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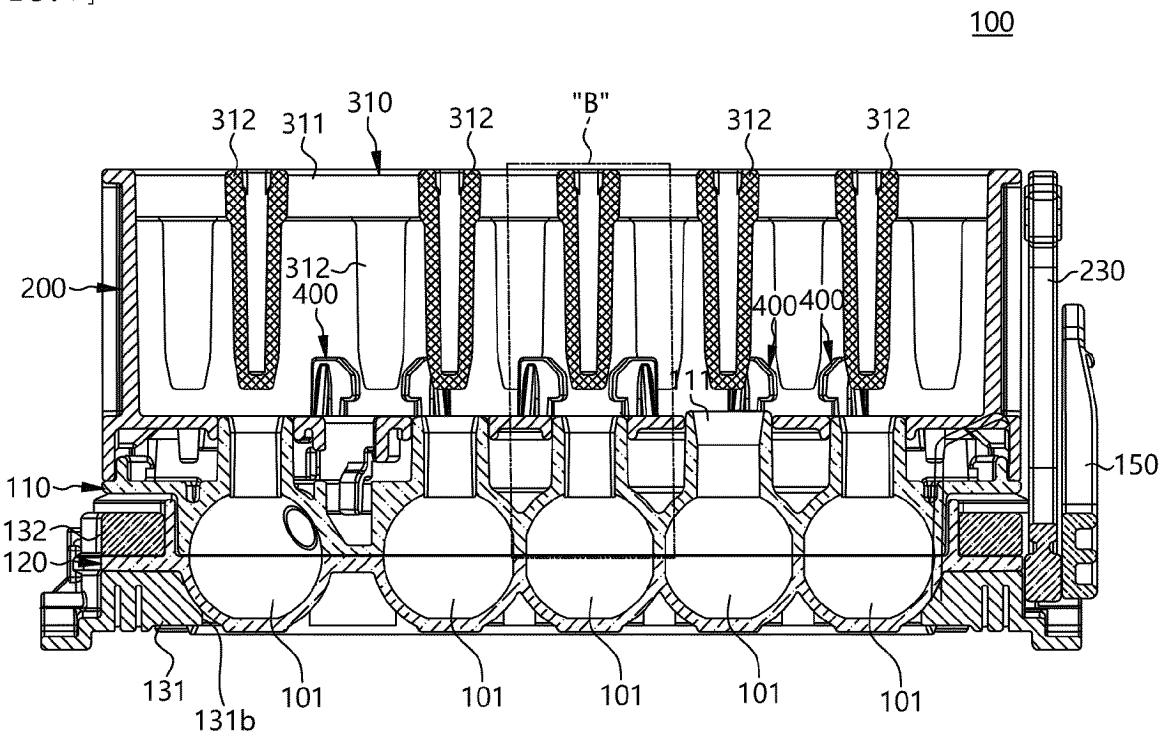
(54) **ICE MAKER AND REFRIGERATOR HAVING THE ICE MAKER**

(57) An ice maker according to the embodiment of the present disclosure includes a structure that guides an ejector pin to move precisely into an ice making cell without hitting surrounding components even if the ejector pin moves in titled state. This prevents the inoperability of the ejector and prevents damage to the ejector pin or trays.

FIG.7]



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Description

TECHNICAL FIELD

[0001] The present disclosure relates to an ice maker for generating and supplying ice, and a refrigerator having the ice maker.

BACKGROUND ART

[0002] In general, a refrigerator is a home appliance that provides storage for a long time using cool air. Such a refrigerator provides at least one storage compartment in which storage is stored, and the storage compartment is configured to be opened and closed by a door.

[0003] The refrigerator is provided with an ice maker for generating ice. The ice maker includes a tray having an ice making cell, and such a tray is provided in a freezing compartment or in a space where cool air may be provided, thereby generating ice.

[0004] Recently, an ice maker for making spherical ice has been provided. Regarding this, it is as disclosed in Korean Patent Publication No. 10-2020-0058011, Korean Patent Publication No. 10-2021-0005782, and Korean Patent Publication No. 10-2023-0015072.

[0005] These ice makers produce ice with a continuous supply of cool air while supplying water into a spherical space created by the engagement between two corresponding trays.

[0006] Meanwhile, an ejector for ejecting ice from each tray is provided in the ice maker. That is, when ice making is completed, ice adhered to an ice making cell of each tray is ejected by using the ejector.

[0007] For this purpose, an ice outlet is formed in each ice making cell of the tray, and an ejector pin is formed in the ejector to penetrate the ice outlet of each ice making cell. Through the operation of the ejector, each ejector pin penetrates each ice outlet of the tray and pushes out the ice adhered to the ice outlet, thereby ejecting the ice from each ice making cell of the tray.

[0008] In order for ice to be smoothly ejected from each of the ice making cells, the ejector pin of the ejector should be accurately moved into the ice outlet. If the ejector pin is not accurately moved into the ice outlet, the ejector pin may hit the area around the ice outlet, causing a malfunction, or damage to the tray, the ejector or the ejector pin.

[0009] Conventionally, guides are provided on both sides of the ejector to support movement to both ends of the ejector.

[0010] However, a structure that depends only on the aforementioned guide may cause the problem that the ejector pin may not be accurately inserted into the ice outlet if the ejector or guide is distorted or deformed.

[0011] In particular, when the ejector pin pushes out the ice into the ice outlet, if the ice is not easily ejected from the ice making cell, the position of the ejector pin may change, causing the entire ejector to become distorted and not function properly.

[0012] Additionally, if the ejector pin is not accurately inserted into the ice outlet and touches an inlet edge of the ice outlet, scratches may occur between the ejector pin and the inlet edge, and the foreign substances generated in this process may be delivered to the ice making cell in the ice outlet.

DETAILED DESCRIPTION OF THE DISCLOSURE

Technical Problem

[0013] The present disclosure is to solve various problems according to the prior art described above, and the purpose of the present disclosure is to guide an ejector so that the ejector does not deviate from its original position when operating to eject ice.

[0014] Another purpose of the present disclosure is to prevent or minimize contact between an ejector pin and a tray when the ejector moves, thereby preventing the generation of foreign substances due to scratches caused by the ejector pin.

[0015] Another purpose of the present disclosure is to stably guide the ejector pins in each row when the ejector pins forming the ejector are provided in a double row.

[0016] Another purpose of the present disclosure is to prevent ice from adhering to a structure for guiding the ejector pins.

Problem Solving

[0017] According to an ice maker of the present disclosure, an ejector pin for ejecting ice in an ice making cell may be configured to be supported by a guide member before or from the moment of entry into a ice outlet of a tray.

[0018] According to the ice maker of the present disclosure, the guide member prevents the ejector pin from hitting around the ice outlet or an inner surface thereof when the ejector pin moves.

[0019] According to the ice maker of the present disclosure, the guide member may be provided on a tray cover.

[0020] According to the ice maker of the present disclosure, the guide member may be molded together with the tray cover to form an integral body.

[0021] According to the ice maker of the present disclosure, the guide member may be manufactured separately from the tray cover and then coupled to the tray cover.

[0022] According to the ice maker of the present disclosure, the guide member is provided on an opposite surface between the ejector and the tray cover to guide the ejector pin to move to the center of the ice outlet.

[0023] According to the ice maker of the present disclosure, a communication hole matching the ice outlet is formed in the tray cover, and the guide member may be provided around the communication hole of the tray

cover.

[0024] According to the ice maker of the present disclosure, the guide member may be provided around the communication hole.

[0025] According to the ice maker of the present disclosure, the guide member may be positioned on at least one radiation direction side with respect to the center of the communication hole.

[0026] According to the ice maker of the present disclosure, the guide member may be formed to surround at least a portion of the circumference of the communication hole.

[0027] According to the ice maker of the present disclosure, two or more guide members may be provided to prevent the ejector pin from tilting during the operation of the ejector pin.

[0028] According to the ice maker of the present disclosure, the positions of the guide members provided in the communication holes adjacent to each other may be determined in consideration of interference with each other or difficulties during molding.

[0029] According to the ice maker of the present disclosure, when the ejector is deformed, the guide member guides the vertical movement of the ej ector pin while contacting the circumferential surface of the ejector pin, thereby guiding the ejector pin to move to a correct position.

[0030] According to the ice maker of the present disclosure, the guide members may be provided at positions symmetrical to each other on the circumferential surfaces of the ejector pins.

[0031] According to the ice maker of the present disclosure, at least a portion of the guide member may protrude to the inside of the communication hole when viewed in a plan view.

[0032] According to the ice maker of the present disclosure, the guide member may be positioned in a plurality of radiation directions with respect to the center of the communication hole when viewed in a plan view.

[0033] According to the ice maker of the present disclosure, the guide member may be formed to guide the ejector pin to move along the center of the ice outlet before the ejector pin enters the ice outlet.

[0034] According to the ice maker of the present disclosure, the guide member may not be provided around at least one communication hole when a plurality of communication holes are formed in the tray cover.

[0035] According to the ice maker of the present disclosure, the guide member may be provided around the communication hole at a central side among the plurality of communication holes.

[0036] According to the ice maker of the present disclosure, the guide member may be provided around the communication holes positioned symmetrically among the plurality of communication holes.

[0037] According to the ice maker of the present disclosure, the guide member may be formed to guide a movement of the ejector pin in a state of being in contact with the circumference of the ejector pin.

[0038] According to the ice maker of the present disclosure, the guide member may be formed to guide a movement of the ejector pin while being in contact with the circumference of the ejector pin when the ejector is deformed or the ejector pin is operated out of the right position.

[0039] According to the ice maker of the present disclosure, at least a portion of the guide member may be formed to protrude toward the inside of the communication hole when viewed from the moving direction of the ejector pin to be adjacent or in contact with the ejector pin.

[0040] According to the ice maker of the present disclosure, the guide member may be formed to prevent ice being adhered to the ice outlet.

[0041] According to the ice maker of the present disclosure, a portion of the guide member protruding toward the inside of the communication hole may be formed to be spaced apart from a surface of the communication hole.

[0042] According to the ice maker of the present disclosure, a separation distance between the guide member and the communication hole may be formed to be higher than a height of water droplet considering the surface tension.

[0043] According to the ice maker of the present disclosure, the ejector pin may be formed to gradually move away from the inner surface of an insertion tube in which the ice outlet is formed toward the end thereof.

[0044] According to the ice maker of the present disclosure, the guide member may be formed to be gradually inclined in the moving direction of the ejector pin toward the end thereof.

[0045] According to the ice maker of the present disclosure, an insertion tube defining the ice outlet is formed in a first tray. The ejector pin may pass through the center of the insertion tube to eject the ice adhered to the ice making cell of the first tray.

[0046] According to the ice maker of the present disclosure, the insertion tube may be coupled or press-fitted into the communication hole of the tray cover.

[0047] According to the ice maker of the present disclosure, the end surface of the insertion tube may be exposed to the surface of the tray cover.

[0048] According to the ice maker of the present disclosure, the guide member may be formed to be spaced apart from the insertion tube. Accordingly, it is possible to prevent the ice protruding from the inside of the insertion tube to the outside of the ice outlet from being adhered to the guide member.

[0049] According to the ice maker of the present disclosure, the separation distance between the guide member and the end surface of the insertion tube may be higher than a height of the water droplet considering the surface tension so that the ice overflowing into the ice outlet does not adhere to the guide member.

[0050] According to the ice maker of the present disclosure, the inner circumferential surface of the insertion tube may be inclined to move away from the center of the

ejector pin toward the entrance so as to prevent or minimize the impact of the insertion tube as the ejector pin enters the ice outlet.

[0051] According to the ice maker of the present disclosure, even if a first ejector is deformed or unilaterally deformed during operation, the ejector pin may assist the right position operation of the first ejector by receiving guidance from the guide member from the beginning of the operation. The ejector pin may be positioned inside the end portion of the guide member during the non-operation.

[0052] According to the ice maker of the present disclosure, the guide member may be formed not to touch the ejector body in a state in which the first ejector is moved completely to the ice ejection position.

[0053] According to the ice maker of the present disclosure, the ice maker may be provided inside the refrigerator door.

[0054] According to the ice maker of the present disclosure, a first tray may be formed in a shape including the tray cover. In this case, the tray cover may be omitted, and the structure provided to the tray cover may be provided to the first tray.

[0055] According to the ice maker of the present disclosure, the tray may include a first tray for providing a part of the ice making cell for making ice, and a second tray for providing another part of the ice making cell.

[0056] According to the ice maker of the present disclosure, the first tray and the second tray may be arranged to be engaged while facing up and down, left and right, or inclined directions.

[0057] According to the ice maker of the present disclosure, when the first tray and the second tray are arranged to be engaged while facing up and down, the ice outlet may be formed on the upper surface of the first tray.

[0058] According to the ice maker of the present disclosure, the tray cover may be formed to supply water into the ice making cell of the first tray and provide cool air to the outer surface of the first tray.

[0059] According to the ice maker of the present disclosure, the ejector may be formed of an ejector body and the ejector pin.

[0060] According to the ice maker of the present disclosure, the ejector body may be disposed so that both ends thereof are supported the lifting movement.

[0061] According to the ice maker of the present disclosure, the ejector pin may protrude downward from the bottom surface of the ejector body.

Effects of the Disclosure

[0062] As described above, the ice maker of the present disclosure provides the following various effects.

[0063] In the ice maker of the present disclosure, even if the ejector pin is tilted during the process of ejecting ice in the ice making cell, an operation failure may be prevented due to the guidance of the guide member.

[0064] In the ice maker of the present disclosure, since the guide member is provided around the communication hole, the guide member may be positioned adjacent to the ejector pin as much as possible.

[0065] In the ice maker of the present disclosure, since a plurality of guide members are provided at positions symmetrical to each other, it is possible to guide accurate movement of the ejector pin regardless of the tilting direction of the ejector pin.

[0066] In the ice maker of the present disclosure, when the guide member is not provided in all of the communication holes but is provided in only a part of them, the guide member may guide the accurate movement of the ejector pins.

[0067] In the ice maker of the present disclosure, the guide member is provided with a protruding end to be as close as possible to the ejector pin for precise guidance of the movement of the ejector pins.

[0068] In the ice maker of the present disclosure, since the bottom surface of the protruding end forming the guide member is formed to be spaced apart from the surface of the communication hole, it is possible to prevent the ice from adhering to the ice outlet.

[0069] In the ice maker of the present disclosure, the end of the ejector pin or the inner circumferential surface of an inlet of the insertion tube may be formed in an inclined structure so as to be spaced apart from each other as much as possible. Accordingly, even if the ejector pin becomes partially tilted, it is possible to prevent the ejector pin from hitting the insertion tube.

[0070] In the ice maker of the present disclosure, since the end surface of the guide member is formed higher than the end surface of the ejector pin when the first ejector is not operated, even if the ejector pin is tilted, the guide member may guide the ejector pin to the accurate position from the beginning.

[0071] In the ice maker of the present disclosure, since the ejector body does not contact the upper surface of the guide member during the operation of the first ejector, an operation failure may be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0072]

FIG. 1 is a perspective view of an ice maker according to an embodiment of the present disclosure.

FIG. 2 is an exploded perspective view of the ice maker of the embodiment of the present disclosure.

FIG. 3 is an exploded view of the ice maker according to the embodiment of the present disclosure.

FIG. 4 is a plan view of the ice maker in the embodiment of the present disclosure.

FIG. 5 is a state diagram in which a first ejector is omitted from the state of FIG. 4.

FIG. 6 is an enlarged view of part "A" of FIG. 5.

FIG. 7 is a front sectional view of the ice maker of the embodiment of the present disclosure.

FIG. 8 is an enlarged view of the state in which the

first ejector of part "B" of FIG. 7 is omitted.

