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(54)

DOOR FOR REFRIGERATOR AND REFRIGERATOR

(57)

The present invention relates to a door for a refrigerator and a refrigerator. The door includes a front panel (24); a containing chamber (231) located behind the front panel (24), the containing chamber (231) having an inlet (2310) accessible from one side of the door (2); an electrical module (25) received in the containing chamber (231); and an insert (3) inserted into the containing chamber (231) from the inlet (2310); characterized in that, the insert (3) includes multiple insert strips (311, 312) spaced apart and extending along an insertion direction (D) in which the insert (3) is inserted into the containing chamber (231) and multiple elastic pressing portions (321, 322, 323) disposed along the corresponding insert strips (311, 312) and used to press the electrical module (25) towards the front panel (24).

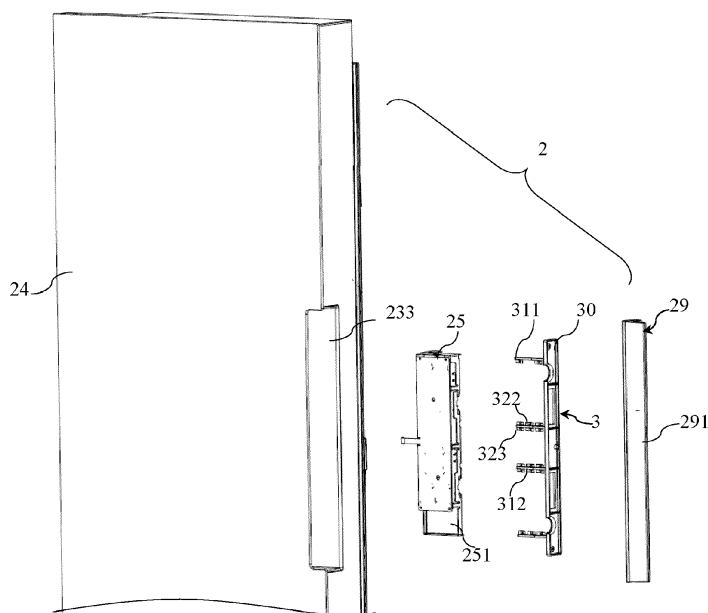


FIG. 3

Description

BACKGROUND

Technical Field

[0001] The present invention relates to a door for a refrigerator and a refrigerator, and particularly to a refrigerator door having an electrical module and a household refrigerator having a door.

Related Art

[0002] WO2007/060188 discloses a refrigerator having a display apparatus disposed on a door. The door has a containing chamber accessible from one side of the door and a display apparatus that can be inserted into the containing chamber after a door foaming procedure. The door further includes a buffer pressed between the display apparatus and a rear wall of a display housing forming the containing chamber, where the buffer is inserted between the display apparatus, which is in the containing chamber and located behind a front panel, and a rear wall of the containing chamber, and when a cover used to close the containing chamber is installed to the door, a rib on the cover is located in a slot of the buffer, so as to prevent displacement of the buffer. The buffer is made from, for example, foamed polystyrene and other materials, to protect and isolate the display apparatus.

SUMMARY

[0003] An objective of the present invention is to provide an improved door for a refrigerator and a refrigerator having the door.

[0004] The objective can be implemented by using features in the independent claims. Preferred embodiments of the present invention are subject matters of the accompanying drawings, the specification and the dependent claims.

[0005] One aspect of the present invention relates to a door for a refrigerator. A door for a refrigerator is provided, where the door includes: a front panel; a containing chamber located behind the front panel, the containing chamber having an inlet accessible from one side of the door; an electrical module received in the containing chamber; and an insert inserted into the containing chamber from the inlet; characterized in that, the insert includes multiple insert strips spaced apart and extending along an insertion direction in which the insert is inserted into the containing chamber and multiple elastic pressing portions disposed along the corresponding insert strips and used to press the electrical module towards the front panel.

[0006] Because the insert is disposed independent of the containing chamber and the electrical module, the insert can be inserted into the containing chamber to

press the electrical module towards the front panel after the electrical module is inserted into the containing chamber. In the process that the electrical module is inserted into the containing chamber, the electrical module does not need to have a friction with the front panel, thereby avoiding damaging parts that are on a side, facing the front panel, of the electrical module. In addition, disposing multiple pressing portions along insert strips that are spaced part, on one hand, helps reduce space occupied by the insert in the door, and on the other hand, makes it possible that the insert is provided with multiple elastic pressing portions in the insertion direction and a width direction to apply a force to the electrical module in a more balanced manner, so that the size and a requirement on strength of each pressing portion may be reduced.

[0007] The inlet of the containing chamber is accessible from one side of the door, so that the electrical module can be placed in the containing chamber or removed from the containing chamber. The inlet of the containing chamber may be located in one side surface of the door, and may also be at a certain distance from the side surface of the door, for example, the inlet of the containing chamber may be adjacent to a slot that is near the side surface of the door and related to a handle.

[0008] In one possible embodiment, the containing chamber is disposed near a longitudinal side of the door. In one alternative embodiment, the containing chamber is disposed near a horizontal side portion of the door, for example, the top or the bottom.

