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(72) Inventors:
• **KIM, Yong Hyun**
07796 Seoul (KR)
• **HONG, Jin Il**
07796 Seoul (KR)
• **CHOI, Soo Young**
07796 Seoul (KR)
• **KIM, Rin**
07796 Seoul (KR)

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(71) Applicant: **LG Electronics Inc.**
Yeongdeungpo-gu
Seoul 07336 (KR)

(74) Representative: **Schornack, Oliver**
Wuesthoff & Wuesthoff
Patentanwlte und Rechtsanwalt PartG mbB
Schweigerstrae 2
81541 Mnchen (DE)

(54) **ICE MAKER, REFRIGERATOR INCLUDING ICE MAKER, AND METHOD OF CONTROLLING REMOVAL OF RESIDUAL ICE FROM FILL CUP OF REFRIGERATOR INCLUDING ICE MAKER**

(57) According to an ice maker, a refrigerator including the ice maker, and a method of controlling removal of residual ice of a fill cup of the refrigerator including the ice maker according to the present invention, by arranging a

heating wire on a fill cup of an ice maker, it is possible to prevent residual ice from remaining and freezing in the fill cup after water supply.

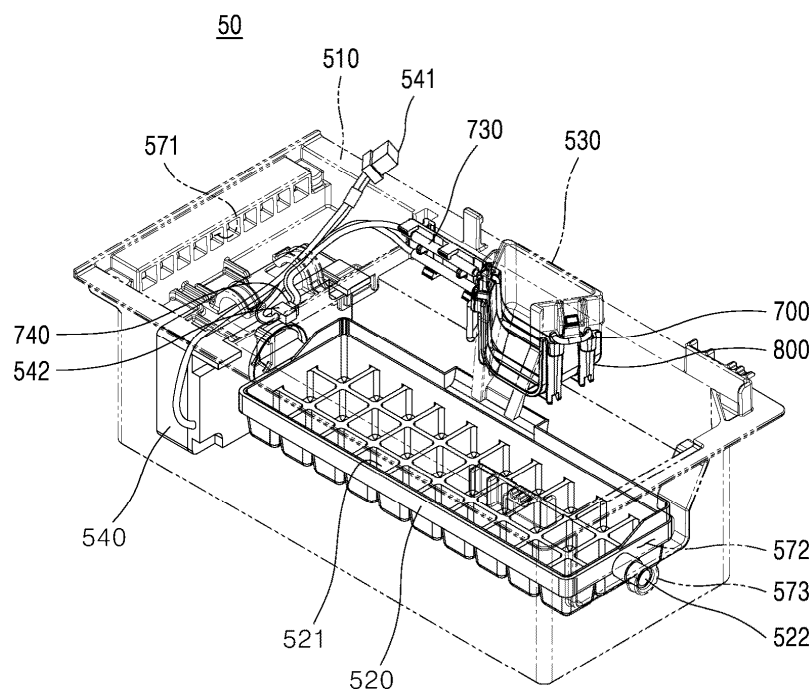


FIG. 8

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Description

BACKGROUND

[Technical Field]

[0001] The present invention relates to an ice maker, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup of the refrigerator including the ice maker.

[Description of the Related Art]

[0002] A refrigerator is a home appliance for supplying cold air generated using circulation of refrigerant to a storage compartment to keep various types of storage objects fresh for a long time. An ice maker that generates ice can be provided inside the refrigerator. The ice maker is configured to make ice by accommodating water supplied from a water source or a water tank in an ice tray.

[0003] Meanwhile, in the case of an ice maker, a fill cup that receives water and supplies the water to an ice tray can be provided. However, during the process of supplying water to the fill cup, residual water can remain in the fill cup and freeze. For example, a freezing problem in the fill cup can occur through the following process.

[0004] First, water is supplied to the fill cup through a water pipe provided in the refrigerator, and ice making begins. After water supply is completed, residual water remains inside the fill cup, which can cause freezing due to a low temperature inside the ice maker. This residual ice needs to melt during the next water supply after ice making is completed, but due to the low temperature and limited heat, the residual ice cannot melt completely and can gradually grow. When such a process is repeated, the residual ice continuously accumulates and blocks the fill cup and an inlet of the water supply pipe, which can eventually cause water to overflow or the water supply to be blocked through a sealing part that seals the water supply pipe during the water supply process.

[0005] As a result, when freezing occurs in the fill cup of the ice maker, a problem that ice production stops or water leaks into the refrigerator can occur. This problem can adversely affect the performance of the ice maker and the hygiene inside the refrigerator and cause inconvenience to a user and lower the reliability of a product.

[0006] The ice maker provided in the conventional refrigerator has no separate structural device to solve such a freezing problem and is not effectively solving the defect problem caused by freezing in the fill cup. Accordingly, in order to solve the above problem, the present invention proposes an ice maker, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup of the refrigerator including the ice maker, which can improve the reliability and efficiency of the ice maker by preventing a freezing problem of the fill cup.

[SUMMARY OF THE INVENTION]

[0007] The present invention is directed to providing an ice maker capable of preventing residual water from remaining in a fill cup of the ice maker and freezing, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0008] The present invention is also directed to providing an ice maker capable of effectively removing residual ice from a fill cup while minimizing the degradation of the performance of the entire ice maker due to the heat from the heating wire disposed in the fill cup, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0009] The present invention is also directed to providing an ice maker capable of increasing the heat transfer efficiency of a heating wire transferred to a fill cup, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0010] The present invention is also directed to providing an ice maker capable of increasing adhesion between a heating wire and a fill cup, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0011] The present invention is also directed to providing an ice maker capable of preventing a heating wire from being easily removed from a fill cup, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0012] The present invention is also directed to providing an ice maker capable of reducing an installation space of a heating wire terminal connected to a heating wire and increasing assemblability, a refrigerator including an ice maker, and a method of controlling removal of residual ice from a fill cup.

[0013] Objects of the present invention are not limited to the above objects, and other objects and advantages of the present invention that are not described can be understood by the following description and will be more clearly understood by embodiments of the present invention. In addition, it will be able to be easily seen that the objects and advantages of the present invention may be achieved by devices and combinations thereof that are described in the claims.

[0014] In order to solve the above problems, according to one embodiment of the present invention, there is provided a refrigerator including a housing that forms an ice-making space, a fill cup mounted in the housing to receive water, a heating wire disposed on at least one outer surface of the fill cup, a heating wire cover fastened to the fill cup to fix the heating wire to the fill cup, and an ice tray disposed in the ice-making space and having one or more ice-making cells.

[0015] The heating wire may be disposed to surround a lower surface and both side surfaces of the fill cup.

[0016] An upper surface of the fill cup to which the water is supplied may be open, and the heating wire disposed on a lower surface of the fill cup may be dis-

posed to overlap the open upper surface of the fill cup in a vertical direction.

[0017] The heating wire may extend in a second direction intersecting the first direction in which water supplied to the fill cup flows to the ice tray.

[0018] The heating wire disposed on a lower surface of the fill cup may be continuously disposed in the second direction.

[0019] The heating wire cover may include a first fastening body portion that surrounds a lower surface and two side surfaces of the fill cup with the heating wire interposed therebetween, and the first fastening body portion may be fastened to the two side surfaces of the fill cup in a hook-coupling manner.

[0020] The side surface of the fill cup may include a catch including an opening slot that is open in a vertical direction, a side surface of the first fastening body portion may include a hook that extends upward, and the hook may be inserted from the bottom to top of the opening slot and hook-coupled to the catch.

[0021] In a state in which the first fastening body portion has been hook-coupled to the fill cup, the hook may generate a removal force outward and downward from the catch.

[0022] The first fastening body portion may include a heating wire seating portion that is recessed so that the heating wire is seated, and a diameter of the heating wire may be greater than a depth of the heating wire seating portion.

[0023] The heating wire cover may include a second fastening body portion that extends outward from the fill cup to fix a heating wire terminal electrically connected to the heating wire, the second fastening body portion may include a hook that protrudes toward an inner surface of the housing, the housing may include an insertion portion having an open upper surface for the hook to be inserted, and the hook may be inserted from the top to bottom of the insertion portion and coupled to the insertion portion.

[0024] The heating wire terminal may be composed of a pair of a first heating wire terminal and a second heating wire terminal, the second fastening body portion may include one or more first hook fixing portions arranged on one side of the first heating wire terminal, one or more second hook fixing portions arranged on one side of the second heating wire terminal, and a support disposed between the first hook fixing portion and the second hook fixing portion to allow one side and the other side to support the other sides of the first heating wire terminal and the second heating wire terminal, respectively, and the first heating wire terminal, the second heating wire terminal, and the support may be disposed not to overlap each other in a vertical direction.

[0025] The ice maker may further include a driving unit configured to rotate the ice tray about one axis, a main connector connected to power applied to the driving unit, an auxiliary connector electrically connected to the main connector, and a heating wire connector electrically connected to the heating wire, wherein the heating wire

connector may be coupled with the auxiliary connector, and the heating wire receives power applied to the main connector.

[0026] According to one embodiment of the present invention, there is provided a refrigerator including a cabinet including a first storage compartment and a second storage compartment, a water supply pipe connecting the first storage compartment to the second storage compartment, and an ice maker disposed in the second storage compartment, wherein the ice maker includes a fill cup that receives water from the water supply pipe, a heating wire disposed on at least one outer surface of the fill cup, and a heating wire cover fastened to the fill cup to fix the heating wire to the fill cup.

[0027] The refrigerator may further include a water supply device disposed in the first storage compartment located above the second storage compartment, wherein water supplied through the water supply device may flow into one side of the water supply pipe, may be discharged from the other side of the water supply pipe, and delivered to the fill cup.

[0028] The heating wire may be disposed to surround an outer lower surface and two outer side surfaces of the fill cup.

[0029] An upper surface of the fill cup to which the water is supplied may be open, and the heating wire disposed on the lower surface of the fill cup may be disposed to overlap an open other side of the water supply pipe in a vertical direction.

[0030] The water supply device may include a water storage compartment that stores water.

[0031] The water supply device may receive water from a water source disposed outside the cabinet.

[0032] According to one embodiment of the present invention, there is provided a method of controlling removal of residual ice of a fill cup of a refrigerator including a cabinet including a first storage compartment and a second storage compartment, a water supply pipe connecting the first storage compartment to the second storage compartment, and an ice maker including a fill cup that is disposed in the second storage compartment and receives water from the water supply pipe and a heating wire disposed on at least one outer surface of the fill cup, including determining whether an ice-transferring control operation of the ice maker exceeds a preset number of times, and operating the heating wire for a preset time when the ice-transferring control operation of the ice maker exceeds the preset number of times.

[0033] The method may further include initializing the preset number of times to 0 after the operating of the heating wire for the preset time.

[0034] According to the present invention, by arranging a heating wire in a fill cup of an ice maker, it is possible to prevent residual water from remaining in the fill cup and freezing after water supply.

[0035] In addition, according to the present invention, the heating wire can be disposed to surround a lower surface and both side surfaces of the fill cup, thereby

concentrating heat at a location within the fill cup in which residual water is likely to accumulate. Accordingly, it is possible to effectively prevent residual water from freezing in the fill cup while minimizing the degradation of the performance of the entire ice maker due to the heat of the heating wire.

[0036] In addition, according to the present invention, since a heating wire cover can provide a structure in which the heating wire can be fixed in close contact with the fill cup through a first fastening body portion, the heating wire can be in close contact with an outer surface of the fill cup, thereby maximizing heat transfer efficiency and ensuring that heat transfer is uniform.

[0037] In addition, according to the present invention, in order to reduce a gap that can occur when the heating wire and the heating wire cover are assembled, by designing the diameter of the heating wire to be larger than the depth of the heating wire seating portion of the heating wire cover, the heating wire can be in closer contact with the fill cup, thereby compensating for assembly tolerance that can occur during an assembly process and maintaining adhesion between the heating wire and the fill cup to increase heat transfer efficiency.

[0038] In addition, according to the present invention, since the first fastening body portion of the heating wire cover can have a hook-coupling structure with the fill cup that can withstand the force generated by an overlapping structure with the heating wire in a vertical direction and left-right direction, the heating wire can be in close contact with the fill cup, thereby prevent the fill cup from being easily removed.

[0039] In addition, according to the present invention, a heating wire terminal connected to the heating wire can be fastened to a second fastening body portion of the heating wire cover in a one-way hook-coupling manner, thereby reducing an installation space and improving workability during the assembly process.

[0040] Specific effects of the present invention together with the above effects will be described with a description of the following detailed matters for carrying out the invention.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0041]

FIG. 1 is a front perspective view of a refrigerator.
FIG. 2 is a front view of the refrigerator in which a first storage compartment and a second storage compartment are open.
FIG. 3 is a rear view of the refrigerator showing a water supply flow path.
FIG. 4 is a view showing a water supply device according to one embodiment mounted in the first storage compartment.
FIG. 5 is a view showing a water supply device according to another embodiment mounted in the first storage compartment.

FIG. 6 is a cross-sectional view showing a water supply flow path between the water supply device and an ice maker.

FIG. 7 is a cross-sectional view showing a coupling structure and path of a water supply pipe that supplies water to a fill cup of the ice maker.

FIG. 8 is a combined perspective view of a first ice maker.

FIG. 9 is an exploded perspective view of the first ice maker.

FIG. 10 is a perspective view of a heating wire cover.

FIG. 11 is a view of a portion of a heating wire cover fastened to the fill cup and an inner surface of a housing to secure the heating wire to the fill cup.

FIG. 12 is a cross-sectional view of the fill cup in which the heating wire is fixed by the heating wire cover and an enlarged view of a portion of the fill cup.

FIGS. 13 and 14 are a cross-sectional view of the fill cup in which the heating wire is fixed by a heating wire cover according to another embodiment and an enlarged view of a portion of the fill cup.

FIG. 15 is a bottom view of the fill cup in which the heating wire is fixed by the heating wire cover.

FIGS. 16 to 19 show heat wires according to various embodiments and are plan views of fill cups in which the heating wires are fixed by heating wire covers.

FIG. 20 is a flowchart of a method of controlling removal of residual ice from the fill cup.

[DETAILED DESCRIPTION OF THE INVENTION]

[0042] The above objects, features, and advantages will be described below in detail with reference to the accompanying drawings, and thus those skilled in the art to which the present invention pertains will be able to easily carry out the technical spirit of the present invention. In describing the present invention, when it is determined that a detailed description of the known technology related to the present invention may unnecessarily obscure the gist of the present invention, a detailed description thereof will be omitted. Hereinafter, exemplary embodiments according to the present invention will be described in detail with reference to the accompanying drawings. In the drawings, the same reference numerals are used to denote the same or similar components.

[0043] Although the terms "first," "second," and the like are used to describe various components, it is obvious that these components are not limited by these terms. These terms are used only to distinguish one component from another, and unless otherwise stated, it is obvious that a first component may be a second component.

[0044] Throughout the specification, unless otherwise stated, each component may be singular or plural.

[0045] Hereinafter, the arrangement of an arbitrary component on an "upper portion (or lower portion)" of a component or "above (or under)" the component may not only mean that the arbitrary component is disposed in

contact with an upper surface (or a lower surface) of the component, but also mean that other components may be interposed between the component and the arbitrary component disposed above (or under) the component.

[0046] In addition, when a certain component is described as being "connected," "coupled," or "joined" to the other component, the components may be directly connected or joined, but it should be understood that another component may be "interposed" between the components, or the components may be "connected," "coupled," or "joined" through another component.

[0047] The singular expression used herein includes the plural expression unless the context clearly dictates otherwise. In the application, terms such as "composed of" or "comprising" should not be construed as necessarily including all of the various components or operations described in the specification and should be construed as not including some of the components or some of the operations or further including additional components or operations.

[0048] Throughout the specification, when "A and/or B" is described, this means A, B, or A and B unless otherwise specified, and when "C to D" is described, this means C or more and D or less unless otherwise specified.