FIG. 9 is an enlarged view of part "B" of FIG. 7.

FIG. 10 is a sectional perspective view of the main part of the relationship between a guide member and an ejector pin of the first ejector in the ice maker of the embodiment of the present disclosure.

FIG. 11 is a sectional perspective view of the main part of a coupling state between a first tray and a tray cover of the ice maker according to the embodiment of the present disclosure.

FIG. 12 is another example of the relationship between the guide member and the ejector pin of the first ejector in the ice makers of the embodiment of the present disclosure.

FIG. 13 is a plan view of another example of the guide member in the ice maker of the embodiment of the present disclosure.

FIG. 14 is a cross-sectional view of another example of the guide member in the ice maker of the embodiment of the present disclosure.

FIGS. 15 to 17 are plan views of other examples of the guide member in the ice maker according to the embodiment of the present disclosure.

FIG. 18 and FIG. 19 are another example of the relationship between the guide member and the ejector pin of the first ejector in the ice maker of the embodiment of the present disclosure.

FIGS. 20 to 23 are plan views of examples of an arrangement of the guide member in the ice maker according to the embodiment of the present disclosure.

FIG. 24 is a cross-sectional view of another example of the shape of the guide member in the ice maker of the embodiment of the present disclosure

FIG. 25 is a perspective view of a refrigerator to which the ice maker according to the embodiment of the present disclosure is applied.

FIG. 26 is an exploded perspective view of the refrigerator door of the refrigerator to which the ice maker according to the embodiment of the present disclosure is applied.

FIG. 27 is a cross-sectional view of the refrigerator door of the refrigerator to which the ice maker according to the embodiment of the present disclosure is applied.

Mode for Disclosure

[0073] Embodiments of the present disclosure will be described with reference to exemplary drawings. In adding reference numerals to the components of each drawing, it should be noted that the same components have the same numerals as possible even if they are displayed on different drawings.

[0074] In addition, in describing the embodiment of the present disclosure, if it is determined that a detailed description of the related known configuration or function hinders the understanding of the embodiment of the present disclosure, the detailed description thereof will be omitted.

[0075] In addition, terms such as first, second, A, B, (a), and (b) may be used to describe the components of the embodiment of the present disclosure. These terms are only intended to distinguish the component from other components, and the term does not limit the nature, order, or order of the component. If it is stated that a component is "combined", or "connected" to another component, it should be understood that another component may be "coupled" or "connected" between each component, but another component may be "coupled" or "connected" between each component.

[0076] Hereinafter, preferred embodiments for an ice maker and a refrigerator having the same of the present disclosure will be described with reference to FIGS. 1 to 27.

[0077] FIG. 1 is a perspective view of the ice maker according to the embodiment of the present disclosure, and FIGS. 2 and 3 are an exploded perspective view and an exploded view of the ice maker according to the embodiment of the present disclosure. Also, FIG. 4 is a plan view of the ice maker according to the embodiment of the present disclosure.

[0078] As shown in these drawings, the ice maker 100 according to an embodiment of the present disclosure generates and provides a spherical ice. Such the ice maker 100 may be applied to, for example, a refrigerator or an apparatus or a device capable of receiving cool air and water.

[0079] In particular, the ice maker 100 according to the embodiment of the present disclosure includes a structure that guides an ejector pin 312 to move accurately into an ice making cell 101 without hitting surrounding components when the ejector pin 312 moves in a titled state. For example, the ice in the ice making cell 101 may be accurately pressed during the operation of the ejector pin 312 by a guide member 400 to prevent an inoperability of a first ejector 310 and to prevent damage to the ejector pins 312 or trays 110, 120.

[0080] The ice maker 100 according to the embodiment of the present disclosure will be described in more detail for each configuration.

[0081] First, the ice maker 100 according to the embodiment of the present disclosure may include trays 110 and 120.

[0082] The trays 110, 120 provide an ice making cell 101 for receiving and storing water for ice making. The ice making cell 101 generates an ice having the same shape as the inner shape of the corresponding ice making cell 101 while the water supplied into the ice making cell 101 is frozen. In the embodiment of the present disclosure, for example, the inner surface of the ice making cell 101 is formed in a spherical shape.

[0083] A plurality of trays 110, 120 may be provided. For example, the trays 110, 120 may be provided as a first tray 110 and a second tray 120.

[0084] The first tray 110 and the second tray 120 may

be disposed to be engaged while facing each other.

[0085] For example, the first tray 110 and the second tray 120 may be arranged to be engaged while facing each other in the vertical direction. In this case, the first tray 110 may be positioned at an upper side such that the hemispherical ice making cell 101 faces a lower side, and the second tray 120 may be positioned at a lower side of the first tray 110 such that the hemispherical ice making cell 101 faces an upper side. That is, the first tray and the second tray work together to produce a spherical ice. In the following embodiment, the first tray 110 and the second tray 120 have a structure in which the first tray 110 is positioned at an upper side and the second tray 120 is positioned at a lower side, and positions and directions of respective constituent elements of the embodiment will be described.

[0086] Although not shown in 106, any one of the first tray 110 and the second tray 120 may be shaped to provide a spherical surface smaller than a hemispherical shape or a spherical surface larger than a hemispherical shape.

[0087] Although not shown, the first tray 110 and the second tray 120 may be arranged to be engaged while facing each other in a right-left direction (horizontal direction), or may be arranged to be engaged while facing each other in a diagonal or inclined direction.

[0088] Although not shown, at least one of the trays 110 and 120 may be configured to be engaged with a counterpart tray while reciprocating in a linear direction. For example, the second tray 120 may be configured to be engaged with or separated from the first tray 110 while being linearly moved in the vertical direction.

[0089] Although not shown, the first tray 110 and the second tray 120 may be configured to operate relative to each other.

[0090] Meanwhile, a plurality of ice making cells 101 may be provided. For example, in the ice maker 100 according to the embodiment of the present disclosure, it is exemplified that a plurality of ice making cells 101 are provided in the trays 110 and 120 as shown in FIGS. 6 and 7. FIG. 5 is a state diagram in which a first ejector is omitted from the state of FIG. 4, and FIG. 6 is an enlarged view of a part "A" of FIG. 5. Also, FIG. 7 is a front cross-sectional view of the ice maker of the embodiment of the present disclosure, and FIG. 8 is an enlarged view of a part "B" of FIG. 7. Although not shown, only one ice making cell 101 may be provided.

[0091] The plurality of ice making cells 101 may be formed to form a plurality of columns or form a plurality of rows. For example, each of the ice making cells 101 may be formed of a plurality of rows and a plurality of columns.

[0092] Considering that ice making cells 101 are formed in a spherical shape, the ice making cells 101 in each row and column may be disposed to cross each other. For example, a part of the second row of ice making cells 101 may be positioned between the first row of ice making cells 101 when viewed in a plan view. By such arrangement, the maximum number of ice making cells 101 may be formed in the tray having a limited width.

[0093] A water supply hole 111 for supplying water into the ice making cell 101 may be formed in at least one tray of the first tray 110 and the second tray 120. For example, the water supply hole 111 (see FIGS. 5 and 6) may be formed in the first tray 110.

[0094] The water supply hole 111 may be formed in any one of the ice making cells 101 of the first tray 110. Although not shown, the water supply hole 111 may be formed in all of the ice making cells 101 of the first tray 110, or may be formed in two or more ice making cells 101.

[0095] The ice making cells 101 may be formed in the same size as each other, or at least one ice making cell 101 may be formed in a different size from other ice making cells 101.

[0096] Meanwhile, the first tray 110 may be formed of a metal material to increase thermal conductivity. In this case, the first tray 110 may be formed through die casting. At least a part of the first tray 110 may be formed of a metal material.

[0097] Also, the first tray 110 may be fixedly provided at a fixed portion. Accordingly, the components of the ice maker 100 may be sequentially coupled or connected to enable interworking with respect to the first tray 110. For example, when the ice maker 100 according to the embodiment of the present disclosure is provided on a door of a refrigerator, the first tray 110 may be fixedly provided on a wall surface of the refrigerator door.

[0098] The first tray 110 may be fixed directly to the fixed portion or may be fixed indirectly using a separate structure.

[0099] An ice outlet 112a may be formed in the first tray 110. An ejector pin 312 of a first ejector 310 to be described later is inserted into the ice outlet 112a. The ice outlet 112a is formed penetrating from the outer surface of the first tray 110 to the ice making cell 101.

[0100] The ice outlet 112a may be formed one for each of the ice making cells 101. Specifically, the ice outlet 112a may be formed to penetrate the center of each of the ice making cells 101.

[0101] An insertion tube 112 that defines the ice outlet 112a is formed in the first tray 110. That is, the inside of the insertion tube 112 may be formed as the ice outlet 112a.

[0102] FIG. 10 is a perspective view of a main part of a relationship between the guide member and the ejector pin of the first ejector in the ice maker according to the embodiment of the present disclosure. FIG. 11 is a perspective view of a main part of a coupling state between the first tray and a tray cover in the ice maker according to the embodiment of the present disclosure.

[0103] As shown in FIGS. 2, 9, and 11, the insertion tube 112 is formed to protrude from the outer surface of the first tray 110. For example, the insertion tube 112 protrudes upward from the upper surface of the first tray 110, and the inside thereof is provided as the ice outlet 112a penetrating to the ice making cell 101. The space (a space provided by the ice outlet) from the ice making cell

101 to the insertion tube 112 may be provided as a space in which an ice in the ice making cell 101 may expand. A space is provided between the upper surface of the first tray 110 and the bottom surface of the tray cover 200 by the height of the insertion tube 112.

[0104] The second tray 120 may be formed of a material that bends and deforms to easily eject ice. For example, the second tray 120 may be formed of silicon.

[0105] The second tray 120 may be supported by a tray supporter 131. The tray supporter 131 is formed to surround the bottom surface of the second tray 120, and is made of a material having greater rigidity than the second tray 120.

[0106] A plurality of seating grooves 131a having a spherical shape may be formed in the tray supporter 131 so that a portion where the ice making cell 101 of the second tray 120 is seated thereon. A through-hole 131b may be formed in a central portion of each of the seating grooves 131a. The ejector pins 131b of the second ejector pass through the through-holes 131b in each of these seating grooves, thereby pressurizing the ice making cells of the second tray 120.

[0107] The second ejector 320 is fixed in a state below the second tray 120. The ejector pins 322 of the second ejector 320 are formed to protrude toward a rotation path of the second tray 120. That is, during the rotation operation of the second tray 120, the ejector pins 322 of the second ejector 320 pass through the through-hole 131b of the tray supporter 131 to eject the ice adhered to the ice making cell 101 of the second tray 120 seated in the seating groove 131a.

[0108] The second tray 120 and the tray supporter 131 may be coupled to each other and provided as a single body. A coupling cover 132 for coupling the second tray 120 and the tray supporter 131 may be provided. The coupling cover 132 is formed to collectively grip the circumference of the second tray 120 and the circumference of the tray supporter 131 and couple them to each other.

[0109] In addition, the tray supporter 131 may be rotatably provided in the first tray 110 using a rotary shaft 140 and a rotary link 150.

[0110] To this end, a first hole 113 through which the rotary shaft 140 passes may be formed at both sides of the first tray 110, and a second hole 131c through which both ends of the rotary shaft 140 pass may be formed at the tray supporter 131. In addition, one end of the rotary link 150 is coupled to the end of the rotary shaft 140 to rotate together with the rotary shaft 140, and the other end of the rotary link 150 is connected to rotate while pressing the tray supporter 131.

[0111] An elastic member 151 is provided between the other end of the rotary link 150 and the tray supporter 131. The elastic member 151 may be formed to press the tray supporter 131 while being compressed and deformed between the other end of the rotary link 150 and the tray supporter 131 by a rotational force generated by rotation of the rotary link 150. The elastic member 151 is operated so that the ice making cells 101 of the first tray 110 and the second tray 120 are engaged with each other and closely adhered to each other while providing a restoring force when the rotary shaft 140 is returned to an initial position.

[0112] Meanwhile, while a gearbox 141 is connected to the rotating shaft 140 and may be configured to rotate by receiving a driving force of a driving source (not shown).

[0113] Next, the ice maker 100 according to the embodiment of the present disclosure may include a tray cover 200.

[0114] Water may be supplied to the ice making cell 101 of the first tray 110 by the tray cover 200. To this end, a water supply duct 210 for supplying water may be provided in the tray cover 200.

[0115] The water supply duct 210 may be formed to supply water to the water supply hole 111 formed in the first tray 110. For example, the water supply duct 210 may flow water from a direct upper portion of the water supply hole 111 to the water supply hole 111, or may flow water from one side of the water supply hole 111 to the water supply hole 111.

[0116] Also, the tray cover 200 may guide the cool air to pass through the first tray 110. To this end, the tray cover 200 may be provided with a cool air guide duct 220 for guiding the cool air to flow toward the first tray 110.

[0117] The cool air guide duct 220 may receive cool air from any one side of the tray cover 200 and may guide cool air toward the first tray 110. For example, the cool air guide duct 220 may be formed to supply cool air to a space formed between the top surface of the first tray 110 and the bottom of the tray cover 200.

[0118] Also, the tray cover 200 may support the operation of a first ejector 310 to be described later. To this end, lifting grooves 201 for lifting a linkage 230 operating the first ejector 310 may be formed on both sidewalls of the tray cover 200.

[0119] Meanwhile, all of the sidewalls of the tray cover 200 on which the water supply duct 210, the cool air guide duct 220, and the lifting groove 201 are formed may be formed as a single body, or at least one of them may be formed as a single body. Although not shown, the tray cover 200 may be formed such that a bottom surface and each circumferential wall thereof are integrally formed with each other, at least one portion thereof may be formed separately and coupled in a combination or other structure.

[0120] The water supply duct 210, the cool air guide duct 220, and the lifting groove 201 may all be provided in the tray cover 200, or at least one may be provided in the tray cover 200.

[0121] The tray cover 200 may be coupled to the first tray 110. If the tray cover 200 is fixed to a fixed portion, the first tray 110 may be coupled to the tray cover 200.

[0122] A communication hole 202 matching the ice outlet 112a of the first tray 110 is formed in the tray cover 200.

[0123] When a plurality of ice outlets 112a are provided, a plurality of communication holes 202 are pro-

vided to coincide with each other. At least one of the communication holes 202 may communicate with the water supply hole 111 of the first tray 110.

[0124] The insertion tube 112 formed in the first tray 110 may be inserted into the communication hole 202. The insertion tube 112 may be press-fitted into an inner circumferential surface of the communication hole 202, and the first tray 110 and the tray cover 200 may be firmly coupled to each other through press-fit coupling.

[0125] The end cross-section of the insertion tube 112 may be formed to be exposed from the bottom of the tray cover 200. That is, the end cross-section of the insertion tube 112 may be formed to have the same height as the surface of the bottom of the tray cover 200 (the upper surface in the drawings), or may be formed to further protrude from the surface of the bottom of the tray cover 200.

[0126] Although not shown in 146, the insertion tube 112 may protrude downward from the bottom of the tray cover 200. In this case, only the ice outlet may be formed in the first tray 110, and the insertion tube 112 may be configured to be press-fitted into the ice outlet.

[0127] Next, the ice maker 100 according to the embodiment of the present disclosure may include a first ejector 310.

[0128] The first ejector 310 is provided to eject the ice in the ice making cell 101 of the first tray 110. That is, even if the ice is adhered to the ice making cell 101 of the first tray 110, the first ejector 310 may eject the ice from the ice making cell 101.

[0129] The first ejector 310 may be provided to be movable toward the tray cover 200 from an upper side of the tray cover 200.

