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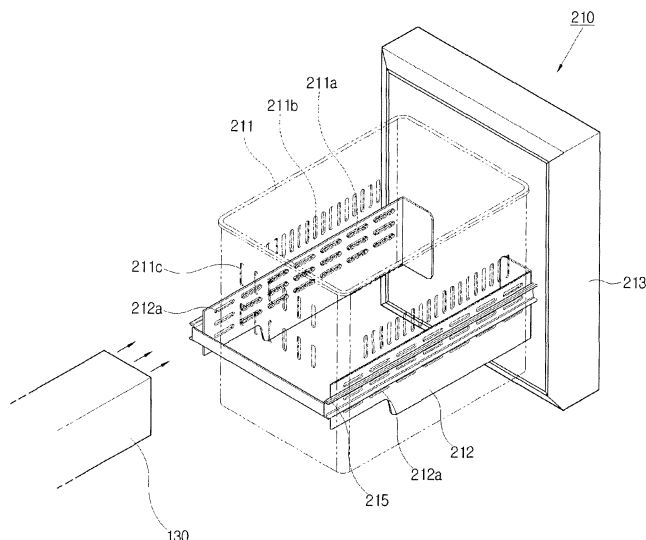
(54) **Refrigerator**

(57) A refrigerator (100), comprises a main body cabinet (101) having an inner cabinet comprising a storage compartment (103) and a guide rail (102) disposed in an inner side thereof, a slide rail (220) to slide on the guide rail (102), and a door assembly (210) comprising a storage container (211) which is accommodated in the storage compartment (103) and a supporting frame (212) to support the storage container (211) and to slide on the

slide rail (220), the supporting frame (212) comprising a first through hole (212A) through which an air current in the storage compartment (103) passes, and the storage container (211) comprising a ventilating hole disposed in a surface thereof to correspond to the first through hole so that the air current passes therethrough.

Thus, the present invention provides a refrigerator (100) which allows a door assembly (210) smoothly opened and closed.

FIG. 2



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 2005-0097641, filed on October 17, 2005, and No. 2005-0131938, filed on December 28, 2005, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a refrigerator. More particularly, to a refrigerator including a door assembly having a ventilating hole.

Description of the Related Art

[0003] Generally, a conventional refrigerator includes a main body cabinet having storage compartment, a door provided to the main body cabinet to open and close the storage compartment, and a cooling system supplying cool air to the storage compartment.

[0004] The cooling system is a direct cooling type system in which an evaporator is provided to an outer surface of an inner cabinet and directly exchanges heat with the storage compartment, and an indirect cooling type system in which cool air around an evaporator is supplied to the storage compartment by a fan.

[0005] As shown in FIG. 1, a conventional refrigerator 100 includes a plurality of main body cabinets 101 respectively provided with a storage compartment 103. A door assembly 110 is slidably coupled to each main body cabinet 101 to open and close the storage compartment 103. The door assembly 110 is provided with a supporting frame 112 supporting a storage container 111. The door assembly 110 includes a door cover 113 integrally coupled to the supporting frame 112 and provided with a handle 114.

[0006] A couple of guide rails 102 for the opening and closing of the door assembly 110 are disposed in opposite sides of the storage compartment 103 of the main body cabinet 101. A slide rail 120 is slidably coupled to each guide rail 102, and is slidably coupled to the supporting frame 112 of the door assembly 110.

[0007] With this configuration, a user can grasp the handle 114 of the door cover 113 to draw the door assembly 110 from the storage compartment 103 of the main body cabinet 101. Here, the slide rail 120 allows the door assembly 110 to smoothly slide with respect to the main body cabinet 101.

[0008] However, in the conventional refrigerator 100, when the door assembly 110 is opened and closed, the supporting frame 112 and the slide rail 120 contact with external air, and consequently, moisture in the external air may be frozen. Since the supporting frame 112 and

the slide rail 120 are cooled by cool air of the storage compartment 101, when the door assembly 110 is drawn to the outside, the supporting frame 112 and the slide rail 120 are exposed to external air having relatively high temperature. At this time, moisture in the external air contacts with the supporting frame 112 and the slide rail 120 and becomes saturated to be condensed or frozen. Also, when the door assembly 110 remains inside the storage compartment 103, the condensed or frozen moisture becomes hard by cool air of the storage compartment 103. As the opening and closing of the door assembly 110 is repeated, the frozen moisture is accumulated.