[0049] Hereinafter, an ice maker and a refrigerator according to some embodiments of the present invention will be described.

[0050] Referring to FIGS. 1 to 3, an exterior of a refrigerator 1 may be formed by a cabinet 10 including one or more storage compartments, which are storage spaces of products, and a plurality of doors 20 capable of opening and closing a front opening of the cabinet 10. The cabinet 10 may include an outer case 101 and an inner case 102 coupled to the inside of the outer case 101. An insulation material 103 may be filled between the inner case 102 and the outer case 101, and various types of ducts related to the cooling system may pass through the insulation material 103. The inner case 102 may be divided into separate spaces by a barrier 13 to include a first storage compartment 11 and a second storage compartment 12. The first storage compartment 11 disposed at the top may serve as a refrigerator, and the second storage compartment 12 disposed at the bottom may serve as a freezer.

[0051] For example, a refrigeration grill fan 141 and a freezing grill fan 142 may be disposed in the first storage compartment 11 and the second storage compartment 12, respectively, to discharge cold air generated from an evaporator to each storage compartment. In the first storage compartment 11 and the second storage compartment 12, one or more accommodation members 111 for accommodating products may be disposed, and the accommodation members 111 may be drawers or shelves.

[0052] The first storage compartment 11 and the second storage compartment 12 may be opened and closed by a pair of first doors 21 and second doors 22, respectively. The first doors 21 and the second doors 22 may be

rotary doors that are connected to one side and the other side of the cabinet 10 by hinges and rotate, respectively. However, the present invention is not limited thereto, and the second door 22 may be a drawer-type door that is withdrawn and inserted along a rail. A dispenser 23 that allows a user to take out water or ice without opening the door may be mounted on one of the first doors 21.

[0053] A water supply device 30 may be disposed on a lower surface of the first storage compartment 11, that is, an upper surface of the barrier 13. The water supply device 30 may be configured to supply water to the ice maker 70 or the dispenser 23 and purify the supplied water. The water supply device 30 may be disposed in contact with one of both left and right walls of the first storage compartment 11. For example, the drawer-type accommodation member 111 may be provided on a lower portion of the first storage compartment 11, and the water supply device 30 may be disposed to fill a space between the accommodation member 111 and a wall surface of the first storage compartment 11.

[0054] The ice maker 70 may be disposed on an upper surface of the second storage compartment 12, that is, a lower surface of the barrier 13. The ice maker 70 may make ice with water supplied from the water supply device 30. The ice maker 70 may be located on one side corresponding to a location of the water supply device 30 among left and right sides of the second storage compartment 12. For example, the water supply device 30 and the ice maker 70 may be located on the right side of the cabinet 10 based on FIG. 2. The water supply device 30 and the ice maker 70 may be disposed in a vertical direction with respect to the barrier 13 and disposed so that at least portions thereof overlaps each other. Accordingly, the water supply device 30 and the ice maker 70 may be disposed in close proximity along a short path, and a water supply path may be formed shortly.

[0055] The ice maker 70 may be provided as one ice maker, but is not limited thereto, and may be provided as a plurality of ice makers and disposed in parallel. For example, the ice maker 70 may include a first ice maker 50 that makes small cube-shaped ice and a second ice maker 60 that makes large spherical ice. A first ice bin 121 and a second ice bin 122 that store ice separated from the first ice maker 50 and the second ice maker 60 may be provided below the first ice maker 50 and the second ice maker 60, respectively.

[0056] Meanwhile, a machine compartment 16 in which a compressor, a condenser, a condenser fan, and the like are disposed may be provided on a lower portion of the cabinet 10. The machine compartment 16 may be disposed on an edge of a lower surface and rear surface of the cabinet 10 and may be open at the rear. The open rear surface of the cabinet 10 may be shielded by a machine compartment cover 161. A water valve 162 may be provided inside the machine compartment 16. The water valve 162 may be connected to an external water source 2 such as a tap. By opening and closing the water valve 162, water from the water source 2 may be selec-

tively supplied to the refrigerator 1. A pipe connecting the water source 2 to the water valve 162 among the entire water supply path 17 may be referred to as a first flow path 171.

[0057] A second flow path 172 connecting the water valve 162 to the water supply device 30 may be disposed on the rear surface of the cabinet 10. The second flow path 172 may extend to the rear of the water supply device 30 through a back cover 15 that finishes the rear surface of the cabinet 10. A first pipe connection portion 151 may be formed on the back cover 15. Through the first pipe connection portion 151, the second flow path 172 may be connected to the water supply device 30 and may supply water to the water supply device 30.

[0058] A third flow path 173 connecting the water supply device 30 to the dispenser 23 may be disposed on the rear surface of the cabinet 10. The third flow path 173 may extend to a second pipe connection portion 152 through the back cover 15. The third flow path 173 may extend to the dispenser 23 through the hinge for rotation of the door 20. In this way, water supplied from the water supply source 2 may be supplied to the water supply device 30 through the water valve 162 of the machine compartment 16, and water from the water supply device 30 may be supplied to the ice maker 70 or the dispenser 23.

[0059] Hereinafter, the water supply device 30 for supplying water to the ice maker 70 will be described with further reference to FIGS. 4 to 7.

[0060] Referring to FIG. 4, the water supply device 30 according to one embodiment may include a filter assembly 33 including a filter that purifies the water supplied from the water source 2, and a case 31 that accommodates the filter assembly 33. Water may be supplied to the filter assembly 33 through the second flow path 172 and purified, and the purified water in the filter assembly 33 may be discharged to the dispenser 23 through the third flow path 173. A method of supplying water from the external water source 2 in this way may be referred to as a plumbing method.

[0061] In addition, the purified water in the filter assembly 33 may be supplied to the ice maker 70 through a fourth flow path 174 that is separately branched from the third flow path 173. The filter assembly 33 may be connected to the water supply valve 34 so that water may be selectively supplied to the ice maker 70. One side of the water supply valve 34 may be connected to the fourth flow path 174, and the other side may be connected to the connection pipe 170. The connection pipe 170 may be connected to a connector 44.

[0062] When the ice maker 70 is provided as a plurality of ice makers, each of which is composed of the first ice maker 50 and the second ice maker 60, the connection pipe 170 may be composed of a first connection pipe 175 and a second connection pipe 176. A first connector 44a and a second connector 44b may be connected to the first connection pipe 175 and the second connection pipe 176, respectively. The first connection pipe 175 and the second connection pipe 176 may be connected to

a first water supply pipe 43a and a second water supply pipe 43b, respectively, while being connected to an upper bracket 41 and may selectively supply water to the first ice maker 50 and the second ice maker 60.

[0063] A case cover 32 capable of opening and closing the front opening to allow access to the filter assembly 33 may be disposed in front of the case 31 of the water supply device 30. In addition, side covers 132 may be provided on side surfaces of the case 31 to selectively open and close the interior of the case to access the filter assembly 33.

[0064] A withdrawal/insertion guide 311 that guides the withdrawal and insertion of the accommodation member 111 may be provided on a lower side surface of the case 31. The withdrawal/insertion guide 311 may extend in a front-rear direction and support side surfaces of the accommodation member 111 to guide the withdrawal and insertion of the accommodation member 111. Case legs 315 that protrude laterally may be formed on a lower end of the side surface of the case 31. For example, the case leg 315 may be provided as a pair of case legs and fixed to a bottom surface 112 of the first storage compartment 11.

[0065] A side opening 313 may be formed in the lower end of the side surface of the case 31. The connection pipe 170 may be withdrawn and inserted through the side opening 313. The connection pipe 170 may extend to a location of the upper bracket 41. The connector 44 connected to the end of the connection pipe 170 may be mounted on an upper surface of the upper bracket 41. By mounting the connector 44, the connection pipe 170 and a water supply pipe 43 inside the barrier 13 may communicate with each other to enable water supply to the ice maker 70.

[0066] Referring to FIG. 5, a water supply device 80 according to another embodiment may include a water tank 81 in which supplied water is stored, and a tank cover 82 that opens and closes the water tank 81 to supply water. Accordingly, the water supply device 80 does not require a separate pipe to be connected to the external water source 2 such as a tap, and water may be stored in the water supply device 80. The water tank 81 may be formed so that the interior is transparent to allow a user to check a water level of the stored water with his or her eyes. In this way, a method of supplying water from the water tank 81 disposed inside the storage compartment of the refrigerator 1 may be referred to as a non-plumbing method. In the case of the non-plumbing method, since water is supplied to the ice maker in a state in which the water is stored in the refrigerator, water at a lower temperature may be supplied to the ice maker than in the plumbing method.

[0067] The user may open the tank cover 82 and directly fill the water tank 81 with water to store water W supplied to the ice maker 70 and the dispenser 23. The tank cover 82 may open and close an open upper surface of the water tank 81. The tank cover 82 may further have an inlet 83 for supplying water into the water tank 81. As

needed, the water supply device 80 may include a filter assembly connected to the water tank 81, and water drained from the water tank 81 may be purified while passing through the filter assembly.

[0068] The upper bracket 41 may cover the bottom surface 112 of the first storage compartment 11, that is, an opening 112a formed in the inner case 102 formed on the upper surface of the barrier 13. The first connector 44a connected to the first connection pipe 175 and the second connector 44b connected to the second connection pipe 176 may be mounted to be spaced apart from each other on the upper surface of the upper bracket 41.

[0069] A connector cover 35 may be detachably mounted on the lower surface of the first storage compartment 11. The connector cover 35 may be mounted on the bottom surface 112 of the first storage compartment 11 to shield the connector 44 and the upper bracket 41 on which the connector 44 is mounted. In addition, the connector cover 35 may extend to the side surface of the case 31 to further shield the connection pipe 170.

[0070] A lower bracket 42 may be provided on the upper surface of the second storage compartment 12, that is, on the lower surface of the barrier 13. The lower bracket 42 may be disposed below the upper bracket 41 and coupled to the inner case 102 forming the second storage compartment 12. The lower bracket 42 may cover the upper surface of the second storage compartment 12, that is, the opening formed in the inner case 102 formed on the lower surface of the barrier 13.

[0071] The water supply pipe 43 may be disposed between the upper bracket 41 and the lower bracket 42. One side located on an upper end of the water supply pipe 43 may be connected to the connector 44 and may communicate with the connection pipe 170. The other side located on a lower end of the water supply pipe 43 may extend to the ice maker 70 through the lower bracket 42. Accordingly, the water supplied from the water supply device 30 may be supplied to the ice maker 70 through the water supply pipe 43 disposed to pass through the barrier 13. The water supply pipe 43 may connect the water supply device 30 to the ice maker 70 through the barrier 13 and form a short flow path along which water is supplied in a direction perpendicular to the barrier 13.

[0072] The ice maker 70 may be mounted on a lower surface of the lower bracket 42. The ice maker 70 may include the first ice maker 50 and the second ice maker 60. The lower bracket 42 may have a first ice maker mounting portion 423 that is recessed so that the first ice maker 50 is mounted, and a second ice maker mounting portion 424 that is recessed so that the second ice maker 60 is mounted. The water supply pipe 43 may include the first water supply pipe 43a that supplies water to the first ice maker 50 and the second water supply pipe 43b that supplies water to the second ice maker 60. Hereinafter, an example in which a plurality of ice makers 70 are mounted will be described, but the present invention is not limited thereto, and the ice maker 70 may be provided as one ice maker. In this case, the ice maker 70

may be the first ice maker 50 or the second ice maker 60.

[0073] The first ice maker 50 may include a first housing 510 mounted on the lower bracket 42, a first ice tray 520 which is provided inside the first housing 510 and in which ice is generated, and a first fill cup 530 provided above the first ice tray 520. The first fill cup 530 may be provided below the first water supply pipe 43a and may receive water supplied from the first water supply pipe 43a and guide the water to the first ice tray 520 including a plurality of first cells 521. A heating wire cover 800 may be disposed on a lower portion of the first fill cup 530 to connect a heating wire 700 to the first fill cup 530.

[0074] The second ice maker 60 may include a second housing 610 mounted on the lower bracket 42, an upper tray 621 and a lower tray 622 which are provided inside the second housing 610 and in which ice is generated, and a second water cup 670 provided above the upper tray 621. The upper tray 621 may be fixed to the second housing 610, and the lower tray 622 may be coupled to the upper tray 621 by a second rotational shaft 623. In a state in which the upper tray 621 and the lower tray 622 are closed, a spherical second cell 620 may be formed to generate spherical ice. In addition, the lower tray 622 may be rotated about the second rotational shaft 623 to open the second cell 620 so that the spherical ice is discharged to the second ice bin 122. For example, an upper ejector 640 may be provided above the upper tray 621, and the upper ejector 640 may push and separate ice inside the second cell 620 in a state in which the lower tray 622 has rotated. The second ice maker 60 may include a lower ejector 660 that is provided in the second housing 610 and presses the lower tray 622 when the lower tray 622 rotates to separate ice. The lower tray 63 and the upper ejector 64 may be operated by a driving unit such as a motor. The second ice maker 60 may further include a detection lever 650 for detecting an ice full state of ice stored in the second ice bin 122. The heating wire cover 800 that fastens the heating wire 700 to the second fill cup 670 may be disposed on a lower portion of the second fill cup 670.

[0075] Hereinafter, the first ice maker 50 according to one embodiment will be described in more detail with further reference to FIGS. 8 to 19. The description of the first ice maker 50 to be described below may also be applied to the second ice maker 60 in the same manner. For example, the descriptions of the heating wire 700 and the heating wire cover 800 applied to the first ice maker 50 may also be applied to the second ice maker 60 in the same manner.

[0076] The first ice maker 50 may include a first housing 510, a first ice tray 520, a first driving unit 540, a temperature sensor unit 550, and an ice full detection unit 560. The first housing 510 may form an ice-making space in which the first ice tray 520, the first driving unit 540, and the like are disposed.

[0077] A cold air outlet 571 may be formed on a front surface of the first housing 510. A cold air inlet 572 may be formed on a rear surface of the first housing 510. Cold air

may flow into the ice-making space through the cold air inlet 572, and the cold air flowing into the ice-making space may be discharged to the outside of the ice-making space through the cold air outlet 571. The cold air outlet 571 and the cold air inlet 572 may be disposed to face each other.

[0078] A first rotational shaft 522 may be disposed on one end of the first ice tray 520. The first rotational shaft 522 may be inserted into a rotation hole 573 formed in the rear surface of the first housing 510. The other end of the first ice tray 520 may be coupled with the rotational shaft of the first driving unit 540. The first driving unit 540 may rotate the first ice tray 520 about the first rotational shaft 522. The ice may be moved to the first ice bin 121 by the rotation of the first ice tray 520. The first driving unit 540 may be mounted on the first housing 510. The first driving unit 540 may include a main connector 541 that receives power and signals and include an auxiliary connector 542 electrically connected to the main connector 541. In addition, the main connector 541 of the first driving unit 540 may be electrically connected to the temperature sensor unit 550 and may apply the power and the signals to the temperature sensor unit 550. The main connector 541, the auxiliary connector 542, and the temperature sensor unit 550 may be electrically connected through wires having a predetermined length. The first housing 510 may include one or more wiring fixing portions 512 that fix wires connected to the main connector 541, the auxiliary connector 542, and the temperature sensor unit 550. For example, the wiring fixing portion 512 may fix the wires in a hook shape and may be formed in an upper region of the first driving unit 540 adjacent to the first driving unit 540. The auxiliary connector 542 may be connected to a heating wire connector 740 of a heating wire 700 to be described below and may operate the heating wire 700 by applying power to the heating wire 700 through a heating wire terminal 730 connected to the heating wire connector 740.

