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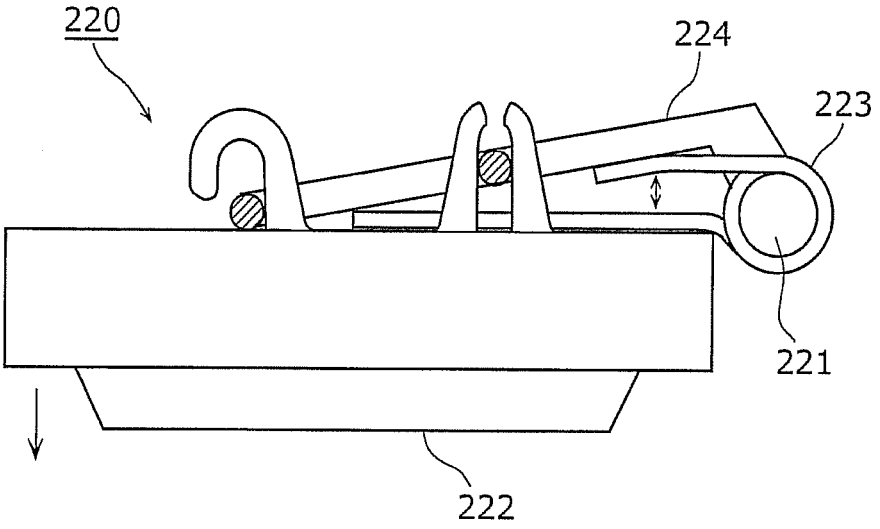
(54) **REFRIGERATOR**

(57) A refrigerator is provided with an ice dispenser capable of suppressing extra power consumption and fully closing the lid, even when the ice is stuck between the supply opening and the lid. A refrigerator (100) includes an ice dispenser (200) for supplying ice, in which the ice dispenser (200) includes: a supply opening (210a) which is an outlet for supplying ice; a lid unit (220) including a shaft (221) and a lid (222) which closes the supply opening through rotation of the shaft (221); and a driver unit (260) which rotates the shaft (221), the driver unit (260) fixes the shaft (221) so as to prevent the shaft (221) from rotating, when the driver unit stops the rotation of the shaft (221), and the lid unit (220) further includes a biasing member (223) which connects the shaft (221) and the lid (222) and provides the lid (222) with a biasing force in a closing direction for closing the supply opening (210a).

FIG. 9B



EP 2 405 213 A1

Description

[Technical Field]

[0001] The present invention relates to refrigerators, and particularly to a refrigerator including an ice dispenser for supplying ice.

[Background Art]

[0002] In recent years, refrigerators with ice dispenser for supplying ice are on the market. The ice dispenser includes a supply pipe which serves as a supply path for ice, and a lid for covering a supply opening which is an exit of the supply pipe. The ice dispenser supplies the user with ice made by an ice maker from the supply opening through the supply path in the supply pipe. However, when supplying ice to the user, the lid is sometimes not completely closed because of ice stuck between the supply opening and the lid covering the supply opening.

[0003] In order to solve this problem, an ice dispenser capable of completely closing its lid by delaying the timing for closing the lid so as to prevent the ice from being stuck between the supply opening and the lid has been conventionally proposed (for example, see Patent Literature 1). In this conventional ice dispenser, by delaying the timing for closing the lid, the ice remaining in the supply pipe passes through the supply path and is served from the supply opening. The lid can be fully closed by preventing the ice from remaining in the supply pipe so as to prevent the ice from being stuck between the supply opening and the lid.

[Citation List]

[Patent Literature]

[0004]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. H11-287550

[Summary of Invention]

[Technical Problem]

[0005] However, although the conventional ice dispenser in a refrigerator prevents the ice from being stuck between the supply opening and the lid, the lid cannot be completely closed when the ice is stuck between the supply opening and the lid.

[0006] In other words, according to the conventional ice dispenser, there is a case in which the ice is stuck between the supply opening and the lid even when the timing for closing the lid is delayed. For example, in the conventional ice dispenser, all of the ice remaining in the supply pipe cannot be served unless the lid closes with timing suitable for the amount of ice remaining in the supply pipe. However, the amount of the ice remaining in the supply pipe is not even, and consequently all of the ice remaining in the supply pipe may not be served, depending on the timing for closing the lid. Furthermore, there is a case in which all of the ice remaining in the supply pipe cannot be served when the ice is stuck in the supply pipe or at the supply opening.

[0007] The lid may not be completely closed due to the ice remaining in the supply pipe stuck between the supply opening and the lid. For example, when a gear motor is used for a driving mechanism for opening and closing the lid, the position of the lid is fixed with the lid not fully closed when the gear motor stops with the ice stuck between the supply opening and the lid. Accordingly, even after the ice melts, the lid is not fully closed, and the lid remains open.

[0008] Alternatively, the lid can be completely closed by driving the gear motor until the ice melts and the lid is fully closed. However, extra power for keep driving the gear motor is necessary.

[0009] The present invention has been conceived in view of these problems, and it is an object of the present invention to provide a refrigerator with an ice dispenser capable of suppressing extra power consumption and fully closing the lid, even when the ice is stuck between the supply opening and the lid.

[Solution to Problem]

[0010] In order to achieve the object above, the refrigerator according to the present invention is a refrigerator including an ice dispenser for supplying ice, in which the ice dispenser includes: a supply opening which is an outlet for supplying ice; a lid unit including a shaft and a lid which closes the supply opening through rotation of the shaft; and a driver unit which rotates the shaft, the driver unit fixes the shaft so as to prevent the shaft from rotating, when the driver unit stops the rotation of the shaft, and the lid unit further includes a biasing member which connects the shaft and the lid and provides the lid with a biasing force in a closing direction for closing the supply opening.

[0011] With this, the biasing member provides the lid with the biasing force in the closing direction for closing the supply opening while the driver unit stops and the shaft is fixed. Accordingly, even if the ice is stuck between the supply opening and the lid, the lid closes the supply opening by the biasing force of the biasing member as the ice melts. Furthermore, no electric power for the lid to close the supply opening is required. Thus, even when the ice is stuck between the supply opening and the lid, it is possible to completely close the lid while suppressing extra power consumption.

[0012] Furthermore, it is preferable that a control unit which causes the driver unit to rotate the shaft at a predetermined interval such that the lid closes the supply opening is included.

[0013] With this, the control unit causes the driver unit

to rotate the shaft such that the lid closes the supply opening at the predetermined time interval. Here, when a large ice is stuck between the supply opening and the lid, there is a possibility that the lid cannot fully close the supply opening even with the movement of the lid toward the closing direction by the biasing member. In this case, after the large ice melts, the control unit can cause the driver unit to rotate the shaft such that the lid is fully closed. Furthermore, the control unit does not cause the driver unit to keep rotating the shaft, but causes the driver unit to rotate the shaft at the predetermined time interval. Thus, extra electric power consumption is suppressed. Therefore, even when the ice is stuck between the supply opening and the lid, it is possible to completely close the lid while suppressing extra power consumption.

[0014] Note that, the present invention can not only be implemented as a refrigerator having the ice dispenser, but also as an ice dispenser.

[Advantageous Effects of Invention]

[0015] The present invention provides a refrigerator with an ice dispenser capable of completely closing the lid while suppressing the extra power consumption even when the ice is stuck between the supply opening and the lid. Therefore, the present invention is highly practical.

[Brief Description of Drawings]

[0016]

[FIG. 1] FIG. 1 is a perspective view illustrating an external appearance of a refrigerator.

[FIG. 2] FIG. 2 is a perspective view illustrating an external appearance of the refrigerator with the third door and the fourth door open.

[FIG. 3] FIG. 3 is a perspective view illustrating an external appearance of the refrigerator with the first door and the second door open.

[FIG. 4] FIG. 4 is a cross-sectional view illustrating the structure of an ice dispenser.

[FIG. 5] FIG. 5 is a perspective view illustrating the structure of the ice dispenser.

[FIG. 6] FIG. 6 is a back-perspective view of the ice dispenser.

[FIG. 7] FIG. 7 is a functional block diagram illustrating functional configuration for controlling the driver unit.

[FIG. 8] FIG. 8 is a perspective view illustrating an external appearance of a lid unit.

[FIG. 9A] FIG. 9A is a planar view illustrating the structure of the lid unit.

[FIG. 9B] FIG. 9B is a planar view illustrating the structure of the lid unit.

[FIG. 10A] FIG. 10A is for describing open-close operation of the lid unit.

