



(11) **EP 2 405 214 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.01.2012 Bulletin 2012/02

(51) Int Cl.:
F25C 5/00 (2006.01)

(21) Application number: **10748515.3**

(86) International application number:
PCT/JP2010/001455

(22) Date of filing: **03.03.2010**

(87) International publication number:
WO 2010/100916 (10.09.2010 Gazette 2010/36)

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

(72) Inventor: **KURITA, Junichi**
Chuo-ku, Osaka-shi
Osaka 540-6207 (JP)

(30) Priority: **05.03.2009 JP 2009052697**

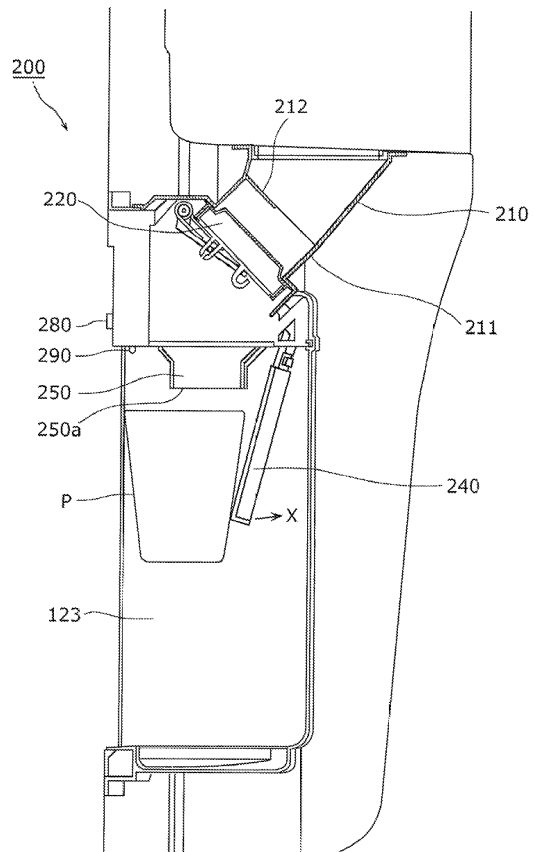
(74) Representative: **Trösch, Hans-Ludwig**
Eisenführ, Speiser & Partner
Postfach 31 02 60
80102 München (DE)

(71) Applicant: **Panasonic Corporation**
Kadoma-shi
Osaka 571-8501 (JP)

(54) **REFRIGERATOR**

(57) A refrigerator having an ice dispenser capable of preventing the ice from falling off of the side of the cup when the user puts the ice into the cup is provided. A refrigerator (100) includes an ice dispenser (200) for supplying ice, in which the ice dispenser (200) includes: a serving opening (250a) for serving the ice to outside of the ice dispenser (200); and a guide (211) having a flat surface for guiding the ice to the serving opening (250a).

FIG. 4



EP 2 405 214 A1

Description

[Technical Field]

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

[Background Art]

[0002] In recent years, refrigerators with ice dispenser for supplying ice have been introduced to the market (for example, see Patent Literature 1). The ice dispenser includes a supply pipe which is a supply path for ice. The ice dispenser supplies the user with the ice made by the ice maker through the path in the supply pipe.

[0003] Here, the cup which the user uses for keeping the ice generally has a circular opening at the top. Thus, conventionally, the cross-sectional shape of the supply pipe in the ice dispenser is circular, corresponding to the shape of the opening of the cup.

[Citation List]

[Patent Literature]

[0004]

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

[Summary of Invention]

[Technical Problem]

[0005] However, with the ice dispenser in the conventional refrigerator, there is a problem that the ice falls off of the side of the cup when the user puts the ice into the cup.

[0006] More specifically, since the cross-sectional shape of the supply pipe in the conventional ice dispenser is circular, sometimes the ice falls down the supply pipe in spiral. In this case, when the ice is served from the supply pipe, there is a case in which the ice moves toward the centrifugal direction by the centrifugal force, falling off of the side of the cup.

[0007] The present invention has been conceived in response to the problem, and it is an object of the present invention to provide a refrigerator having an ice dispenser capable of preventing the ice from falling off of the side of the cup when the user puts the ice into the cup.

[Solution to Problem]

[0008] 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 serving opening for serving the

ice to outside of the ice dispenser; and a guide having a flat surface for guiding the ice to the serving opening.

[0009] With this, the supplied ice slips along the flat surface of the guide. Accordingly, when the ice is served from the serving opening, the ice does not fall out of the cup by centrifugal force and others. Accordingly, when the user puts the ice into the cup, it is possible to prevent the ice from falling off of the side of the cup.

[0010] Furthermore, it is preferable that the serving opening is a circular opening.

[0011] Accordingly, the serving opening for serving the ice is the circular opening. Since the serving opening is circular corresponding to the shape of the opening of the cup, it is possible to prevent the ice from falling off of the cup when the user puts the ice into the cup.

[0012] Furthermore, it is preferable that the ice dispenser further includes a baffle provided downward above the guide at a predetermined distance from the guide.

[0013] With this, the baffle is arranged at the top portion of the supply pipe. Accordingly, even if the user inserts his hand inside the supply pipe for example, it is possible to prevent the hand from touching devices above the supply pipe.

[0014] Furthermore, it is preferable that the ice dispenser further includes: a serving unit composed of a light-transmissive material and forming the serving opening; and a lighting apparatus for lighting up the serving opening through the serving unit.

[0015] With this, the lighting apparatus such as LED is arranged, lighting up the serving opening. This helps the user to check the serving opening which is an outlet of the ice, preventing the ice from falling off of the cup when the user puts the ice into the cup.

[0016] Furthermore, it is preferable that the ice dispenser further includes a reflective member for covering the serving unit at a predetermined distance from the serving unit, and for reflecting light emitted by the lighting apparatus toward the serving unit.

[0017] With this, the light emitted from the lighting apparatus such as LED is reflected on the reflective member, thereby the reflected light lighting up the serving opening. Accordingly, the light on the serving opening is brighter than the light when the lighting apparatus directly lights up the serving opening. This makes it easier for the user to check the serving opening which is the outlet of the ice more easily, preventing the ice from falling off of the side of the cup when the user puts the ice into the cup.

[0018] Note that, the present invention can not only be implemented as a refrigerator with the ice dispenser, but also as an ice dispenser.

[Advantageous Effects of Invention]

[0019] The present invention provides a refrigerator including an ice dispenser capable of preventing the ice from falling off of a side of a cup when the user put the

ice into the cup. Therefore, the present invention is very highly practical.