[0009] The electrical module is preferably a user interface electrical module, and may include an input unit for receiving a user input instruction and/or an output unit displaying information for a user. For example, the electrical module may include a touch unit to receive a touch instruction from the user. In one alternative embodiment, the user interface electrical module may also receive an instruction from the user through a key or another input apparatus.

[0010] The front panel may be made of glass or a glass-like material. When the door has a foamed heat insulation layer therein, the front panel may be directly in contact with the heat insulation layer, or a door plate in contact with the heat insulation layer may be disposed on a rear side of the front panel, for example, the front panel is fixed (for example, adhered) onto the door after the foaming procedure of the door is finished.

[0011] The "multiple" refers to at least two. Therefore, the insert may have at least two insert strips and at least two pressing portions. When the insert has more than three insert strips, adjacent insert strips may have a constant or variable distance therebetween. Each insert strip may be configured with at least one pressing portion, and preferably, each insert strip is configured with multiple pressing portions.

[0012] Other individual features or those combined with other features and therefore considered to be characteristics of the present invention are elaborated in the

following appended claims.

[0013] In one possible embodiment, at least one insert strip is configured with multiple pressing portions spaced apart in the insertion direction. Therefore, the pressing portions can be distributed on different depths of the containing chamber in the insertion direction with the insert strips extending in the containing chamber, which helps the insert provide a more balanced force for the electrical module, so that the front side of the electrical module is in contact with the front panel in a more desirable manner.

[0014] In one possible embodiment, at least one pair of elastic pressing portions is symmetrically disposed on two sides of at least one insert strip. Therefore, on the one hand, more pressing portions are arranged on the insert, and on the other hand, the pressing portions symmetrically disposed help the insert apply a more balanced force to the electrical module on the same depth of the containing chamber.

[0015] In one possible embodiment, the electrical module and/or a rear wall of the containing chamber facing the front panel has a guide slot extending in the insertion direction, and the insert strips are inserted into the containing chamber along the corresponding guide slot. Therefore, the insert strips can be inserted into the containing chamber along the guide slot, which not only facilitates rapid positioning of the insert, but also helps to restrict shake of the insert strips in a width direction of the containing chamber in the process of being inserted into the containing chamber, so that the insert is accurately and smoothly inserted into the containing chamber.

[0016] In one possible embodiment, one end of the elastic pressing portions is connected to the insert strips, and the other end is a free end and extends towards a direction opposite to the insertion direction. This particularly helps prevent the pressing portions from being damaged in the process that the insert is inserted into the containing chamber.

[0017] In one possible embodiment, the elastic pressing portions and the insert strips do not overlap in a thickness direction of the door. For example, the elastic pressing portions may be connected to side surfaces, facing the containing chamber, of end portions of the insert strips. This helps reduce, in the thickness direction of the door, the size of a part, which is located in the containing chamber, of the insert, so that the size of the containing chamber does not need to be increased significantly in the thickness direction of the door.

[0018] In one possible embodiment, the insert includes a substrate, the substrate is at least substantially perpendicular to the front panel, and the insert strips extend inward from an inner side of the substrate. Therefore, the insert can occupy smaller space in the door.

[0019] In one possible embodiment, the substrate is provided with at least one light-transmitting through hole. For example, a light source located in the containing chamber may be allowed to illuminate a handle groove nearby.

[0020] In one possible embodiment, the electrical mod-

ule includes an electric device and a bearing housing that bears the electric device, and the bearing housing or a rear wall of the containing chamber has a rib matching the pressing portions. Therefore, in a part where no rib is distributed, the size of the containing chamber in the thickness direction of the door can be reduced.

[0021] In one possible embodiment, the rib may gradually rise in the insertion direction, and in the multiple pressing portions spaced in the insertion direction, a pressing portion closer to the inlet is higher. Therefore, it helps the insert be inserted into the containing chamber, and moreover, after the insert reaches an installation position, the pressing portions can abut against the rib in a balanced manner.

[0022] In one possible embodiment, a guide slot disposed parallel to the rib is included, and the insert strips are inserted into the containing chamber along the guide slot.

[0023] In one possible embodiment, the door may include a cover used to close the inlet, and the insert is disposed independent of the cover. In one preferred embodiment, the insert includes a plate-like substrate adjacent to an inner side of the cover, and the insert strips extend inward from the substrate.

[0024] In one possible embodiment, the door may include a handle groove adjacent to the containing chamber and a grip portion located behind the front panel, the grip portion being integrally formed on the cover.

[0025] In one possible embodiment, the door includes a handle groove disposed side by side with the containing chamber and a recess open towards a front side of the door, the handle groove is approached through the recess, and the recess, the handle groove and the containing chamber are distributed side by side in sequence in the insertion direction of the insert. Because a concave portion, the handle groove and the user interface electric module are distributed side by side in sequence in a depth direction of the handle groove and do not overlap in a length direction of the handle groove, each of them may obtain a greater length in a bounding box if necessary. Therefore, the door may have a compact operation center, and meanwhile, the concave portion and the handle groove may have a sufficient length to enable a user to conveniently put his/her hand into the handle groove and grip the grip portion to open the door. Similarly, a user electrical interface of a user operation center may also occupy a larger size on the door.