[0009] Accordingly, the slide ability among the guide rail 102, the slide rail 120 and the supporting frame 112 is deteriorated, and the opening and closing of the door assembly 110 needs an excessive force because of an increase in frictional resistance.

SUMMARY OF THE INVENTION

[0010] Accordingly, it is an aspect of the present invention to provide a refrigerator which allows a door assembly smoothly opened and closed.

[0011] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0012] The foregoing and/or other aspects of the present invention can be achieved by providing a refrigerator, comprising a main body cabinet having an inner cabinet comprising a storage compartment and a guide rail disposed in an inner side thereof, a slide rail to slide on the guide rail, and a door assembly comprising a storage container which is accommodated in the storage compartment and a supporting frame to support the storage container and to slide on the slide rail, the supporting frame comprising a first through hole through which an air current in the storage compartment passes, and the storage container comprising a ventilating hole disposed in a surface thereof to correspond to the first through hole so that the air current passes therethrough.

[0013] According to the embodiment of the present invention, the slide rail comprises a second through hole to allow the air current passed through the first through hole to be transferred to the guide rail therethrough.

[0014] According to the embodiment of the present invention, the storage container further comprises a sub-ventilating hole adjacent to the ventilating hole.

[0015] According to the embodiment of the present invention, the refrigerator further comprises an inner rail coupled with the supporting frame and to slide on the slide rail.

[0016] According to the embodiment of the present invention, the inner rail comprises a third through hole allowing the air current passed through the first through hole to be transferred to the slide rail therethrough.

[0017] The foregoing and/or other aspects of the present invention can be achieved by providing a refrig-

erator, comprising an inner cabinet comprising a storage compartment and a guide rail, a slide rail to slide on the guide rail, a storage container which is accommodated in the storage compartment, and a supporting frame to support the storage container and to slide on the slide rail, to thereby move between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, the supporting frame comprising a first through hole through which an air current in the storage compartment passes, and the slide rail comprising a second through hole disposed to correspond to the first through hole in the closing position so that the air current passes therethrough.

[0018] According to the embodiment of the present invention, the storage container comprises a ventilating hole disposed to correspond to the first through hole in the closing position so that the air current passes there-through.

[0019] According to the embodiment of the present invention, the refrigerator further comprises an inner rail coupled with the supporting frame to slide on the slide rail, and the inner rail comprising a third through hole to allow the air current passed through the first through hole to be transferred to the slide rail through the third through hole.

[0020] The foregoing and/or other aspects of the present invention can be achieved by providing a refrigerator comprising an inner cabinet forming a storage compartment and having a guide rail, the refrigerator further comprising an air current generating part to generate an air current in the storage compartment, a storage container which is accommodated in the storage compartment, the storage container comprising an inlet in a first side thereof through which the air current generated from the air current generating part flows into the storage container, and a ventilating hole in a second side thereof through which the air current inside the storage container flows out, and a supporting frame which is supported to the guide rail, to thereby support the storage container, wherein the storage container moves between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, and with the storage container further comprises a first through hole disposed to correspond to the ventilating hole so that the air current inside the storage container passes through the ventilating hole and the first through hole.

[0021] According to the embodiment of the present invention, the refrigerator further comprises a slide rail interposed between the guide rail and the supporting frame, to support the supporting frame to slide on the guide rail, and with the slide rail comprising a second through hole disposed to correspond to the first through hole so that the air current passed through the first through hole passes through the second through hole when the supporting frame is in the closing position.

[0022] According to the embodiment of the present in-

vention, the storage container further comprises a sub-ventilating hole adjacent with the ventilating hole.

[0023] According to the embodiment of the present invention, the refrigerator further comprises an inner rail coupled with the supporting frame to slide on the slide rail.

[0024] According to the embodiment of the present invention, the inner rail comprises a third through hole to allow the air current passed through the first through hole to be transferred to the slide rail therethrough.

[0025] The foregoing and/or other aspects of the present invention can be achieved by providing a refrigerator comprising an inner cabinet including a storage compartment and a guide rail, the refrigerator further comprising a storage container comprising a ventilating hole through which an air current passes, and a slide rail to support the storage container with respect to the guide rail to allow the storage container to move between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, and the slide rail comprising a through hole disposed to correspond to the ventilating hole when the storage container is in the closing position.

[0026] According to the embodiment of the present invention, the refrigerator further comprises a supporting frame to support the storage container, interposed between the storage container and the slide rail to slide on the slide rail, and the supporting frame comprising a through hole disposed to correspond to the ventilating hole.