[Brief Description of Drawings]

[0020]

[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 according to Embodiment 1.

[FIG. 5] FIG. 5 is a cross-sectional view illustrating the structure of an ice dispenser according to Embodiment 1.

[FIG. 6] FIG. 6 is a cross-sectional view illustrating the structure of an ice dispenser according to Embodiment 2.

[FIG. 7] FIG. 7 is a cross-sectional view illustrating the structure of a serving unit and a reflective member according to Embodiment 2.

[FIG. 8] FIG. 8 is a cross-sectional view illustrating the structure of a serving unit and a reflective member according to Embodiment 2.

[FIG. 9] FIG. 9 is a cross-sectional view illustrating the structure of an ice dispenser according to Embodiment 2.

[Description of Embodiments]

(Embodiment 1)

[0021] The following shall describe Embodiment 1 of a refrigerator according to the present invention with reference to the drawings.

[0022] FIG. 1 is a perspective view illustrating the external appearance of the refrigerator.

[0023] FIG. 2 is a perspective view illustrating the external appearance of the refrigerator with the third door and the fourth door open.

[0024] 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.

[0025] The heat-insulating main body 150 is a box with an opening at the front face, and has heat-insulating property blocking the heat exchange between the inside and the outside of the refrigerator 100.

[0026] The first door 111 is a door freely opens and closes at an opening on the user's right when facing the heat-insulating main body 150. In Embodiment 1, 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 wall on the right 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.

[0027] The second door 121 is a door freely opens and closes at an opening on the user's left when facing the heat-insulating main body 150. In Embodiment 1, the second door 121 is attached to the heat-insulating main body 150 by a hinge (not illustrated) such that the second door 121 swings around an axis extending in the vertical direction at the front of the wall on the left 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.

[0028] The through hole 113 is a hole passing through the first door 111 in the thickness direction. The through hole 113 is for the user to take out storage items stored behind the first door 111, and to store items behind the first door 111, without opening the first door 111.

[0029] The third door 112 is a door freely opening and closing at the through hole 113. In Embodiment 1, 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 view from front (with rounded corners), and the axis passes through the lower end portion of the third door 112.

[0030] 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 of the receiving space 123, an opening through the front face of the second door 121 in the thickness direction is formed.

[0031] More specifically, the fourth door 122 is a door which freely opens and closes at the front of the receiving space 123. In Embodiment 1, 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 laterally extending 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.

[0032] FIG. 3 is a perspective view illustrating the external appearance of the refrigerator with the first door and the second door open.

[0033] As illustrated in FIG. 3, the refrigerator 100 includes a partition 153.

[0034] The partition 153 is a wall laterally partitioning the inside of the heat-insulating main body 150. In Embodiment 1, a first storage compartment 151 is inside the heat-insulating main body 150 on the right side of the partition 153, 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.

[0035] 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, which is the freezer compartment.

[0036] The following shall describe the details of the ice dispenser.

[0037] FIG. 4 is a cross-sectional view illustrating the structure of the ice dispenser 200 according to Embodiment 1. 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.

[0038] As illustrated in FIG. 4, the ice dispenser 200 is an apparatus for supplying ice that is made, and includes a supply pipe 210, a lid 220, a lever 240, a serving unit 250, a switch 280, and a lighting apparatus 290.

[0039] The supply pipe 210 is a pipe forming a supply path for supplying the user with the ice made by an ice maker (not illustrated) provided above, and is rectangular in cross-section. The supply pipe 210 includes a guide 211 and a baffle 212.

[0040] The guide 211 has a flat surface guiding the ice that is made to the serving unit 250. More specifically, the guide 211 is a part of the supply pipe 210, and is a tabular member forming a bottom face portion of the supply path. In other words, the ice made by the ice maker is supplied to the serving unit 250 by slipping on the flat surface along the flat top face of the guide 211.

[0041] The baffle 212 is arranged downward above the guide 211 at a predetermined distance from the guide 211. More specifically, the baffle 212 is a tabular member and arranged partitioning a top half of the supply path in the supply pipe 210. The ice made by the ice maker is supplied to the serving unit 250 by slipping off the space between the baffle 212 and the guide 211 below the baffle 212.

[0042] The lid 220 is a lid closing the opening of the supply pipe 210. More specifically, the lid 220 opens and closes the outlet of the supply pipe 210 through the rotation of the shaft at the top. The lid 220 is rectangular, corresponding to the rectangular shape of the exit of the supply pipe 210.

[0043] The lever 240 is a part for rotating the shaft of the lid 220 such that the lid 220 opens and closes the exit of the supply pipe 210. More specifically, when the user wishes to supply the cup P with the ice, the user inserts the cup P into the receiving space 123, and presses the lever 240 into the X direction with the cup P. Here, the lower end portion of the lever 240 is pressed into the X direction, and thus the lever 240 swings in the X direction with the top end portion as the center. When the lever

240 swings to a predetermined angle, the lid 220 opens the exit of the supply pipe 210.

[0044] When the cup P is supplied with ice and the user takes the cup P out of the receiving space 123, the lever 240 is turned back to the original position. Subsequently, when the lever 240 is turned back to the original position, the lever 240 is released from the position at the predetermined angle, and the lid 220 closes the opening of the supply pipe 210.

[0045] The serving unit 250 serves the ice supplied from the supply pipe 210. The ice supplied from the serving unit 250 is supplied into the cup P of the user. The serving unit 250 includes a serving opening 250a.

[0046] The serving opening 250a is an exit of the serving unit 250. More specifically, the serving opening 250a is an outlet for the ice serving the ice to outside of the ice dispenser 200. Furthermore, the serving opening 250a is a circular opening. More specifically, the guide 211 guides the ice to the serving opening 250a through the supply path in the supply pipe 210.

[0047] The lighting apparatus 290 directly lights up the serving opening 250a from above. The lighting apparatus 290 is arranged above the serving opening 250a at the top portion of the front face of the receiving space 123. The lighting apparatus 290 is, for example, an LED. More specifically, when the user wishes to supply the cup P with the ice, the lighting apparatus 290 lights up the serving opening 250a.

[0048] The switch 280 is a switch for operating the ice dispenser 200. The switch 280 is arranged above the front face of the receiving space 123 to facilitate the operation by the user. More specifically, the switch 280 includes multiple switches such as a switch for lighting the lighting apparatus 290 and a switch for switching between ice supply and water supply.

[0049] FIG. 5 is a perspective view illustrating the structure of the ice dispenser according to Embodiment 1. Note that, for description purpose, the cover 300 covering the lid 220 and others is illustrated as transparent in dotted lines in FIG. 5.