[FIG. 10B] FIG. 10B is for describing open-close operation of the lid unit.

[FIG. 11A] FIG. 11A is for describing closing operation of the lid unit when ice is stuck.

[FIG. 11B] FIG. 11B is for describing closing operation of the lid unit when ice is stuck.

[FIG. 12] FIG. 12 illustrates a biasing member according to a variation of Embodiment.

[Description of Embodiments]

[0017] The following shall describe Embodiment of the refrigerator according to the present invention with reference to the drawings.

[0018] FIG. 1 is a perspective view illustrating the external appearance of the refrigerator.

[0019] FIG. 2 is a perspective view illustrating the external appearance of the refrigerator with a third door and a fourth door open.

[0020] As illustrated in these drawings, the refrigerator 100 includes a heat-insulating main body 150, a first door 111, a second door 121, a third door 112, a through hole 113, a fourth door 122, and a receiving space 123.

[0021] The heat-insulating main body 150 is a box with an opening at the front face, and has a heat-insulating capacity for blocking the exchange of heat between the inside and the outside of the refrigerator 100.

[0022] The first door 111 is a door which freely opens and closes at an opening of the heat-insulating main body on the right of the user when facing the heat-insulating main body 150. In this Embodiment, the first door 111 is attached to the heat-insulating main body 150 by a hinge (not illustrated) such that the first door 111 swings around an axis extending in the vertical direction in front of the right side wall of the heat-insulating main body 150. The first door 111 is rectangular when viewed from front, and the axis passes through a right end portion of the first door 111.

[0023] The second door 121 freely opens and closes at an opening of the heat-insulating main body 150 on the left of the user when facing the heat-insulating main body 150. In this Embodiment, the second door 121 is attached to the heat-insulating main body 150 by a hinge (not illustrated) such that the first door 111 rotates around an axis extending in the vertical direction in front of the left side wall of the heat-insulating main body 150. The second door 121 is rectangular when viewed from front, and the axis passes through a left end portion of the second door 121.

[0024] The through hole 113 is a hole through the first door 111 in thickness direction. The through hole 113 is for taking out items stored behind the first door 111 and for taking into items behind the first door 111 for storage, without opening the first door 111.

[0025] The third door 112 is a door which freely opens and closes at the through hole 113. In this Embodiment, the third door 112 is attached to the first door 111 by a hinge (not illustrated) such that the third door 112 swings around an axis laterally extending at the lower end portion

of the through hole 113. The third door 112 is substantially square-shaped when viewed from front (with rounded corners), and the axis passes through the lower end portion of the third door 112.

[0026] The receiving space 123 is a space provided inside of the second door 121, and is a space for the user to receive ice supplied from an ice dispenser (not illustrated) provided inside of the second door 121. At the front face of the receiving space 123, an opening through the front face of the second door 121 in the thickness direction is formed.

[0027] More specifically, the fourth door 122 is a door which freely opens and closes at the front of the receiving space 123. In this Embodiment, the fourth door 122 is attached to the second door 121 by a hinge (not illustrated) such that the fourth door 122 swings around an axis extending laterally at the lower end portion of the front of the receiving space 123. The fourth door 122 is substantially square-shaped when viewed from front (with rounded corners), and the axis passes through the lower end portion of the fourth door 122.

[0028] FIG. 3 is a perspective view illustrating the external appearance of the refrigerator with the first door and the second door open.

[0029] As illustrated in the drawing, the refrigerator 100 includes a partition 153.

[0030] The partition 153 is a wall laterally partitioning the inside of the heat-insulating main body 150. In this Embodiment, the right side of the partition 153 inside the heat-insulating main body 150 is a first storage compartment 151, and is a refrigerator compartment. On the other hand, the left side of the partition 153 inside the heat-insulating main body 150 is a second storage compartment 152, and is a freezer compartment. The partition 153 is a wall partitioning the refrigerator compartment and the freezer compartment, and has heat-insulating property.

[0031] The ice dispenser for supplying the user with ice made is provided inside the second door 121 (A in FIG. 3) which freely opens and closes at the opening of the second storage compartment 152, which is the freezer compartment.

[0032] The following shall describe the details of the ice dispenser.

[0033] FIG. 4 is a cross-sectional view illustrating the structure of the ice dispenser 200. More specifically, FIG. 4 is a cross-sectional view schematically illustrating the cross-section of A in the second door 121 illustrated in FIG. 3. Note that, for description purpose, the illustration of the fourth door 122 is omitted in FIG. 4.

[0034] As illustrated in FIG. 4, the ice dispenser 200 supplies the ice that is made, and includes a supply pipe 210, a lid unit 220, a lever 240, and a serving unit 250.

[0035] The supply pipe 210 forms a path for supplying the ice made by an ice maker (not illustrated) arranged above with the user. The supply pipe 210 has a supply opening 210a.

[0036] The supply opening 210a is an opening of the supply pipe 210. More specifically, the supply opening 210a is an outlet for supplying ice. Note that the supply opening 210a may take any shape as long as the supplied ice can pass through.

[0037] The lid unit 220 is a lid covering the supply opening 210a in the supply pipe 210. The lid unit 220 includes a shaft 221 and a lid 222.

[0038] The shaft 221 is arranged above the lid 222, and is a rod-shaped shaft for swinging the lid 222. More specifically, the shaft 221 swings the lid 222 around the shaft 221 with the shaft 221 as the center, through the rotation of the shaft 221. Note that, the shaft 221 is preferably arranged above the lid 222, however, it is not limited to the above, and the shaft 221 may be arranged at the center.

[0039] The lid 222 is a tabular portion which rotates around the shaft 221 by the rotation of the shaft 221 for opening and closing the supply opening 210a. In other words, the lid 222 opens the supply opening 210a by the rotation of the shaft 221 (clockwise rotation in FIG. 4) to open the supply opening 210a. The lid 222 closes the supply opening 210a by the rotation of the shaft 221 (counterclockwise rotation in FIG. 4). Note that, the lid 222 may take any shape as long as the supply opening 210a can be closed.

[0040] The lever 240 is a switch for rotating the shaft 221 such that the lid 222 opens and closes the supply opening 210a. More specifically, when the user wishes to supply ice into a cup P, the user inserts the cup P into the receiving space 123, and presses the lever 240 in the X direction. In this case, the lower end portion of the lever 240 is pressed into the X direction, the lever 240 swings in the X direction with the top end portion as the center. Furthermore, when the lever 240 swings to a predetermined angle, the lever 240 causes the lid 222 to open the supply opening 210a.

[0041] When the cup P is supplied with ice, and the user took the cup P out of the receiving space 123, the lever 240 is turned back to the original position. Subsequently, when the lever 240 turns back to the original position, the lid 222 closes the supply opening 210a by the lever 240 released from the position at the predetermined angle.

[0042] The serving unit 250 is a part for serving the ice supplied from the supply opening 210a. The ice supplied from the serving unit 250 is supplied into the user's cup P.

[0043] FIG. 5 is a perspective view illustrating the structure of the ice dispenser 200. Note that, for description purpose, the supply pipe 210 and the cover 300 covering the lid unit 220 and others are illustrated as transparent in dotted lines.

[0044] FIG. 6 is a back perspective view illustrating the ice dispenser 200. More specifically, FIG. 6 is a right-top perspective view of the ice dispenser 200 illustrated in FIG. 5. Note that, for description purpose, the illustration of the supply pipe 210 is omitted in FIG. 6.

[0045] As illustrated in these drawings, the ice dispenser 200 further includes a driver unit 260.

[0046] The driver unit 260 is a driving mechanism for rotating the shaft 221. More specifically, the driver unit 260 swings the lid 222 around the shaft 221 by rotating the shaft 221, and opens and closes the lid 222 with respect to the supply opening 210a.

[0047] More specifically, the driver unit 260 drives the shaft 221 such that once the lever 240 swings to the predetermined angle; the lid 222 opens the supply opening 210a. Furthermore, the driver unit 260 drives the shaft 221 such that the lid 222 closes the supply opening 210a once the lever 240 is released from the position at the predetermined angle.

[0048] Furthermore, when the rotation of the shaft 221 stops, the driver unit 260 fixes the shaft 221 to prevent the rotation of the shaft 221. More specifically, the driver unit 260 includes a gear motor having a worm gear, for example. Accordingly, when the driver unit 260 stops rotation of the shaft 221, the rotation of the shaft 221 is fixed at a position at the time when the driver unit 260 stops, and the position of the lid 222 is fixed.

[0049] FIG. 7 is a functional block diagram illustrating the functional structure for controlling the driver unit 260.