[0130] The first ejector 310 may be vertically moved by the support of the tray cover 200. To this end, the first ejector 310 may be provided with moving protrusions 311a which move along the lifting grooves 201 formed on both sidewalls of the tray cover 200.

[0131] The first ejector 310 has an ejector body 311 and an ejector pin 312.

[0132] The ejector body 311 may be defined as a body of the first ejector 310. The moving protrusions 311a are formed on both side surfaces of the ejector body 311.

[0133] The ejector pin 312 protrudes from the ejector body 311. The ejector pin 312 may protrude from the bottom of the ejector body 311 toward the center of the ice outlet 112a formed in the first tray 110 (or the center of the communication hole 202 of the tray cover 200). That is, the ejector pin 312 may pass through the ice outlet 112a of the first tray 110 to eject the ice in the ice making cell 101 while pressing the ice.

[0134] A plurality of ejector pins 312 are provided to pass through each ice outlet 112a, and each ejector pin 312 is positioned to face each ice outlet 112a.

[0135] The ejector pin 312 is preferably formed not to hit the upper surface of the insertion tube 112 in the process of being inserted into the insertion hole 112a. That is, it is preferable to prevent the operation failure of the first ejector 310 caused by the ejector pin 312 hitting the upper surface of the insertion tube 112, in advance.

[0136] In order to prevent the problem that the first ejector 310 hits the upper surface of the insertion pipe 112, various structures may be provided other than a guide member 400 to be described later.

[0137] For example, as shown in FIGS. 7 and 9, in order to prevent an operation failure of the first ejector 310, an end (lower end) portion of the ejector pin 312 may be formed to be gradually inclined inward toward the end. Accordingly, a problem of hitting the upper surface of the insertion tube 112 while the ejector pin 312 is inserted into the insertion tube 112 may be minimized.

[0138] As another example, in order to prevent an operation failure of the first ejector 310 as shown in FIGS. 7 to 9, an inner circumferential surface of the insertion tube 112 may be gradually inclined outward toward an upper end thereof. Accordingly, a problem of hitting an upper surface of the insertion tube 112 while the ejector pin 312 is inserted into the insertion tube 112 may be minimized.

[0139] As another example, a guide member 400 to be described below may be provided to prevent an operation failure of the first ejector 310. This will be described in more detail in the description of the guide member 400.

[0140] Meanwhile, the first ejector 310 may be configured to be interwork with the second tray 120. For example, when the second tray 120 is separated from the first tray 110 while rotating with respect to the rotating shaft 140, the first ejector 310 may be configured to separate an ice adhered to the ice making cell 101 of the first tray 110 while descending.

[0141] A linkage 230 may be provided for interworking of the first ejector 310 and the second tray 120. To this end, one end of the linkage 230 may be rotatably connected to both side walls of the tray supporter 131 supporting the second tray 120. The other end of the linkage 230 may be connected to the moving protrusion 311a of the first ejector 310 exposed through the lifting groove 201 of the tray cover 200. Accordingly, when the second tray 120 is rotated with respect to the rotating shaft 140, one end of the linkage 230 is pulled downward to move downward the moving protrusion 311a connected to the other end of the linkage 230.

[0142] Next, the ice maker 100 according to the embodiment of the present disclosure may include a guide member 400.

[0143] The guide member 400 is provided to guide the ejector pin 312 of the first ejector 310 to move accurately into the ice outlet 112a.

[0144] Of course, even if the guide member 400 is not provided, the first ejector 310 is guided by the lifting movement of the moving protrusions 311a formed on both sides of the ejector body 311 while moving along the lifting grooves 201 formed on both side walls of the tray cover 200. However, only the moving protrusions 311a and the lifting grooves 201 cannot solve the problem caused by the tilting of the ejector pins 312 due to the

torsion or bending deformation of the ejector body 311. In consideration of this, even if the ejector body 311 is twisted or bent, the ejector pins 312 may be accurately moved into the ice outlet 112a by the guide member 400.

[0145] The guide member 400 may be formed at various positions. For example, the guide member 400 may be provided in at least one of the tray cover 200 and the first tray 110.

[0146] For example, as shown in FIGS. 5 to 11, the guide member 400 may be formed on an upper surface of the tray cover 200 to support the ejector pin 312 of the first ejector 310 passing through the ice outlet 112a.

[0147] Particularly, the guide member 400 may be preferably positioned around the communication hole 202 formed in the upper surface of the tray cover 200. That is, the guide member 400 is formed at a position as close as possible to the communication hole 202, thereby utilizing spaces for other parts of the upper surface of the tray cover 200.

[0148] Although not shown, the guide member 400 may be provided in the insertion tube 112 of the first tray 110.

[0149] In the case, the guide member 400 may be coupled or integrally formed with the insertion tube 112 and support the ejector pin 312 of the first ejector 310 passing through the ice outlet 112a.

[0150] Although not shown, the guide member 400 may be provided on at least one or both opposite surfaces between the tray cover 200 and the first ejector 310.

[0151] Next, the guide member 400 may be formed in various shapes to guide the ejector pin 312 to the center of the ice outlet 112a as much as possible. That is, the guide member 400 may be formed to provide a better guide according to a provided position or a peripheral structure.

[0152] For example, as shown in FIGS. 6 to 11, at least a portion of the guide member 400 may selectively contact the ejector pin 312 while being positioned around the communication hole 202 of the upper surface of the tray cover 200. That is, when the ejector pin 312 is out of the right position during the downward movement (e.g., when the ejector pin is tilted due to bending deformation of the ejector body), the guide member 400 may be guided to the right position while being in contact with the ejector pin 312. The guide member 400 may be formed in a structure having the same thickness and width, or a plate structure having a smaller thickness than a width and a larger area, or a block structure such as a rod or bar.

[0153] If the guide member 400 is formed in a plate structure, a rib 401 (see FIGS. 8 and 9) for reinforcing strength may be further formed in the guide member 400 to prevent deformation when the guide member 400 is in contact with the ejector pin 312. The rib 401 may be formed to prevent deformation of the guide member 400 in the thickness direction.

[0154] The shape according to an example of the guide member 400 may be desirable in that it has a simple structure to prevent a movement failure of the ejector pin 312.

[0155] As another example, as shown in FIG. 12, the guide member 400 may be formed in a pipe structure having a portion of the upper surface of the tray cover 200 that gradually expands toward the upper surface thereof. That is, the guide member 400 is formed in a funnel shape whose inner diameter becomes narrower toward the communication hole 202, so that the position of the ejector pin 312 during descending may be corrected. The funnel-shaped guide member 400 may be integrally formed on the upper surface of the tray cover 200 or may be coupled in a separate coupling structure.

[0156] As another example, as shown in FIGS. 13 and 14, the guide member 400 may be formed in a ring-shaped structure surrounding the circumference of the communication hole 202 on the upper surface of the tray cover 200.

[0157] As another example, as shown in FIG. 15, the guide member 400 may be formed in an arc shape that surrounds only a portion of the communication hole 202 on the upper surface of the tray cover 200. In this case, the length of the arc provided by the arc-shaped guide member 400 may vary depending on surrounding components. For example, the length of the arc may be formed differently depending on the rotation radius of the second tray 120, the diameter of the communication hole 202, or the outer diameter of the ejector pin 312, etc. The arc-shaped guide member 400 may be provided only in one communication hole 202, or two or more guide members 400 may be provided in one communication hole 202.

[0158] When the guide member 400 is formed as a block or plate structure, it may be disposed radially from the circumference of the communication hole 202 on the upper surface of the tray cover 200. As a result, even if the ejector pin 312 is tilted toward the outside of the communication hole 202, it may be guided to the inside of the communication hole 202.

[0159] The guide member 400 of the block or plate structure may be provided in plurality of at least two for more stable support of the ejector pin 312. That is, considering that the ejector pin 312 may be tilted in various direction, the ejector pin 312 may be accurately supported regardless of the tilt direction of the ejector pin 312.

[0160] When a plurality of guide members 400 are provided, each guide member 400 may be formed in various positions.

[0161] As an example, the plurality of guide members 400 may be formed at positions symmetrical to each other with respect to the center of one communication hole 202 or the center of the ejector pin 312. Accordingly, when the ejector pin 312 passing between each guide member 400 deviates from its right position and contacts the guide member 400, the ejector pin 312 is forcibly guided by the guide member 400 to move to the ice outlet112a accurately.

[0162] As another example, the plurality of guide members 400 may be positioned so as not to face each other with respect to the center of the communication hole 202. That is, in order to prevent the ejector pins 312 from tilting in each direction as much as possible with only the minimum guide member 400, it may be desirable to arrange the guide members 400 so that they do not face each other. For example, as shown in the embodiment, each guide member 400 may be arranged to be symmetrical in a certain angular range when viewed from the center of the communication hole 202.

[0163] The plurality of guide members 400 may have different arrangement angles depending on the quantity provided to the communication hole 202. For example, as shown in FIG. 16, when three or more guide members 400 are provided in the communication hole 202, they may be disposed at equal intervals. However, when only two guide members 400 are provided in the communication hole 202 as shown in FIG. 6, they may not be at equal intervals.

[0164] When only two guide members 400 are provided in the communication hole 202, as shown in FIG. 17, the guide members 400 are disposed only at the front side with respect to the center of the corresponding communication hole 202. While the second tray 120 is separated from the first tray 110 while rotating, since a force acts in the vector direction in the rotation direction, a force that pushes the second tray 120 toward the front side is further applied. If this phenomenon continues and is repeated, there is a possibility that the ejector pin 312 may be deviated from a right position due to distortion of the ejector. In consideration of this, it is preferable to arrange more guide members 400 at the front side, which is the direction in which the second tray 120 moves.

[0165] That is, the number of guide members 400 disposed at the front side with respect to the center of the communication hole 202 may be larger than the number of guide members 400 disposed at the rear side.

[0166] When provided in plural in the communication hole 202, the guide member 400 may be disposed at positions capable of supporting different side circumferential surfaces of the ejector pin 312 in consideration of interference with each other or difficulties during molding.

[0167] Meanwhile, the spherical ice making cells 101 provided in the trays 110, 120 are arranged to cross each other while arranging in a double row to produce as many ices as possible, which has been mentioned in the above description.

[0168] When the ice making cells 101 are provided in a double row and are disposed to be misaligned with each other, the distance between each adjacent ice outlet 112a (or the communication hole 202) may make it difficult for two guide members 400 to be provided simultaneously. Considering this, the guide member 400 may not be formed around all the communication holes 202 but may be formed only around some of the communication holes 202. That is, when a plurality of communication holes 202 are provided, the guide member 400 may not be provided in at least one communication hole 202.

[0169] For example, if two communication holes 202 adjacent to each other are provided in the same row (horizontal direction in the drawing), the guide member 400 may be formed around any one communication hole 202.

[0170] As another example, if three or more communication holes 202 adjacent to each other are provided in the same row (horizontal direction in the drawing), the guide member 400 may be formed around the communication hole 202 positioned in the center.

[0171] As another example, if two adjacent communication holes 202 are provided in different rows (vertical direction in the drawing), the guide member 400 may be formed around any one communication hole 202.

[0172] As another example, when three or more communication holes 202 adjacent to each other are provided in different rows (vertical direction in the drawing), at least one guide member 400 may be provided for each row.

[0173] In the present embodiment, it is illustrated that guide members 400 are formed around the communication hole 202 disposed in the center of one row and around the two communication holes 202 disposed on both sides of the other row.

[0174] Meanwhile, the guide member 400 formed in the communication holes 202 in each row may be arranged to be arranged in different directions with respect to the center of the communication hole 202.

[0175] For example, referring to FIG. 5, in the lower row of the drawing, the guide members 400 may be formed on both sides below the center of the communication hole 202. In the upper row of the drawing, the guide members 400 may be formed on both sides above the center of the communication hole 202.

[0176] Although not shown in 196, the guide members 400 may be formed in different directions of all communication holes 202.

[0177] In addition, it is desirable for the guide member 400 to move the ejector pin 312 up and down along the center of the communication hole 202 (or the center of the ice outlet) as much as possible.

[0178] That is, it is desirable that the guide member 400 is positioned adjacent to the circumference of the ejector pin 312 as much as possible and is configured to directly contact the circumferential surface of the ejector pin 312 when the ejector pin 312 is out of position.

[0179] To this end, at least a portion of the guide member 400 may be formed to protrude to the inside of the communication hole 202 when viewed in a plan view. That is, as shown in FIGS. 6, 8, and 9, a portion of the guide member 400 protrudes inward from the communication hole 202 so that the ejector pin 312 does not deviate from the communication hole 202.

[0180] Preferably, the guide member 400 may be provided with a protruding end 410 (see FIG. 8) which coincides with an inner circumferential surface of the insertion tube 112 in the communication hole 202 or protrudes further to an inner side (the ice outlet) than

the inner circumferential surface of the insertion tube 112. That is, a problem of hitting the upper surface of the insertion tube 112 during the downward movement of the ejector pin 312 may be fundamentally prevented by the protruding end 410.

[0181] In this case, the end surface (the surface facing the circumferential surface of the ejector pin) of the protruding end 410 constituting the guide member 400 may be formed in an inclined, multistage inclined, or curved surface so as to gradually be adjacent to the ejector pin 312 from the upper surface to the lower surface. As a result, even if the ejector pin 312 is tilted when descending, it may be gradually guided to the right position.

[0182] Of course, the protruding end 410 of the guide member 400 may protrude such that the protruding end 410 may be in contact with the circumferential surface of the ejector pin 312. However, in such a structure, there is a concern that foreign substances may be generated due to continuous friction between the protruding end 410 and the ejector pin 312 and may fall into the ice making cell 101 through the ice outlet 112a. For this reason, it is preferable that the protruding end 410 protrudes only until the protruding end 410 and the ejector pin 312 do not contact each other.

[0183] Meanwhile, the protruding end 410 is formed to protrude more inwardly or equal to the inner circumferential surface of the ice outlet 112a when viewed in a plan view. That is, referring to FIG. 8, the protruding distance (t) of the protruding end 410 may be formed to be equal to or greater than the thickness of the insertion tube 112. Accordingly, the ejector pin 312 guided by the protruding end 410 may be prevented from hitting the insertion tube 112.

[0184] When the protruding end 410 is formed to protrude into the ice outlet 112a, the bottom surface of the protruding end 410 may be positioned to be in contact with the top surface of the insertion tube 112 forming the ice outlet 112a. Accordingly, an ice expanded in the insertion tube 112 may be adhered to the bottom surface of the protruding end 410. In consideration of this, the guide member 400 is preferably formed to prevent the ice generated in the ice outlet 112a from being adhered.

[0185] To this end, the bottom surface of the protruding end 410 of the guide member 400 is preferably formed to be spaced apart from the surface of the communication hole 202 or the top surface of the insertion tube 112, but to be as close as possible to the surface of the communication hole 202 or the top surface of the insertion tube 112. That is, as shown in FIG. 8, the separation distance (d) between the bottom surface of the protruding end 410 and the surface of the communication hole 202 or the top surface of the insertion tube 112 should be formed to be as close as possible but to be spaced apart by a distance such that the ice is not adhered.

[0186] Particularly, the separation distance (d) may be determined in consideration of the height due to surface tension of water droplets. That is, even if the insertion tube 112 is filled with water, it is preferable that the bottom surface of the protruding end 410 is positioned higher than the height of the water droplet due to the surface tension.

[0187] Next, it is preferable that the guide member 400 is formed to prevent the ejector pin 312 from being tilted before the ejector pin 312 enters the ice outlet 112a.

[0188] To this end, the guide member 400 may protrude upward from the upper surface of the tray cover 200 to guide the movement of the ejector pin 312 from the upper side of the ice outlet 112a.