[0027] The foregoing and/or other aspects of the present invention can be achieved by providing a refrigerator comprising a storage compartment housing a storage container to store food therein, guide rails to be disposed on an inner side of the storage compartment, slide rails to be disposed along sides of the storage container, to slide along the guide rails, the storage container comprising a door to form an external appearance thereof, a supporting frame to be connected with the door and the slide rails, to support the storage container and to slide on the slide rails, the supporting frame comprising first through holes through which air in the storage compartment passes through, and ventilating holes disposed on a surface of the storage container corresponding to the through holes, so that the air passes therethrough.

[0028] According to the embodiment of the present invention, the storage container further comprises sub-ventilating holes adjacent to the ventilating holes to allow air to pass therethrough.

[0029] According to the embodiment of the present invention, the slide rails comprise second through holes to allow the air which passes through the first through holes to be transferred to the guide rail therethrough.

[0030] According to the embodiment of the present invention, the refrigerator further comprises an inner rail coupled with the supporting frame, to slide on the slide rail, wherein the inner rail comprises third through holes corresponding to the first through holes and the second

through holes, to allow the air which passes through the first through holes to be transferred to the slide rail there-through.

[0031] According to the embodiment of the present invention, the refrigerator further comprises ball bearings interposed between the guide rails, the slide rails, and the inner rail.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating a conventional refrigerator;

FIG. 2 is a perspective view illustrating a portion of a refrigerator according to an embodiment of the present invention;

FIG. 3 is a sectional view illustrating a door assembly coupled with a main body cabinet in FIG. 2; and

FIG. 4 is a side view illustrating the door assembly drawn from the main body cabinet in FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below so as to explain the present invention by referring to the figures.

[0034] The refrigerator 100 shown in FIG. 1 will now be used to illustrate various embodiments of the present invention. Therefore, the reference numerals shown in FIG. 1 refer to like elements throughout.

[0035] As shown in FIG. 2, an air current generating part 130 is provided to the storage compartment 103 to generate an air current such as cool air. The air current generating part 130 may be a duct or a fan. Alternatively, the air current generating part 130 may be a unit transferring air current generated in other storage compartments to the storage compartment 103. The present invention is not limited hereto and may vary, accordingly.

[0036] Further, FIG. 2 illustrates a door assembly 210 coupled to the guide rail 102 through a slide rail 220.

[0037] As shown in FIG. 2, the door assembly 210 comprises a storage container 211, a supporting frame 212 disposed around a circumference of the storage container 211 to support the storage container 211, and a door cover 213 coupled with the supporting frame 212. The supporting frame 212 supports the storage container 211 so that the storage container 211 moves between a closing position in which the storage container 211 is accommodated in the storage compartment 103 and an opening

position in which the storage container 211 is drawn therefrom.

[0038] The supporting frame 212 comprises a plurality of first through holes 212a, and a plurality of ventilating holes 211a are formed in a side of the storage container 211 to correspond to the first through holes 212a.

[0039] Also, a plurality of inlets 211c are formed in a rear side of the storage container 211 to allow cool air generated from the air current generating part 130 to flow into the storage container 211.

[0040] The cool air generated from the air current generating part 130 is supplied into the storage container 211 through the inlets 211c, to cool an inside of the storage container 211.

[0041] Also, the cool air supplied into the storage container 211 is transferred to all portions of the supporting frame 212 and the slide rail 220 through the ventilating holes 211a and the first through holes 212a.

[0042] The storage container 211 comprises a plurality of sub-ventilating holes 211b adjacent with the ventilating holes 211a. The sub-ventilating holes 211b allow the cool air to flow more smoothly.

[0043] The supporting frame 212 comprises an inner rail 215, and is slidably coupled with the slide rail 220.

[0044] FIG. 3 is a sectional view illustrating the state in which the supporting frame 212 is positioned in the closing position so that the door assembly 210 is coupled with the main body cabinet 101.

[0045] As shown in FIG. 3, a groove 'H' is provided in an inner surface of the storage compartment 103, and the guide rail 102 is disposed to the groove 'H'. The slide rail 220 is slidably coupled with an inner side of the guide rail 102. The slide rail 220 slides on the guide rail 102. The slide rail 220 comprises a plurality of second through holes 220a disposed to correspond to the first through holes 212a when the supporting frame 212 is positioned in the closing position, so that cool air can pass through the first through holes 212a and the second through holes 220a.