[0050] As illustrated in FIG. 5, the ice dispenser 200 further includes a driver unit 260.

[0051] The driver unit 260 is a driver mechanism for opening and closing the lid 220. More specifically, the driver unit 260 rotates the shaft of the lid 220 such that the lid 220 swings around the shaft, opening and closing the lid 220 with respect to the exit of the supply pipe 210.

[0052] More specifically, the driver unit 260 is driven such that a rotation of the lever 240 to a predetermined angle opens the exit of the supply pipe 210 by the lid 220. Subsequently, the ice made by the ice maker slips off the guide 211 and, is provided to the serving unit 250 from the exit of the supply pipe 210. The ice supplied to the serving unit 250 is served from the serving opening 250a, supplied to the cup P of the user.

[0053] Furthermore, when the lever 240 is released from the position at the predetermined angle, the driver unit 260 is driven such that the lid 220 closes the opening

of the supply pipe 210. With this, the ice slipping off the guide 211 is stopped, stopping the serving of the ice from the serving opening 250a to the cup P.

[0054] As described above, since the guide 211 which is a bottom face portion of the supply pipe 210 has an upper face flat tabular surface, the supplied ice slips off the flat surface of the guide 211. Accordingly, when the ice is served from the supply pipe 210, the ice does not fall due to the centrifugal force, for example. Accordingly, when the user puts the ice into the cup, it is possible to prevent the ice from falling off of the side of the cup.

[0055] Furthermore, the serving opening 250a which is an outlet for serving the ice is a circular opening. Accordingly, since the serving opening 250a is circular corresponding to the shape of the opening of the cup, it is possible to prevent the ice from falling off of the side of the cup when the user puts the ice into the cup.

[0056] Furthermore, the lighting apparatus 290 lights up the serving opening 250a from above, preventing the ice from falling off of the side of the cup when the user puts the ice into the cup.

[0057] The baffle 212 is arranged at the top portion of the supply pipe 210. Accordingly, even if the user inserts his hand inside the supply pipe 210, it is possible to prevent the hand from touching the devices above the supply pipe 210.

(Embodiment 2)

[0058] Next, Embodiment 2 of the refrigerator according to the present invention shall be described. In Embodiment 1, the lighting apparatus 290 is arranged above the serving opening 250a at the top portion at the front of the receiving space 123, directly lighting up the serving opening 250a from above. However, in Embodiment 2, the lighting apparatus 290 lights up the serving opening 250a via the serving unit 250.

[0059] FIG. 6 is a perspective view illustrating the structure of the ice dispenser 200 according to Embodiment 2.

[0060] As illustrated in FIG. 6, the ice dispenser 200 includes a reflective member 270, in addition to the serving unit 250 and the switch 280 illustrated in FIG. 4. Here, the configuration differs from the ice dispenser 200 according to Embodiment 1 in that the ice dispenser 200 according to Embodiment 2 does not include a lever 240, includes the reflective member 270, and the lighting apparatus 290 is arranged at a different position.

[0061] Note that, in the ice dispenser 200 according to Embodiment 2, the lever 240 is not provided, and the lid 220 opens the exit of the supply pipe 210 by pressing the switch 280. However, in the same manner as the ice dispenser 200 according to Embodiment 1, the lever 240 may be included, and the lever 240 may causes the lid 220 to open the exit of the supply pipe 210.

[0062] Furthermore, in the ice dispenser 200 according to Embodiment 2, the serving unit 250 is composed of light-transmissive material. For example, the serving

unit 250 is made of a material made of transparent or translucent resin. Note that, the serving unit 250 may be composed of a light-transmissive material, and the material is not particularly limited. The light here is a light emitted by the lighting apparatus 290.

[0063] The reflective member 270 covers the serving unit 250 at a predetermined distance from the serving unit 250, and reflects the light emitted from the lighting apparatus 290 toward of the serving unit 250. For example, the reflective material 270 is a member made of metal or resin which reflects light. Note that, the reflective material 270 may be made of a material that reflects light, and the material is not particularly limited.

[0064] The following shall describe the structure of the serving unit 250 and the reflective member 270 in detail.

[0065] FIGS. 7 and 8 are perspective views illustrating the structure of the serving unit 250 and the reflective member 270 according to Embodiment 2. More specifically, FIG. 7 is a perspective view of the serving unit 250 and the reflective member 270 viewed from below, and FIG. 8 is a perspective view of the serving unit 250 and the reflective member 270 viewed from above.

[0066] As illustrated in these drawings, the reflective member 270 covers the serving unit 250 at a predetermined distance from the serving unit 250, and has an elliptic cross-section. The reflective member 270 has an inner face composed of light-reflecting material. The light here is a light emitted by the lighting apparatus 290.

[0067] The serving unit 250 has a circular cross-section at the lower portion of the serving unit 250, and has a rectangular cross-section at the upper portion. In other words, the serving opening 250a of the serving unit 250 is circular, and an entrance of the serving unit 250b is rectangular.

[0068] Accordingly, the upper portion of the serving unit 250 with a rectangular cross-section can serve as the guide 211 according to Embodiment 1. More specifically, when the supplied ice is served from the serving unit 250, it is possible to prevent the ice from falling by centrifugal force, for example.

[0069] Next, the position for arranging the lighting apparatus 290 shall be described.

[0070] FIG. 9 is a cross-sectional view illustrating the structure of the ice dispenser 200 according to Embodiment 2. More specifically, FIG. 9 illustrates a cross-sectional view of a lower portion of the ice dispenser 200 illustrated in FIG. 6 to illustrate a position for arranging the lighting apparatus 290.

[0071] As illustrated in FIG. 9, the lighting apparatus 290 is arranged between the serving unit 250 and the reflective member 270. The lighting apparatus 290 is, for example, an LED. The lighting apparatus 290 lights up the serving opening 250a via the serving unit 250.

[0072] More specifically, the user presses a switch for causing the lighting apparatus 290 to emit light among the switches 280, and the lighting apparatus 290 emits light. Subsequently, when the lighting apparatus 290 emits light, the emitted light reflects on the reflective

member 270. The reflected light transmits the serving unit 250 made of the light-transmissive material, lighting up the serving opening 250a.

[0073] According to the description above, the lighting apparatus 290 such as LED is arranged, and the lighting apparatus 290 lights up the serving opening 250a. More specifically, the lighting apparatus 290 is arranged between the serving unit 250 and the reflective member 270, and emits light. The light emitted from the lighting apparatus 290 reflects on the reflective member 270. Accordingly, lighting apparatus 290 lights up the serving opening 250a brighter, compared to a case in which the lighting apparatus 290 lights up the serving opening 250a directly. This makes it easier for the user to check the serving opening 250a which is the outlet of the ice more easily, preventing the ice from falling off of the side of the cup when the user puts the ice into the cup.