[0189] Particularly, it is preferable that the guide member 400 is formed to prevent the ejector pin 312 from being tilted from the start of the operation of the ejector pin 312.

[0190] To this end, as shown in FIG. 8, the end cross-section (top surface) of the guide member 400 may be formed to be higher than the end cross-section (bottom surface) of the ejector pin 312 when the first ejector 310 does not operate. That is, the guide member 400 is formed as high as possible so that the ejector pin 312 of the first ejector 310 is guided from the guide member 400 from the beginning of the operation.

[0191] When the guide member 400 is formed excessively high, the upper surface of the guide member 400 may contact the bottom surface of the ejector body 311 during the operation of the first ejector 310, and in this case, the first ejector 310 may not descend any further, thereby limiting the maximum descent distance of the first ejector 310.

[0192] Considering this, the guide member 400 is preferably formed so as not to contact the ejector body 311 even if the first ejector 310 descends to the maximum (moves to a complete position for ejecting ice).

[0193] For example, as shown in FIG. 18, the guide member 400 may be formed at a height that does not contact the ejector body 311 even when the first ejector 310 descends to the maximum (moves to a complete position for ejecting ice). Due to the structure thereof, interference by the guide member 400 does not occur during the operation of the first ejector 310.

[0194] As another example, as shown in FIG. 19, a receiving groove 311b in which a part of the guide member 400 is received may be formed recessed or penetrating the bottom surface of the ejector body 311 of the first ejector 310. Due to the structure thereof, interference by the guide member 400 does not occur during the operation of the first ejector 310.

[0195] Meanwhile, the guide member 400 may be provided to only one radiation direction side with respect to the center of the communication hole 202. That is, the single guide member 400 may guide the ejector pin 312 inserted into the communication hole 202 to the center of the ice outlet 112a.

[0196] When the single guide member 400 is provided, the guide member 400 may be provided around all communication holes 202 provided in the tray cover 200 or only around some communication holes 202.

[0197] As shown in FIG. 20, when the guide member 400 is provided around all the communication holes 202, each guide member 400 may be formed to be disposed in the same direction in the radiation direction of each communication hole 202.

[0198] As shown in FIG. 21, when the guide member 400 is provided only around some communication holes 202, the guide member 400 may not be provided at the adjacent communication hole 202. In this case, the guide member 400 may be formed at the same direction as each other of the communication hole 202.

[0199] As shown in FIG. 22, the guide member 400 may be formed to be disposed on the different side of the radiation directions of each communication hole 202. That is, each of the guide members 400 may be configured to be disposed at a complementary position. Accordingly, the guide members 400 may correct the directions of each ejector pin 312 even if they have different directions.

[0200] As shown in FIG. 23, the guide member 400 may be formed to be disposed on different radiation directions for each communication hole 202 in each row. Even in this case, each guide member 400 may be disposed at a complementary position to guide the movement of the guide members 400 having different directions.

[0201] As shown in FIG. 24, a protruding height of the guide member 400 may be minimized. That is, the guide member 400 may be formed such that the insertion tube 112 does not protrude or only a height sufficient to guide the ejector pin 312 into the ice outlet 112a of the insertion tube 112.

[0202] Hereinafter, the ice making and ice ejection process by the above-described ice maker 100 according to the embodiment of the present disclosure will be described.

[0203] First, during ice making operation, the second tray 120 is positioned adjacent to the first tray 110. In this case, the second tray 120 is coupled to surround the first tray 110, and opposite surfaces between the two trays 110 and 120 are positioned to be partially spaced apart from each other.

[0204] In this state, when water is supplied to a water supply duct 210, the water is supplied to a water supply hole 111 formed in the first tray 110 under the guidance of the water supply duct 210.

[0205] In addition, the water supplied into the ice making cell 101 through the water supply hole is provided between the first tray 110 and the second tray 120, and the same amount of water is supplied to all ice making cells 101 through the separation area between the first tray 110 and the second tray 120.

[0206] Furthermore, when the supply of a predetermined amount of water is completed and the rotating shaft 140 is rotated by a driving source, a rotating link 150 is rotated together. When a pressing force of the elastic member 151 is released by the rotation of the rotating link 150, the second tray 120 is moved toward the first tray 110 by a restoring force of the elastic member 151. Accordingly, the second tray 120 is completely in close contact with the first tray 110, and thus the respective ice making cells 101 provided between the two trays 110 and 120 form partitioned compartments.

[0207] Subsequently, cool air is supplied to the cool air guide duct 220. The cool air is guided by the cool air guide duct 220 to provide the cool air toward the first tray 110. More specifically, the cool air is supplied by the cool air guide duct 220 to a space formed between the top surface of the first tray 110 and the bottom surface of the tray cover 200.

[0208] Accordingly, the first tray 110 is cooled by heat conduction with the cool air and freezes the water present in the ice making cell 101 therein.

[0209] The cool air may be provided continuously or intermittently for a predetermined time period, and when the predetermined time elapses, the supply of cool air is stopped.

[0210] When the supply of cool air is stopped, the driving source operates and the rotating shaft 140 is rotated. When the rotating shaft 140 is rotated, the rotating link 150 coupled to the rotating shaft 140 is rotated together to pressurize the elastic member 151. Accordingly, while the tray supporter 131 to which the elastic member 151 is connected is rotated, the second tray 120 is spaced apart from the first tray 110.

[0211] As the rotating shaft 140 continues to rotate and the rotating link 150 applies pressure to the elastic member 151, the tray supporter 131 rotates around the rotation center of the rotating shaft 140 and rotates the second tray 120, thereby separating the second tray 120 from the first tray 110.

[0212] In addition, when the tray supporter 131 is rotated while the rotating shaft 140 is rotated, the linkage 230 is linked to lower the ejector body 311 of the first ejector 310.

[0213] Due to the downward movement of the ejector body 311, the ejector pins 312 of the first ejector body 310 are moved downward toward the inside of the ice outlet 112a of the first tray 110. In this case, the two moving protrusions 311a formed on both side surfaces of the ejector body 311 receive a downward movement force by the linkage 230, respectively. Accordingly, the two moving protrusions 311a are moved downward along the lifting grooves 201 formed on both sidewalls of the tray cover 200.

[0214] In addition, the ejector pin 312 inserted into the ice outlet 112a of the first tray 110 ejects the ice from the ice making cell 101 while striking or pressing the ice in the ice making cell 101 communicating with the ice outlet 112a. As a result, the ice is separated from the ice making cell 101 and falls downward.

[0215] Meanwhile, if the pressing force by the two linkages 230 provided to the two moving protrusions 311a differs from each other, or if the two moving protrusions 311a are tilted to either side due to unexpected interference while descending along the lifting groove

201, deformation or bending of the ejector body 311 may occur.

[0216] When deformation or bending occurs in the ejector body 311 in this way, each of the ejector pins 312 is also tilted.

[0217] However, when the ejector pin 312 is tilted, the ejector pins 312 are moved downward under the guidance of the guide member 400 while being in contact with the guide member 400 formed in the tray cover 200. Thus, a problem in which the ejector pins 312 are not accurately inserted into the ice outlet 112a and an operation failure occurs may be prevented in advance.

[0218] As described above, in the ice maker 100 of the present disclosure, even if the ejector pin 312 tilts while ejecting the ice in the ice making cell 101, an operation failure may be prevented because the guide member 400 guides the movement of the ejector pin 312.

[0219] In addition, in the ice maker 100 of the present disclosure, since the guide member 400 is provided around the communication hole 202, the guide member 400 may be positioned adjacent to the ejector pin 312 as much as possible with a minimum size.

[0220] In addition, in the ice maker 100 of the present disclosure, since a plurality of guide members 400 are provided at positions symmetrical to each other, the guide member 400 may guide the precise movement of the ejector pin 312 regardless of the tilting direction of the ejector pin 312.

[0221] In addition, in the ice maker 100 of the present disclosure, even if the guide member 400 is not provided in each communication hole 202 but only in a part, the guide member 400 may guide the precise movement of the ejector pin 312.

[0222] In addition, in the ice maker 100 of the present disclosure, the protruding end 410 is formed in the guide member 400 so as to be as close to the ejector pin 312 as possible, thereby guiding the precise movement of the ejector pin 312.

[0223] Additionally, in the ice maker 100 of the present disclosure, since the bottom surface of the protruding end 410 constituting the guide member 400 is spaced apart from the surface of the communication hole 202, thereby preventing ice in the ice outlet 112a from adhering.

[0224] Furthermore, in the ice maker 100 of the present disclosure, by forming the end of the ejector pin 312 or the inner circumferential surface of the end of the insertion tube 112 in an inclined structure, they may be spaced apart from each other as much as possible. Accordingly, even if the ejector pin 312 is partially tilted, the ejector pin 312 may be prevented from hitting the insertion tube 112.

[0225] In addition, in the ice maker 100 of the present disclosure, since the upper surface of the guide member 400 is formed higher than the bottom surface of the ejector pin 312 when the first ejector 310 is not operating, the ejector pin 312 may be guided to the right position from the initial movement even if the ejector pin 312 is tilted.

[0226] In addition, in the ice maker 100 of the present disclosure, since the ejector body 311 does not contact the upper surface of the guide member 400 during the operation of the first ejector 310, an operation failure may be prevented.

[0227] Meanwhile, the ice maker 100 of the present disclosure may be used alone, but may be additionally provided to various home appliances.

[0228] For example, the ice maker 100 of the present disclosure may be applied to a refrigerator. When the ice maker 100 of the present disclosure is applied to a refrigerator as described above, it may be installed in a storage compartment of a cabinet or in a refrigerator door selectively opening and closing the storage compartment.

[0229] In particular, the ice maker 100 of the present disclosure may be installed on a refrigerator door equipped with a dispenser because the overall structure of the ice maker 100 is simple and the size may be reduced as much as possible.

[0230] Hereinafter, an example in which the ice maker 100 of the present disclosure is applied to a refrigerator door will be described with reference to FIGS. 25 to 27.

[0231] Here, FIG. 25 is a perspective view of the refrigerator to which the ice maker according to the embodiment of the present disclosure is applied, FIG. 26 is an exploded perspective view of the refrigerator door to which the ice maker according to the embodiment of the present disclosure is applied, and FIG. 27 is a cross-sectional view of the refrigerator door to which the ice maker according to the embodiment of the present disclosure is applied.

[0232] First, the refrigerator includes a cabinet 10 having a storage compartment and a refrigerator door 20 selectively opening and closing the storage compartment.

[0233] A dispenser 21 may be provided on an outer surface (a surface exposed to a room) of the refrigerator door 253. The dispenser 21 is a device that supplies ice made by the ice maker 100 to a user.

[0234] An ice bin 22 for storing ice may be provided on an inner surface (a surface exposed to the storage compartment) of the refrigerator door. The ice bin 22 may be positioned above the dispenser 21 to supply the ice to the dispenser 21.

[0235] The ice maker 100 of the present disclosure may be provided on an upper side of the ice bin 22 in the refrigerator door 20. In this case, at least a portion of an upper surface of the ice bin 22 is opened, and the ice maker 100 is disposed so that an ice ejected from each ice making cell 101 falls due to the opening of the second tray 120. That is, the ice made by the ice maker 100 and then ejected from the ice making cell 101 is stored in the ice bin 22 by passing through the open upper surface of the ice bin 22.

[0236] The ice maker 100 may be provided in the same structure as the ice maker 100 according to the embodiment of the present disclosure described above. In this case, the first tray 110 constituting the ice maker 100 is

fixedly installed on an inner wall of the refrigerator door 20. In this case, the first tray 110 may be fixed directly to the inner wall of the refrigerator door 20 or may be installed on the inner wall of the refrigerator door 20 with a separating fixing structure added.

[0237] The tray cover 200 other than the first tray 110 may be fixed to the inner wall of the refrigerator door 20, and the first tray 110 may be installed on the tray cover 200.

[0238] Furthermore, a cool air guide duct 220 of the tray cover 200 constituting the ice maker 100 may be configured to receive cool air through a duct communication hole 20a (see FIG. 25) formed on a sidewall of the refrigerator door 20.

[0239] In addition, the water supply duct 210 of the tray cover 200 constituting the ice maker 100 may be configured to receive water from a water supply line (not shown) connected to the refrigerator door 20.

[0240] Meanwhile, a space in which the ice maker 100 and the ice bin 22 are installed is provided on the inner wall surface of the refrigerator door 20, and the space is configured to be selectively opened and closed by an ice making compartment door 30.

[0241] Therefore, the ice made in the ice maker 100 is stored in the ice bin 22 in the refrigerator door 20 while being ejected from the ice making cell 101 by the ejecting process between the two trays 110 and 120 and each ejector. The ice maker 100 repeats the ice making and ice ejecting process when an amount of the ice stored in the ice bin 22 is less than a set amount, and stops the ice ejecting process if the amount of the ice stored in the ice bin 22 is greater than the set amount.

[0242] In addition, when the dispenser 21 is operated, the ice in the ice bin 22 is discharged through the dispenser 21.

[0243] As such, the ice maker 100 of the present disclosure may perform the process of making an ice and providing it to the ice bin 22 when the amount of ice in the ice bin 22 is insufficient while being provided to the refrigerator door 20.

[0244] Meanwhile, the other components of the ice maker 100 of the present disclosure except for the guide member 400 may be implemented in a form other than the above-described embodiment.

[0245] As an example, although not shown, the tray cover 200 and the first tray 110 may be provided as a single body. That is, the structure of the tray cover 200 (e.g., the cool air guide duct 220, the water supply duct 210, etc.) may be integrally molded into the first tray 110.

[0246] When the structure of the tray cover 200 is formed in the first tray 110, the guide member 400 may be formed directly in the first tray 110.

[0247] As another example, although not shown, the second tray 120 and the tray supporter 131 may be integrally formed and provided. In this case, the coupling cover 132 may not be required, or the coupling cover 132 may also be integrally formed.

[0248] As another example, the first ejector 310 or the second ejector 320 may not be provided. That is, although not shown, heat may be applied instead of the first ejector 310 or the second ejector 320, or an ice adhered to the ice making cell 101 of the first tray 110 or the second tray 120 may be ejected by other structures.

[0249] In the above, just because all the components constituting the embodiment according to the present disclosure are described to be combined or operated in combination, the present disclosure is not necessarily limited to such embodiments. That is, within the scope of the purpose of the present disclosure, all of its components may operate in a selective combination of one or more. In addition, terms such as "include", "comprise", or "have" described above mean that the corresponding component may be inherent unless otherwise stated contrary, and thus should be construed as being capable of further including other components rather than excluding other components. All terms, including technical or scientific terms, have the same meaning as is generally understood by those of ordinary skill in the art to which the present disclosure belongs, unless defined otherwise. Generally used terms, such as predefined terms, should be construed as consistent with the contextual meaning of the relevant technology and are not interpreted in an ideal or overly formal sense unless explicitly defined in the present disclosure.

[0250] More than descriptions are merely exemplary descriptions of the technical idea of the present disclosure, and those skilled in the art may make various modifications and modifications without departing from the essential characteristics of the present disclosure. Accordingly, the embodiments disclosed in the present disclosure are not intended to limit the technical idea of the present disclosure but to illustrate the technical idea of the present disclosure, and the scope of the technical idea of the present disclosure is not limited by these embodiments. The scope of protection of the present disclosure should be interpreted by the following claims, and all technical ideas within the equivalent scope should be construed as being included in the scope of the present disclosure.

