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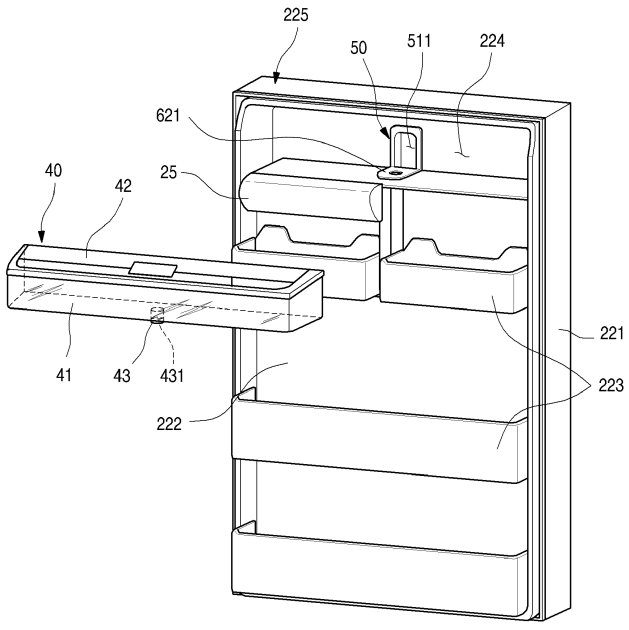
(54) REFRIGERATOR

(57) Provided is a refrigerator. The refrigerator includes a cabinet defining a refrigerating compartment and a freezing compartment, a refrigerating compartment door opening and closing the refrigerating compartment, a freezing compartment door opening and closing the freezing compartment, a dispenser provided in a front surface of the refrigerating compartment door, an ice maker provided in the freezing compartment door, a water tank detachably disposed on a rear surface of the refrigerating compartment door above the dispenser to supply water by a self-weight of the water when the water tank is mounted, and a tank connection member disposed in the refrigerating compartment door and connected to the water tank when the water tank is mounted to provide a passage branched toward the dispenser and the ice maker.

FIG. 3



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Description

BACKGROUND

[0001] Embodiments relate to a refrigerator.

[0002] In general, refrigerators are electric appliances for storing foods at low temperature in a storing space closed by a door. The storing space is cooled with cool air that exchanges heat with refrigerant in refrigeration cycles, thereby optimally storing foods.

[0003] Also, as the dietary changes and user's preferences vary, the refrigerator is in a trend of becoming larger and multifunctional, and various comfortable structures are being added to refrigerators.

[0004] For example, in recent years, a refrigerator in which a dispenser for dispensing water is provided in a refrigerating compartment door, or an ice maker for making ices is mounted in a freezing compartment or a freezing compartment door is being developed. Also, a water tank in which water to be supplied to the dispenser is stored may be detachably provided on a rear surface of the refrigerating compartment door.

[0005] However, in such a refrigerator, it is impossible to supply water from the water tank for supplying the water to the dispenser to the ice maker.

SUMMARY

[0006] Embodiments provide a refrigerator in which water is capable of being supplied to a dispenser and an ice maker by a water tank that is detachably disposed on a door.

[0007] Embodiments also provide a refrigerator in which water is capable of being supplied to a dispenser by a self-weight thereof when a water tank is mounted and also being supplied to the ice maker.

[0008] Embodiments also provide a refrigerator in which a detachable water tank having a simple structure, which is capable of supplying water to a dispenser and an ice maker, is provided.

[0009] Embodiments also provide a refrigerator in which a passage branched from a tank connection member connected to a water tank when the water tank is mounted is provided to supply water to a dispenser by a self-weight of the water and also supply water to an ice maker by a pump.

[0010] The object is solved by the features of the independent claim. Preferred embodiments are given in the dependent claims.

[0011] In one embodiment, a refrigerator includes: a cabinet defining a refrigerating compartment and a freezing compartment; a refrigerating compartment door opening and closing the refrigerating compartment; a freezing compartment door opening and closing the freezing compartment; a dispenser provided in a front surface of the refrigerating compartment door; an ice maker provided in the freezing compartment door; a water tank detachably disposed on a rear surface of the refrigerating compartment door above the dispenser to supply water by a self-weight of the water when the water tank is mounted; and a tank connection member disposed in the refrigerating compartment door and connected to the water tank when the water tank is mounted to provide a passage branched toward the dispenser and the ice maker.

[0012] The freezing compartment may be disposed above the refrigerating compartment.

[0013] A center hinge rotatably supporting the refrigerating compartment door and the freezing compartment door between the refrigerating compartment door and the freezing compartment door may be disposed in the cabinet, and the center hinge may have a hollow through which a tube for supplying water from the tank connection member to the ice maker passes.

[0014] The tank connection member may include: a case upper part which defines a recessed space exposed to the rear surface of the refrigerating compartment door and into which a portion of the water tank is inserted; and a case lower part defining a recessed space that is opened to the dispenser, wherein the tank connection member may further include a connector disposed in the case lower part to communicate with the water tank mounted on the case upper part.

[0015] The case lower port may be disposed higher than a dispensing nozzle of the dispenser to discharge the water within the water tank to the dispenser by the self-weight of the water.

[0016] A tank mounting part supporting a bottom surface and both side surfaces of the water tank may be disposed on the rear surface of the door, and a connector inlet opened to one side of the connector and connected to the water tank may be exposed to a bottom surface of the tank mounting part.

[0017] The water tank may include: a tank body storing the water; a tank cover opening and closing the tank body; and a tank outlet protruding from the tank body and inserted into the tank connection member when the refrigerating compartment door is mounted to provide a water discharge passage.

[0018] The tank connection member may include a connector that is branched into a dispenser-side connection part into which the tank outlet is inserted and which supplies water from a lower side of the tank outlet to the dispenser and an ice maker-side connection part supplying water to the ice maker.

[0019] The dispenser-side connection part may extend to the dispenser, and the ice maker-side connection part may extend to a side opposite to the dispenser-side connection part.

[0020] A side fixing part extending in a direction crossing the dispenser-side connection part and the ice maker-side connection part and rotatably shaft-coupled to both side surfaces of the tank connection member may be disposed on the connector.

[0021] A lower fixing part which extends downward along the side fixing part and to which a screw for fixing

is coupled may be further disposed on a lower end of the connector.

[0022] An opening protrusion protruding upward and inserted into the tank outlet when the water tank is mounted to open a check valve within the tank outlet may extend inside the connector.

[0023] A pump connected to the branched one side of the tank connection member to supply water to the ice maker may be disposed in the refrigerating compartment door, and the pump may be disposed lower than the water tank.

[0024] A sealing member sealing a gap between the tank outlet and the connector may be disposed on an opened upper end of the connector, and a sealing rib protruding inward and closely attached to an outer surface of the tank outlet may be disposed inside the sealing member.

[0025] The dispenser-side connection part and the ice maker-side connection part may be inclined downward, and a pump for supplying water to a dispensing nozzle of the dispenser and the ice maker may be disposed lower than the dispenser-side connection part and the ice maker-side connection part.

[0026] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Fig. 1 is a perspective view of a refrigerator according to an embodiment.

Fig. 2 is a view of the refrigerator with a door opened.

Fig. 3 is an exploded perspective view illustrating a mounted structure of a water tank according to an embodiment.

Fig. 4 is a view illustrating an arrangement and water supply structure of an ice maker assembly and the water tank according to an embodiment.

Fig. 5 is a cross-sectional view taken along line 5-5' of Fig. 1.

Fig. 6 is an exploded perspective view illustrating a coupling structure of a dispenser and a tank connection member according to an embodiment.

Fig. 7 is an exploded perspective view of the tank connection member.

Fig. 8 is a cross-sectional view of a connector according to an embodiment.

Fig. 9 is a view illustrating a water flow state in the tank connection member.

Fig. 10 is a schematic view an overall water flow path in the refrigerator.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0028] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings. The scope of the present disclosure, however, shall not be construed as being limited to embodiments provided herein. Rather, it will be apparent that other embodiments that fall within the scope of the present disclosure may easily be derived through adding, modifying, and deleting elements herein.

[0029] Fig. 1 is a perspective view of a refrigerator according to an embodiment. Also, Fig. 2 is a view of the refrigerator with a door opened.

[0030] As illustrated in the drawings, a refrigerator 1 according to an embodiment includes a cabinet 10 defining a storage space therein and a door 20 opening and closing an opened front surface of the cabinet 10, which define an outer appearance of the refrigerator 1.

[0031] A refrigerating compartment 12 and a freezing compartment 11 may be vertically defined in the cabinet 10. The refrigerating compartment 12 may be defined in a lower portion of the cabinet 10, and the freezing compartment 11 may be defined in an upper portion of the cabinet 10. Also, although not shown, constituents such as a compressor, a condenser, an evaporator, and an expansion device, which constitute a refrigeration cycle for cooling the storage space, may be provided in the cabinet 10.

[0032] The door 20 may include a refrigerating compartment door 22 for opening and closing the refrigerating compartment 12 and a freezing compartment door 21 for opening and closing the freezing compartment 11. Since the refrigerating compartment door 22 is disposed at a lower side, the refrigerating compartment door 22 may be called a lower door. Also, since the freezing compartment door 21 is disposed at an upper side, the freezing compartment door 21 may be called an upper door.

