(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 047 292 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
22.11.2023 Bulletin 2023/47

(21) Application number: **20806799.1**

(22) Date of filing: **18.03.2020**

(51) International Patent Classification (IPC):
F25D 17/06 *(2006.01)* ***F25D 17/08*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F25D 17/062

(86) International application number:
PCT/CN2020/079990

(87) International publication number:
WO 2020/228412 (19.11.2020 Gazette 2020/47)

(54) MODULAR UNIVERSAL AIR SUPPLY DEVICE FOR REFRIGERATOR, REFRIGERATOR, AND METHOD FOR MANUFACTURING REFRIGERATOR

MODULARE UNIVERSALLUFTZUFUHRVORRICHTUNG FÜR KÜHLSCHRANK, KÜHLSCHRANK UND VERFAHREN ZUM HERSTELLEN EINES KÜHLSCHRANKS

DISPOSITIF D'ALIMENTATION EN AIR UNIVERSEL ET MODULAIRE POUR RÉFRIGÉRATEUR, RÉFRIGÉRATEUR ET PROCÉDÉ DE FABRICATION DE RÉFRIGÉRATEUR

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

(30) Priority: **10.05.2019 CN 201910389731**

(43) Date of publication of application:
24.08.2022 Bulletin 2022/34

(73) Proprietors:
- **Qingdao Haier Refrigerator Co., Ltd.**
  Laoshan District
  Qingdao
  Shandong 266101 (CN)
- **Haier Smart Home Co., Ltd.**
  Qingdao, Shandong 266101 (CN)

(72) Inventors:
- **ZHU, Xiaobing**
  Qingdao, Shandong 266101 (CN)
- **FEI, Bin**
  Qingdao, Shandong 266101 (CN)
- **CHENG, Xueli**
  Qingdao, Shandong 266101 (CN)
- **XUE, Yaxin**
  Qingdao, Shandong 266101 (CN)

(74) Representative: **Ziebig Hengelhaupt Intellectual Property Attorneys**
Patentanwaltskanzlei PartGmbB
Leipziger Straße 49
10117 Berlin (DE)

(56) References cited:
WO-A1-2017/049961
CN-A- 107 726 708
CN-A- 108 286 859
CN-A- 108 426 405
CN-A- 109 708 383
CN-A- 110 057 155
CN-U- 205 119 611
CN-U- 207 778 935
JP-A- 2004 069 143
KR-A- 20090 101 524
US-A1- 2018 172 336
US-B2- 11 131 496

EP 4 047 292 B1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the technical field of refrigeration equipment, and more particularly relates to a modular universal air supply device for a refrigerator, a refrigerator, and a method for manufacturing a refrigerator.

BACKGROUND OF THE INVENTION

[0002] With the development of society and economy and the improvement of people's living standards, refrigerators have also become indispensable household appliances in people's daily lives. Existing refrigerating compartments of refrigerators have diversified appearances and different width requirements on air ducts. During research and development of some refrigerators, it is often only necessary to modify the appearance of the air duct and the appearance of interior trimmings. However, the air duct needs to transmit air to an air outlet, so when the air duct is widened, foam of a heat insulation layer inside needs to be widened. If the heat insulation layer is not widened, cold air will directly pass through a plastic cover plate, and may cause condensation. Therefore, an inner liner cooperating with the heat insulation layer to achieve a fixation effect also needs to be widened and modified, resulting in new mold opening for the air duct and new mold opening for the corresponding inner liner of a cabinet, which causes great cost input of molds. And management waste is caused by too many air ducts and cabinets. In addition, management confusion easily occurs.

[0003] For instance, CN 205 119 611 U discloses a refrigerator, which may include a box body 200, and a storage compartment 211 and an air supply duct 221 are defined in the box body 200. The air supply duct 221 can be configured to deliver cold air into the storage compartment 211, so that the temperature in the storage compartment 211 can be maintained near the target temperature. In order to adjust the cooling capacity in the storage compartment 211 conveniently, the refrigerator in the embodiment of the utility model can also include a component air supply device 300.

[0004] CN 108 426 405 A teaches an air duct assembly, which includes a deflector plate for controlling the direction of wind flow and a cover plate buckled with the deflector plate, the deflector plate and the cover plate are buckled to form an air chamber, and the air chamber is covered. The splitter plate is divided into two lateral air ducts with opposite air flow directions, and each side air duct is divided into several split air ducts with the same wind flow direction by at least one secondary splitter plate. There are several positioning columns, and the positioning columns pass through the drainage plate and the corresponding through holes on the cover plate in turn, and the end of the positioning column protruding from the cover plate is equipped with a locking bolt; the other surface of the positioning plate is fixed. A decorative plate is connected. The cover plate, the drainage plate, the positioning plate and the decorative plate are combined into an air duct component body.

[0005] WO 2017/049961 A relates to a refrigerator comprising a refrigerator compartment (200) comprising a storage compartment (211) and a ventilation channel (221) limited therein, wherein the ventilation channel (221) is configured to provide a cold air to inside of the storage compartment (211) and a ventilation control device (300), arranged in the ventilation channel (221). The ventilation control device (300) comprises a housing (40) comprising at least one air inlet (421) and a plurality of air outlets and an adjustment member (50) configured to adjust respective areas of the plurality of air outlets, through which air is output, by being controlled to completely block, partially block, or completely open each of the air outlets, so as to adjust an air volume of the air output to the storage compartment (211) via the ventilation channel (221).

BRIEF DESCRIPTION OF THE INVENTION

[0006] In view of the above problems, the present invention is proposed so as to provide a modular universal air supply device for a refrigerator, a refrigerator and a method for manufacturing a refrigerator to solve or at least partially solve the above problems. The universality of a cabinet and air duct foam can be improved; the cost input of molds is reduced; the management waste caused by too many air ducts and cabinets is reduced; the air ducts with different appearance widths can be installed in the same cabinet, and cross-platform air duct module universality and cabinet universality are achieved.

[0007] Therefore, in one aspect, the present invention proposes a modular universal air supply device for a refrigerator, including:

an air duct main body, provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement; each of the vertical end surfaces being provided with at least one air supply outlet;

two widening modules, disposed at two transverse sides of the air duct main body, wherein each of the widening air duct modules is provided with at least one connection air duct, and each of the connection air ducts communicates with one of the air supply outlets on the corresponding vertical end surface; and

a first air duct cover plate and a second air duct cover plate, the first air duct cover plate and the second air duct cover plate both including a front cover portion and two connection portions respectively disposed at two transverse sides of the front cover portion, wherein the front cover portion is disposed at a front

side of the air duct main body, and each of the connection portions is configured to be installed on a cabinet of the refrigerator; and

the second air duct cover plate further includes two widening cover portions, wherein each of the widening cover portions is connected to one transverse side of the front cover portion, and is disposed at a front side of one of the widening modules; and each of the widening cover portions is integrally formed with the front cover portion, or each of the widening cover portions is installed on the front cover portion through a connection structure.

[0008] Optionally, a thermal insulation material layer is disposed between the air duct main body and the front cover portion; and

a thermal insulation material layer is disposed between the optional widening module and the corresponding widening cover portion.

[0009] Optionally, each of the connection portions includes a vertical side plate connected to the front cover portion, and a plurality of first buckles connected to a back side edge of the vertical side plate, so as to fit with a plurality of first clamping grooves formed in the cabinet; and

at least one first ventilation hole is formed in each of the vertical side plates, and each of the first ventilation holes is formed in a way of corresponding to one of the air supply outlets.

[0010] Optionally, both of the first air duct cover plate and the second air duct cover plate further include:

a connection plate connected to an upper side edge of the front cover portion, and a plurality of second buckles connected to a back side edge of the connection plate, so as to fit with a plurality of second clamping grooves formed in the cabinet.

[0011] Optionally, the second air duct cover plate further includes:

two enclosures, wherein each of the enclosures is disposed at a back surface of one of the widening cover portions, and defines an accommodation cavity for accommodating the corresponding widening module together with the connection portion or the air duct main body; and

at least one second ventilation hole is formed in each of the enclosures, and each of the second ventilation holes is disposed in a way of corresponding to an outlet of one of the connection air ducts of the corresponding widening module.

[0012] Optionally, bulges of the plurality of first buckles of each of the connection portions are located at an outer side of the corresponding vertical side plate; at least one third buckle is further disposed on each of the connection portions, and a bulge of the third buckle is located at an inner side of the corresponding vertical side plate; and

a bulge of each of the second buckles is located at the upper side of the connection plate; at least one fourth buckle is also disposed on the connection plate; and a bulge of the fourth buckle is located at a lower side of the connection plate.

[0013] Optionally, the cabinet is an inner liner, and the thermal insulation material layer is PE foam.

[0014] In another aspect, the present invention further provides a refrigerator according to claim 7.

[0015] In yet another aspect, the present invention further provides another refrigerator, wherein the refrigerator includes an inner liner and a modular universal air supply device, and the modular universal air supply device includes:

an air duct main body, disposed at a back portion of the inner liner and provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement, wherein each of the vertical end surfaces is provided with at least one air supply outlet;

two widening modules, disposed at two transverse sides of the air duct main body, wherein at least one connection air duct is disposed on each of the widening air duct modules, and each of the connection air ducts communicates with one of the air supply outlets on the corresponding vertical end surface; and

a second air duct cover plate, including a front cover portion, two connection portions respectively disposed at two transverse sides of the front cover portion, and two widening cover portions, wherein the front cover portion is disposed at a front side of the air duct main body, and each of the connection portions is installed on the inner liner; each of the widening cover portions is connected to one transverse side of the front cover portion, and is disposed at a front side of one of the widening modules; and each of the widening cover portions is integrally formed with the front cover portion, or each of the widening cover portions is installed on the front cover portion through a connection structure.

