241, the second blade 285 may be disposed adjacent to a side wall of the tray 241, and when the tray 241 rotates, the second blade 285 may separate ice formed on the side wall of the tray 241.

[0383] A plurality of second blades 285 may be provided and supported by the first bracket 220 and the second bracket 230 so as to face both side walls of the tray 241.

[0384] In order to generate ice including a strength that is easy for a user to chew and to supply the ice to the user, a surface of finally supplied ice may form a quasi-liquid

layer. The quasi-liquid layer may be a state in which the surface is not completely frozen solid but is slightly melted or slightly moist.

[0385] To form the quasi-liquid layer, methods such as forming ice particles to be small before recombination (compression) through the compression part 300, compressing ice particles to form predetermined voids (air layers) between the particles, or providing a predetermined amount of heat during the compression process may be used.

[0386] In some examples, the quasi-liquid layer may be formed by forming small ice particles on the first circumferential surface 242a of the tray 241. In some examples, the circumferential surface 242a may be referred to as a circumferential portion or a peripheral portion of the ice-making body (e.g., tray 241) configured to receiver water.

[0387] The first circumferential surface 242a may include recesses 241a including a predetermined depth and protrusions 241b connected to ends of the recesses 241a.

[0388] Each recess 241a may have a length in a circumferential direction along the first circumferential surface 242a. During ice removal, as the tray 241 rotates, ice formed in the recesses 241a arranged in the circumferential direction may be separated by the first blade 280.

[0389] Each protrusion 241b may have a length in a circumferential direction along the first circumferential surface 242a. During ice removal, as the tray 241 rotates, ice formed on the protrusions 241b arranged in the circumferential direction may be separated by the first blade 280.

[0390] A plurality of recesses 241a and a plurality of protrusions 241b may be provided. The protrusions 241b may be positioned between the plurality of recesses 241a, and the recesses 241a may be positioned between the plurality of protrusions 241b.

[0391] The plurality of recesses 241a and the plurality of protrusions 241b may be alternately arranged in an axial direction.

[0392] The recesses 241a may form water storage spaces. Water storage spaces may also be formed on the protrusions 241b. In some examples, since the recesses 241a form storage spaces including a predetermined depth, a thickness of ice formed in the recesses 241a may be greater than a thickness of ice formed on the protrusions 241b.

[0393] As water is stored in the plurality of recesses 241a and the stored water freezes, an effect may be obtained in which small ice particles are pre-separated by the protrusions 241b. In some examples, ice frozen on the protrusions 241b may have a relatively small thickness and may serve to weakly connect ice formed in the plurality of recesses 241a. Accordingly, ice frozen on the protrusions 241b may be separated or broken by the first blade 280.

[0394] The recesses 241a and protrusions 241b of the tray 241 may be arranged to face the first blade 280.

[0395] FIG. 18 is a front perspective view illustrating an arrangement of a first bracket and first and second blades, FIG. 19 is a rear perspective view illustrating an arrangement of a first bracket and first and second blades, and FIG. 20 is a front view of a first bracket.

[0396] A refrigerator may include ice-making brackets 220 and 230 providing a space for accommodating at least a portion of a tray 241. The ice-making brackets 220 and 230 may define a cold air flow path.

[0397] The ice-making brackets may be referred to as a flow duct. The flow duct may be defined by coupling a first bracket 220 and a second bracket 230.

[0398] The ice-making brackets 220 and 230 may include a first bracket 220 facing a first surface of the tray 241. The first surface may be a surface formed on one of both side walls of the tray 241.

[0399] The ice-making brackets 220 and 230 may include a second bracket 230 facing a second surface of the tray 241. The second surface may be a surface formed on the other of both side walls of the tray 241.

[0400] The refrigerator may include a first motor 210 providing driving force to the tray 241 and a power transmission device for transmitting driving force of the first motor 210 to the tray 241, and the power transmission device may include a shaft or bar supported by the ice-making brackets 220 and 230.

[0401] Referring to FIGS. 18 and 19, in some examples, the ice-making brackets 220 and 230 may include a first bracket 220 forming at least a portion of a cold air flow path and supporting the tray 241.

[0402] The first bracket 220 may include a mounting position or mounting space for blades 280 and 285.

[0403] The first bracket 220 may include a first wall 221 supporting the tray assembly 240. The first wall 221 may include an insertion hole 221a into which at least a portion of a central bracket 243 or a bar 249 of the tray assembly 240 is inserted.

[0404] In another example, a shaft of the first motor 210 may pass through the tray assembly 240 and be inserted into the insertion hole 221a.

[0405] The first wall 221 may form one surface of the first bracket 220. For example, the first wall 221 may form a front surface of the first bracket 220.

[0406] Based on the refrigerator shown in FIG. 1, the refrigerating compartment doors 20 and 30 may be disposed at a front of a cabinet 10, and the ice maker 100 may be mounted on a rear surface of the refrigerating compartment doors 20 and 30. In this case, the first wall 221 of the first bracket 220 may be forming a front wall mounted on the rear surface of the refrigerating compartment doors 20 and 30.

[0407] A direction in which the refrigerating compartment doors 20 and 30 and the freezer compartment door 50 are arranged may be defined as a vertical direction. The vertical direction may correspond to a gravity direction. For example, based on FIG. 1, the refrigerating compartment doors 20 and 30 may be disposed above the freezer compartment door 50.

[0408] The first wall 221 of the first bracket 220 may form the communication portion 221b (water supply pipe connection portion) into which a water supply pipe 120 is inserted.

[0409] The first bracket 220 may include a second wall 222 connected to an upper end of the first wall 221, and a guide plate 226 for guiding flow of cold air inside the first bracket 220 may be provided on the second wall 222. The guide plate 226 may extend downward from the second wall 222 in a rounded or inclined shape.

[0410] In another example, the guide plate 226 may be connected to the first wall 221 and protrude toward the second bracket 230.

[0411] The second wall 222 of the first bracket 220 may protrude from the first wall 221 toward the second bracket 230 and be coupled to the second bracket 230. The second wall 222 may form an end wall of the ice-making brackets 220 and 230.

[0412] The first bracket 220 may include at least one wall defining a water storage space in which water is stored. For example, the at least one wall may include a plurality of walls.

[0413] The first bracket 220 may include a plurality of walls defining a mounting space for a reservoir 250. The first blade 280 may be installed on the plurality of walls.

[0414] The first bracket 220 may include a third wall 223 including a surface on which the reservoir 250 is seated. For example, the third wall 223 may support a bottom wall of the reservoir 250. The third wall 223 may define a lower end of the first bracket 220.

[0415] The first bracket 220 may include a fourth wall 224 connected to the third wall 223 and facing a first side surface of the reservoir 250.

[0416] The first bracket 220 may include a fifth wall 225 connected to the third wall 223 and facing a second side surface of the reservoir 250. For example, the fifth wall 225 may be disposed opposite to the fourth wall 224 with the reservoir 250 interposed therebetween.

[0417] The fourth wall 224 and the fifth wall 225 may extend from both sides of the third wall 223 toward the tray assembly 240, for example upward.

[0418] The fourth wall 224 may include a first opening 224b through which cold air is introduced from a cold air duct 400. In order to supply cold air introduced through the first opening 224b to circumferential walls 242a and 242b of the tray assembly 240, the first opening 224b may be positioned higher than the insertion hole 221a.

[0419] The first bracket 220 may include a water supply guide wall 224a disposed below the water supply pipe 120 in the gravity direction and guiding water supplied from the water supply pipe 120 to the reservoir 250. The water supply guide wall 224a may form at least a portion of the fourth wall 224.

[0420] The water supply guide wall 224a may extend obliquely from the opening 224b toward a side surface of the reservoir 250.

[0421] For example, the water supply guide wall 224a may extend obliquely with respect to the gravity direction

to guide water to slowly flow into the reservoir 250 along the water supply guide wall 224a.

[0422] The ice maker 100 may include a first blade 280 disposed outside a first circumferential surface 242a of the tray 241 to scrape ice formed on the first circumferential surface 242a. For example, the first blade 280 may be disposed adjacent to the first circumferential surface 242a to contact ice formed thereon.

[0423] The first blade 280 may be disposed adjacent to one side surface of the reservoir 250.

[0424] The first blade 280 may be connected to the fifth wall 225. The reservoir 250 may be provided on an inner surface side of the fifth wall 225, and the first blade 280 may be provided on an outer surface side of the fifth wall 225.

[0425] The tray assembly 240 may include a plurality of side walls connected to both ends of circumferential surfaces 242a and 242b, and the plurality of side walls may be spaced apart in a direction of a central axis of the tray 241. If the first and second tray covers 246 and 247 are omitted, the side walls of the tray assembly 240 may be side walls of the tray 241.

[0426] The ice maker 100 may include a second blade 285 disposed adjacent to at least one of the plurality of side walls of the tray assembly 240 and configured to remove unwanted ice formed on the side wall.

[0427] The second blade 285 may be installed on the ice-making brackets 220 and 230.

[0428] The second blade 285 may be disposed between the side wall of the tray assembly 240 and one surface of the ice-making brackets 220 and 230.

[0429] A plurality of second blades 285 may be provided. One of the plurality of second blades 285 may be disposed between a first side wall of the tray assembly 240 and a first surface of the ice-making brackets 220 and 230. The first surface of the ice-making brackets 220 and 230 may be formed on a wall of the first bracket 220.

[0430] Another one of the plurality of second blades 285 may be disposed between a second side wall of the tray assembly 240 and a second surface of the ice-making brackets 220 and 230. The second surface of the ice-making brackets may be formed on a wall of the second bracket 230.

[0431] More specifically, a second blade 285, for example one-side blade 285a, may be mounted on the first bracket 220. For example, the one-side blade 285a may be provided on the first wall 221. The first wall 221 may include an inner surface facing one side wall of the tray assembly 240. The one-side blade 285a may be provided on the inner surface of the first wall 221.

[0432] The first bracket 220 may include a boss 221d provided on a rear surface of the surface on which the second blade 285 is provided, that is, on an outer surface, for fixing the second blade 285 to the first wall 221.

[0433] The boss 221d may protrude from the outer surface of the first wall 221 and may include a fastening hole to which a fastening member is coupled. The fastening member may pass through the fastening hole of the

boss 221d and be coupled to a fastening hole 287 of the second blade 285 provided on the inner surface of the first wall 221.

[0434] The first bracket 220 may include plate coupling portions 229 and 229a supported by an ice-making chamber plate 85. The plate coupling portions 229 and 229a may include a first plate coupling portion 229 coupled to a coupling hole 88 formed in a support wall 85a of the ice-making chamber plate 85. For example, the first plate coupling portion 229 may include a rib protruding from the first bracket 220.

[0435] The plate coupling portions 229 and 229a may include a second plate coupling portion 229a coupled to the support wall 85a of the ice-making chamber plate 85. For example, the second plate coupling portion 229a may include a boss protruding from the first bracket 220. A predetermined fastening member may pass through the boss and be fastened to the support wall 85a.

[0436] Referring to FIG. 20, a center C of the first bracket 220 may be formed at an insertion hole 221a. The center C may define a first height H1 with respect to a bottom surface of the first bracket 220, for example, a third wall 223.

[0437] The first blade 280 may be disposed at a position protruding further toward the tray 241 than an opening of the reservoir 250, for example, an upper end thereof, thereby facilitating ice release from the tray 241.

[0438] The first blade 280 may define a second height H2 with respect to the bottom surface of the first bracket 220, for example, the third wall 223. The second height H2 may be smaller than the first height H1.

[0439] That is, the first blade 280 may be disposed at a position lower than the insertion hole 221a so as to scrape ice frozen on a lower portion of the tray assembly 240.

[0440] When the tray 241 rotates counterclockwise with reference to FIG. 20, a first circumferential surface 242a of the tray 241 may approach the first blade 280 disposed at a position lower than the insertion hole 221a and may be de-iced. Accordingly, the released ice may move toward an outer side of the fifth wall 225.