[0079] The ice full detection unit 560 may be disposed on an inner surface of the first housing 510 and may detect the amount of ice inside the first housing 510. The temperature sensor unit 550 may include a temperature sensor 551 and a sensor cover 552. The temperature sensor 551 may measure temperature and output the measured temperature. The sensor cover 552 may be disposed below the temperature sensor 551. The sensor cover 552 may be formed of an insulation material. The sensor cover 552 may fix the temperature sensor 551 to a lower portion of the first ice tray 520.

[0080] The first fill cup 530 may be disposed on the inner surface of the first housing 510. Water supplied through the water supply pipe 43 may be supplied to the first ice tray 520 through the first fill cup 530. The first ice tray 520 may include one or more first cells 521 which are ice-making cells and in which water is received. The first fill cup 530 may be disposed on one side of the first ice tray 520 and disposed at a middle point of the first ice tray 520 in a front-rear direction to evenly supply water to a

plurality of first cells 521.

[0081] The first fill cup 530 may be formed in a form in which an upper surface through which water is supplied from the water supply pipe 43 and a front surface through which water is supplied to the first ice tray 520 are open. For example, the first fill cup 530 may be formed of a lower surface 530b, a rear surface 530d, and two side surfaces 530s connecting the lower surface 530b to the rear surface 530d and may have a container shape in which the front and upper surfaces are open. The lower surface 530b may be formed as an inclined surface inclined toward the first ice tray 520 so that the water supplied to the first fill cup 530 may flow to the first ice tray 520 well. A catch 531 having an opening slot 531h that is open in a vertical direction may be formed on each of the two side surfaces 530s of the first fill cup 530. The catch 531 may be formed to protrude outward from upper regions of outer surfaces of the side surfaces 530s of the first fill cup 530.

[0082] Meanwhile, when residual water occurs in the first fill cup 530 that receives water from the water supply pipe 43, the residual water may freeze and grow into residual ice within the first fill cup 530. In order to remove the residual ice that grows inside the first fill cup 530 in this way, the heating wire 700 may be disposed on an outer surface of the first fill cup 530. The heating wire 700 may be fixed to the first fill cup 530 by the heating wire cover 800 fastened to the first fill cup 530. Such growth of the residual ice may occur more smoothly in the non-plumbing type water supply structure that supplies water at a relatively lower temperature. For example, in the case of a non-plumbing type water supply structure, since water is stored in the water tank 81 disposed inside the storage compartment of the refrigerator 1, the water stored in the water tank 81 is actually reduced to a temperature close to the temperature of the storage compartment of the refrigerator 1. Meanwhile, in the case of a plumbing type water supply structure that supplies water from the external water source 2 having a higher water temperature than the temperature inside the refrigerator 1, water having a relatively higher water temperature than in the non-plumbing type water supply structure is supplied to the first fill cup 530. Accordingly, in the case of the plumbing type water supply structure, since water having a higher water temperature than in the non-plumbing type water supply structure is supplied to the first fill cup 530, ice is likely to grow in the first fill cup 530 or its growth rate may be slower. Accordingly, in the case of the non-plumbing type water supply structure that supplies water having a lower water temperature than in the plumbing type water supply structure to the first fill cup 530, since residual ice is likely to grow or its growth rate is faster, the effect of suppressing the growth of residual ice by the heating wire 700 can be more effective than in the plumbing type water supply structure. That is, the effect of suppressing the growth of residual ice in the first fill cup 530 by the heating wire 700 is effective in both the non-plumbing type water supply structure and the plumbing

ing type water supply structure, but can be more effective in the non-plumbing type water supply structure that supplies water at a lower temperature.

[0083] The heating wire 700 may be disposed on at least one outer surface of the first fill cup 530. For example, the heating wire 700 may be disposed to surround the lower surface 530b and both side surfaces 530s of the first fill cup 530. The heating wire 700 is preferably disposed in a region of the first fill cup 530 in which a large amount of residual ice may be generated. When the heating wire 700 is disposed along the entire region of the lower surface 530b of the first fill cup 530, it can be easier to remove residual ice from the lower surface 530b of the first fill cup 530, but when the heating wire 700 is disposed along a wide region, the temperatures of the first ice maker 50 and the storage compartment may increase, which may adversely affect the cooling efficiency of the refrigerator 1. In order to make water into ice, the heat needs to be removed from the water, and when the heating wire 700 is applied to the first fill cup 530, the ice-making performance of the ice maker 70 can be reduced due to the heat supplied by the heating wire 700.

[0084] In addition, since the lower surface 530b of the first fill cup 530 is formed as an inclined surface that is inclined toward the first ice tray 520, an end of the lower surface 530b of the first fill cup 530 is disposed adjacent to the first ice tray 520. Accordingly, the heating wire 700 may be preferably disposed to be as far apart as possible from the first ice tray 520.

[0085] Accordingly, the heating wire 700 may be more intensively disposed adjacent to the rear surface 530d of the first fill cup 530 rather than the open front surface thereof. That is, the heating wire 700 is preferably intensively disposed in a space in which residual water is likely to remain.

[0086] For example, the heating wire 700 disposed on the lower surface 530b of the first fill cup 530 may be disposed to overlap the upper surface of the open first fill cup 530 in the vertical direction. In addition, the heating wire cover 800 that surrounds the lower surface 530b of the first fill cup 530 with the heating wire 700 interposed therebetween may also be disposed to overlap the upper surface of the first fill cup 530 in the vertical direction. The upper surface of the first fill cup 530 may be disposed to overlap a water outlet disposed on the other side of the water supply pipe 43 in the vertical direction. Accordingly, when the heating wire 700 is intensively disposed in the region of the lower surface 530b of the first fill cup 530 located to overlap the water outlet of the water supply pipe 43 in the vertical direction, it is possible to prevent the growth of the residual ice in the upper direction in which the water supply pipe 43 is located. In addition, since the heating wire 700 does not need to be disposed in the region of the lower surface 530b of the first fill cup 530 adjacent to the first ice tray 520, it is also possible to prevent a reduction in the cooling efficiencies of the ice maker 70 and the refrigerator 1.

[0087] Meanwhile, the heating wire cover 800 may include a first fastening body portion 810 that surrounds the lower surface 530b and the two side surfaces 530s of the fill cup 530 with the heating wire 700 interposed therebetween. Accordingly, the first fastening body portion 810 may be formed to have a shape that surrounds the lower surface 530b and the two side surfaces 530s of the fill cup 530 from the outside. For example, the first fastening body portion 810 may be formed to have a substantially U-shaped shape. The heating wire cover 800 may be formed to surround a portion of the lower surface 530b of the fill cup 530. For example, the first fastening body portion 810 may be formed not to surround a region adjacent to the front surface of the fill cup 530. For example, the first fastening body portion 810 may be formed to surround a region that overlaps the open upper surface of the first fill cup 530 in the vertical direction. Accordingly, the heat conducted to the first fastening body portion 810 by the heating wire 700 can be prevented from reaching the lower surface 530b of the fill cup 530 adjacent to the first ice tray 520 as much as possible.

[0088] A heating wire seating portion 813 on which the heating wire 700 is seated may be formed inside the first fastening body portion 810. The heating wire seating portion 813 may be formed to be recessed downward so that the heating wire 700 may be seated. For example, the heating wire seating portion 813 may be formed in an extended form to connect the two side surfaces and the lower surface of the first fastening body portion 810 to provide a path through which the heating wire 700 passes. The heating wire seating portion 813 may be provided as a pair of heating wire seating portions and disposed to be spaced a predetermined distance from each other. The pair of heating wire seating portions 813 may be disposed to be spaced apart from each other in the front-rear direction that is a direction of the front and rear surfaces of the fill cup 530 based on a state of being fastened to the fill cup 530. The heating wire seating portion 813 adjacent to the rear surface 530d of the fill cup 530 may be defined as a first heating wire seating portion 813a, and the heating wire seating portion 813 adjacent to the front surface of the fill cup 530 may be defined as a second heating wire seating portion 813b.

[0089] A heating wire guide portion 814 formed to protrude outward may be disposed on an upper end of each heating wire seating portion 813 disposed on side surfaces of the first fastening body portion 810. The heating wire guide portion 814 may be open in the vertical direction so that the heating wire 700 may pass there-through to connect a path through which the heating wire 700 passes. The heating wire guide portion 814 formed on the side surface of the first fastening body portion 810 adjacent to the direction in which the heating wire terminal 730 extends may be defined as a first heating wire guide portion 814a, and the heating wire guide portion 814 located on the opposite side surface on which the first heating wire guide portion 814a is disposed may be

defined as a second heating wire guide portion 814b. The first heating wire guide portion 814a may be formed to have open side surfaces facing outward to allow the heating wire 700 to be easily bent outward. In this case, a catch rib 816 may be formed on the open side surfaces of the first heating wire guide portion 814a to restrain the heating wire 700 from being removed.

[0090] For example, the first heating wire 710 extending from a first heating wire terminal 731 may be inserted through the first heating wire guide portion 814a formed on the first heating wire seating portion 813a. The first heating wire 710 may extend along the first heating wire seating portion 813a and extend outward through the second heating wire guide portion 814b formed on the first heating wire seating portion 813a. In this way, the first heating wire 710 extending to the outside of the second heating wire guide portion 814b formed on the first heating wire seating portion 813a may be bent to be inserted into the second heating wire guide portion 814b formed on the second heating wire seating portion 813b and connected to the second heating wire 720. The second heating wire 720 may extend along the second heating wire seating portion 813b, may be bent and extended to the outside of the first heating wire guide portion 814a of the second heating wire seating portion 813b, and connected to the second heating wire terminal 732. The first heating wire 710 and the second heating wire 720 described in the present specification may not be physically distinguished, but rather conceptually distinguished. Accordingly, the first heating wire 710 and the second heating wire 720 may be formed integrally, and the heating wire 700 may be formed in the form of a single line.

[0091] Referring to FIG. 16, a cut portion 815 that is open in the vertical direction may be formed on each of both edges of the first heating wire mounting portion 813a and the second heating wire mounting portion 813b that correspond to the lower surface 530b of the fill cup 530. The heating wire 700 extending along the first heating wire mounting portion 813a and the second heating wire mounting portion 813b may be exposed downward through the cut portion 815. Since the heating wires 700 are bent upward from the edges of the first heating wire seating portion 813a and the second heating wire seating portion 813b, the heating wire 700 may be subjected to strong tension at the edges of the first heating wire seating portion 813a and the second heating wire seating portion 813b. Accordingly, in order to prevent the removal of the heating wire 700 through the cut portion 815 that may be caused by the strong tension of the heating wire 700, the catch rib 816 may be formed on each cut portion 815. In addition, the catch rib 816 on the cut portion 815 may provide a fixing structure that increases adhesion so that the heating wire 700 may be fixedly in close contact with the lower surface 530b of the fill cup 530. The user can easily check the fixing structure of the heating wire 700 through the cut portion 815.

[0092] Referring to FIG. 17, when a direction in which water W supplied to the fill cup 530 flows to the first ice

tray 520 is defined as a first direction, the heating wire 700 may extend in a second direction, which is a direction intersecting the first direction. In this case, the first direction may be a direction from the rear surface 530d to the front surface of the fill cup 530 with respect to the first fill cup 530, and the second direction may be a direction connecting the two side surfaces 530s of the first fill cup 530. For example, the first heating wire 710 and the second heating wire 720 may be disposed continuously without interruption in the second direction. Accordingly, the heating wire 700 may be disposed along all paths of the water W flowing in the first direction, thereby effectively suppressing the growth of residual ice.

[0093] The first heating wire 710 and the second heating wire 720 may extend in a straight line, but are not limited thereto. Referring to FIG. 16, the first heating wire 710 and the second heating wire 720 according to another embodiment may be disposed to extend in the second direction in a curved shape including a curved portion. In this way, when the first heating wire 710 and the second heating wire 720 include a curved portion, a contact area between the heating wire 700 and the lower surface 530b of the first fill cup 530 may be increased, thereby increasing the efficiency of the heating wire. Even in this case, the first heating wire 710 and the second heating wire 720 may be disposed continuously without interruption in the second direction.

[0094] In addition, the heating wire 700 is not limited to a line shape. Referring to FIG. 17, the heating wire 700 may be formed in a planar shape and may extend in the second direction of the lower surface 530b of the fill cup 530. In this case, the heating wire 700 may be disposed to cover the two side surfaces 530s of the fill cup 530 in a planar shape. For example, the heating wire 700 may be a planar heating element. In this way, when the heating wire 700 is formed in a planar shape, the contact area between the heating wire 700 and the lower surface 530b of the first fill cup 530 may be further increased, thereby increasing the efficiency of the heating wire.

[0095] The first fastening body portion 810 may be fastened to the first fill cup 530 in a hook-coupling manner. A hook 812 extending upward may be formed on each of the two side surfaces of the first fastening body portion 810. The hook 812 may be extended upward by an extension 811 from an upper end of the side surface of the first fastening body portion 810. The hook 812 may be disposed between the pair of first heating wire guide portions 814a and between the pair of second heating wire guide portions 814b. The hook 812 may be formed to have a hook shape facing the outside of the first fastening body portion 810.

[0096] Referring to FIG. 15, the hook 812 of the first fastening body portion 810 may be inserted from the bottom to the top of the opening slot 531h formed on the side surface 530s of the first fill cup 530 and hook-coupled to the catch 531 of the first fill cup 530. As described above, the heating wire 700 may be disposed between the first fastening body portion 810 and the first

fill cup 530. An outer surface of the heating wire 700 may be formed of a material having a predetermined elasticity. For example, the outer surface of the heating wire 700 may be covered with a material such as silicon. Accordingly, the heating wire 700 disposed to overlap the lower surface 530b of the first fill cup 530 may exert a force that pushes the first fastening body portion 810 downward, and the heating wire 700 disposed to overlap the side surface 530s of the first fill cup 530 may exert a force that pushes the first fastening body portion 810 outward in a lateral direction.

[0097] Accordingly, a removal force that tries to remove the first fastening body portion 810 downward and outward may be exerted by an elastic repulsive force of the heating wire 700. In this case, the hook 812 is hook-coupled on an upper surface of the catch 531 so that the catch 531 supports the lower surface of the hook 812. Accordingly, even when the removal force is generated downward from the first fastening body portion 810, a lower surface of the hook 812 is supported by the catch 531, and thus the first fastening body portion 810 may not be removed from the fill cup 530. In addition, since an outer surface of the hook 812 or the extension 811 is in contact with an inner surface of the catch 531, the catch 531 supports the outer surface of the hook 812 or the extension 811. Accordingly, even when the removal force is generated outward in a lateral direction of the first fastening body portion 810, the outer surface of the hook 812 is supported by the catch 531, and thus the first fastening body portion 810 may not be removed from the fill cup 530.

[0098] That is, in a state in which the first fastening body portion 810 has been hook-coupled to the fill cup 530, the hook 812 may generate the removal force outward and downward from both sides of the catch 531. In this way, when the removal force is applied to the heating wire cover 800 in the vertical direction by the heating wire 700, the hook 812 of the heating wire cover 800 can prevent the removal of the heating wire cover 800 due to the hook coupling having a catch direction in which a catch force is applied downward by the catch 531 of the fill cup 530. In addition, when the removal force is applied to the heating wire cover 800 in the left-right direction by the heating wire 700, the hook 812 may be further opened outward, thereby further enhancing the fastening force of the hook coupling.

[0099] A diameter d1 of the heating wire 700 may be set to be larger than a depth d2 of the heating wire seating portion 813 of the first fastening body portion 810. The heating wire 700 may be seated on the heating wire seating portion 813, and one side and the other side of the heating wire 700 may be in contact with the lower surface 530b of the fill cup 530 and the first fastening body portion 810, respectively. As described above, since the outer surface of the heating wire 700 is formed of a material having a predetermined elasticity, when the diameter d1 of the heating wire 700 is set to be larger than the depth d2 of the heating wire seating portion 813,

the heating wire 700 may be pressed by the first fastening body portion 810. Accordingly, a contact area between the lower surface 530b and the side surface 530s of the fill cup 530 in contact with the heating wire 700 may increase, thereby increasing the heat efficiency by the heating wire 700.