[0050] As illustrated in FIG. 7, the refrigerator 100 further includes a control unit 270 for controlling the driver unit 260.

[0051] The control unit 270 is a processing unit for controlling the driver unit 260. More specifically, the control unit 270 drives the driver unit 260 such that the lid 222 opens and closes the supply opening 210a by the swing of the lever 240.

[0052] More specifically, the control unit 270 causes the driver unit 260 to rotate the shaft 221 such that the lid 222 opens the supply opening 210a. Furthermore, the control unit 270 rotates the shaft 221 such that the lid 222 closes the supply opening 210a.

[0053] Furthermore, the control unit 270 causes the driver unit 260 to rotate the shaft 221 such that the lid 222 closes the supply opening 210a at a predetermined time interval. Here, the predetermined time may be a few minutes or a few hours, and is not particularly limited. However, it is preferable that the predetermined time is a time until the ice stuck between the lid 222 and the supply opening 210a melts.

[0054] Next, the structure of the lid unit 220 shall be described in detail.

[0055] FIG. 8 is a perspective view illustrating the external appearance of the lid unit 220.

[0056] FIG. 9A and 9B are planar views illustrating the structure of the lid unit 220.

[0057] As illustrated in these drawings, the lid unit 220 includes, in addition to the shaft 221 and the lid 222, a biasing member 223 and a stopper 224.

[0058] The biasing member 223 is a member for connecting the shaft 221 with the lid 222, and for giving a biasing force to the lid 222 in the closing direction for closing the supply opening 210a. More specifically, an end of the biasing member 223 is fixed to the shaft 221, and the other end of the biasing member 223 is fixed with the lid 222 through the stopper 224. More specifically, the biasing member 223 is a torsion spring.

[0059] The stopper 224 is fixed to the other end of the biasing member 223 and the shaft 221, and is a portion for regulating the swing of the lid 222 around the shaft 221 by the biasing member 223. More specifically, the stopper 224 is arranged such that the lid 222 swings only within the range a illustrated in FIG. 9A. Here, a is 5mm, for example.

[0060] Here, FIG. 9A illustrates the lid unit 220 with the lid 222 opening the supply opening 210a, and FIG. 9B illustrates the lid unit 220 with the lid 222 closing the supply opening 210a. More specifically, in the lid unit 220 illustrated in FIG. 9B, the biasing member 223 provides a biasing force in the closing direction for causing the lid 222 to close the supply opening 210a (downward in FIG. 9B).

[0061] Next, the opening and closing of the lid unit 220 shall be specifically described.

[0062] FIGS. 10A and 10B are for describing the opening and closing of the lid unit 220. More specifically, FIG. 10A illustrates the open state of the lid unit 220, and FIG. 10B illustrates the closed state of the lid unit 220.

[0063] First, as illustrated in FIG. 10A, the lid 222 opens the supply opening 210a by the rotation of the shaft 221 (rotates clockwise in FIG. 10A) caused by the driving of the driver unit 260 by the control unit 270. The biasing member 223 and the stopper 224 in the open state are arranged in a state illustrated in FIG. 9A with respect to the lid 222. More specifically, no biasing force by the biasing member 223 is provided for the lid 222.

[0064] As illustrated in FIG. 10B, the lid 222 closes the supply opening 210a by the rotation of the shaft 221 (rotates counterclockwise in FIG. 10B) caused by the driving of the driver unit 260 by the control unit 270. The biasing member 223 and the stopper 224 in this closed state are arranged as illustrated in FIG. 9B with respect to the lid 222. More specifically, the biasing member 223 provides a biasing force to the lid 222 in the closing direction for closing the supply opening 210a.

[0065] More specifically, first, from the state illustrated in FIG. 10A, the lid 222 closes the supply opening 210a with the state illustrated in FIG. 9A by the rotation of the shaft 221. Furthermore, by the rotation of the shaft 221, the stopper 224 swings around the shaft 221, and the biasing member 223 and the stopper 224 are arranged in the state illustrated in FIG. 9B.

[0066] FIGS. 11A and 11B are for describing the closing of the lid unit 220 when ice is stuck. More specifically, FIG. 11A illustrates the closed state of the lid unit 220 when ice is stuck, and FIG. 11B illustrates the closed state of the lid unit 220 after the ice melts.

[0067] First, as illustrated in FIG. 11A, the shaft 221 rotates from the state illustrated in FIG. 10A (rotates counterclockwise in FIG. 11A). Subsequently, with the ice Q stuck between the lid 222 and the supply opening 210a, the lid 222 closes the supply opening 210a in the state illustrated in FIG. 9A.

[0068] Furthermore, by the rotation of the shaft 221, the stopper 224 swings around the shaft 221, and the biasing member 223 and the stopper 224 are arranged in the state illustrated in FIG. 9B. More specifically, the biasing member 223 provides a biasing force to the lid 222 in the closing direction for closing the supply opening 210a.

[0069] Here, even though the ice Q is still stuck between the lid 222 and the supply opening 210a, the driving of the driver unit 260 by the control unit 270 stops in this state. Accordingly, the rotation of the shaft 221 stops at a position with the ice Q stuck.

[0070] Next, as illustrated in FIG. 11B, when the ice Q stuck melts, the lid 222 closes the supply opening 210a by the biasing member 223. More specifically, by the biasing force in the closing direction to the lid 222 by the biasing member 223 allows the lid 222 to swing around the shaft 221 as the stuck ice Q melts. The lid 222 is arranged in the state illustrated in FIG. 9A with respect to the biasing member 223 and the stopper 224, completely closing the supply opening 210a.

[0071] As described above, in a state in which the driver unit 260 stops and the shaft 221 is fixed, the biasing member 223 provides, to the lid 222, a biasing force in the closing direction for closing the supply opening 210a. Accordingly, even if the ice is stuck between the supply opening 210a and the lid 222, the lid 222 closes the supply opening 210a by the biasing force of the biasing member 223 once the ice melts. Furthermore, here, no electric power for the lid 222 to close the supply opening 210a is necessary.

[0072] Here, the range of swing by the lid 222 is the range a illustrated in FIG. 9A. Thus, depending on the size of ice being stuck, the lid 222 may not be able to completely close the supply opening 210a.

[0073] Accordingly, the control unit 270 causes the driver unit 260 to rotate the shaft 221 such that the lid 222 closes the supply opening 210a at a predetermined time interval. This allows the lid 222 to completely close the supply opening 210a.

[0074] The control unit 270 causes the driver unit 260 to rotate the shaft 221 at the predetermined time interval, instead of continuously driving the driver unit 260 to rotate the shaft 221. Therefore, extra power consumption can be suppressed.

[0075] Accordingly, even when ice is stuck between the supply opening 210a and the lid 222, the lid 222 can be completely closed while suppressing extra power consumption.

[0076] Although only an exemplary embodiment of the refrigerator according to the present invention have been described in detail above, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention.

[0077] Accordingly, all such modifications are intended to be included within the scope of this invention.

[0078] For example, in this Embodiment, the biasing member 223 is a torsion spring. However, the biasing member 223 is not limited to the torsion spring.

[0079] FIG. 12 illustrates a biasing member according to a variation of Embodiment.

[0080] As illustrated in FIG. 12, the lid unit 220 includes a biasing member 223a instead of the biasing member 223 illustrated in FIG. 8. Here, the biasing member 223a is a tabular leaf spring. An end of the biasing member 223a is fixed to the shaft 221, and the other end of the biasing member 223a is fixed to the lid 222. With this, the biasing member 223a can provide a biasing force to the lid 222 in the closing direction for closing the supply opening 210a. In this case, as illustrated in FIG. 9A, the swing of the lid 222 is not regulated by the stopper 224. Thus, even when a relatively large ice is stuck, the lid 222 can completely close the supply opening 210a.

[Industrial Applicability]

[0081] The present invention is applicable to a refrigerator.

[Reference Signs List]

[0082]

100 Refrigerator
111 First door
112 Third door
113 Through hole
121 Second door
122 Fourth door
123 Receiving space
150 Heat-insulating main body
151 First storage compartment
152 Second storage compartment
153 Partition
200 Ice dispenser
210 Supply pipe
210a Supply opening
220 Lid unit
221 Shaft
222 Lid
223 Biasing member
224 Stopper
240 Lever
250 Serving unit
260 Driver unit
270 Control unit
300 Cover

Claims

1. A refrigerator comprising
an ice dispenser for supplying ice,
wherein said ice dispenser includes:

a supply opening which is an outlet for supplying ice;
a lid unit including a shaft and a lid which closes said supply opening through rotation of said shaft; and
a driver unit configured to rotate said shaft,
said driver unit fixes said shaft so as to prevent said shaft from rotating, when said driver unit stops the rotation of said shaft, and
said lid unit further includes a biasing member which connects said shaft and said lid and provides said lid with a biasing force in a closing direction for closing said supply opening.