[0033] Also, the refrigerating compartment door 22 and the freezing compartment door 21 may be rotatably mounted on the cabinet 10. Here, a center hinge 13 rotatably supporting the refrigerating compartment door 22 and the freezing compartment door 21 may be disposed between the refrigerating compartment door 22 and the freezing compartment door 21.

[0034] An upper end of the refrigerating compartment door 22 and a lower end of the freezing compartment door 21 may be shaft-coupled to each other by the center hinge 13. As illustrated in Fig. 4, a hinge shaft of the center hinge 13 may have a hollow or hole. Thus, a tube through which water between the refrigerating compartment door 22 and the freezing compartment door 21 flows may pass through the hollow. The hollow may be designated also as opening.

[0035] Also, the upper end of the refrigerating compartment door 22 and the lower end of the freezing compartment door 21 may be shaft-coupled to each other by a hinge (not shown) to rotatably support the refrigerating compartment door 22 and the freezing compartment door 21.

[0036] An ice maker assembly 30 may be provided on

the freezing compartment door 21. The ice maker assembly 30 may include a case 31 mounted on a rear surface of the freezing compartment door 21, an ice maker 33 provided in the case 31 to make ice, and an ice drawer 32 storing ice made in the ice maker 33.

[0037] The ice maker 33 may be provided as an auto ice maker that automatically transfers ice when the ice making is completed after water for making ice is automatically supplied. A structure of the auto ice maker may be realized through the general technology, and auto ice makers having various structures may be applied to the present disclosure.

[0038] Also, the ice drawer 32 may be disposed below the ice maker 33 and mounted to be withdrawable from the case 31. A user may take out the made ice through the ice drawer and use the ice.

[0039] A dispenser 70 for dispensing water at the outside of the refrigerating compartment door 22 may be provided in a front surface of the refrigerating compartment door 22. The dispenser 70 may include a dispenser case 71, which provides a recessed space, in the front surface of the refrigerating compartment door 22. Alternatively, at least a portion of the recessed space of the dispenser 70 may be defined by recessing an outer case 31 defining an outer surface of the refrigerating compartment door 22.

[0040] A cover plate 73 covering a dispensing nozzle 75 through which water is dispensed may be disposed on an upper end of the dispenser 70. Also, a tray 74 for collecting residual water occurring when the water is dispensed may be disposed on a lower end of the dispenser 70. Also, a dispensing lever 72 for manipulating water dispensing through the dispensing nozzle 75 may be disposed in the recessed inner side of the dispenser 70. The water may be dispensed through the dispensing nozzle 75 by the manipulation of the dispensing lever 72.

[0041] A water tank 40 may be disposed on the rear surface of the refrigerating compartment door 22. The water tank 40 may be disposed on an upper end of the rear surface of the refrigerating compartment door 22. That is, the water tank 40 may be disposed at a position higher than that of the dispenser 70. Thus, the water dispensed from the water tank 40 may be supplied to the dispenser 70 by a self-weight thereof. When the dispensing lever 72 is manipulated, the water may be dispensed through the dispensing nozzle 75.

[0042] Hereinafter, the water tank 40 will be described in more detail with reference to the drawing.

[0043] Fig. 3 is an exploded perspective view illustrating a mounted structure of the water tank according to an embodiment.

[0044] As illustrated in the drawing, the water tank 40 may include a tank body 41 defining a space into which water is accommodated and a cover 42 opening and closing the tank body 41. At least a portion of the tank body 41 may be made of a transparent material so that a level of water stored therein is confirmed.

[0045] A tank outlet 43 may be provided at one side of a bottom surface of the tank body 41 or a circumferential surface including the bottom surface. The tank outlet 43 may have a tube shape extending downward to communicate with a tank connection member 50 provided on the rear surface of the refrigerating compartment door 22. Thus, in the state in which the water tank 40 is mounted, water within the water tank 40 may be supplied to the tank connection member 50.

[0046] The tank outlet 43 may extend directly downward or in an inclined direction and have a tube shape that is insertable into the tank connection member 50. Also, a check valve may be disposed in the tank outlet 43. Thus, in a state in which the water tank 40 is separated from the refrigerating compartment door 22, the check valve may be closed, and thus, the water within the water tank 40 may not be discharged. When the water tank 40 is mounted on the refrigerating compartment door 22, the check valve may be opened, and thus, the water within the water tank 40 may be supplied through the tank connection member 50.

[0047] For this, the tank connection member 50 may be mounted on a door liner 222, and a connection member case may be exposed through a tank mounting part 224. Also, an upper recess part 511 that is recessed to accommodate the tank outlet 43 may be defined in the tank connection member 50. Also, a connector inlet 621 of a connector 60 into which the tank outlet 43 is inserted may be exposed to the inside of the upper recess part 511. A configuration of the tank connection member 50 will be described below in more detail.

[0048] The tank cover 42 may open and close an opened surface of the tank body 41. When the tank cover 42 is opened, water may be filled into the tank body 41. That is, the user may confirm a level of water stored in the water tank 40 through the tank body 41. Then, if it is determined that supplement of water is required, the tank cover 42 may be opened to fill water into the tank body 41. The water tank 40 may supplement water in the state of being mounted on the refrigerating compartment door 22. After the water tank 40 is separated to fill water, the water tank 40 may be mounted on the refrigerating compartment door 22.

[0049] The water tank 40 is mounted on the rear surface of the refrigerating compartment door 22. In the state in which the refrigerating compartment door 22 is closed, the water tank 40 is disposed in an inner region of the refrigerating compartment 12. Thus, the water accommodated in the water tank 40 may be cooled to a low temperature by cold air of the refrigerating compartment 12. Thus, the cooled water may be provided through the dispenser 70.

[0050] The refrigerating compartment door 22 may include an outer plate 221 defining an outer appearance of the front surface thereof and a door liner 222 defining an outer appearance of the rear surface thereof. A plurality of door baskets 223 may be detachably disposed on the door liner 222. Also, a tank mounting part 224 that is recessed inward may be disposed on an upper end of

the door liner 222 defining the rear surface of the refrigerating compartment door 22.

[0051] The tank mounting part 224 may support at least lower end and both left and right surfaces of the water tank 40. Also, a coupling structure to the water tank 40 may be provided in the tank mounting part 224. Thus, even though the refrigerating compartment door 22 rotates, the water tank 40 may not be arbitrarily separated. Also, the tank connection member 50 may be disposed inside the tank mounting part 224 to communicate with the tank outlet 43 when the water tank 40 is completely mounted on the tank mounting part 224.

[0052] Fig. 4 is a view illustrating an arrangement and water supply structure of the ice maker assembly and the water tank according to an embodiment.

[0053] As illustrated in the drawing, the ice maker assembly 30 may be mounted on the rear surface of the freezing compartment door 21. Here, the case 31 may be coupled to the mounting bracket 34 disposed on the rear surface of the freezing compartment door 21. At least a portion of the mounting bracket 34 may be exposed through the door liner defining a rear surface of the freezing compartment door 21. Also, a connector part 341 and a water supply tube connection part 342 may be disposed on the mounting bracket 34.

[0054] The connector part 341 may be coupled to one side of the ice maker 33 in a male and female connection manner. An electric wire may be connected to the connector part 341 to communicate with the ice maker 33 and supply power to the ice maker 33. Also, the water supply tube connection part 342 may be connected to an ice maker-side tube 23 to supply the water within the water tank 40 to the ice maker 33.

[0055] Also, the ice maker 33 may be disposed on an upper portion of the case 31, and a plurality of cold air holes 311 for supplying cold air to the ice maker 33 may be defined in a top surface of the case 31. The ice drawer 32 that is withdrawable from the case 31 may be disposed below the ice maker 33. Also, a drawer for accommodating foods may be further disposed below the ice drawer 32.

[0056] The water tank 40 may be disposed on the refrigerating compartment door 22. Also, in the state in which the water tank 40 is mounted, water within the water tank 40 may communicate with the tank connection member 50. Also, a pump case 25 may be disposed on one side of the tank connection member 50.

[0057] A pump 24 for supplying water supplied from the water tank 40 to the ice maker 33 disposed there above may be provided in the pump case 25. The pump 24 may be accommodated in a pump mounting part 251 provided inside the pump case 25. Also, the tank connection member 50 and the pump 24 may be connected to each other by a connection tube 231. The pump 24 may be connected to one end of the ice maker-side tube 23.

[0058] Thus, when the pump 24 is driven, the water supplied from the water tank 40 may flow to the pump through the connection tube 231 and then flow upward along the ice maker-side tube 23 through the pump 24 and be supplied to the ice maker 33.

[0059] Here, the ice maker-side tube 23 may pass through the hinge shaft of the center hinge 13 while being directed to the freezing compartment door 21 via the refrigerating compartment door 22. Thus, the ice maker-side tube 23 may not be exposed to the outside and thus do not interfere with the refrigerating compartment door 22 and the freezing compartment door 21 when the refrigerating compartment door 22 and the freezing compartment door 21 rotate.

[0060] Also, the ice maker-side tube 23 may be provided in plurality, and the plurality of ice-maker-side tubes 23 may be connected to each other. For example, as illustrated in the drawing, the ice maker-side tube 23 may include a first tube 232 extending up to the center hinge 13 in the refrigerating compartment 12 and a second tube 233 extending from the center hinge 13 up to the ice maker 33. Here, the first tube 232 and the second tube 233 may be connected to each other at the center hinge 13.

[0061] Hereinafter, the dispenser 70 and the tank connection member 50 will be described in more detail.