[0016] Optionally, the modular universal air supply device is any one of the above modular universal air supply devices.

[0017] In yet another aspect, the present invention further provides a method for manufacturing a refrigerator by using any one of the above modular universal air supply devices, wherein

when manufacturing a refrigerator including an inner liner, an air duct main body and a first air duct cover plate, the manufacturing method includes:

manufacturing an inner liner for the refrigerator by a first mold;

manufacturing an air duct main body by a second mold;

manufacturing a first air duct cover plate including a

front cover portion and connection portions; and
assembling the inner liner, the air duct main body and the first air duct cover plate; and
when manufacturing a refrigerator including an inner liner, an air duct main body, two widening modules and a second air duct cover plate, the manufacturing method includes:

manufacturing the inner liner by the first mold;
manufacturing the air duct main body by the second mold;
manufacturing the widening modules by a third mold;
manufacturing the first air duct cover plate including a front cover portion and connection portions, manufacturing widening cover portions, installing the widening cover portions onto the first air duct cover plate to manufacture a second air duct cover plate; or manufacturing a second air duct cover plate including a front cover portion, connection portions and widening cover portions; and
assembling the inner liner, the air duct main body, two of the widening modules and the second air duct cover plate.

[0018] In the modular universal air supply device and the refrigerator of the present invention, since the air duct main body, the widening modules, the first air duct cover plate and the second air duct cover plate are provided, that is, only appearance components and universal left and right ventilation pipes (i.e., widening modules) are newly added, while the cabinet and the foam assembly inside both can be universal to an existing cabinet, the cost of molds caused by new addition of components is reduced. At the same time, the cabinets of all models can be planned in a unified manner to realize the universality of components of cabinets of different platforms. That is, the present invention realizes the modular design and study on an air duct assembly, and the mold cost and the management cost are reduced.

[0019] Further, through the present invention, during widening of the air duct, the air duct foam and air duct PE foam are universal; the inner liner is also universal; air guide pipes are added to left and right sides to guide air to a place where it is required; and the PE foam and the ventilation pipes cooperate to prevent condensation on the air duct cover plates. The modular unified standardization of the air duct of the refrigerator can be realized; universality on refrigerators with different air supply widths is realized; and the modular universal air supply device can be applicable to all refrigerators with surrounding air outlet.

[0020] According to the following detailed descriptions of specific embodiments of the present invention in conjunction with the drawings, those skilled in the art will more clearly understand the above and other objectives, advantages and features of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Some specific embodiments of the present invention are described in detail below with reference to the drawings by way of example and not limitation. The same reference numerals in the drawings indicate the same or similar components or parts. Those skilled in the art should understand that these drawings are not necessarily drawn in scale. In the drawings:

Figure 1 is a schematic structure diagram of a modular universal air supply device according to an embodiment of the present invention.
Figure 2 is a schematic structure diagram of a modular universal air supply device according to an embodiment of the present invention.
Figure 3 is a schematic structure diagram of a refrigerator according to an embodiment of the present invention.
Figure 4 is a schematic diagram of airflow flowing inside the refrigerator shown in Figure 3.
Figure 5 is a schematic sectional view along an A-A plane in Figure 3.
Figure 6 is a schematic sectional view along a B-B plane in Figure 3.
Figure 7 is a schematic structure diagram of a refrigerator according to an embodiment of the present invention.
Figure 8 is a schematic diagram of airflow flowing inside the refrigerator shown in Figure 7.
Figure 9 is a schematic sectional view along a C-C plane in Figure 7.
Figure 10 is a schematic sectional view along a D-D plane in Figure 7.
Figure 11 is a schematic enlargement view of a local cross section in Figure 10.
Figure 12 is a schematic structure diagram of an inner liner of the refrigerator shown in Figure 3 and Figure 7.

DETAILED DESCRIPTION

[0022] Figure 1 is a schematic structure diagram of a modular universal air supply device according to an embodiment of the present invention. Figure 2 is a schematic structure diagram of a modular universal air supply device according to an embodiment of the present invention. As shown in Figure 1 and Figure 2, and referring to Figure 3 to Figure 12, the embodiment of the present invention provides a modular universal air supply device for a refrigerator. The modular universal air supply device may include an air duct main body 20, two widening modules 30, a first air duct cover plate 40 and/or a second air duct cover plate 50.

[0023] The air duct main body 20 may be provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement. Each of the vertical end surfaces is provided with

at least one air supply outlet. A lower end surface of the air duct main body 20 may be provided with an air inlet 22. An air duct may be provided with at least one communication groove 21/communication passage communicating with the air inlet 22 and at least one air supply outlet. That is, the air duct main body 20 is mainly used to guide an airflow to flow, and is made of a thermal isolation material/heat insulation material.

[0024] The two widening modules 30 may be disposed at two transverse sides of the air duct main body 20. At least one connection air duct is disposed on each of the widening air duct modules, and each of the connection air ducts communicates with one air supply outlet on the corresponding vertical end surface. The widening modules 30 may also be called ventilation pipes, and are configured to widen the air duct main body 20 in a width direction (i.e., transverse direction) of the air duct main body 20 to further convey the airflow. The widening modules 30 are made of a thermal isolation material/heat insulation material.

[0025] The first air duct cover plate 40 and the second air duct cover plate 50 both include a front cover portion 41 and two connection portions 42 respectively disposed at two transverse sides of the front cover portion 41. The front cover portion 41 is disposed at a front side of the air duct main body 20. Each of the connection portions 42 is configured to be installed on a cabinet of the refrigerator, for example, installed at an inner liner 90 of the cabinet. Additionally, the second air duct cover plate 50 further includes two widening cover portions 51. Each of the widening cover portions 51 is connected to one transverse side of the front cover portion 41, and is disposed at a front side of one widening module 30. Each of the widening cover portions 51 is integrally formed with the front cover portion 41, or each of the widening cover portions 51 is installed on the front cover portion 41 or one connection portion 42 through a connection structure. When each of the widening cover portions 51 is installed on the front cover portion 41 or one connection portion 42 through a connection structure, the condition can also be understood as that each of the widening cover portions 51 is installed at one corresponding side of the first air duct cover plate 40 through a connection structure.

[0026] When the modular universal air supply device according to the embodiment of the present invention is used, and when a refrigerator including an inner liner 90, an air duct main body 20 and a first air duct cover plate 40 is manufactured, the inner liner 90, the air duct main body 20 and the first air duct cover plate 40 are selected to be assembled so as to form the refrigerator with a narrow air duct. When a refrigerator including an inner liner 90, an air duct main body 20, two widening modules 30 and a second air duct cover plate 50 is manufactured, the inner liner 90, the air duct main body 20, the two widening modules 30 and the second air duct cover plate 50 are selected to be assembled so as to form the refrigerator with a wide air duct cover plate. When the wide and narrow air ducts of the refrigerator are converted, the unified inner liner 90 and air duct main body 20 can be used, and even the unified first air duct cover plate 40 can be used to further reduce the molds, so that the cost input of the molds is reduced; the management waste caused by too many air ducts, cabinets and the like is reduced; the air ducts with different appearance widths can be installed in the same cabinet, and cross-platform air duct module universality and cabinet universality are achieved.

[0027] In some embodiments of the present invention, a thermal insulation material layer 60 is disposed between the air duct main body 20 and the front cover portion 41. A thermal insulation material layer 60 is disposed between the widening modules 30 and the corresponding widening cover portions 51. The thermal insulation material layer 60 is preferably PE foam, and a thickness may be in a range of 2 mm to 4 mm, preferably 3 mm. The arrangement of the thermal insulation material layer 60 may prevent condensation from forming on a front surface of the air duct cover plate. The second air duct cover plate 50 further includes two enclosures 52. Each of the enclosure portions 52 is disposed at a back surface of one widening cover portion 51, and defines an accommodation cavity for accommodating the corresponding widening module 30 together with the connection portion 42 or the air duct main body 20. At least one second ventilation hole is formed in each enclosure 52, and each of the second ventilation holes is disposed in a way of corresponding to an outlet of one connection air duct of the corresponding widening module 30.

[0028] In some embodiments of the present invention, each of the connection portions 42 includes a vertical side plate connected to the front cover portion 41, and a plurality of first buckles 55 connected to a back side edge of the vertical side plate, so as to fit with a plurality of first clamping grooves 91 formed in the cabinet. At least one first ventilation hole is formed in each of the vertical side plates, and each of the first ventilation holes is formed in a way of corresponding to one air supply outlet. Both of the first air duct cover plate 40 and the second air duct cover plate 50 further include a connection plate connected to an upper side edge of the front cover portion 41, and a plurality of second buckles 56 connected to a back side edge of the connection plate, so as to fit with a plurality of second clamping grooves 92 formed in the cabinet.

[0029] Bulges of the plurality of first buckles 55 of each of the connection portions 42 are located at an outer side of the corresponding vertical side plate. At least one third buckle 57 is further disposed on each of the connection portions 42, and a bulge of the third buckle 57 is located at an inner side of the corresponding vertical side plate. A bulge of each of the second buckles 56 is located at the upper side of the connection plate; at least one fourth buckle 58 is also disposed on the connection plate; and a bulge of the fourth buckle 58 is located at a lower side of the connection plate. The third buckle 57 and the fourth buckle 58 are preferably used to fix the air duct main

body 20, and can also be used to be fixed to the inner liner 90. In some embodiments of the present invention, the buckles may also be called clamping hooks, and the clamping grooves are called clamping hook fixing grooves.