[0441] The second blade 285 may define a third height H3 with respect to the bottom surface of the first bracket 220, for example, the third wall 223. The third height H3 may be smaller than the first height H1.

[0442] When the tray 241 rotates counterclockwise with reference to FIG. 20, a side wall of the tray 241 may approach the second blade 285 disposed at a position lower than the insertion hole 221a and may be de-iced. Accordingly, the released ice may move toward the reservoir 250.

[0443] The third height H3 may be greater than the second height H2. Accordingly, the second blade 285 may be installed without interfering with the reservoir 250.

[0444] FIG. 21 is a front perspective view illustrating an arrangement of a gear bracket and first and second blades, and FIG. 22 is a rear perspective view illustrating

an arrangement of a gear bracket and first and second blades.

[0445] The ice-making brackets 220 and 230 may include a second bracket 230 connected to the first bracket 220. The second bracket 230 may form at least a portion of the cold air flow path.

[0446] The first bracket 220 and the second bracket 230 may guide flow of cold air flowing around the tray 241.

[0447] One side of the first bracket 220 may be open, and the second bracket 230 may shield the open one side of the first bracket 220.

[0448] Referring to FIGS. 21 and 22, in some examples, the second bracket 230 may include a gear bracket 231 and a gear cover 232. (see FIG. 9) A gear assembly 235 and 236 may be accommodated in an inner space defined by the gear bracket 231 and the gear cover 232.

[0449] The gear bracket 231 may include a bracket wall 231a facing a side wall of the tray assembly 240. The bracket wall 231a may support the gear assembly 235 and 236.

[0450] The bracket wall 231a may include a first-through portion 1231 into which at least a portion of a central portion 236a of the driven gear 236 or the bar 249 is inserted. The first-through portion 1231 may be formed in a wall protruding from the bracket wall 231a toward the tray assembly 240.

[0451] The bracket wall 231a may include a second-through portion 1232 into which at least a portion of a central portion 235a of the driving gear 235 is inserted. The first-through portion 1231 and the second-through portion 1232 may be spaced apart by a distance corresponding to a sum of radii of the driving gear 235 and the driven gear 236.

[0452] A second blade 285, for example, an other-side blade 285b, may be mounted on the gear bracket 231. For example, the other-side blade 285b may be provided on the bracket wall 231a. The bracket wall 231a may include an outer surface facing the other side wall of the tray assembly 240. The other-side blade 285b may be provided on the outer surface of the bracket wall 231a.

[0453] The gear bracket 231 may include a boss 231e provided on a rear surface of a surface on which the second blade 285 is provided, that is, on an inner surface, for fixing the second blade 285 to the bracket wall 231a.

[0454] The boss 231e may protrude from the inner surface of the bracket wall 231a and may include a fastening hole to which a fastening member is coupled. The fastening member may pass through the fastening hole of the boss 231e and be coupled to a fastening hole 287 of the second blade 285 provided on the outer surface of the bracket wall 231a.

[0455] As described above, the first bracket 220 and the second bracket 230 may form a space for accommodating the tray assembly 240, and one wall of the first bracket 220 and one wall of the second bracket 230 may be disposed to face both side walls of the tray assembly 240.

[0456] By providing second blades 285a and 285b on

the one wall of the first bracket 220 and the one wall of the second bracket 230, respectively, when unwanted ice is formed on both side walls of the tray assembly 240, the frozen ice may be separated by the second blades 285a and 285b, and the separated ice may be effectively handled by being introduced into the reservoir 250 at a lower side.

[0457] FIG. 23 is a side view illustrating an example configuration of an ice-making part of an ice maker, and FIG. 24 is a view illustrating partial configurations of an ice-making part and a compression part of an ice maker.

[0458] Referring to FIG. 23, both end portions of the ice-making brackets 220 and 230 may form openings through which cold air passes. A first opening 224b connected to a discharged portion 430 of a cold air duct 400 may be formed at one end portion of the ice-making brackets 220 and 230. A second opening 227 may be formed at the other end portion of the ice-making brackets 220 and 230.

[0459] The first opening 224b may be an opening for cold air inflow, and the second opening 227 may be an opening for cold air discharge. The second opening 227 may function as an opening through which powdered ice released from the tray 241 is discharged.

[0460] The first opening 224b may be formed on one side surface of the first bracket 220, and at least a portion of circumferential surfaces 242a and 242b of the tray 241, particularly at least a portion of the first circumferential surface 242a, may be disposed to face the first opening 224b.

[0461] The second opening 227 may be formed on the other side surface of the first bracket 220. The other side surface of the first bracket 220 may be opposite to the one side surface on which the first opening 224b is formed. That is, the one side surface and the other side surface of the first bracket 220 may be disposed to face each other. Cold air introduced through the first opening 224b may cool the tray 241 while passing along the circumferential surfaces 242a and 242b of the tray 241 and may be discharged through the second opening 227.

[0462] The second opening 227 may be defined as a space between a guide plate 226 provided on one side portion of the first bracket 220 and the first blade 280. The guide plate 226 may be formed in a rounded shape corresponding to curvature of the first circumferential surface 242a of the tray 241, and may guide cold air flowing along the second wall 222 of the first bracket 220 toward the first circumferential surface 242a.

[0463] In other words, the second opening 227 may be a space between the guide plate 226 and the fifth wall 225 on which the first blade 280 is mounted.

[0464] Ice formed on the first circumferential surface 242a may be released by the first blade 280, and the released powdered ice may be discharged through the second opening 227, and the discharged powdered ice may flow into the compression part 300.

[0465] The first bracket 220 may include a first accommodating space 220a in which the tray assembly 240 is

accommodated. An axial width of the first accommodating space 220a may be formed to be greater than an axial width of the tray assembly 240.

[0466] A cold air flow path through which cold air flows may be formed between an outer wall of the tray assembly 240 and a wall of the ice-making brackets 220 and 230.

[0467] For example, the first tray cover 246 of the tray assembly 240 and the gear bracket 231 may be spaced apart by a first distance S1, and a first side flow path may be formed in a space spaced apart by the first distance.

[0468] The second tray cover 247 of the tray assembly 240 and the first wall 221 of the first bracket 220 may be spaced apart by a second distance S2, and a second side flow path may be formed in a space spaced apart by the second distance. As described above, since cold air supplied through the first and second side flow paths may cool side walls of the tray assembly 240, cooling of the tray 241 may be rapidly performed, thereby improving ice-making performance.

[0469] The tray 241 may be made of a material including high thermal conductivity to facilitate cooling. For example, the tray 241 may be made of a metal material. Examples of the metal material may include steel or aluminum.

[0470] The ice-making part 200 may include second blades 285 for separating ice frozen on side walls of the tray assembly 240. A plurality of second blades 285 may be provided to scrape ice formed on both side walls of the tray assembly 240.

[0471] One of the plurality of second blades 285 may be installed on the first wall 221 of the first bracket 220, and another one may be installed on a wall of the gear bracket 231.

[0472] When the tray assembly 240 rotates, in order for ice separated from the side walls of the tray assembly 240 by the second blades 285 to be introduced into the reservoir 250, the side walls of the tray assembly 240 and the second blades 285 may overlap the inner space of the reservoir 250 in a vertical direction.

[0473] Referring to FIG. 24, with respect to the center C of the tray assembly 240, the first blade 280 and the second blade 285 may be disposed opposite to each other.

[0474] For example, when a radial extension line ℓ_c passing through the center C of the tray assembly 240 is defined, the first and second blades 280 and 285 may be disposed opposite to each other with respect to the extension line ℓ_c .

[0475] The first blade 280 may be disposed opposite to the first opening 224b with respect to the extension line ℓ_c . Accordingly, cold air introduced through the first opening 224b may cool the circumferential wall 242a of the tray 241, and the cooled tray 241 may rotate counterclockwise with reference to FIG. 24 and may be de-iced by the first blade 280.

[0476] The second blade 285 may be provided on a side on which the first opening 224b is formed with

respect to the extension line ℓc . For example, the second blade 285 may be disposed in a space between the first opening 224b and the reservoir 250.

[0477] Accordingly, the second blade 285 may function as a blocking plate for preventing cold air introduced through the first opening 224b from directly flowing into the reservoir 250. As a result, freezing of water in the reservoir 250 may be prevented.

[0478] By disposing the first and second blades 280 and 285 opposite to each other with respect to the extension line ℓc , the inner space of the ice-making brackets 220 and 230 may be utilized, and cold air flow may be smoothly formed.

[0479] If the first and second blades 280 and 285 are disposed biased to one side with respect to the extension line ℓc , there may occur a problem in that cold air flow is not smooth in the region where the first and second blades 280 and 285 are disposed. In some examples, such a problem may be solved.

[0480] Since the first and second blades 280 and 285 scrape ice frozen on the tray assembly 240, they may act as resistance against rotation of the tray assembly 240.

[0481] If the first and second blades 280 and 285 are disposed biased to one side with respect to the extension line ℓc , the resistance may act strongly in a specific region, thereby restricting rotation of the tray assembly 240. In some examples, such resistance may be distributed to both sides of the tray assembly 240, thereby solving the problem.

[0482] In order for the first blade 280 to release ice on the first circumferential wall 242a of the tray assembly 240 and for the second blade 285 to release ice on the side wall of the tray assembly 240, a first distance D1 from the center C of the tray assembly 240 to the first blade 280 may be formed to be greater than a second distance D2 from the center C of the tray assembly 240 to the second blade 285.

[0483] Hereinafter, additional examples of the present disclosure will be described. These examples may differ from the previous examples only in some configurations, and thus differences will be mainly described, and the same parts will be described with reference to the description of the previous examples.

[0484] FIG. 25 is a rear view showing an example of a first bracket and illustrates an example state in which a heater is installed on an ice-making bracket, and FIG. 26 is a side cross-sectional view showing an example of an ice maker and illustrates an example state in which a heater is installed on an ice-making bracket.

[0485] Referring to FIGS. 25 and 26, in some examples, an ice maker may include ice-making brackets 220a' and 230a' on which a heater 1255 is installed. The heater 1255 may be installed on a wall of the ice-making brackets 220a' and 230a' to prevent freezing of the ice-making brackets 220a' and 230a'.

[0486] The ice-making brackets 220a' and 230a' may include both side surfaces facing both side walls of the tray assembly 240, and the heater 1255 may be disposed

on both side surfaces of the ice-making brackets 220a' and 230a'.

[0487] The ice-making brackets 220a' and 230a' may include a first bracket 220a' and a second bracket 230a' connected to each other. General descriptions regarding the first and second brackets 220a' and 230a' may be made with reference to the descriptions regarding the first and second brackets 220 and 230 in the previous examples.

[0488] The heater 1255 may include a first heater 1255a installed on a wall of the first bracket 220a. The heater 1255 may include a second heater 1255b installed on a wall of the second bracket 230a.

[0489] The first heater 1255a and the second heater 1255b may be connected to each other and receive power.

[0490] The ice-making brackets 220a' and 230a' may include a portion to which the cold air duct 400 is connected, and a density or output of the heater 1255 in a region close to the portion may be greater than a density or output of the heater 1255 in a region far from the portion.

[0491] With respect to a rotation axis of the tray 241, a density or output of the heater 1255 on a side of the cold air duct 400 may be greater than a density or output of the heater 1255 on a side opposite to the cold air duct 400.

[0492] More specifically, when an extension line ℓc passing through the center C in the vertical direction is defined, the heater may include a first heater part 1256 disposed on a side close to the opening 224b with respect to the extension line ℓc , that is, in region A, and a second heater part 1257 disposed on a side far from the opening 224b with respect to the extension line ℓc , that is, in region B.

[0493] A density or output of the heater in the first heater part 1256 may be greater than a density or output of the heater in the second heater part 1257.

[0494] The heater 1255 may include heater lines arranged in multiple stages on a wall of the first bracket 220a' or the second bracket 230a'.

[0495] The number of heater lines 1256a, 1256b, and 1256c arranged in multiple stages in the first heater part 1256, for example, three-stage arrangement as shown in FIG. 25, may be greater than the number of heater lines 1257a and 1257b arranged in multiple stages in the second heater part 1257, for example, two-stage arrangement as shown in FIG. 25.