[0026] When the concave portion and the handle groove are disposed near a longitudinal side of the door, for example, near a left side or a right side of the door, the depth direction of the handle groove is a transverse direction of the door, and when the concave portion and the handle groove are disposed near a transverse side of the door, for example, located on the top or the bottom of the door, the depth direction of the handle groove is a length direction (which may also be called height direction) of the door.

[0027] Another aspect of the present invention relates

to a refrigerator, including the door for a refrigerator as described above.

[0028] It should be understood that the present invention is applicable to refrigerators with various different structures, but should not be limited to the preferred embodiments disclosed in the present invention. For example, the present invention is applicable to a side-by-side combination refrigerator having a first storage compartment and a second storage compartment disposed side by side, is applicable to a refrigerator having a first storage compartment and a second storage compartment disposed up and down, and is further applicable to a refrigerator in which a pair of doors close the same storage compartment.

[0029] A storage compartment of a refrigerator may be used for storing food and/or wine, for example, the refrigerator may have at least one storage compartment purely for storing wine.

[0030] The door may be a rotatable door pivotally connected to a main body of the refrigerator, and may also be a drawer-type door drawably connected to the main body.

[0031] The door may close one or more storage compartments of the refrigerator, and may also close a part of one or more storage compartments.

[0032] The structure and other invention objectives as well as beneficial effects of the present invention will be more comprehensible with reference to the accompanying drawings and the description about the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] As a part of the specification and for facilitating further comprehension of the present invention, the following accompanying drawings illustrate specific implementation manners of the present invention, and describe the principle of the present invention together with the specification.

FIG. 1 is a partial schematic three-dimensional view of a refrigerator according to a preferred embodiment of the present invention;

FIG. 2 is a partial schematic three-dimensional view of a door according to a preferred embodiment of the present invention;

FIG. 3 is a partial schematic exploded view of a door according to a preferred embodiment of the present invention;

FIG. 4 is a partial schematic sectional view along an A-A direction in FIG. 2;

FIG. 5 is a schematic three-dimensional view of an insert according to a preferred embodiment of the present invention; and

FIG. 6 is a partial schematic three-dimensional view of a bearing housing of an electrical module according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION

[0034] FIG. 1 is a partial schematic three-dimensional view of a refrigerator 100 according to a preferred embodiment of the present invention. As shown in FIG. 1, the refrigerator 100 includes a main body 5 having a first storage compartment (not shown) and a second storage compartment (not shown) disposed side by side. The refrigerator 100 further includes a pair of doors 2, 2' that are open towards each other and connected to the main body 5, to separately close corresponding storage compartments.

[0035] Referring to FIG. 2 to FIG. 4 in combination with FIG. 1, the door 2 has an integrated operation center 6. The operation center 6 includes a user interface 61 and a handle groove 232 integrated in the operation center 6. When a user opens or closes the door 2, a hand of the user can reach into the handle groove 232.

[0036] The operation center 6 further includes a concave portion 233, and the hand of the user enters into the handle groove 232 through the concave portion 233. The concave portion 233 is exposed to a front side and a right side of the door 2, and is therefore accessible from the front side and the right side of the door 2.

[0037] The operation center 6 is disposed on one side of the door 2 opposite to the other door 2'. In this embodiment, the door 2' also has a concave portion and a handle groove (not shown) that is accessible from the concave portion. The concave portions on the pair of doors 2 and 2' are disposed opposite to each other, and have a same length.

[0038] In this embodiment, the concave portion 233 and the handle groove 232 only extend in part of the length of the door 2, and therefore are at a distance from a top surface 203 and a bottom surface (not shown) of the door 2.

[0039] The user interface 61 is configured to receive inputs from users and/or output information. The user interface 61 includes an electrical module 25. The electrical module 25 may include an output unit for outputting information (for example, information about settings of the refrigerator 100 and/or information about food stored in the refrigerator 100, or information irrelevant to the refrigerator, such as video/pictures) to users and an input unit for receiving a user instruction. The electrical module 25 may include a display apparatus.

[0040] The user interface 6 includes multiple touch areas 24a indicated by touch IDs and/or a display area 24b. The touch areas 24a and/or the display area 24b are formed on a front panel 24 located in front of the electrical module 25.

[0041] The front panel 24 forms at least most of a front surface 201 of the door 2. The front panel 24 may be

made of glass or a glasslike material. The front panel 24 may be adhered onto the door 2 by using an adhering apparatus 242, and may also be fixed onto the door 2 by using a mechanical structure. In this embodiment, the front panel 24 is not in contact with a heat insulation layer 20 of the door 2, a rear side of the front panel 24 further has a door plate 21, and the heat insulation layer 20 is located between the door plate 21 and a door liner 22. In one alternative embodiment, the front panel 24 may also be bonded to the heat insulation layer 20 in the foaming procedure.

[0042] The electrical module 25 is contained in a containing chamber 231 accessible from one side of the door 2, and the containing chamber 231 has an inlet 2310 open towards one side of the door 2. In this embodiment, the containing chamber 231 has an inlet 2310 open towards the concave portion 233 and the handle groove 232 of the door, so that the containing chamber 231 is accessible via the concave portion 233 and the handle groove 232 that are exposed to a side surface 202 of the door 2.