[0074] 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.

[0075] Accordingly, all such modifications are intended to be included within the scope of this invention.

[0076] For example, in Embodiments, the supply pipe 210 has a rectangular cross-section. However, the cross-sectional shape of the supply pipe 210 is not limited to rectangle, and may be in any shape as long as a flat surface guiding the ice to the serving opening 250a is included in the guide 211.

[0077] Furthermore, in Embodiments, the serving opening 250a is a circular opening. However, the serving opening 250a is not limited to circular, but may be rectangular, for example.

[0078] Furthermore, in Embodiments, the ice dispenser 200 includes a reflective member 270, and the light emitted from the lighting apparatus 290 reflects on the reflective member 270, lighting up the serving opening 250a. However, the ice dispenser 200 does not include the reflective member 270, and the lighting apparatus 290 may directly lights up the serving opening 250a through the serving unit 250 made of the light-transmissive material.

[Industrial Applicability]

[0079] The present invention is applicable to a refrigerator.

[Reference Signs List]

[0080]

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
211 Guide
212 Baffle
220 Lid
240 Lever
250 Serving unit
250a Serving opening
260 Driver unit
270 Reflective member
280 Switch
290 Lighting apparatus
300 Cover

Claims

1. A refrigerator comprising an ice dispenser for supplying ice, wherein said ice dispenser includes:
 - a serving opening for serving the ice to outside of said ice dispenser; and
 - a guide having a flat surface for guiding the ice to said serving opening.
2. The refrigerator according to Claim 1, wherein said serving opening is a circular opening.
3. The refrigerator according to Claim 1 or 2, wherein said ice dispenser further includes a baffle provided downward above said guide at a predetermined distance from said guide.
4. The refrigerator according to one of Claims 1 to 3, wherein said ice dispenser further includes:
 - a serving unit composed of a light-transmissive material and forming said serving opening; and
 - a lighting apparatus for lighting up said serving opening through said serving unit.
5. The refrigerator according to Claim 4, wherein said ice dispenser further includes a reflective member for covering said serving unit at a predetermined distance from said serving unit, and for reflecting light emitted by said lighting apparatus toward said serving unit.
6. An ice dispenser comprising:

a serving opening for serving ice to outside of said ice dispenser; and
 a guide having a flat surface for guiding the ice to said serving opening.

5

Amended claims under Art. 19.1 PCT

1. A refrigerator comprising
 an ice dispenser for supplying ice, 10
 wherein said ice dispenser includes:

a serving opening for serving the ice to outside of said ice dispenser;
 a guide having a flat surface for guiding the ice to said serving opening; and 15
 a baffle provided downward above said guide at a predetermined distance from said guide, and said serving opening is a circular opening.

20

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

a serving opening for serving the ice to outside of said ice dispenser; 25
 a guide having a flat surface for guiding the ice to said serving opening;
 a serving unit composed of a light-transmissive material and forming said serving opening; and 30
 a lighting apparatus for lighting up said serving opening through said serving unit, and said serving opening is a circular opening.

3. The refrigerator according to Claim 2, 35
 wherein said ice dispenser further includes a reflective member for covering said serving unit at a predetermined distance from said serving unit, and for reflecting light emitted by said lighting apparatus toward said serving unit. 40