[0030] Figure 3 is a schematic structure diagram of a refrigerator according to an embodiment of the present invention. As shown in Figure 3, and referring to Figure 4 to Figure 6, arrows in the figures show flowing directions of airflows. The embodiment of the present invention further provides a refrigerator, including an inner liner 90 and a modular universal air supply device. Additionally, the modular universal air supply device includes an air duct main body 20 and a first air duct cover plate 40. The air duct main body 20 is disposed at a back portion of the inner liner 90. Additionally, the air duct main body 20 is provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement. Each of the vertical end surfaces is provided with at least one air supply outlet, whose main effect is to guide air to a region requiring refrigeration. The first air duct cover plate 40 includes a front cover portion 41 and two connection portions 42 respectively disposed at two transverse sides of the front cover portion 41. The front cover portion 41 is disposed at a front side of the air duct main body 20, and each of the connection portions 42 is installed on the inner liner 90. Preferably, the refrigerator uses partial components of the modular universal air supply device in any one of the above embodiments so as to form the refrigerator with the narrow air duct. A width of the narrow air duct can be 400 mm. That is, the modular universal air supply device according to the present embodiment includes partial or all corresponding components of the modular universal air supply device according to any one of the above embodiments.

[0031] In some further embodiments of the present invention, if a refrigerator with a wide air duct needs to be manufactured, on the basis of the refrigerator with the narrow air duct of the embodiment, two widening air duct modules are added, and two widening cover portions 51 are added; or two widening air duct modules are added, and the first air duct cover plate 40 is changed into the second air duct cover plate 50.

[0032] Figure 7 is a schematic structure diagram of a refrigerator according to an embodiment of the present invention. As shown in Figure 7, and referring to Figure 8 to Figure 10, arrows in the figures show flowing directions of airflows. The embodiment of the present invention further provides a refrigerator, including an inner liner 90 and a modular universal air supply device. Additionally, the modular universal air supply device includes an air duct main body 20, two widening modules 30 and a second air duct cover plate 50.

[0033] The air duct main body 20 is disposed at a back portion of the inner liner 90. Additionally, the air duct main body 20 is provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement. Each of the vertical end surfaces is provided with at least one air supply outlet. The two widening modules 30 are disposed at two transverse sides of the air duct main body 20. At least one connection air duct is provided on each of the widening air duct modules; each of the connection air ducts communicates with one air supply outlet on the corresponding vertical end surface whose main effect is to guide air to a region requiring refrigeration. The second air duct cover plate 50 includes a front cover portion 41, two connection portions 42 respectively disposed at two transverse sides of the front cover portion 41, and two widening cover portions 51. The front cover portion 41 is disposed at a front side of the air duct main body 20, and each of the connection portions 42 is installed on the inner liner 90. Each widening cover portion 51 is connected to one transverse side of the front cover portion 41, and is disposed at a front side of one widening module 30. Additionally, each of the widening cover portions 51 is integrally formed with the front cover portion 41, or each of the widening cover portions 51 is installed on the front cover portion 41 or one connection portion 42 through a connection structure. Preferably, the refrigerator uses partial components of the modular universal air supply device in any one of the above embodiments so as to form the refrigerator with the wide air duct. A width of the wide air duct can be 500 mm. That is, the modular universal air supply device according to the present embodiment includes partial or all corresponding components of the modular universal air supply device according to any one of the above embodiments.

[0034] In some further embodiments of the present invention, if a refrigerator with a narrow air duct needs to be manufactured, on the basis of the refrigerator with the wide air duct of the embodiment, two widening air duct modules are removed, and two widening cover portions 51 are removed; or the two widening air duct modules are removed, and the second air duct cover plate 50 is changed into the first air duct cover plate 40.

[0035] The embodiment of the present invention further provides a method for manufacturing a refrigerator. Specifically, when manufacturing a refrigerator including an inner liner 90, an air duct main body 20 and a first air duct cover plate 40, the manufacturing method of the refrigerator includes: the inner liner 90 for the refrigerator is manufactured by a first mold; the air duct main body 20 is manufactured by a second mold; the first air duct cover plate 40 including a front cover portion 41 and connection portions 42 is manufactured; and the inner liner 90, the air duct main body 20 and the first air duct cover plate 40 are assembled.

[0036] When manufacturing a refrigerator including an inner liner 90, an air duct main body 20, two widening modules 30 and a second air duct cover plate 50, the manufacturing method of the refrigerator includes: the inner liner 90 is manufactured by the first mold; the air duct main body 20 is manufactured by the second mold; the widening modules 30 are manufactured by a third mold; the first air duct cover plate 40 including a front

cover portion 41 and connection portions 42 is manufactured; widening cover portions 51 are manufactured; and the widening cover portions 51 are installed onto the first air duct cover plate 40 to manufacture the second air duct cover plate 50; or the second air duct cover plate 50 including a front cover portion 41, connection portions 42 and widening cover portions 51 is manufactured; and the inner liner 90, the air duct main body 20, the two widening modules 30 and the second air duct cover plate 50 are assembled.

Claims

1. A modular universal air supply device for a refrigerator, comprising:

   an air duct main body (20), provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement, each of the vertical end surfaces being provided with at least one air supply outlet, **characterized in that**
   two widening modules (30), disposed at two transverse sides of the air duct main body (20), wherein each of the widening air duct modules is provided with at least one connection air duct, and each of the connection air ducts communicates with one of the air supply outlets on the corresponding vertical end surface; and
   a first air duct cover plate (40) and a second air duct cover plate (50), the first air duct cover plate (40) and the second air duct cover plate (50) both comprising a front cover portion (41) and two connection portions (42) respectively disposed at two transverse sides of the front cover portion (41), wherein the front cover portion (41) is disposed at a front side of the air duct main body (20), and each of the connection portions (42) is configured to be installed on a cabinet of the refrigerator; and
   the second air duct cover plate (50) further comprises two widening cover portions (51), wherein each of the widening cover portions (51) is connected to one transverse side of the front cover portion (41), and is disposed at a front side of one of the widening modules (30); and each of the widening cover portions (51) is integrally formed with the front cover portion (41), or each of the widening cover portions (51) is installed on the front cover portion (41) or one of the connection portions (42) through a connection structure.

2. The modular universal air supply device according to claim 1, wherein

   a thermal insulation material layer (60) is disposed between the air duct main body (20) and the front cover portion (41); and
   a thermal insulation material layer (60) is disposed between the widening module and the corresponding widening cover portion.

3. The modular universal air supply device according to claim 1, wherein

   each of the connection portions (42) comprises a vertical side plate connected to the front cover portion (41), and a plurality of first buckles (55) connected to a back side edge of the vertical side plate, so as to fit with a plurality of first clamping grooves formed in the cabinet; and
   at least one first ventilation hole is formed in each of the vertical side plates, and each of the first ventilation holes is formed in a way of corresponding to one of the air supply outlets.

4. The modular universal air supply device according to claim 3, wherein both of the first air duct cover plate (40) and the second air duct cover plate (50) further comprise:
   a connection plate connected to an upper side edge of the front cover portion (41), and a plurality of second buckles (56) connected to a back side edge of the connection plate, so as to fit with a plurality of second clamping grooves formed in the cabinet.

5. The modular universal air supply device according to claim 1, wherein the second air duct cover plate (50) further comprises:

   two enclosures (52), wherein each of the enclosures (52) is disposed at a back surface of one of the widening cover portions (51), and defines an accommodation cavity for accommodating the corresponding widening module (30) together with the connection portion or the air duct main body (20); and
   at least one second ventilation hole is formed in each of the enclosures (52), and each of the second ventilation holes is disposed in a way of corresponding to an outlet of one of the connection air ducts of the corresponding widening module.

6. The modular universal air supply device according to claim 2, wherein
   the cabinet is an inner liner (90), and the thermal insulation material layer (60) is PE foam.

7. A refrigerator, wherein the refrigerator comprises an inner liner (90) and a modular universal air supply device according to any of the previous claims, and the modular universal air supply device comprises:

an air duct main body (20), disposed at a back portion of the inner liner (90) and provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement, wherein each of the vertical end surfaces is provided with at least one air supply outlet; and
a first air duct cover plate (40), comprising a front cover portion (41) and two connection portions (42) respectively disposed at two transverse sides of the front cover portion (41), wherein the front cover portion (41) is disposed at a front side of the air duct main body (20), and each of the connection portions (42) is installed on the inner liner (90).

8. A refrigerator, wherein the refrigerator comprises an inner liner (90) and a modular universal air supply device, and the modular universal air supply device comprises:

an air duct main body (20), disposed at a back portion of the inner liner (90) and provided with a front surface and a back surface in opposite arrangement, and two vertical end surfaces in opposite arrangement, wherein each of the vertical end surfaces is provided with at least one air supply outlet;
two widening modules (30), disposed at two transverse sides of the air duct main body (20), wherein at least one connection air duct is disposed on each of the widening air duct modules, and each of the connection air ducts communicates with one of the air supply outlets on the corresponding vertical end surface; and
a second air duct cover plate (50), comprising a front cover portion (41), two connection portions (42) respectively disposed at two transverse sides of the front cover portion (41), and two widening cover portions (51), wherein the front cover portion (41) is disposed at a front side of the air duct main body (20), and each of the connection portions (42) is installed on the inner liner (90); each of the widening cover portions (51) is connected to one transverse side of the front cover portion (41), and is disposed at a front side of one of the widening modules (30); and each of the widening cover portions (51) is integrally formed with the front cover portion (41), or each of the widening cover portions (51) is installed on the front cover portion (41) or one of the connection portions (42) through a connection structure.

9. The refrigerator according to claim 7 or 8, wherein the modular universal air supply device is the modular universal air supply device according to any one of claims 1 to 6.