[0043] Preferably, the containing chamber 231, the concave portion 233 and the handle groove 232 are located in a same interface housing 23, and the concave portion 233, the handle groove 232 and the containing chamber 231 are disposed side by side in sequence in the interface housing 23 in a depth direction of the handle groove 232. Therefore, visual elements of the user interface 61, including the touch areas 24a and the display area 24b, as well as the handle groove 232 and the concave portion 233 are visually disposed side by side in a transverse direction of the door 2. The electrical module 25 located behind the front panel 24 as well as the handle groove 232 and the concave portion 233 are also disposed side by side in the transverse direction of the door 2. In this way, the containing chamber 231 that contains the electrical module 25, the handle groove 232, and the concave portion 233 do not overlap in a length direction of the handle groove 232 (which is also a length direction of the door 2 in this embodiment), but they at least partially overlap in a depth direction of the handle groove 232 (which is also a transverse direction of the door 2 in this embodiment). In this way, the handle groove 232 and the concave portion 233 can be constructed to have greater lengths in the operation center 6 if necessary.

[0044] The inlet 2310 of the containing chamber 231 can be closed by a cover 29 removably connected to a door body 20. After the front panel 24 is fixed to the door body 20, before the cover 29 is not fixed to the door body 20 or after the cover 29 is removed from the door body 20, the electrical module 25 can be inserted into the containing chamber 231 or removed from the containing chamber 231 via the concave portion 233 and the handle groove 232.

[0045] The front panel 24 forms a front boundary of the containing chamber 231, and the electrical module 25 is connected to a rear surface of the front panel 24, so as to receive an instruction that is input by a user by touching

the front panel 24.

[0046] According to the embodiment of the present invention, the size of the electrical module 25 in the thickness direction (a fore-and-aft direction) of the door 2 is less than the thickness of the containing chamber 231, and therefore, in the process that the electrical module 25 is inserted into the containing chamber 231, a side, facing the front panel 24, of the electrical module 25 does not produce a great friction with the front panel 24, thereby avoiding damaging the electrical module 25. As shown in FIG. 3 to FIG. 5, the door 2 includes an insert 3 that can be inserted into the containing chamber 231 from the inlet 2310 of the containing chamber 231. The insert 3 is disposed independent of the containing chamber 231 and the electrical module 25, and after the electrical module 25 is located in the containing chamber 231, the insert 3 is inserted between the electrical module 25 and a rear wall 24 of the containing chamber 231. Therefore, the electrical module 25 is pressed towards the front panel 24 and is in close contact with the rear surface of the front panel 24.

[0047] The insert 3 includes multiple insert strips 311, 312 spaced apart and extending along an insertion direction D in which the insert 3 is inserted into the containing chamber 231 and multiple elastic pressing portions 321, 322, 323 (only several elastic pressing portions are marked in the figures) disposed along the corresponding insert strips 311, 312 and used to press the electrical module 25 towards the front panel 24.

[0048] In this embodiment, a first end of each pressing portion 321, 322, 323 is connected to a corresponding insert strip 311, 312, and a second end of each pressing portion 321, 322, 323 is a free end and extends towards a direction opposite to the insertion direction D of the insert 3.

[0049] In this embodiment, the pressing portions 321, 322, 323 are of spring structures. The first end of each pressing portion 321, 322, 323 may be connected to a side surface, facing the containing chamber 231, of two ends of the corresponding insert strip 311, 312. The pressing portion 321, 322, 323 and the insert strip 311, 312 do not overlap in the thickness direction of the door 2, which facilitates a part, which is in the containing chamber 231, of the insert 3 to be constructed to have a smaller thickness.

[0050] In this embodiment, the insert 3 has four insert strips 311, 312 spaced apart. Two first insert strips 311 are near corresponding end portions (which are an upper end and a lower end in this embodiment) of the containing chamber 231 respectively, and two second insert strips 312 are spaced apart between the two first insert strips 311.

[0051] The insert 3 includes a substrate 30, and the substrate 30 is at least substantially perpendicular to the front panel 24. The insert strips 31 extend inward from an inner side of the substrate 30. The substrate 30 may be located near the inlet of the containing chamber 231. The substrate 30 may be provided with at least one light-

transmitting through hole 301. One end of the substrate 30 may be provided with at least one grip concave portion 302 to facilitate removal of the insert 3.

[0052] In this embodiment, each insert strip 311, 312 is configured with a plurality of pressing portions 321, 322, 323 spaced apart in the insertion direction D, so that in the insertion direction, the insert 3 may have multiple groups of pressing portions 321, 322, 323. multiple pairs of elastic pressing portions 321, 322, 323 may also be symmetrically disposed on two sides of the second insert strips 312.

[0053] The electrical module 25 includes a bearing housing 251 for bearing an electric device (such as a PCB, which is not marked). A side, facing the rear wall 24 of the containing chamber 231, of the bearing housing 251 may have multiple guide slots 252 extending in the insertion direction D. The insert strips 311 and 312 are inserted into the containing chamber 231 along the corresponding guide slots 252.

[0054] As shown in FIG. 4 and FIG. 6, a side, facing the rear wall 24, of the bearing housing 251 has a rib 253 matching the pressing portions 321, 322, 323. The pressing portions 321, 322, 323 abut against the corresponding rib 253. The rear wall 24 may be provided with a concave portion at the corresponding rib 253, so that in a part where the rib 253 is not provided, the size, in the thickness direction of the door 2, of the containing chamber 231 does not need to be increased, thereby avoiding occupying space of 20 of the door 2.