REFERENCE NUMERALS

[0251]

10. Cabinet
20. Refrigerator door
21. Dispenser
22. Ice bin
30. ice making compartment door
100. ice maker
101. ice making cell
110. first tray
111. water supply hole
112. insertion tube
112a. ice outlet

113. first hole
120. second tray
131. tray supporter
131a. seating groove
131b. through-hole
131c. 2nd hole
132. coupling cover
140. rotating shaft
141. gearbox
150. rotating link
151. elastic member
200. Tray cover
201. lifting groove
202. communication hole
210. water supply duct
220. cool air guide duct
230. Linkage
310. first ejector
311. ejector body
311a. moving protrusion
311b. receiving groove
312. ejector pin
320. Second ejector
322. ejector pin
400. guide member
401. rib
410. Protruding end

Claims

1. An ice maker comprising:

a first tray which provides a part of an ice making cell for ice making and having an ice outlet communicating with the inside of the ice making cell;
a second tray which provides another part of the ice making cell for ice making and selectively separated from the first tray;
a tray cover coupled to the first tray and having a communication hole matching the ice outlet of the first tray;
a first ejector including an ejector body that is movably disposed on the tray cover and an ejector pin that protrudes from the ejector body and passes through the ice outlet to eject ice in the ice making cell of the first tray; and
a guide member provided on the tray cover and guiding the movement of the ejector pin.

2. The ice maker of claim 1, wherein the guide member is provided around the communication hole formed in the tray cover.

3. The ice maker of claim 2, wherein the guide member is positioned on at least one radiation direction side with respect to the center of the communication hole to guide the movement of the ejector pin.

4. The ice maker of claim 2, wherein the guide member is formed to surround at least a portion of the circumference of the communication hole

5. The ice maker of claim 1, wherein a plurality of ice making cells and ice outlets are provided in the first tray,

a plurality of communication holes are provided in the tray cover are provided and positioned to coincide with each of the ice outlets,
a plurality of ejector pins are provided and positioned to face each of the communication holes.

6. The ice maker of claim 1, wherein the guide member is provided around a communication hole formed at the center of the tray cover among the communication holes or communication holes formed at a position symmetrical to each other with respect to the center of the tray cover.

7. The ice maker of claim 1, wherein at least a part of the guide member has a protruding end that protrudes inward of the communication hole so as to be adjacent to or in contact with the ejector pin when viewed from the moving direction of the ejector pin.

8. The ice maker of claim 7, wherein the bottom surface of the protruding end formed on the guide member is formed to be spaced apart from the surface of the communication hole.

9. The ice maker of claim 8, wherein a separation distance between the bottom surface of the protruding end and the surface of the communication hole is formed to be higher than a height of the water droplet considering the surface tension

10. The ice maker of claim 1, wherein the end of the ejector pin is formed to be gradually inwardly inclined toward the end.

11. The ice maker of claim 1, wherein a surface of the guide member facing the ejector pin is gradually inclined to be closer to the ejector pin in the moving direction of the ejector pin.

12. The ice maker of claim 1, wherein the first tray has an insertion tube inserted into the communication hole while providing the ice outlet, and the guide member is formed to be spaced apart from the insertion tube.

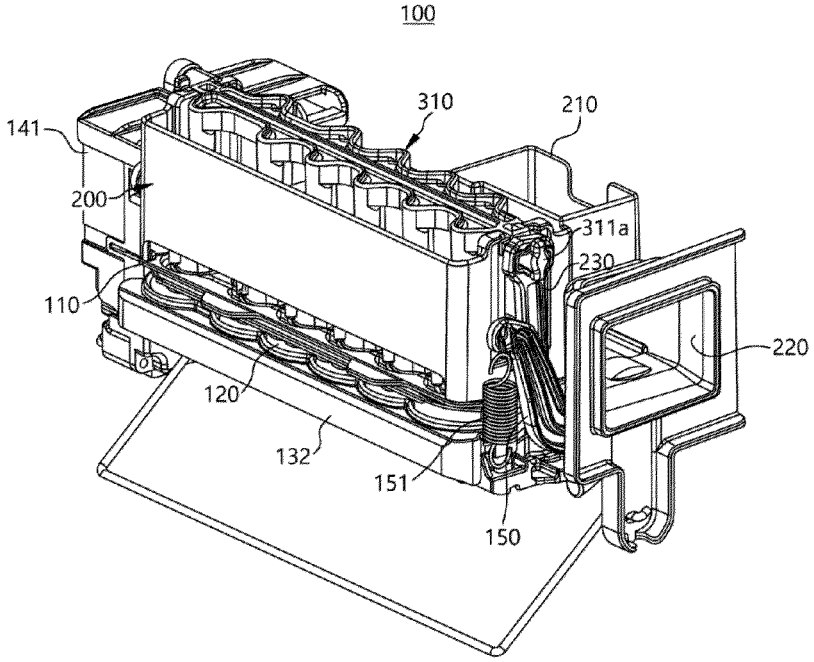
13. The ice maker of claim 12, wherein a separation distance between the guide member and the end surface of the insertion tube is formed to be higher than the height of the water droplet considering the

surface tension

14. The ice maker of claim 1, wherein the end surface of the guide member is formed to be higher than the end surface of the ejector pin when the first ejector does not operate

15. The ice maker of claim 1, wherein the guide member is formed at a height that does not contact the ejector body when the first ejector operates.

[FIG.1]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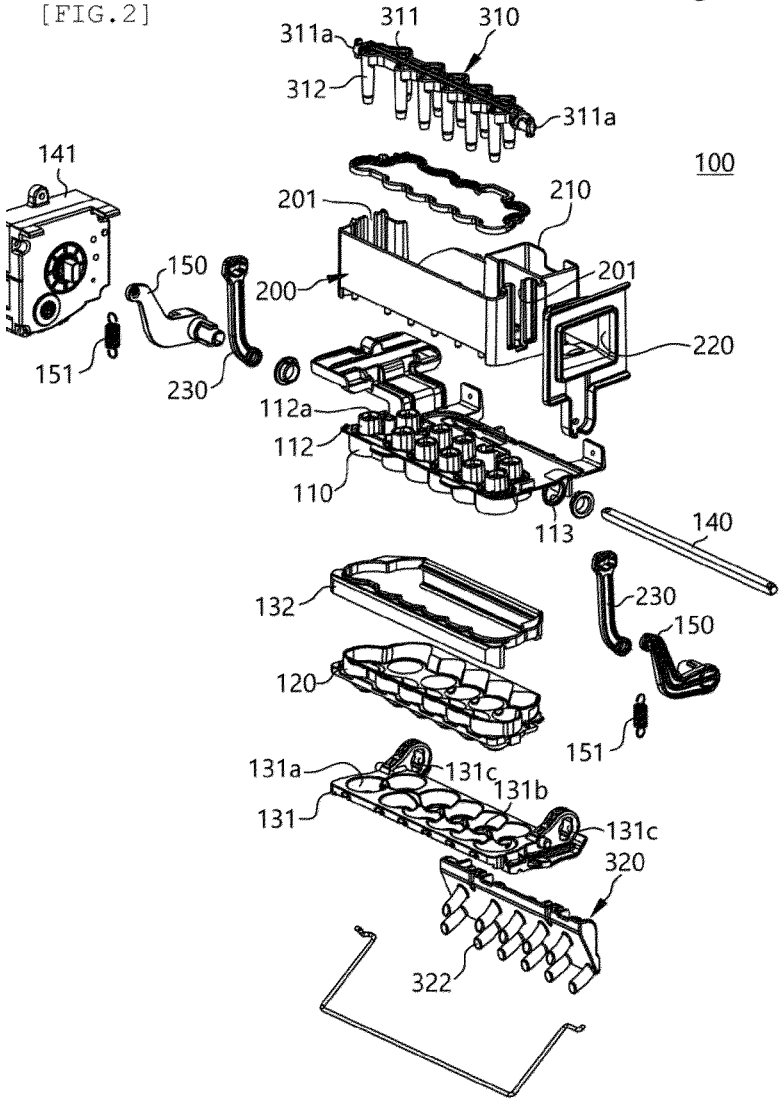
[FIG.2]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131a
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131c
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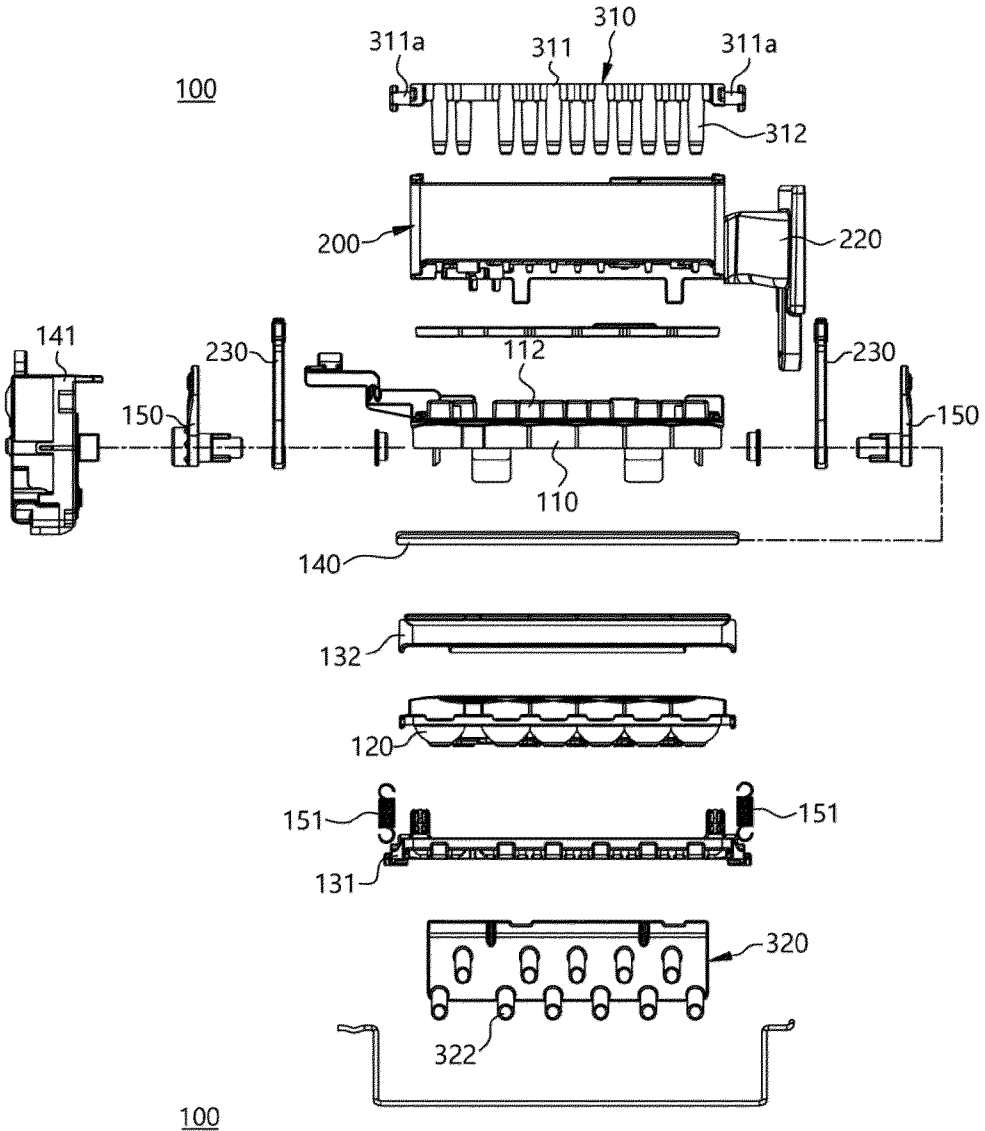
322

[FIG.3]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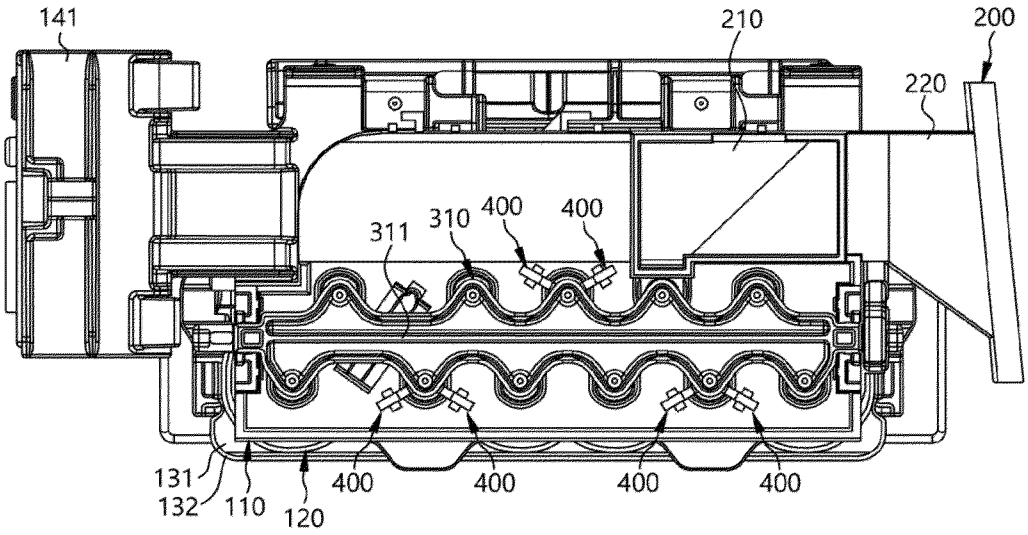
[FIG.4]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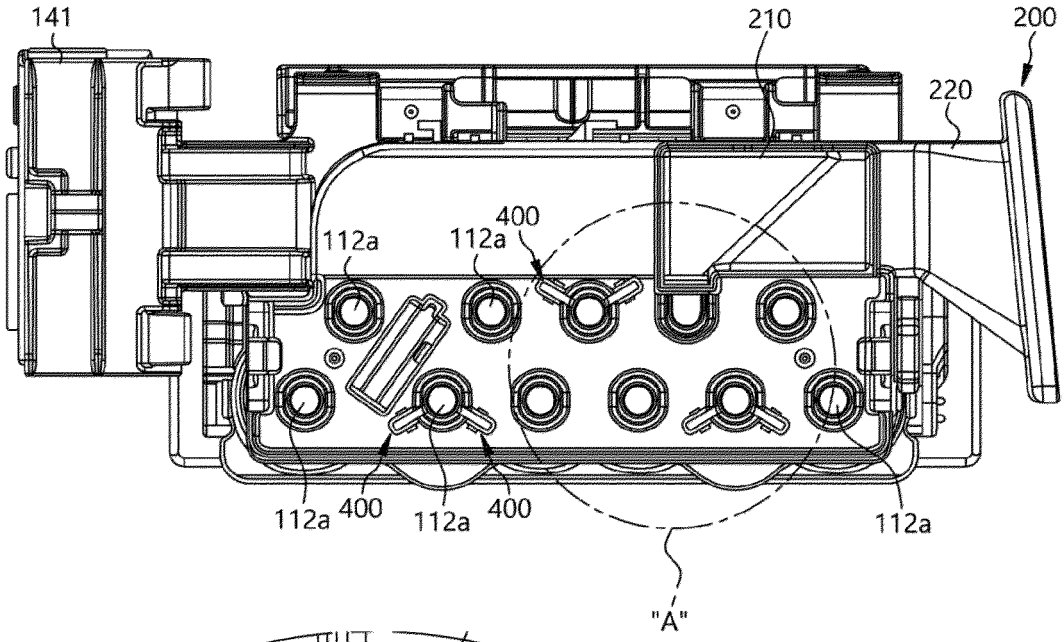
100

[FIG.5]



[FIG.6]