10. A method for manufacturing a refrigerator, wherein when manufacturing a refrigerator comprising an inner liner (90), an air duct main body (20) and a first air duct cover plate (40), the manufacturing method comprises:

manufacturing an inner liner (90) for the refrigerator by a first mold;
manufacturing an air duct main body (20) by a second mold;
manufacturing a first air duct cover plate (40) comprising a front cover portion (41) and connection portions (42); and
assembling the inner liner (90), the air duct main body (20) and the first air duct cover plate (40);
characterized in that
when manufacturing a refrigerator comprising an inner liner (90), an air duct main body (20), two widening modules (30) and a second air duct cover plate (50), the manufacturing method comprises:

manufacturing the inner liner (90) by the first mold;
manufacturing the air duct main body (20) by the second mold;
manufacturing widening modules (30) by a third mold;
manufacturing the first air duct cover plate (40) comprising a front cover portion (41) and connection portions (42), manufacturing widening cover portions (51), and installing the widening cover portions (51) onto the first air duct cover plate (40) to manufacture a second air duct cover plate (50); or manufacturing a second air duct cover plate (50) comprising a front cover portion (41), connection portions (42) and widening cover portions (51); and
assembling the inner liner (90), the air duct main body (20), two of the widening modules (30) and the second air duct cover plate (50).

Patentansprüche

1. Modulare universelle Luftversorgungseinrichtung für einen Kühlschrank, umfassend:

einen Luftkanalhauptkörper (20), der mit einer vorderen Oberfläche und einer hinteren Oberfläche in gegenüberliegender Anordnung und zwei vertikalen Endflächen in gegenüberliegender Anordnung versehen ist, wobei jede der vertikalen Endflächen mit mindestens einem Luftversorgungsauslass versehen ist, **gekennzeichnet durch**

zwei Aufweitungsmodule (30), die an zwei Querseiten des Luftkanalhauptkörpers (20) angeordnet sind, wobei jedes der Aufweitungsluftkanalmodule mit mindestens einem Verbindungsluftkanal versehen ist und jeder der Verbindungsluftkanäle mit einem der Luftversorgungsauslässe an der entsprechenden vertikalen Endfläche verbunden ist; und

eine erste Luftkanalabdeckplatte (40) und eine zweite Luftkanalabdeckplatte (50), wobei sowohl die erste Luftkanalabdeckplatte (40) als auch die zweite Luftkanalabdeckplatte (50) einen vorderen Abdeckabschnitt (41) und zwei Verbindungsabschnitte (42), die jeweils an einer von zwei Querseiten des vorderen Abdeckabschnitts (41) angeordnet sind, umfasst, wobei der vordere Abdeckabschnitt (41) an einer Vorderseite des Luftkanalhauptkörpers (20) angeordnet ist und jeder der Verbindungsabschnitte (42) dazu eingerichtet ist, auf einem Schrank des Kühlschranks installiert zu sein; und **dadurch, dass**

die zweite Luftkanalabdeckplatte (50) ferner zwei Aufweitungsabdeckabschnitte (51) umfasst, wobei jeder der Aufweitungsabdeckabschnitte (51) mit einer Querseite des vorderen Abdeckabschnitts (41) verbunden ist und an einer Vorderseite eines der Aufweitungsmodule (30) angeordnet ist; und jeder der Aufweitungsabdeckabschnitte (51) einstückig mit dem vorderen Abdeckabschnitt (41) gebildet ist oder jeder der Aufweitungsabdeckabschnitte (51) durch eine Verbindungsstruktur auf dem vorderen Abdeckabschnitt (41) oder einem der Verbindungsabschnitte (42) installiert ist.

2. Modulare universelle Luftversorgungseinrichtung nach Anspruch 1, wobei

eine Wärmeisolationsmaterialschicht (60) zwischen dem Luftkanalhauptkörper (20) und dem vorderen Abdeckabschnitt (41) angeordnet ist; und

eine Wärmeisolationsmaterialschicht (60) zwischen dem Aufweitungsmodul und dem entsprechenden Aufweitungsabdeckabschnitt angeordnet ist.

3. Modulare universelle Luftversorgungseinrichtung nach Anspruch 1, wobei

jeder der Verbindungsabschnitte (42) eine vertikale Seitenplatte, die mit dem vorderen Abdeckabschnitt (41) verbunden ist, und mehrere erste Schnallen (55) umfasst, die mit einer Rückseitenkante der vertikalen Seitenplatte verbunden sind, um zu mehreren ersten Klemmnuten zu passen, die in dem Schrank ausgebildet sind, und

mindestens ein erstes Belüftungsloch in jeder der vertikalen Seitenplatten ausgebildet ist und jedes der ersten Belüftungslöcher derart ausgebildet ist, dass es einem der Luftversorgungsauslässe entspricht.

4. Modulare universelle Luftversorgungseinrichtung nach Anspruch 3, wobei sowohl die erste Luftkanalabdeckplatte (40) als auch die zweite Luftkanalabdeckplatte (50) ferner umfasst:

eine Verbindungsplatte, die mit einer oberen Seitenkante des vorderen Abdeckabschnitts (41) verbunden ist, und mehrere zweite Schnallen (56), die mit einer Rückseitenkante der Verbindungsplatte verbunden sind, um zu mehreren zweiten Klemmnuten zu passen, die in dem Schrank ausgebildet sind.

5. Modulare universelle Luftversorgungseinrichtung nach Anspruch 1, wobei die zweite Luftkanalabdeckplatte (50) ferner umfasst:

zwei Gehäuse (52), wobei jedes der Gehäuse (52) an einer hinteren Oberfläche eines der Aufweitungsabdeckabschnitte (51) angeordnet ist und zusammen mit dem Verbindungsabschnitt oder dem Luftkanalhauptkörper (20) einen Aufnahmehohlraum zum Aufnehmen des entsprechenden Aufweitungsmoduls (30) definiert;

wobei mindestens ein zweites Belüftungsloch in jedem der Gehäuse (52) ausgebildet ist und jedes der zweiten Belüftungslöcher derart angeordnet ist, dass es einem Auslass eines der Verbindungsluftkanäle des entsprechenden Aufweitungsmoduls entspricht.

6. Modulare universelle Luftversorgungseinrichtung nach Anspruch 2, wobei

der Schrank eine Innenverkleidung (90) ist und die Wärmeisolationsmaterialschicht (60) ein PE-Schaum ist.

7. Kühlschrank, wobei der Kühlschrank eine Innenverkleidung (90) und eine modulare universelle Luftversorgungseinrichtung nach einem der vorhergehenden Ansprüche umfasst

und die modulare universelle Luftversorgungseinrichtung umfasst:

einen Luftkanalhauptkörper (20), der an einem hinteren Abschnitt der Innenverkleidung (90) angeordnet ist und mit einer vorderen Oberfläche und einer hinteren Oberfläche in gegenüberliegender Anordnung sowie zwei vertikalen Endflächen in gegenüberliegender Anordnung versehen ist, wobei jede der vertikalen Endflächen mit mindestens einem Luftversorgungsauslass versehen ist; und

eine erste Luftkanalabdeckplatte (40), die einen vorderen Abdeckabschnitt (41) und zwei Verbindungsabschnitte (42) aufweist, die jeweils an einer von zwei Querseiten des vorderen Abdeckabschnitts (41) angeordnet sind, wobei der vordere Abdeckabschnitt (41) an einer Vorderseite des Luftkanalhauptkörpers (20) angeordnet ist und jeder der Verbindungsabschnitte (42) an der Innenverkleidung (90) installiert ist.

8. Kühlschrank, wobei der Kühlschrank eine Innenverkleidung (90) und eine modulare universelle Luftversorgungseinrichtung umfasst und die modulare universelle Luftversorgungseinrichtung umfasst:

einen Luftkanalhauptkörper (20), der an einem hinteren Abschnitt der Innenverkleidung (90) angeordnet ist und mit einer vorderen Oberfläche und einer hinteren Oberfläche in gegenüberliegender Anordnung sowie zwei vertikalen Endflächen in gegenüberliegender Anordnung versehen ist, wobei jede der vertikalen Endflächen mit mindestens einem Luftversorgungsauslass versehen ist;
zwei Aufweitungsmodule (30), die an zwei Querseiten des Hauptkörpers des Luftkanals (20) angeordnet sind, wobei mindestens ein Verbindungsluftkanal auf jedem der Aufweitungsluftkanalmodule angeordnet ist und jeder der Verbindungsluftkanäle mit einem der Luftversorgungsauslässe auf der entsprechenden vertikalen Endfläche verbunden ist; und
eine zweite Luftkanalabdeckplatte (50), die einen vorderen Abdeckabschnitt (41), zwei Verbindungsabschnitte (42), die jeweils an einer von zwei Querseiten des vorderen Abdeckabschnitts (41) angeordnet sind, und zwei Aufweitungsabdeckabschnitte (51) aufweist, wobei der vordere Abdeckabschnitt (41) an einer Vorderseite des Luftkanalhauptkörpers (20) angeordnet ist und jeder der Verbindungsabschnitte (42) auf der Innenverkleidung (90) installiert ist; jeder der Aufweitungsabdeckabschnitte (51) mit einer Querseite des vorderen Abdeckabschnitts (41) verbunden ist und an einer Vorderseite eines der Aufweitungsmodule (30) angeordnet ist; und jeder der Aufweitungsabdeckabschnitte (51) einstückig mit dem vorderen Abdeckabschnitt (41) ausgebildet ist oder jeder der Aufweitungsabdeckabschnitte (51) durch eine Verbindungsstruktur auf dem vorderen Abdeckabschnitt (41) oder einem der Verbindungsabschnitte (42) installiert ist.

9. Kühlschrank nach Anspruch 7 oder 8, wobei die modulare universelle Luftversorgungseinrichtung die modulare universelle Luftversorgungseinrichtung nach einem der Ansprüche 1 bis 6 ist.