[0062] Fig. 5 is a cross-sectional view taken along line 5-5' of Fig. 1. Also, Fig. 6 is an exploded perspective view illustrating a coupling structure of the dispenser and the tank connection member according to an embodiment.

[0063] As illustrated in the drawings, the dispenser 70 may be disposed in the front surface of the refrigerating compartment door 22. The dispenser 70 may have a recessed space by the dispenser case 71. Also, the dispenser case 71 may be configured to support the recessed front surface of the refrigerating compartment door 22.

[0064] In detail, the dispenser case 71 may include an upper case 711 defining an upper portion of the dispenser 70, a lower case 712 defining a lower portion of the dispenser case 71, and a case connection part 713 connecting the upper case 711 to the lower case 712.

[0065] An upper accommodation part 711a may be recessed to be defined in the upper case 711. The upper accommodation part 711a may be opened forward, and the dispensing nozzle 75 and the dispensing lever 72 may be disposed in the upper accommodation part 711a. Also, at least a portion of the upper accommodation part 711a in which the dispensing nozzle 75 is disposed may be covered by the upper cover 42. For this, a cover coupling part 711b coupled to the upper cover 42 may be disposed inside the upper accommodation part 711a.

[0066] Also, a tube connection part 751 connected to the dispenser-side tube 75 is disposed on an upper end of the dispensing nozzle 75. The dispenser-side tube 76 may be disposed inside the refrigerating compartment door 22. The dispenser-side tube 76 has one end connected to the dispensing nozzle 75 by passing through the upper accommodation part 711a and the other end connected to a dispenser-side connection part disposed

on the tank connection member 50. Thus, the water within the water tank 40 may be introduced into the dispenser-side tube 76 through the dispenser-side connection part 63 of the connector 60 and then be dispensed to the dispensing nozzle 75 through the dispenser-side tube 76.

[0067] Here, the dispensing nozzle 75 or a dispensing valve 752 for opening and closing a passage connected to the dispensing nozzle 75 may be further disposed at one side of the dispensing nozzle 75 or the upper accommodation part 711a. The dispensing valve 752 may be opened and closed by manipulating the dispensing lever 72.

[0068] The lower accommodation part 712a may be defined in the recessed lower end of the dispenser 70, i.e., the lower case 712 to provide a space in which the dispenser tray 74 is detachably mounted. Also, a tray coupling part 712b coupled to the dispenser tray 74 may be further disposed on a bottom surface of the lower accommodation part 712a.

[0069] The case connection part 713 is provided in a pair. The pair of case connection parts 713 may extend from both upper ends of the lower accommodation part 712a up to a lower end of the upper accommodation part 711a. A space between the upper accommodation part 711a and the lower accommodation part 712a may be maintained by the case connection part 713.

[0070] Fig. 17 is an exploded perspective view of the tank connection member. Also, Fig. 8 is a cross-sectional view of the connector according to an embodiment.

[0071] As illustrated in the drawings, the tank connection member 50 may include the connection member case and the connector 60 mounted on the connection member case.

[0072] In detail, the connection member case may be injection-molded by using a plastic material. The connector 60 may be fixedly mounted on the connection member case so that the dispenser-side tube 76 and the connection tube 231 are connected. Also, the connection member case may have a structure into which the tank outlet 43 of the water tank 40 is insertable.

[0073] The connection member case may include a case upper part 51 and a case lower part 52. The case upper part 51 may be a portion that is exposed to the outside of the door liner 222, and the case lower part 52 may be disposed inside the door liner 222. Also, the case upper part 51 may be connected to the water tank 40, and the connector 60 may be disposed on the case lower part 52.

[0074] The case upper part 51 may define an upper portion of the connection member case. An upper recess part 511 that is recessed may be defined at a center of the case upper part 51, and an upper edge 512 may be disposed on a circumference of the upper recess part 511. Thus, in the state in which the tank connection member 50 is mounted on the refrigerating compartment door 22, the upper recess part 511 may be exposed through the rear surface of the refrigerating compartment door 22.

[0075] The upper edge 512 may adhere to be fixed to the door liner 222. Also, the upper edge 512 may have a shape corresponding to that of the upper recess part 511. The upper edge 512 may include a vertical part coming into contact with a rear surface of the tank mounting part 224 and a horizontal part 512b coming into contact with a bottom surface of the tank mounting part 224.

[0076] Also, the opened top surface of the connector 60 may be exposed to an inner surface of the upper recess part 511. Thus, when viewing the rear surface of the refrigerating compartment door 22, the upper recess part 511 may be exposed to the inside of the tank mounting part 224. A connector inlet 621 of the top surface of the connector may be exposed to the inside of the upper recess part 511 to communicate with the water tank 40.

[0077] The case lower part 52 may define a lower portion of the connection member case. The case lower part 52 may extend to a lower end of the case upper part 51 and include a lower recess part 521 that is opened forward and a lower edge disposed on a circumference of the lower recess part 521.

[0078] The lower recess part 521 may have an upper end coming into contact with the horizontal part 512b. A communication part 522 communicating with the lower recess part 521 may be provided in a bottom surface of the horizontal part 512b, i.e., a top surface of the lower recess part 521. The communication part 522 may extend to the inside of the lower recess part 521 and be connected to the opened top surface of the connector 60.

[0079] Also, a tube hole 523 that is opened backward may be defined in one side of an inner surface of the lower recess part 521. The tube hole 523 may be opened at a position corresponding to the ice maker-side connection part 64 of the connector, and the ice maker-side connection part 64 or the connection tube 231 connected to the ice maker-side connection part 64 may pass through the tube hole 523.

[0080] The lower recess part 521 may be disposed at a rear side corresponding to the dispenser 70, and the dispenser-side connection part 63 of the connector 60 accommodated in the lower recess part 521 may extend to the dispenser 70.

[0081] The connector 60 may be accommodated in the lower recess part 521. The connector 60 may be coupled to the communication part 522 inside the lower recess part 521 to communicate with the upper recess part 511. Also, the dispenser-side connection part 63 of the connector 60 may be disposed to face the dispenser 70 and connected to the dispenser-side tube 76. Also, the ice maker-side connection part 64 of the connector 60 may extend to a position that is adjacent to the pump 24 and be connected to the connection tube 231 connected to the pump 24.

[0082] When the structure of the connector 60 is described in more detail with reference to Fig. 8, the connector 60 may include a connector body 61 entirely defining a passage and a sealing member 62 sealing a gap between the connector body 61 and the water tank 40.

[0083] In detail, the connector body 61 may be injec-

tion-molded by using a plastic material. The connector body 61 may have an opened upper end and a lower end that is branched forward and backward to provide the dispenser-side connection part 63 and the ice maker-side connection part 64.

[0084] The upper end of the connector body may have a cylindrical shape having an opened top surface and extending upward. In detail, a sealing member coupling part 611 to which the sealing member 62 is coupled may be disposed on the upper end of the connector body 61. Also, a lower end of the sealing member coupling part 611 may have a stepped structure to support a lower end of the sealing member 62.

[0085] Also, an outlet connection part 612 may be disposed below the sealing member coupling part 611. The outlet connection part 612 may correspond to an outer diameter of the tank outlet 43. When the water tank 40 is mounted, a lower end of the tank outlet 43 may be supported by the outlet connection part 612.

[0086] An opening protrusion 613 extending upward may be disposed on a bottom surface of the outlet connection part 612. The opening protrusion 613 may be spaced apart from a circumferential surface of the tank outlet 43 to provide a space. Also, when the tank outlet 43 is inserted into the outlet connection part 612, the opening protrusion 613 may push the check valve 431 inside the tank outlet 43 to open the check valve 431. Here, the end of the tank outlet 43 may be inserted into a space 614 between the circumferential surface of the outlet connection part 612 and the opening protrusion 613. The opening protrusion 613 may be provided in plurality along a bottom surface of the outlet connection part 612 to uniformly push the overall check valve 431 upward so that the check valve 431 moves.

[0087] A water discharge part 615 may be disposed below the outlet connection part 612. The water discharge part 615 may be recessed downward and branched to both sides to the dispenser-side connection part 63 and the ice maker-side connection part 64. Thus, water discharged from the water tank 40 may be divided at the water discharge part 615 and then be supplied to the dispenser-side connection part 63 and the ice maker-side connection part 64.

[0088] The dispenser-side connection part 63 and the ice maker-side connection part 64 may be inclined downward. Thus, the water divided at the water discharge part 615 may flow by a self-weight thereof along the inclination of the dispenser-side connection part 63 and the ice maker-side connection part 64. Also, the dispensing nozzle 75 and the pump 24, which communicate with the dispenser-side connection part 63 and the ice maker-side connection part 64, may be disposed below the dispenser-side connection part 63 and the ice maker-side connection part 64, and thus, the water may be supplied to the dispenser-side connection part 63 and the ice maker-side connection part 64 by the self-weight thereof.

[0089] A side fixing part 65 extending in a horizontal direction, i.e., a direction crossing the extension direction of the dispenser-side connection part 63 and the ice maker-side connection part 64 may be disposed on a lower end of the connector body 61. The side fixing part 65 may extend in both left and right directions between the dispenser-side connection part 63 and the ice maker-side connection part 64. The side fixing part 65 may be fixed to both side surfaces of the lower recess part 521, and a screw passing through the lower recess part 521 may be coupled to the side fixing part 65 so that the side fixing part 65 is fixed inside the lower recess part 521.

