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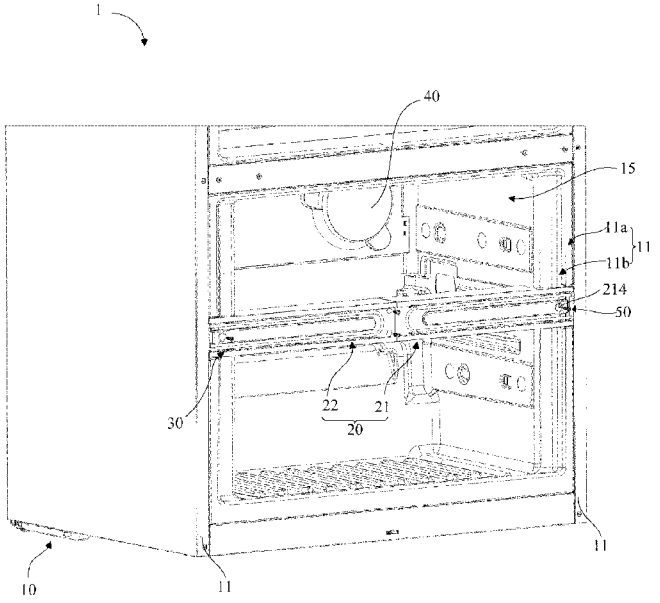

FIG. 2

(57) Abstract: A refrigeration appliance and a method for manufacturing a refrigeration appliance are disclosed. The refrigeration appliance includes: a case body (10, 100), where the case body (10, 100) includes a pair of opposite case walls (11, 101); and a beam (20, 60), which bridges the pair of case walls (11, 101). The beam (20, 60) includes at least two beam section, a length of each of the beam sections is less than a length of the beam (20, 60), and the at least two beam sections are connected along a length direction of the beam sections to form the beam (20, 60). The beam in the present invention is formed by connecting at least two end beam sections, and a length of each beam section is less than the length of the beam. Therefore, the beam may be installed before a foaming process of the case body, or may be assembled to the case body after a foaming process of the case body.

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REFRIGERATION APPLIANCE AND METHOD FOR MANUFACTURING REFRIGERATION APPLIANCE

BACKGROUND

Technical Field

The present invention relates to the technical field of refrigeration appliances, and in particular, to a refrigeration appliance and a method for manufacturing a refrigeration appliance.

Related Art

It is known in the prior art to dispose, at a front end of a case body of a refrigeration appliance, a beam that bridges two thermal insulation case walls. For example, a beam spans a front opening of a compartment, and two or more doors for closing corresponding parts of a storage compartment seal and abut against the beam. For another example, a beam that extends in a vertical direction bridges an upper wall and a lower wall opposite to each other.

During assembly, a known method is to install a beam to a case body before a foaming process of the case body. However, when another member (for example, a relatively large refrigeration member such as an evaporator and/or an air duct component) needs to be assembled in a compartment after the foaming process of the case body, the beam in front of the compartment affects installation of a refrigeration component, or even blocks the refrigeration component from entering the compartment, and consequently, the refrigeration component cannot be installed.

If the beam is assembled to the case body after the foaming process, because a length of the beam is greater than a size of an opening of the compartment along a length direction of the beam, and the case body of the refrigeration appliance may deform after the foaming process, it is extremely challenging to install the beam, and it is difficult to ensure manufacturing quality of the refrigeration appliance.

SUMMARY

An objective of the present invention is to provide an improved refrigeration appliance and a method for manufacturing a refrigeration appliance, so as to overcome

at least one of the foregoing technical problems.

Another objective of the present invention is to provide a refrigeration appliance easy in manufacture and a manufacturing method of same.

Therefore, an aspect of the present invention relates to a refrigeration appliance. The refrigeration appliance includes: a case body, including a pair of opposite case walls; and a beam, which bridges the pair of case walls, where the beam includes at least two beam sections, a length of each of the beam sections is less than a length of the beam, and the at least two beam sections are connected along a length direction of the beam sections to form the beam.

The beam is formed by connecting the at least two beam sections, and the length of each beam section is less than the length of the beam. Therefore, the beam may be installed before a foaming process of the case body, or may be assembled to the case body after a foaming process of the case body, and this may be selected by a manufacturer as needed. For example, when a relatively large member (such as an evaporator, an air duct member, or a water tank) is disposed behind the beam in a storage compartment, the beam may be installed after the case body of the refrigeration appliance completes foaming and the relatively large member is installed in the storage compartment. For another example, one or some beam sections are assembled to the case body before the foaming process of the case body, and a remaining beam section is assembled after the foaming process of the case body. It can be seen that, the refrigeration appliance according to this embodiment of the present invention is not only easy in manufacture and but also helps ensure manufacturing quality. It should be understood that, the present invention is applicable to both a beam that extends transversely and a beam that extends vertically.

The refrigeration appliance may include a cooling/freezing device such as a refrigerator, a wine cooler, or a freezer.

Optionally, a thermal insulation material is provided in each of the beam sections. Because thermal insulation material is provided in each beam section, it can be expected that the beam has a relatively desirable thermal insulation function in its entire length direction. The thermal insulation material may be formed in each beam section by means of the foaming process or the thermal insulation material in each beam section is

formed by using another thermal insulation element such as an EPS element. In another embodiment, thermal insulation materials in one or some beam sections are formed in corresponding beam sections by means of the foaming process, and an inner thermal insulation material of a remaining beam section is another thermal insulation element.

Optionally, each of the beam sections includes a first housing and a second housing, where the first housing and the second housing enclose a thermal insulation space, and the thermal insulation material is located in the thermal insulation space.

Optionally, adjacent connection end portions of at least one pair of adjacent beam sections are at least partially overlapped and joined in an up-down direction and/or a front-rear direction. This facilitates a fixed connection between the adjacent connection end portions of the adjacent beam sections. When the adjacent connection end portions are overlapped and joined in the up-down direction, the beam section may be better supported. When the adjacent connection end portions are overlapped in the front-rear direction, it helps block cold air from flowing from a rear end to a front end of the beam.

Optionally, one of the adjacent connection end portions includes an accommodating groove, and the other one of the adjacent connection end portions includes a protruded portion located in the accommodating groove. This helps implement supporting/limiting of the adjacent connection end portions in the up-down direction and/or the front-rear direction, and helps enhance connection strength of the adjacent connection end portions.

Optionally, the refrigeration appliance includes a fixing apparatus, where the fixing apparatus fixes parts, which are overlapped in the up-down direction and/or the front-rear direction, of the adjacent end portions. By using the fixing apparatus such as a bolt or a screw, adjacent connection end portions of beam sections are fixedly connected, thereby enhancing connection strength of the adjacent connection end portions.

Optionally, a side, which faces the beam, of the case wall is provided with an insertion groove; and one end, which faces the case wall, of the beam section is inserted into the insertion groove. After one end, which faces the case wall, of the beam

section is inserted into the insertion groove, pre-installation of the beam and the case wall can be implemented.

Optionally, the at least two beam sections include a first beam section and a second beam section, where one end of the first beam section is fixed in one of the case walls, one end of the second beam section is fixed in the other one of the case walls, and the other end of the first beam section is connected to the other end of the second beam section.

Lengths of the first beam section and the second beam section may be approximately the same, or may obviously vary from each other. When one of the two beam sections is short, the beam section may be installed before the foaming process of the case body, or may be installed after the foaming process of the case body.

Optionally, the at least two beam sections include a first beam section and a second beam section that are respectively fixed in corresponding case walls, and at least one third beam section located between the first beam section and the second beam section.

Optionally, the first beam section and the second beam section are beam bases connected to the corresponding case walls. The beam base is relatively short. Therefore, it not only facilitates installation of the first beam section and the second beam section, but also provides a possibility that even if a relatively large member needs to be installed in the storage compartment after the foaming process of the case body, the first beam section and the second beam section may still be installed in the case body before the foaming process of the case body, because the first beam section and the second beam section acting as bases may be designed short to such an extent and do not affect/interfere with the installation of the relatively large member after the foaming process of the case body.

Optionally, the first beam section and the second beam section each include a first leg portion connected to a front end surface of a corresponding case wall and a second leg portion connected to an inner surface of the corresponding case wall. For the first beam section and the second beam section, the first leg portion engages with the front end surface of the corresponding case wall, the second leg portion engages with the inner surface of the corresponding case wall, and fixed connections are implemented by using a screw, enhancing connection stability of the beam and the case wall.

Optionally, the first beam section and the second beam section each include an L-shaped inner housing connected to a corresponding case wall and a board-shaped outer housing, where the inner housing and the outer housing enclose an L-shaped thermal insulation space, and an L-shaped thermal insulation material is provided in the thermal insulation space.

Optionally, two ends of the third beam section are close to inner surfaces of the corresponding case walls. In this way, a length of the third beam section constitutes a most part of the length of the beam. Therefore, it can be expected that the beam is formed by two relatively short beam bases (the first beam section and the second beam section) that are fixed to the corresponding case walls and the relatively long third beam section that connects the two beam bases.

Optionally, the refrigeration appliance includes a dew prevention pipe that extends along a length direction of the beam, and each of the beam sections includes a groove to receive a corresponding part of the dew prevention pipe. In this way, the corresponding part of the dew prevention pipe may be embedded in the groove on each beam section, and the dew prevention pipe may be reliably fixed.

Optionally, the refrigeration appliance includes an evaporator, where the evaporator is disposed along an inner surface of a rear wall of the case body, and has an overlapped projection with the beam in the front-rear direction. When a manufactured refrigeration appliance needs to assemble an evaporator in a storage compartment behind a beam, because the beam used in this embodiment of the present invention includes the at least two beam sections, the evaporator may be installed in the storage compartment before at least one of the foregoing beam sections is assembled to the case wall or in an adjacent beam section. This facilitates manufacturing of the refrigeration appliance, improves installation efficiency, and helps ensure quality of the refrigeration appliance.

The beam includes a one-piece front panel, and the front panel covers the at least two beam sections. The front panel is in a one-piece structure and covers the at least two beam sections. Even if a gap probably exists between the beam sections, the one-piece structure front panel may cover the gap. Therefore, the beam may still be beautiful and concise in appearance.

Another aspect of the present invention relates to a method for manufacturing a refrigeration appliance, at least one of at least two beam sections of a beam that bridges a pair of case walls is connected to a case wall and/or an adjacent beam section after a foaming process of a case body. The at least one beam section may be assembled to the case wall and/or the adjacent beam section after the foaming process of the case body. Therefore, even if a relatively large member needs to be installed in a storage compartment behind the beam, the member may still be installed in the storage compartment before the at least one beam section is assembled to the case wall or the adjacent beam section. Therefore, the method for manufacturing a refrigeration appliance according to this embodiment of the present invention not only facilities manufacturing of the refrigeration appliance and improves installation efficiency, but also helps ensure quality of the refrigeration appliance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic three-dimensional view of a case body according to an embodiment of the present invention;

FIG. 2 is another schematic three-dimensional view of a case body according to an embodiment of the present invention;

FIG. 3 is a schematic three-dimensional view of a first beam section according to an embodiment of the present invention;

FIG. 4 is a schematic three-dimensional exploded view of FIG. 3;

FIG. 5 is a schematic three-dimensional view of a second beam section according to an embodiment of the present invention;

FIG. 6 is a schematic three-dimensional exploded view of FIG. 5;

FIG. 7 is a schematic view of a connection between a first beam section and a second beam section according to an embodiment of the present invention;

FIG. 8 is another schematic three-dimensional view of a case body without a beam according to an embodiment of the present invention;

FIG. 9 is an enlarged view of a connection between a first beam section and a second beam section in FIG. 2;

FIG. 10 is a schematic three-dimensional view of installation of a refrigeration component according to an embodiment of the present invention;

FIG. 11 is a schematic main view of a case body with an installed refrigeration component according to an embodiment of the present invention;

FIG. 12 is a schematic three-dimensional view according to an embodiment of the present invention when a first beam section and a second beam section on a case wall are not assembled together;

FIG. 13 is a schematic three-dimensional view of a case body according to another embodiment of the present invention;

FIG. 14 is a schematic three-dimensional view of a beam according to another embodiment of the present invention;

FIG. 15 is a schematic three-dimensional exploded view of a third beam section according to another embodiment of the present invention;

FIG. 16 is a schematic three-dimensional view of a beam base according to another embodiment of the present invention;

FIG. 17 is a schematic three-dimensional exploded view of the beam base in FIG. 16; and

FIG. 18 is another schematic three-dimensional view of a case body according to another embodiment of the present invention.

DETAILED DESCRIPTION

To make the foregoing objectives, features, and advantages of the present invention more obvious and more understandable, the following describes specific embodiments of the present invention in detail with reference to the accompanying drawings.

Embodiment 1

Referring to FIG. 1, this embodiment of the present invention provides a refrigeration appliance 1, and the refrigeration appliance 1 includes a case body 10. Referring to FIG. 2, the case body 10 includes a pair of opposite case walls 11. In this embodiment, the case walls 11 extend in a height direction, and are disposed opposite to each other along a width direction of the case body 10. The width direction of the case

body 10 is perpendicular to a height direction of the case body 10, and is perpendicular to a front-rear direction of the case body 10.