10. Verfahren zum Herstellen eines Kühlschranks, wobei
bei der Herstellung eines Kühlschranks, der eine Innenverkleidung (90), einen Luftkanalhauptkörper (20) und eine erste Luftkanalabdeckplatte (40) umfasst, das Herstellungsverfahren umfasst:

Herstellen einer Innenverkleidung (90) für den Kühlschrank durch eine erste Form;
Herstellen eines Luftkanalhauptkörpers (20) durch eine zweite Form;
Herstellen einer ersten Luftkanalabdeckplatte (40), die einen vorderen Abdeckabschnitt (41) und Verbindungsabschnitte (42) umfasst, und
Zusammensetzen der Innenverkleidung (90), des Luftkanalhauptkörpers (20) und der ersten Luftkanalabdeckplatte (40); **dadurch gekennzeichnet, dass**
bei der Herstellung eines Kühlschranks, der eine Innenverkleidung (90), einen Luftkanalhauptkörper (20), zwei Aufweitungsmodule (30) und eine zweite Luftkanalabdeckplatte (50) umfasst, das Herstellungsverfahren umfasst:

Herstellen der Innenverkleidung (90) durch die erste Form;
Herstellen des Luftkanalhauptkörpers (20) durch die zweite Form;
Herstellen von Aufweitungsmodulen (30) durch eine dritte Form;
Herstellen der ersten Luftkanalabdeckplatte (40), die einen vorderen Abdeckabschnitt (41) und Verbindungsabschnitte (42) aufweist, Herstellen von Aufweitungsabdeckabschnitten (51) und Installieren der Aufweitungsabdeckabschnitte (51) auf der ersten Luftkanalabdeckplatte (40), um eine zweite Luftkanalabdeckplatte (50) herzustellen; oder Herstellen einer zweiten Luftkanalabdeckplatte (50), die einen vorderen Abdeckabschnitt (41), Verbindungsabschnitte (42) und Aufweitungsabdeckabschnitte (51) umfasst, und
Zusammensetzen der Innenverkleidung (90), des Luftkanalhauptkörpers (20), zwei der Aufweitungsmodule (30) und der zweiten Luftkanalabdeckplatte (50).

Revendications

1. Un dispositif d'alimentation en air universel et modulaire pour réfrigérateur, comprenant:

un corps principal de conduit d'air (20), pourvu d'une surface avant et d'une surface arrière dans un agencement opposé, et deux surfaces d'extrémité verticales dans un agencement op-

posé, chacune des surfaces d'extrémité verticales étant pourvue d'au moins un orifice d'insufflation d'air,

caractérisé en ce que

deux modules d'élargissement (30), disposés au niveau de deux côtés transversaux du corps principal de conduit d'air (20), dans lequel chacun des modules d'élargissement de conduit d'air est pourvu d'au moins un conduit d'air de raccordement, et chacun des conduits d'air de raccordement communique avec un des orifices d'insufflation d'air sur la surface d'extrémité verticale correspondante; et

une première plaque de couverture de conduit d'air (40) et une deuxième plaque de couverture de conduit d'air (50), la première plaque de couverture de conduit d'air (40) et la deuxième plaque de couverture de conduit d'air (50) comprennent toutes les deux une partie de couverture avant (41) et deux parties de raccordement (42) disposées respectivement sur deux côtés transversaux de la partie de couverture avant (41), dans lequel la partie de couverture avant (41) est disposée sur un côté avant du corps principal de conduit d'air (20), et chacune des parties de raccordement (42) est configurée pour être installée sur une armoire du réfrigérateur; et

la deuxième plaque de couverture de conduit d'air (50) comprend en outre deux parties de couverture d'élargissement (51), dans lequel chacune des parties de couverture d'élargissement (51) est reliée à un côté transversal de la partie de couverture avant (41), et est disposée à l'avant de l'un des modules d'élargissement (30); et chacune des parties de couverture d'élargissement (51) est formée d'un seul tenant avec la partie de couverture avant (41), ou chacune des parties de couverture d'élargissement (51) est installée sur la partie de couverture avant (41) ou sur une des parties de raccordement (42) par l'intermédiaire d'une structure de raccordement.

2. Le dispositif d'alimentation en air universel et modulaire selon la

revendication 1, dans lequel une couche de matériau d'isolation thermique (60) est disposée entre le corps principal de conduit d'air (20) et la partie de couverture avant (41); et

une couche de matériau d'isolation thermique (60) est disposée entre le module d'élargissement et la partie de couverture d'élargissement correspondante.

3. Le dispositif d'alimentation en air universel et modulaire selon la

revendication 1, dans lequel chacune des parties de raccordement (42) comprend une plaque latérale verticale reliée à la partie de couverture avant (41), et une pluralité de premières boucles (55) reliées à un bord arrière de la plaque latérale verticale, de manière à s'adapter à une pluralité de premières rainures de serrage formées dans l'armoire; et

au moins un premier trou de ventilation est formé dans chacune des plaques latérales verticales, et chacun des premiers trous de ventilation est formé de manière à correspondre à un des orifices d'insufflation d'air.

4. Le dispositif d'alimentation en air universel et modulaire selon la revendication 3, dans lequel la première plaque de couverture de conduit d'air (40) et la deuxième plaque de couverture de conduit d'air (50) comprennent toutes les deux en outre :

une plaque de raccordement reliée à un bord latéral supérieur de la partie de couverture avant (41), et une pluralité de deuxièmes boucles (56) reliées à un bord latéral arrière de la plaque de raccordement, de manière à s'adapter à une pluralité de deuxièmes rainures de serrage formées dans l'armoire.

5. Le dispositif d'alimentation en air universel et modulaire selon la

revendication 1, dans lequel la deuxième plaque de couverture de conduit d'air (50) comprend en outre:

deux enceintes (52), dans lequel chacune des enceintes (52) est disposée sur une surface arrière de l'une des parties de couverture d'élargissement (51), et définit une cavité d'hébergement pour accueillir le module d'élargissement correspondant (30) avec la partie de raccordement ou le corps principal de conduit d'air (20); et

au moins un deuxième trou de ventilation est formé dans chacune des enceintes (52), et chacun des deuxièmes trous de ventilation est disposé de manière à correspondre à une sortie de l'un des conduits d'air de raccordement du module d'élargissement correspondant.

6. Le dispositif d'alimentation en air universel et modulaire selon la

revendication 2, dans lequel l'armoire est une doublure intérieure (90), et la couche de matériau d'isolation thermique (60) est en mousse PE.

7. Un réfrigérateur, dans lequel le réfrigérateur comprend une doublure intérieure (90) et un dispositif d'alimentation en air universel et modulaire selon l'une quelconque des revendications précédentes, et le dispositif d'alimentation en air universel et modulaire comprend:

un corps principal de conduit d'air (20), disposé dans une partie arrière de la doublure intérieure (90) et pourvu d'une surface avant et d'une surface arrière dans un agencement opposé, et deux surfaces d'extrémité verticales dans un agencement opposé, dans lequel chacune des surfaces d'extrémité verticales est pourvue d'au moins un orifice d'insufflation d'air; et
une première plaque de couverture de conduit d'air (40), comprenant une partie de couverture avant (41) et deux parties de raccordement (42) disposées respectivement sur deux côtés transversaux de la partie de couverture avant (41), dans lequel la partie de couverture avant (41) est disposée au niveau d'un coté avant du corps principal de conduit d'air (20), et chacune des parties de raccordement (42) est installée sur la doublure intérieure (90).

8. Un réfrigérateur, dans lequel le réfrigérateur comprend une doublure intérieure (90) et un dispositif d'alimentation en air universel et modulaire, et le dispositif d'alimentation en air universel et modulaire comprend:

un corps principal de conduit d'air (20), disposé sur une partie arrière de la doublure intérieure (90) et pourvu d'une surface avant et d'une surface arrière dans un agencement opposé, et deux surfaces d'extrémité verticales dans un agencement opposé, dans lequel chacune des surfaces d'extrémité verticales est pourvue d'au moins un orifice d'insufflation d'air;
deux modules d'élargissement (30), disposés sur deux côtés transversaux du corps principal de conduit d'air (20), dans lequel au moins un conduit d'air de raccordement est disposé sur chacun des modules d'élargissement de conduit d'air, et chacun des conduits d'air de raccordement communique avec un des orifices d'insufflation d'air sur la surface d'extrémité verticale correspondante; et
une deuxième plaque de couverture de conduit d'air (50), comprenant une partie de couverture avant (41), deux parties de raccordement (42) disposées respectivement sur les côtés transversaux de la partie de couverture avant (41), et deux parties de couverture d'élargissement (51), dans lequel la partie de couverture avant (41) est disposée sur un côté avant du corps principal de conduit d'air (20), et chacune des parties de raccordement (42) est installée sur la doublure intérieure (90); chacune des parties de couverture d'élargissement (51) est reliée à un côté transversal de la partie de couverture avant (41), et est disposée à l'avant de l'un des modules d'élargissement (30); et chacune des parties de couverture d'élargissement (51) est formée d'un seul tenant avec la partie de couverture avant (41), ou chacune des parties de couverture d'élargissement (51) est installée sur la partie de couverture avant (41) ou une des parties de raccordement (42) par l'intermédiaire d'une structure de raccordement.

9. Le réfrigérateur selon la revendication 7 ou 8, dans lequel le dispositif
d'alimentation en air universel et modulaire est le dispositif d'alimentation en air universel et modulaire selon l'une quelconque des revendications 1 à 6.