[0496] With such a configuration, even when low-temperature cold air is supplied from the cold air duct 400 to the ice maker 100, a rapid temperature drop in region A may be prevented, thereby preventing freezing of the ice-making brackets 220a' and 230a'.

[0497] The heater 1255 may be disposed at a position lower than the second blade 285, that is, in a region adjacent to the reservoir 250. Accordingly, the heat generated by the heater 1255 may prevent the reservoir 250 from dropping to a temperature below zero degrees Celsius.

[0498] When the heater 1255 is provided, the heater 255 of the reservoir 250 described in the previous examples may be omitted. The heater 255 may also be additionally disposed.

[0499] FIG. 27 is a cross-sectional view illustrating an example configuration of an ice-making part.

[0500] In some implementations, an ice-making part 200a may include a reservoir 250 having a reservoir opening 250a into which water is introduced, and ice-making brackets 1220 and 1230 including at least two walls supporting both side surfaces of the reservoir.

[0501] In some examples, a width of the reservoir opening may be formed to be greater than or same as a distance between the two walls, thereby preventing unwanted ice from being formed in a space between the reservoir 250 and the ice-making brackets 1220 and 1230.

[0502] The ice-making brackets 1220 and 1230 may include a wall supporting the tray assembly 240, and the wall of the ice-making brackets 1220 and 1230 may include a portion forming the same plane as a wall of the reservoir 250, thereby preventing ice separated from the wall of the ice-making brackets 1220 and 1230 from being introduced into the reservoir 250 and freezing near the wall of the reservoir 250.

[0503] More specifically, referring to FIG. 27, the ice-making part 200a may include a first bracket 1220 and a second bracket 1230.

[0504] The first bracket 1220 may include a first wall 1221 supporting the tray assembly 240. The first wall 1221 may be corresponding to the first wall 221 of the first bracket 220 described in the previous examples.

[0505] The first wall 1221 may include a first part 1223 forming an upper portion of the first wall 1221. The first part 1223 may include a protruding portion 1221a1 forming an insertion hole 1221a.

[0506] The first wall 1221 may include a second part 1224 extending from the first part 1223 with a stepped portion in an axial direction.

[0507] The first wall 1221 may include a third part 1225 extending from the second part 1224 to cover an outer region of the heater 1255. A lower end of the third part 1225 may form a lower end of the first wall 1221.

[0508] Due to the configurations of the second part 1224 and the third part 1225, the first wall 1221 may extend by being bent outward of the reservoir 250 by a size of the heater 255.

[0509] The first part 1223 of the first wall 1221 may include a portion forming the same plane as a wall of the reservoir 250, for example, a reservoir second wall 252. For example, an extension line $\ell 41$ extending an inner surface of the first part 1223 may pass through an inner surface of the reservoir second wall 252 of the reservoir 250. With such a configuration, it is possible to prevent ice separated from the first wall 1221 or the side wall of the tray assembly 240 from being introduced into the reservoir 250 and freezing near the wall of the reservoir 250.

[0510] The second bracket 1230 may include a gear

bracket 1231b supporting the tray assembly 240. The gear bracket 1231b may be corresponding to the gear bracket 231 described in the previous examples.

[0511] The gear bracket 1231b may include a first part 1233 forming an upper portion of the gear bracket 1231b. The first part 1233 may include a protruding portion 1231a1 forming an insertion hole 1231a.

[0512] The gear bracket 1231b may include a second part 1234 extending from the first part 1233 with a stepped portion in an axial direction.

[0513] The gear bracket 1231b may include a third part 1235 extending from the second part 1234 to cover an outer region of the heater 1255. A lower end of the third part 1235 may form a lower end of the gear bracket 1231b.

[0514] Due to the configurations of the second part 1234 and the third part 1235, the gear bracket 1231b may extend by being bent outward of the reservoir 250 by a size of the heater 255.

[0515] The first part 1233 of the gear bracket 1231b may include a portion forming the same plane as a wall of the reservoir 250, for example, the reservoir second wall 252. For example, an extension line $\ell 42$ extending an inner surface of the first part 1233 may pass through an inner surface of the reservoir second wall 252. With such a configuration, it is possible to prevent ice separated from the gear bracket 1231b or the side wall of the tray assembly 240 from being introduced into the reservoir 250 and freezing near the wall of the reservoir 250.

[0516] Accordingly, the width of the reservoir opening may be greater than or equal to the distance between the extension line $\ell 41$ and the extension line $\ell 42$.

Claims

1. A refrigerator comprising:

a cabinet that defines a storage space;
a door configured to open and close at least a portion of the storage space;
an ice-making body that is movably provided at the cabinet or the door, the ice-making body comprising a circumferential portion configured to receive water and to generate ice; and
a bracket assembly that defines (i) an accommodating space accommodating the ice-making body and (ii) an opening configured to receive cooled air,

wherein the bracket assembly comprises:

a first bracket comprising a first wall that covers a first side of the ice-making body, and

a second bracket that covers a second side of the ice-making body and defines the accommodating space together with the first bracket.

2. The refrigerator of claim 1, wherein at least one of the first bracket or the second bracket supports a central portion of the ice-making body.
3. The refrigerator of claim 1 or 2, wherein the first bracket comprises a guide plate that protrudes from the first wall toward the second bracket and extends along the circumferential portion of the ice-making body, the guide plate being configured to guide the cooled air introduced through the opening to the circumferential portion of the ice-making body.
4. The refrigerator of any one of claims 1 to 3, further comprising a reservoir configured to store water to be supplied to the ice-making body, wherein the bracket assembly comprises at least one wall that supports the reservoir.
5. The refrigerator of any one of claims 1 to 4, wherein the first bracket comprises a second wall that protrudes from the first wall and is connected to the second bracket, and wherein the second wall defines at least a portion of a cold-air flow path in the bracket assembly.
6. The refrigerator of claim 5, further comprising a reservoir configured to store water to be supplied to the ice-making body, wherein the bracket assembly further comprises a third wall that protrudes from the first wall toward the second bracket and that supports the reservoir.
7. The refrigerator of claim 6, wherein the bracket assembly further comprises a fourth wall and a fifth wall that protrude from the first wall toward the second bracket, and wherein the reservoir is disposed between the fourth wall and the fifth wall.
8. The refrigerator of claim 7, wherein the fourth wall defines the opening.
9. The refrigerator of claim 8, further comprising a water supply pipe configured to supply water to the reservoir,
 - wherein the first wall comprises a water supply pipe connection portion that is connected to the water supply pipe, and
 - wherein the fourth wall comprises a water supply guide wall that is disposed adjacent to the water supply pipe and that extends from the opening toward the reservoir.
10. The refrigerator of any one of claims 1 to 9, further comprising a first blade disposed adjacent to the circumferential portion of the ice-making body and configured to contact the ice on the circumferential portion while the ice-making body moves relative to the first blade, wherein the bracket assembly comprises a wall connected to the first blade.
11. The refrigerator of claim 10, further comprising a reservoir configured to store water to be supplied to the ice-making body, wherein the wall connected to the first blade faces a surface of the reservoir.
12. The refrigerator of any one of claims 1 to 11, further comprising a second blade provided at the first bracket or the second bracket, wherein the ice-making body comprises a side wall that extends from an end of the circumferential portion and that faces the second blade.
13. The refrigerator of any one of claims 1 to 12, further comprising a plurality of second blades,
 - wherein the ice-making body comprises a first side wall and a second side wall,
 - wherein one of the plurality of second blades is disposed between the first bracket and the first side wall of the ice-making body, and
 - wherein another one of the plurality of second blades is disposed between the second bracket and the second side wall of the ice-making body.
14. The refrigerator of any one of claims 1 to 13, further comprising:
 - a motor configured to provide driving force to the ice-making body; and
 - a power transmission device configured to transmit the driving force of the motor to the ice-making body, the power transmission device comprising a gear assembly.
 - wherein the second bracket defines a space that accommodates the power transmission device.
15. The refrigerator of any one of claims 1 to 14, further comprising a heater disposed at the bracket assembly and configured to maintain the bracket assembly above a freezing temperature, wherein the heater comprises (i) a first portion disposed adjacent to the opening and (i) a second portion disposed away from the opening relative to the first portion, the heater being configured to provide a greater output at the first portion than at the second portion.