Still referring to FIG. 2, the case body 10 has a storage compartment 15 and a beam 20 that bridges the pair of case walls 11 at a front opening of the storage compartment 15. The front opening in this embodiment is an opening that faces a user after the user opens a door (not shown in the figure) of the refrigeration appliance 1. Due to the existence of the beam 20, the front opening of the storage compartment 15 is divided into two openings by the beam 20. The refrigeration appliance 1 may have doors for respectively closing the corresponding openings (not shown in the figure). When the door is closed, an inner side of the door may be tightly connected to the beam 20 to prevent cold air in the storage compartment 15 from leaking.

It should be understood that, the present invention is also applicable to a case in which the beam 20 is located between adjacent storage compartments.

Still referring to FIG. 2, a refrigeration component 40 is disposed in the storage compartment 15. The refrigeration component 40 has an overlapped projection with the beam 20 in the front-rear direction. That is, the refrigeration component 40 and the beam 20 are opposite to each other in the front-rear direction of the refrigeration appliance 1. In this embodiment, the refrigeration component 40 may include a member such as an air duct cover, an evaporator, and/or a fan.

In this embodiment, the refrigeration component 40 is relatively large. For example, the height of the refrigeration component 40 is close to or greater than heights of the pair of openings separated by the beam 20. If the beam 20 has been assembled to the case body 11, it is difficult or uneasy to assemble the refrigeration component 40 in the storage compartment 15. Consequently, it is inconvenient to install the refrigeration component 40.

According to this embodiment of the present invention, referring to FIG. 2, the beam 20 includes two beam sections 21, 22, and a length of each beam section is less than a length of the beam 20. For ease of description, in this embodiment, the two beam sections 21, 22 include a first beam section 21 and the second beam section 22. The first beam section 21 and the second beam section 22 are connected along a length direction to form the beam 20. A length direction of the beam 20 is the width direction

of the case body 10.

The length of each beam section is less than the length of the beam 20. Therefore, the beam 20 may be installed before a foaming process of the case body 10, or may be assembled to the case body 10 after a foaming process of the case body 10, and this may be selected by a manufacturer as needed. For example, when a relatively large member (for example, a water tank or a refrigeration member such as an evaporator, an air duct member, or a fan) is disposed behind the beam 20 in the storage compartment 15, the beam 20 may be installed after the case body 10 of the refrigeration appliance completes foaming and the relatively large member is installed in the storage compartment 15.

In this embodiment, in the foaming process of the case body 10, a foaming agent is injected into a pre-assembled unit of the case body 10, and the foaming agent is solidified in a thermal insulation space (not shown in the figure) of the case body 10 to form a thermal insulation layer.

That is, in this embodiment, when a relatively large member needs to be installed behind the beam 20 in the storage compartment 15, the beam 20 is installed later than the relatively large member. In this way, interference to installation of the relatively large member caused when the beam 20 is installed earlier is avoided.

For another example, one or some beam sections are assembled to the case body 10 before the foaming process of the case body 10, and a remaining beam section is assembled after the foaming process of the case body 10. It can be seen that, the refrigeration appliance according to this embodiment of the present invention is not only easy in manufacture and but also helps ensure manufacturing quality. In this embodiment, there are two beam sections, the first beam section 21 may be first assembled to the case body 10, and then the second beam section 22 is assembled after the foaming process of the case body 10.

In this embodiment, the beam 20 is formed by connecting the first beam section 21 and the second beam section 22 along the length direction of the beam sections. To ensure connection stability of the first beam section 21 and the second beam section 22, referring to FIG. 7, adjacent connection end portions 23, 24 of the first beam section 21 and the second beam section 22 are at least partially overlapped and joined in an

up-down direction and/or a front-rear direction. The connection end portion 24 of the first beam section 21 and the connection end portion 23 of the second beam section 22 are opposite to each other in the length direction of the beam sections, and are overlapped and joined in the up-down direction and/or the front-rear direction. In this embodiment, parts, which are overlapped in the up-down direction and/or the front-rear direction, of the connection end portion 24 of the first beam section 21and the connection end portion 23 of the second beam section 22 may be fixed by using a fixing apparatus. For example, a bolt hole or a screw hole may be provided in the overlapped part of the connection end portion 23 and the connection end portion 24. The parts, which are overlapped in the up-down direction and/or the front-rear direction, of the connection end portion 24 of the first beam section 21 and the connection end portion 23 of the second beam section 22 may be fixed by using a bolt or a screw.

It should be noted that, the fixing apparatus is not limited to the screw and the bolt, as long as the refrigeration appliance can fix the parts, which are overlapped in the up-down direction and/or the front-rear direction, of the adjacent end portions.

Specifically, referring to FIG. 7, in this embodiment, a protruded portion 216 is disposed at the connection end portion 24 of the first beam section 21, and the connection end portion 23 of the second beam section 22 is provided with an accommodation groove 226. When the first beam section 21 and the second beam section 22 are assembled, the protruded portion 216 may be located in the accommodation groove 226. In this way, the protruded portion 216 and the accommodation groove 226 are overlapped and joined in the up-down direction and/or the front-rear direction. Overlapped parts of the protruded portion 216 and the accommodation groove 226 are fixedly connected by using the fixing apparatus.

Still referring to FIG. 3 and FIG. 7, in this embodiment, the protruded portion 216 of the first beam section 21 is provided with a buckle 213 and a bolt hole (not shown in the figure). Referring to FIG. 5 and FIG. 7, a slot 224 and a bolt hole 225 are provided in the accommodation groove 226 on the second beam section 22. The bolt hole on the protruded portion 216 of the first beam section 21 corresponds to the bolt hole 225 on the second beam section 22 in the front-rear direction of the case body 10. Referring to FIG. 7 and FIG. 9, the buckle 213 on the first beam section 21 is clamped

with the slot 224 on the second beam section 22, and the bolt hole on the first beam section 21 and the bolt hole 225 on the second beam section 22 are connected by using a screw 51.

In this embodiment, referring to FIG. 8 and FIG. 2, sides, which face the beam 20, of the case walls 11 is provided with insertion grooves 12, 12a. During assembly of the beam sections, the first beam section 21 may be first inserted into the insertion groove 12a, and then the second beam section 22 is inserted into the other insertion groove 12. Finally, the parts, which are overlapped in the up-down direction and/or the front-rear direction, of the adjacent connection end portions 23, 24 of the first beam section 21 and the second beam section 22 are fixed by using the fixing apparatus, so that the beam 20 is assembled to the case walls 11.

Specifically, referring to FIG. 3 and FIG. 4, in this embodiment, the first beam section 21 includes a first housing 21a and a second housing 21b. The first housing 21a and the second housing 21b of the first beam section 21 enclose a thermal insulation space (not shown in the figure), and a thermal insulation material is located in thermal insulation space.

Referring to FIG. 5and FIG. 6, the second beam section 22 includes a first housing 22a and a second housing 22b. The first housing 22a and the second housing 22b of the second beam section 22 enclose a thermal insulation space (not shown in the figure), and a thermal insulation material is located in thermal insulation space.

Referring to FIG. 8, FIG. 1, and FIG. 2, a side, which faces the beam 20, of the case body 10 of the refrigeration appliance 1 is provided with a mounting hole 13 along the width direction of the case body 10. Referring to FIG. 3, a surface, which faces the mounting hole 13, of the first beam section 21 is provided with a through hole 214 opposite to the mounting hole 13. Referring to FIG. 5, a surface, which faces the mounting hole 13, of the second beam section 22 is provided with a through hole 223 opposite to the mounting hole 13.

After the first beam section 21 is inserted into the insertion groove 12a, the through hole 214 of the first beam section 21 and the mounting hole 13 on the case wall 11 are connected by using a screw 50, so as to a fixed connection between the first beam section 21 and the case wall 11.

After the second beam section 22 is inserted into the other insertion groove 12, the through hole 223 on the second beam section 22 and the mounting hole 13 on the case wall 11 are connected by using a screw 50, so as to a fixed connection between the second beam section 22 and the case wall 11.

In an actual installation process, the screw 50 may not be tightened, to implement pre-installation of the first beam section 21 and the second beam section 22 with the case wall 11. After the connection end portion 24 of the first beam section 21 is fixedly connected to the connection end portion 23 of the second beam section 22, the screw 50 is tightened, to complete assembling of the beam 20 and the case wall 11.

Still referring to FIG. 2, in this embodiment, each of opposite case walls 11 of the refrigeration appliance 1 has an inner surface 11b and a front end surface11a along the width direction of the case body 10. The front end surface11a of the case wall 11 and the inner surface 11b of the case wall 11 are perpendicular to each other. The inner surfaces 11b of the case walls 11 are disposed opposite to each other along the width direction of the case body 10.

Referring to FIG. 3, the first beam section 21 includes a first leg portion 212 connected to a front end surface 11a of a corresponding case wall 11 and a second leg portion 211 connected to an inner surface 11b of the corresponding case wall 11.

The first leg portion 212 and the second leg portion 211 of the first beam section 21 are connected to form an L shape as an entirety. In this embodiment, after the first beam section 21 is inserted into the insertion groove 12a, the first leg portion 212 of the first beam section 21 engages with the front end surface11a of the corresponding case wall 11, and the second leg portion 211 of the first beam section 21 engages with the inner surface 11b of the corresponding case wall 11. In this case, the through hole 214 on the first beam section 21 and the mounting hole 13 on the case wall 11 correspond to each other along the front-rear direction of the case body 10, and may be connected by using the screw 50.

Still referring to FIG. 5, the second beam section 22 includes a first leg portion 222 connected to a front end surface 11a of a corresponding case wall 11 and a second leg portion 221 connected to an inner surface 11b of the corresponding case wall 11.

The first leg portion 222 and the second leg portion 221 of the second beam section

22 are connected to form an L shape as an entirety. The first leg portion 222 of the second beam section 22 engages with the front end surface11a of the corresponding case wall 11, and the second leg portion 221 of the second beam section 22 engages with the inner surface 11b of the corresponding case wall 11. In this case, the through hole 223 on the second beam section 22 and the mounting hole 13 on the case wall 11 correspond to each other along the front-rear direction of the case body 10, and may be connected by using the screw 50.

Generally, air at different temperatures contains different amounts of water vapor, and air at a higher temperature contains a larger amount of water vapor. When the air temperature decreases to below an extreme temperature containing water vapor, excess water vapor precipitates and a dew condensation phenomenon occurs. Therefore, a dew removal apparatus is designed for a common refrigeration appliance, and is installed around an inner side of a door frame of a case body with a storage compartment of the refrigeration appliance and on an inner side of a beam. A high-temperature high-pressure refrigerant flowing through a pipe heats the door frame, increases a circumferential temperature, and prevents occurrence of the dew condensation phenomenon.

Referring to FIG. 2, the refrigeration appliance 1 in this embodiment further includes a dew prevention pipe 30 that extends along the length direction of the beam 20. Referring to FIG. 4, a part of the first beam section 21 away from the storage compartment 15 is provided with a groove 215 that extends along the length direction of the beam 20, and the groove 215 is used to receive a corresponding part of the dew prevention pipe 30. That is, a part, which is overlapped with the first beam section 21 along the front-rear direction of the case body 10, of the dew prevention pipe 30 is located in the groove 215 on the first beam section 21.

Referring to FIG. 6, a part of the second beam section 22 away from the storage compartment 15 is provided with a groove 227 that extends along the length direction of the beam 20, and the groove 227 is used to receive a corresponding part of the dew prevention pipe 30. That is, a part, which is overlapped with the second beam section 22 along the front-rear direction of the case body 10, of the dew prevention pipe 30 is located in the groove 227 on the second beam section 22.

In this way, the corresponding part of the dew prevention pipe 30 may be embedded in the groove 215 of the first beam section 21 and the groove 227 of the second beam section 22, and the dew prevention pipe 30 may be reliably fixed. the dew prevention pipe 30 heats the beam 20 by using waste heat that is generated after a refrigerant is cooled through a condenser, to prevent dew condensation. This embodiment further provides a method for manufacturing the refrigeration appliance. After a foaming process of the case body 10, the first beam section 21 and the second beam section 22 are respectively connected to the case walls 11, and then the first beam section 21 and the second beam section 22 are connected.

In this embodiment, referring to FIG. 10, when a relatively large member such as the refrigeration component 40 needs to be assembled in the storage compartment 15 behind the beam 20, the beam 20 is not installed yet. The refrigeration component 40 is disposed along an inner surface of a rear wall 14 of the case body 10, and has an overlapped projection with the beam 20 in a front-rear direction of the case body 10.

Referring to FIG. 11, the refrigeration component 40, for example, has been installed in the storage compartment 15. Referring to FIG. 12 and FIG. 2, after the first beam section 21 is inserted into the insertion groove 12a, the through hole 214 on the first beam section 21 and the mounting hole 13 on the case wall 11 are connected by using a screw 50, so as to a fixed connection between the first beam section 21 and the case wall 11. After the second beam section 22 is inserted into the other insertion groove 12, the through hole 223 on the second beam section 22 and the mounting hole 13 on the case wall 11 are connected by using a screw 50, so as to a fixed connection between the second beam section 22 and the case wall 11. FIG. 2 is a status diagram obtained after the refrigeration component 40, the beam 20, and the dew prevention pipe 30 are assembled.