[0055] The rib 253 gradually rises in the insertion direction D. Correspondingly, in the multiple pressing portions 321, 322, 323 spaced apart in the insertion direction D, a pressing portion 321, 322, 323 closer to the inlet is higher. For example, the pressing portion 321 is higher than the pressing portion 322, and the pressing portion 322 is higher than the pressing portion 323. The rib 253 can be disposed adjacent to and in parallel to the corresponding guide slot 252.

[0056] The insert 3 is disposed independent of the cover 29 for closing the inlet of the containing chamber 231. After the insert 3 is inserted into the containing chamber 231, the cover 29 closes the containing chamber 231.

[0057] The door 2 includes a grip portion 291 located behind the front panel 24. The grip portion 291 is integrally formed on the cover 29. After the cover 29 is fixed to the door 2, when the hand of the user reaches into the handle groove 232, the user can hold the grip portion 291 with fingers.

[0058] In a front-rear direction, the grip portion 291 can be completely covered by the front panel 24, and the grip portion 291 is located between the handle groove 232 and the front panel 24. When opening the door, the user presses some fingers on a rear surface of the grip portion 291, and presses another finger (for example, the thumb) on the front panel 24 in front of the grip portion 291, so as to apply a force to open the door 2.

[0059] Various embodiments of individual parts described with reference to FIG. 1 to FIG. 6 can be com-

bined in any given manner, to implement advantages of the present invention. In addition, the present invention is not limited to the illustrated embodiments, and generally, means other than those illustrated may also be used, as long as the means can also achieve the same effect.

Claims

1. A door (2) for a refrigerator (100), the door (2) comprising:
 - a front panel (24);
 - a containing chamber (231) located behind the front panel (24), the containing chamber (231) having an inlet (2310) accessible from one side of the door (2);
 - an electrical module (25) received in the containing chamber (231); and
 - an insert (3) inserted into the containing chamber (231) from the inlet (2310);

characterized in that,
the insert (3) comprises multiple insert strips (311, 312) spaced apart and extending along an insertion direction (D) in which the insert (3) is inserted into the containing chamber (231) and multiple elastic pressing portions (321, 322, 323) disposed along the corresponding insert strips (311, 312) and used to press the electrical module (25) towards the front panel (24).
2. The door (2) according to claim 1, **characterized in that**, at least one insert strip (311, 312) is configured with multiple pressing portions (321, 322, 323) spaced apart in the insertion direction (D).
3. The door (2) according to claim 1, **characterized in that**, at least one pair of elastic pressing portions (321, 322, 323) is symmetrically disposed on two sides of at least one insert strip (312).
4. The door (2) according to any one of claims 1 to 3, **characterized in that**, the electrical module (25) and/or a rear wall (24) of the containing chamber (231) facing the front panel (24) has a guide slot (252) extending in the insertion direction (D), and the insert strips (311, 312) are inserted into the containing chamber (231) along the corresponding guide slot (252).
5. The refrigerator (100) according to claim 1, **characterized in that**, one end of the elastic pressing portions (321, 322, 323) is connected to the insert strips (311, 312), and the other end is a free end and extends towards a direction opposite to the insertion direction (D).
6. The refrigerator (100) according to claim 1, **charac-**

terized in that, the elastic pressing portions (321, 322, 323) and the insert strips (311, 312) do not overlap in a thickness direction of the door (2).

refrigerator (100) according to any one of the preceding claims.

7. The refrigerator (100) according to claim 1, **characterized in that**, the insert (3) comprises a substrate (30), the substrate (30) is at least substantially perpendicular to the front panel (24), and the insert strips (311, 312) extend inward from an inner side of the substrate (30). 5
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8. The refrigerator (100) according to claim 7, **characterized in that**, the substrate (30) is provided with at least one light-transmitting through hole (301). 15
9. The door (2) according to claim 1, **characterized in that**, the electrical module (25) comprises an electric device and a bearing housing (251) that bears the electric device, and the bearing housing (251) or a rear wall (24) of the containing chamber (231) has a rib (253) matching the pressing portions (321, 322, 323). 20
10. The door (2) according to claim 9, **characterized in that**, the rib (253) gradually rises in the insertion direction (D), and in the multiple portions (321, 322, 323) spaced apart in the insertion direction (D), a pressing portion (321, 322, 323) closer to the inlet (2310) is higher. 25
30
11. The door (2) according to claim 9, **characterized by** comprising a guide slot (252) disposed parallel to the rib (253), the insert strips (311, 312) being inserted into the containing chamber (231) along the guide slot (252). 35
12. The door (2) according to claim 1, **characterized by** comprising a cover (29) used to close the inlet (2310), the insert (3) being disposed independent of the cover (29). 40
13. The door (2) according to claim 12, **characterized by** comprising a handle groove (232) adjacent to the containing chamber (231) and a grip portion (291) located behind the front panel (24), the grip portion (291) being integrally formed on the cover (29). 45
14. The door (2) according to claim 1, **characterized in that**, the door (2) comprises a handle groove (232) disposed side by side with the containing chamber (231) and a recess (233) open towards a front side of the door (2), the handle groove (232) is approached through the recess (233), and the recess (233), the handle groove (232) and the containing chamber (231) are distributed side by side in sequence in the insertion direction (D) of the insert (3). 50
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15. A refrigerator (100), comprising the door (2) for the