4. The ice dispenser according to one of Claims 1, 2, and 3.

45

50

55

FIG. 1

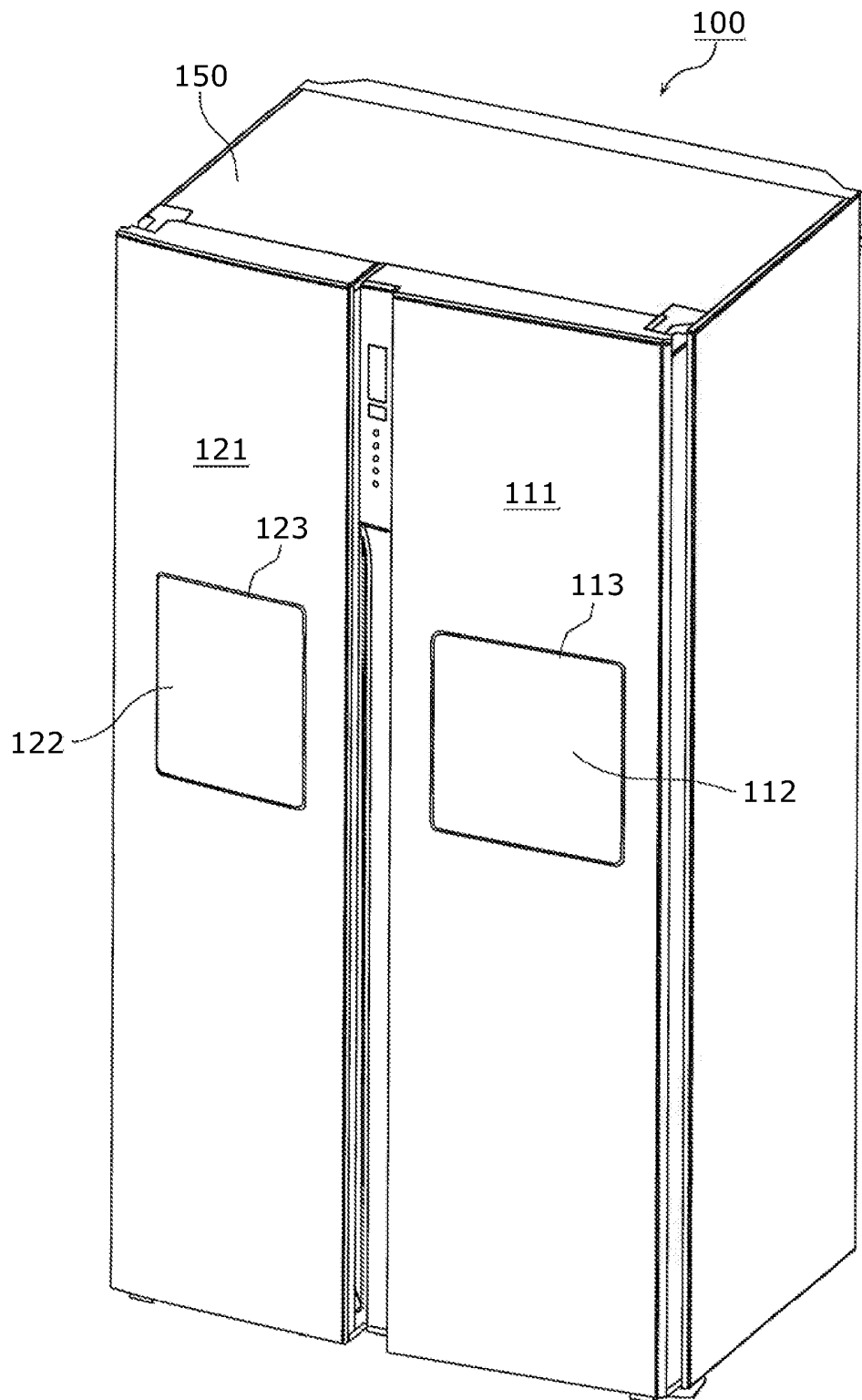


FIG. 2

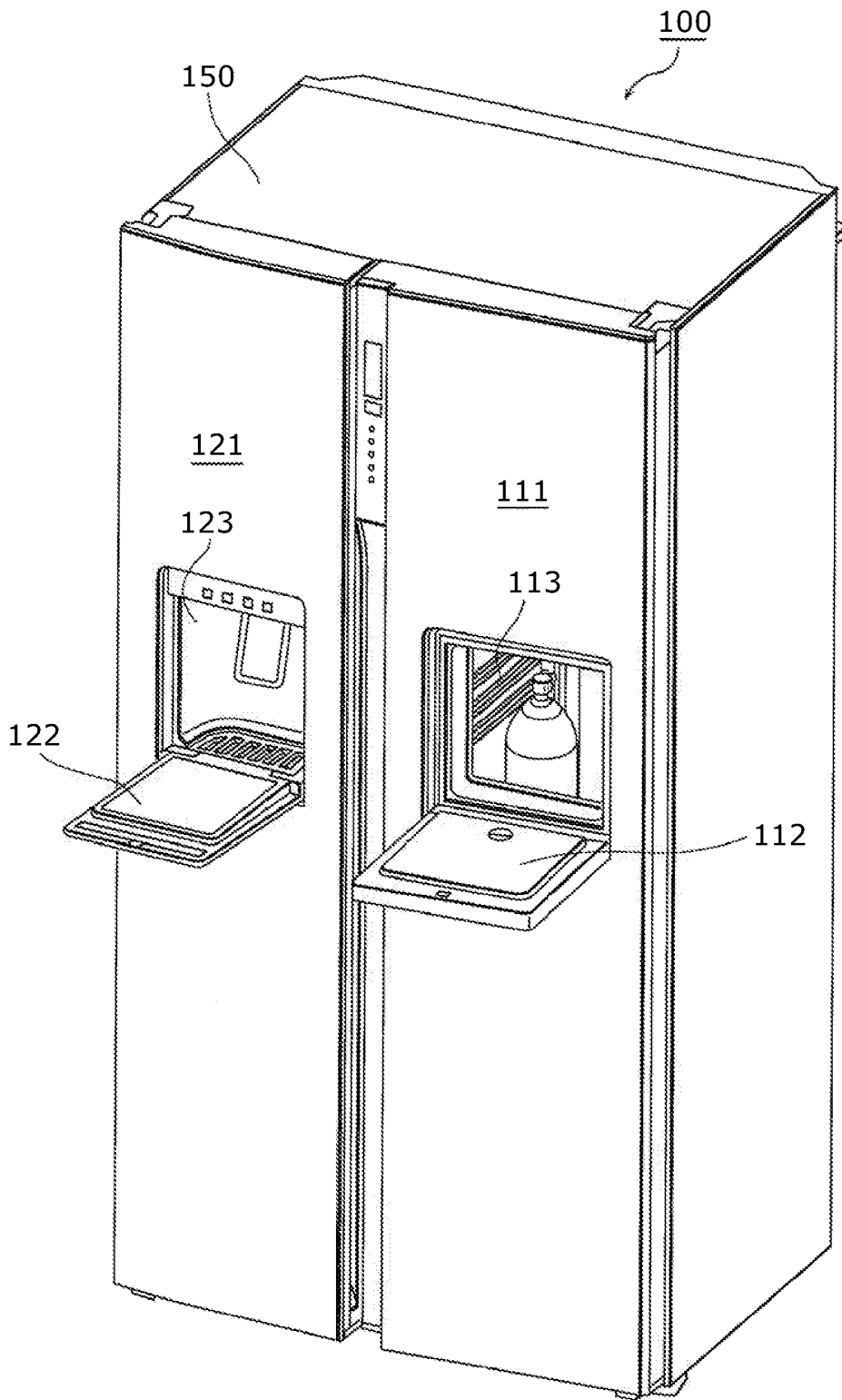


FIG. 3

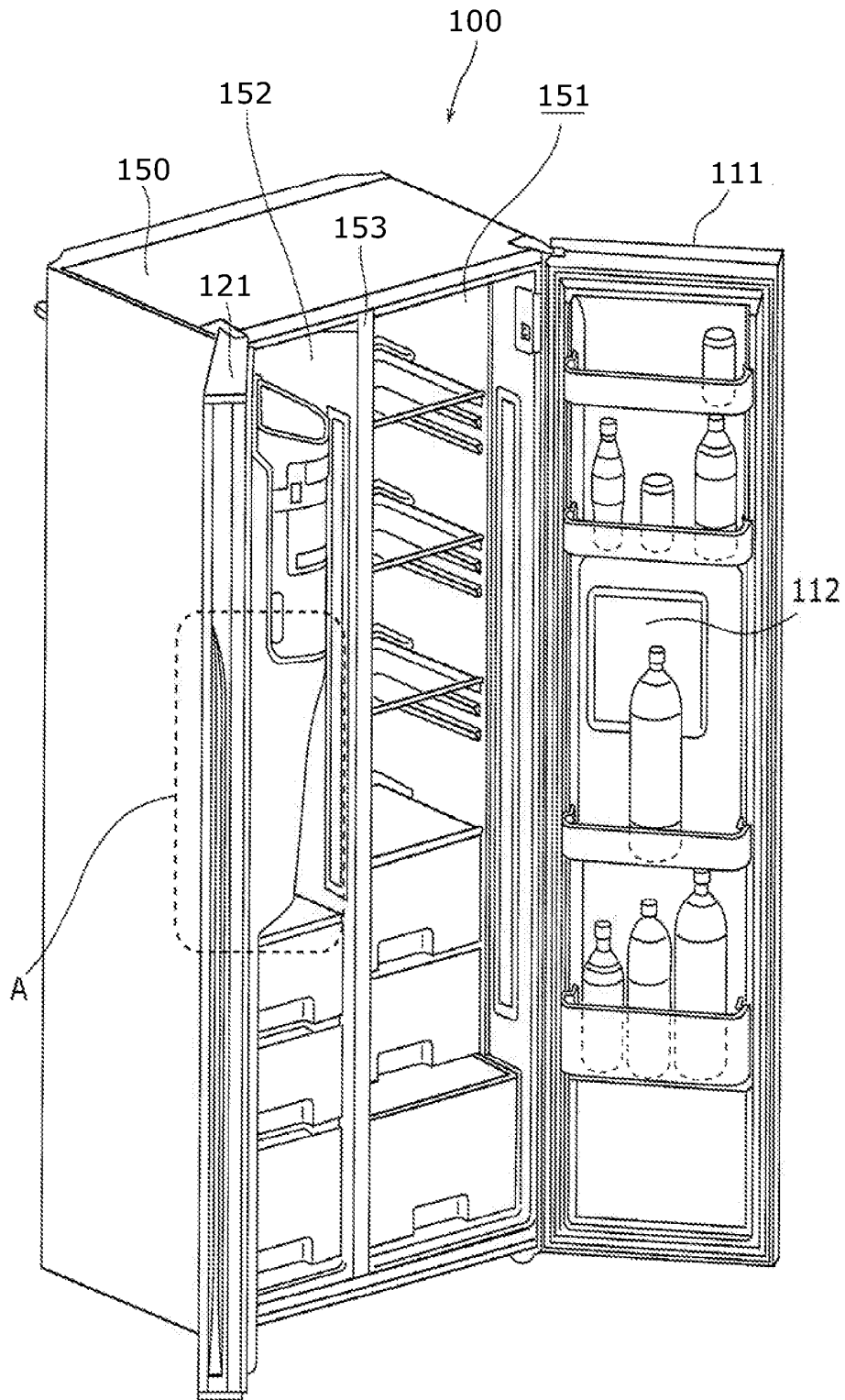


FIG. 4

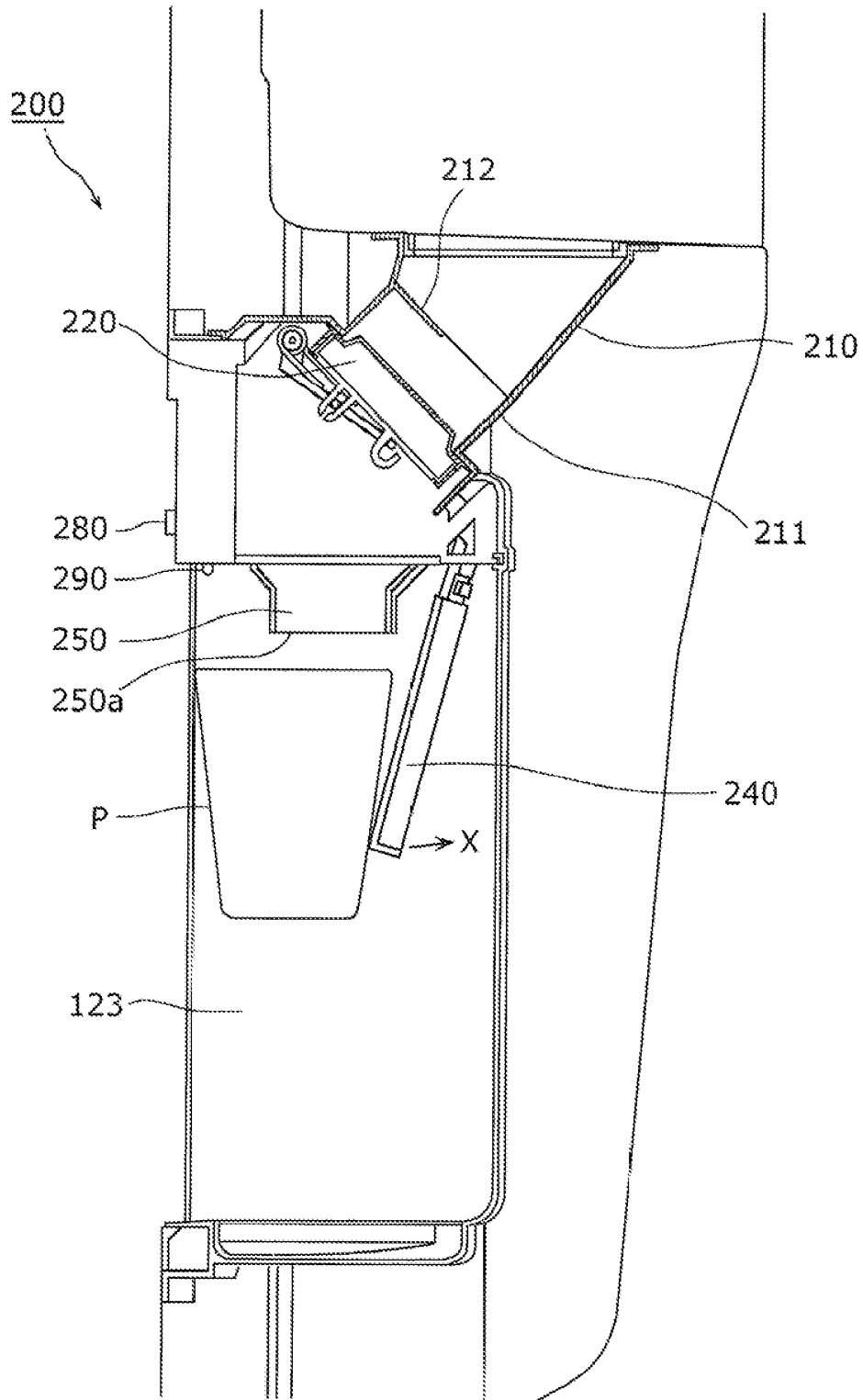


FIG. 5

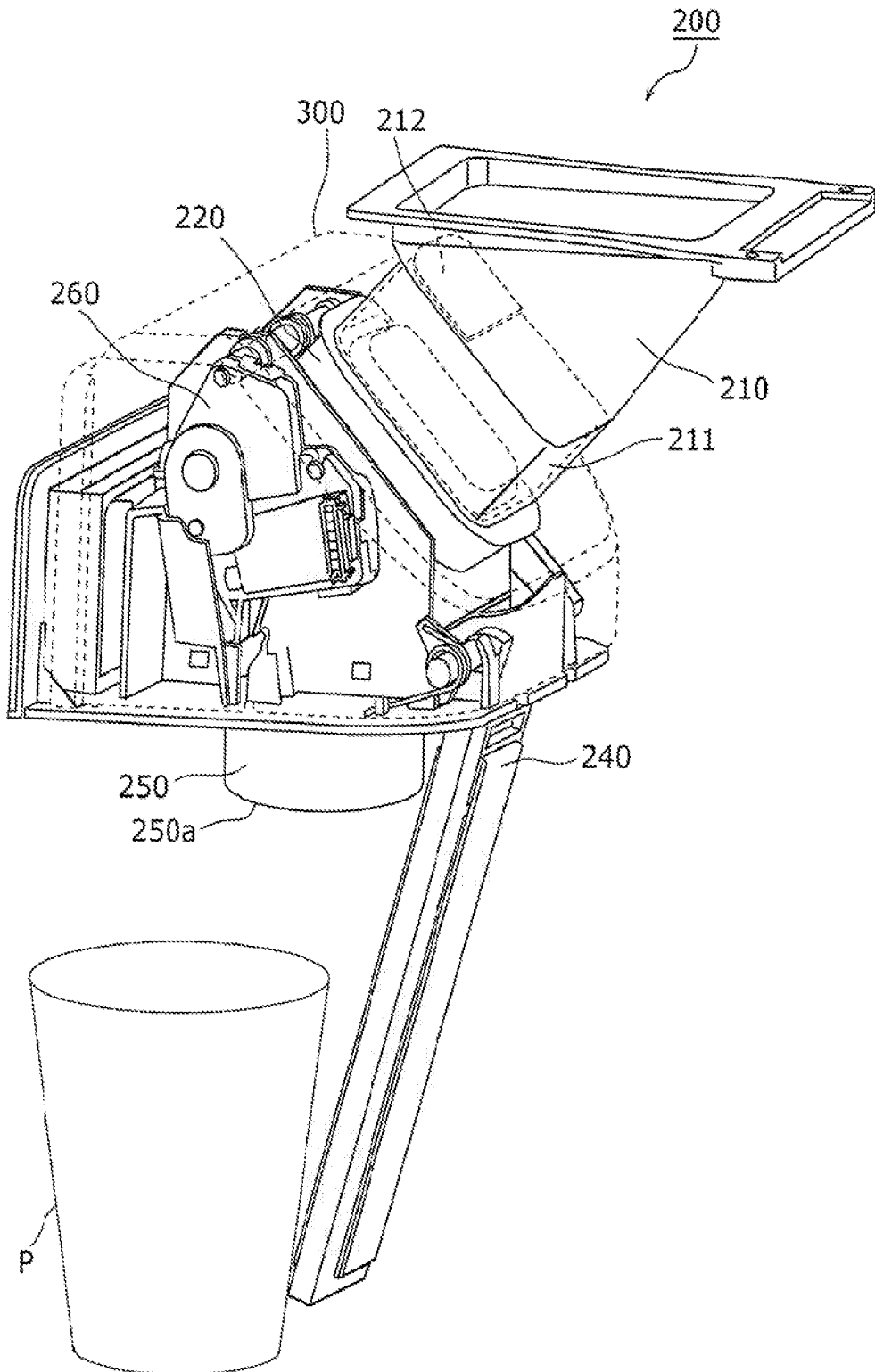


FIG. 6

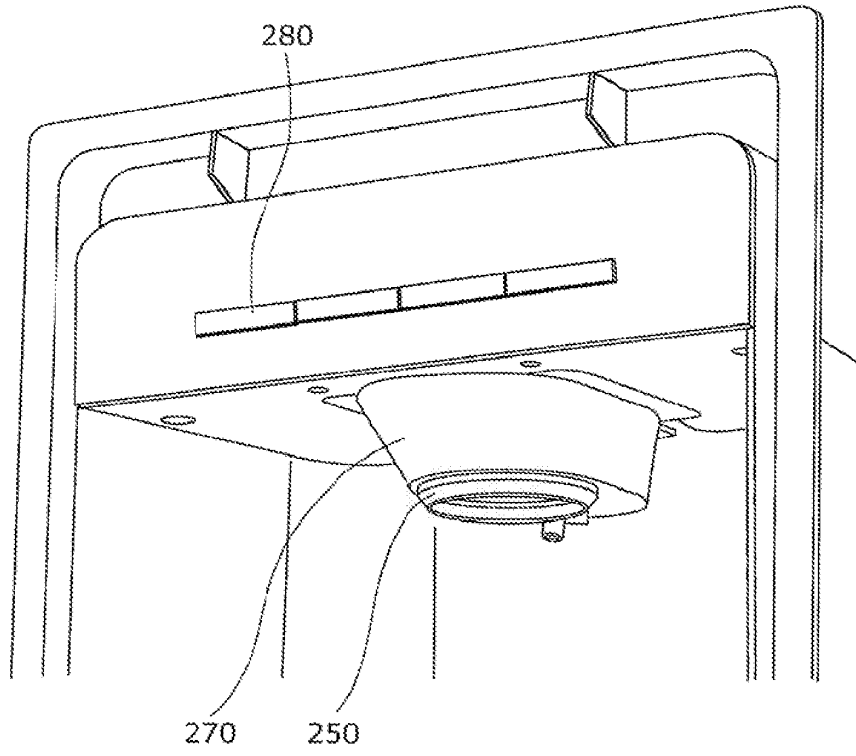