[0100] Meanwhile, the heating wire cover 800 may include a second fastening body portion 820 that fixes the heating wire terminal 730. The second fastening body portion 820 may extend outward from one side of the first fastening body portion 810. For example, the second fastening body portion 820 may extend in a plate shape from one side of the rear surface of the second heating wire guide portion 814b of the first heating wire seating portion 813a of the first fastening body portion 810 toward the first driving unit 540. The second fastening body portion 820 may be in contact with the inner surface of the first housing 510. A hook 824 may be formed on a rear surface of the second fastening body portion 820 facing the inner surface of the first housing 510. An insertion portion 511 may be formed on the inner surface of the first housing 510. The insertion portion 511 may be formed so that an upper surface is open and the hook 824 of the second fastening body portion 820 is inserted from the top to the bottom and hook-coupled. Accordingly, a fastening direction in which the first fastening body portion 810 is fastened to the fill cup 530 and a fastening direction in which the second fastening body portion 820 is fastened to the first housing 510 may be opposite.

[0101] For example, the hook 812 of the first fastening body portion 810 may be inserted from the bottom to the top of the opening slot 531h of the catch 531 of the first fill cup 530 and hook-coupled, and the hook 824 of the second fastening body portion 820 may be inserted from the top to the bottom of the insertion portion 511 of the first housing 510 and hook-coupled. Accordingly, the first fastening body portion 810 and the second fastening body portion 820 of the heating wire cover 800 may generate fastening forces in opposite directions, thereby increasing the fastening force of the heating wire cover 800 and preventing the heating wire cover 800 from being easily removed.

[0102] In addition, the heating wire cover 800 may be formed using an injection-molding process. The second fastening body portion 820 of the heating wire cover 800 may have an assembly tolerance in the first housing 510 due to errors or injection warpage during the injection-molding process. The hook 824 of the second fastening body portion 820 according to the present invention may be designed to be spaced a predetermined distance from rear and lower surfaces of the inside of the insertion portion 511. Accordingly, even when a gap occurs between the hook 824 of the second fastening body portion 820 and the insertion portion 511 during the assembly process or due to injection warpage, the hook 824 and the insertion portion 511 can be smoothly hook-coupled.

[0103] The second fastening body portion 820 of the heating wire cover 800 may include one or more first hook

fixing portions 821 arranged on one side of the first heating wire terminal 731, one or more second hook fixing portions 822 arranged on one side of the second heating wire terminal 732, and a support 823 disposed between the first hook fixing portion 821 and the second hook fixing portion 822 to allow one side and the other side to support the other sides of the first heating wire terminal 731 and the second heating wire terminal 732, respectively. The first hook fixing portion 821, the second hook fixing portion 822, and the support 823 may be formed on the opposite surface of the second fastening body portion 820 on which the hook 824 is formed. The first hook fixing portion 821, the support 823, and the second hook fixing portion 822 may be sequentially disposed to be spaced a predetermined distance from each other in the vertical direction. In this case, the first hook fixing portion 821, the support 823, and the second hook fixing portion 822 may be disposed not to overlap each other in the vertical direction. Accordingly, when the first hook fixing portion 821, the support 823, and the second hook fixing portion 822 may be formed by injection molding, a required injection mold can be simplified.

[0104] In addition, the first hook fixing portion 821 and the second hook fixing portion 822 may fix the first heating wire terminal 731 and the second heating wire terminal 732 in a one-way hook-coupling manner, respectively. In this case, hooks of the first hook fixing portion 821 and the second hook fixing portion 822 may be formed in a direction facing each other. In this way, the heating wire terminal 730 connected to the heating wire 700 may be fastened to the second fastening body portion 820 of the heating wire cover 800 in a one-way hook-coupling manner, thereby reducing an installation space and improving workability during the assembly process.

[0105] Meanwhile, referring to FIG. 12, the heating wire 700 may be disposed to surround the lower surface 530b and the two side surfaces 530s of the first fill cup 530. In this case, the first heating wire seating portion 813a and the second heating wire seating portion 813b on which the heating wire 700 is seated may extend to the upper region of the heating wire cover 800 as far as possible, and the second heating wire guide portion 814b through which the heating wire 700 passes may also be formed in the upper region of the heating wire cover 800 and disposed adjacent to the hook 812.

[0106] Describing another embodiment with reference to FIG. 13, the heating wire 700 may be disposed to surround only the lower surface 530b and portions of the two side surfaces 530s, that is, lower regions of the two side surfaces 530s, of the first fill cup 530. In this case, the first heating wire seating portion 813a and the second heating wire seating portion 813b on which the heating wire 700 is seated may extend to only the lower region of the heating wire cover 800, and the second heating wire guide portion 814b through which the heating wire 700 passes may be formed in the lower region of the heating wire cover 800 and disposed to be spaced a predetermined distance from the hook 812.

[0107] Describing another embodiment with reference to FIG. 14, the heating wire 700 may be disposed on only the lower surface 530b of the first fill cup 530 and may not be disposed on the two side surfaces 530s of the first fill cup 530. For example, the heating wire 700 may be connected to pass through the cut portion 815 of the first heating wire seating portion 813a and the cut portion 815 of the second heating wire seating portion 813b that are formed on the lower end of the heating wire cover 800. In this way, since the heating wire 700 is disposed on only the lower surface 530b of the first fill cup 530, it is possible to suppress the generation of residual ice on the lower surface 530b of the first fill cup 530 in which the residual ice is intensively generated and reduce the total length of the heating wire 700 disposed within the ice maker, thereby increasing the cooling efficiency of the ice maker.

[0108] A method of controlling the removal of residual ice from a fill cup of an ice maker mounted in a refrigerator will be described with reference to FIG. 20.

[0109] An initial control operation S100 of the ice maker 70 may be initiated. The initial control operation S100 may be an operation in which the operation of the ice maker 70 is first initiated.

[0110] After the initial control operation S100, a control unit of the refrigerator 1 may proceed with an operation S110 of setting an ice-making count to 0.

[0111] After the operation S110 is performed, an ice-making control operation S120 may be performed. The ice-making control operation S120 may include an operation of supplying water to the fill cup 530 through the water supply pipe 43, supplying the water supplied to the fill cup 530 to the first ice tray 520, and icing the water supplied to the first ice tray 520.

[0112] After the ice-making control operation S120, an operation S130 of determining whether ice is full may be performed. An ice-transferring control operation S140 of detecting, by the ice full detection unit 560, whether the ice stored in the first ice bin 121 has been fully filled and transferring ice of the first ice tray 520 to the first ice bin 121 when it is not in an ice full state may be performed.

[0113] After the operation S140, an operation S150 of checking whether the ice-making count is N (N is a natural number) may be performed. The ice-making count may be preset. An ice-making count increment operation S170 of increasing an ice-making count by 1 when the ice-making count does not meet the preset N may be performed. After the operation S170 is performed, a water supply control operation S180 may be performed, and the ice-making control operation S120 may be re-performed.

[0114] When the ice-making count meets the preset N, an operation S160 of operating the heating wire 700 of the fill cup 530 may be performed. After the operation S160 is performed, an operation S161 of determining whether the heating wire 700 has been operated for a preset time or longer may be performed. The preset time in the operation S161 may be set to M (M is a natural number), but this is not particularly limited, and the time

may be set in more detail. After the operation S161 is performed, an operation S162 of stopping the operation of the heating wire 700 of the first fill cup 530 and an operation S163 of initializing the ice-making count to 0 may be performed. After the operation S163 is performed, the ice-making control operation S120 may be re-performed.

[0115] In this way, a method of controlling the removal of residual ice from a fill cup of an ice maker according to the present invention may control whether the heating wire operates based on the number of preset ice-making control operations, thereby effectively removing residual ice of the fill cup periodically without separately detecting whether residual ice is generated in the fill cup.

[0116] Although the present invention has been described above with reference to the exemplary drawings, the present invention is not limited by the embodiments and drawings disclosed in the present specification, and it is obvious that various modifications can be made by those skilled in the art within the scope of the technical spirit of the present invention. In addition, even when the operational effects according to the configuration of the present invention have not been explicitly described in the description of the embodiments of the present invention, it goes without saying that the effects predictable by the corresponding configuration should be recognized.

Claims

1. An ice maker comprising:
 - a housing that forms an ice-making space;
 - a fill cup mounted in the housing to receive water;
 - a heating wire disposed on at least one outer surface of the fill cup;
 - a heating wire cover fastened to the fill cup to fix the heating wire to the fill cup; and
 - an ice tray disposed in the ice-making space and having one or more ice-making cells.
2. The ice maker of claim 1, wherein the heating wire is disposed to surround a lower surface and both side surfaces of the fill cup.
3. The ice maker of claim 1 or 2, wherein an upper surface of the fill cup to which the water is supplied is open, and the heating wire disposed on a lower surface of the fill cup is disposed to overlap the open upper surface of the fill cup in a vertical direction.
4. The ice maker of one of claims 1 to 3, wherein the heating wire extends in a second direction intersecting the first direction in which water supplied to the fill cup flows to the ice tray.
5. The ice maker of claim 4, wherein the heating wire is disposed on a lower surface of the fill cup and is continuously disposed in the second direction.
6. The ice maker of one of claims 1 to 5, wherein the heating wire cover includes a first fastening body portion that surrounds a lower surface and two side surfaces of the fill cup with the heating wire interposed therebetween, and the first fastening body portion is fastened to the two side surfaces of the fill cup in a hook-coupling manner.
7. The ice maker of one of claims 1 to 6, wherein the heating wire cover includes a second fastening body portion that extends outward from the fill cup to fix a heating wire terminal electrically connected to the heating wire,
 - the second fastening body portion includes a hook that protrudes toward an inner surface of the housing,
 - the housing includes an insertion portion having an open upper surface for the hook to be inserted, and
 - the hook is inserted from the top to bottom of the insertion portion and coupled to the insertion portion.
8. The ice maker of one of claim 1 to 7, further comprising:
 - a driving unit configured to rotate the ice tray about one axis;
 - a main connector connected to power applied to the driving unit;
 - an auxiliary connector electrically connected to the main connector; and
 - a heating wire connector electrically connected to the heating wire, wherein the heating wire connector is coupled with the auxiliary connector, and the heating wire receives power applied to the main connector.
9. A refrigerator comprising:
 - a cabinet including a first storage compartment and a second storage compartment;
 - a water supply pipe connecting the first storage compartment to the second storage compartment; and
 - an ice maker disposed in the second storage compartment, wherein the ice maker includes:
 - a fill cup that receives water from the water supply pipe;
 - a heating wire disposed on at least one

outer surface of the fill cup; and
 a heating wire cover fastened to the fill cup
 to fix the heating wire to the fill cup.

10. The refrigerator of claim 9, further comprising: 5
- a water supply device disposed in the first storage compartment located above the second storage compartment, 10
- wherein water supplied through the water supply device flows into one side of the water supply pipe, is discharged from the other side of the water supply pipe, and is delivered to the fill cup.
11. The refrigerator of claim 9 or 10, wherein the heating wire is disposed to surround an outer lower surface and two outer side surfaces of the fill cup. 15
12. The refrigerator of claim 10 or 11, when being dependent on claim 10, wherein the water supply device includes a water storage compartment that stores water. 20
13. The refrigerator of one of claims 10 to 12, when being dependent on claim 10, wherein the water supply device receives water from a water source disposed outside the cabinet. 25
14. A method of controlling removal of residual ice of a fill cup of a refrigerator including a cabinet including a first storage compartment and a second storage compartment, a water supply pipe connecting the first storage compartment to the second storage compartment, and an ice maker including a fill cup that is disposed in the second storage compartment and receives water from the water supply pipe and a heating wire disposed on at least one outer surface of the fill cup, the method comprising: 30
- determining whether an ice-transferring control operation of the ice maker exceeds a preset number of times; and 40
- operating the heating wire for a preset time when the ice-transferring control operation of the ice maker exceeds the preset number of times. 45
15. The method of claim 14, further comprising initializing the preset number of times to 0 after the operating of the heating wire for the preset time. 50

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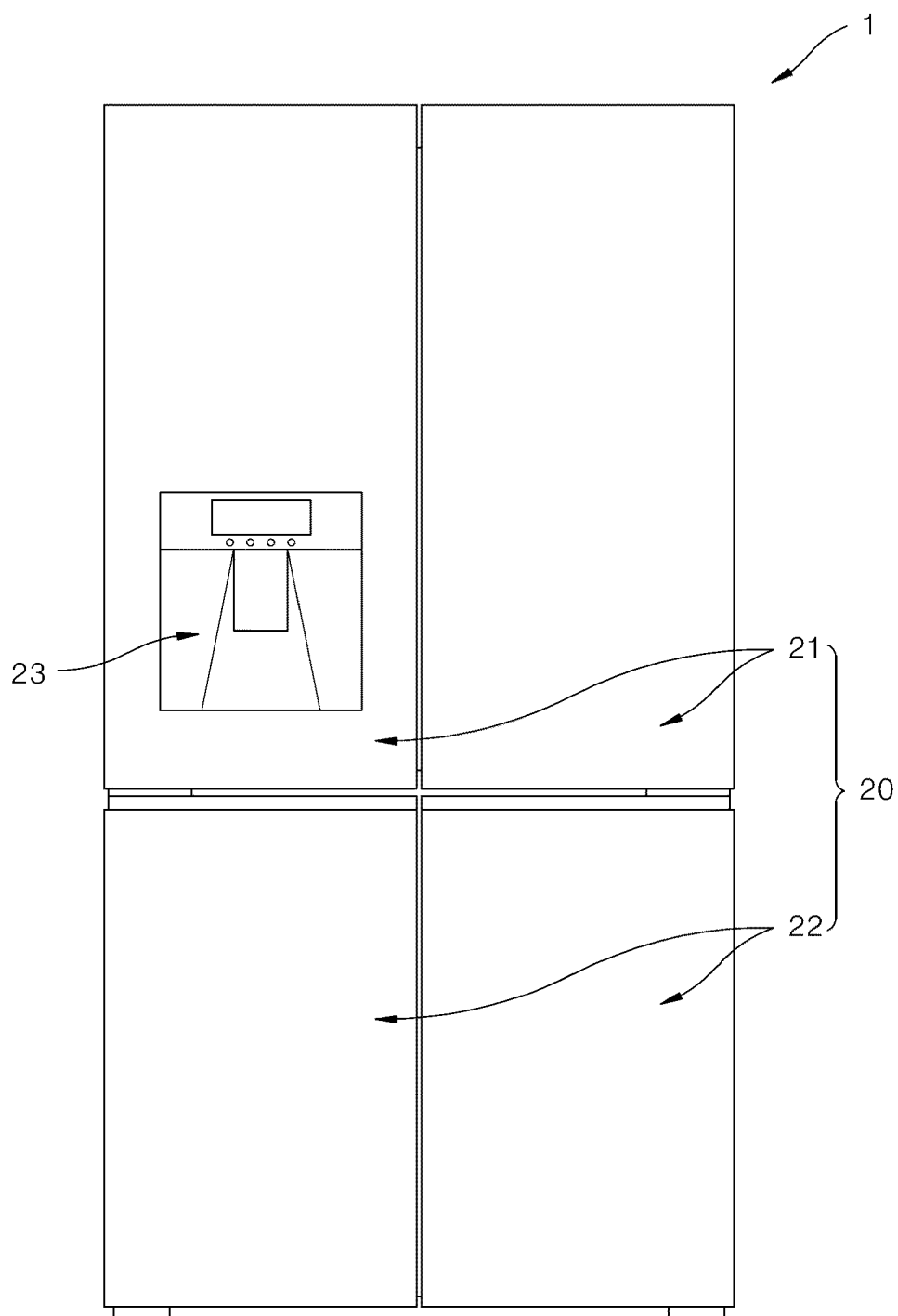