2. The refrigerator according to Claim 1, further comprising
a control unit configured to cause said driver unit to rotate said shaft at a predetermined interval such that said lid closes said supply opening.

3. An ice dispenser for supplying ice, comprising:

a supply opening which is an outlet for supplying ice;
a lid unit including a shaft and a lid which closes said supply opening through rotation of said shaft; and
a driver unit configured to rotate said shaft,
wherein said driver unit fixes said shaft so as to prevent said shaft from rotating, when said driver unit stops the rotation of said shaft, and
said lid unit further includes a biasing member which connects said shaft and said lid and provides said lid with a biasing force in a closing direction for closing said supply opening.

FIG. 1

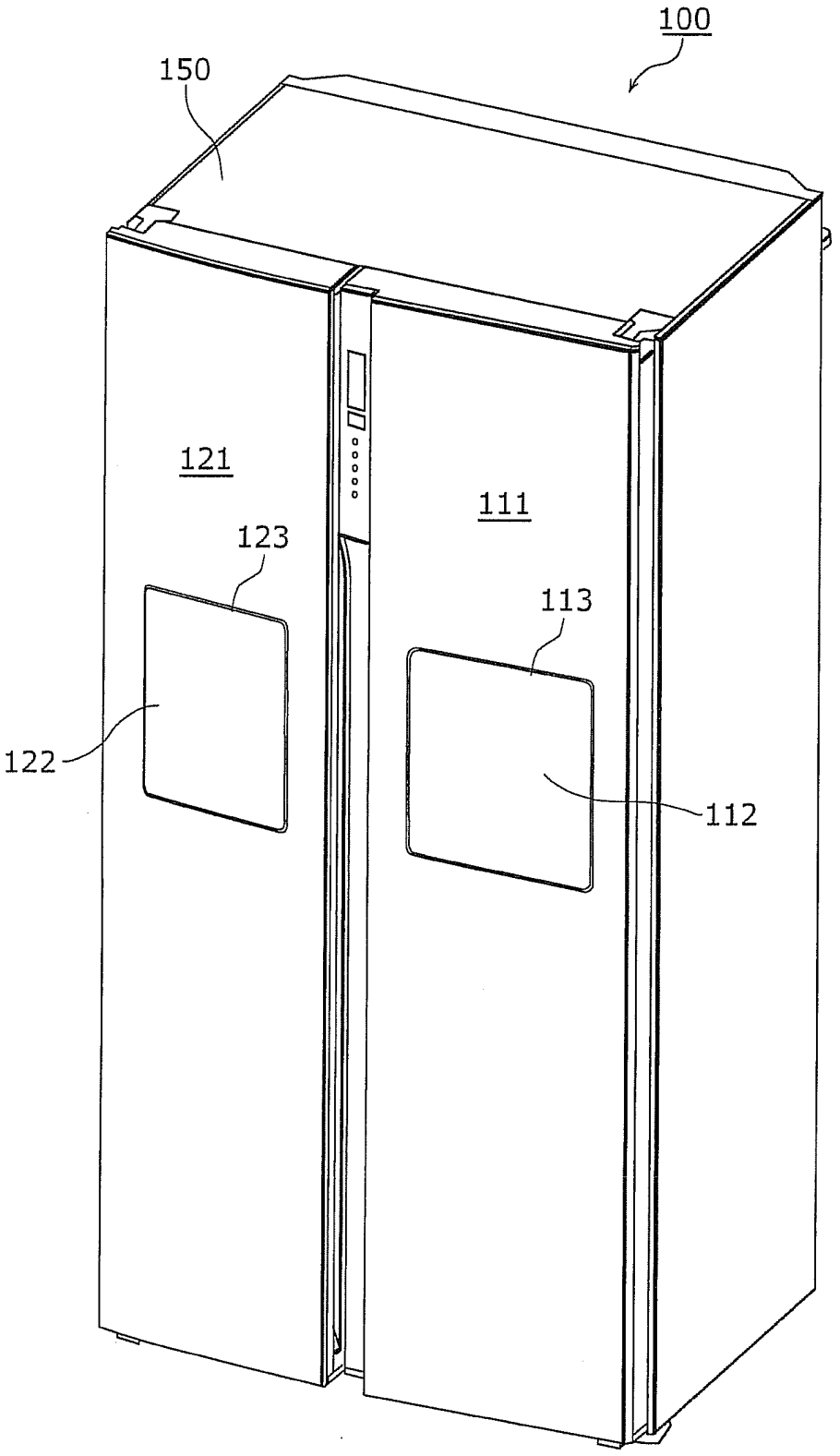


FIG. 2

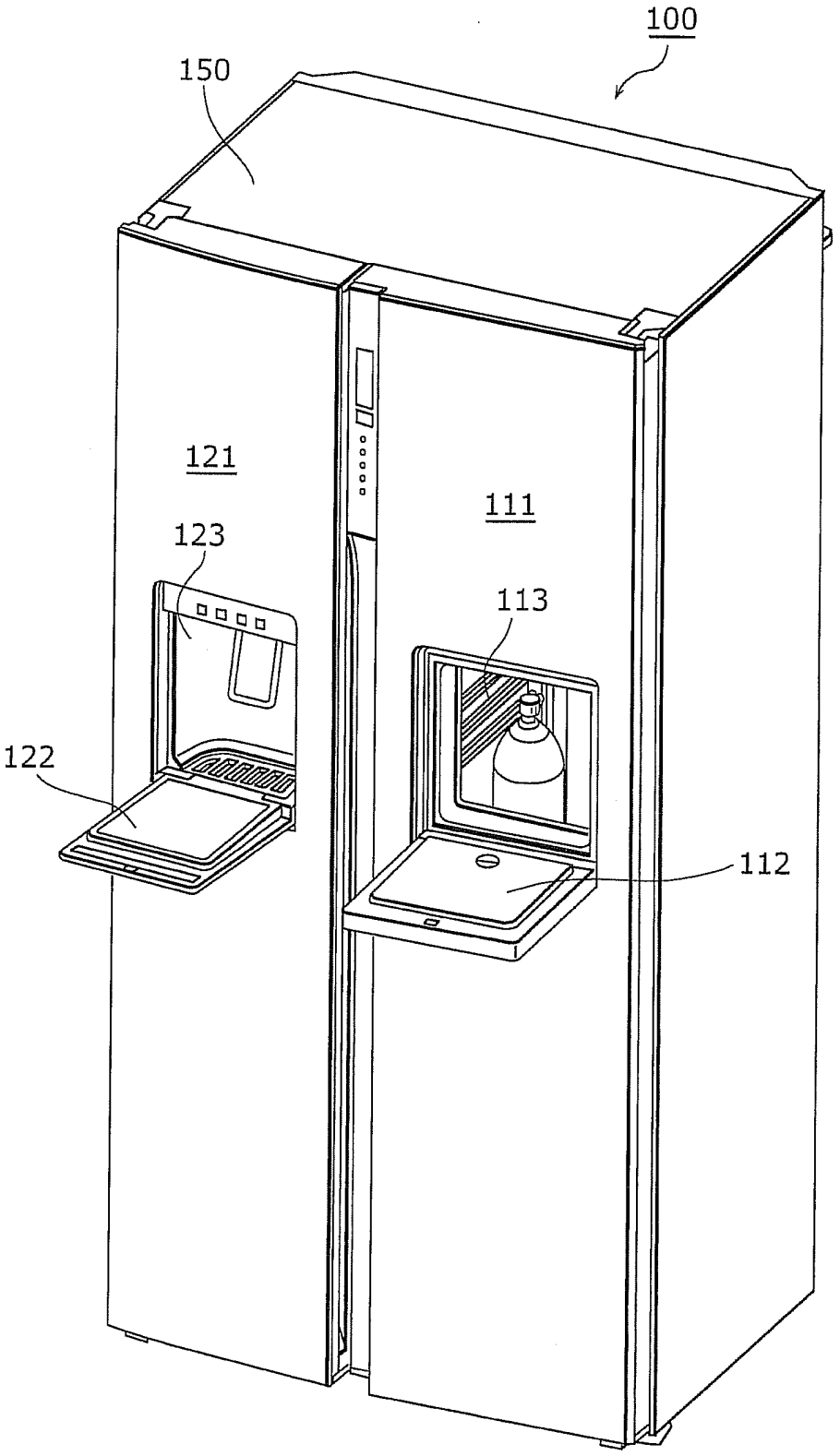


FIG. 3

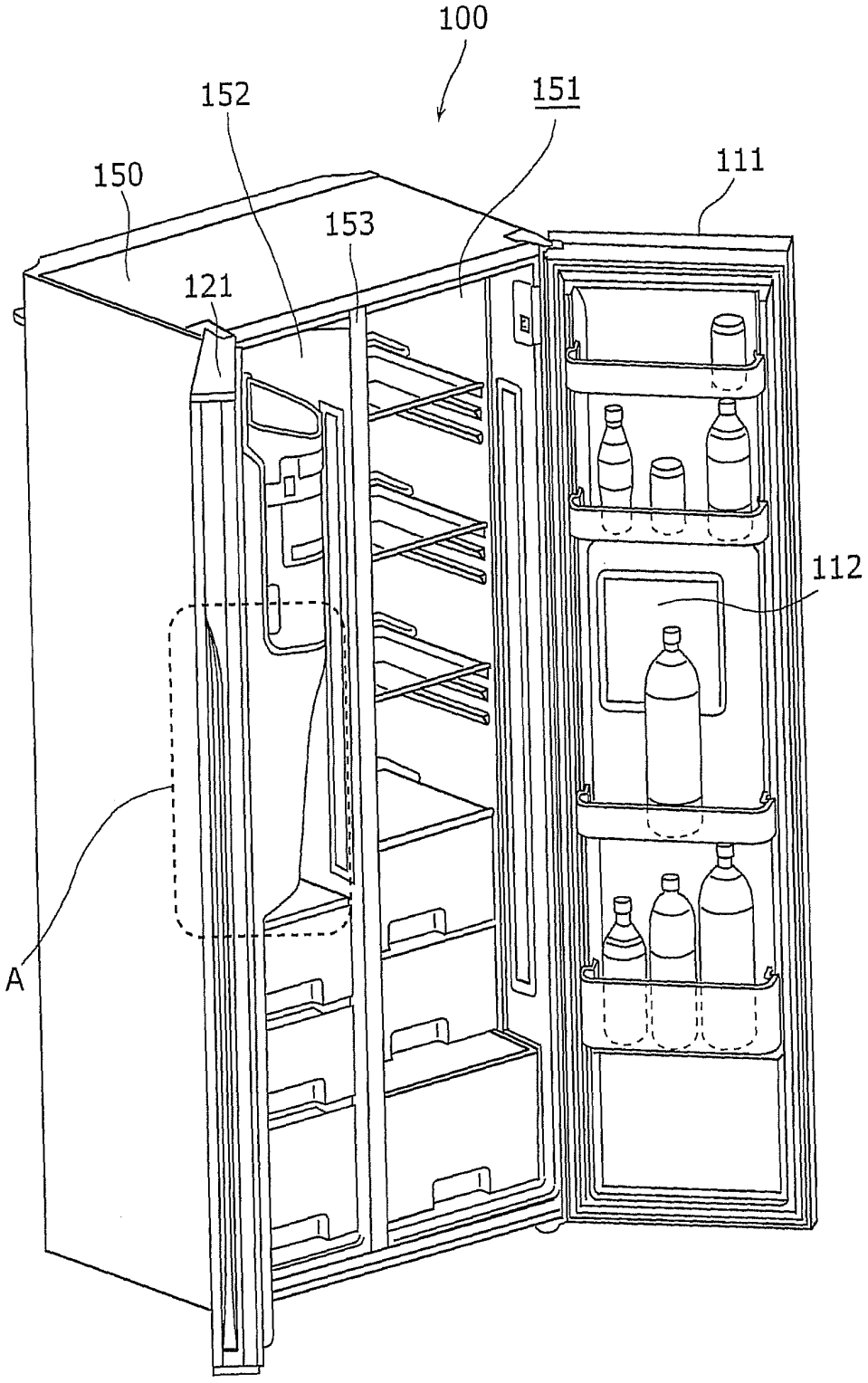


FIG. 4

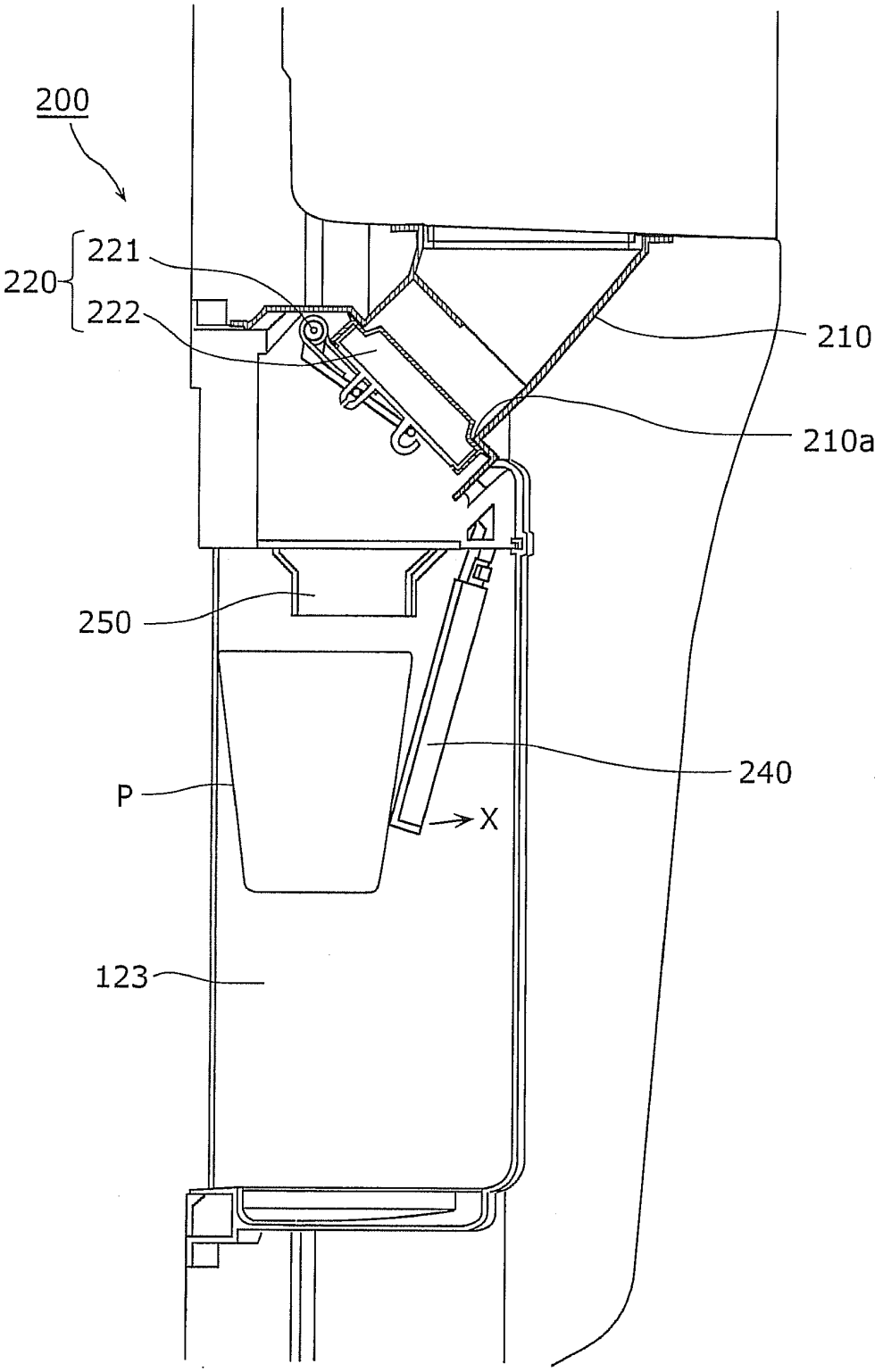


FIG. 5

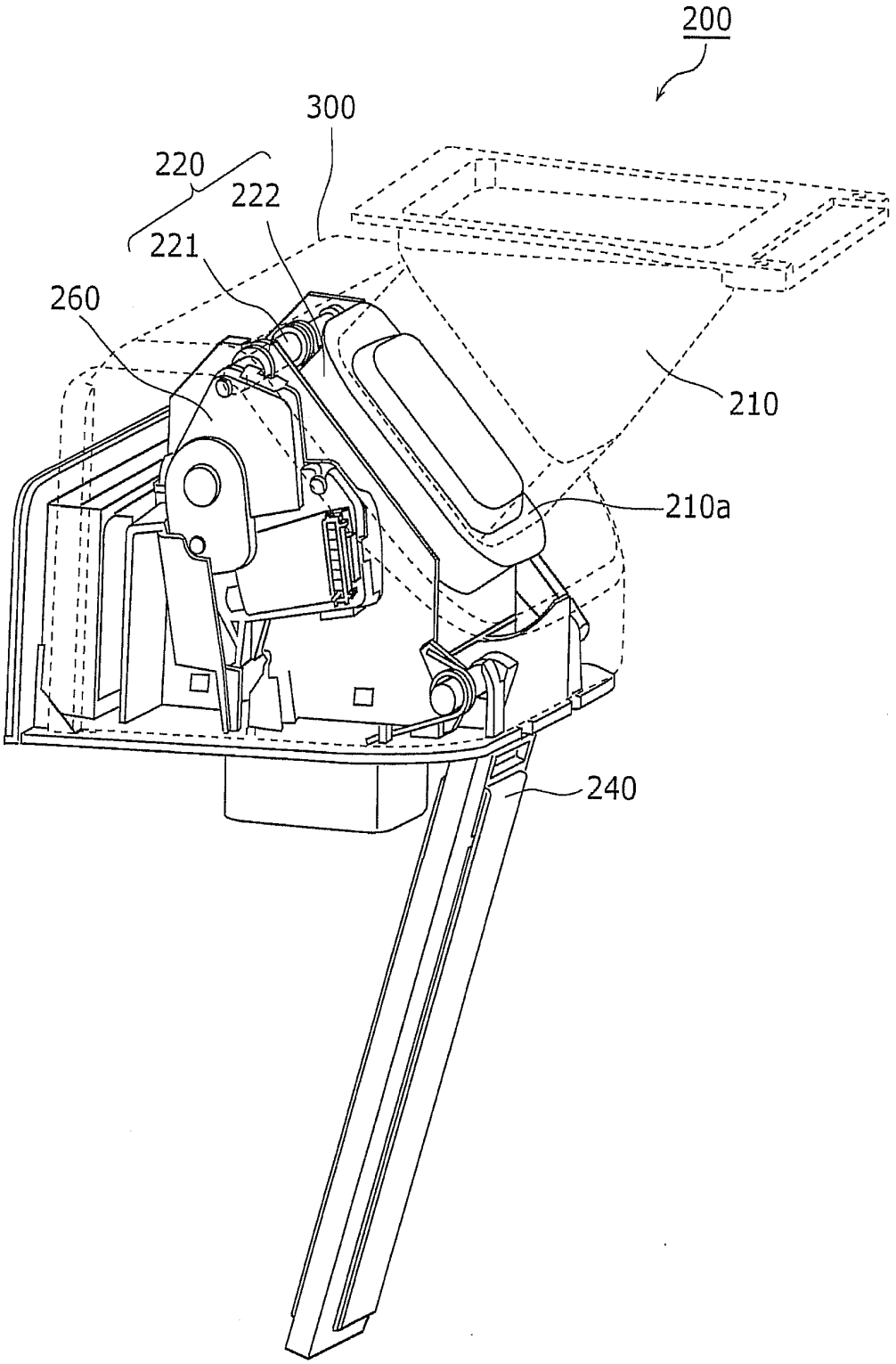


FIG. 6

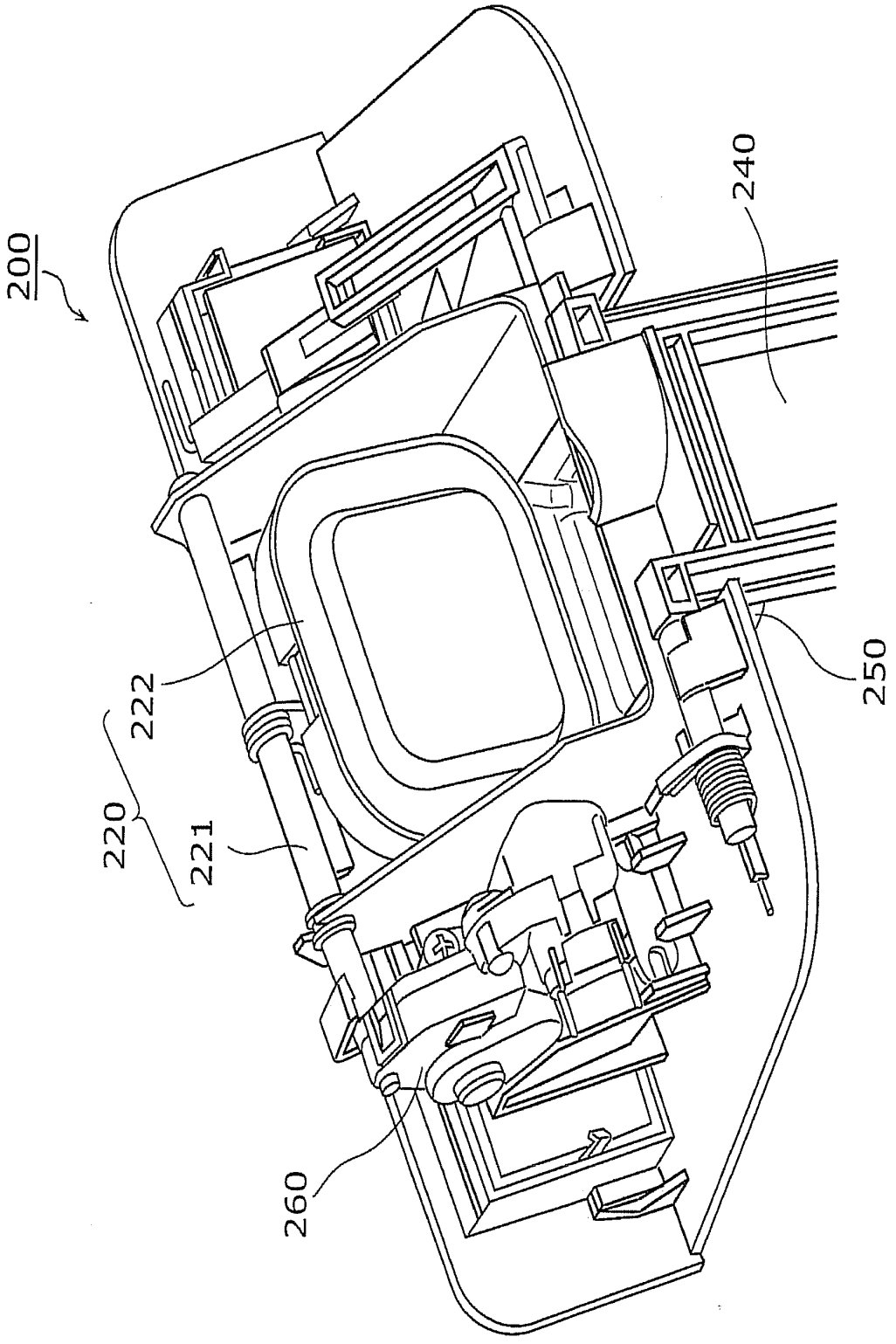


FIG. 7

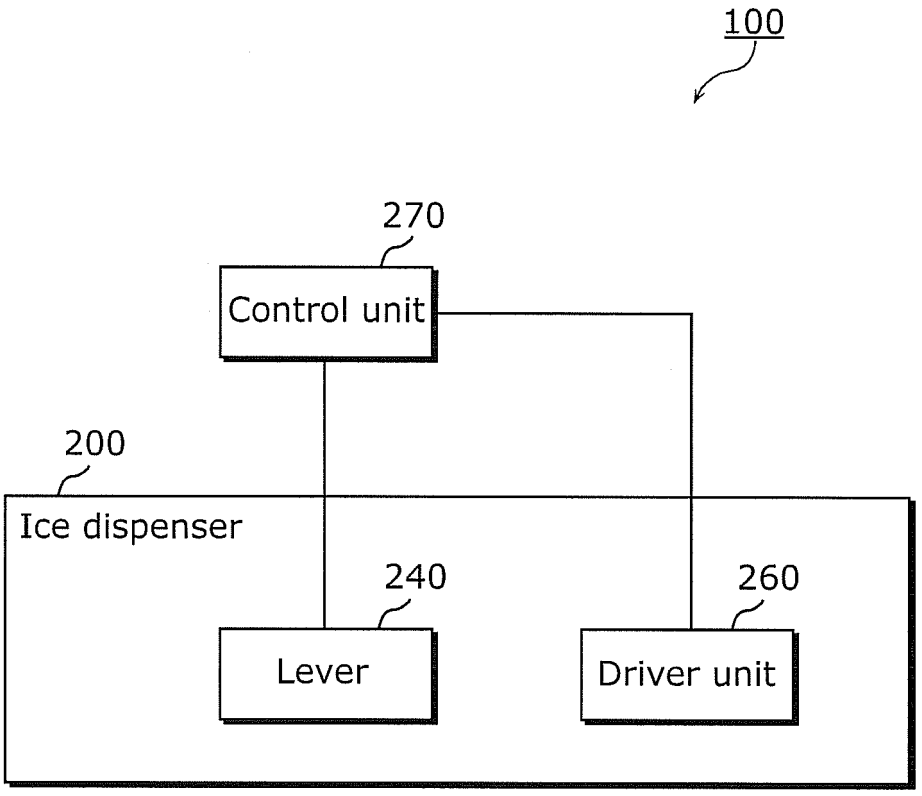

100
270
Control unit