FIG. 7

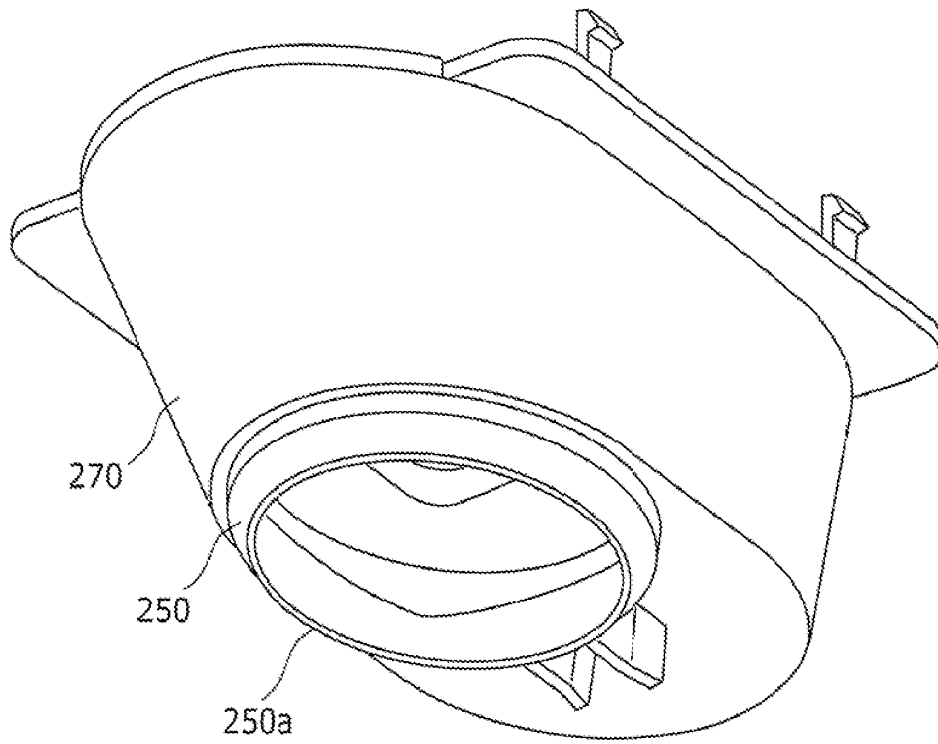


FIG. 8

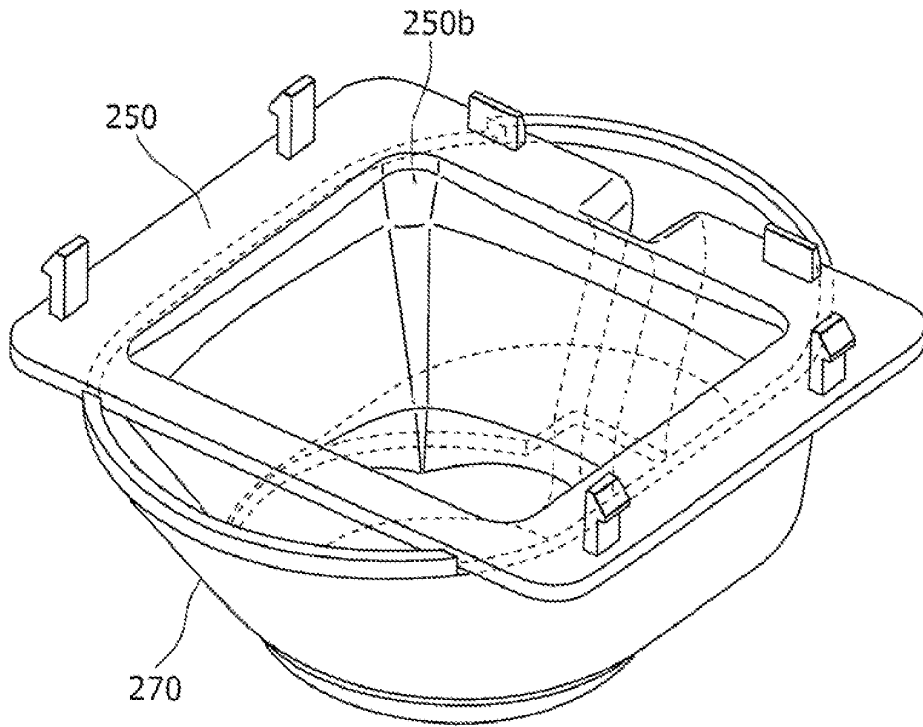
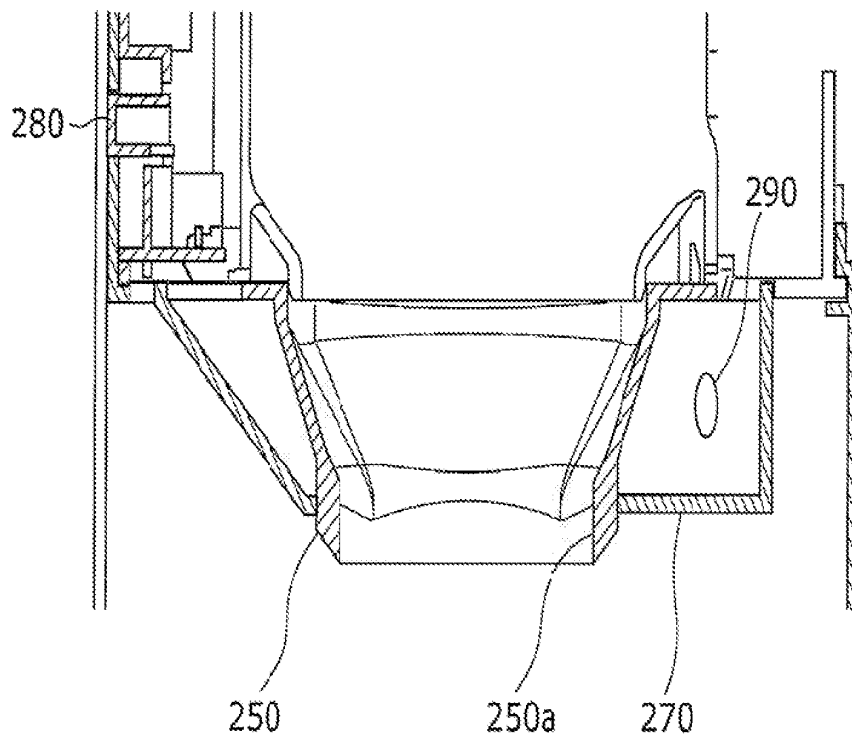


FIG. 9



EP 2 405 214 A1

INTERNATIONAL SEARCH REPORT

International application No. PCT/JP2010/001455
--

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.
X Y	US 2008/0156017 A1 (WHIRLPOOL CO.), 03 July 2008 (03.07.2008), paragraphs [0021] to [0037]; fig. 4 to 9 & CA 2616574 A	1, 2, 6 3-5
Y	JP 03-260574 A (Toshiba Setsubi Kiki Kabushiki Kaisha), 20 November 1991 (20.11.1991), page 2, lower right column, line 1 to page 3, upper left column, line 3; fig. 4 (Family: none)	3
Y	US 2006/0144075 A1 (MAYTAG CORP.), 06 July 2006 (06.07.2006), paragraph [0058]; fig. 10, 11 & CA 2545021 A	4, 5
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 23 March, 2010 (23.03.10)		Date of mailing of the international search report 06 April, 2010 (06.04.10)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer Telephone No.
Facsimile No.		

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP H11287550 B [0004]