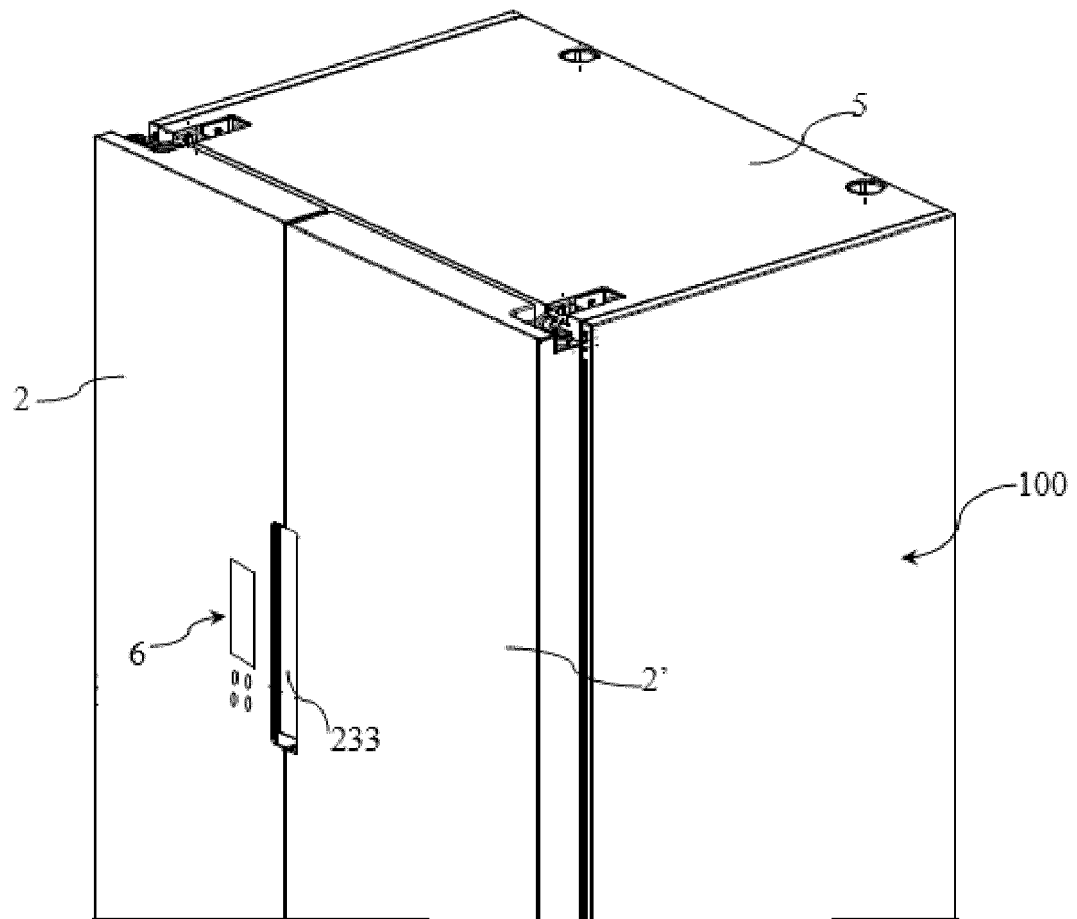


FIG. 1

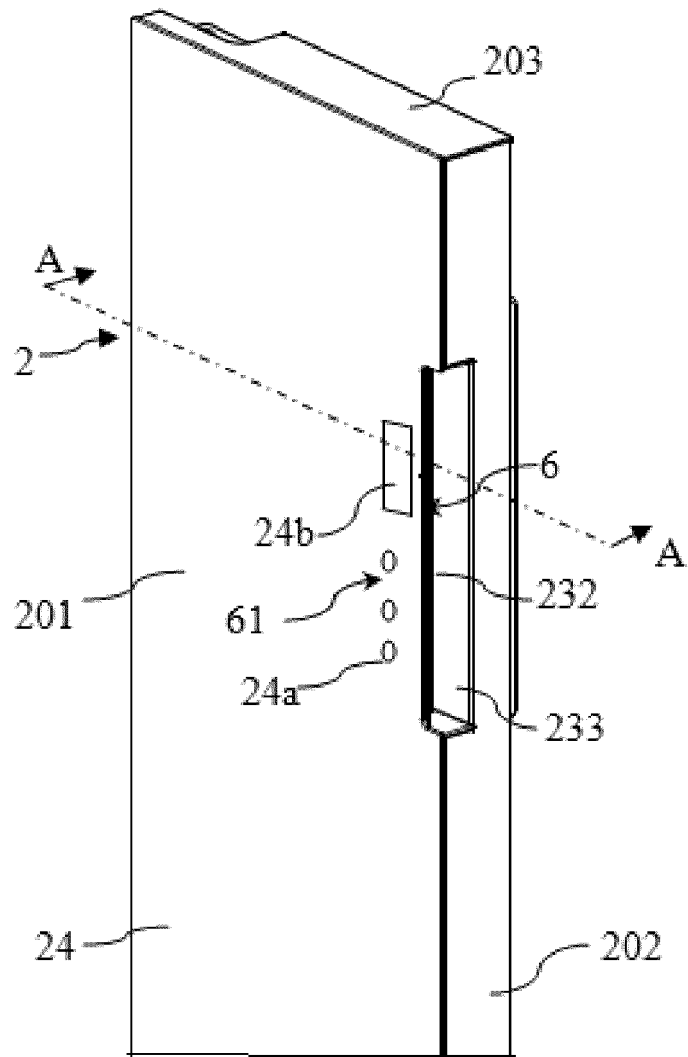


FIG. 2

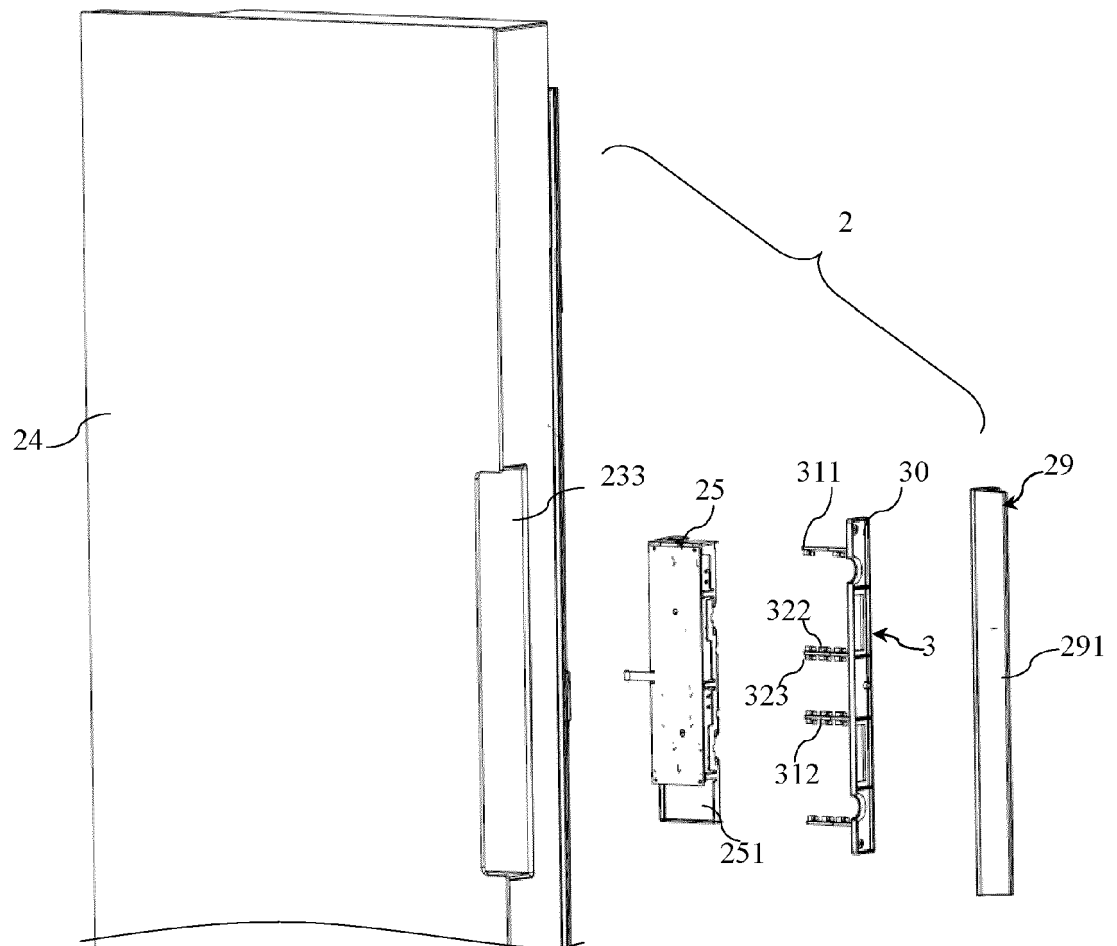


FIG. 3

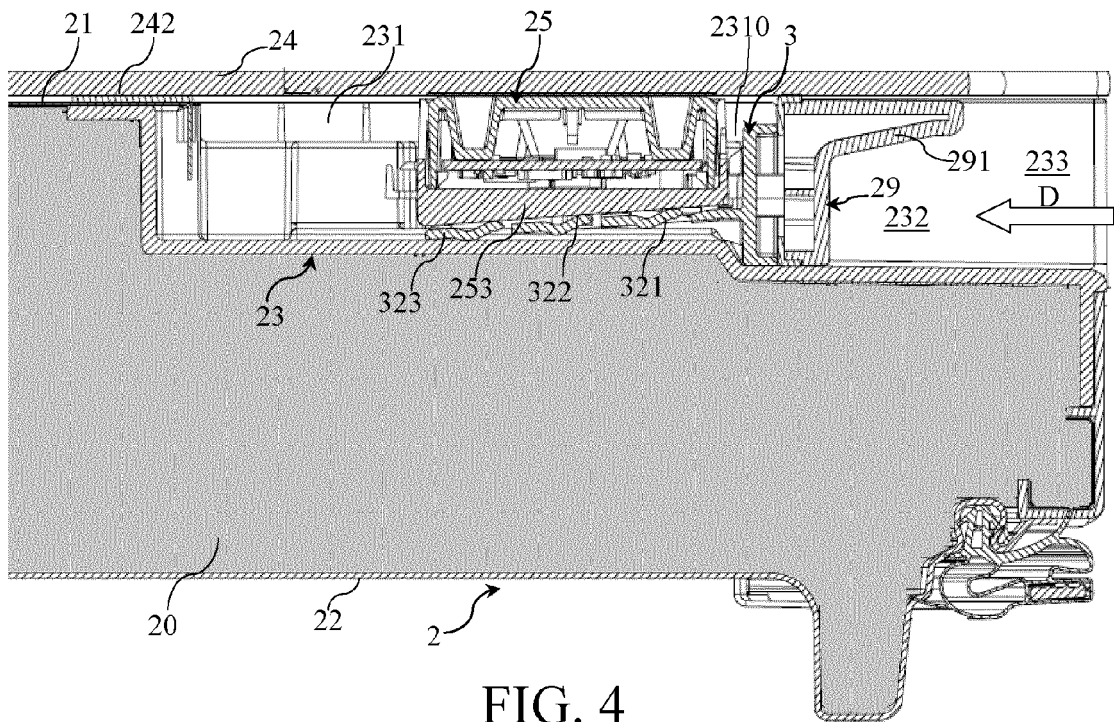