[0090] Also, the side fixing part 65 may be provided in a shaft shape and shaft-coupled inside the lower recess part 521. In this case, the connector 60 may be movable somewhat by using the side fixing part 65 as an axis. Thus, the connection to the water tank 40 or the connection between the dispenser-side tube 76 and the connection tube 231 may be easy.

[0091] A lower fixing part 66 may be disposed on the lower end of the connector body 61. The lower fixing part may extend downward between the dispenser-side connection part 63 and the ice maker-side connection part 64. Also, the lower fixing part 66 may extend along the side fixing part 65.

[0092] A screw hole 661 may be defined in a center of the lower fixing part 66. Thus, the connector 60 may be fixed to the inside of the lower recess part 521 by using the screw coupled to the screw hole 661. Here, the connector 60 may be fixed at three points by the side fixing part 65 and the lower fixing part 66 to provide a stable coupling structure inside the lower recess part 521.

[0093] Also, when the connector 60 is fixed, the side fixing part 65 may be fixed first so that the connector 60 is rotatably fixed to the lower fixing part 66. Then, the dispenser-side tube 76 and the connection tube 231 may be connected to each other to fix the lower fixing part 66 and thereby facilitate the connection between the tubes 76 and 231 and stably fix the connector 60.

[0094] The sealing member 62 may be fixedly mounted on the sealing member coupling part 611 disposed on the upper end of the connector body 61. The sealing member 62 may be made of a rubber or silicon material. The sealing member 62 may be disposed inside the communication part 522 of the upper recess part 511 in the state of being fixed to the sealing member coupling part 611. Thus, when the water tank 40 is mounted, the tank outlet 43 of the water tank 40 may be inserted into the connector inlet 621 disposed on the upper end of the sealing member 62.

[0095] In detail, the top surface of the sealing member 62 may be opened to provide the connector inlet 621 and have a shape corresponding to an outer diameter of the tank outlet 43. Also, a plurality of sealing ribs 623 protruding in a central direction may be disposed on an inner surface of the sealing member 62. The sealing ribs 623 may be disposed along the inner surface of the sealing member 62 and have an inner diameter less than an outer diameter of the tank outlet 43. Thus, when the tank outlet 43 is inserted, the sealing ribs 623 may be closely at-

tached to a circumference of the tank outlet 43 to seal the gap between the tank outlet 43 and the connector 60. The sealing rib 623 may be provided in plurality, and the plurality of sealing ribs 623 may be vertically spaced apart from each other to maintain more effective sealing performance.

[0096] An inner extension part 622 and an outer extension part 625 may be disposed on a lower portion of the sealing member 62. The inner extension part 622 and the outer extension part 625 may be spaced apart from each other to provide a space, into which an upper end of the sealing member coupling part 611 is inserted, between the inner extension part 622 and the outer extension part 625.

[0097] Thus, when the sealing member 62 is mounted, the upper end of the sealing member coupling part 611 may be coupled between the inner extension part 622 and the outer extension part 625 so that the sealing member 62 is fixedly mounted. Here, a restriction protrusion 624 extending in a direction crossing the insertion direction of the sealing member coupling part 611 may be disposed on the inner extension part 622. The restriction protrusion 624 may be provided in plurality and press the outside of the sealing member coupling part 611 so that the sealing member 62 and the connector body 61 are more firmly coupled to each other. Thus, even though the water tank 40 is repeatedly detached, the sealing member 62 may not be separated from the connector body 6, but be maintained in the coupled state.

[0098] Hereinafter, a process of supplying the water within the water tank 40 to the dispenser 70 and the ice maker 33 in the refrigerator 1 having the above-described structure will be described in more detail with reference to the accompanying drawings.

[0099] Fig. 9 is a view illustrating a water flow state in the tank connection member. Also, Fig. 10 is a schematic view an overall water flow path in the refrigerator.

[0100] As illustrated in the drawings, the user fills water into the water tank 40 in the state in which the water tank 40 is mounted on or separated from the tank mounting part 224. In the state in which the water tank 40 is mounted on the tank mounting part 224, the tank outlet 43 may be in the state of being inserted into the connector 60. Here, the check valve 432 within the tank outlet 43 may be opened by the opening protrusion 613 to supply water.

[0101] A portion of the water introduced into the connector 60 may be discharged to the dispenser-side tube 76 through the dispenser-side connection part 63 that is branched from the tank outlet 43 inside the connector 60 and then supplied to the dispenser 70. In this state, the preparation for dispensing the water through the dispenser 70 may be completed, and when the user manipulates the dispensing lever 72, the water may be dispensed through the dispensing nozzle 75.

[0102] A portion of the water introduced into the connector 60 may be discharged to the connection tube 231 through the ice maker-side connection part 64 branched from the tank outlet 43 inside the connector 60 and then supplied to the pump 24. In this state, when a single for supplying water to the ice maker 33 is generated, the operation of the pump 24 may start. When the pump 24 is driven, the water within the water tank 40 may be supplied to the water tank 40 through the ice maker-side tube 23.

[0103] Here, the water supplied by the operation of the pump 24 may flow through the first tube 232 and the second tube 233 constituting the ice maker-side tube 23 and pass through the center hinge 13 and then flow from the refrigerating compartment to 22 to the freezing compartment door 21 via the center hinge 13.

[0104] As described above, the supply of water to the ice maker 33 may be automatically performed, and the operation of the pump 24 may be stopped after a set amount of water is supplied to the ice maker 33. Thus, the supply of water to the ice maker 33 may be terminated.

[0105] The following effects may be expected in the refrigerator according to this embodiment.

[0106] The water tank mounted inside the refrigerator may supply water to the dispenser and also supply water to the ice maker to improve use convenience.

[0107] Also, the water supplied from the detachable water tank may be supplied to the dispenser and the pump by the self-weight thereof. Particularly, the water may be supplied to the ice maker that is disposed at the upper side by the operation of the pump. As a result, the water may be supplied to all of the dispenser and the ice maker through the simple structure to reduce the manufacturing cost and improve the productivity.

[0108] Also, when the water tank is mounted, the connector and the water tank may automatically communicate with each other. Thus, the water may be supplied to the dispenser and the ice maker without performing separate manipulation to more improve the use convenience.

[0109] Also, even though the dispenser and the ice maker are disposed to be spaced apart from other, the water may be supplied at the same time through one water tank. Particularly, the automatic ice making may be enabled by the automatic water supply through the simple structure to improve the use convenience and reduce the manufacturing cost.

[0110] Also, the water may be supplied to all of the dispenser and the ice maker through only the simple structure of the connector and the pump to realize the compact structure.

[0111] Also, the water may be automatically supplied to the ice maker disposed inside the freezing compartment door through the water tank that is detachably disposed on the refrigerating compartment door to improve the convenience in water supply and enable the water to be automatically supplied and ice to be made without being connected to a separate water pipe, thereby improving the ice making performance and the ice supply convenience.

[0112] Although embodiments have been described

with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A refrigerator comprising:

a cabinet (10) defining a refrigerating compartment (12) and a freezing compartment (11);
a refrigerating compartment door (22) configured to open and close the refrigerating compartment (12);
a freezing compartment door (21) configured to open and close the freezing compartment (11);
a dispenser (70) provided in a front surface of the refrigerating compartment door (22);
an ice maker (33) provided in the freezing compartment door (21);
a water tank (40) detachably disposed on a rear surface of the refrigerating compartment door (22) above the dispenser (70) to supply water by a self-weight of the water; and
a tank connection member (50) disposed in the refrigerating compartment door (22) and connected to the water tank (40) when the water tank (40) is mounted to provide a passage branched toward the dispenser (70) and the ice maker (33).

2. The refrigerator according to claim 1, wherein the freezing compartment (11) is disposed above the refrigerating compartment (12).

3. The refrigerator according to claim 1 or 2, further comprising a center hinge (13) rotatably supporting the refrigerating compartment door (22) and the freezing compartment door (11) between the refrigerating compartment door (22) and the freezing compartment door (11), wherein
the center hinge (13) has a hollow allowing a tube (23) for supplying water from the tank connection member (50) to the ice maker (33) to pass through.

4. The refrigerator according as claimed in any one of the preceding claims, wherein the tank connection member (50) comprises:

a case upper part (51) which defines a recessed space exposed to the rear surface of the refrigerating compartment door (22) and into which a portion of the water tank (40) is inserted; and
a case lower part (52) defining a recessed space that is opened to the dispenser (70),
wherein the tank connection member (50) further comprises a connector (60) disposed in the case lower part (52) to communicate with the water tank (40) mounted on the case upper part (51).

5. The refrigerator according to claim 4, wherein the case lower part (51) is disposed higher than a dispensing nozzle (75) of the dispenser (70) to discharge the water within the water tank (40) to the dispenser (70) by the self-weight of the water.

6. The refrigerator according to claim 4 or 5, wherein a tank mounting part (224) supporting at least one of a bottom surface and/or both side surfaces of the water tank (40) is disposed on the rear surface of the refrigerating compartment door (22), and
a connector inlet (621) opened to one side of the connector (60) and connected to the water tank (40) is exposed to a bottom surface of the tank mounting part (224).