Referring to FIG. 1, the beam 20 further includes a one-piece front panel 90. After the refrigeration component 40, the beam 20, and the dew prevention pipe 30 of the refrigeration appliance 1 are assembled, the front panel 90 covers the first beam section 21 and the second beam section 22. The front panel 90 is in a one-piece structure and covers the first beam section 21 and the second beam section 22. Even if a gap probably exists between the first beam section 21 and the second beam section 22,

the one-piece structure front panel 90 may cover the gap. Therefore, the beam 20 may still be beautiful and concise in appearance.

The method for manufacturing the refrigeration appliance according to this embodiment of the present invention not only facilities manufacturing of the refrigeration appliance 1 and improves installation efficiency of the refrigeration appliance 1, but also helps ensure quality of the refrigeration appliance 1.

In this embodiment, after the refrigeration component 40 is assembled, the first beam section 21 and the second beam section 22 are respectively connected to the case walls 11 and are connected at the adjacent connection end portions 23, 24 by using the fixing apparatus. In another embodiment, either the first beam section 21 or the second beam section 22 may be first connected to a case wall 11, and one of the beam sections is not fixedly, but movably connected to a case wall 11. Therefore, during installation of the refrigeration component 40, if a beam section installed on a case wall 11 affects installation of the refrigeration component 40, the installed beam section may be controlled to move to a position that does not affect the refrigeration component 40. After the refrigeration component 40 is installed, the beam section is connected to a case wall 11 and finally the beam sections are assembled.

Embodiment 2

In Embodiment 1, a beam 20 includes a first beam section 21 and a second beam section 22 that are respectively fixed to corresponding case walls 11. That is, the beam 20 in Embodiment 1 is formed by connecting the first beam section 21 and the second beam section 22 that extend along a length direction. In this embodiment, referring to FIG. 18 and FIG. 13, a beam 60 also bridges case walls 101 that are disposed opposite to each other along a width direction of a case body 100 of a refrigeration appliance 1a. Different from Embodiment 1, referring to FIG. 13 and FIG. 14, there are three beam sections 61, 62, 63 in Embodiment 2.For ease of description, the beam sections 61, 62, 63 include a first beam section 61, a second beam section 62, and a third beam section 63.

The first beam section 61 and the second beam section 62 are fixed on the case walls 101 that are disposed opposite to each other along the width direction of the case body 100. The third beam section 63 is located between the first beam section 61 and

the second beam section 62. That is, in this embodiment, the beam 60 that bridges the case walls 101 of the case body 100 is formed by connecting the first beam section 61, the second beam section 62, and the third beam section 63 along a length direction.

Referring to FIG. 14, in this embodiment, the first beam section 61 has a connection end portion 64 adjacent to the third beam section 63, and the third beam section 63 has a connection end portion 65 adjacent to the first beam section 61. The second beam section 62 has a connection end portion 67 adjacent to the third beam section 63, and the third beam section 63 has a connection end portion 66 adjacent to the second beam section 62.

Same as Embodiment 1, the connection end portion 64 of the first beam section 61 and the connection end portion 65 of the third beam section 63 are at least partially overlapped and joined in an up-down direction and/or a front-rear direction.

The connection end portion 67 of the second beam section 62 and the connection end portion 66 of the third beam section 63 are at least partially overlapped and joined in the up-down direction and/or the front-rear direction.

The adjacent connection end portions 64, 65, 66, 67 are fixed connected by using a fixing apparatus (not shown in the figure) to form the beam 60 in this embodiment.

Referring to FIG. 13 and FIG. 14, sides, which face the beam 60, of the case walls 101 are provided with a pair of insertion grooves 101c, 101d that are provided opposite to each other along the width direction. In this embodiment, the first beam section 61 is inserted into the insertion groove 101c, and the second beam section 62 is inserted into the insertion groove 101d. That is, during assembly of the beam 60, the first beam section 61 may be first inserted into the insertion groove 101c to connect to a case wall 101, and then the second beam section 62 is inserted into the insertion groove 101d to connect to a case wall 101. Finally, parts, which are overlapped in the up-down direction and/or the front-rear direction, of the adjacent connection end portions 64, 65, 66, 67 of the third beam section 63, the first beam section 61, and the second beam section 62 are fixedly connected by using the fixing apparatus.

In addition, still referring to FIG. 13, a side, which faces the beam 60, of the case body 100 of the refrigeration appliance 1a is provided with a mounting hole (not shown in the figure) along the width direction of the case body 100. Referring to FIG. 13 and

FIG. 16, a surface, which faces the mounting hole, of the first beam section 61 is provided with a through hole 613 opposite to the mounting hole; and a surface, which faces the mounting hole, of the second beam section 62 is provided with a through hole 613 opposite to the mounting hole. Referring to FIG. 13, he through hole 613 on the first beam section 61 and the through hole 613 on the second beam section 62 each may be connected to the mounting hole on the case wall 101 by using a screw 80, to fix one end of the first beam section 61 to one of the case walls 101 and fix one end of the second beam section 62 to the other case wall 101. The first beam section 61 and the second beam section 62 are connected to the case walls 10 by using, not limited to, the screws 80.

Referring to FIG. 14, in this embodiment, the first beam section 61 and the second beam section 62 are relatively short beam bases connected to the corresponding case walls 101. The first beam section 61 and the second beam section 62 may be symmetrical in structure.

The beam base is relatively short. Therefore, it not only facilitates installation of the first beam section 61 and the second beam section 62, but also provides a possibility that even if a relatively large member needs to be installed in a storage compartment 15 after the foaming process of the case body 100, the first beam section 61 and the second beam section 62 may still be installed in the case body 100 before the foaming process of the case body 100, because the first beam section 61 and the second beam section 62 acting as bases may be designed short to such an extent and do not affect/interfere with the installation of the relatively large member after the foaming process of the case body 10.

Referring to FIG. 16, FIG. 17, and FIG. 13, the first beam section 61 and the second beam section 62 each include a first leg portion 614 connected to a front end surface 101a of a corresponding case wall 101 and a second leg portion 615 connected to an inner surface 101b of the corresponding case wall 101.

Referring to FIG. 17, a thermal insulation material is provided in each of the first beam section 61 and the second beam section 62. In this embodiment, the first beam section 61 and the second beam section 62 each include an L-shaped inner housing 616a connected to a corresponding case wall and a board-shaped outer housing 616b. The

inner housing 616a and the outer housing 616b enclose an L-shaped thermal insulation space, and an L-shaped thermal insulation material 617 is provided in the thermal insulation space. In this embodiment, the inner housing 616a is closer to the case wall 101, and the housing 616b is farther from the case wall 101 than the inner housing 616a. For ease of description, the inner housings 616a may also be understood as first housings 616a of the first beam section 61 and the second beam section 62, and the housings 616b may also be understood as second housings 616b of the first beam section 61 and the second beam section 62.

Still referring to FIG. 17, the inner housing 616a includes a first sub housing 616c connected to a front end surface 101a of a corresponding case wall 101 and a second sub housing 616d connected to an inner surface 101b of the corresponding case wall 101. The housing 616b covers the first sub housing 616c and the second sub housing 616d.

In this embodiment, shapes of the inner surface 101b and the front end surface101a of the case wall 101 are the same as shapes of an inner surface 11b and a front end surface11a of the case wall 11 in Embodiment 1.

In this embodiment, thermal insulation material 617 includes a first thermal insulation portion 617a and a second thermal insulation portion 617b. The first thermal insulation portion 617a and the second thermal insulation portion 617b are connected to form the L-shaped thermal insulation material 617.

Still referring to FIG. 17 and FIG. 16, in this embodiment, the first sub housing 616c, the first thermal insulation portion 617a, and a part, which covers the first sub housing 616c, of the housing 616b constitute the first leg portion 614 of the first beam section 61 or the second beam section 62. The second sub housing 616d, the second thermal insulation portion 617b, and a part, which covers the second sub housing 616d, of the housing 616b constitute the second leg portion 615 of the first beam section 61 and the second beam section 62.

Referring to FIG. 15, in this embodiment, the third beam section 63 includes a first housing 63a and a second housing 63b. The first housing 63a and the second housing 63b of the third beam section 63 enclose a thermal insulation space (not shown in the figure), and a thermal insulation material is provided in the thermal insulation space.

The thermal insulation material may be an EPS (Expanded Polystyrene, EPS for short) thermal insulation element, but not limited to, the EPS thermal insulation element, or may be another-type thermal insulation element. Alternatively, the thermal insulation material may be formed in the thermal insulation space by means of a foaming process.

Still referring to FIG. 13 and FIG. 14, in this embodiment, two ends of the third beam section 63 are close to inner surfaces 101b of the corresponding case walls 101. In this way, a length of the third beam section 63 constitutes a most part of the length of the beam 60. Therefore, the beam 60 is formed by two relatively short beam bases (the first beam section 61 and the second beam section 62) that are fixed to the corresponding case walls and the relatively long third beam section 63 that connects the two beam bases.

The length of the third beam section 63 may be specified, but is not specifically limited in this embodiment. For example, a sum of lengths of the first beam section 61 and the second beam section 62 may approximately occupy 5% to 20 % of the length of the entire beam 60. The length of the third beam section 63 is greater than the lengths of the first beam section 61 and the second beam section 62, and the length of the third beam section 63 may approximately occupy 80% to 95% of the length of the entire beam 60. The third beam section 63 may be designed to be relatively long, and the first beam section 61 and the second beam section 62 at two ends may be designed to be relatively short.

Still referring to FIG. 17, in a same direction, the first sub housing 616c is provided with a first through hole 613c; a position, which corresponds to the first through hole 613c, on the first thermal insulation portion 617a is provided with a second through hole 613b; and a position, which corresponds to the first through hole 613c, on the housing 616b is provided with a third through hole 613a. The first through hole 613c, the second through hole 613b, and the third through hole 613a form the through hole 613 in this embodiment.

Still referring to FIG. 13, in this embodiment, after the first beam section 61 and the second beam section 62 are respectively installed on the corresponding case walls 101, two ends of the third beam section 63 in the length direction are respectively connected to the first beam section 61 and the second beam section 62 to form the beam 60 in this

embodiment.

Referring to FIG. 14 and FIG. 16, an end, which faces the third beam section 63, of the first beam section 61 may be provided with a bolt hole 612; and an end, which faces the first beam section 61, of the third beam section 63 may be provided with a bolt hole (not shown in the figure). The bolt hole 612 on the first beam section 61 and the bolt hole on the third beam section 63 may be connected by using a bolt or a screw.

An end, which faces the third beam section 63, of the second beam section 62 may be provided with a bolt hole 612; and an end, which faces the second beam section 62, of the third beam section 63 may be provided with a bolt hole (not shown in the figure). The bolt hole 612 on the second beam section 62 and the bolt hole on the third beam section 63 may be connected by using a bolt or a screw. A connection manner is not limited to the bolt or the screw, and another connection manner may be used. For example, adjacent beam sections are clamped and fixed.

Still referring to FIG. 14, buckles 632 are further disposed at the two ends of the third beam section 63 in the length direction. Protruded portions 618 are disposed at ends, which face the third beam section 63, of the first beam section 61 and the second beam section 62, and the protruded portions 618 of first beam section 61 and the second beam section 62 are respectively clamped with the buckles 632 on the third beam section 63. In this way, the third beam section 63 may be fixed to the first beam section 61 and the second beam section 62 in a clamp manner, a bolt connection manner, or a screw connection manner, to help enhance connection strength.

Referring to FIG. 17, in a same direction, the second sub housing 616d is provided with a first bolt hole 612b; a position, which corresponds to the first bolt hole 612b, on the housing 616b is provided with a second bolt hole 612a; and the first bolt hole 612b and the second bolt hole 612a form the bolt hole 612 in this embodiment.

Still referring to FIG. 13 and FIG. 14, the refrigeration appliance 1a in this embodiment also includes a dew prevention pipe 70 that extends along the length direction of the beam 60. Referring to FIG. 14, in this embodiment, a part of the first beam section 61 away from the storage compartment is provided with a groove 611 that extends along the length direction of the beam 60, and the groove 611 is used to receive a corresponding part of the dew prevention pipe 70. That is, a part, which is

overlapped with the first beam section 261 along the front-rear direction of the case body 100, of the dew prevention pipe 70 is located in the groove 611 on the first beam section 61.

Likewise, the second beam section 62 is provided with a groove 621, and the third beam section 63 is provided with a groove 631. In this way, corresponding parts of the dew prevention pipe 70 may be embedded in the grooves of 611, 621, 631 of the beam sections, and the dew prevention pipe 70 may be reliably fixed.

Likewise, referring to FIG. 18, after an evaporator, a refrigeration component 41, and the beam 60 of the refrigeration appliance 1a are assembled, a front panel 91 is used to cover the first beam section 61, the second beam section 62, and the third beam section 63 of the beam 60. The front panel 91 is also in a one-piece structure. Even if a gap probably exists between the first beam section 61, the second beam section 62, and the third beam section 63, the one-piece structure front panel 91 may cover the gap. Therefore, the beam 60 may still be beautiful and concise in appearance.