[0046] The inner rail 215 of the door assembly 210 is slidably coupled with an inner side of the slide rail 220. The inner rail 215 slides on the slide rail 220. Thus, the door assembly 210 is accommodated/drawn in/from the main body cabinet 101 by a sliding means among the inner rail 215, the slide rail 220 and the guide rail 102.

[0047] As illustrated in FIG. 3, a ball bearing 230 is disposed among the respective rails 102, 220 and 215, but alternatively, the respective rails 102, 220 and 215 may be slidably coupled by means of a sliding contact, a rolling contact, etc.

[0048] When the door assembly 210 is drawn from the main body cabinet 101 to open the storage compartment 103, first, the inner rail 215 slides integrally with the door assembly 210 along the slide rail 220 a predetermined distance. Then, an end portion of the inner rail 215 becomes engaged with an end portion of the slide rail 220, and the slide rail 220 moves integrally with the door assembly 210. The slide rail 220 slides on the guide rail

102 to be drawn from the main body cabinet 101, and accordingly, the door assembly 210 is drawn from the main body cabinet 101.

[0049] Alternatively, the inner rail 215 can be omitted as necessary. The supporting frame 212 is formed in the shape of the inner rail 215 to be directly slidably coupled with the slide rail 220.

[0050] FIG. 4 illustrates a state in which the door assembly 210 is drawn from the main body cabinet 101. As shown in FIG. 4, when the supporting frame 212 is positioned in the opening position and the door assembly 210 is fully drawn from the main body cabinet 101, the slide rail 220 slides on the guide rail 102 of the main body cabinet 101 to protrude from a front of the refrigerator 100, and the inner rail 215 protrudes forward over the slide rail 220.

[0051] In FIG. 3, the storage container 211 comprises the ventilating holes 211a and the sub-ventilating holes 211b. The supporting frame 212 comprises the first through holes 212a disposed to correspond to the ventilating holes 211a. Also, the inner rail 215 comprises a plurality of third through holes 215a disposed to correspond to the ventilating holes 211a.

[0052] When the door cover 213 of the door assembly 210 closes the storage compartment 103, cool air generated from the air current generating part 130 flows into the storage container 211 through the inlets 211c. Then, the cool air flowed in the storage container 211 flows to the guide rail 102 through the ventilating holes 211a of the storage container 211, the first through holes 212a of the supporting frame 212, the third through holes 215a of the inner rail 215, and the second through holes 220a of the slide rail 220 in an ordered sequence. At this time, the cool air flowed to the respective rails 102, 220 and 215 removes moisture or ice remaining in the respective rails 102, 220 and 215 by means of drying or sublimation. Alternatively, the air current generating part 130 can be omitted as necessary. Thus, moisture or ice thereon can be removed by a natural convection in the storage compartment 103.

[0053] Accordingly, moisture condensed or ice frozen on the supporting frame 212, the slide rail 220 and the inner rail 215 when the door assembly 210 is drawn to the outside can be immediately removed by cool air passing through the supporting frame 212, the slide rail 220 and the inner rail 215 to circulate in the storage compartment 103 when the door assembly 210 is accommodated in the main body cabinet 101. Thus, moisture or ice can be prevented from being accumulated thereon. Consequently, the guide rail 102, the slide rail 220 and the supporting frame 212 can slide smoothly without being hindered by means of frozen moisture or ice thereon.

[0054] In the refrigerator according to the embodiment of the present invention, the supporting frame supports the storage container, and is slidably supported with the slide rail. However, alternatively, the supporting frame can be omitted. The slide rail can directly support the storage container, and slide integrally with the storage

container on the guide rail. Also, cool air can pass through the ventilating holes of the storage container and the second through holes of the slide rail to remove moisture or ice thereon.

[0055] As described above, the present invention provides the refrigerator comprising the ventilating holes formed to the storage container and the first through holes formed to the supporting frame allowing cool air to be supplied to the slide rail and the guide rail to remove moisture or ice thereon, and accordingly can decrease frictional resistance between the slide rail and the guide rail, and thereby allowing the door assembly to be smoothly opened and closed.

[0056] Although a few embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims and their equivalents.