7. The refrigerator as claimed in any one of the preceding claims, wherein the water tank (40) comprises:

a tank body (41) configured to store water;
a tank cover (42) opening and closing the tank body (41); and
a tank outlet (43) protruding from the tank body (41), the tank outlet is to be inserted into the tank connection member (50) when the water tank (40) is mounted to provide a water discharge passage.

8. The refrigerator as claimed in any one of the preceding claims, wherein the tank connection member (50) comprises a connector (60) that is branched into a dispenser-side connection part (63) for supplying water from the water tank (40) to the dispenser (70) and an ice maker-side connection part (64) for supplying water to the ice maker (33).

9. The refrigerator according to claim 8, wherein the dispenser-side connection part (63) extends in direction of the dispenser (70), and
the ice maker-side connection part (64) extends to a side opposite to the dispenser-side connection part (63).

10. The refrigerator according to claim 8 or 9, wherein a side fixing part (65) extending in a direction crossing the dispenser-side connection part (63) and the ice

maker-side connection part (64) and rotatably shaft-coupled to both side surfaces of the tank connection member (50) is disposed on the connector (60).

11. The refrigerator according to claim 10, further comprising a lower fixing part (66) which extends downward from the connector (60) along the side fixing part (65) and to which a screw for fixing is coupled.

12. The refrigerator according to any one of the claims 7-11, wherein the connector (60) comprises an opening protrusion (613) protruding upward, the opening protrusion (613) is to be inserted into the tank outlet (43) when the water tank (40) is mounted to open a check valve within the tank outlet (43).

13. The refrigerator as claimed in any one of the preceding claims, wherein a pump (24) connected to the tank connection member (50) to supply water to the ice maker (33) is disposed in the refrigerating compartment door (22), wherein the pump (40) is disposed lower than the water tank (40).

14. The refrigerator according to any one of the claims 7-13, further comprising a sealing member (62) for sealing a gap between the tank outlet (43) and on an opened upper end of the connector (60), and
a sealing rib (623) protruding inward and closely attached to an outer surface of the tank outlet (43) is disposed inside the sealing member (62).

15. The refrigerator according to any one of the claim 8-14, wherein the dispenser-side connection part (63) and the ice maker-side connection part (64) are inclined downward, wherein a pump (24) is provided for supplying water to a dispensing nozzle (75) of the dispenser (70) and the ice maker (33), the pump (24) is disposed lower than the dispenser-side connection part (63) and the ice maker-side connection part (64).

FIG. 1

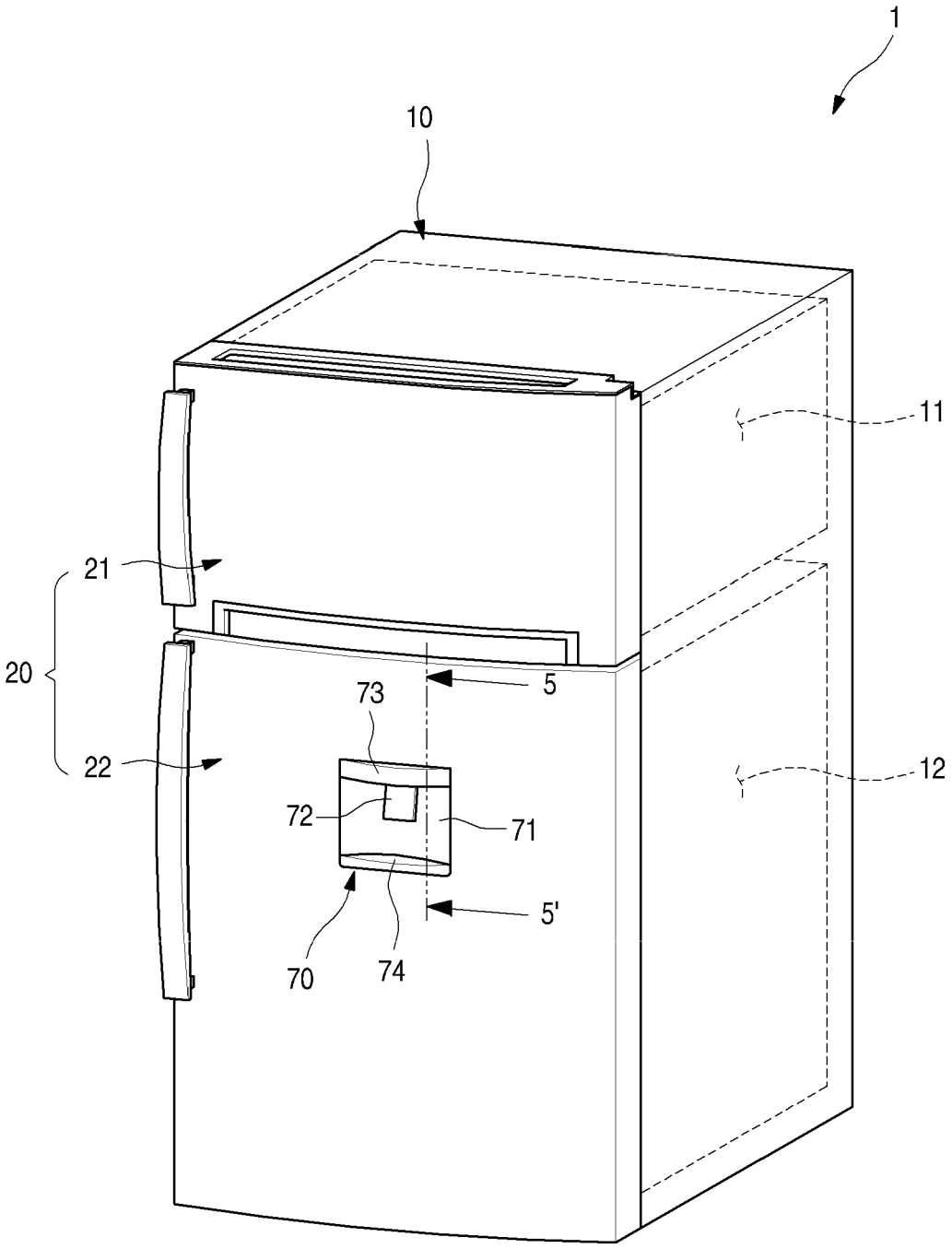
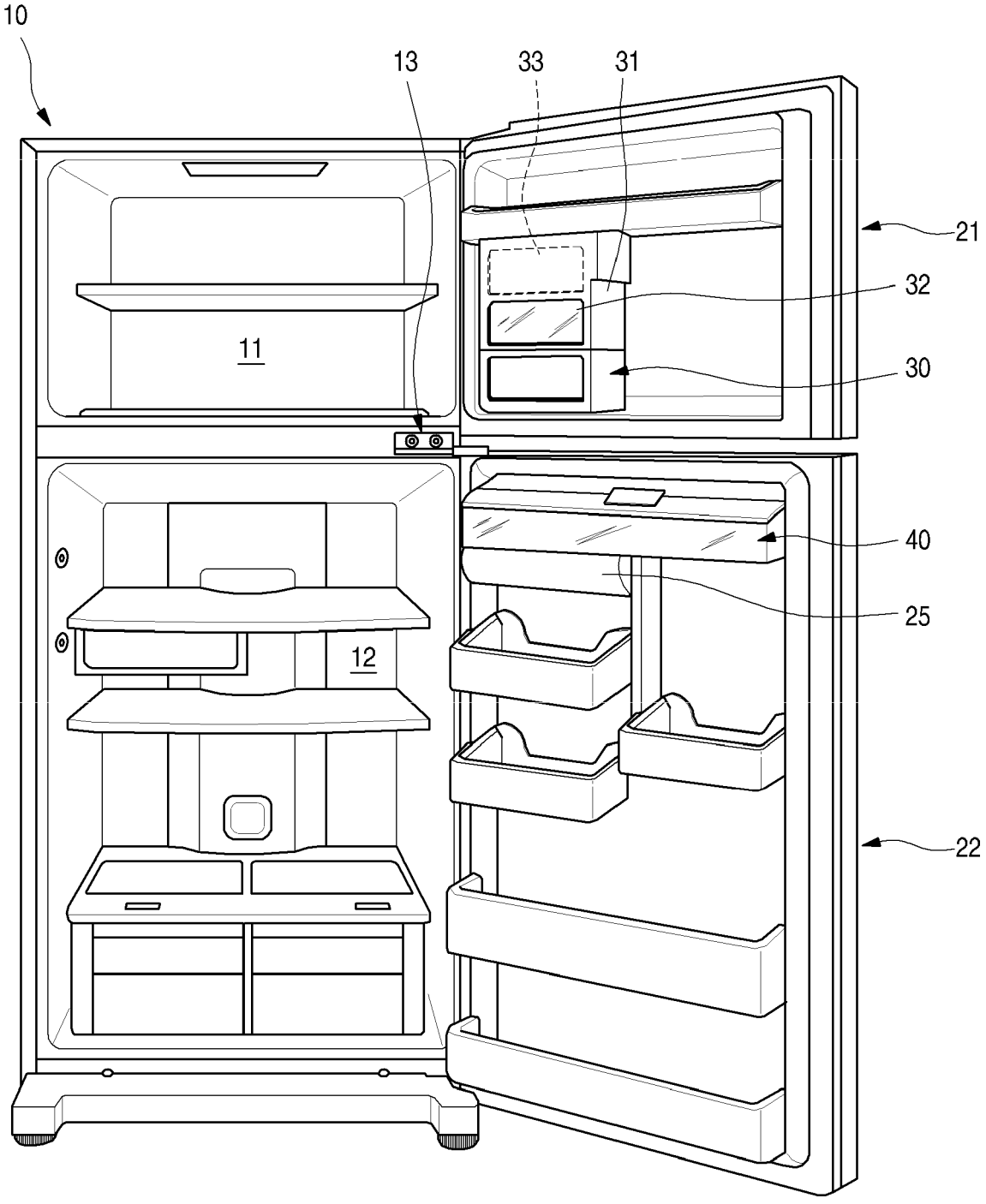