In this embodiment, during assembly, the first beam section 61 and the second beam section 62 are connected to the case body before the foaming process of the case body.

A relatively large member such as the refrigeration component 41 is assembled in the storage compartment after the foaming process of the case body.

After a relatively large member such as the refrigeration component 41 is assembled in the storage compartment, the third beam section 63 is connected to between the first beam section 61 and the second beam section 62. Then, the front panel is connected in front of the connected beam section 61 to 63.

In an optional embodiment, the first beam section 61, the second beam section 62, and the third beam section 63 may all be assembled to the case body after the foaming process of the case body.

It should be understood that, when none relatively large member is disposed in the storage compartment, a manufacturer may institute, as needed, whether the beam sections 61 to 63 are installed to the case body after the foaming process of the case body.

It should be noted that, the embodiments of the present invention provide a two-section beam 20 and a three-section beam 60, but are not limited to the structures. In another embodiment, a beam may have four sections, or five or more sections.

In the present invention, the embodiments are described focusing on the differences from the embodiment described above. For a same part in the embodiments, refer to the embodiment described above.

Although the present invention is disclosed above, the present invention is not limited thereto. Any person skilled in the art can make various changes and modifications, without departing from the spirit and the protection scope of the present invention. Therefore, the protection scope of the present invention should depend on what is defined by the scope of claims.

CLAIMS

What is claimed is:

1. A refrigeration appliance, comprising:

a case body (10, 100), comprising a pair of opposite case walls (11, 101); and

a beam (20, 60), which bridges the pair of case walls (11, 101), characterized in that, the beam (20, 60) comprises at least two beam sections (21, 22, 61, 62, 63), a length of each of the beam sections (21, 22, 61, 62, 63) is less than a length of the beam (20, 60), and the at least two beam sections (21, 22, 61, 62, 63) are connected along a length direction of the beam sections (21, 22, 61, 62, 63) to form the beam (20, 60).

2. The refrigeration appliance according to claim 1, characterized in that a thermal insulation material is provided in each of the beam sections (21, 22, 61, 62, 63).

3. The refrigeration appliance according to claim 2, characterized in that each of the beam sections (21, 22, 61, 62, 63) comprises a first housing (21a, 22a, 63a, 616a) and a second housing (21b, 22b, 63b, 616b), wherein the first housing (21a, 22a, 63a, 616a) and the second housing (21b, 22b, 63b, 616b) enclose a thermal insulation space, and the thermal insulation material is located in the thermal insulation space.

4. The refrigeration appliance according to any one of the foregoing claims, characterized in that adjacent connection end portions (23, 24, 64, 65, 66, 67) of at least one pair of adjacent beam sections (21, 22, 61, 62, 63) are at least partially overlapped in an up-down direction and/or a front-rear direction.

5. The refrigeration appliance according to any one of the foregoing claims, characterized in that one of the adjacent connection end portions (23, 24) comprises an accommodating groove (226), and the other one of the adjacent connection end portions (23, 24) comprises a protruded portion (216) located in the accommodating groove (226).

6. The refrigeration appliance according to any one of the foregoing claims, characterized by comprising a fixing apparatus, wherein the fixing apparatus fixes parts, which are overlapped in the up-down direction and/or the front-rear direction, of the adjacent end portions (23, 24, 64, 65, 66, 67).

7. The refrigeration appliance according to any one of the foregoing claims, characterized in that a side, which faces the beam (20, 60), of the case wall (11, 101) is provided with an insertion groove (12, 12a, 101c, 101d); and one end, which faces the case wall (11, 101), of the beam section (21, 22, 61, 62) is inserted into the insertion groove (12, 12a, 101c, 101d).

8. The refrigeration appliance according to any one of the foregoing claims, characterized in that the at least two beam sections (21, 22) comprise a first beam section (21) and a second beam section (22), wherein one end of the first beam section (21) is fixed in one of the case walls (11), one end of the second beam section (22) is fixed in the other one of the case walls (11), and the other end of the first beam section (21) is connected to the other end of the second beam section (22).

9. The refrigeration appliance according to any one of the foregoing claims, characterized in that the at least two beam sections (61, 62, 63) comprise a first beam section (61) and a second beam section (62) that are respectively fixed in corresponding case walls (101), and at least one third beam section (63) located between the first beam section (61) and the second beam section (62).

10. The refrigeration appliance according to any one of the foregoing claims, characterized in that the first beam section (61) and the second beam section (62) are beam bases connected to the corresponding case walls (101).

11. The refrigeration appliance according to any one of the foregoing claims, characterized in that the first beam section (61) and the second beam section (62) each comprise a first leg portion (614) connected to a front end surface (101a) of a corresponding case wall (101) and a second leg portion (615) connected to an inner surface (101b) of the corresponding case wall (101).

12. The refrigeration appliance according to any one of the foregoing claims, characterized in that the first beam section (61) and the second beam section (62) each comprise an L-shaped inner housing (616a) connected to a corresponding case wall (101) and a board-shaped outer housing (616b), wherein the inner housing (616a) and the outer housing (616b) enclose an L-shaped thermal insulation space, and an L-shaped thermal insulation material (617) is provided in the thermal insulation space.

13. The refrigeration appliance according to any one of the claims 9 - 12,

characterized in that two ends of the third beam section (63) are close to inner surfaces of the corresponding case walls (101).

14. The refrigeration appliance according to any one of the foregoing claims, characterized by comprising a dew prevention pipe (30, 70) that extends along a length direction of the beam (20, 60), and each of the beam sections (21, 22, 61, 62, 63) comprises a groove (215, 227, 611, 621, 631) to receive a corresponding part of the dew prevention pipe (30, 70).

15. The refrigeration appliance according to any one of the foregoing claims, characterized by comprising a refrigeration component (40, 41), wherein the refrigeration component (40, 41) is disposed along an inner surface of a rear wall (14) of the case body (10, 100), and has an overlapped projection with the beam (20, 60) in a front-rear direction.

16. The refrigeration appliance according to any one of the foregoing claims, characterized in that the beam (20, 60) comprises a one-piece front panel (90, 91), and the front panel (90, 91) covers the at least two beam sections (21, 22, 61, 62, 63).

17. A method for manufacturing the refrigeration appliance according to any one of the foregoing claims, characterized in that, at least one of the at least two beam sections (21, 22, 61, 62, 63) of the beam (20, 60) that bridges the pair of case walls (11, 101) is connected to the case wall (11, 101) and/or an adjacent beam section after a foaming process of the case body (10, 100).