Claims

1. A refrigerator, comprising:

a main body cabinet having an inner cabinet comprising a storage compartment and a guide rail disposed in an inner side thereof;
a slide rail to slide on the guide rail; and
a door assembly comprising a storage container which is accommodated in the storage compartment and a supporting frame to support the storage container and to slide on the slide rail, the supporting frame comprising a first through hole through which an air current in the storage compartment passes, and
the storage container comprising a ventilating hole disposed in a surface thereof to correspond to the first through hole so that the air current passes therethrough.

2. The refrigerator according to claim 1, wherein the slide rail comprises a second through hole to allow the air current passed through the first through hole to be transferred to the guide rail therethrough.

3. The refrigerator according to claim 1, wherein the storage container further comprises a sub-ventilating hole adjacent to the ventilating hole.

4. The refrigerator according to claim 1, further comprising an inner rail coupled with the supporting frame and to slide on the slide rail.

5. The refrigerator according to claim 4, wherein the inner rail comprises a third through hole allowing the air current passed through the first through hole to be transferred to the slide rail therethrough.

6. A refrigerator, comprising:

an inner cabinet comprising a storage compartment and a guide rail;
 a slide rail to slide on the guide rail;
 a storage container which is accommodated in the storage compartment; and
 a supporting frame to support the storage container and to slide on the slide rail, to thereby move between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, the supporting frame comprising a first through hole through which an air current in the storage compartment passes, and
 the slide rail comprising a second through hole disposed to correspond to the first through hole in the closing position so that the air current passes therethrough.

7. The refrigerator according to claim 6, wherein the storage container comprises a ventilating hole disposed to correspond to the first through hole in the closing position so that the air current passes therethrough.

8. The refrigerator according to claim 6, further comprising an inner rail coupled with the supporting frame to slide on the slide rail, and the inner rail comprising a third through hole to allow the air current passed through the first through hole to be transferred to the slide rail through the third through hole.

9. A refrigerator comprising an inner cabinet forming a storage compartment and having a guide rail, the refrigerator further comprising:

an air current generating part to generate an air current in the storage compartment;
 a storage container which is accommodated in the storage compartment, the storage container comprising an inlet in a first side thereof through which the air current generated from the air current generating part flows into the storage container, and a ventilating hole in a second side thereof through which the air current inside the storage container flows out; and
 a supporting frame which is supported to the guide rail, to thereby support the storage container, wherein the storage container moves between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, and with the storage container further comprises a first through hole disposed to correspond to the ventilating hole so that the air current inside the stor-

age container passes through the ventilating hole and the first through hole.

10. The refrigerator according to claim 9, further comprising a slide rail interposed between the guide rail and the supporting frame, to support the supporting frame to slide on the guide rail, and with the slide rail comprising a second through hole disposed to correspond to the first through hole so that the air current passed through the first through hole passes through the second through hole when the supporting frame is in the closing position.

11. The refrigerator according to claim 9, wherein the storage container further comprises a sub-ventilating hole adjacent with the ventilating hole.

12. The refrigerator according to claim 9, further comprising an inner rail coupled with the supporting frame to slide on the slide rail.

13. The refrigerator according to claim 12, wherein the inner rail comprises a third through hole to allow the air current passed through the first through hole to be transferred to the slide rail therethrough.

14. A refrigerator comprising an inner cabinet including a storage compartment and a guide rail, the refrigerator further comprising:

a storage container comprising a ventilating hole through which an air current passes; and
 a slide rail to support the storage container with respect to the guide rail to allow the storage container to move between a closing position in which the storage container is accommodated in the storage compartment and an opening position in which the storage container is drawn therefrom, and the slide rail comprising a through hole disposed to correspond to the ventilating hole when the storage container is in the closing position.

15. The refrigerator according to claim 14, further comprising a supporting frame to support the storage container, interposed between the storage container and the slide rail to slide on the slide rail, and the supporting frame comprising a through hole disposed to correspond to the ventilating hole.

16. A refrigerator comprising:

a storage compartment housing a storage container to store food therein;
 guide rails to be disposed on an inner side of the storage compartment;
 slide rails to be disposed along sides of the storage container, to slide along the guide rails;

the storage container comprising:

a door to form an external appearance thereof,
 a supporting frame to be connected with the door and the slide rails, to support the storage container and to slide on the slide rails, the supporting frame comprising first through holes through which air in the storage compartment passes through, and ventilating holes disposed on a surface of the storage container corresponding to the through holes, so that the air passes there-through.