FIG. 1

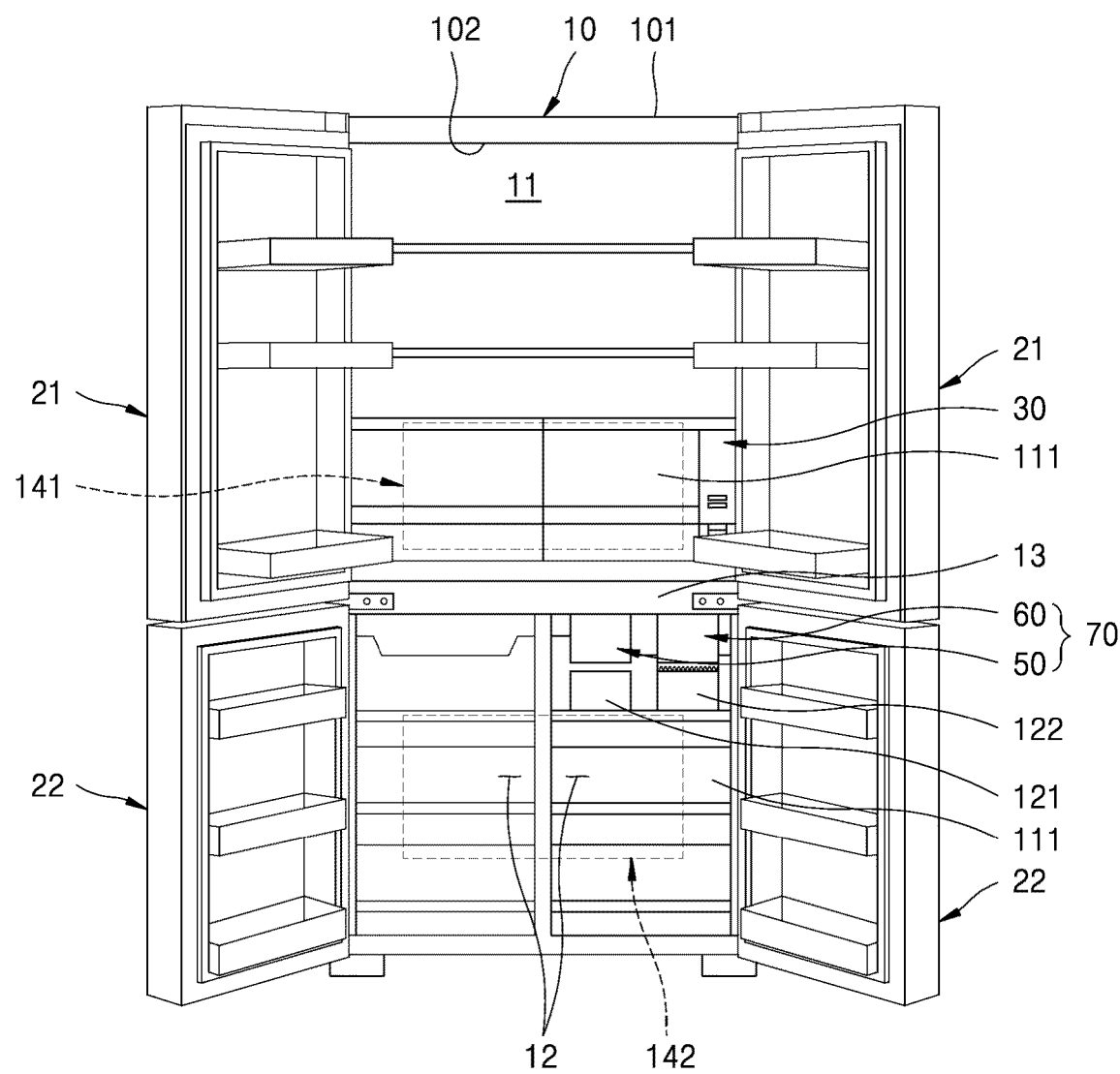


FIG. 2

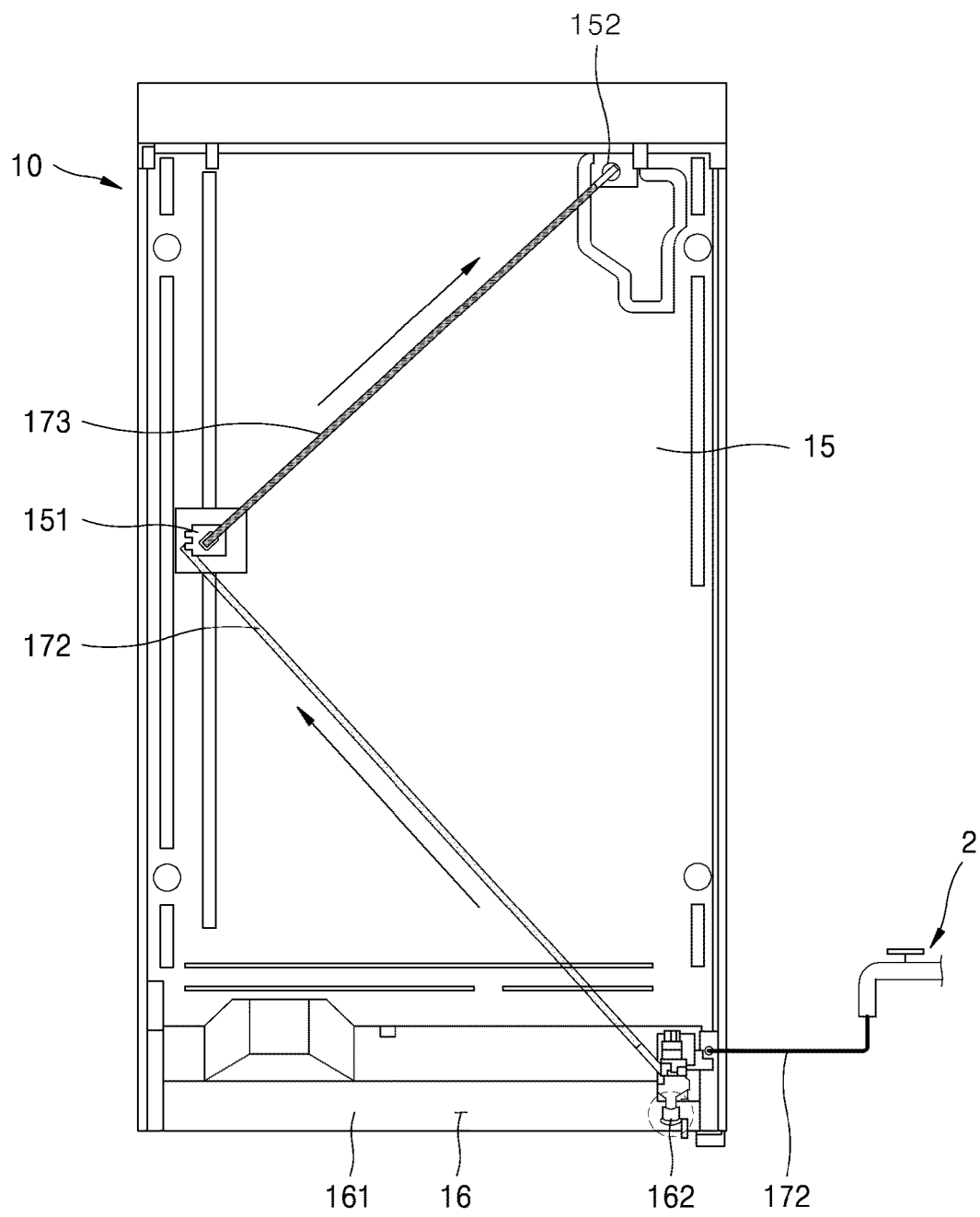


FIG. 3

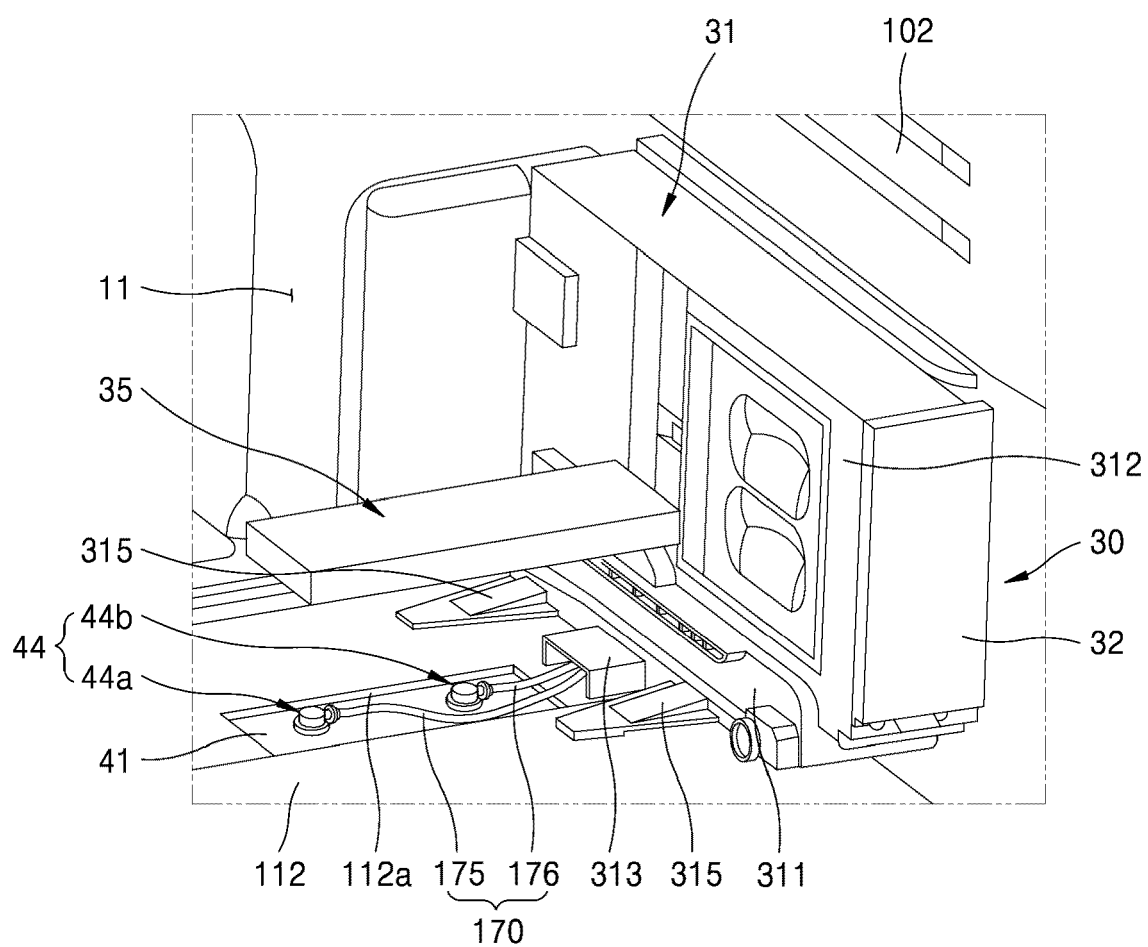


FIG. 4

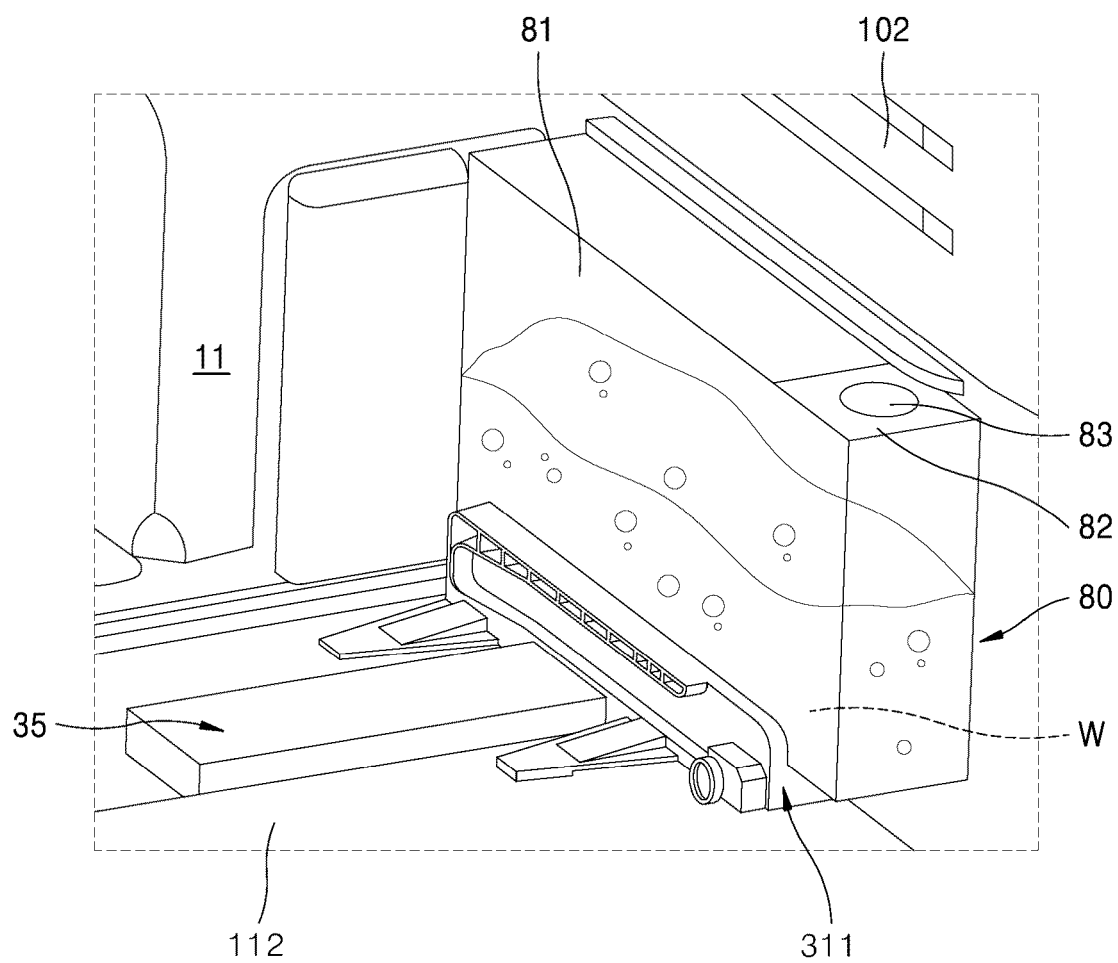


FIG. 5