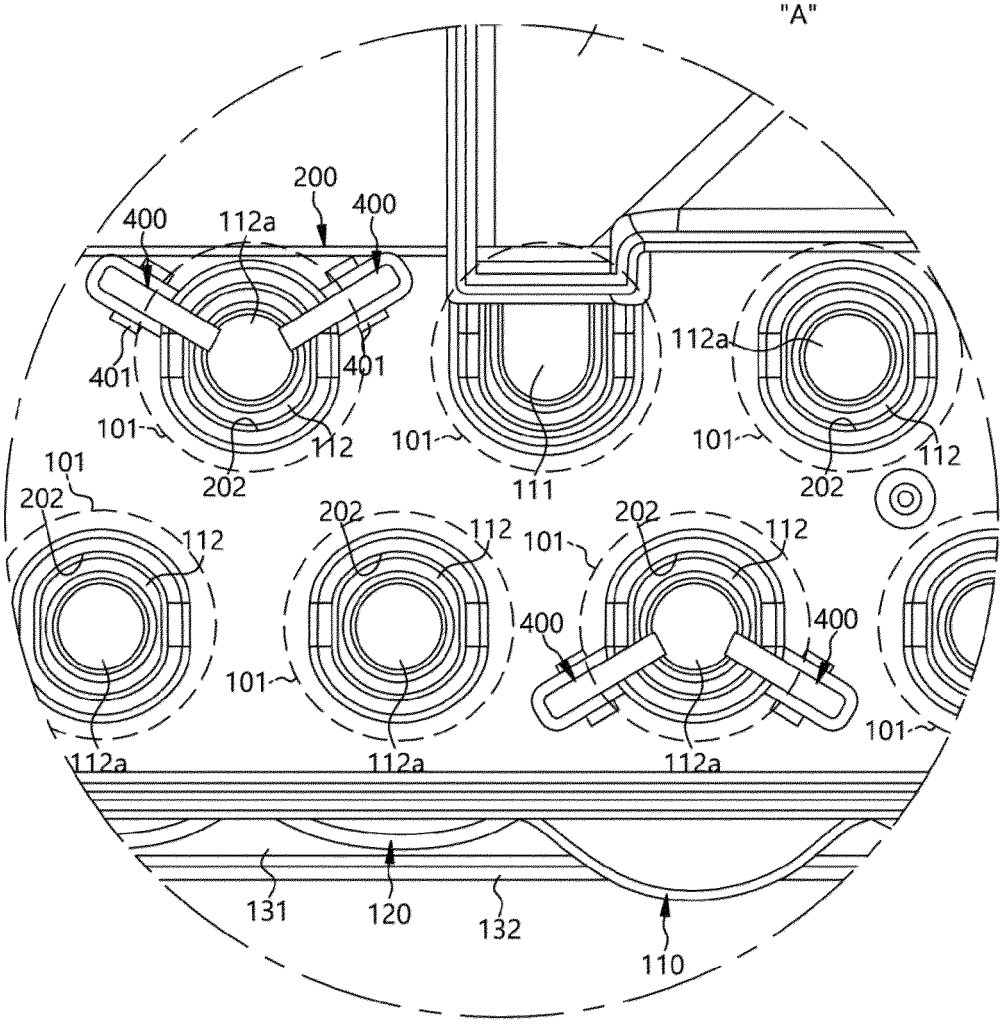
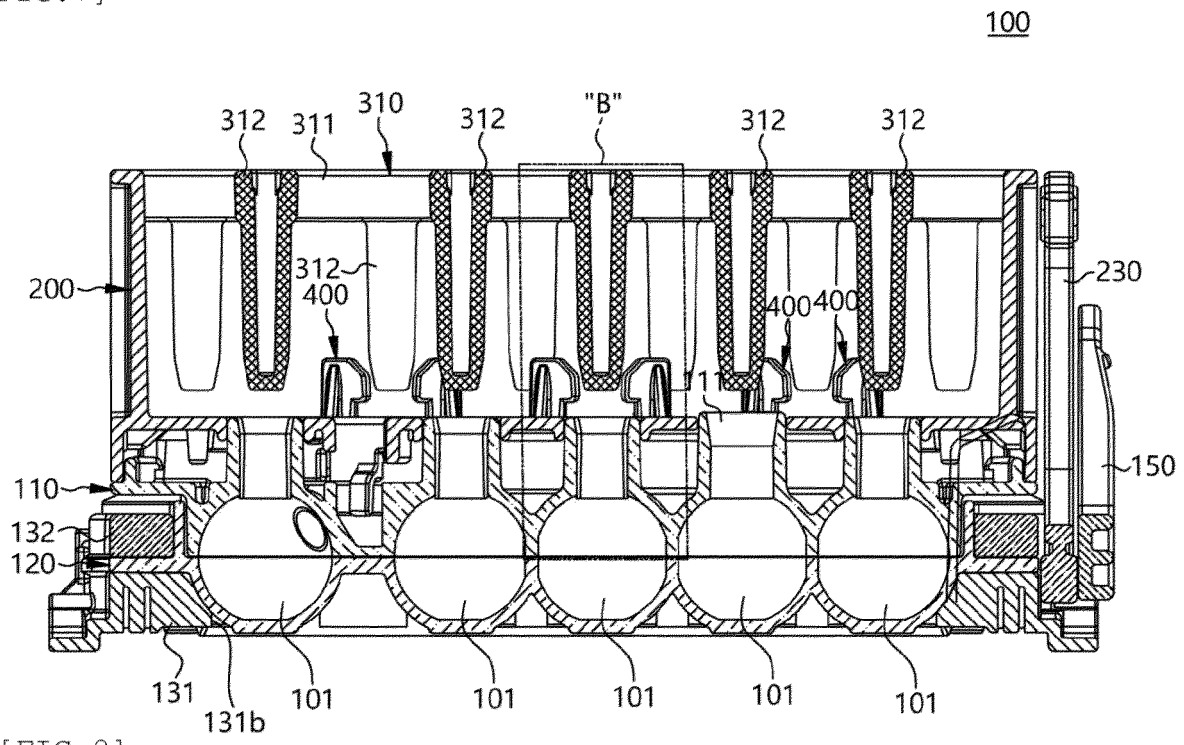


FIG.7]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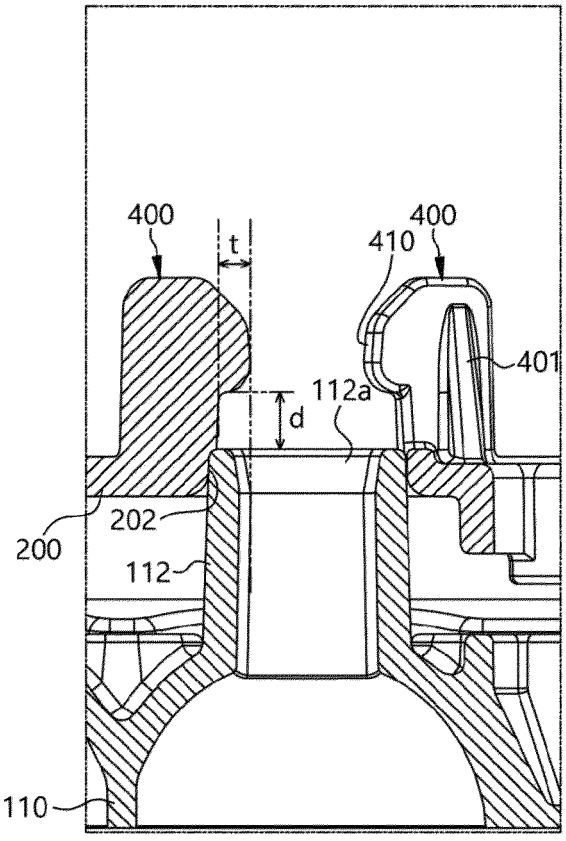
[FIG.8]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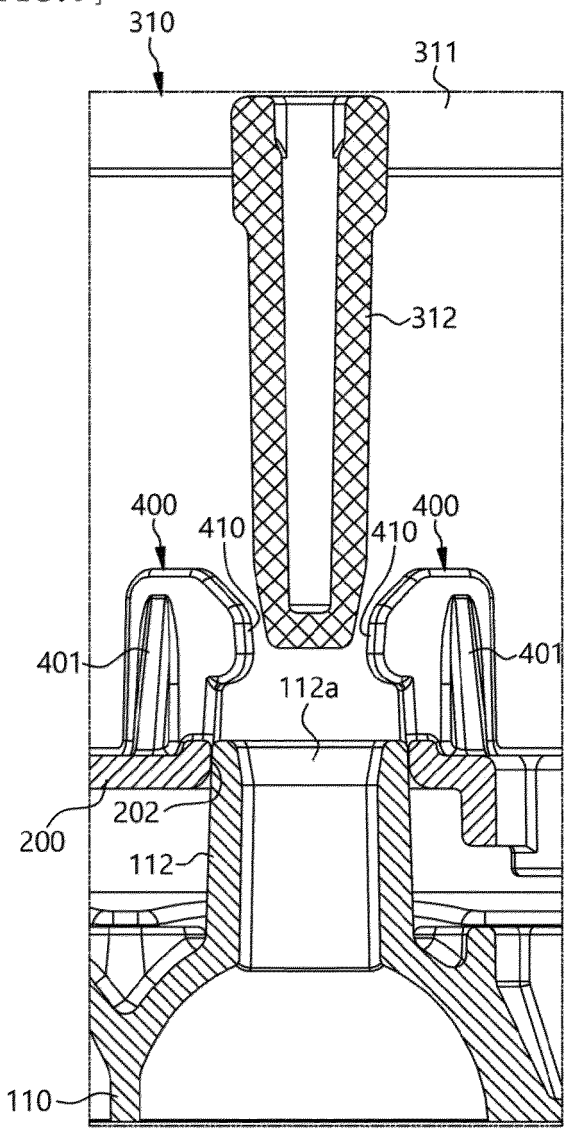
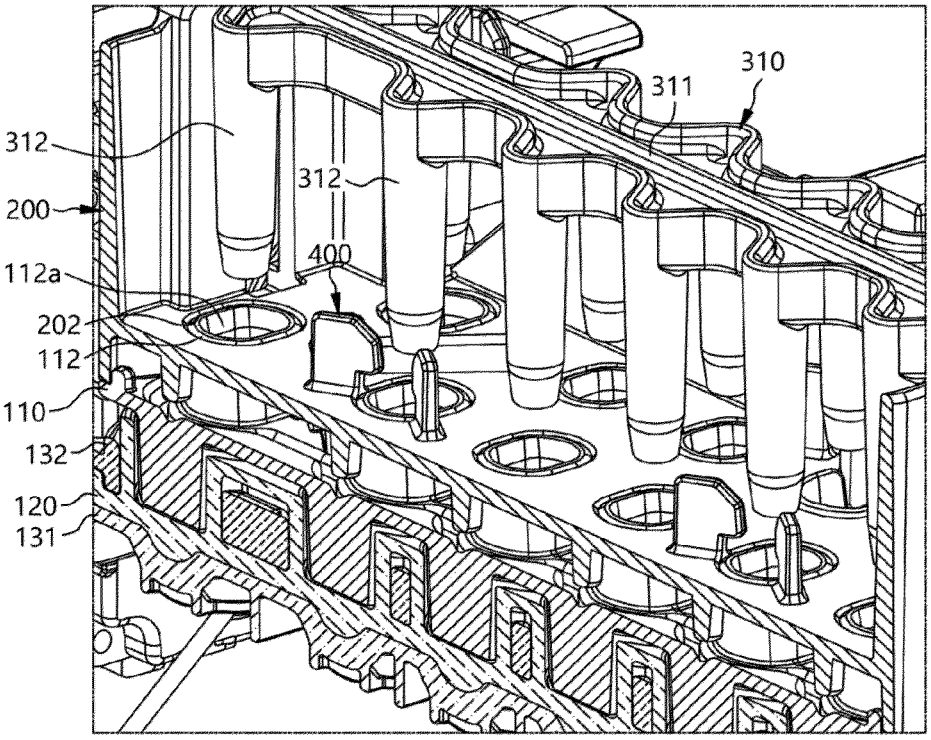
[FIG.9]