FIG. 2



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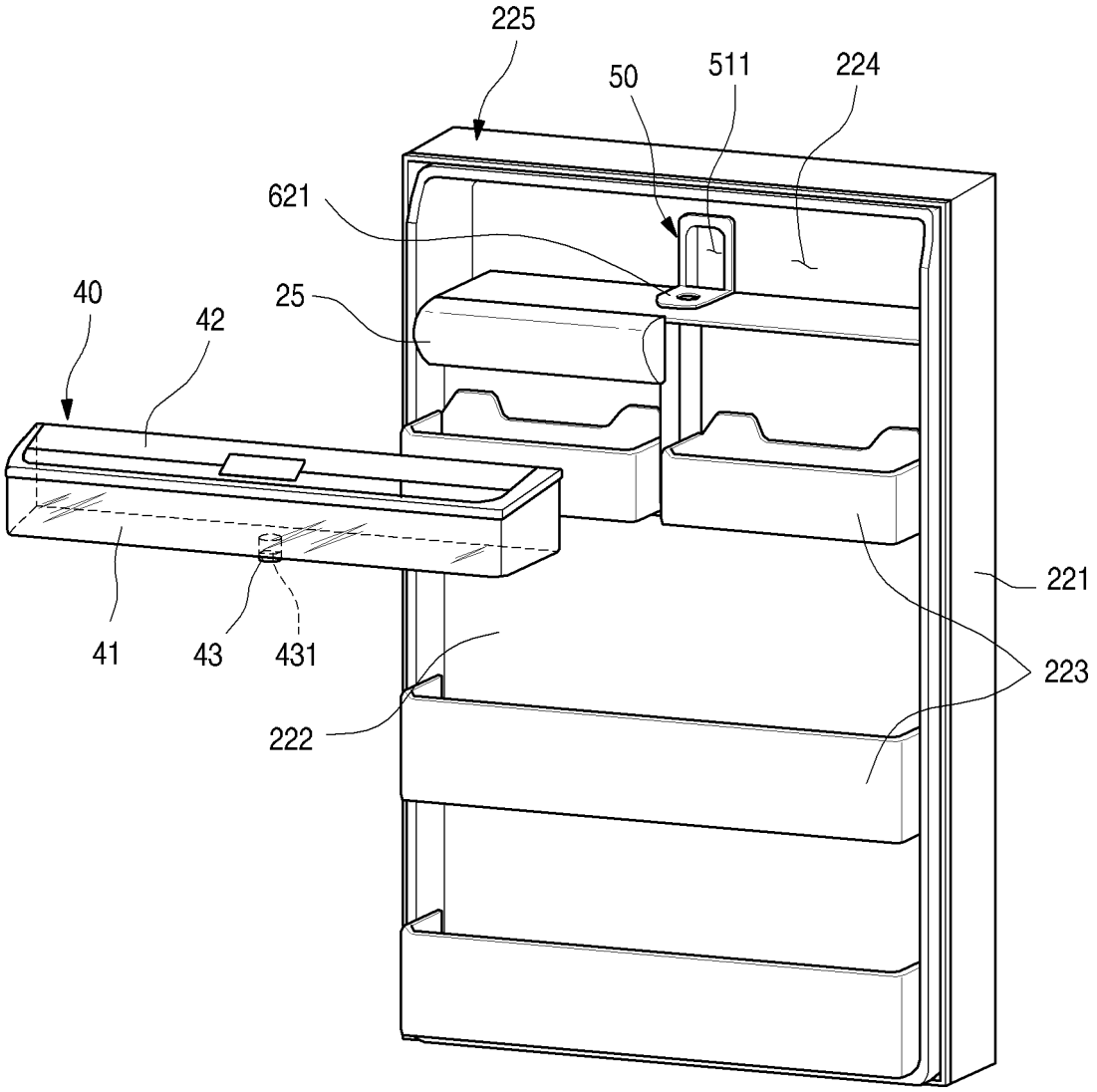

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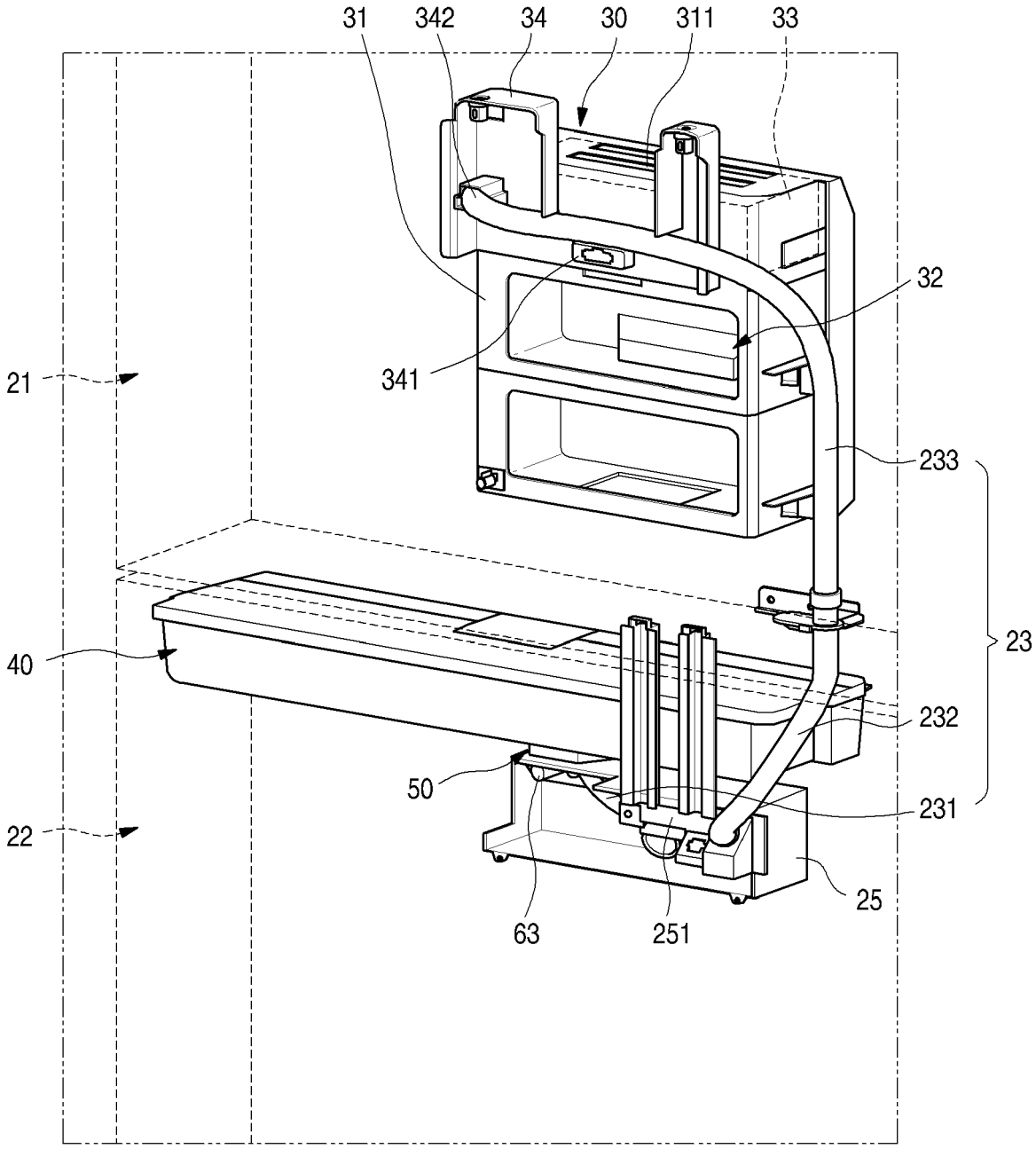