FIG. 1A

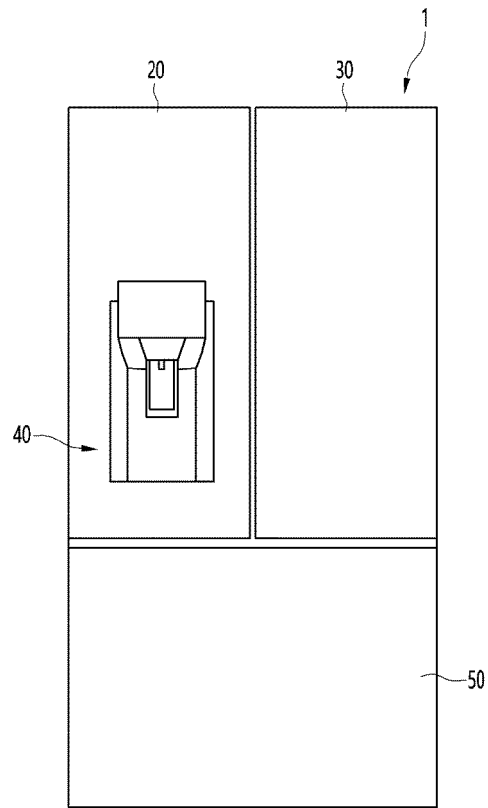


FIG. 1B

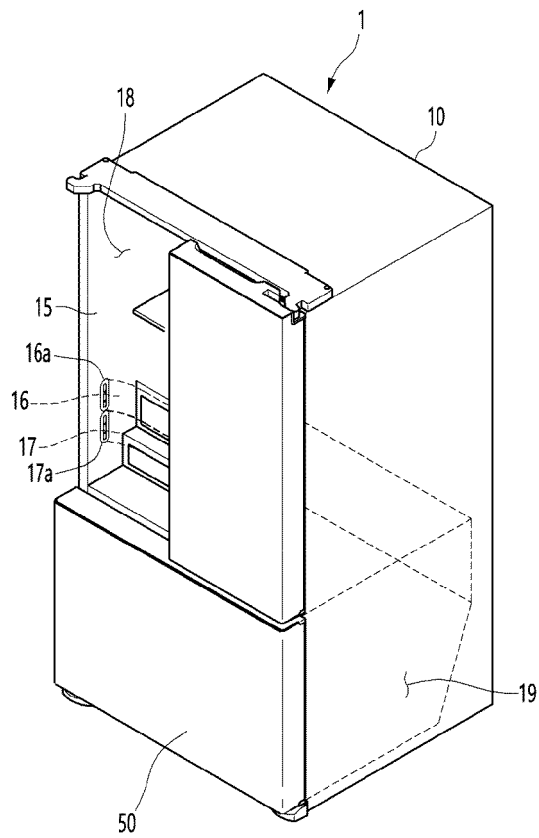


FIG. 2A

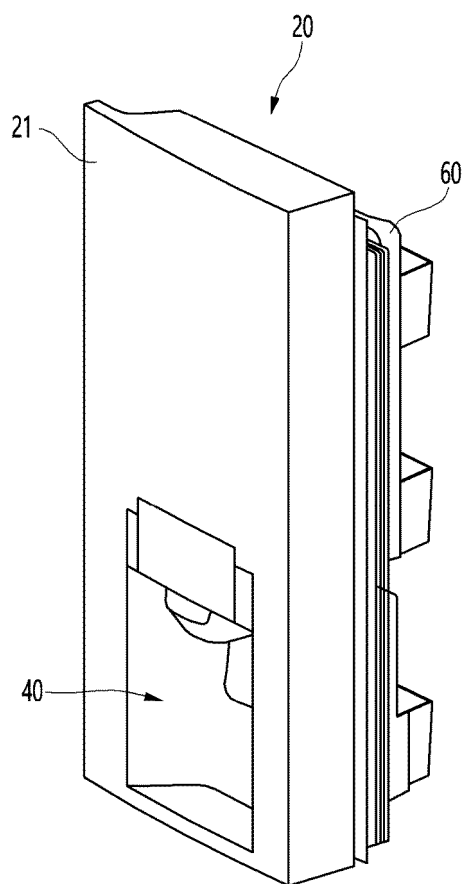


FIG. 2B

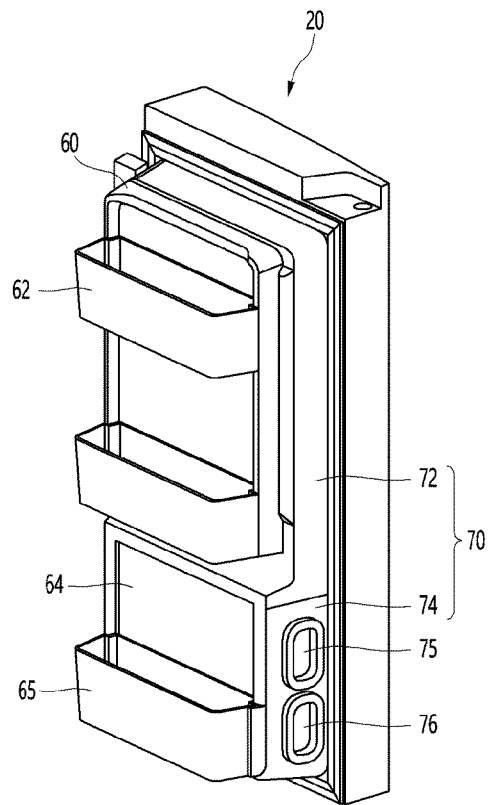


FIG. 3A

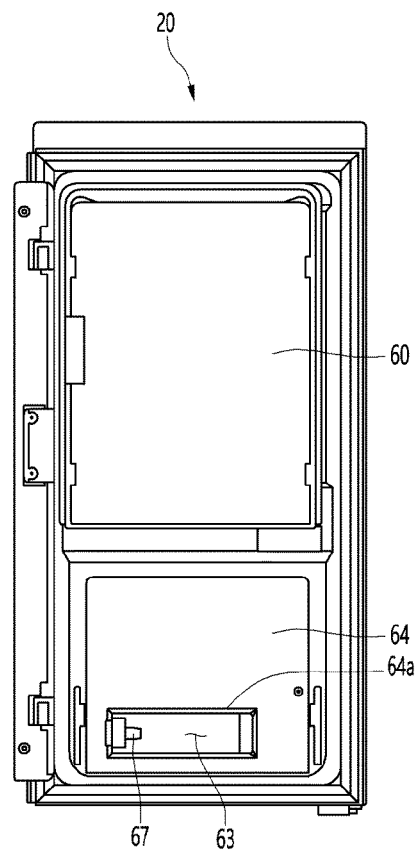


FIG. 3B

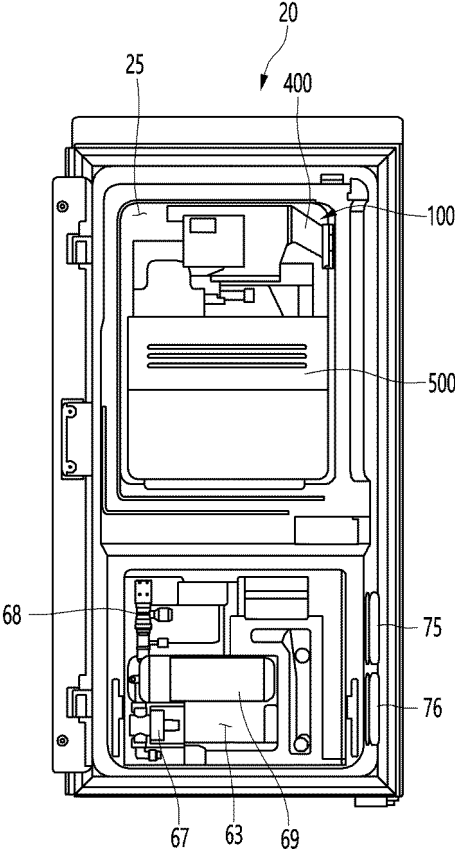


FIG. 4

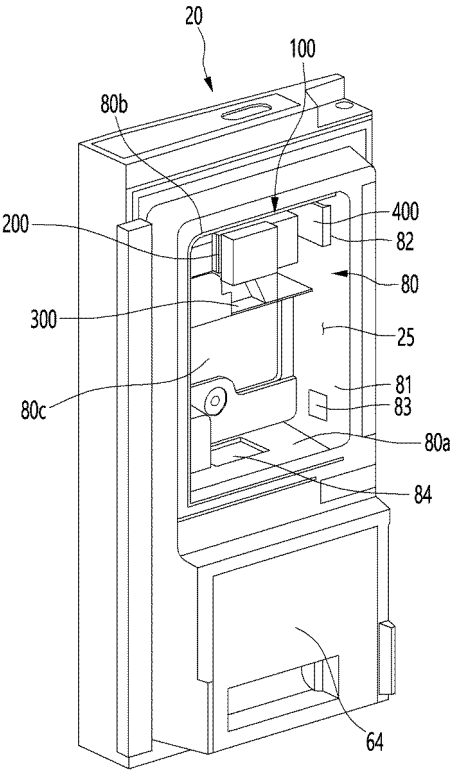


FIG. 5

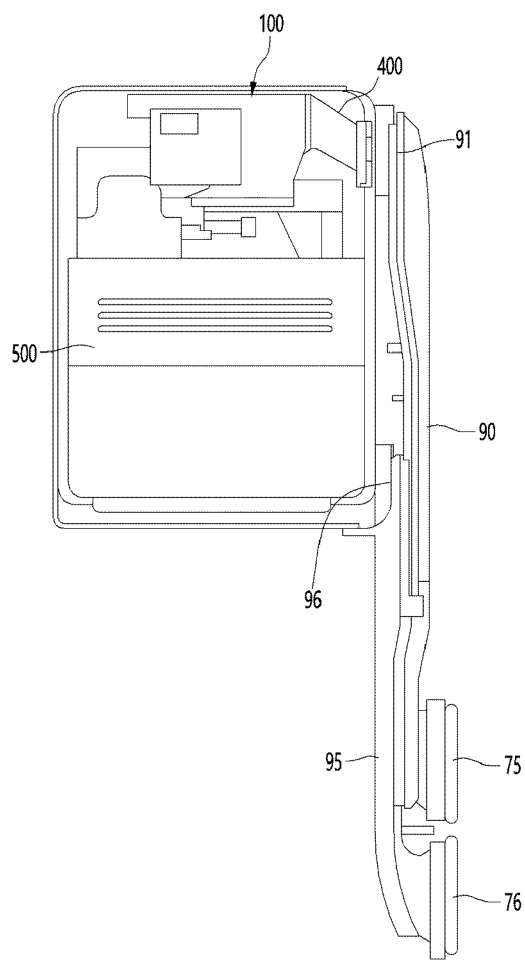


FIG. 6

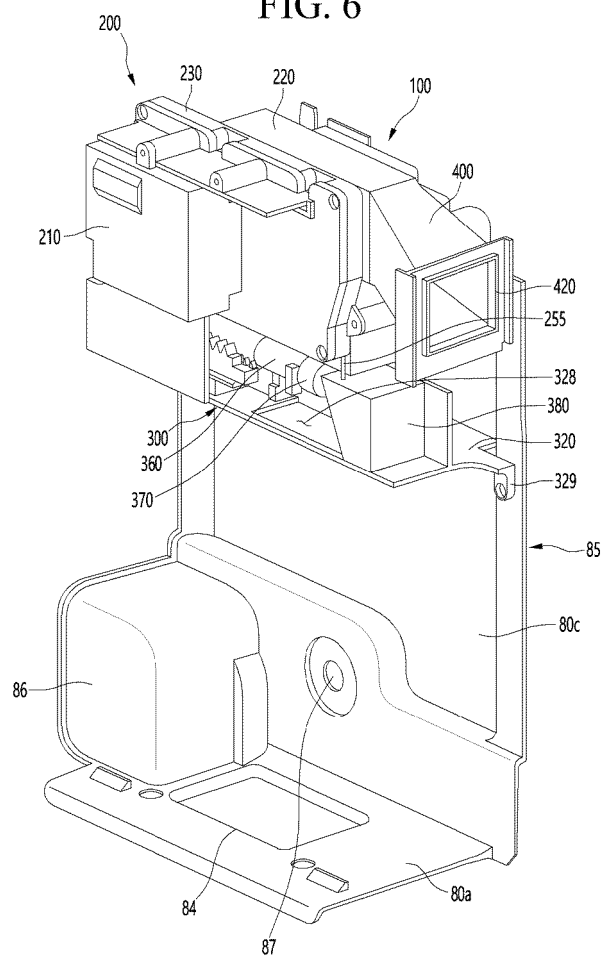


FIG. 7

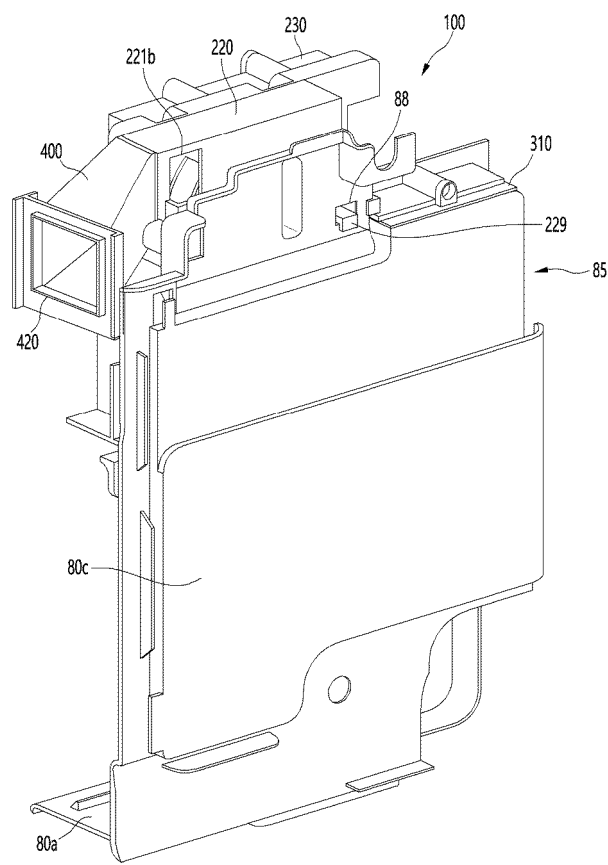


FIG. 8

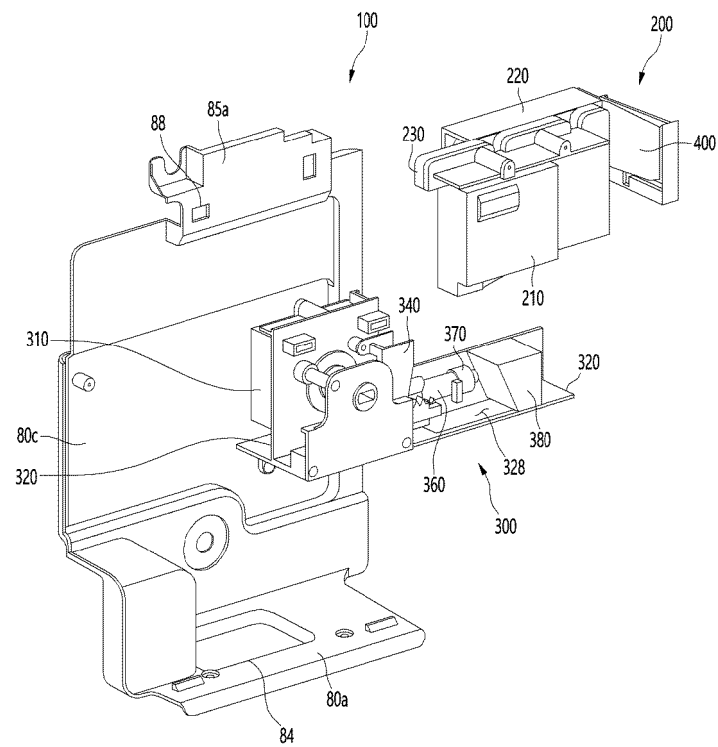