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17. The refrigerator according to claim 16, wherein the storage container further comprises sub-ventilating holes adjacent to the ventilating holes to allow air to pass therethrough.

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18. The refrigerator according to claim 16, wherein the slide rails comprise second through holes to allow the air which passes through the first through holes to be transferred to the guide rail there-through.

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19. The refrigerator according to claim 18, further comprising:

an inner rail coupled with the supporting frame, to slide on the slide rail, wherein the inner rail comprises third through holes corresponding to the first through holes and the second through holes, to allow the air which passes through the first through holes to be transferred to the slide rail therethrough.

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20. The refrigerator according to claim 19, further comprising ball bearings interposed between the guide rails, the slide rails, and the inner rail.

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FIG. 1

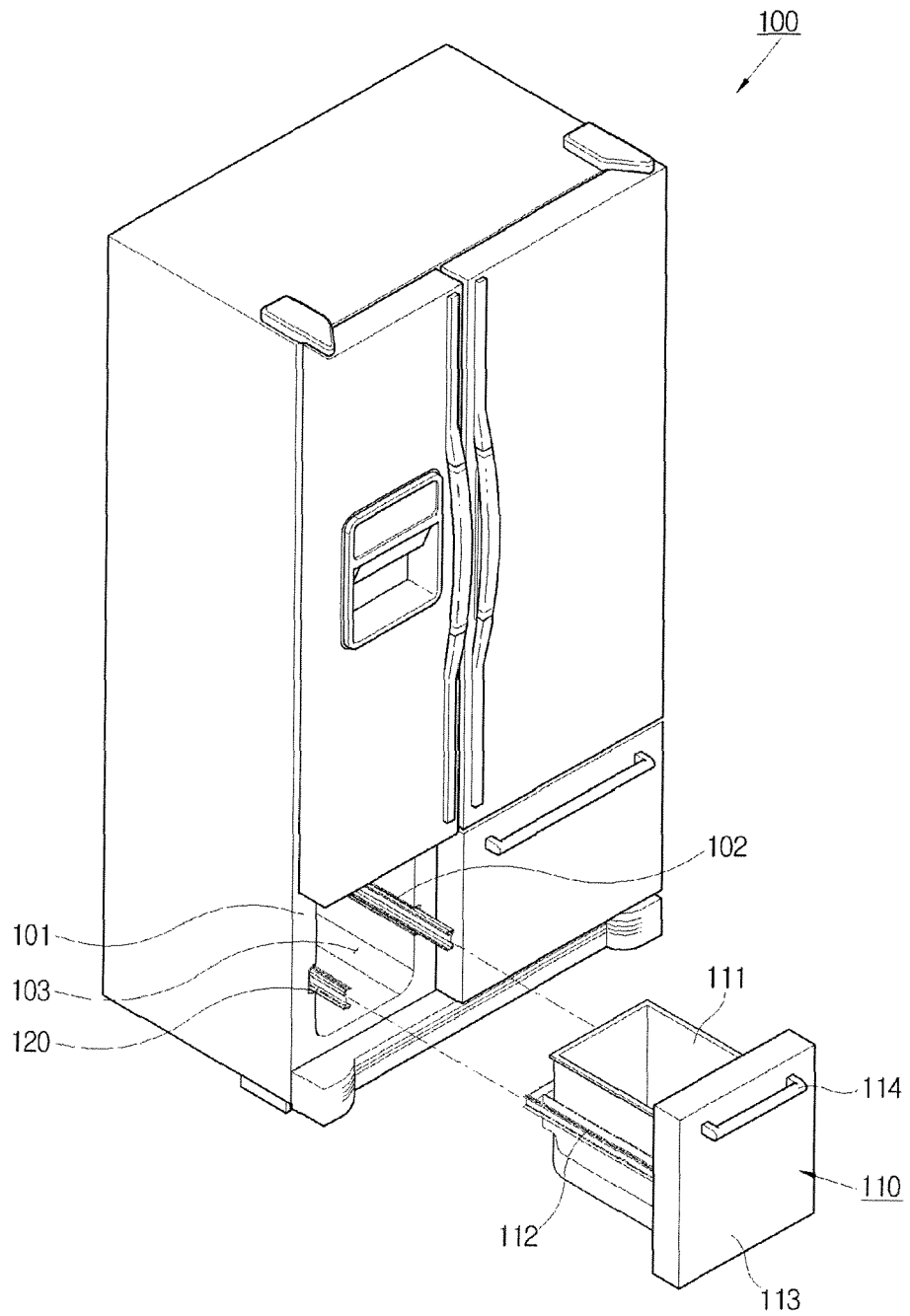


FIG. 2

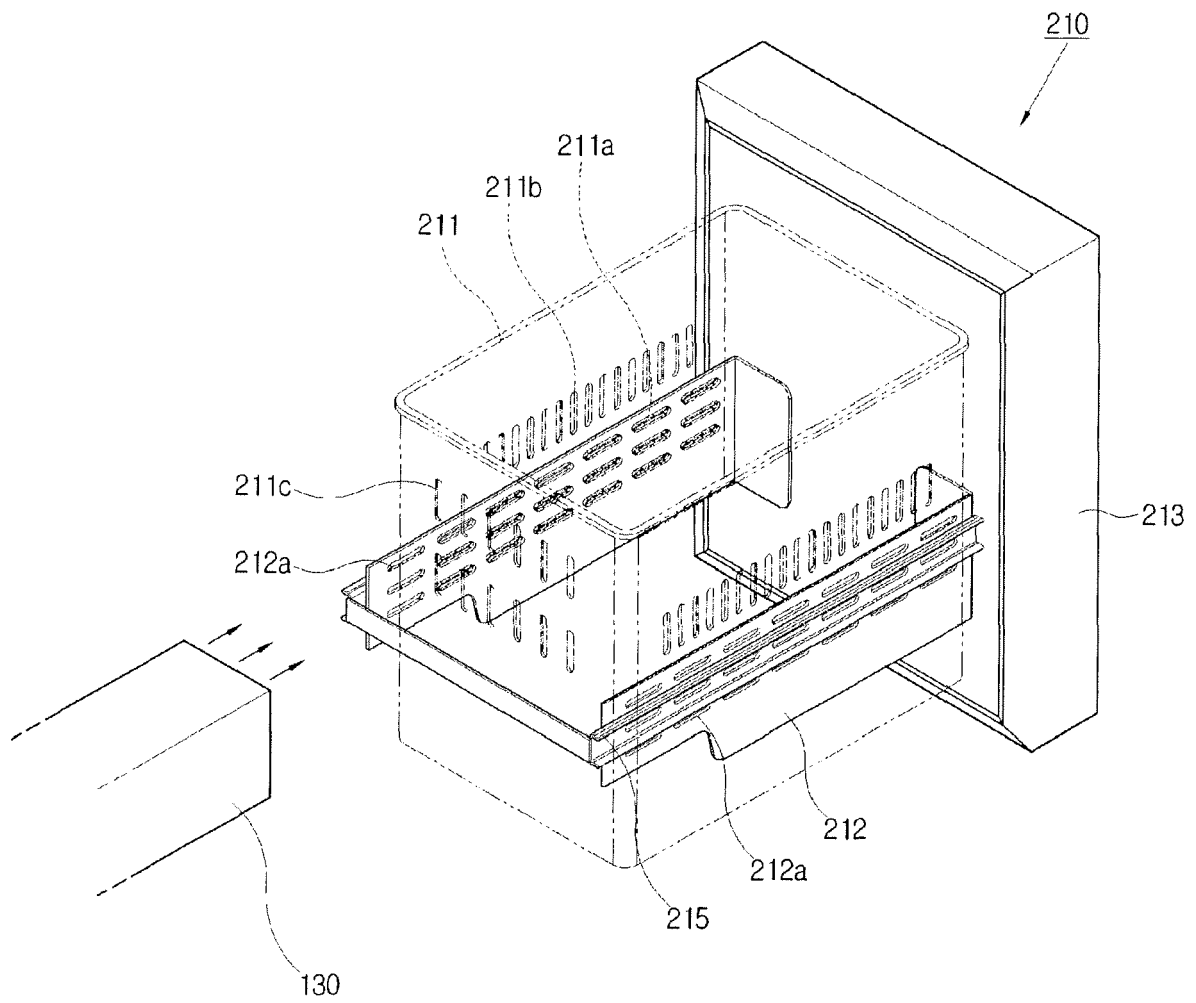


FIG. 3

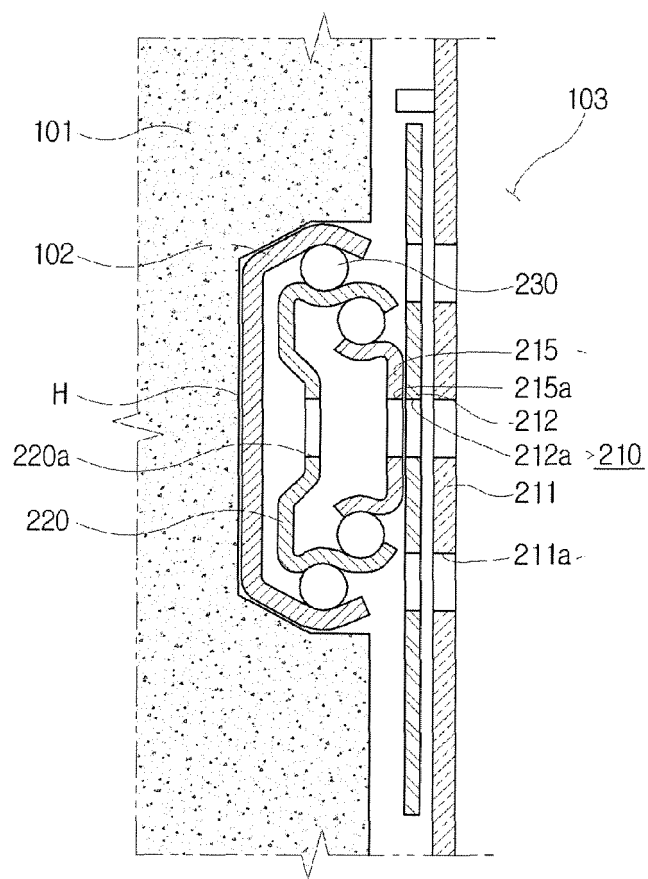
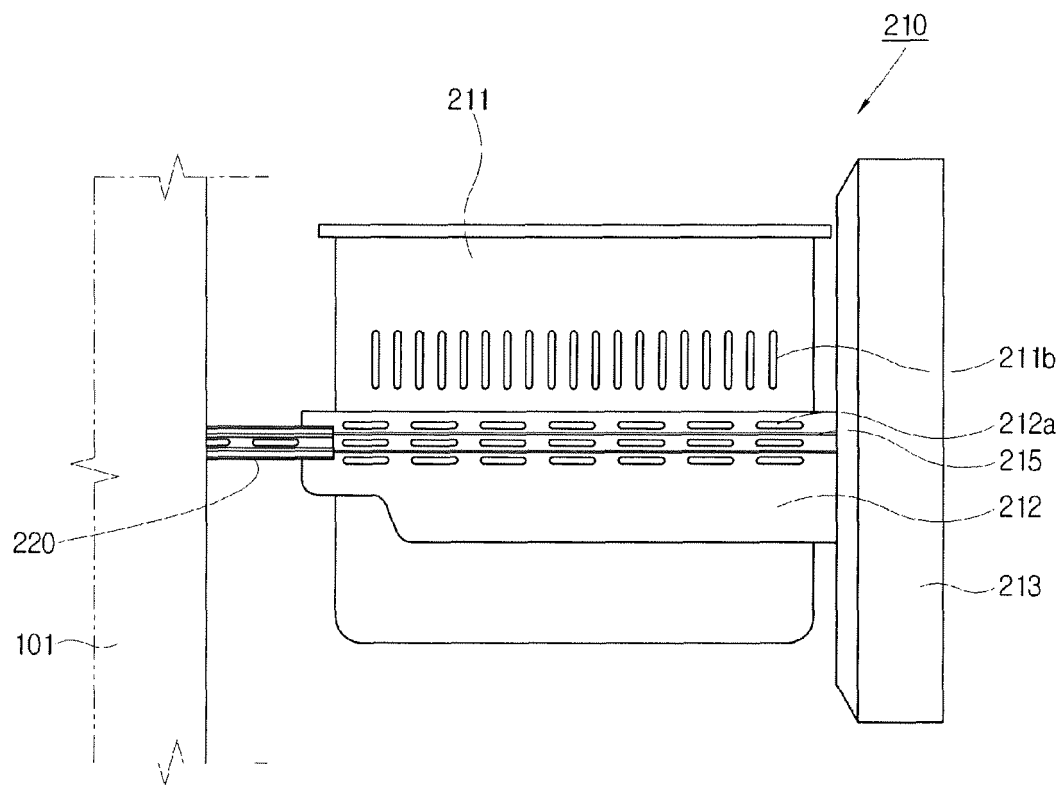


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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