



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

(43) Date of publication:
15.03.2023 Bulletin 2023/11

(51) International Patent Classification (IPC):
F25D 25/02 ^(2006.01) **F25D 11/02** ^(2006.01)

(21) Application number: **20934293.0**

(86) International application number:
PCT/CN2020/094262

(22) Date of filing: **04.06.2020**

(87) International publication number:
WO 2021/223281 (11.11.2021 Gazette 2021/45)

(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
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **08.05.2020 CN 202010381538**

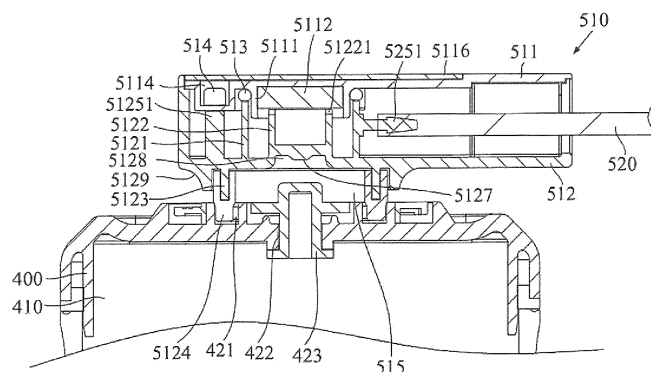
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(54) **REFRIGERATOR**

(57) Disclosed in the present invention is a refrigerator, comprising a storage chamber, door bodies, a preservation box and a vacuumizing assembly. A storage cavity is formed in the preservation box, the preservation box is provided with a vacuumizing interface portion, and the preservation box is connected to the door bodies. The vacuumizing assembly comprises a vacuum pump, a vacuumizing pipeline and a vacuumizing joint assembly, and the vacuum pump is in communication with the vacuumizing joint assembly by means of the vacuumizing pipeline. When the vacuumizing joint assembly is connected to the vacuumizing interface portion, the vacu-

mizing assembly can vacuumize the storage cavity. The vacuumizing joint assembly comprises an upper cover body and a lower cover body, an airflow channel is formed between the upper cover body and the lower cover body, the vacuumizing pipeline is connected to the upper cover body or the lower cover body and is in communication with the airflow channel, and the lower cover body can be connected to the vacuumizing interface portion so that the airflow channel is in communication with the storage cavity. The vacuumizing joint assembly is of a vertically detachable structure, facilitating installation of components such as a pipeline.



Description

[0001] This application claims priority to Chinese Patent Application No. 202010381538.7, titled 'REFRIGERATOR', filed on May 8, 2020 with the Chinese Patent Office, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of refrigeration equipment technologies, and in particular, to a refrigerator with a vacuum fresh-keeping device.

BACKGROUND

[0003] In recent years, people's awareness on health has gradually increased, and the demand for food preservation has also increased. The refrigerator is the most commonly used household appliance for food storage, and the preservation and storage of food has become an urgent technical problem to be solved in the field of refrigerators.

[0004] At present, for the question of preservation and storage of food, various manufacturers have developed different preservation technologies, such as vacuum preservation techniques. For example, the conditions under which food spoils are changed under vacuum. Firstly, in the vacuum environment, it is very difficult for micro-organisms and various promoting enzymes to survive, and it takes a long time to achieve the requirement of microbial growth. Secondly, in the vacuum state, the oxygen in the container is greatly reduced, various chemical reactions cannot be completed, and the food is not oxidized, so that the food can be preserved for a long time.

SUMMARY

[0005] In some embodiments of the present disclosure, a vacuuming assembly is used for vacuuming the preservation box, the vacuuming assembly includes a vacuum pump, a vacuuming pipeline and a vacuuming joint assembly. The vacuuming pipeline communicates the vacuum pump and the vacuuming joint assembly. In a case where the vacuuming joint assembly is connected to the vacuuming interface portion, the vacuuming assembly is capable of vacuuming a storage cavity of the preservation box. The vacuuming joint assembly includes an upper cover body and a lower cover body. An airflow channel is provided between the upper cover body and the lower cover body. The vacuuming pipeline is connected to the upper cover body or the lower cover body, and communicated with the airflow channel. The lower cover body is connected to the vacuuming interface portion so that the airflow channel communicates with the storage cavity. The vacuuming joint assembly is an up-down detachable structure, which is simple in structure and convenient for installing pipelines and other compo-

nents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In order to illustrate the technical solutions of the embodiments of the present invention more clearly, accompanying drawings to be used in the description of some embodiments will be introduced briefly below. However, the accompanying drawings to be described below are merely some embodiments of the present disclosure, and a person of ordinary skill in the art may obtain other drawings according to these drawings without creative effort.