FIG. 9

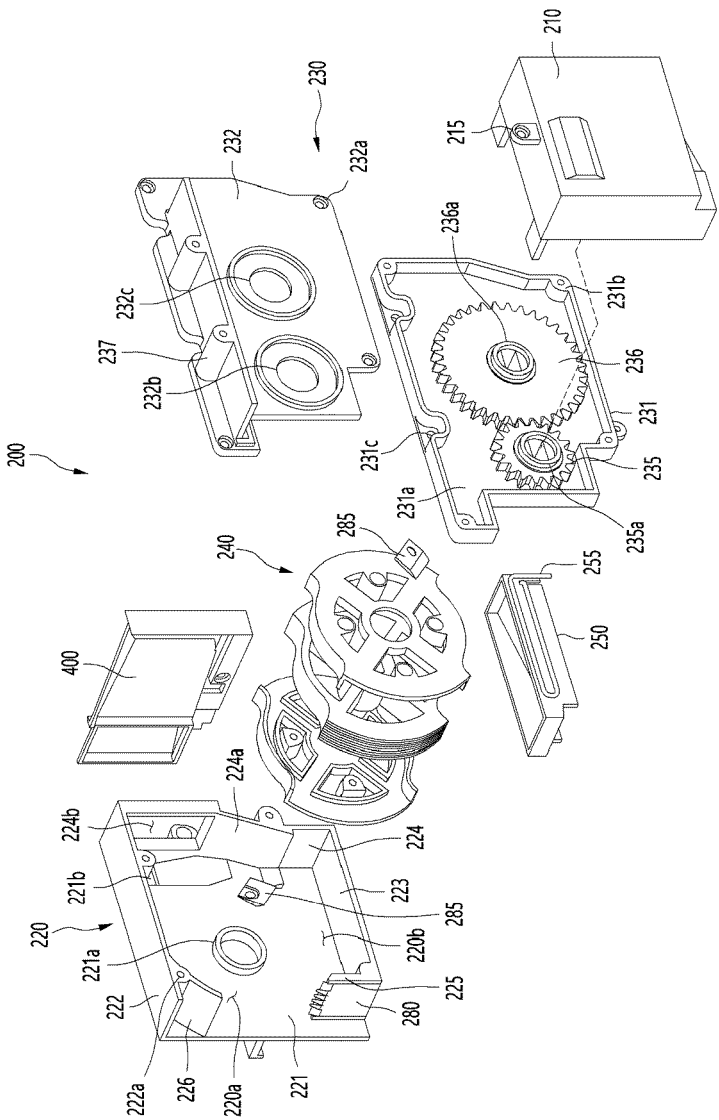


FIG. 10

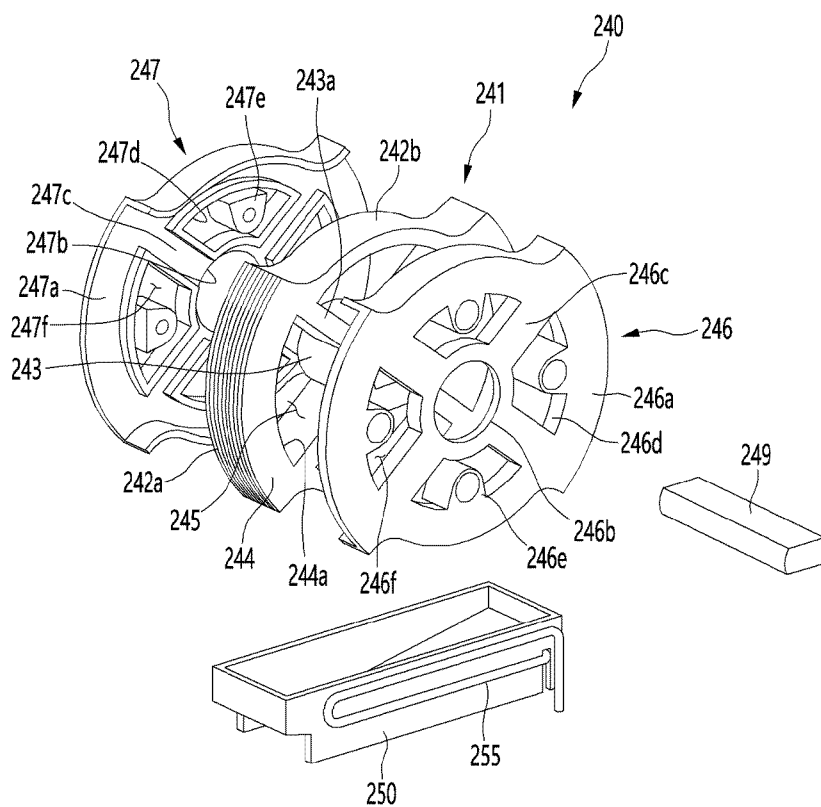


FIG. 11A

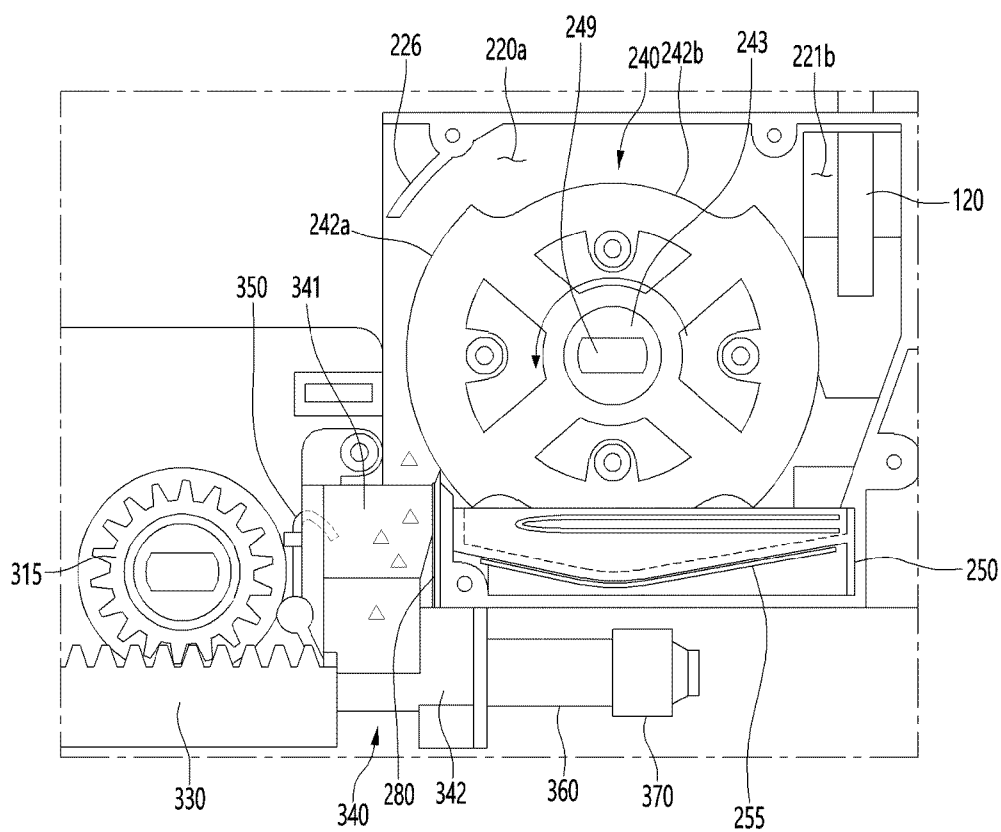


FIG. 11B

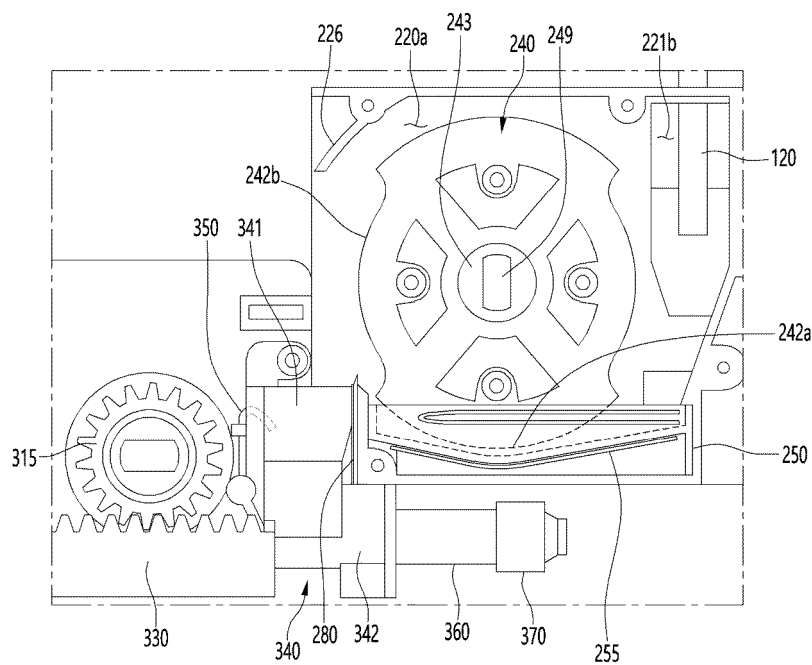


FIG. 12

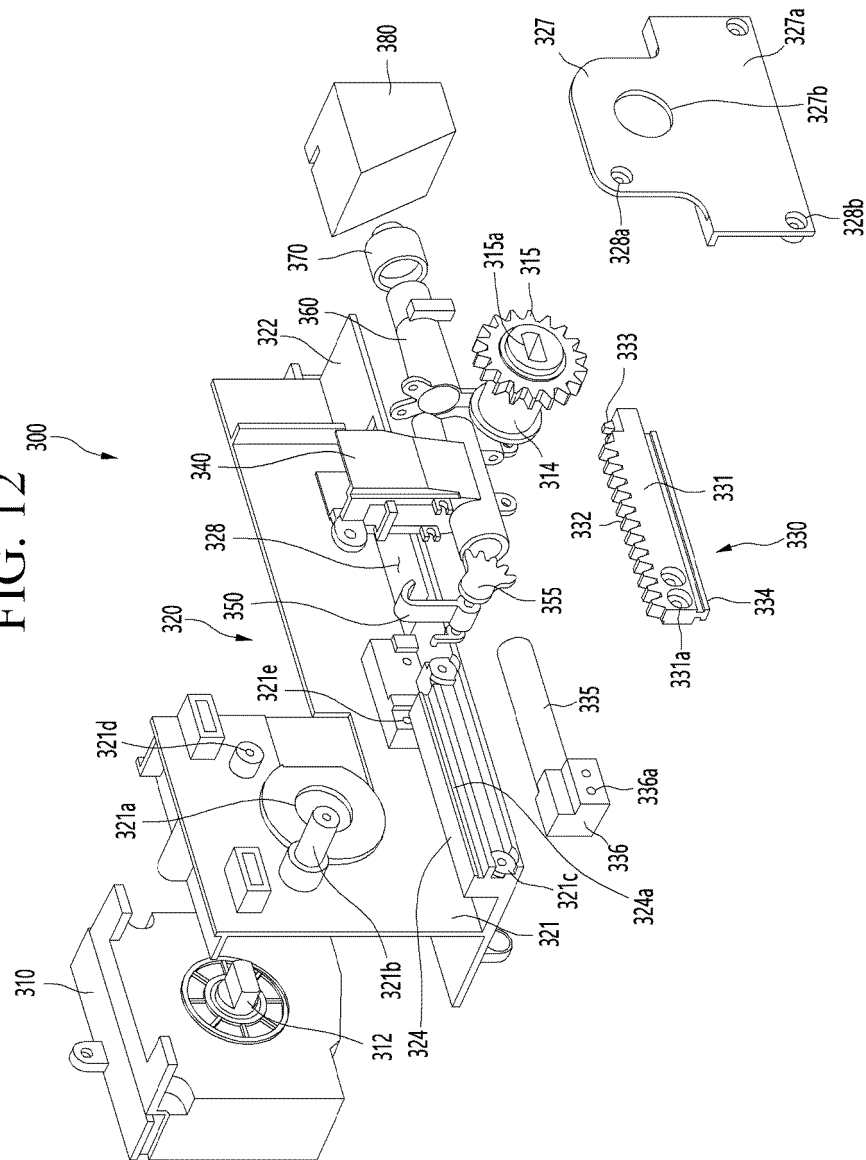


FIG. 13

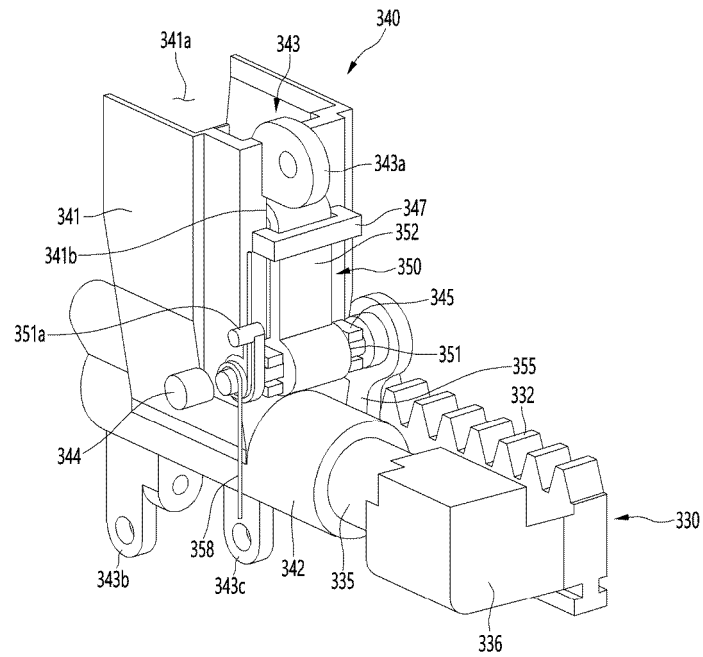


FIG. 14

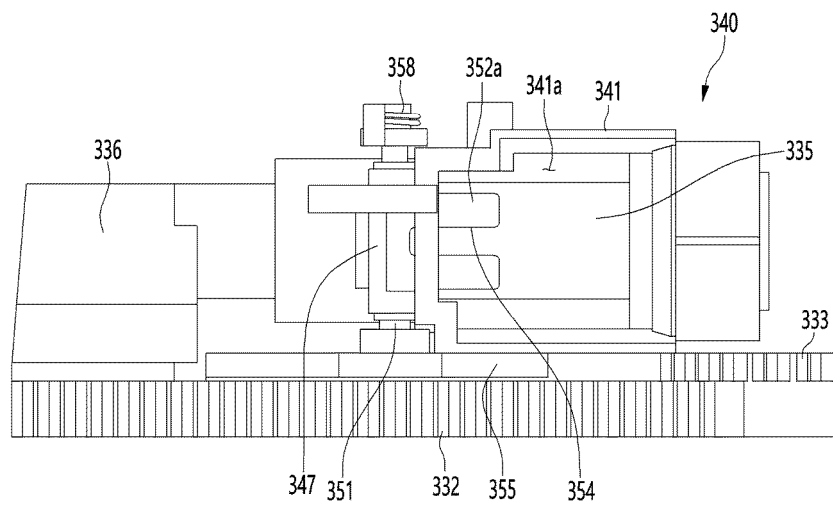


FIG. 15A

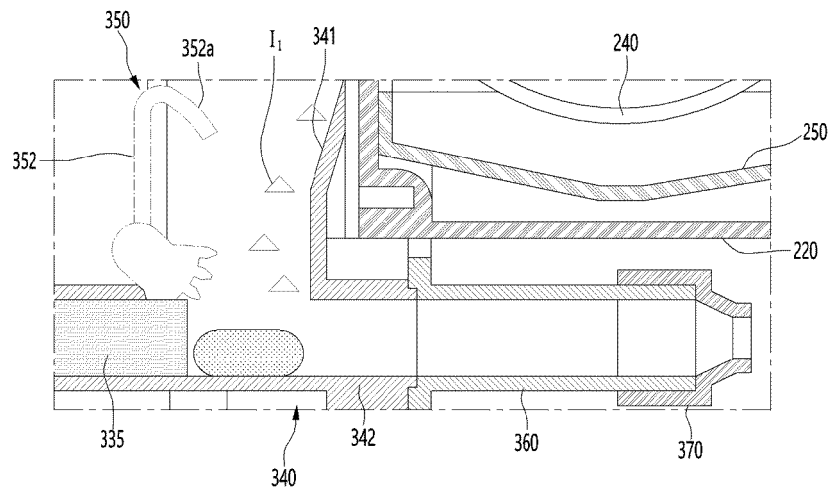


FIG. 15B

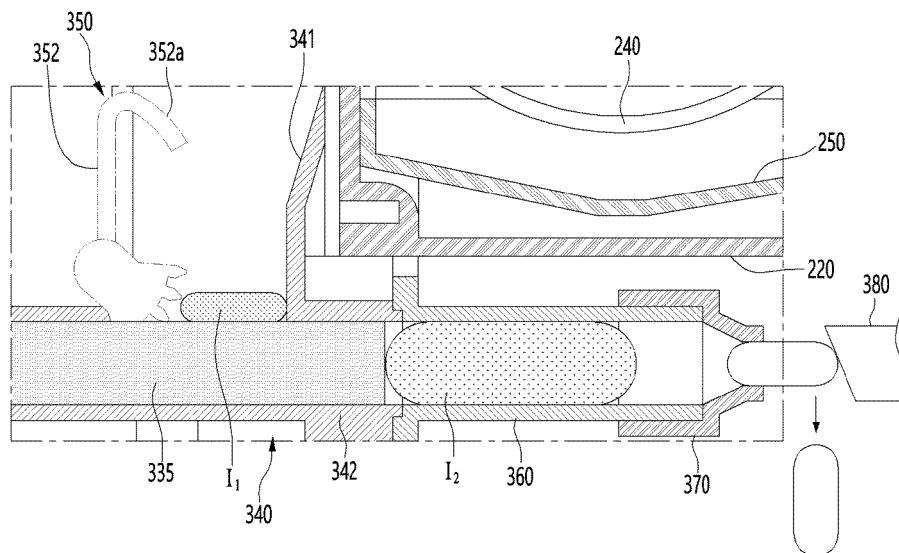


FIG. 15C

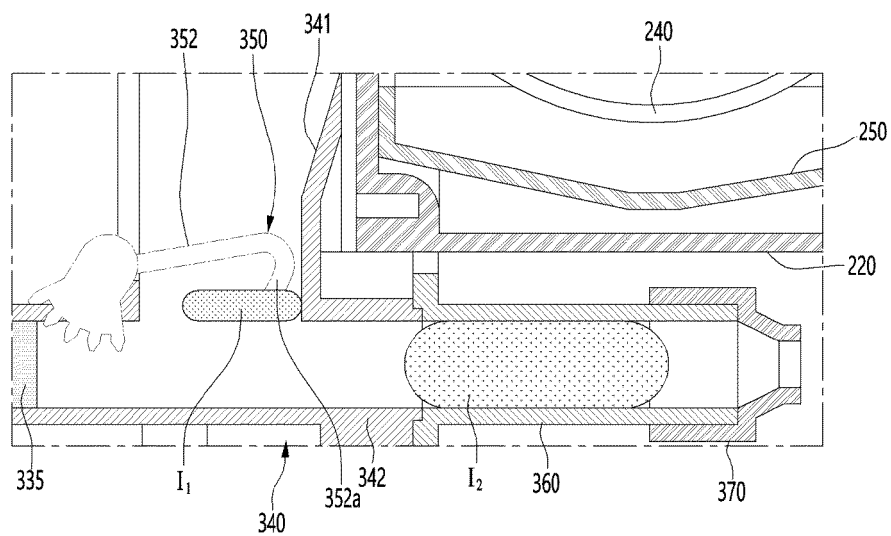


FIG. 15D

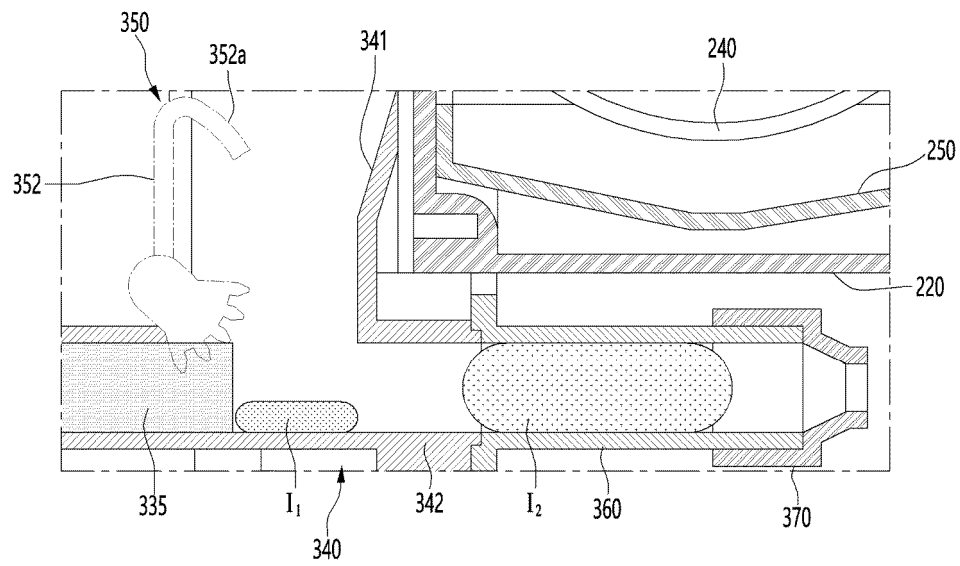