[FIG.10]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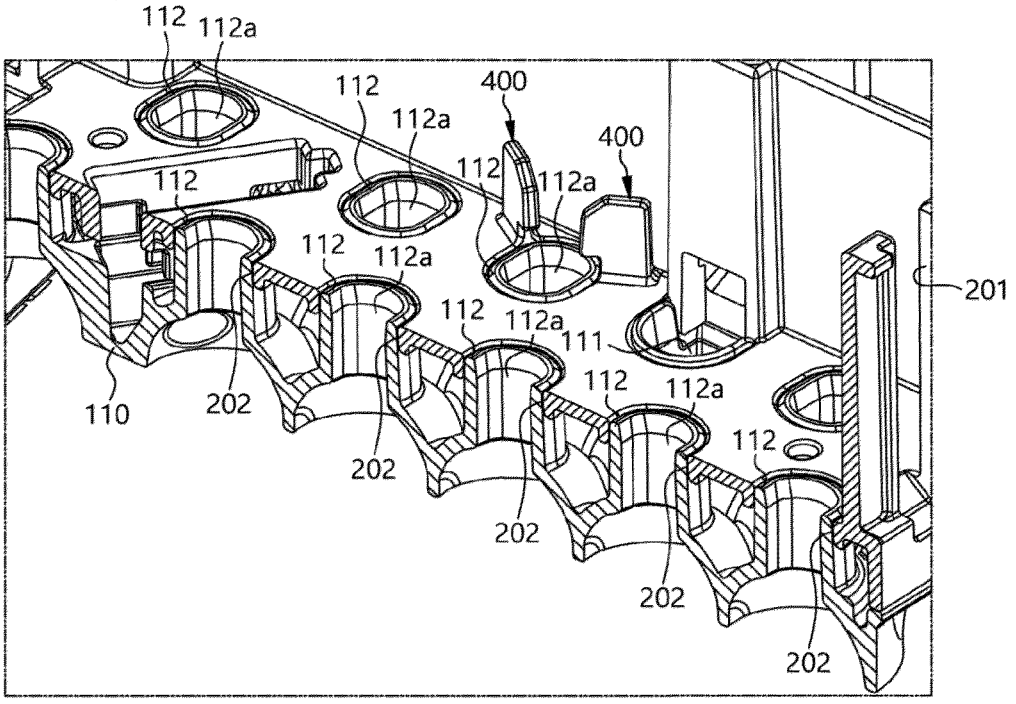
[FIG.11]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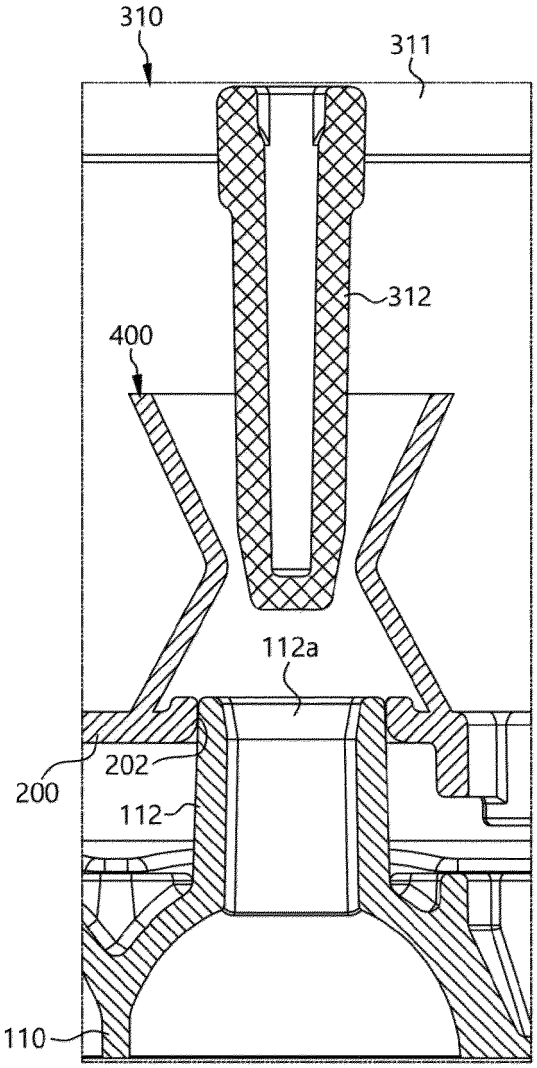
[FIG.12]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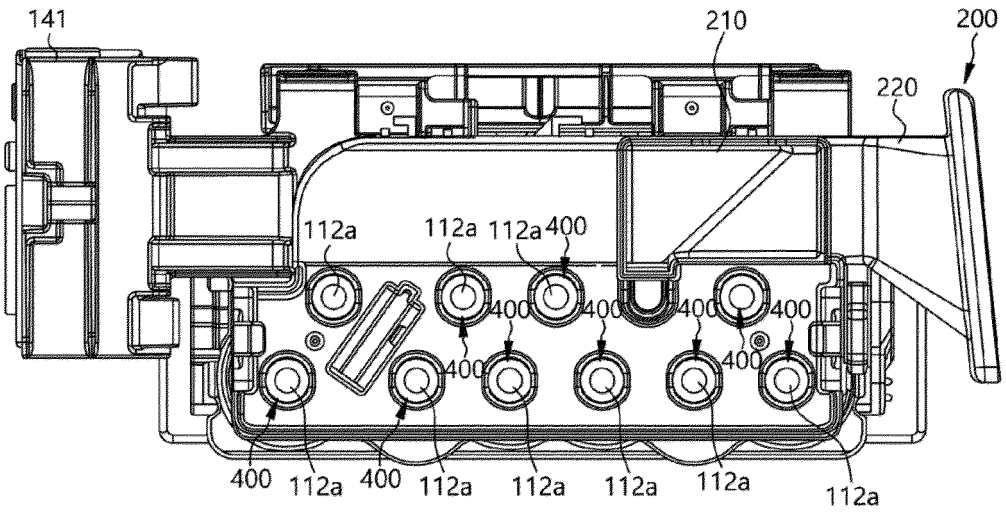
[FIG.13]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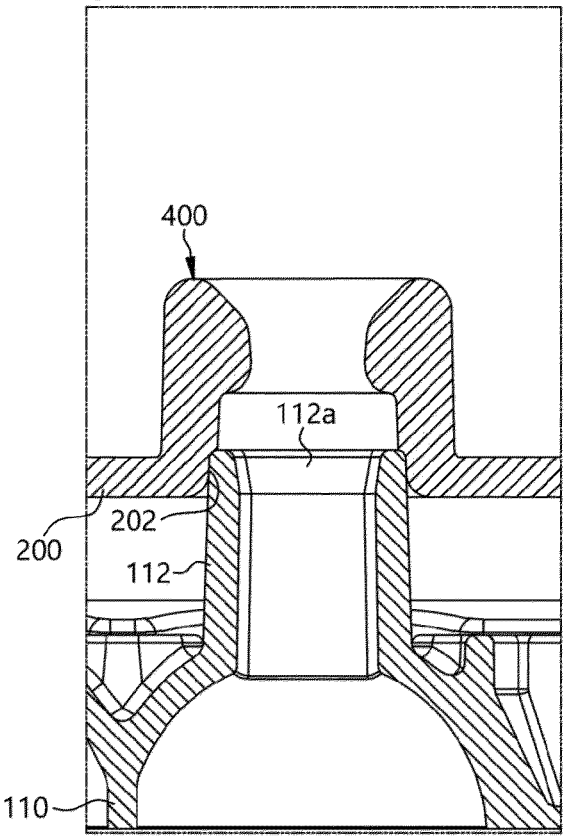
[FIG.14]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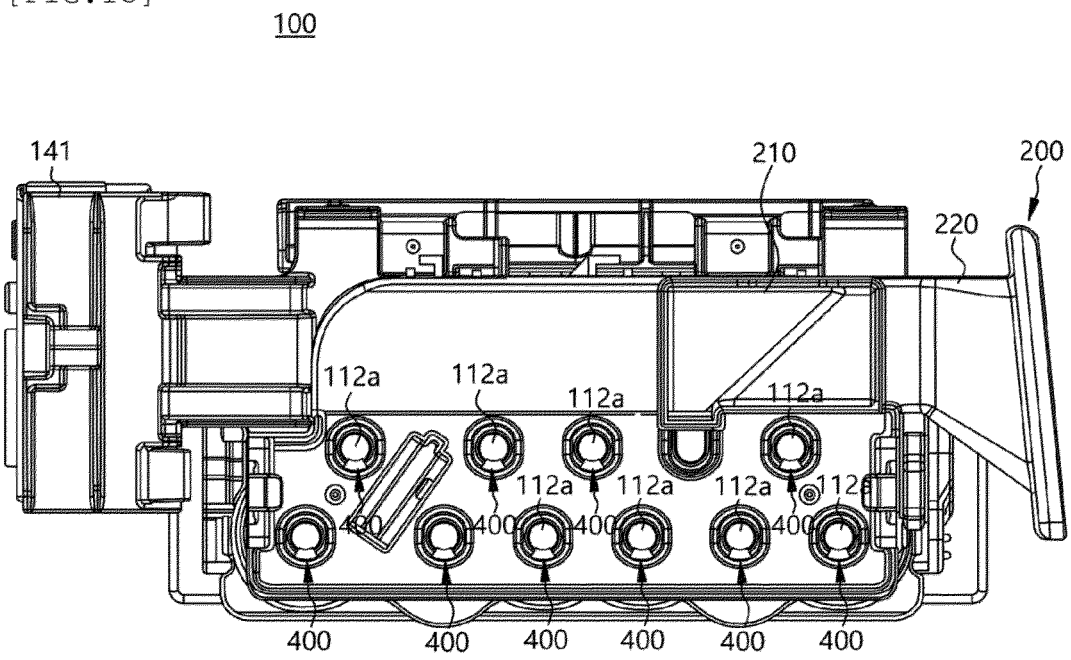
[FIG.15]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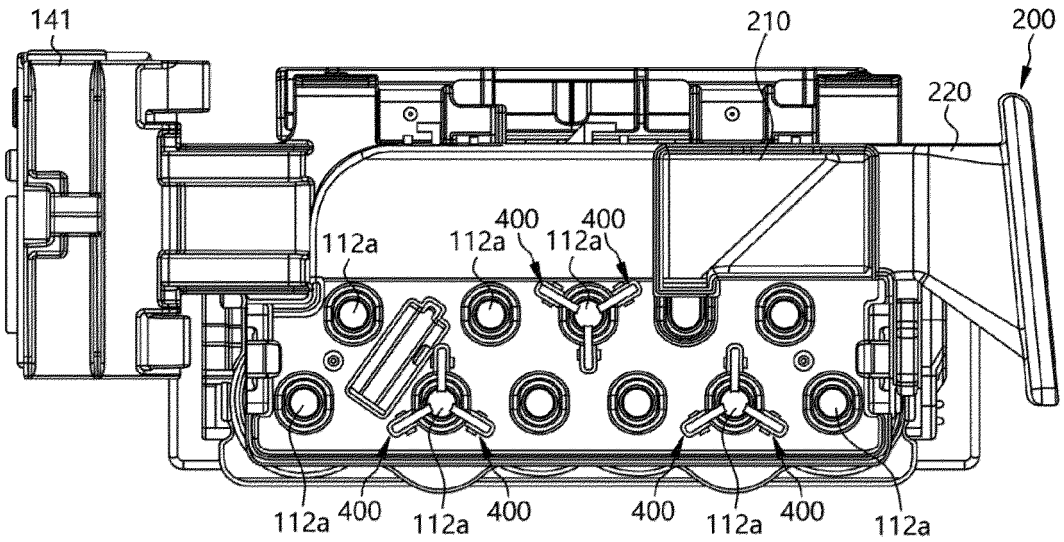
[FIG.16]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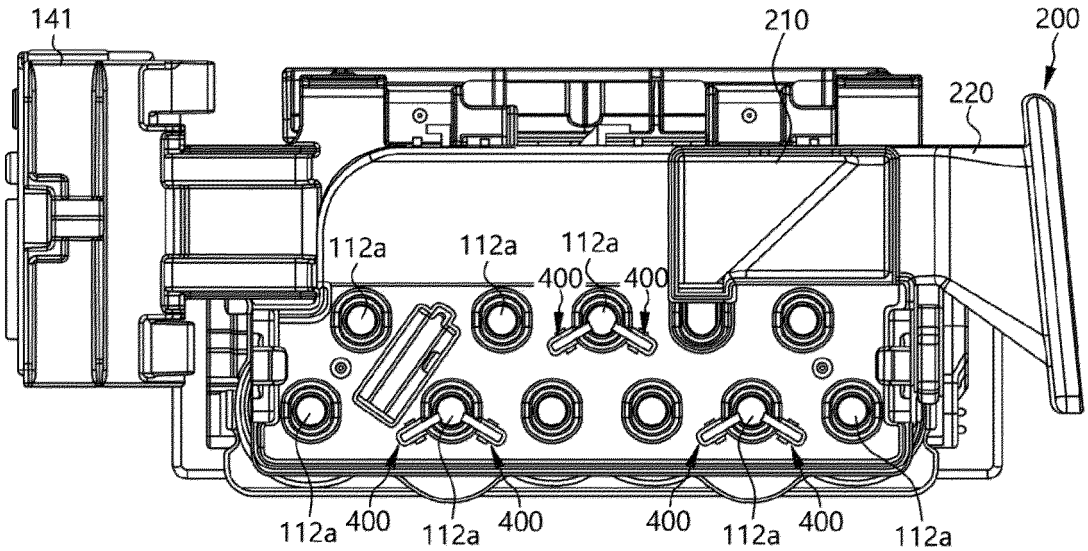
[FIG.17]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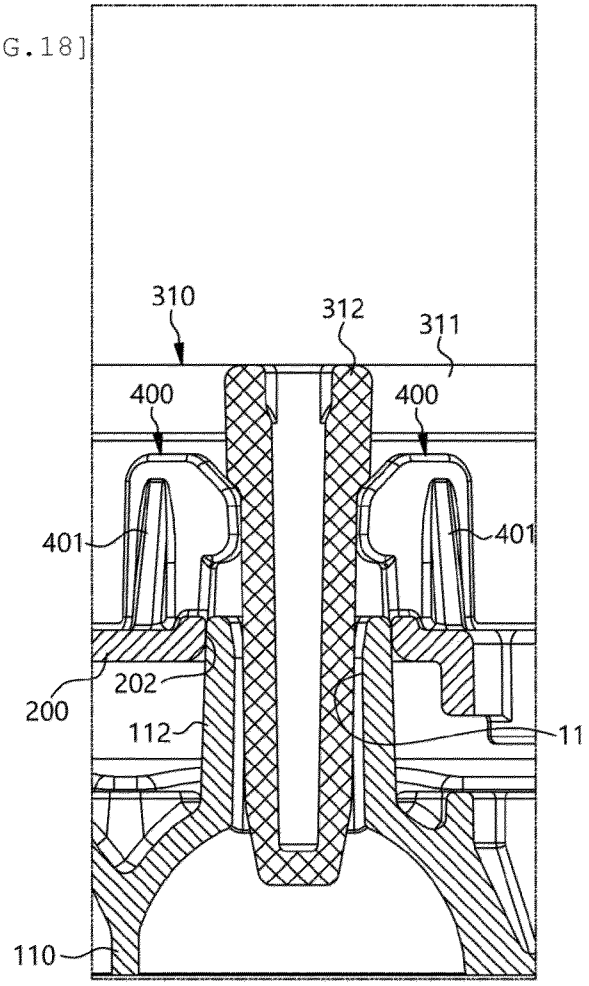
[FIG.18]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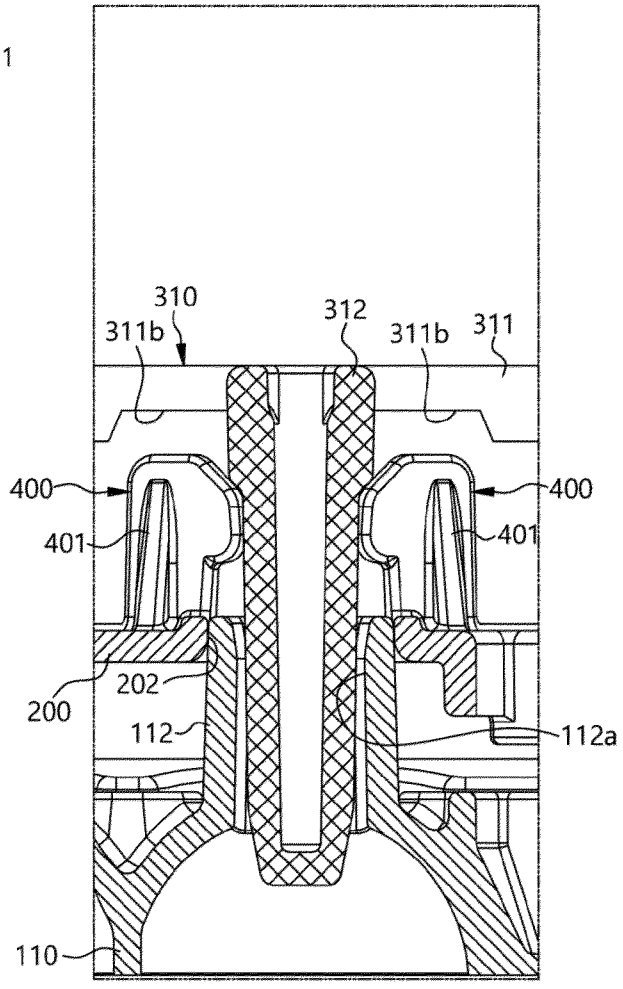
[FIG.19]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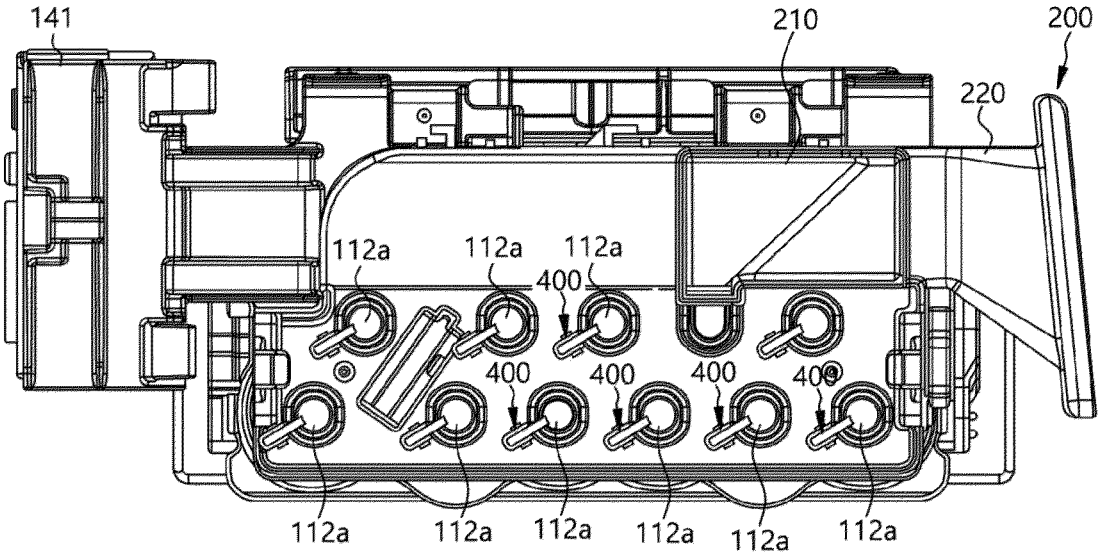
[FIG.20]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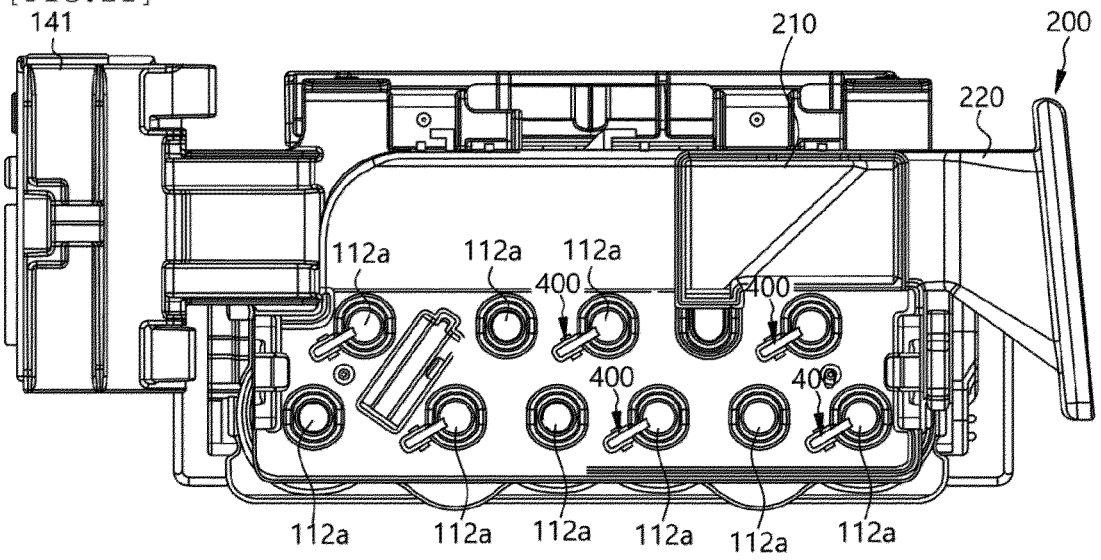
[FIG.21]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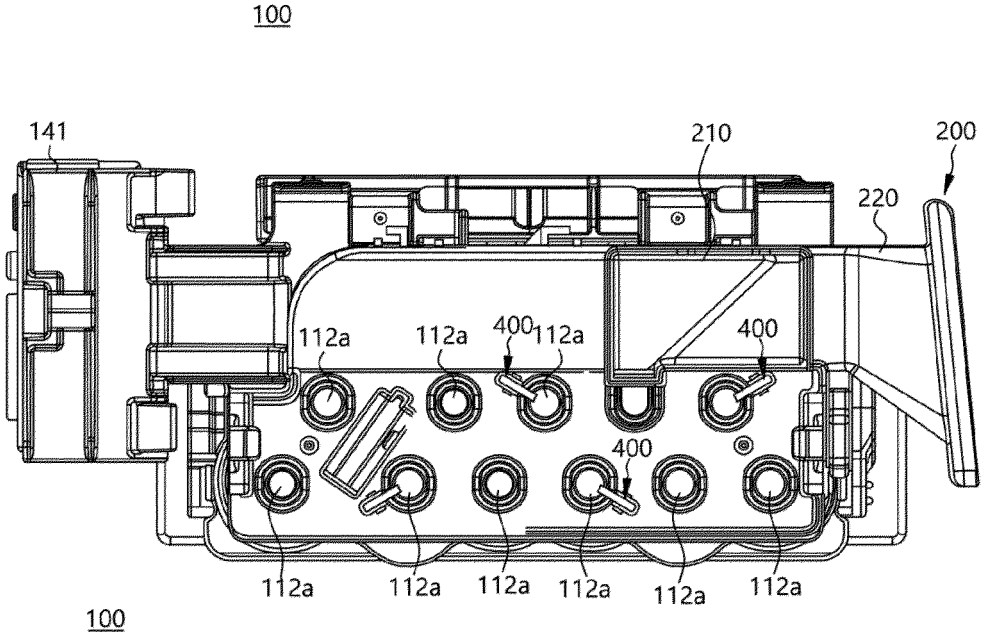
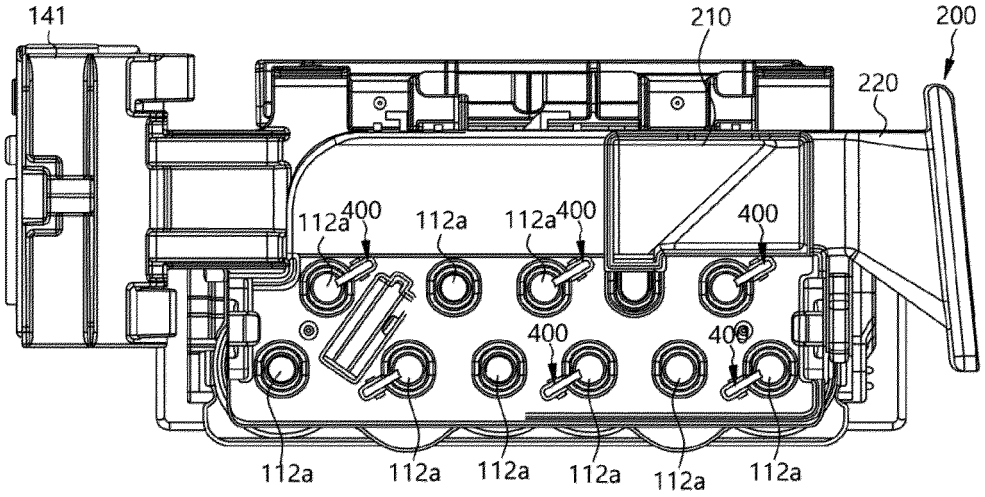
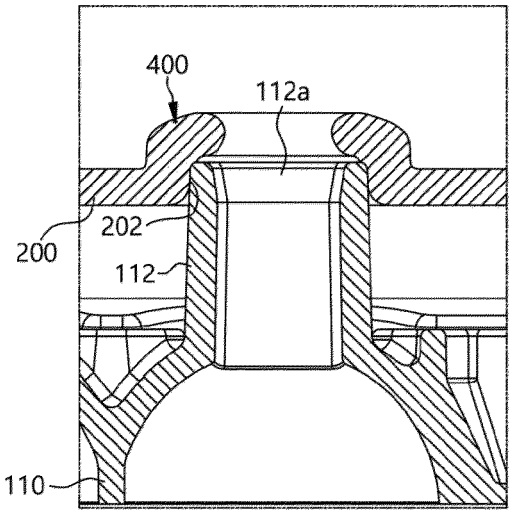
[FIG.22]