FIG. 4

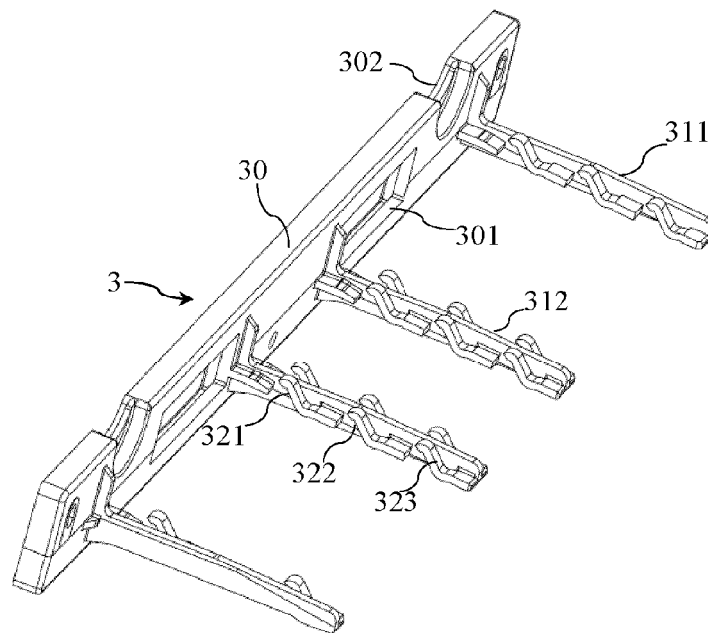


FIG. 5

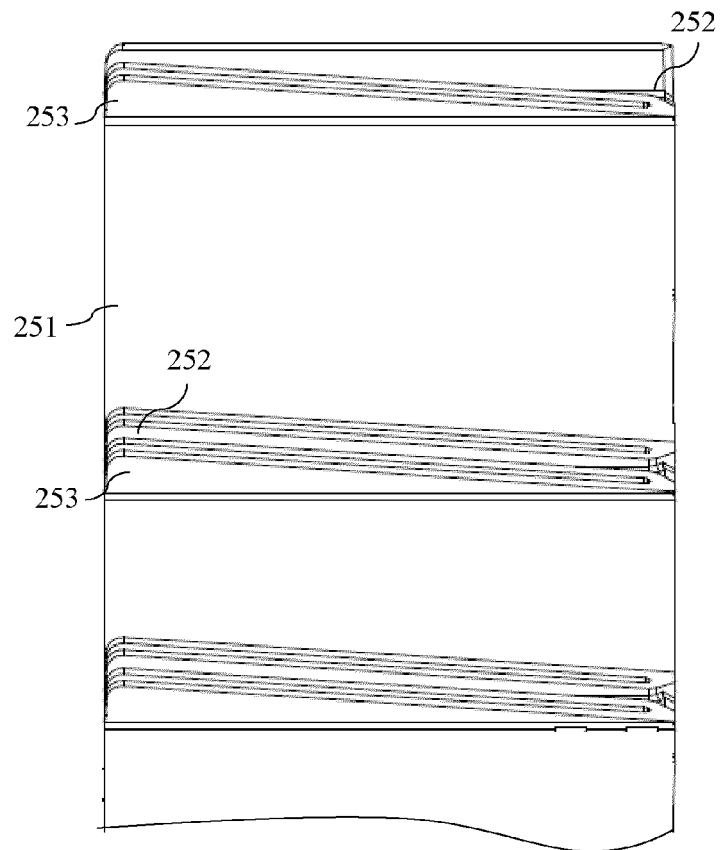


FIG. 6



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 18 6467

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 January 2016	Examiner Kuljis, Bruno
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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