FIG. 16

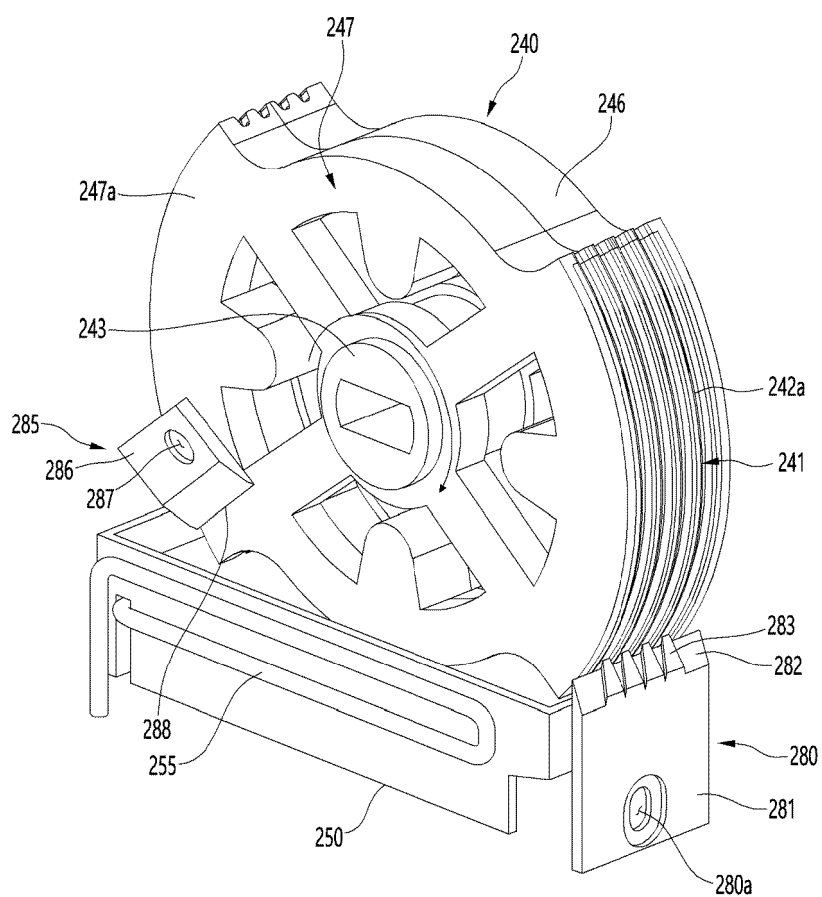


FIG. 17

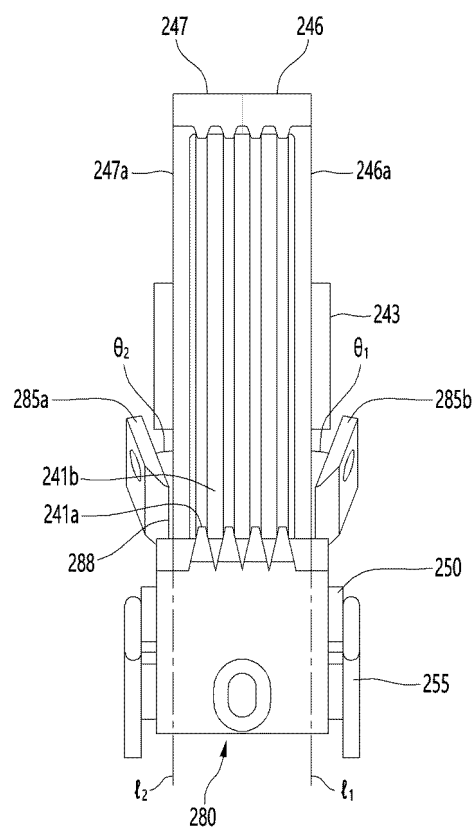


FIG. 18

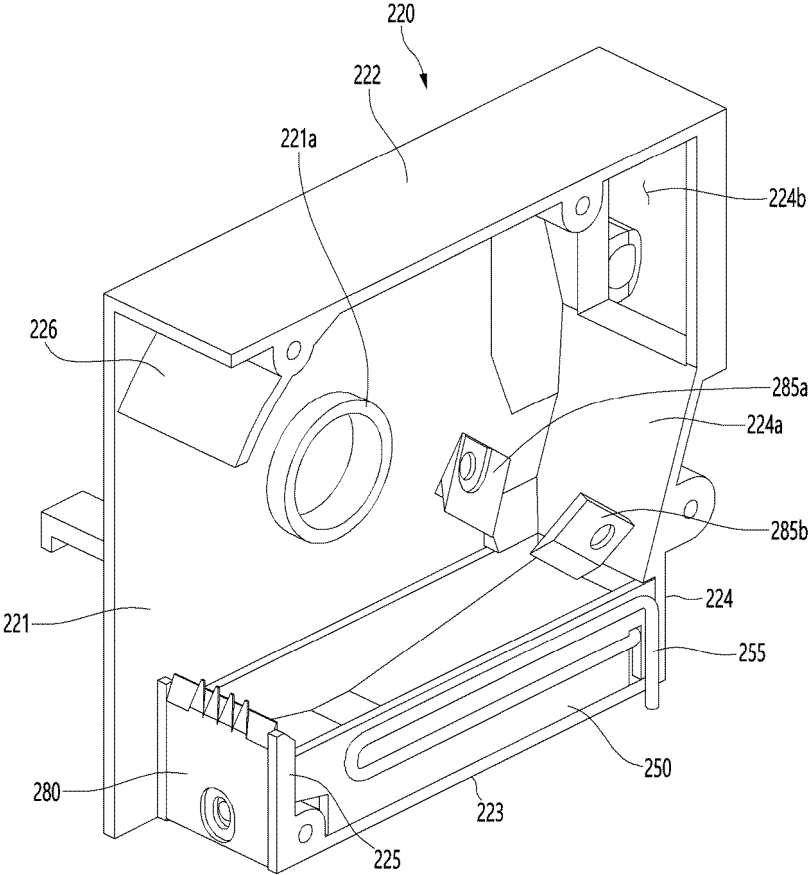


FIG. 19

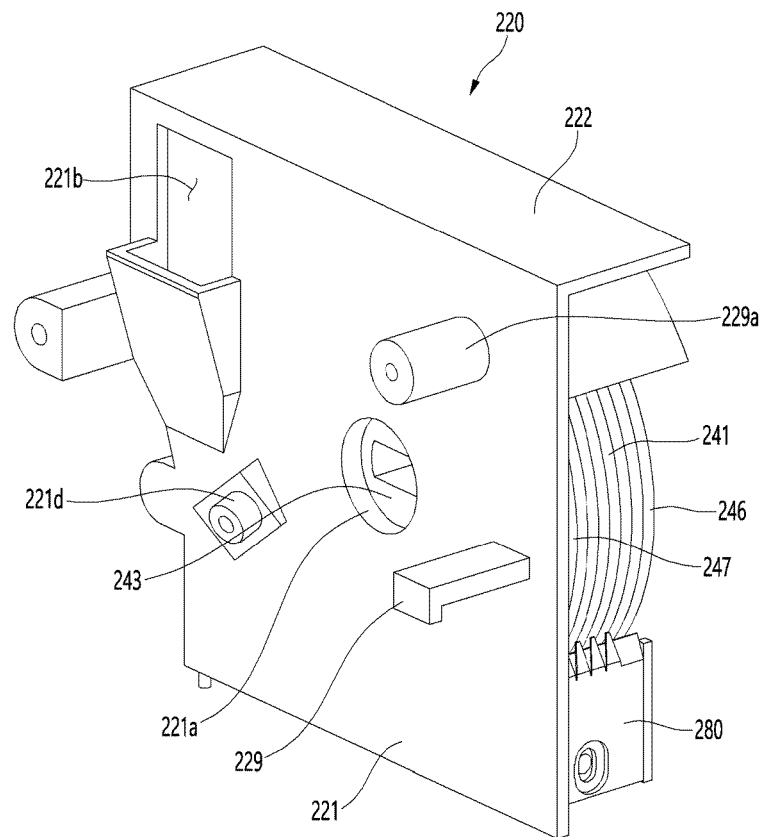


FIG. 20

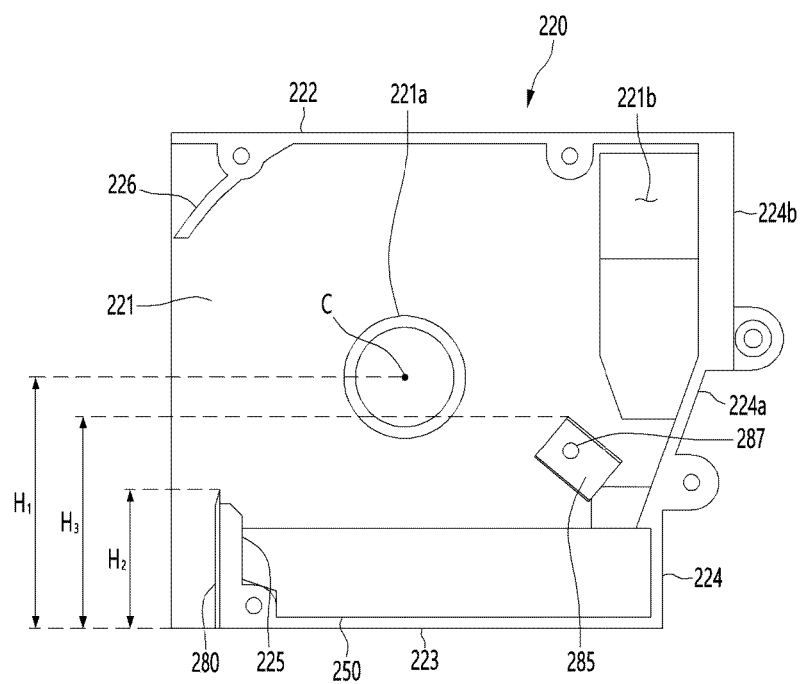


FIG. 21

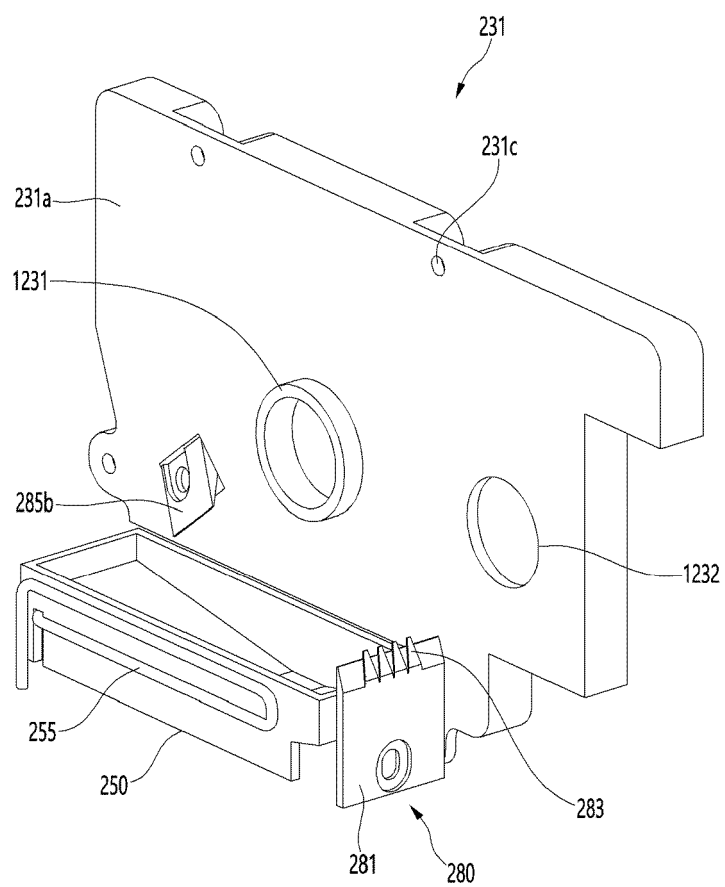


FIG. 22

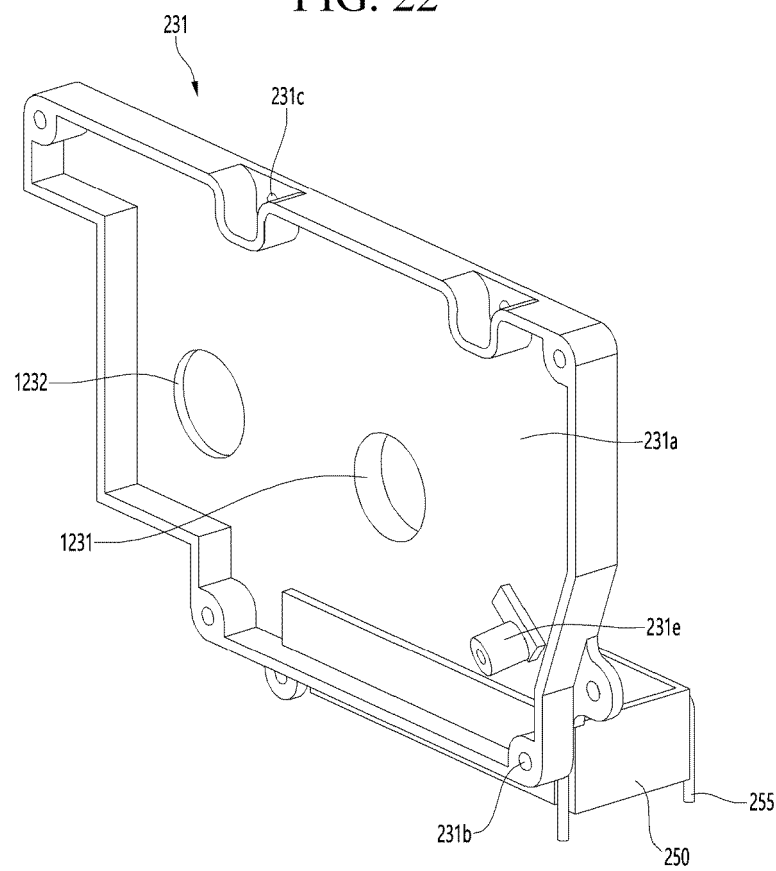


FIG. 23

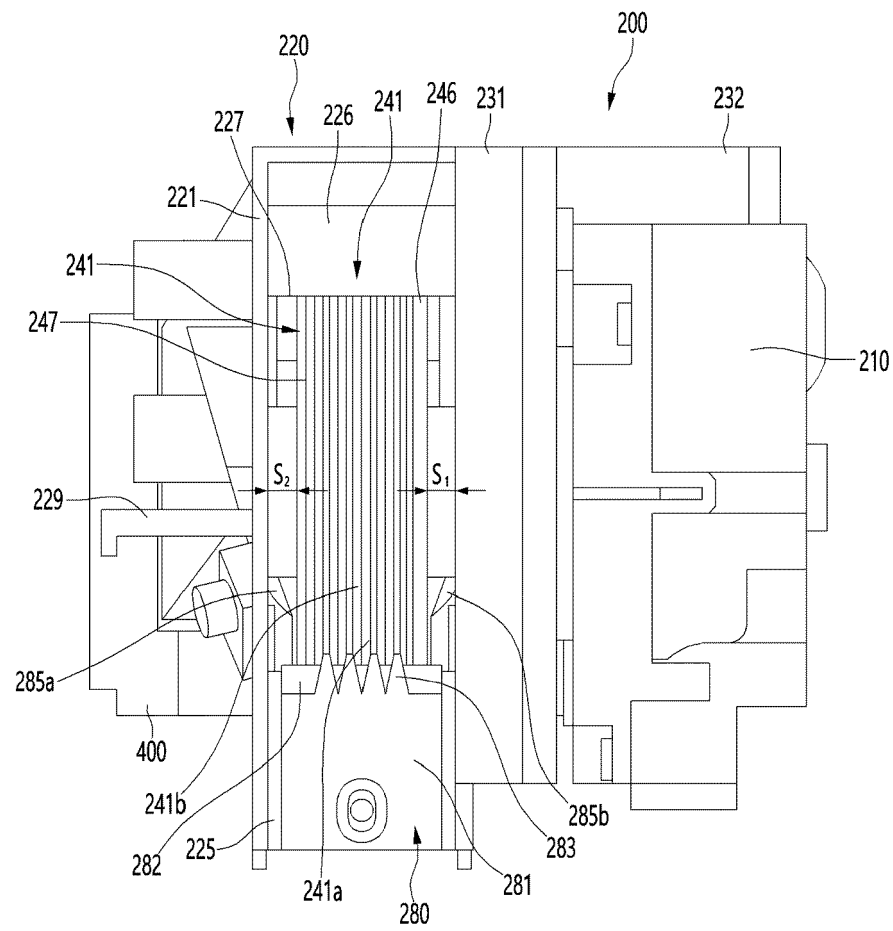


FIG. 24

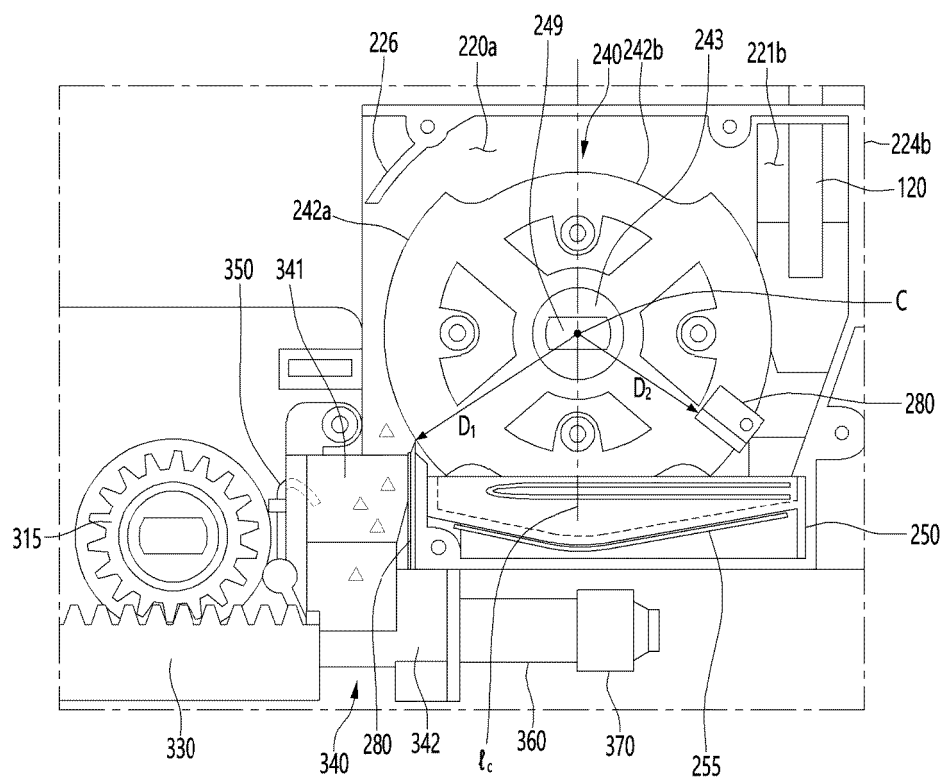


FIG. 25

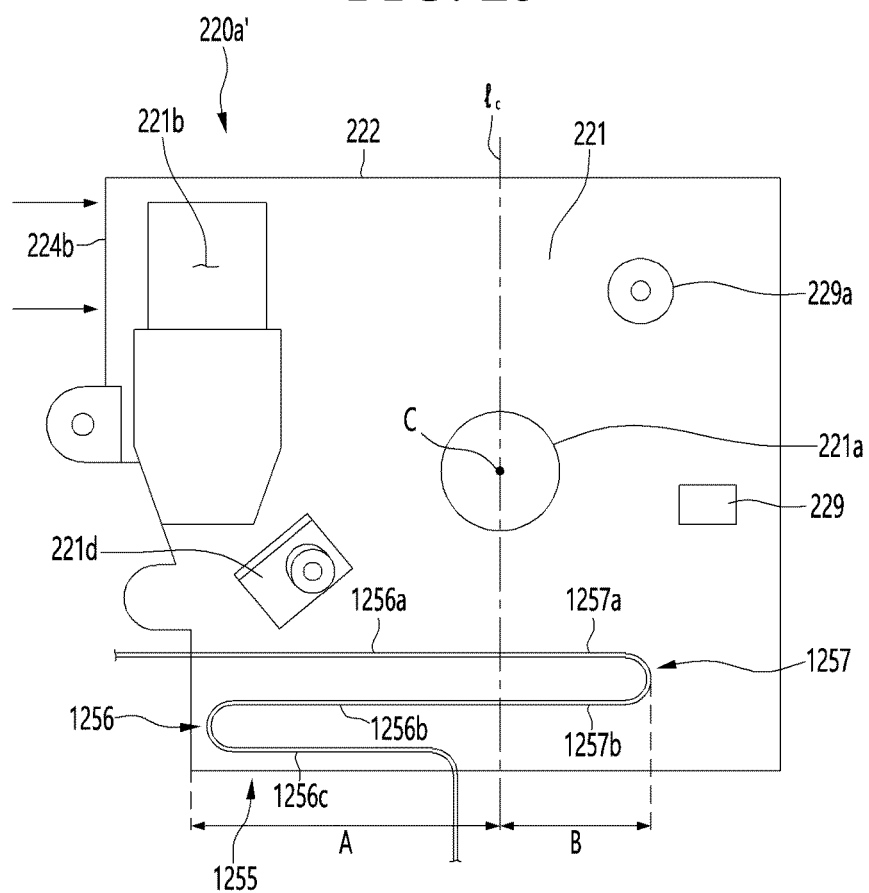


FIG. 26