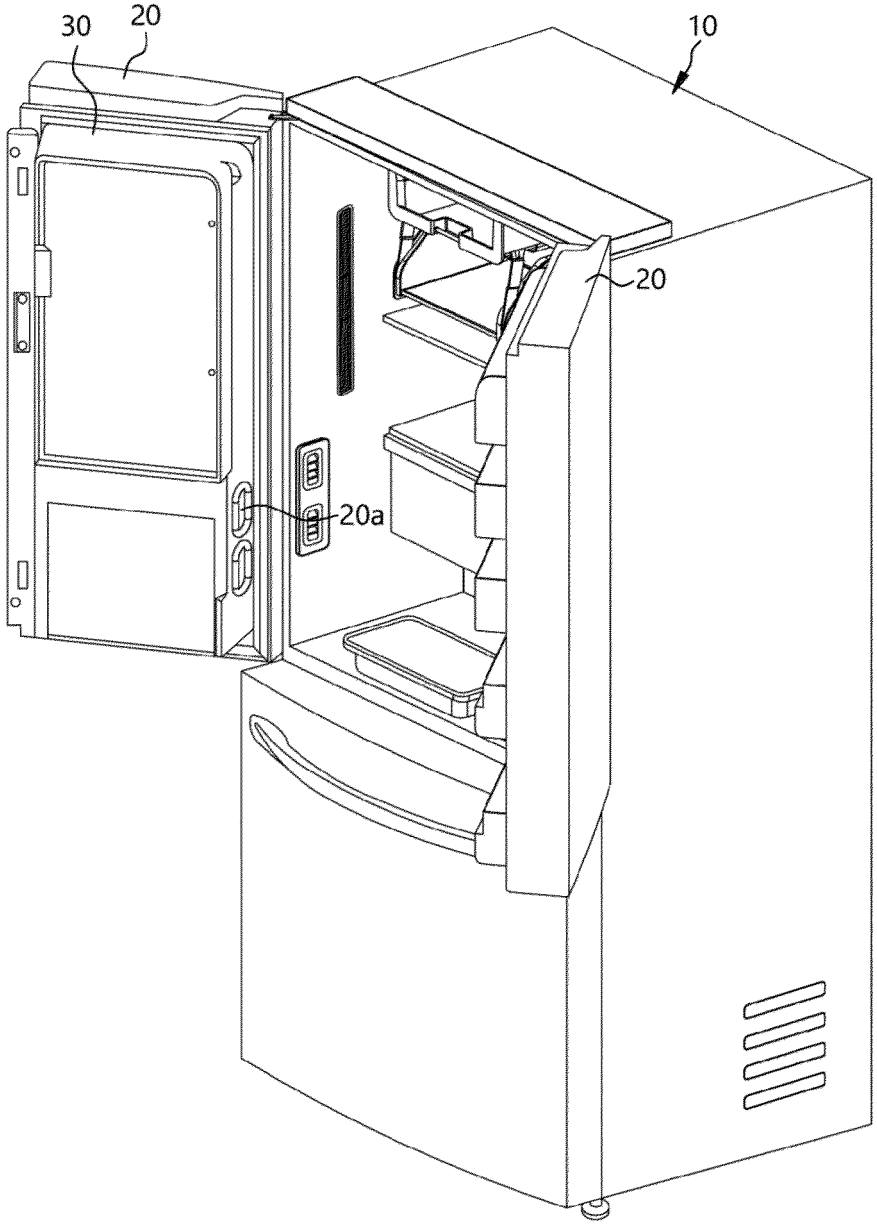
[FIG.23]



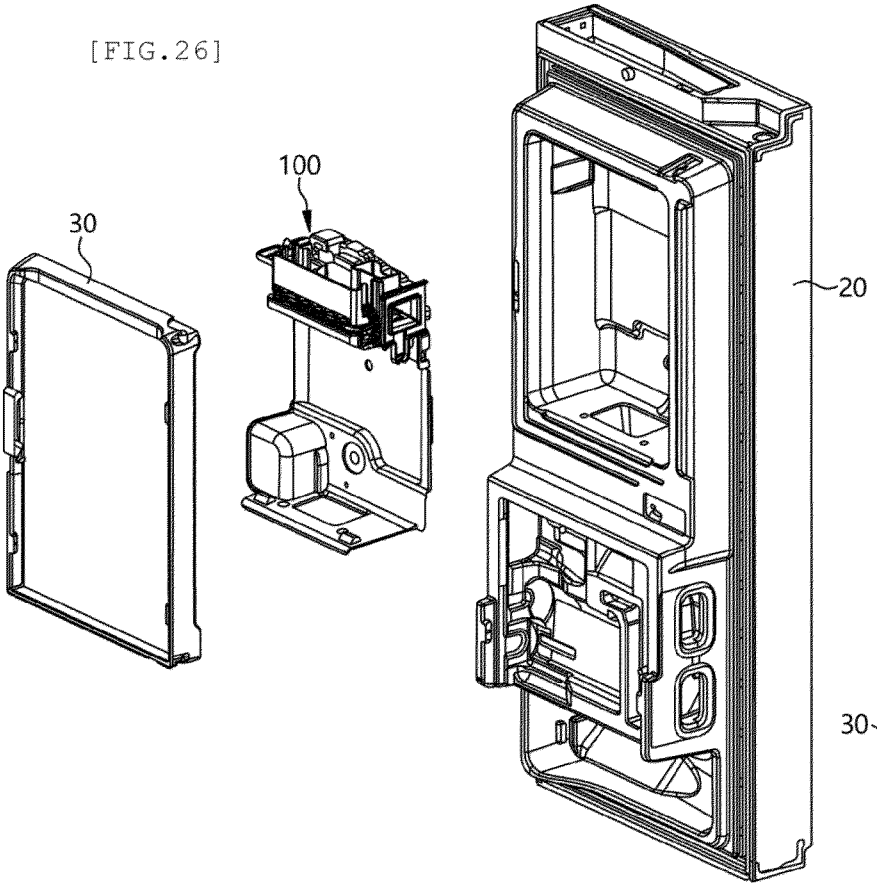
[FIG.24]



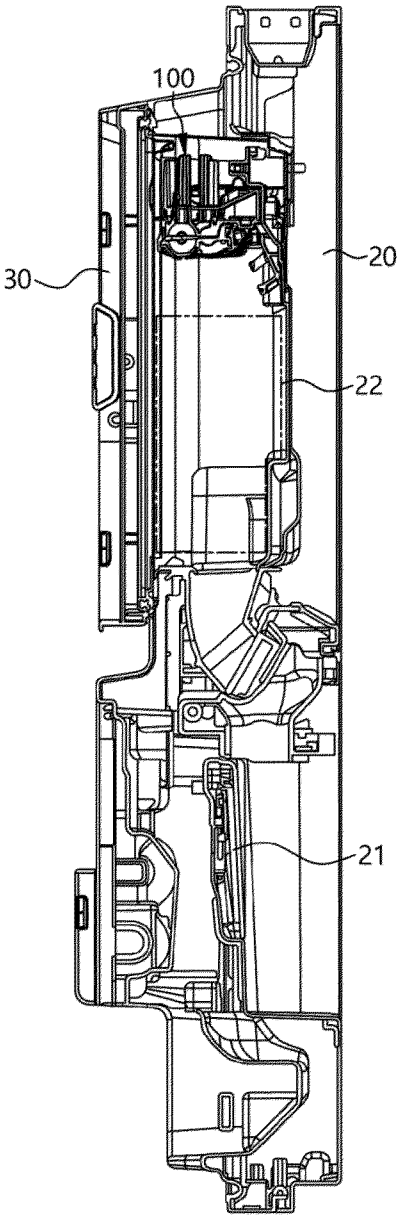
[FIG.25]



[FIG.26]



[FIG.27]



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EUROPEAN SEARCH REPORT

Application Number
EP 24 19 6078

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2021/341203 A1 (LEE DONGHOON [KR] ET AL) 4 November 2021 (2021-11-04) * abstract; figures 1-20 *	1,5, 12-14	INV. F25C1/04 F25C5/04
X	US 2014/165619 A1 (CULLEY BRIAN K [US]) 19 June 2014 (2014-06-19) * abstract; figures 26-30 *	1-9, 11-13,15	
X	CN 219 889 821 U (QINGDAO HAIER REFRIGERATOR CO LTD ET AL.) 24 October 2023 (2023-10-24) * abstract; figures 1-6 *	1	
X	US 2023/026086 A1 (KIM YONGHYUN [KR]) 26 January 2023 (2023-01-26) * abstract; figures 2-5 *	1	
A	US 2022/316782 A1 (MITCHELL ALAN JOSEPH [US]) 6 October 2022 (2022-10-06) * the whole document *	1-15	
A	US 9 234 689 B2 (SON JUHYUN [KR]; LEE WOOKYONG [KR] ET AL.) 12 January 2016 (2016-01-12) * the whole document *	1-15	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	24 January 2025	Bejaoui, Amin

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- KR 1020210005782 **[0004]**
- KR 1020230015072 **[0004]**