10. Un procédé de fabrication de réfrigérateur, dans lequel
lors de la fabrication d'un réfrigérateur comprenant une doublure intérieure (90), un corps principal de conduit d'air (20) et une première plaque de couverture de conduit d'air (40), le procédé de fabrication comprend:

la fabrication d'une doublure intérieure (90) pour le réfrigérateur par un premier moule;
la fabrication d'un corps principal de conduit d'air (20) par un deuxième moule;
la fabrication d'une première plaque de couverture de conduit d'air (40) comprenant une partie de couverture avant (41) et des parties de raccordement (42); et
l'assemblage de la doublure intérieure (90), du corps principal de conduit d'air (20) et de la première plaque de couverture de conduit d'air (40);
caractérisé en ce que
lors de la fabrication d'un réfrigérateur comprenant une doublure intérieure (90), un corps principal de conduit d'air (20), deux modules d'élargissement (30) et une deuxième plaque de couverture de conduit d'air (50), le procédé de fabrication comprend:

la fabrication de la doublure intérieure (90) par le premier moule;
la fabrication du corps principal de conduit d'air (20) par le deuxième moule;
la fabrication des modules d'élargissement (30) par un troisième moule;
la fabrication de la première plaque de couverture de conduit d'air (40) comprenant une partie de couverture avant (41) et des parties de raccordement (42), la fabrication des parties de couverture d'élargissement (51), et l'installation des parties de couverture d'élargissement (51) sur la première plaque de couverture de conduit d'air (40) pour fabriquer une deuxième plaque de couverture de conduit d'air (50); ou la fabrication d'une deuxième plaque de couverture de conduit d'air (50) comprenant une par-

tie de couverture avant (41), des parties de raccordement (42) et des parties de couverture d'élargissement (51); et

l'assemblage de la doublure intérieure (90), du corps principal de conduit d'air (20), de deux modules d'élargissement (30) et de la deuxième plaque de couverture de conduit d'air (50).