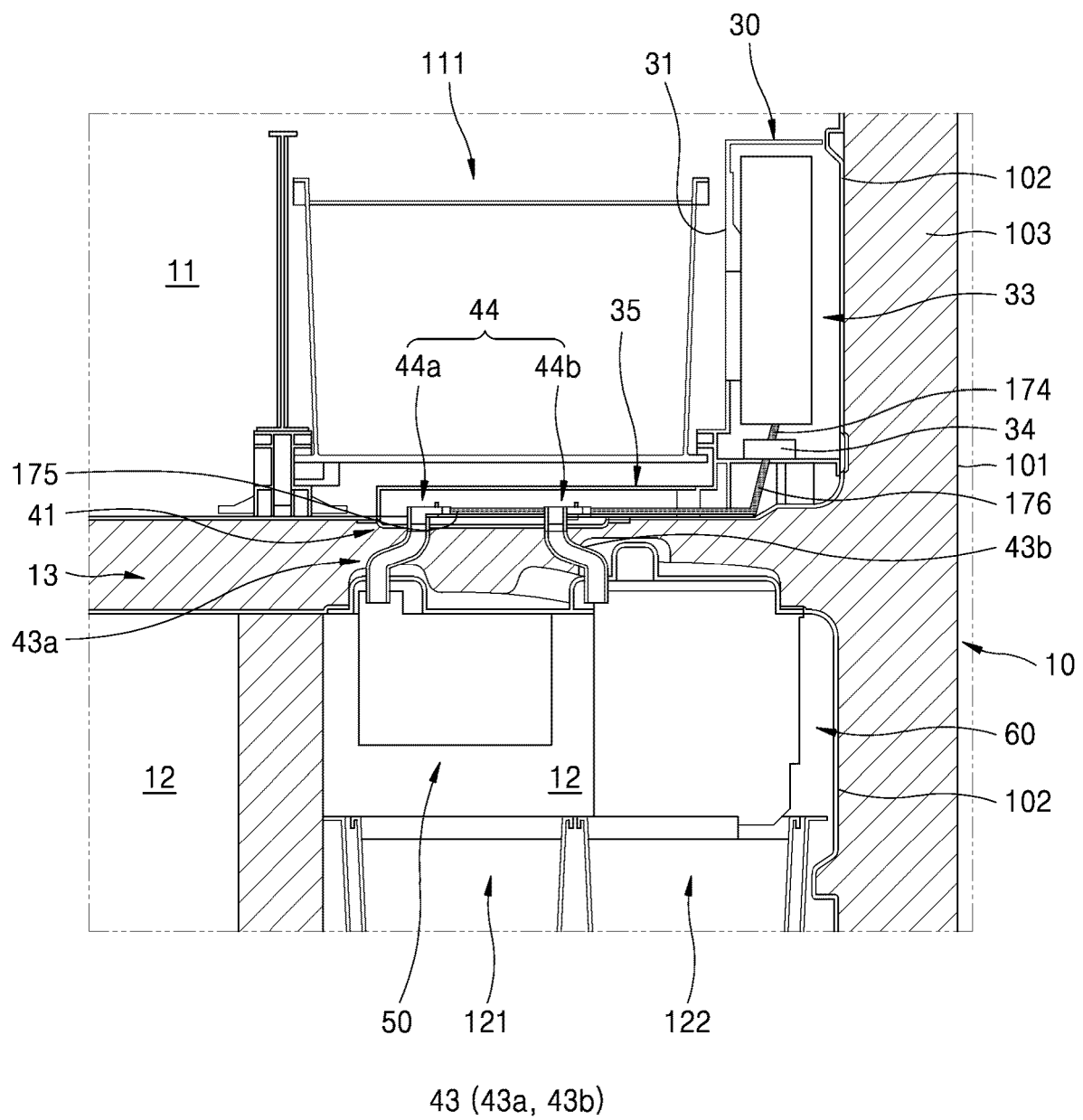


FIG. 6

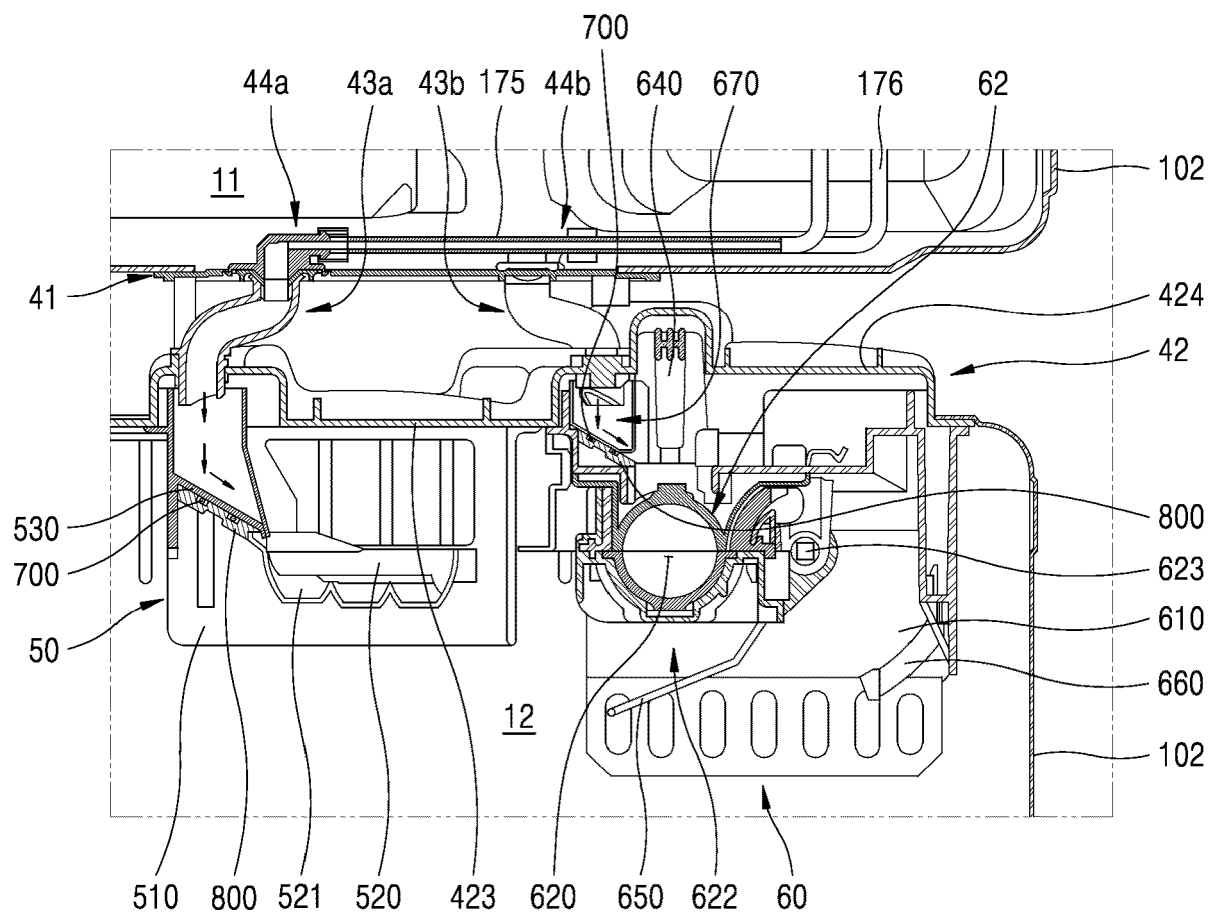


FIG. 7

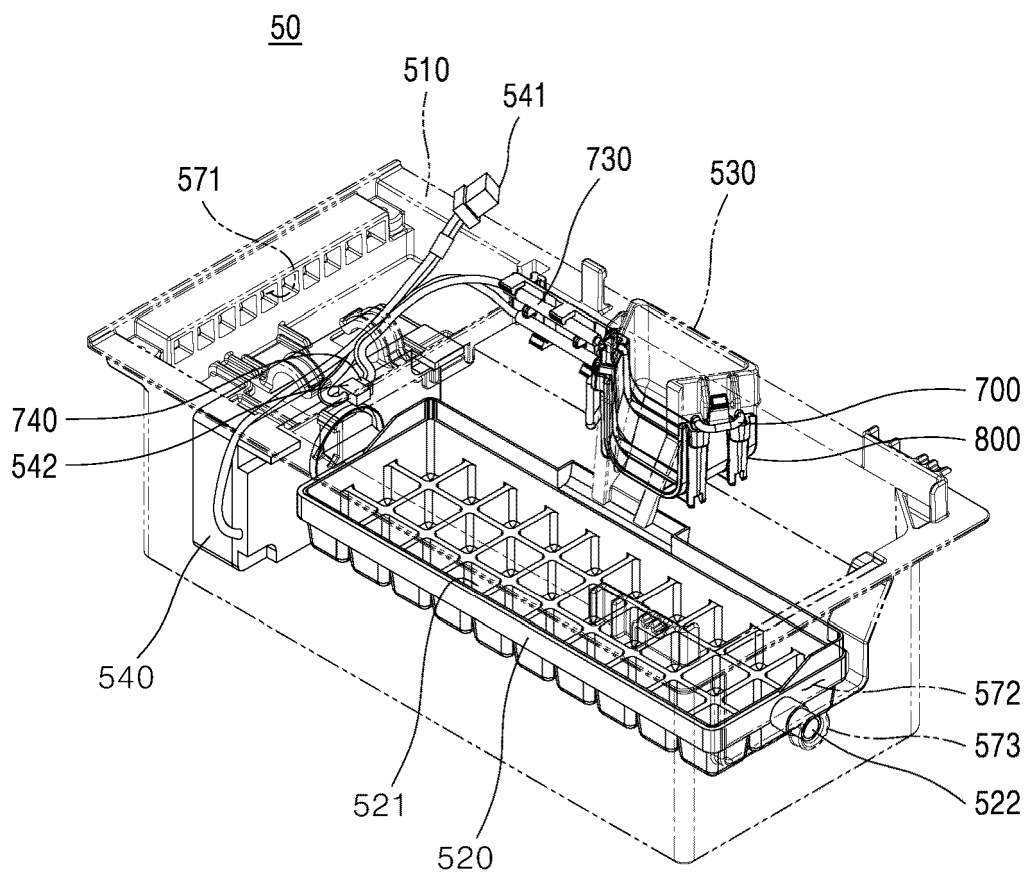


FIG. 8

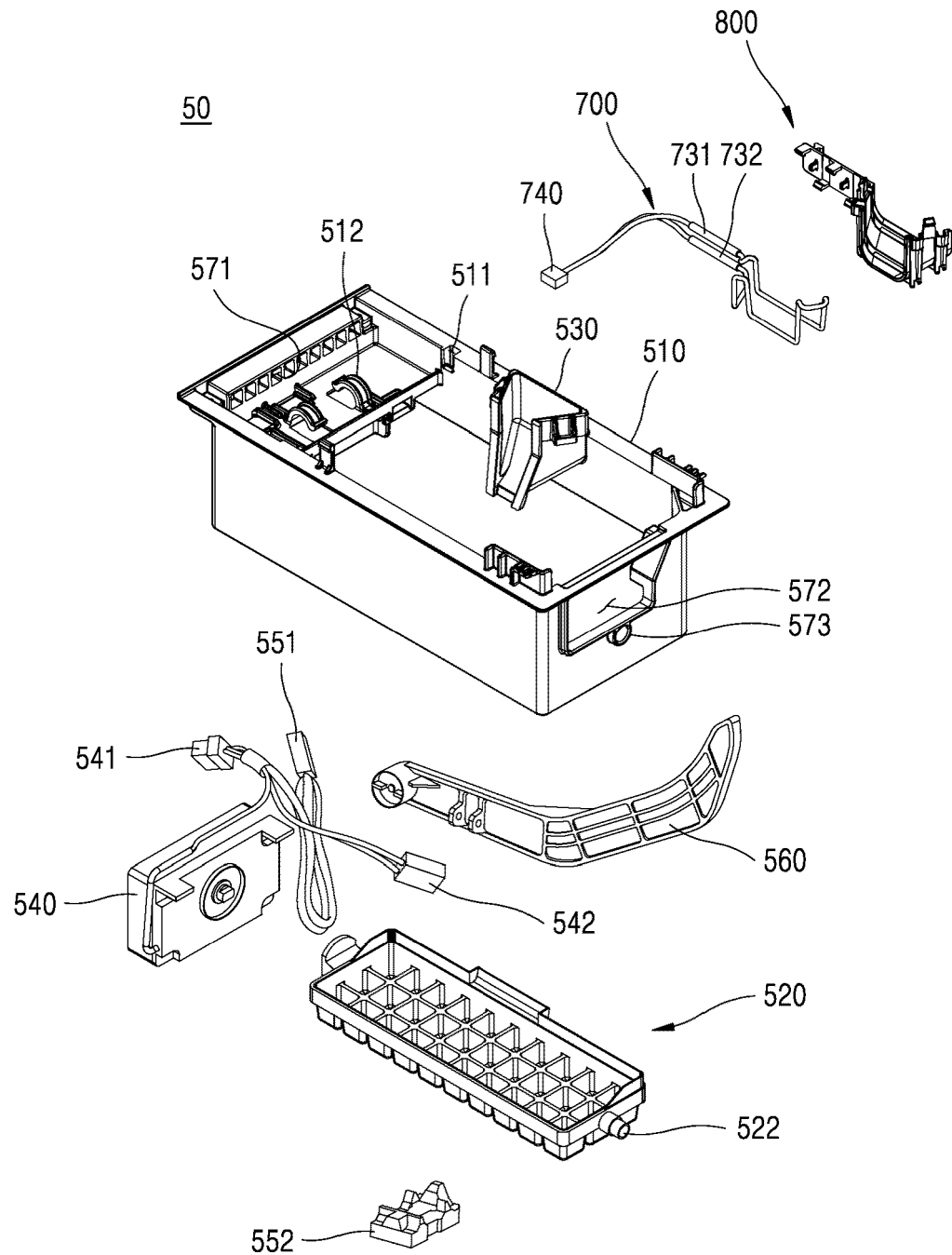
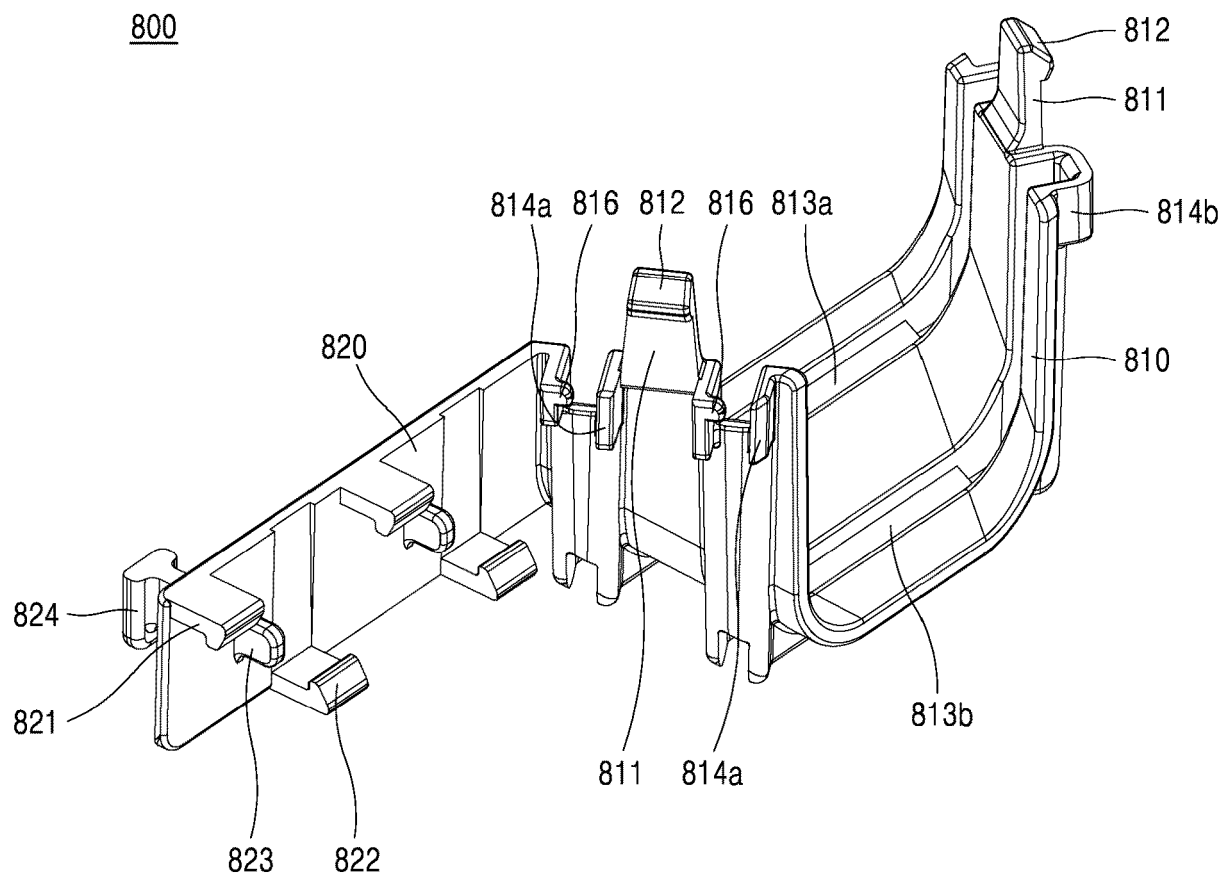