200
Ice dispenser
240
Lever
260
Driver unit

FIG. 8

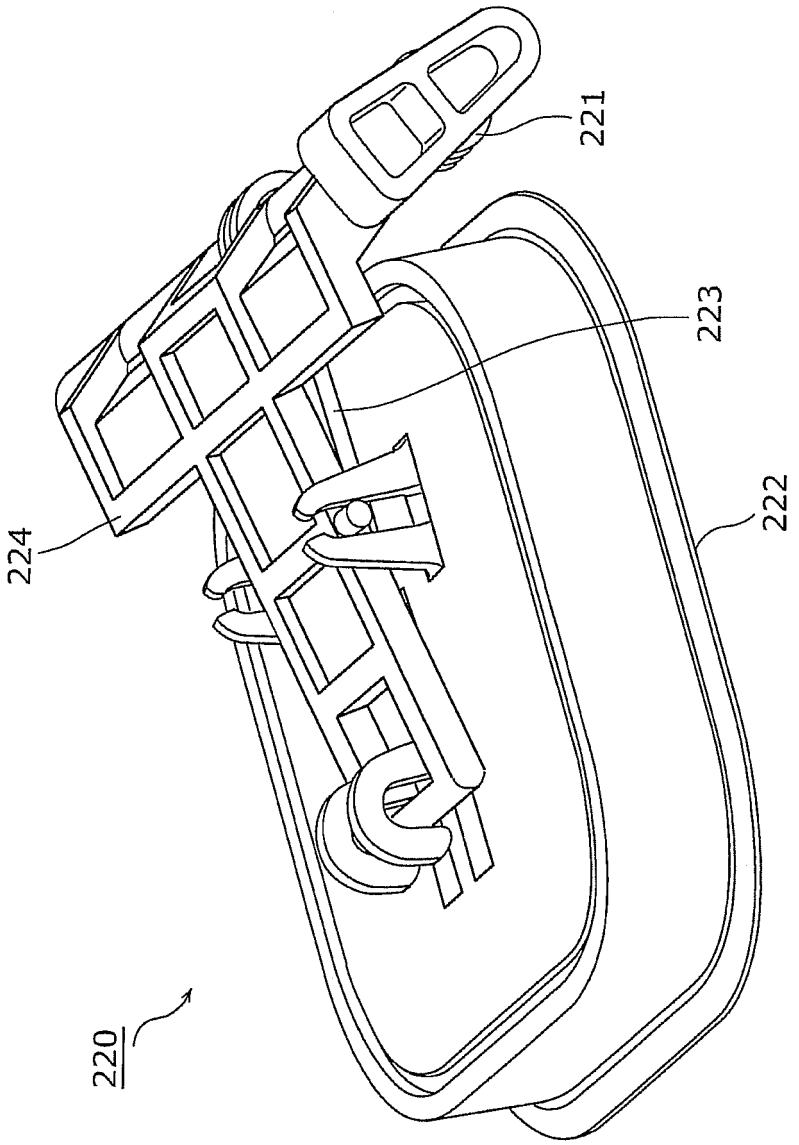


FIG. 9A

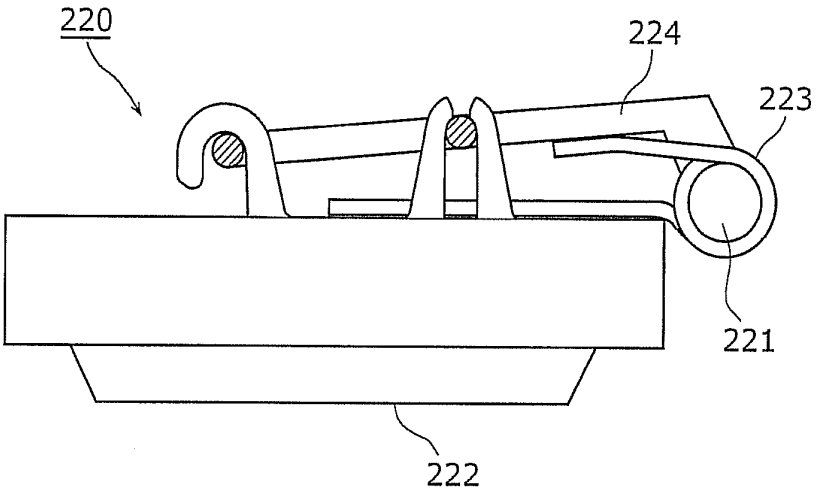


FIG. 9B

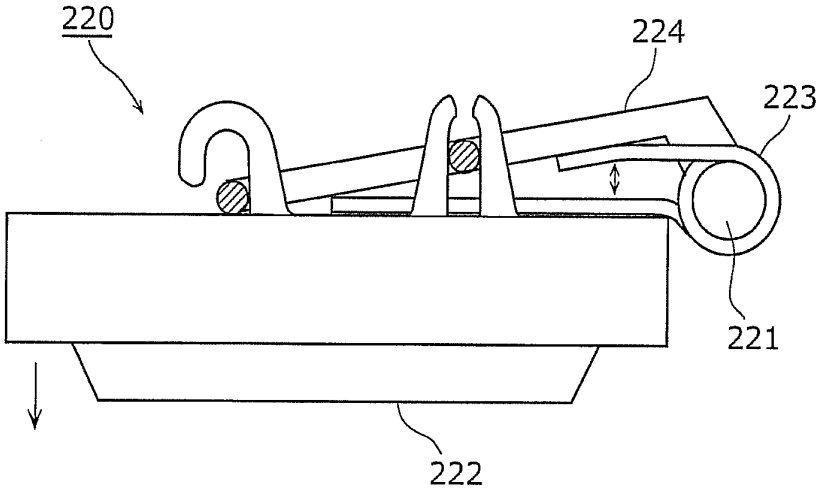


FIG. 10A

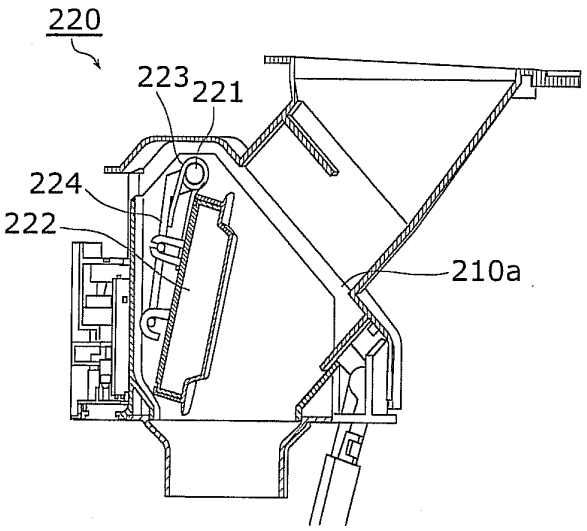


FIG. 10B

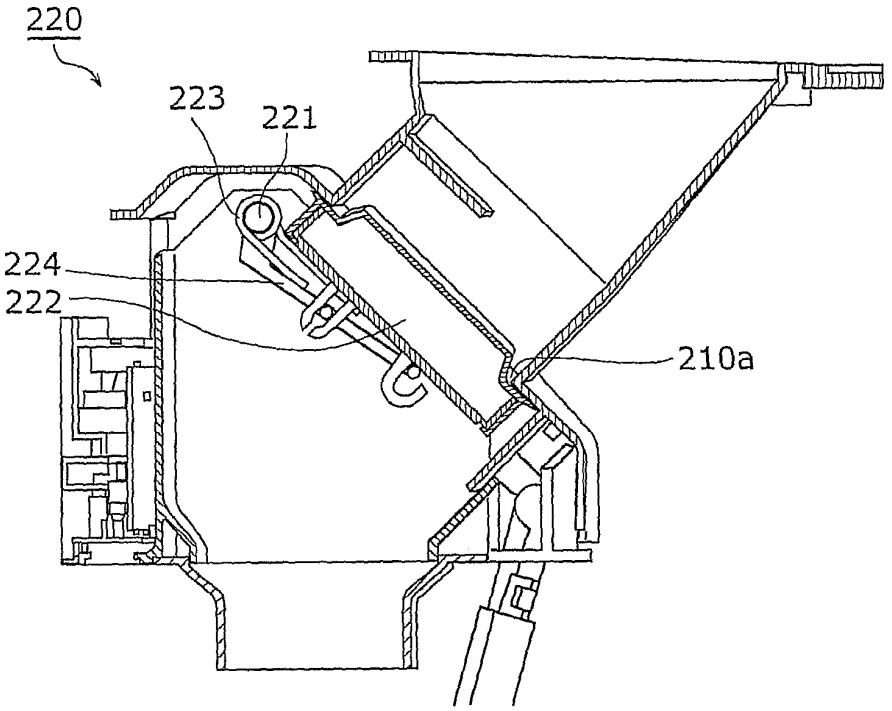


FIG. 11A

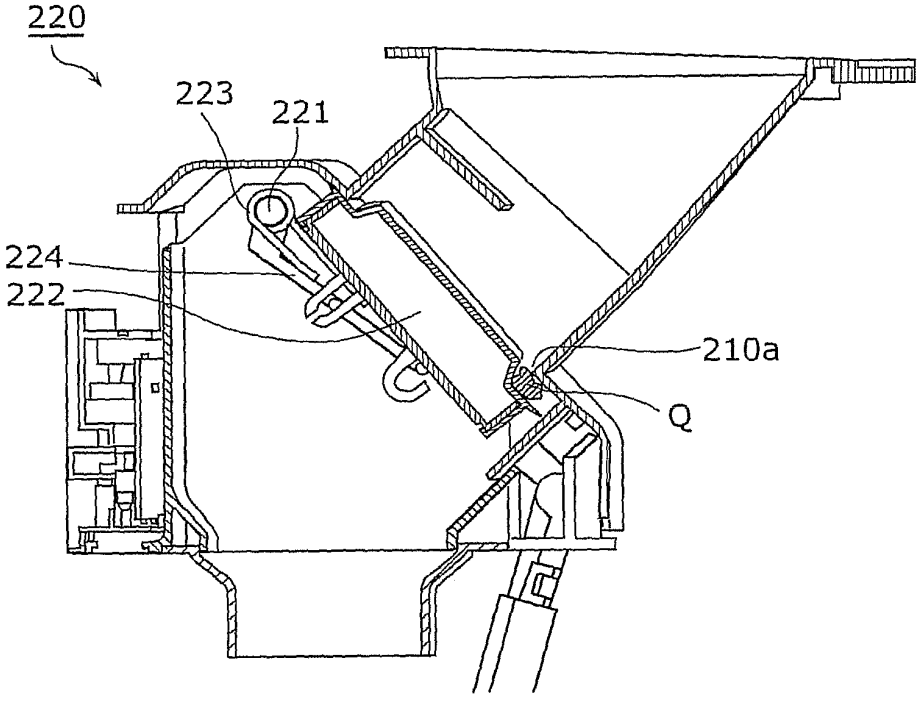


FIG. 11B

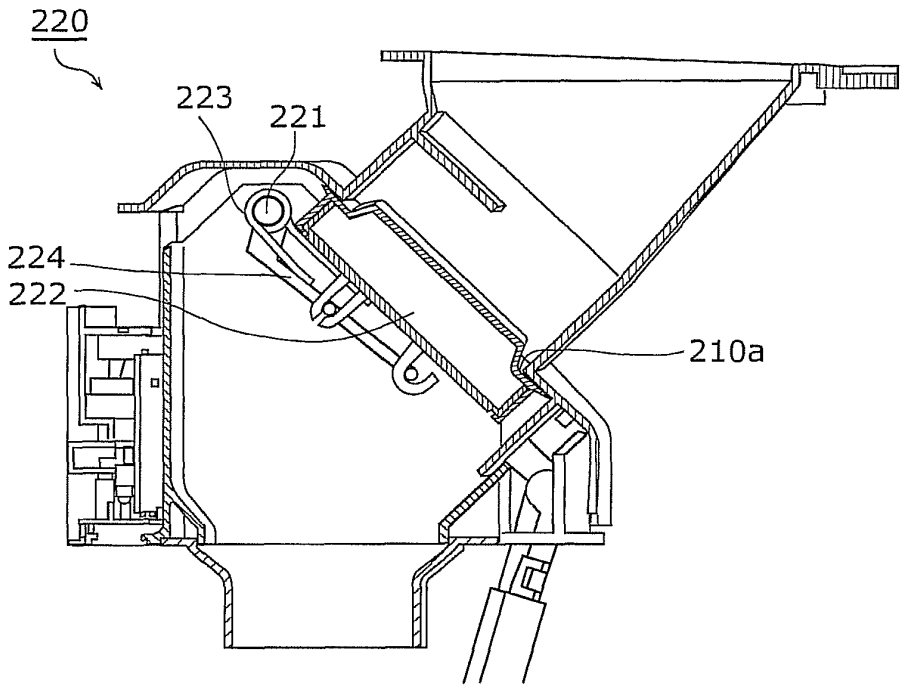
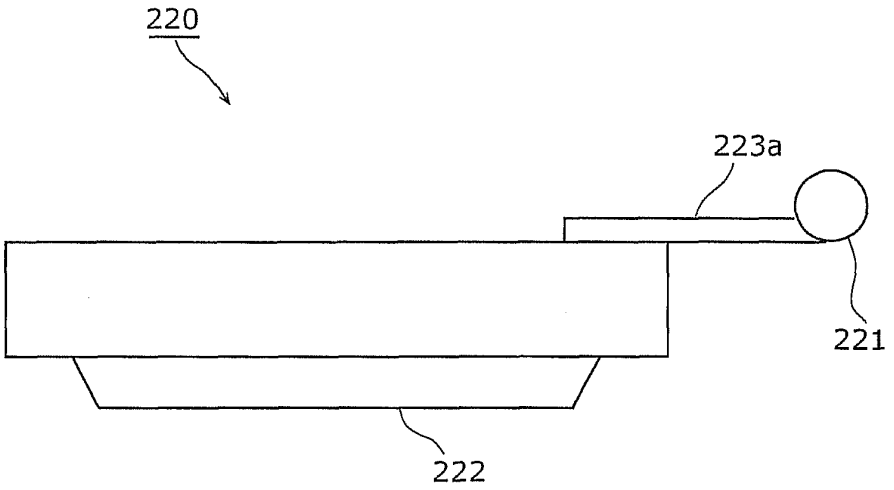


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/001441

A. CLASSIFICATION OF SUBJECT MATTER
F25C5/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F25C5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010
Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 06-201240 A (White Consolidated Industries, Inc.), 19 July 1994 (19.07.1994), paragraphs [0036] to [0038]; fig. 8, 9 & US 5442933 A & US 5473911 A & US 5474213 A & US 5526854 A & NZ 248935 A & AU 5030493 A & CA 2108620 A & KR 10-0144443 B & CA 2108620 A1	1-3
A	JP 2006-084157 A (Hoshizaki Electric Co., Ltd.), 30 March 2006 (30.03.2006), paragraphs [0019] to [0021]; fig. 1 to 4 (Family: none)	1-3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 March, 2010 (26.03.10)	13 April, 2010 (13.04.10)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/001441

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6267272 B1 (SAMGSUNG ELECTRONICS CO., LTD.), 31 July 2001 (31.07.2001), entire text; fig. 2, 3, 6, 7 & EP 1081448 A3 & DE 60024009 D & DE 60024009 T & KR 20-0170259 Y & KR 10-2001-0029590 A & KR 20-0170259 Y1	1-3
A	US 4089436 A (WHIRLPOOL CO.), 16 May 1978 (16.05.1978), column 3, line 1 to column 6, line 12; all drawings (Family: none)	1-3

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H11287550 B **[0004]**