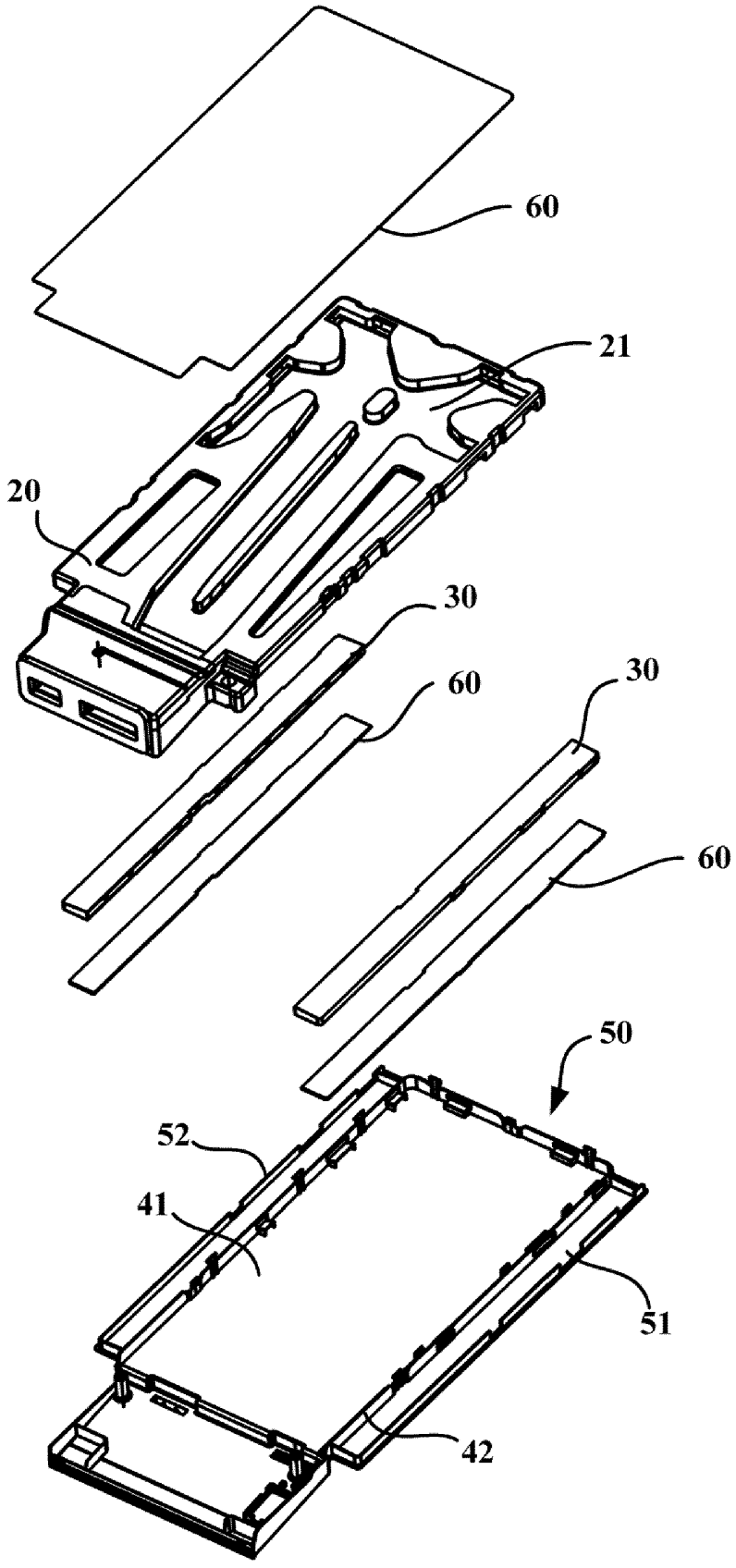

Fig. 1

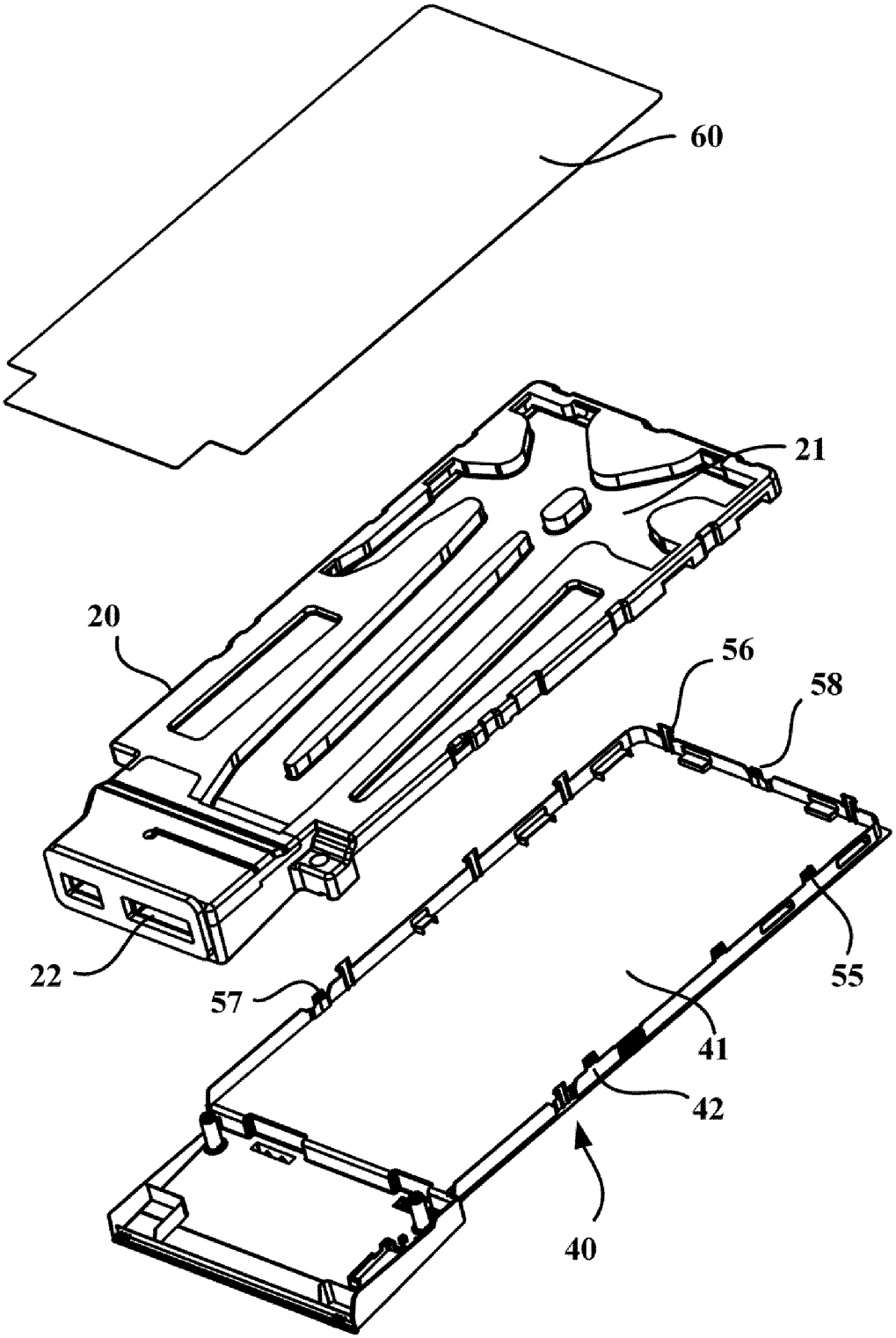

Fig. 2

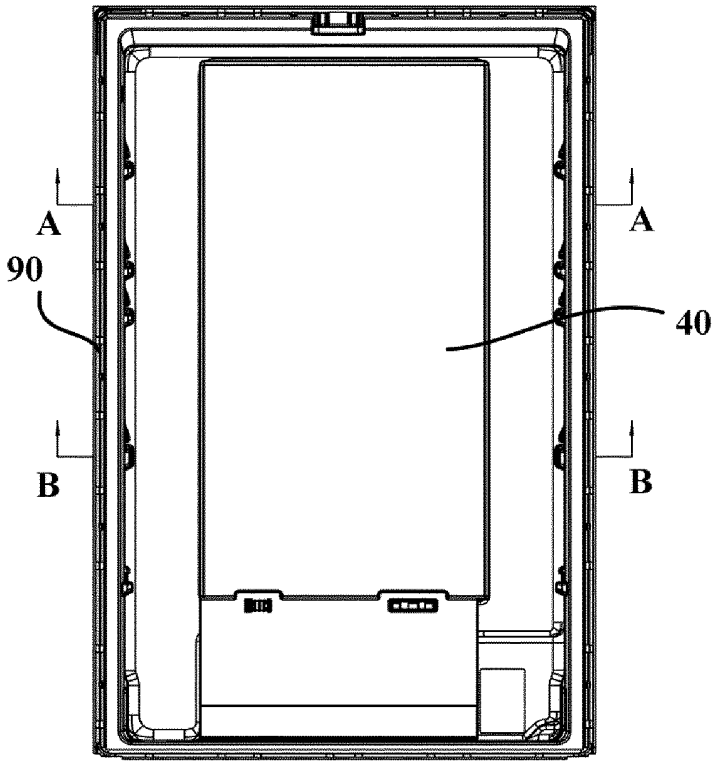

Fig. 3

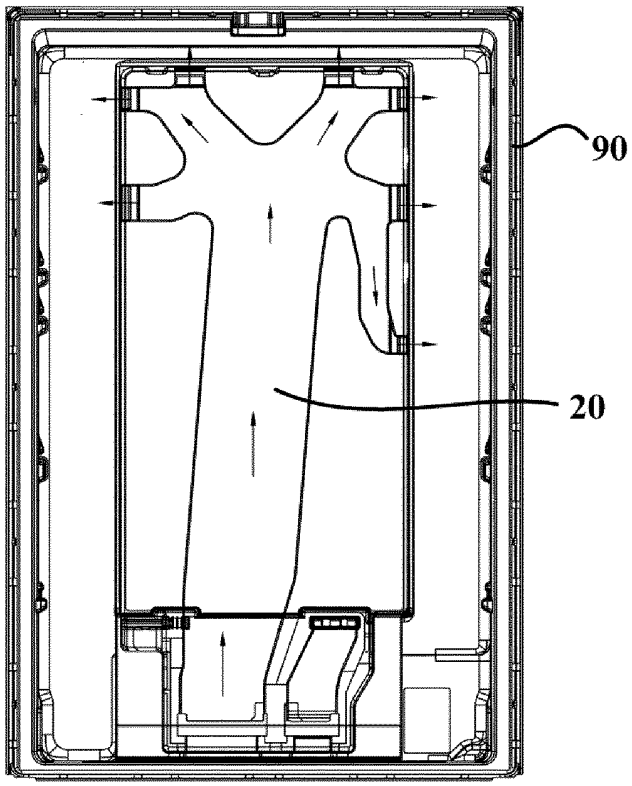

Fig. 4

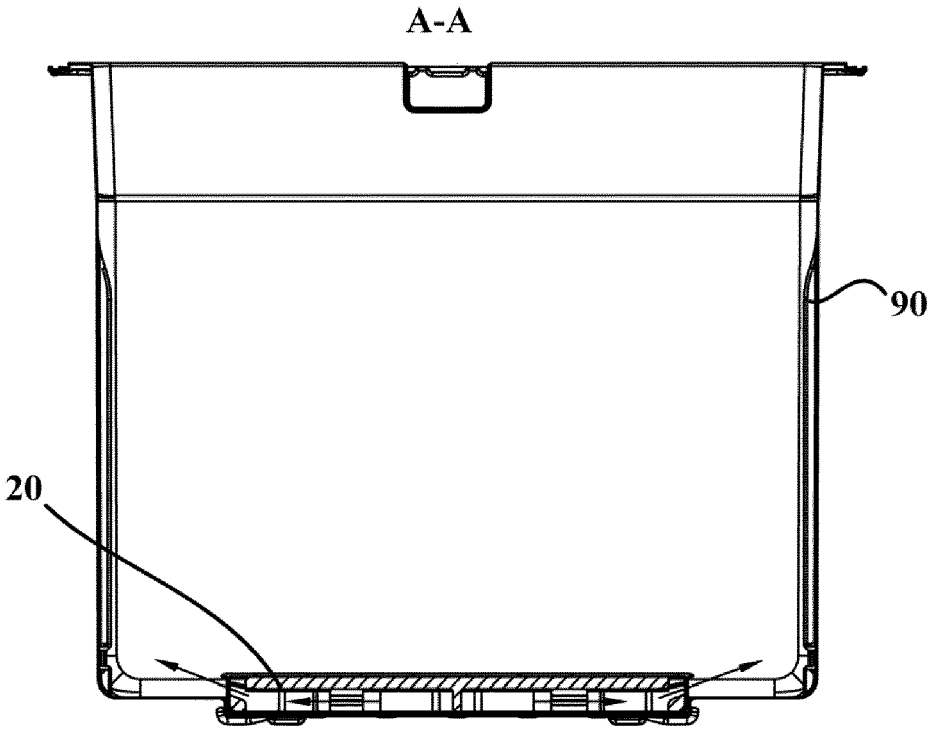

Fig. 5

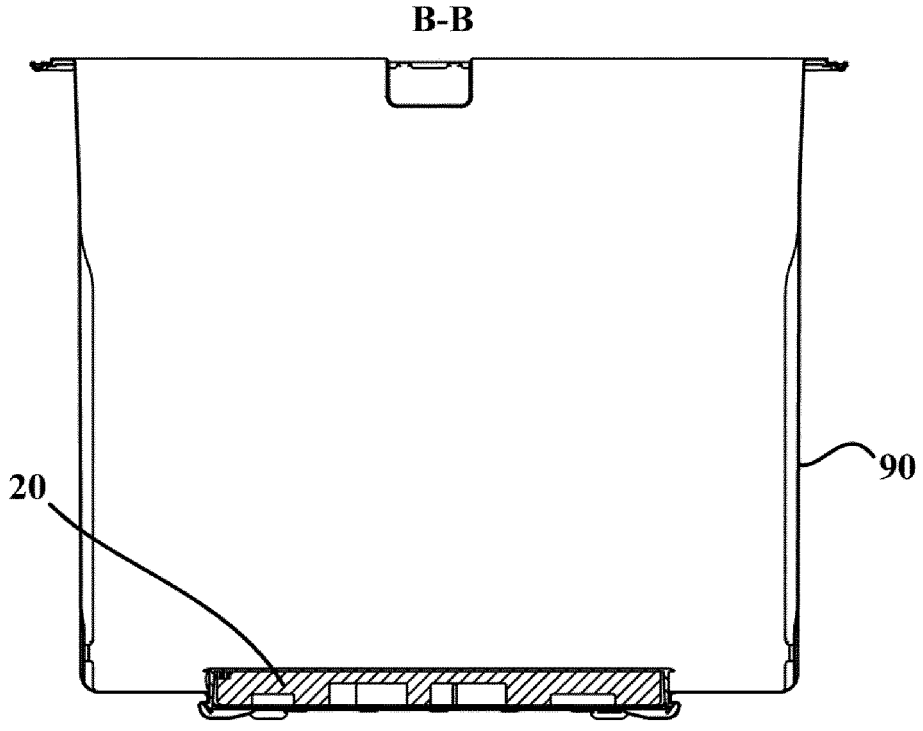

Fig. 6

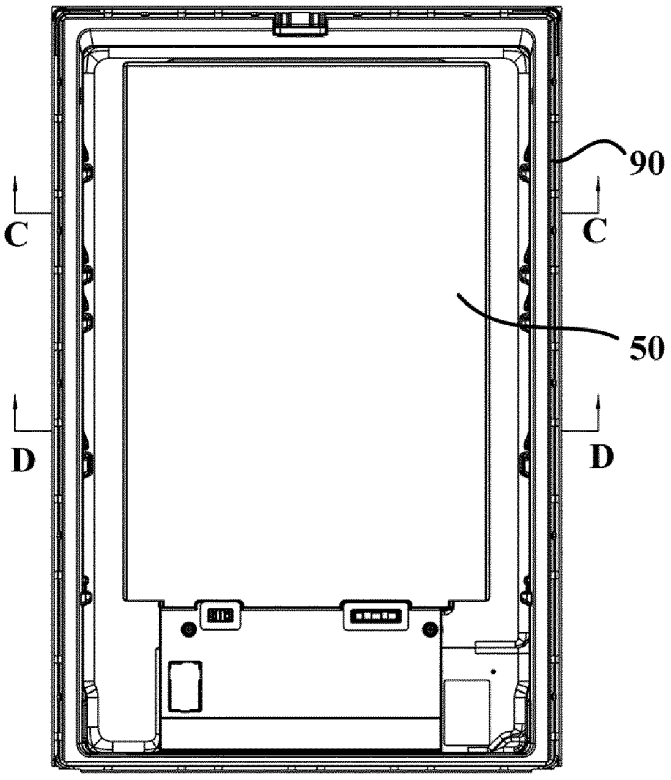

Fig. 7

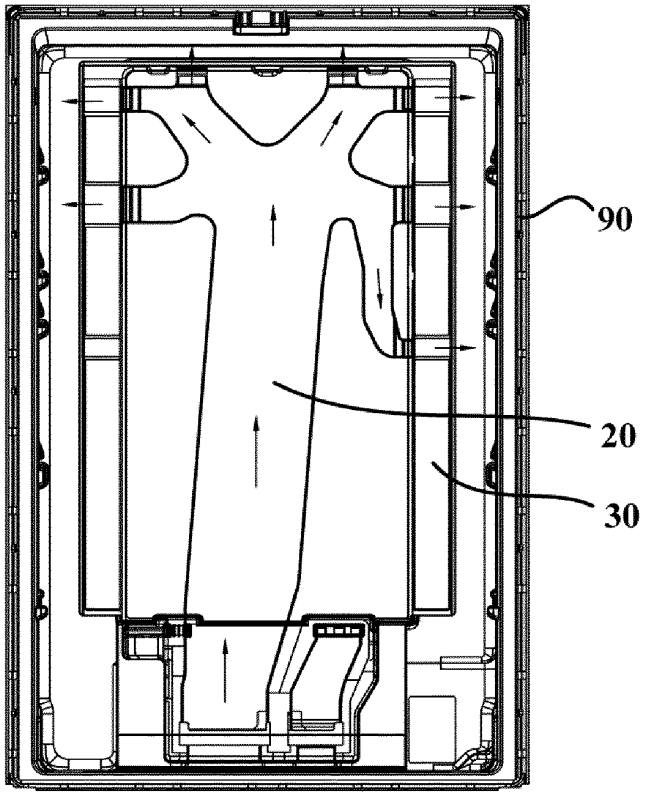