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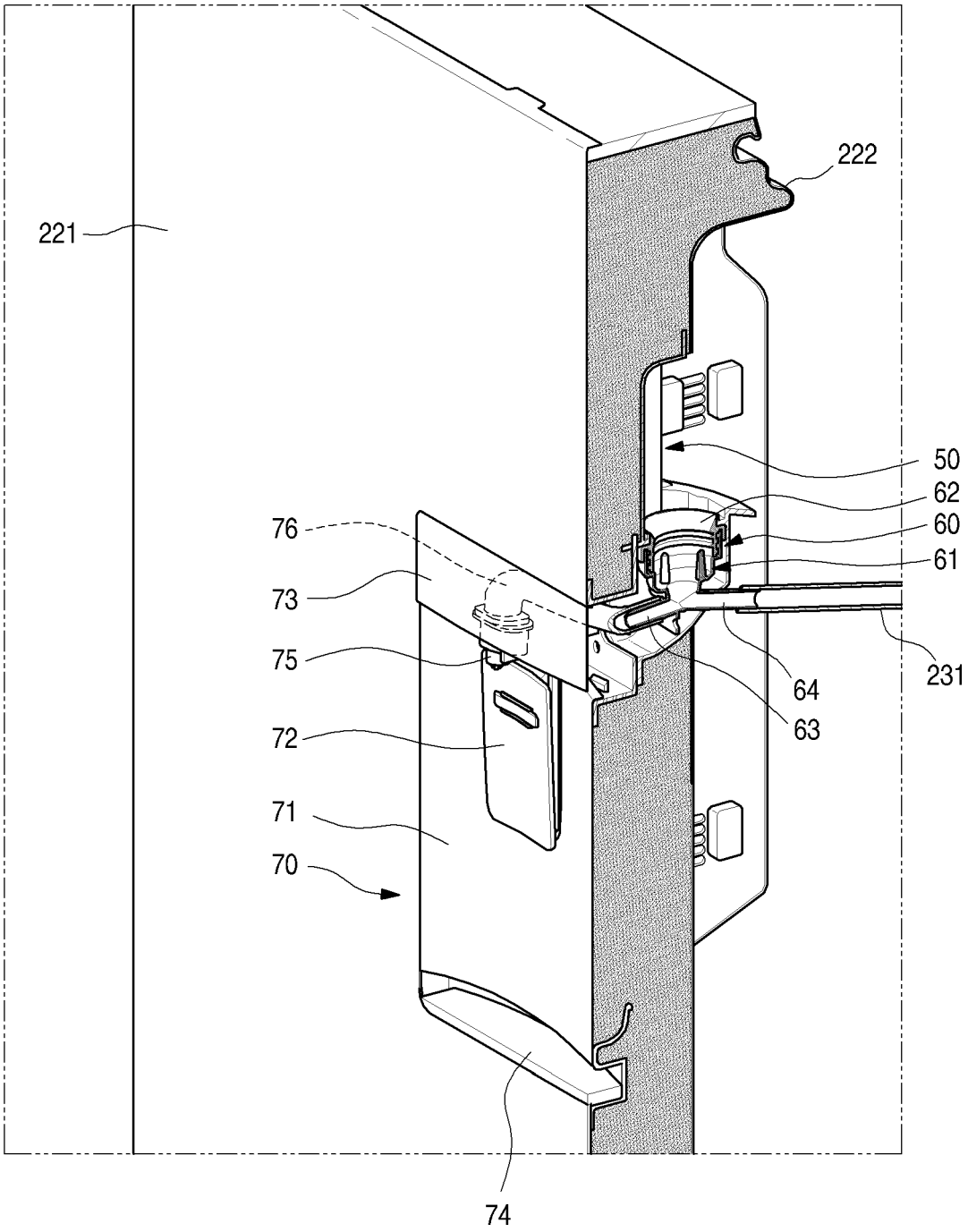

FIG. 6

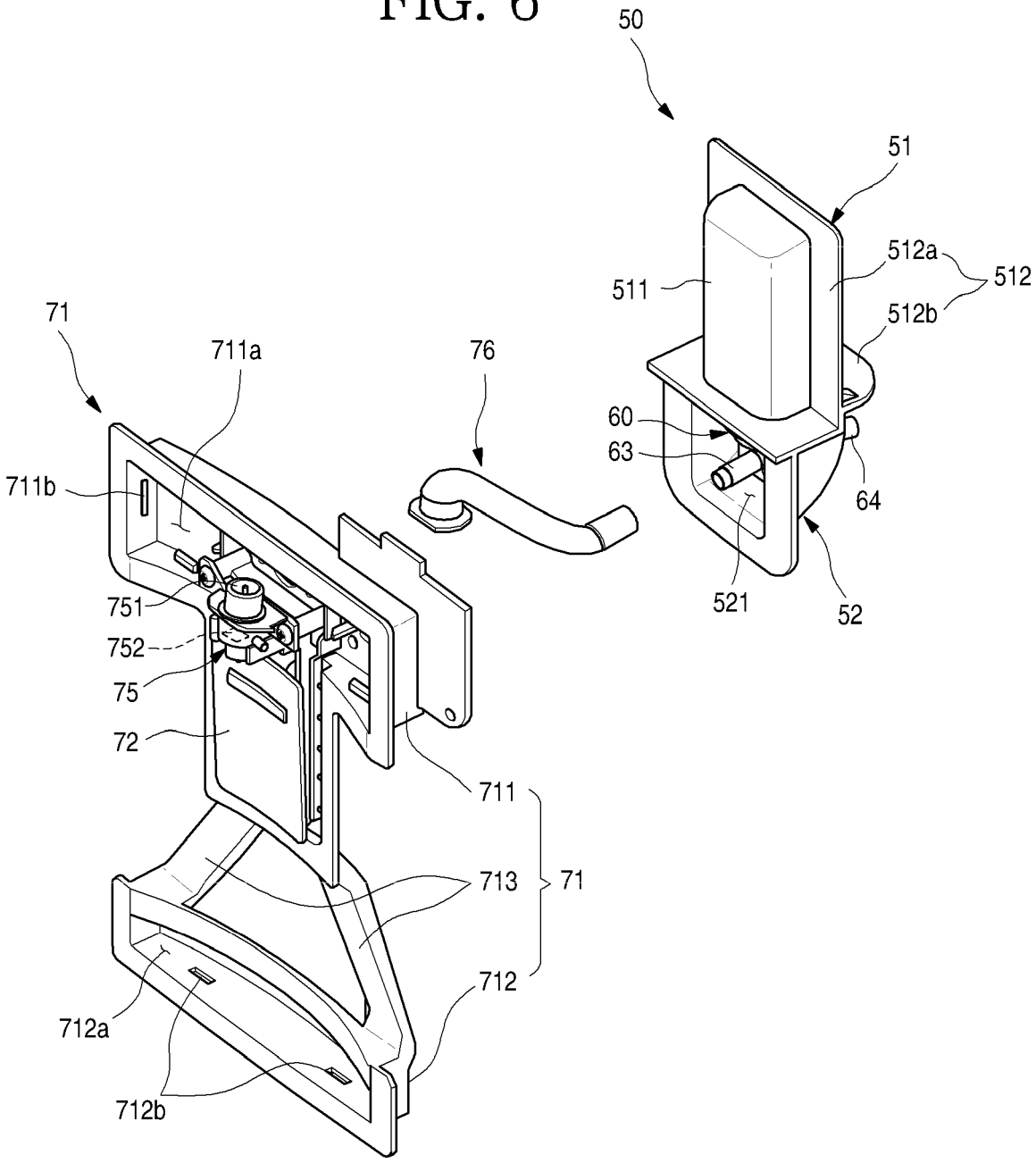
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FIG. 7