FIG. 9



814 (814a, 814b)
813 (813a, 813b)

FIG. 10

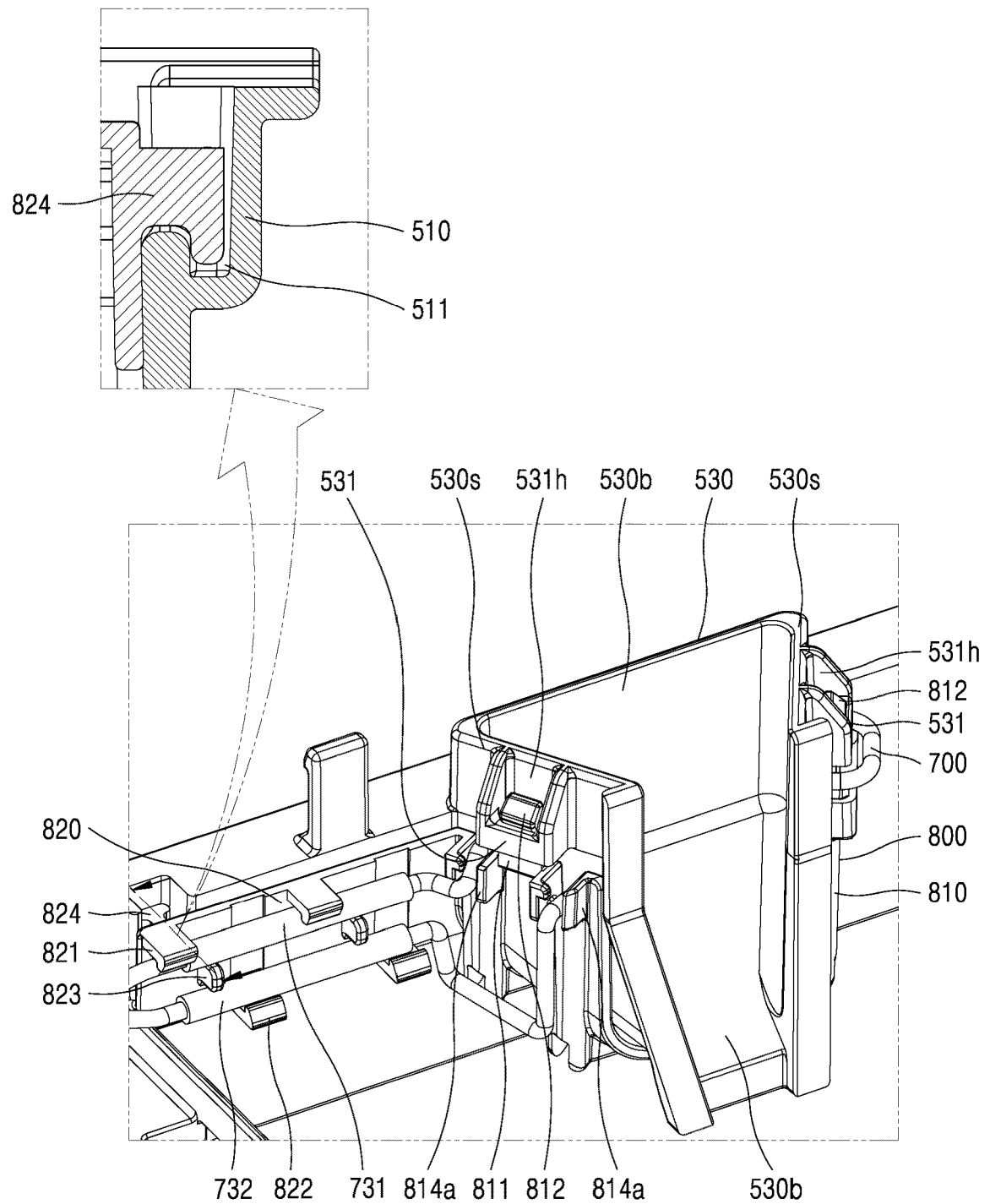


FIG. 11

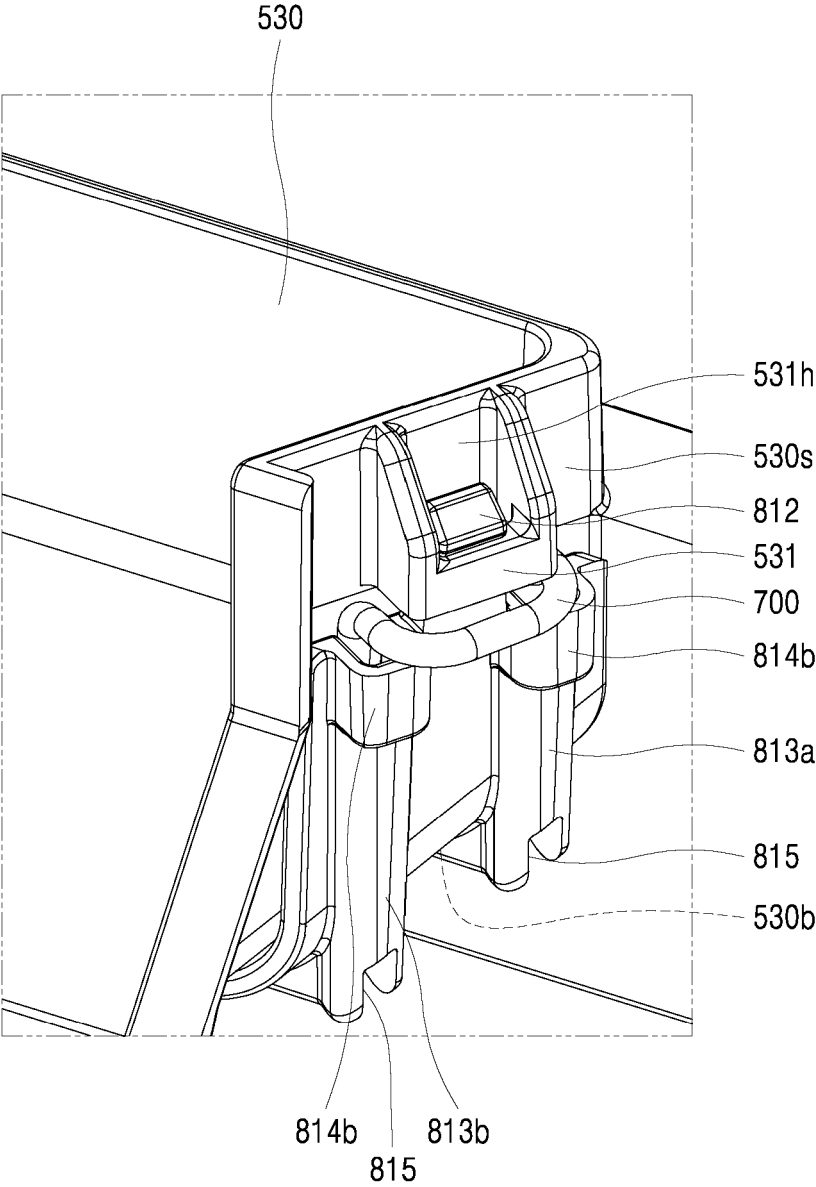


FIG. 12

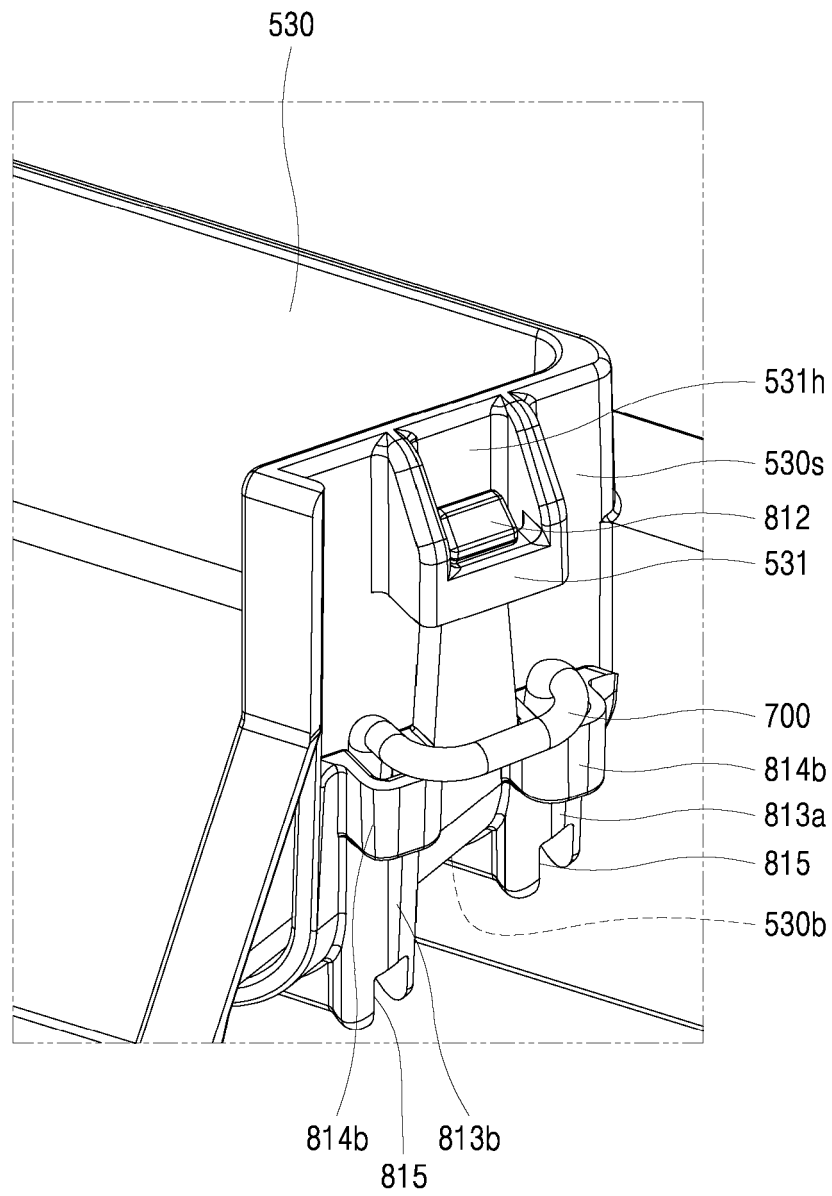


FIG. 13

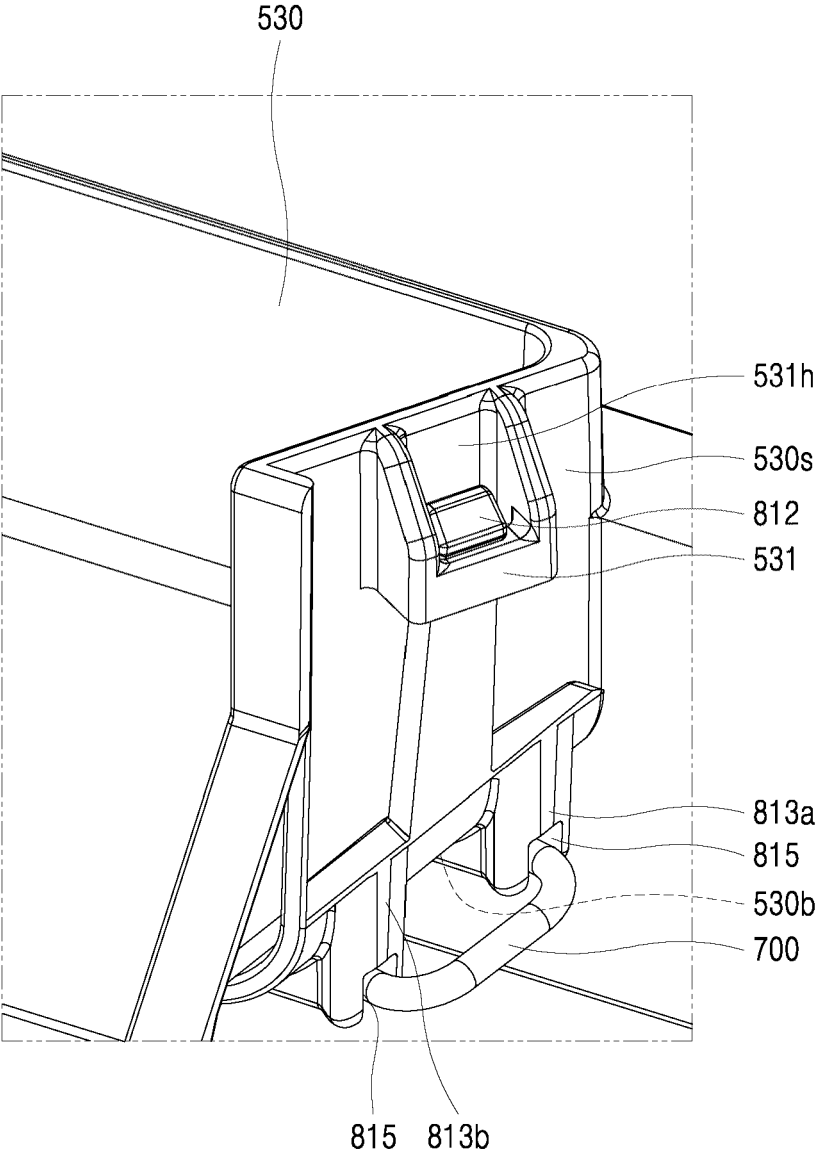


FIG. 14

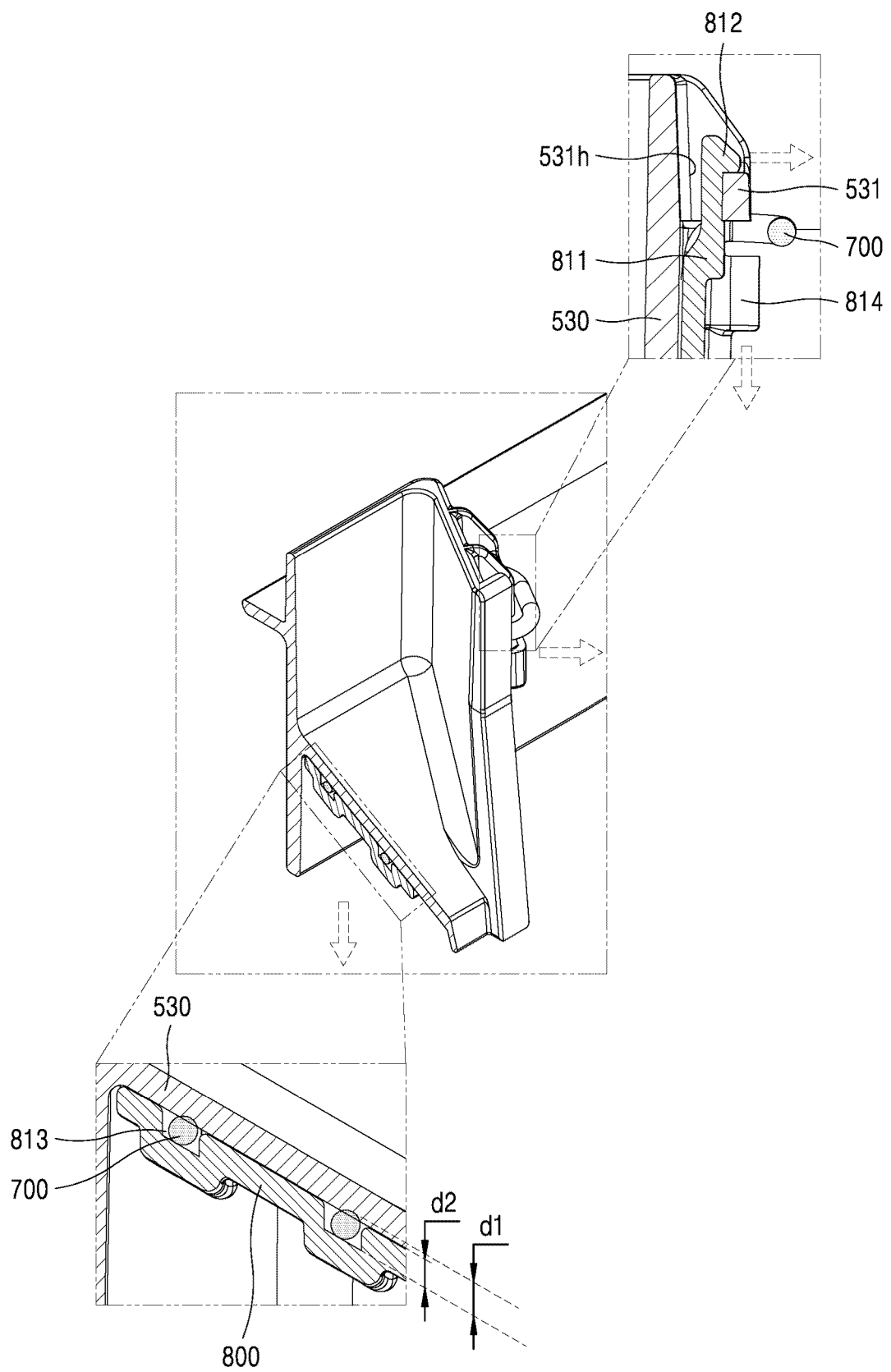


FIG. 15

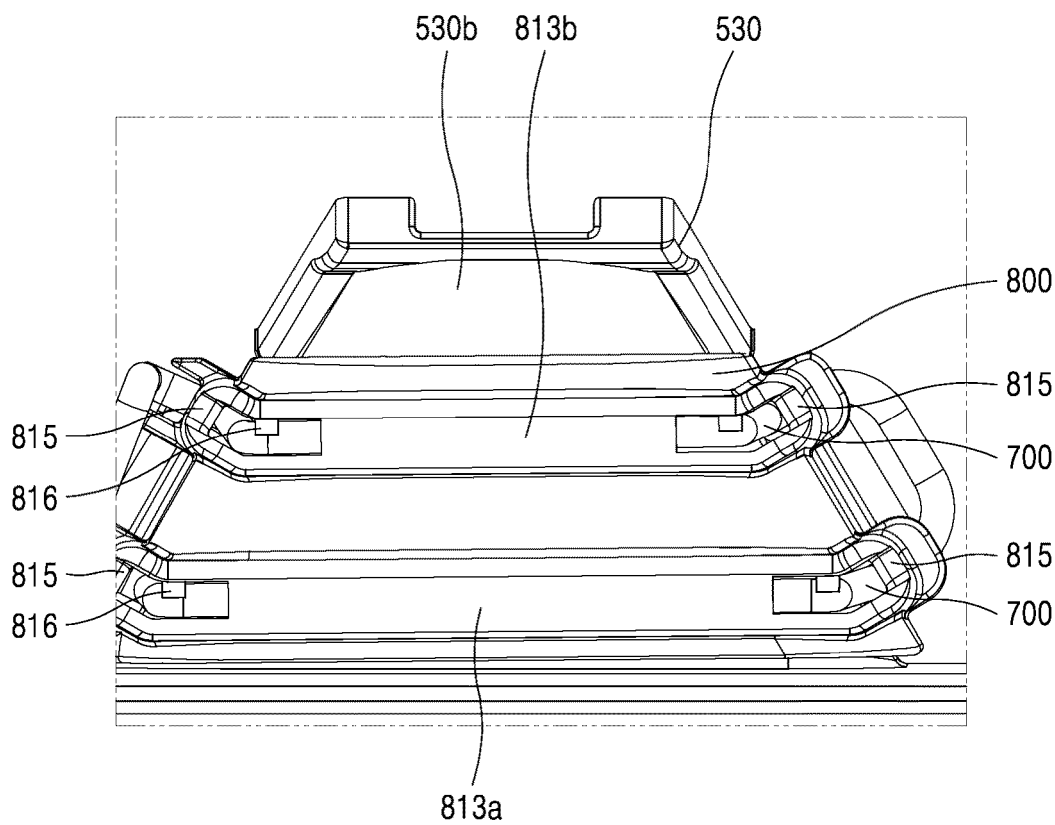


FIG. 16

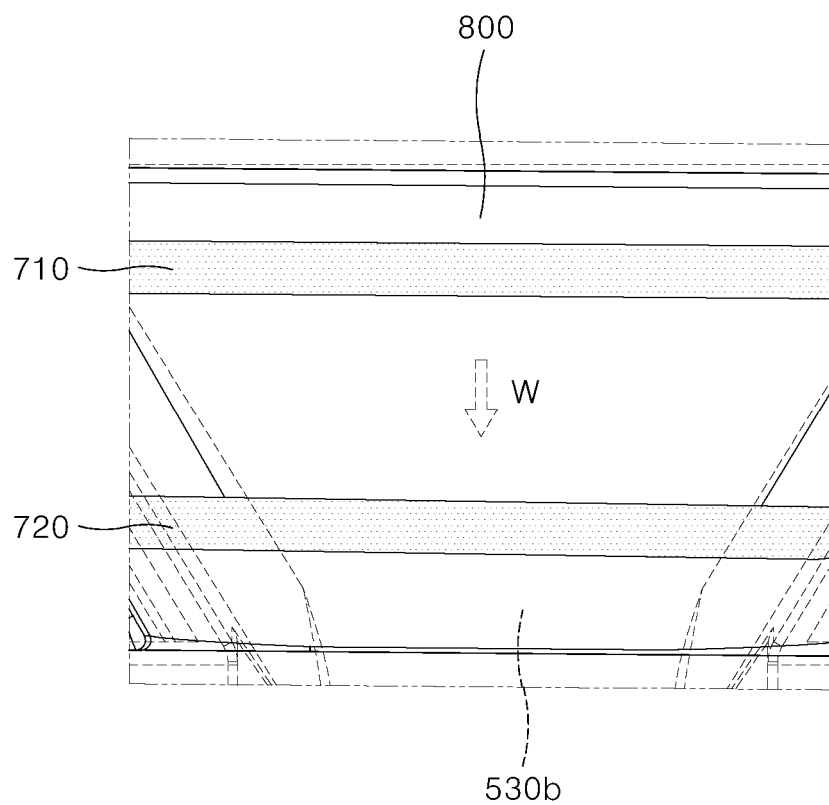


FIG. 17

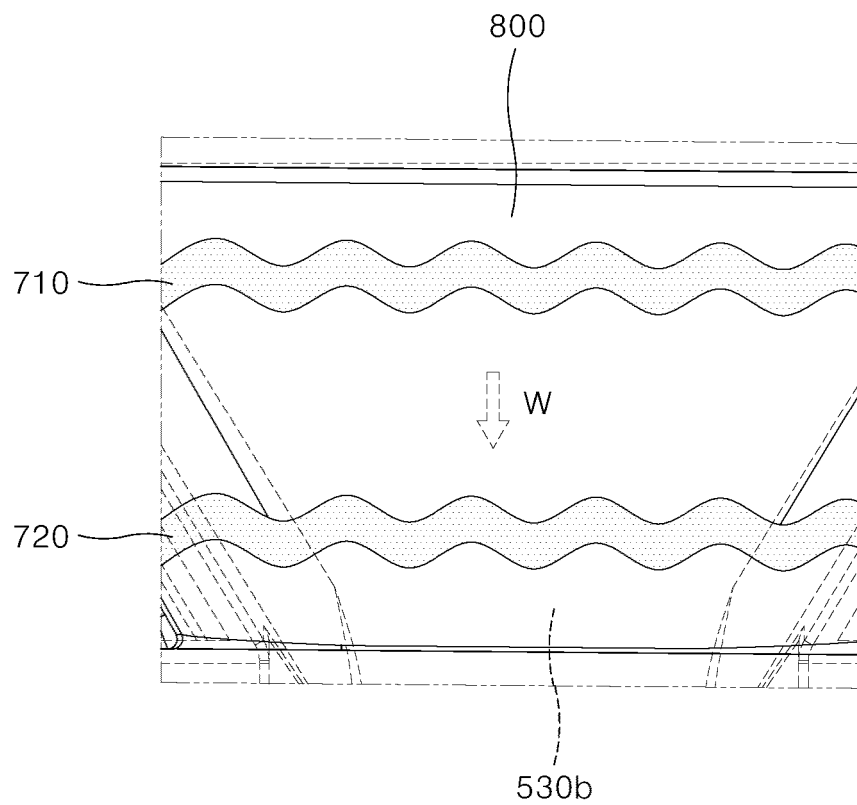


FIG. 18

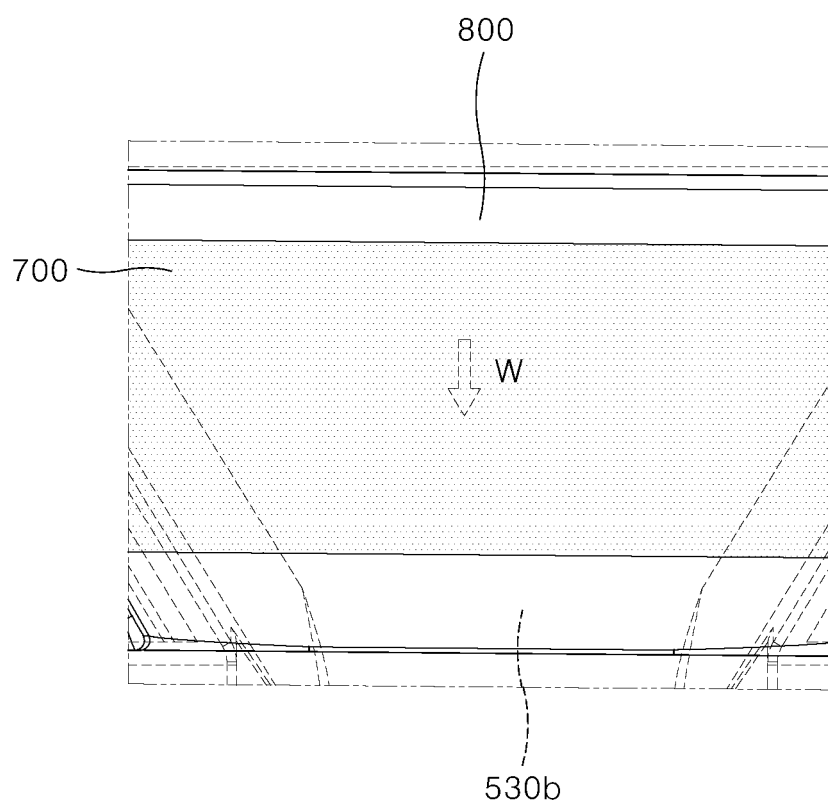


FIG. 19

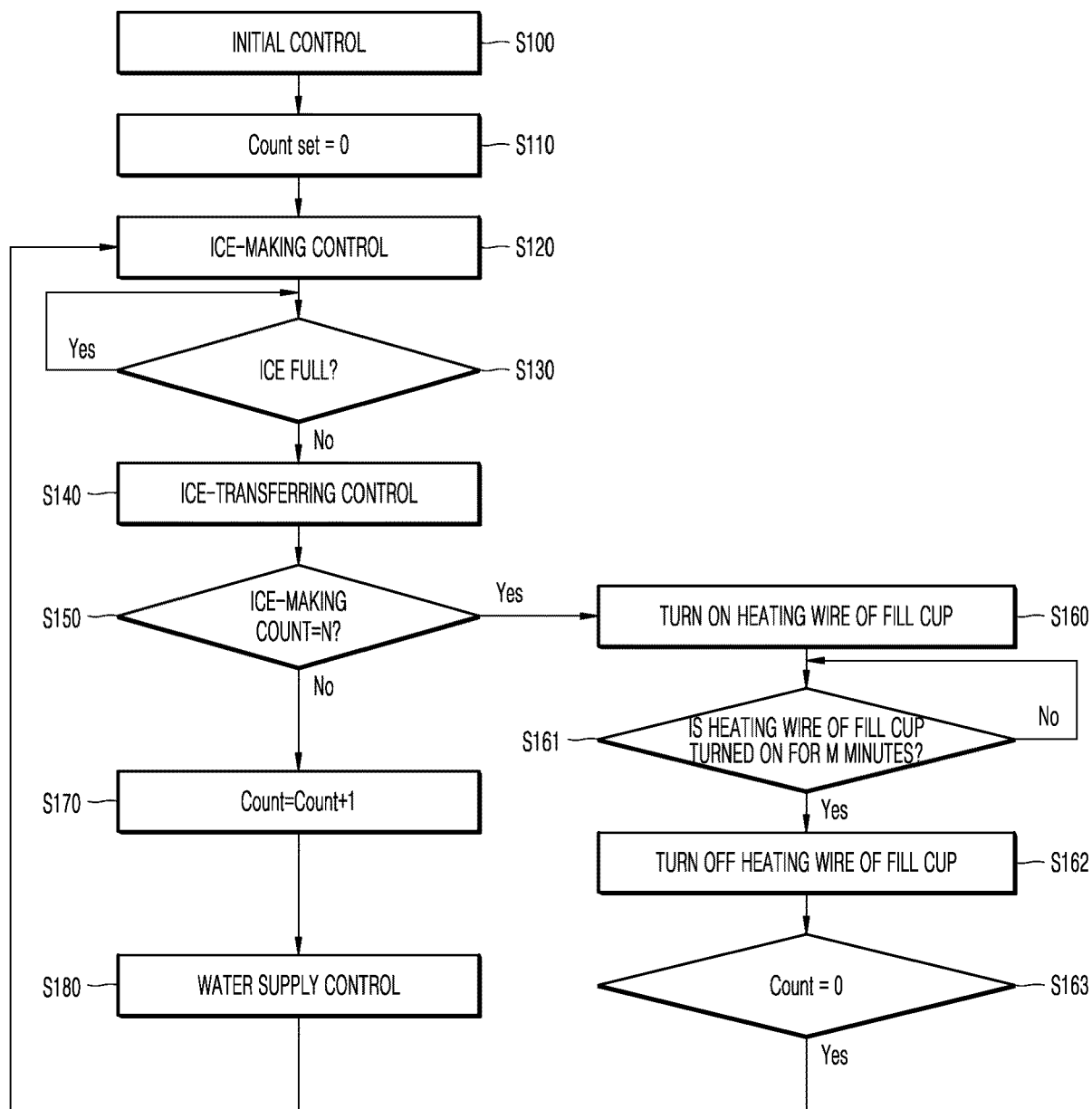


FIG. 20



EUROPEAN SEARCH REPORT

Application Number

EP 25 21 0778

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 10 627 147 B2 (ELECTROLUX HOME PROD INC [US]) 21 April 2020 (2020-04-21)	1-5,8,9,11,12,14,15	INV. F25C1/25
Y	* column 9, lines 22-24; figures 1,2,3,7,8 * * column 4, line 57 *	6,7,10,13	
X	WO 2021/023223 A1 (QINGDAO HAIER REFRIGERATOR CO LTD [CN] ET AL.) 11 February 2021 (2021-02-11) * figure 4 *	1	
Y	US 10 222 112 B2 (BSH HAUSGERAETE GMBH [DE]) 5 March 2019 (2019-03-05) * figures 1,2 *	6,7,10,13	
			TECHNICAL FIELDS SEARCHED (IPC)
			F25C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		6 March 2026	Vigilante, Marco
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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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06-03-2026

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