Fig. 8

C-C

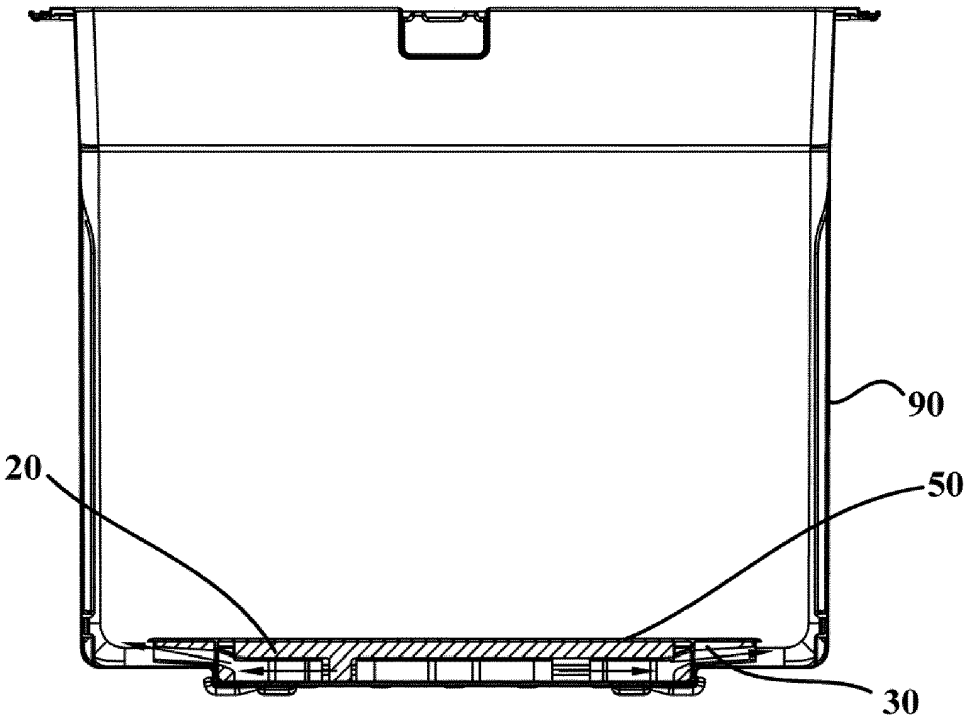

Fig. 9

D-D

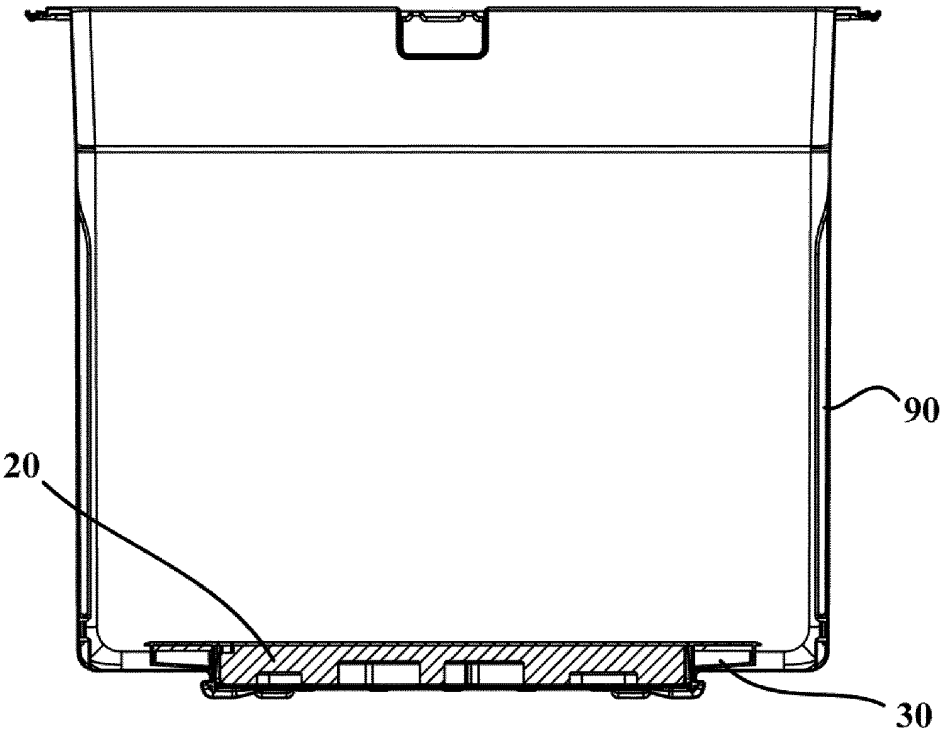

Fig. 10

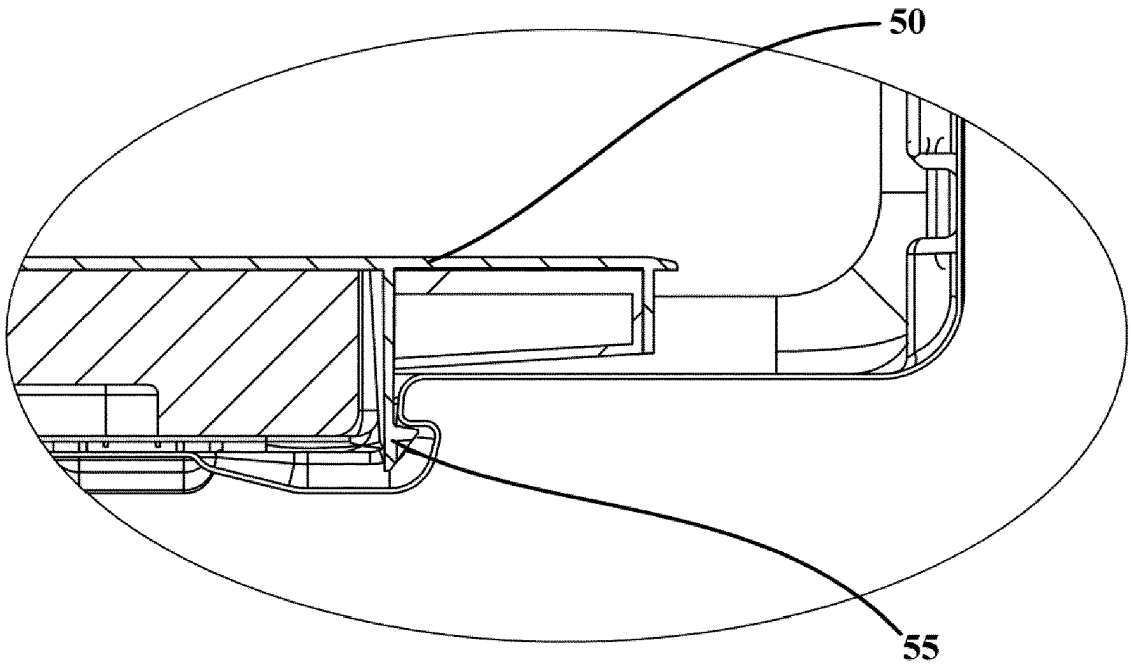

Fig. 11

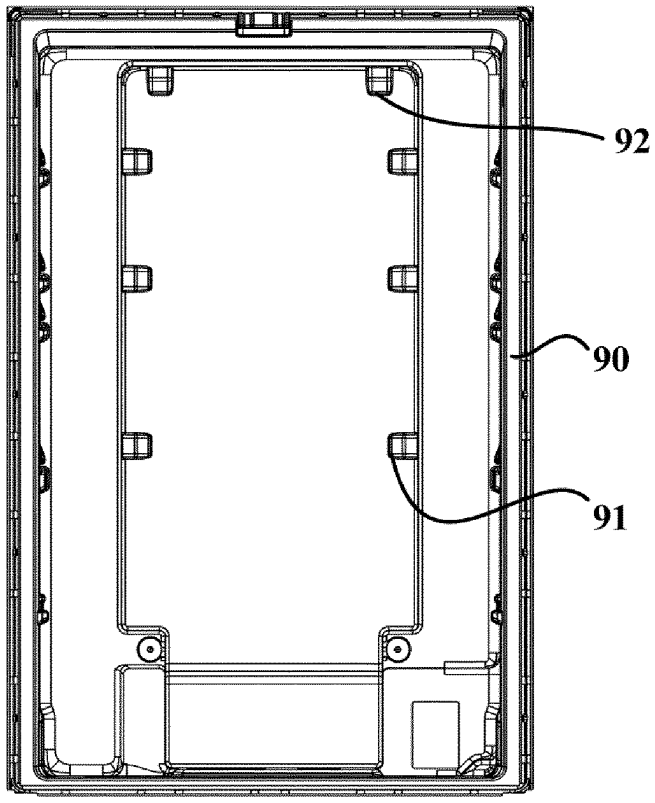

Fig. 12

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- CN 205119611 U **[0003]**
- CN 108426405 A **[0004]**
- WO 2017049961 A **[0005]**