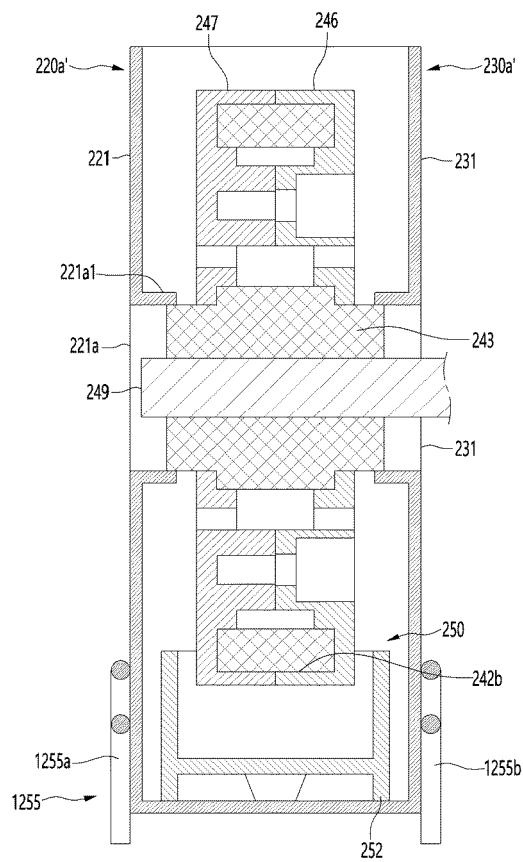
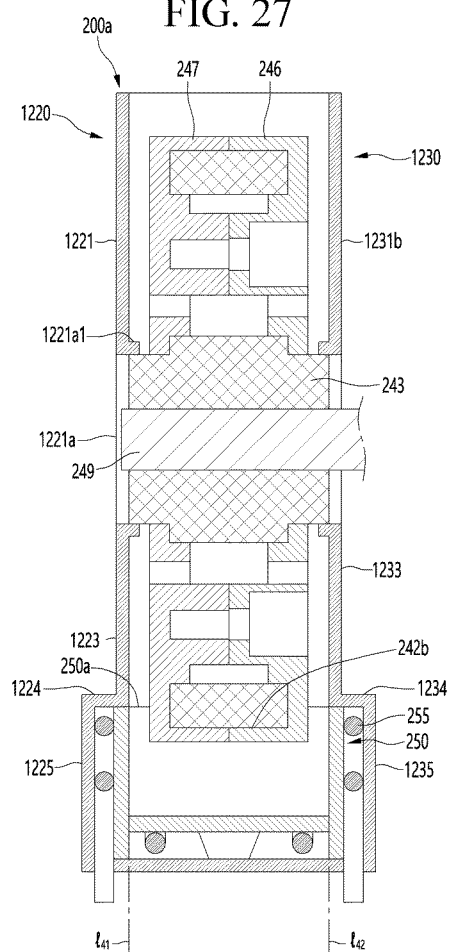


FIG. 27





EUROPEAN SEARCH REPORT

Application Number

EP 26 16 9015

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* paragraph [0038] - paragraph [0067]; figures 1-11 *	12	F25C1/24 F25C5/04 F25C5/08 F25C5/20 F25D23/02
Y	US 2011/146324 A1 (LEE SEUNG MOK [KR] ET AL) 23 June 2011 (2011-06-23)	1-11, 13-15	
A	* paragraph [0060] - paragraph [0175]; figures 1-19 *	12	
Y	CA 3 096 279 A1 (ELECTROLUX DO BRASIL SA [BR]) 24 October 2019 (2019-10-24)	4,6-9,15	
	* page 10, line 1 - page 10, line 8; figures 1-11 *		
			TECHNICAL FIELDS SEARCHED (IPC)
			F25C F25D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		13 July 2026	Kolev, Ivelin
CATEGORY OF CITED DOCUMENTS			
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T : theory or principle underlying the invention			
E : earlier patent document, but published on, or after the filing date			
D : document cited in the application			
L : document cited for other reasons			
& : member of the same patent family, corresponding document			

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