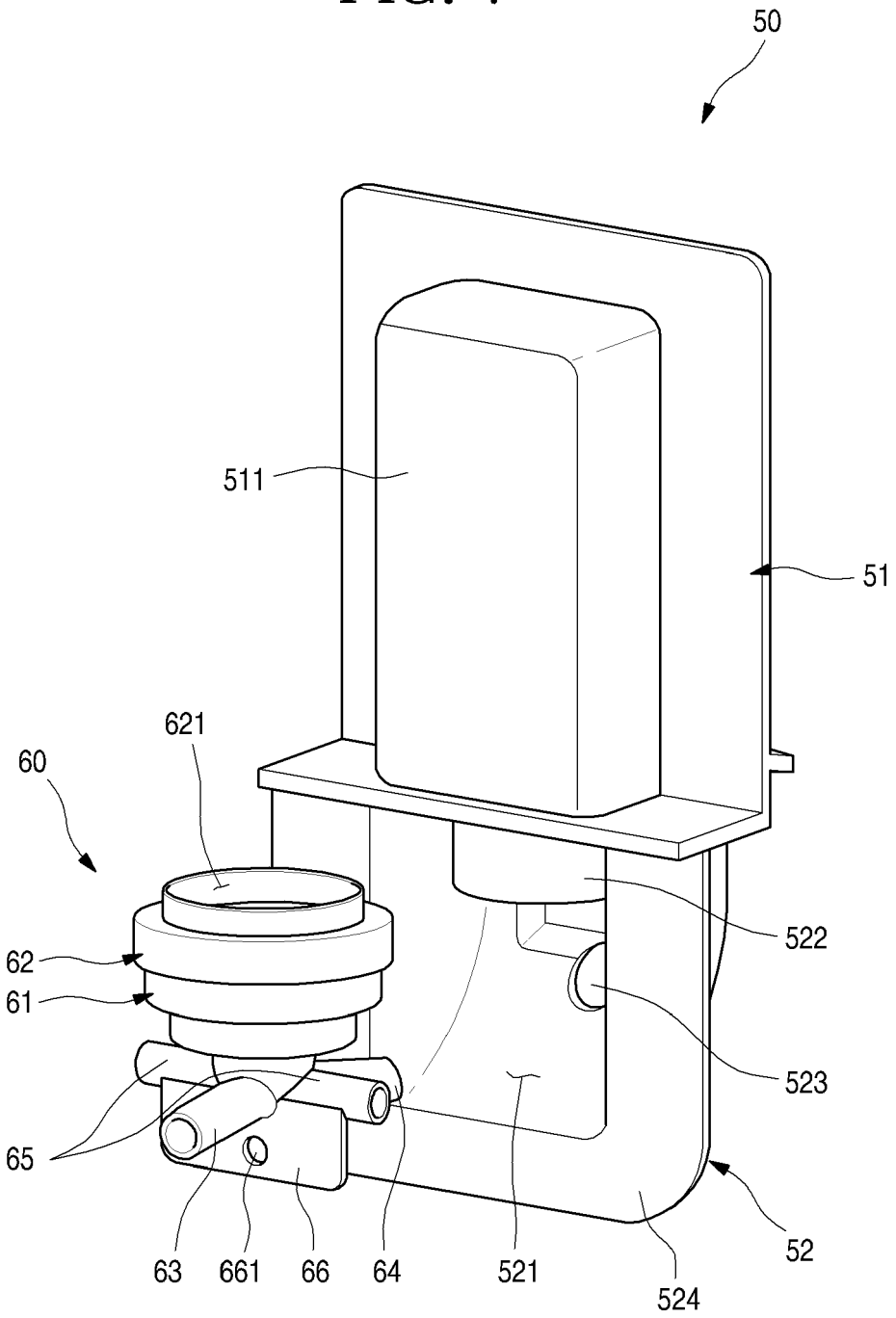

FIG. 8

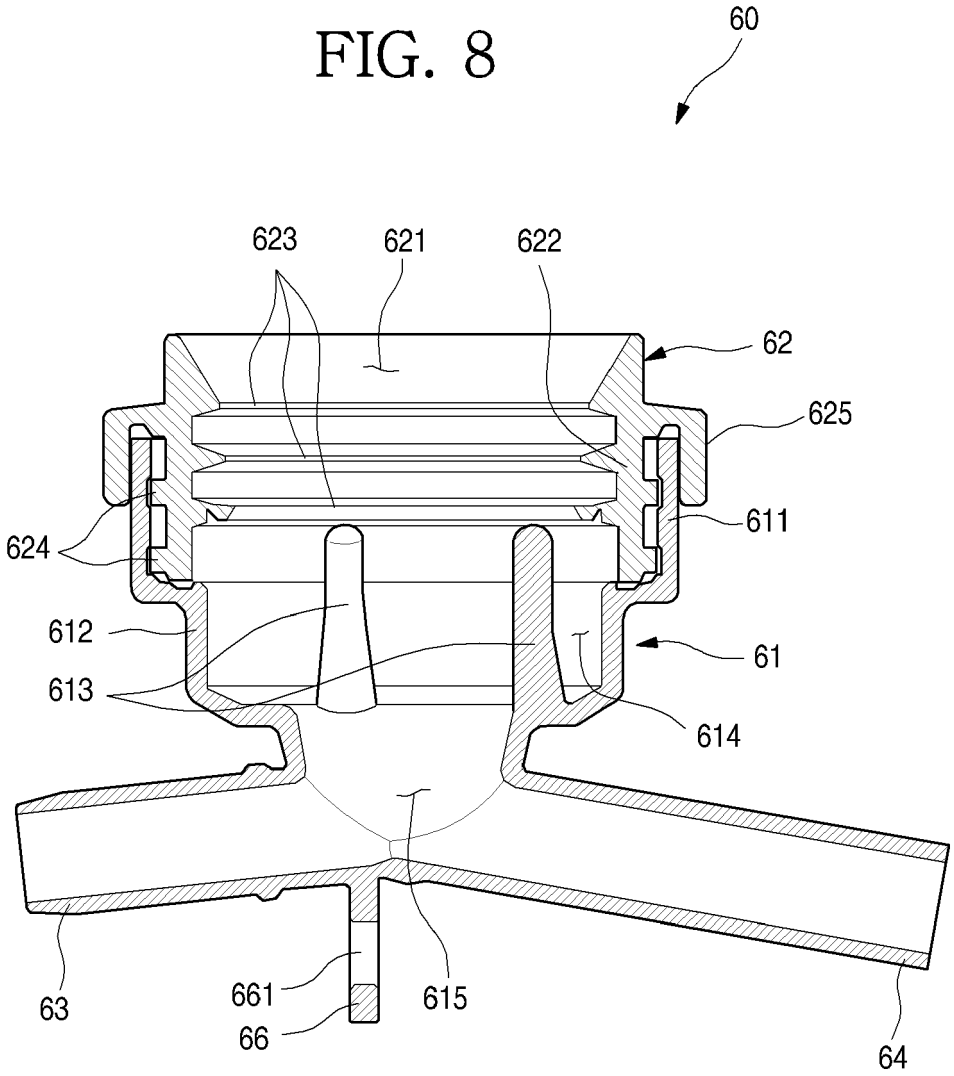

FIG. 9

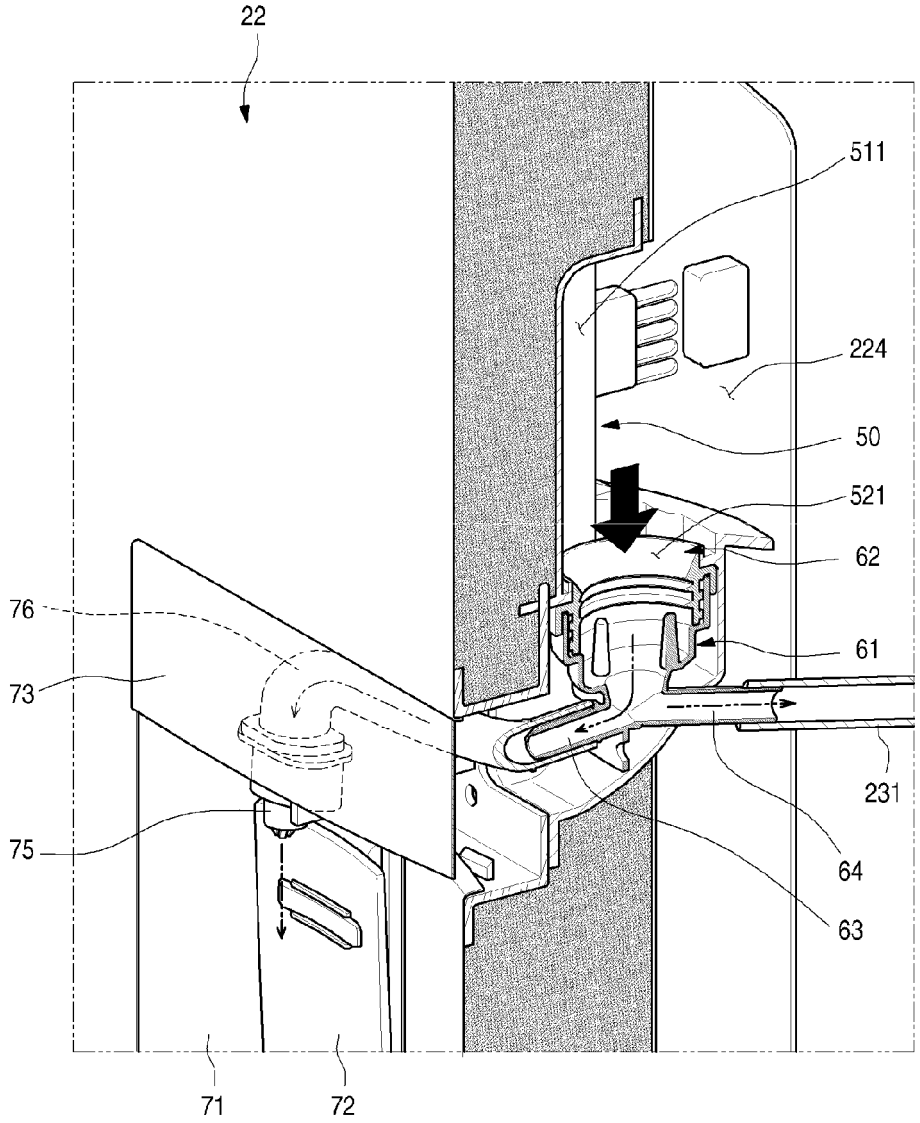
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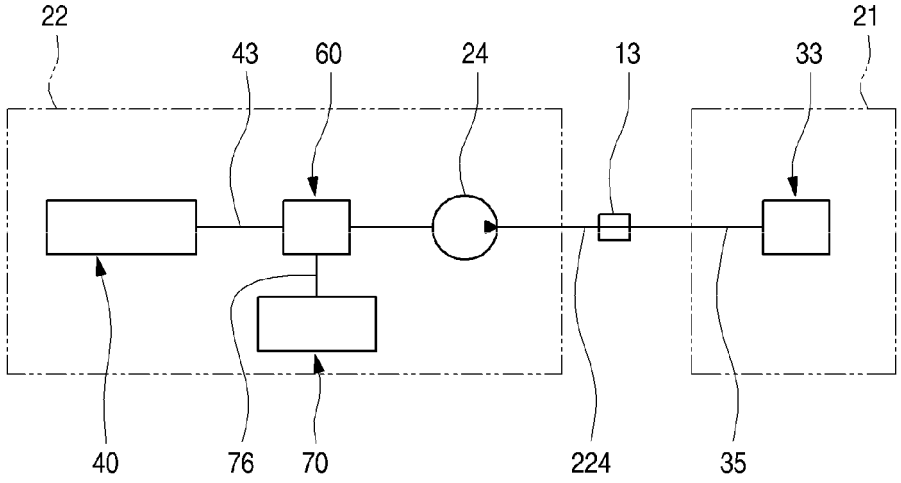
FIG. 10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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 2786

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F25C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 October 2018	Léandre, Arnaud

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