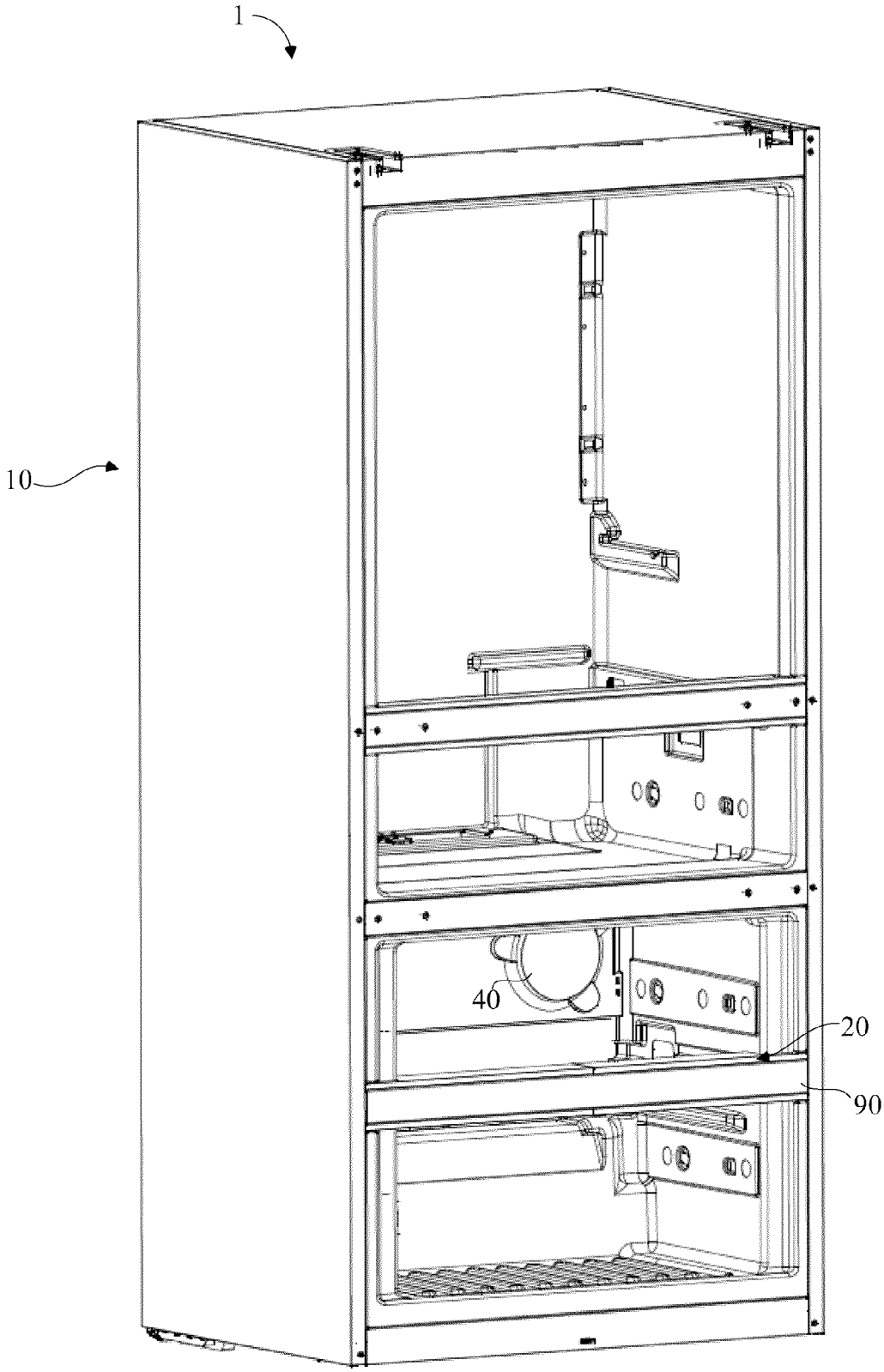

FIG. 1

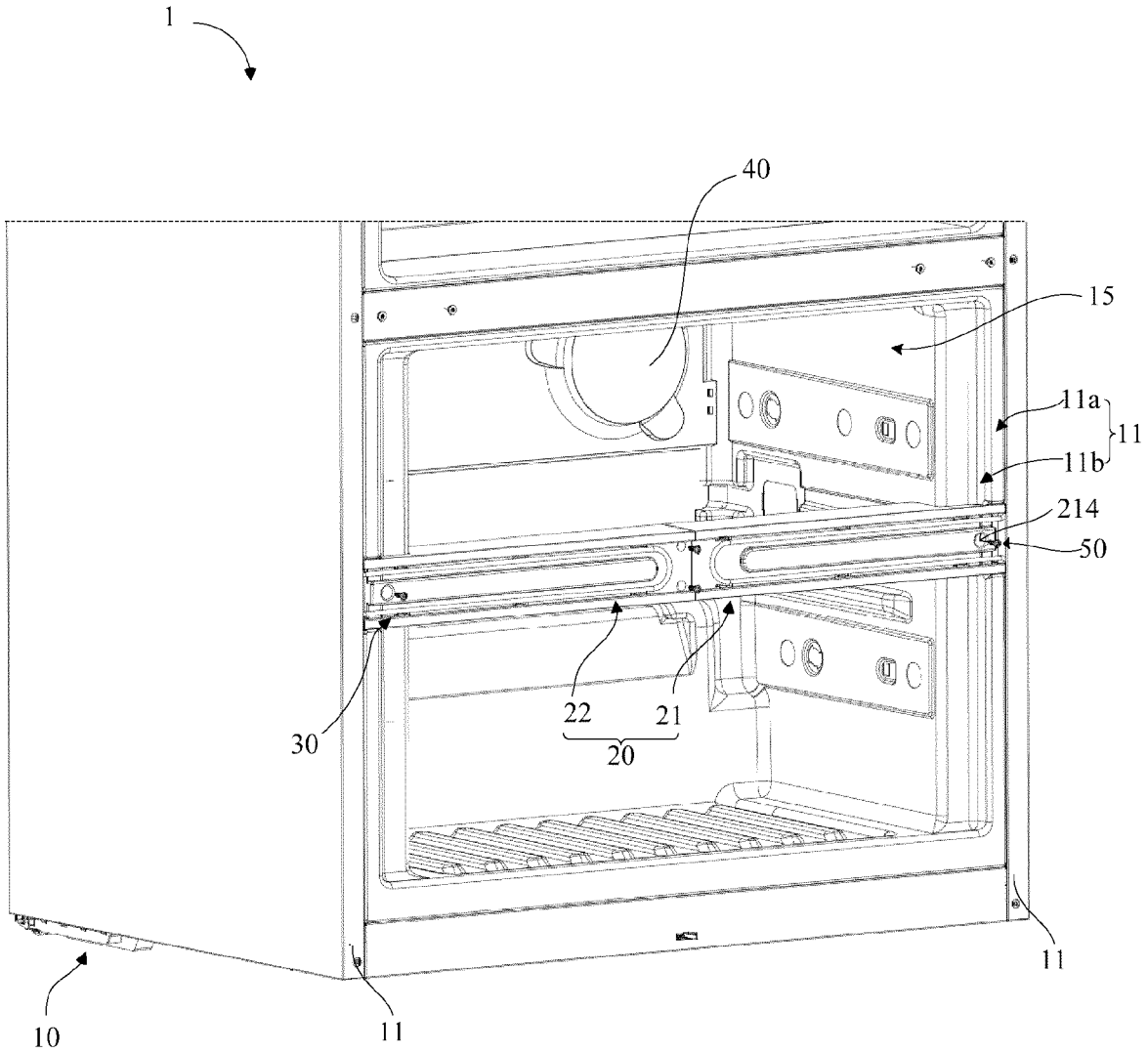

FIG. 2

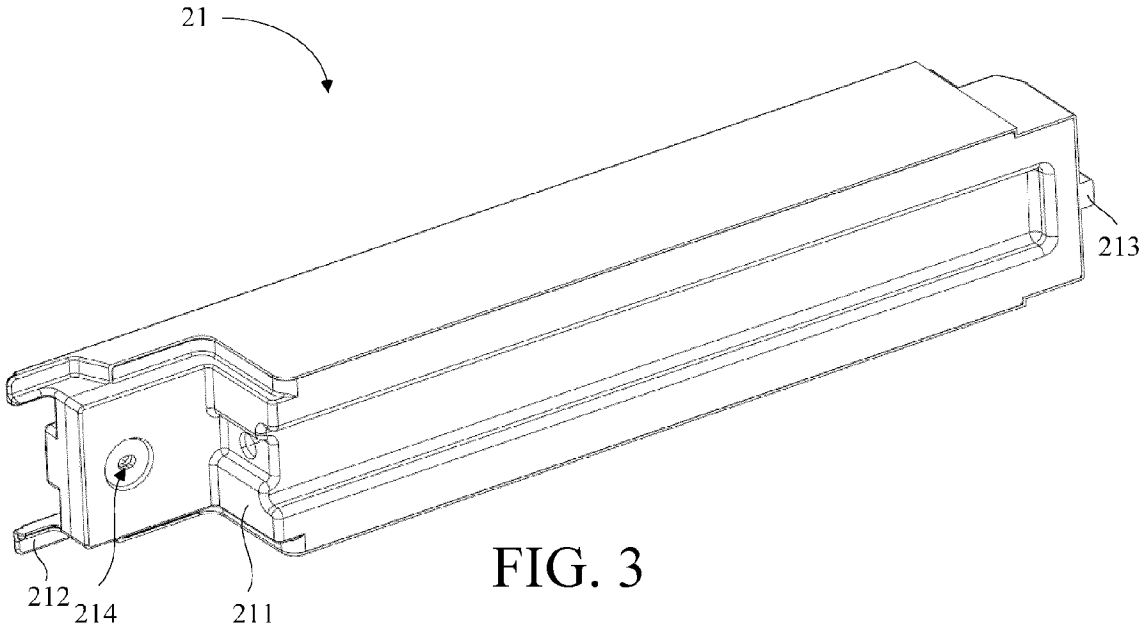

FIG. 3

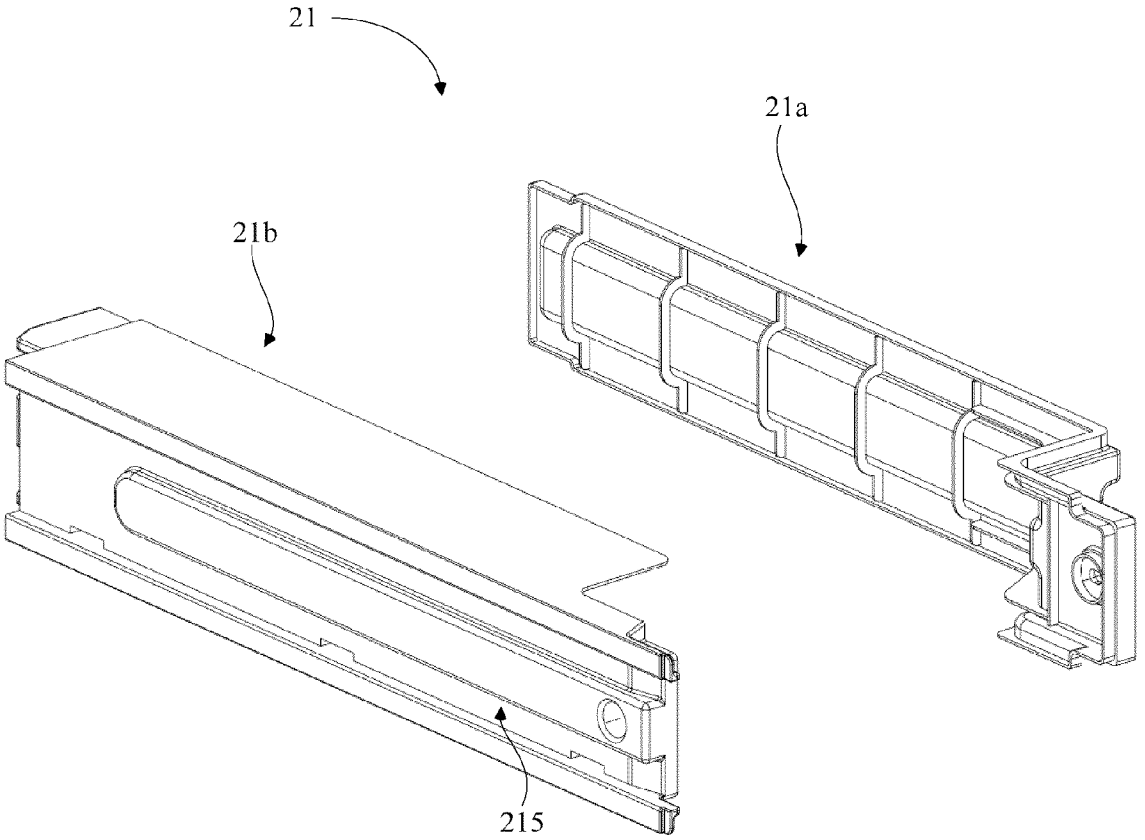

FIG. 4

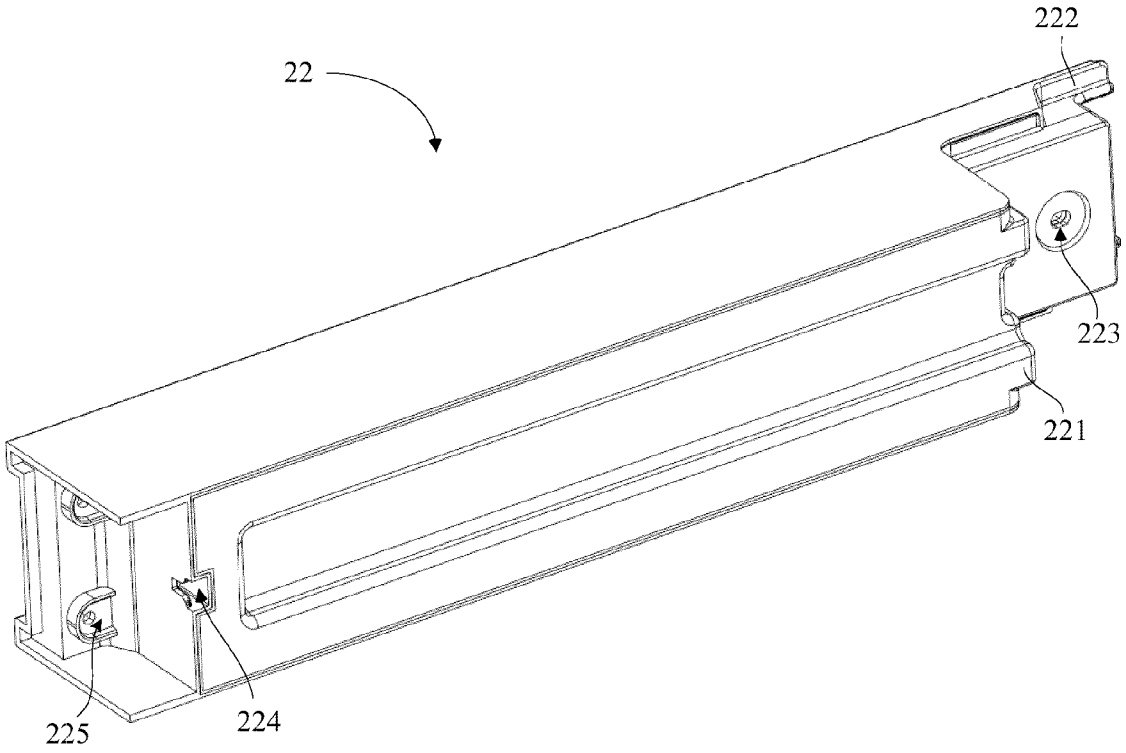

FIG. 5

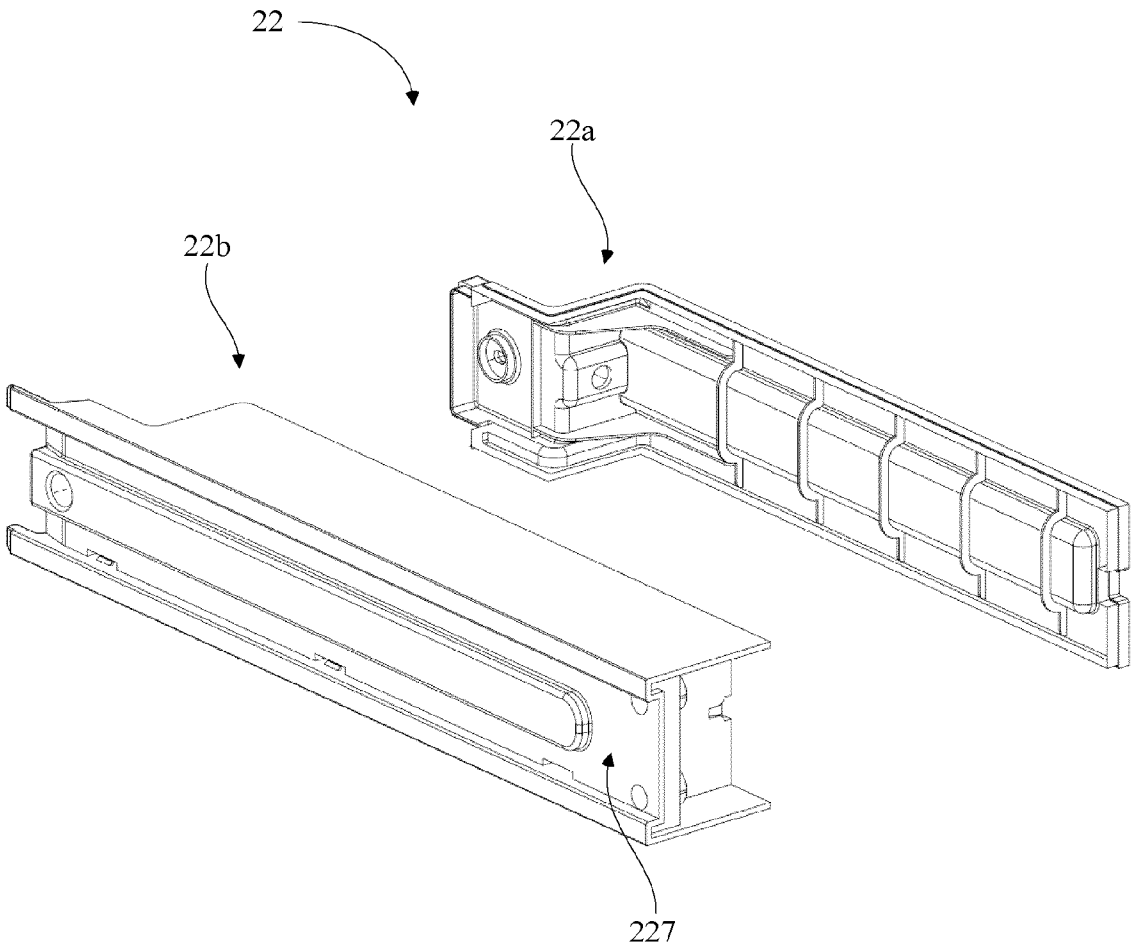

FIG. 6

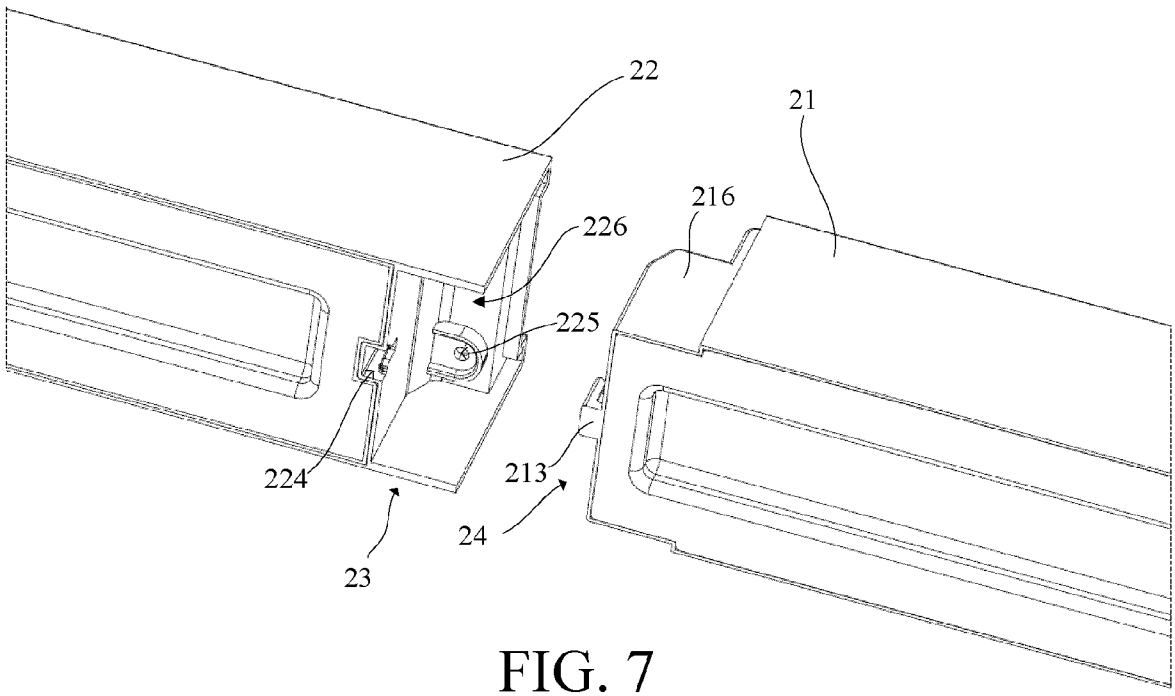

FIG. 7

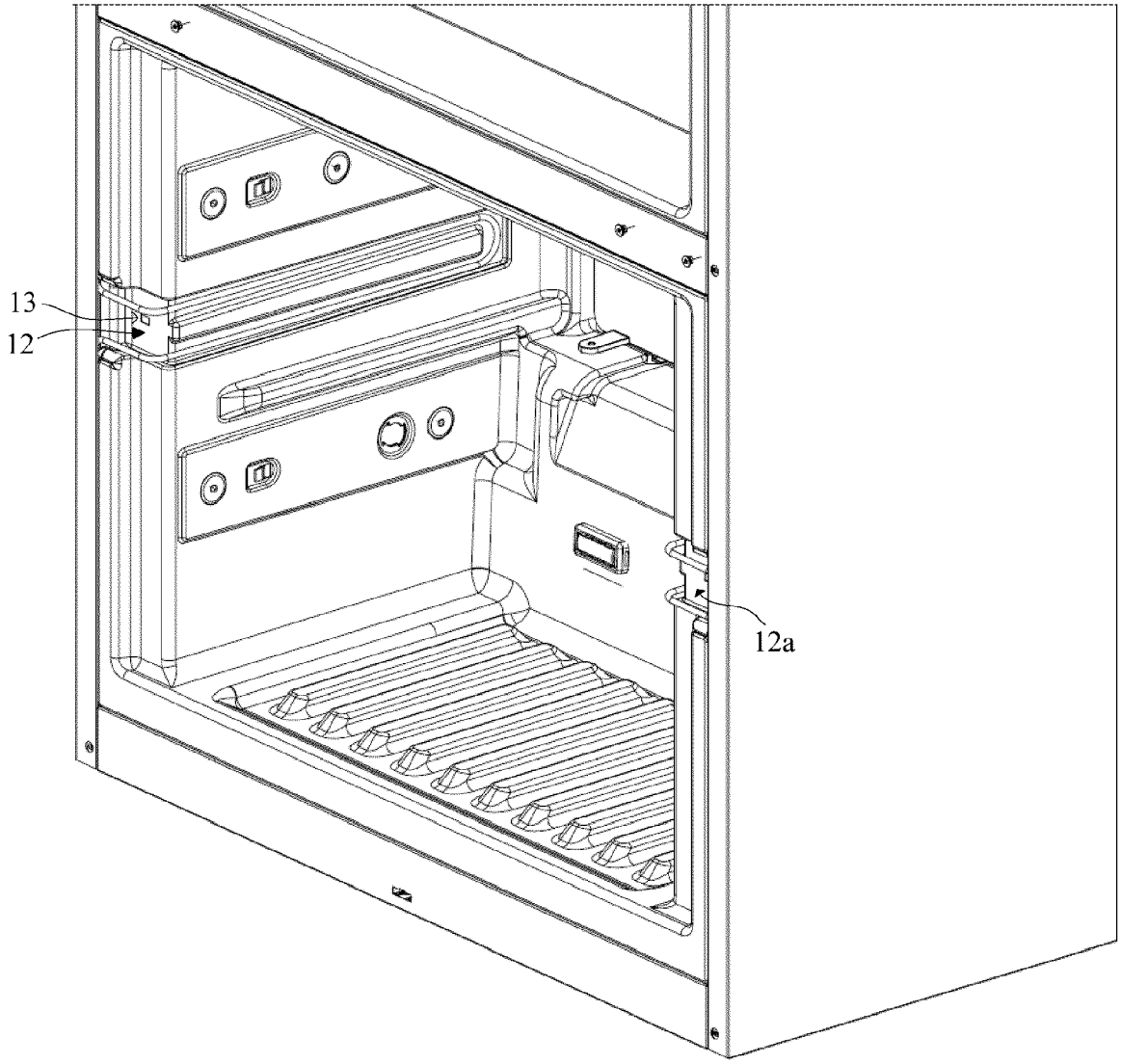

FIG. 8

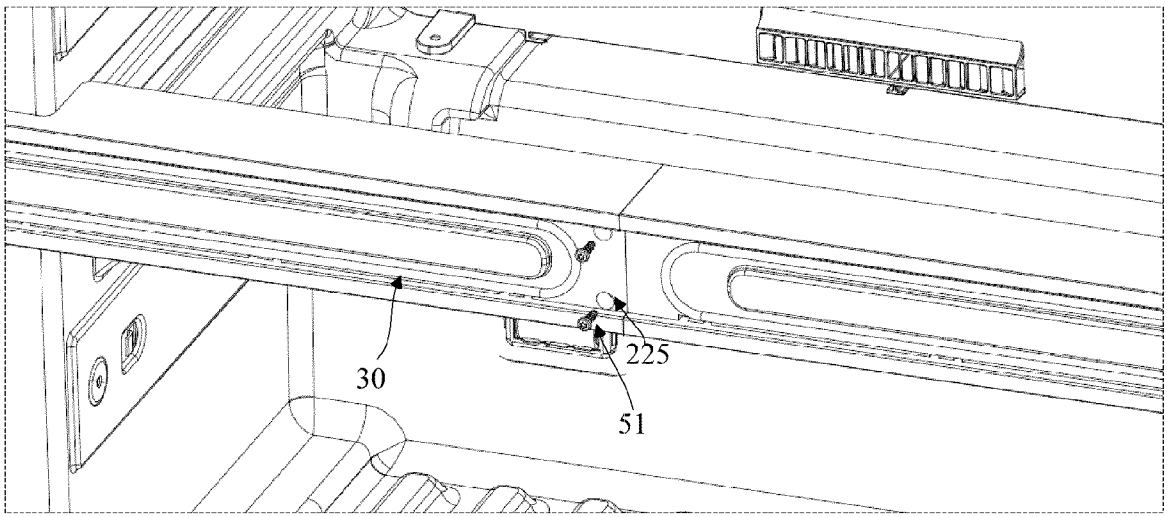

FIG. 9

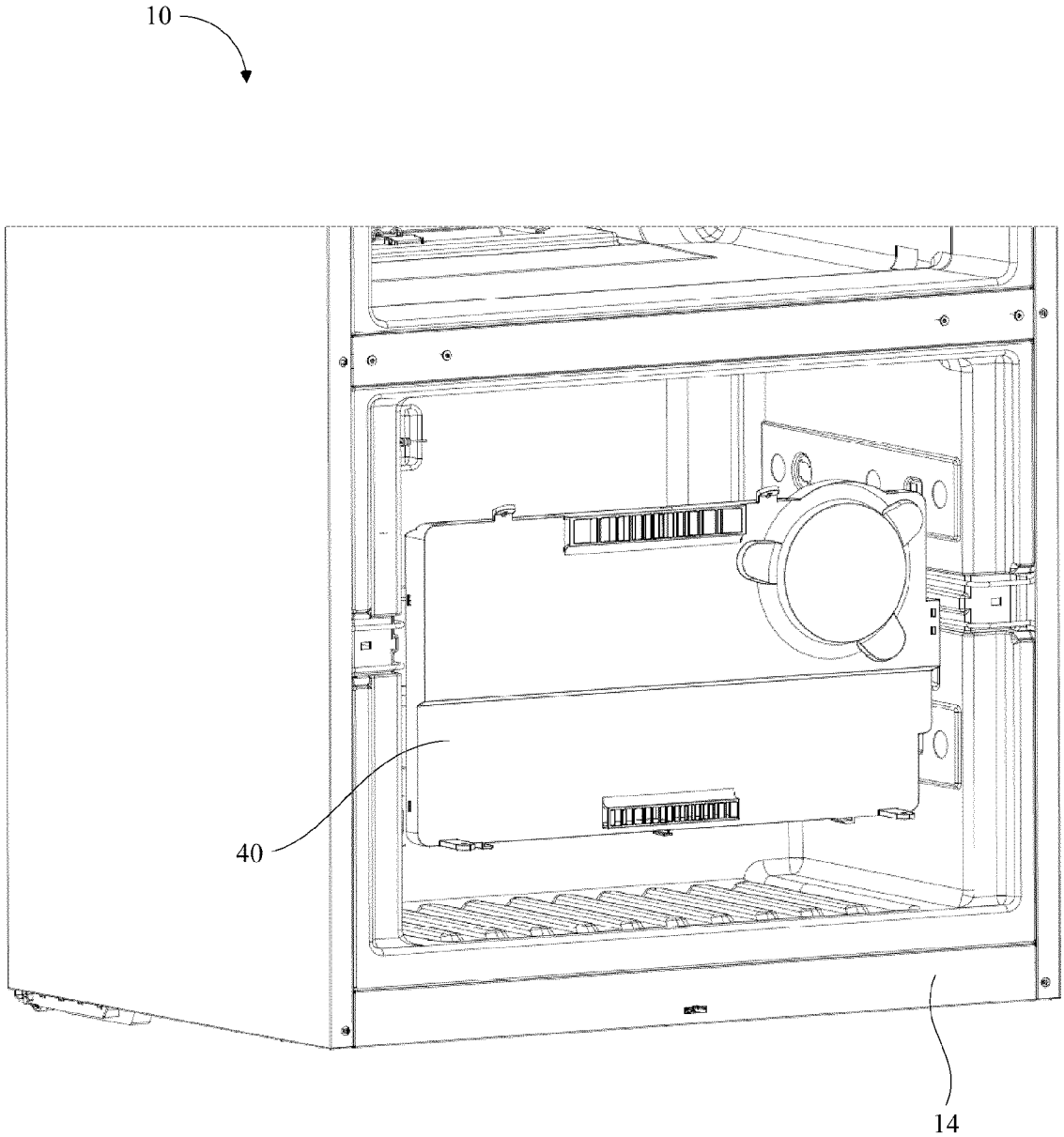

FIG. 10

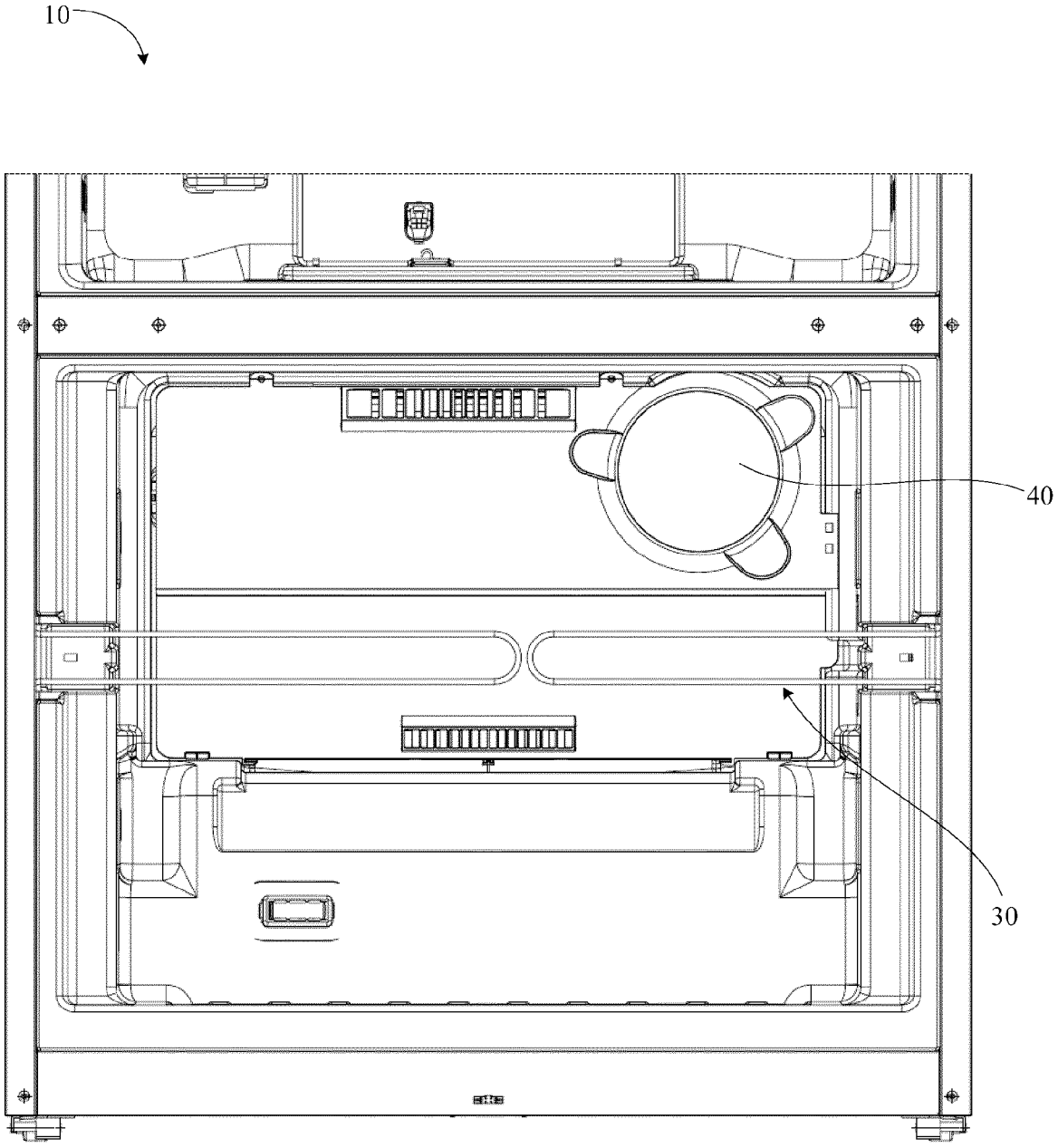

FIG. 11

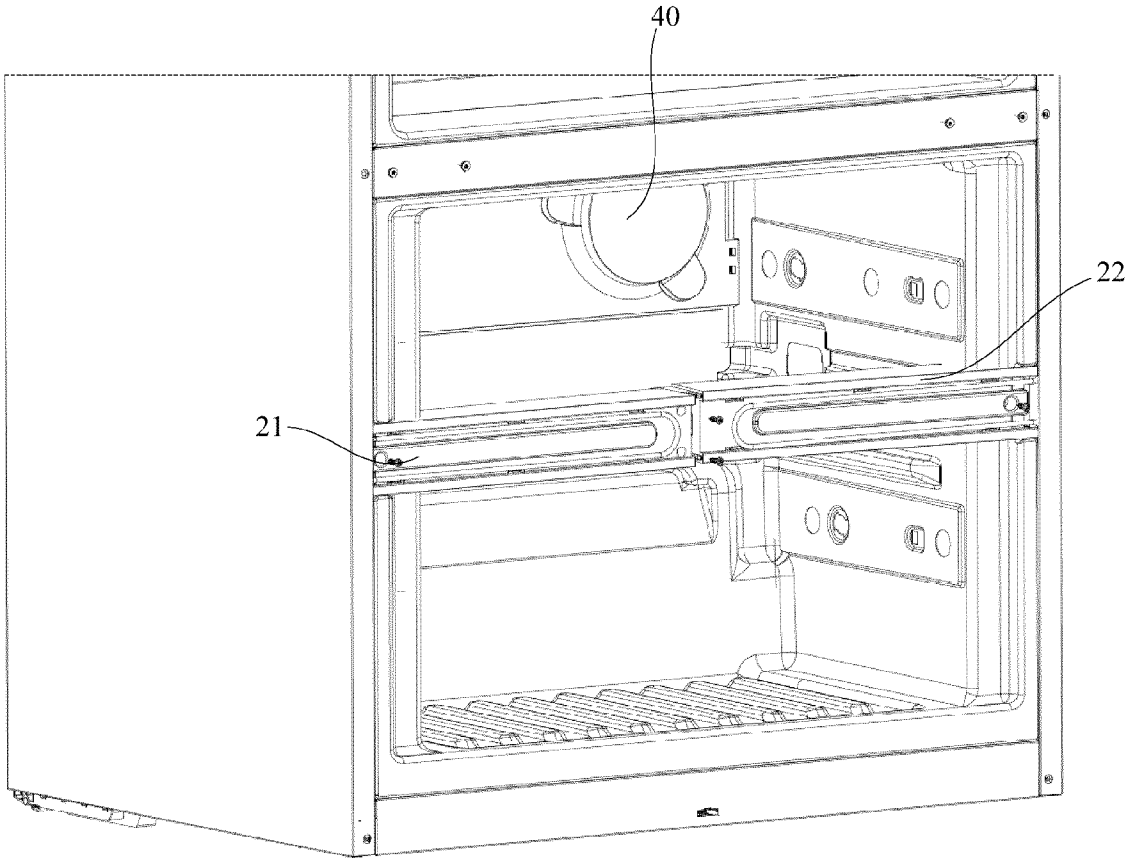

FIG. 12

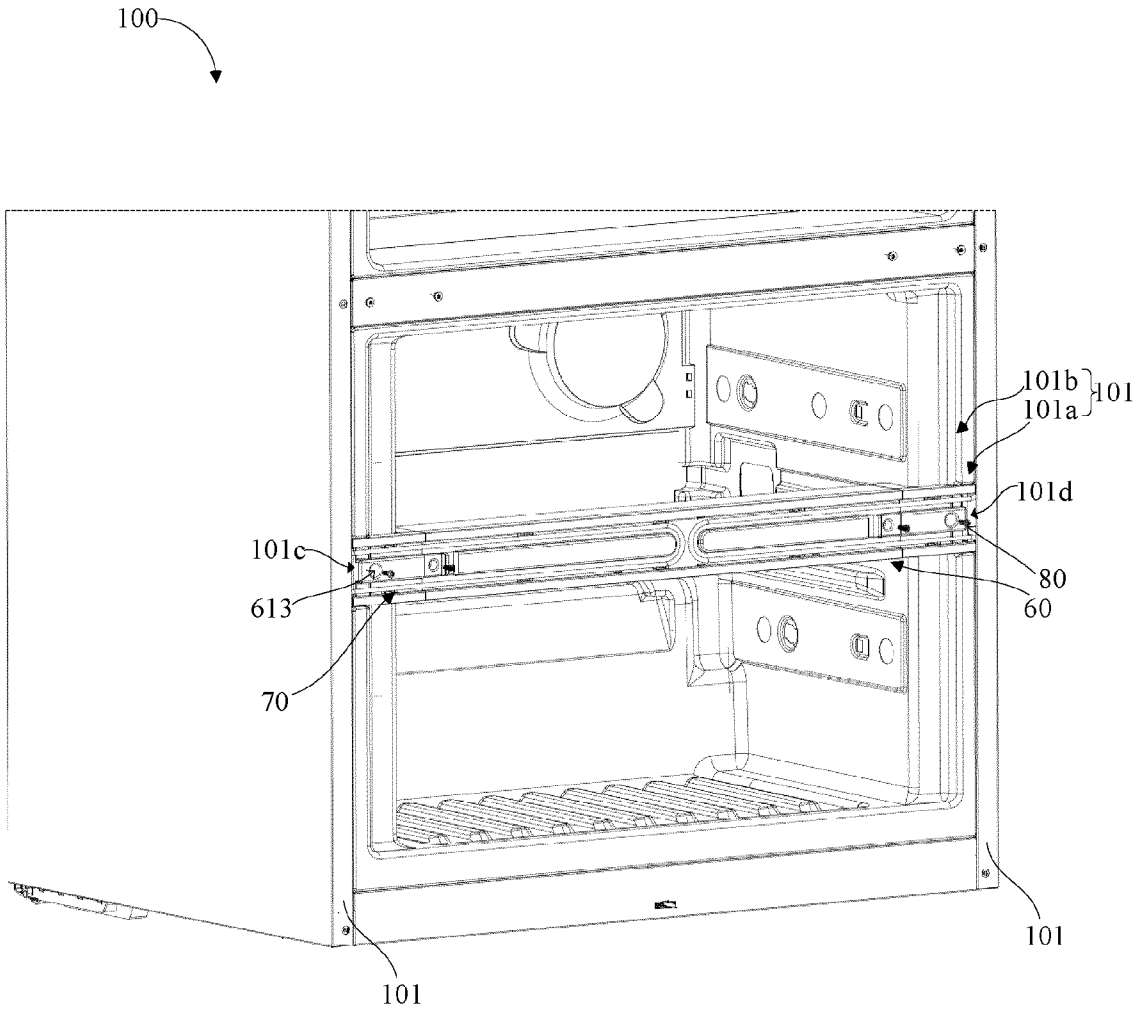

FIG. 13

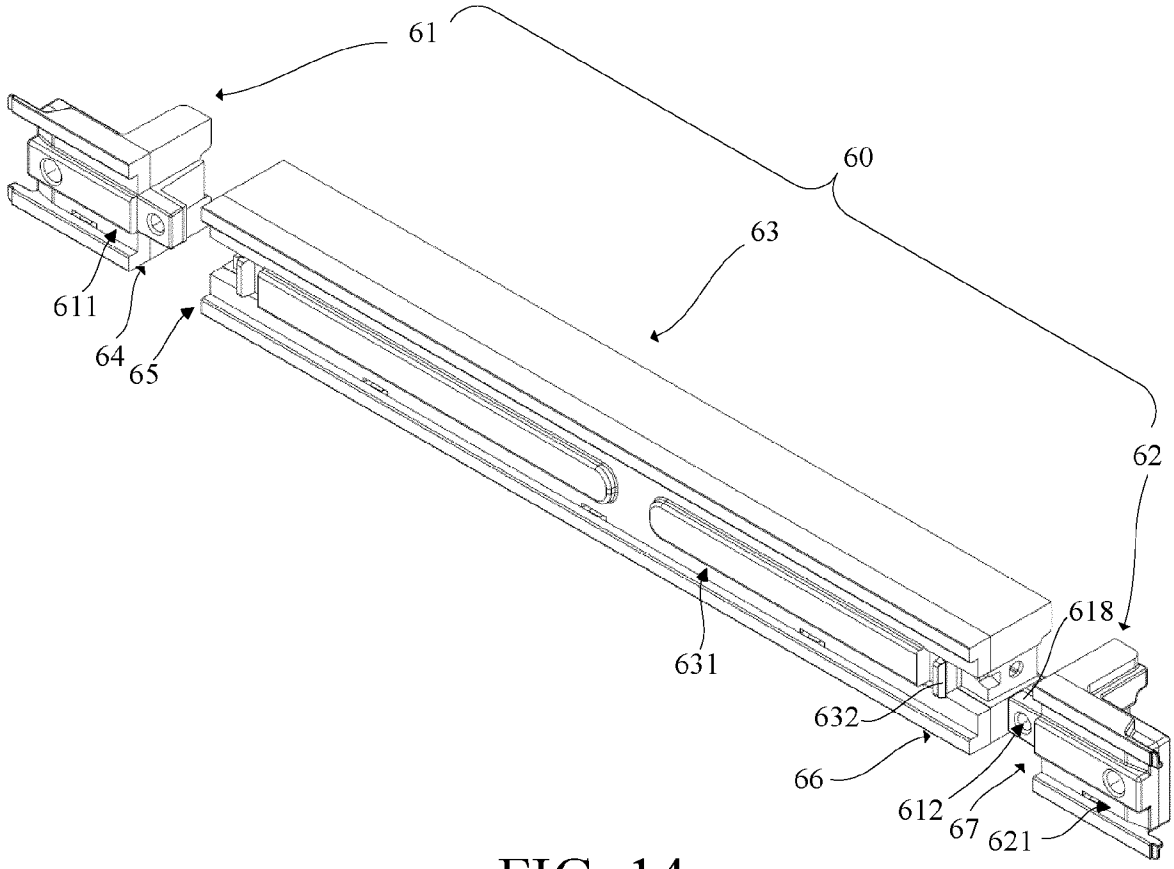

FIG. 14

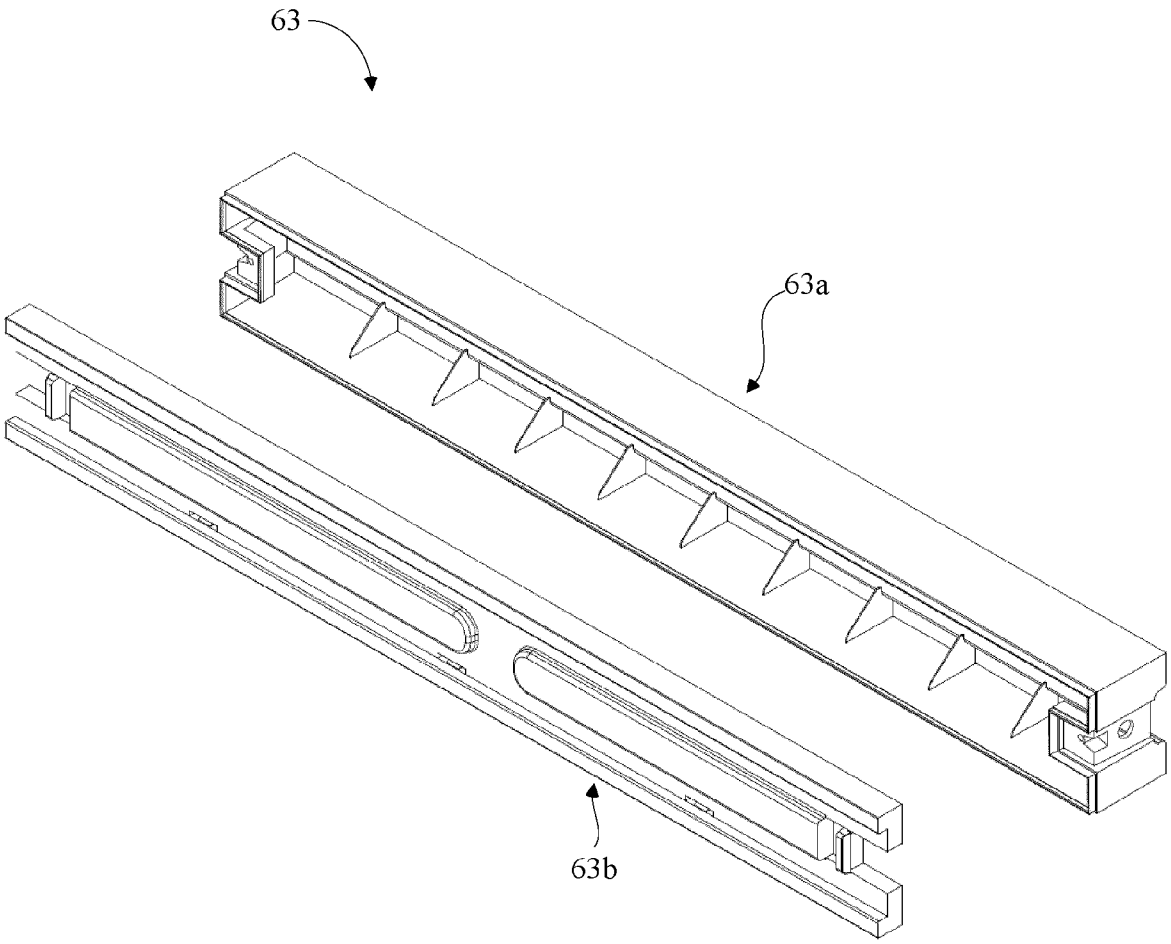

FIG. 15

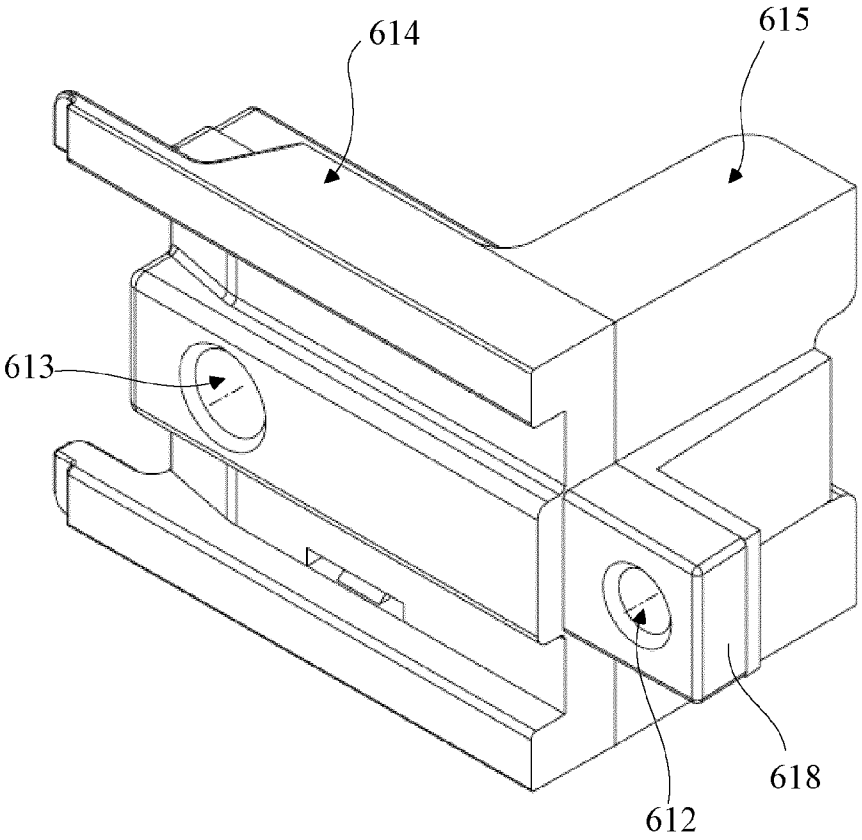

FIG. 16

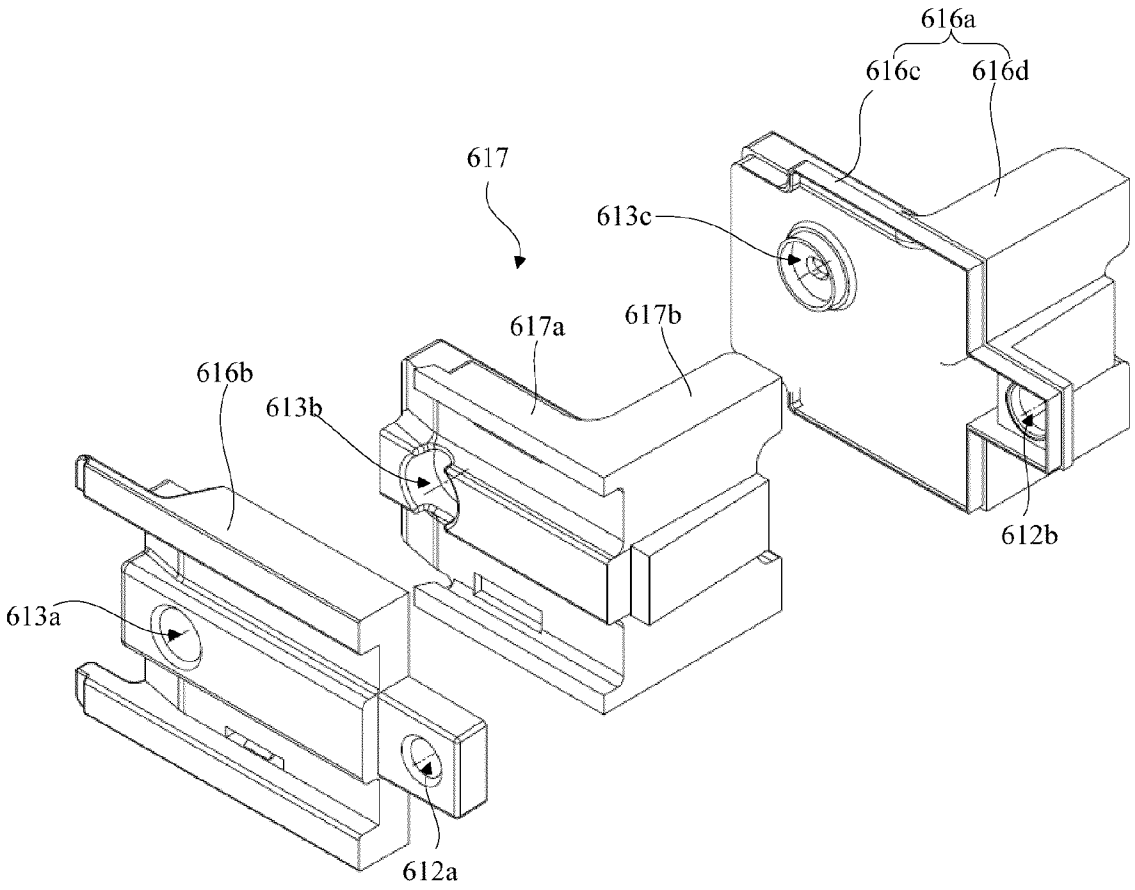

FIG. 17

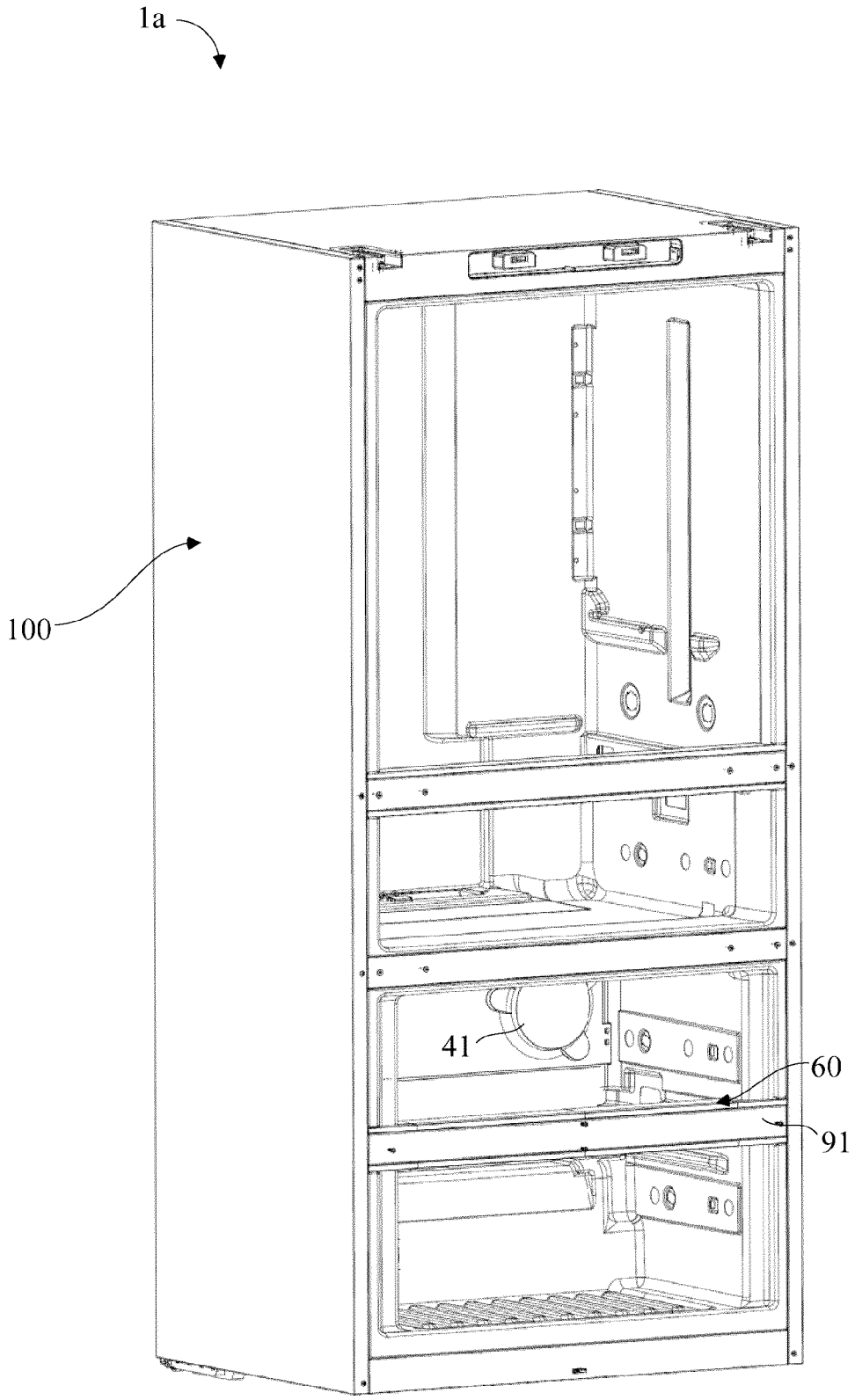

FIG. 18

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/068084

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D23/00 F25D23/06
ADD. F25D21/04

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)
F25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 065 211 A (ASS ELECT IND) 12 April 1967 (1967-04-12) figures 2,3	1,4-8, 10,17
X	US 5 897 181 A (AVENDANO JOSE G [US] ET AL) 27 April 1999 (1999-04-27) figures 1,9	1,4, 6-10,13
X	US 4 548 049 A (RAJGOPAL PREMKUMAR [US]) 22 October 1985 (1985-10-22) figure 2	1,4,6-8, 10,16
X	JP S62 19589 U (--) 5 February 1987 (1987-02-05) figures	1-3,14

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[X] Further documents are listed in the continuation of Box C.

[X] 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)

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Date of the actual completion of the international search	Date of mailing of the international search report
3 August 2017	18/08/2017

Name and mailing address of the ISA/	Authorized officer
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