FIG. 1 is a schematic structural diagram of a refrigerator, in accordance with some embodiments of the present disclosure;
FIG. 2 is a schematic diagram showing an assembly structure of a preservation box, a vacuuming joint assembly and a mounting base, in accordance with some embodiments of the present disclosure;
FIG. 3 is a schematic structural diagram of the vacuuming joint assembly shown in FIG. 2 after being rotated upward (the preservation box being omitted);
FIG. 4 is a cross-sectional view of a vacuuming joint assembly, in accordance with some embodiments of the present disclosure;
FIG. 5 is a schematic structural diagram of a lower cover body of the vacuuming joint assembly shown in FIG. 4;
FIG. 6 is a schematic structural diagram of an upper cover body of the vacuuming joint assembly shown in FIG. 4;
FIG. 7 is a cross-sectional view of another vacuuming joint assembly, in accordance with some embodiments of the present disclosure;
FIG. 8 is a schematic structural diagram of a mounting base (separate structures), in accordance with some embodiments of the present disclosure;
FIG. 9 is a schematic structural diagram of the mounting base shown in FIG. 8 viewed from a back side;
FIG. 10 is a schematic structural diagram of a mounting substrate of the mounting base shown in FIG. 8;
FIG. 11 is a schematic structural diagram of a mounting cover plate of the mounting base shown in FIG. 8;
FIG. 12 is a schematic structural diagram of a mounting base (one-piece structure), in accordance with some embodiments of the present disclosure;
FIG. 13 is a schematic structural diagram of the mounting base shown in FIG. 12 viewed from a back side;
FIG. 14 is a schematic diagram showing an assembly structure of a mounting base and a side frame of a door body, in accordance with some embodiments of the present disclosure; and
FIG. 15 is a schematic diagram showing a partial structure of a side frame of a door body, in accord-

ance with some embodiments of the present disclosure.

[0007] Reference signs:

Storage compartment 100; Freezing compartment 110; Refrigerating compartment 120;
 Door body 200;
 Door shell 210;
 Liner 220;
 Upper end cover 230;
 Lower end cover 240;
 Side frame 250; Limiting portion 251; Clamping groove portion 2511; Blocking rib 2512; Reinforcing rib 2513;
 Shelf 260;
 Box body 300;
 Preservation box 400; Storage cavity 410; Vacuuming interface portion 420; Groove portion 421; Vent 422; Pressure relief valve 423;
 Vacuuming assembly 500;
 Vacuuming joint assembly 510; Upper cover body 511; Upper cover protruding portion 5111; Second magnet 5112; Third magnet 5113; Screw mounting countersink 5114; Hook 5115; Decorative plate 5116; Lower cover body 512; Lower cover protruding portion I 5121; Lower cover protruding portion II 5122; Vent hole 51221; Lower cover inserting portion 5123; Soft rubber portion 5124; Bottom plate 5125; Screw mounting column 51251; Column 51252; Peripheral side plate 5126; Clamping groove 51261; Annular boss 51262; Through hole 51263; Lower cover air inlet 5127; Concave portion 5128; Arc transition portion 5129; Sealing loop 513; Screw 514; Air buffering cavity 515;
 Vacuuming pipeline 520; First pipe joint 5251; Second pipe joint 5252;
 Vacuum pump 530;
 Mounting base 600;
 Mounting substrate 610; First mounting substrate 611; Second mounting substrate 612; First protruding portion 6121; Second protruding portion 6122; Cavity 613; Upper cavity 6131; Lower cavity 6132; Wire hole 6133; Opening 614; Dividing plate 615; Supporting column 616; First magnet 617; Hook portion 618;
 Mounting cover plate 620; Opening portion 621; Extending portion 622; Round hole 6221; Buckle portion 623;
 Key switch 900.

DETAILED DESCRIPTION

[0008] The technical solutions in the embodiments of the present disclosure will be clearly and completely described below with reference to the accompanying drawings in the embodiments of the present disclosure. However, the described embodiments are merely some but

not all embodiments of the present disclosure. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present disclosure without paying any creative effort shall be included in the protection scope of the present disclosure.

[0009] In the description of the present disclosure, it can be understood that, orientations or positional relationships indicated by the terms such as "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", and the like are based on orientations or positional relationships shown in the drawings, which are merely to facilitate and simplify the description of the present disclosure, and are not to indicate or imply that the devices or elements referred to must have a particular orientation, or must be constructed or operated in a particular orientation. Therefore, these terms should not be construed as limitations on the present disclosure.

[0010] The terms "first" and "second" are used for descriptive purposes only, and are not to be construed as indicating or implying a relative importance or implicitly indicating a number of indicated technical features. Therefore, the features defined with "first" and "second" may explicitly or implicitly include one or more of these features. In the description of the present disclosure, the term "a/the plurality of" means two or more unless otherwise specified.

[0011] In the description of the present disclosure, it will be noted that, terms "installed", "connection" and "connected" are to be construed broadly. For example, it may be a fixed connection, a detachable connection, or an integral connection; it may be a mechanical connection or an electrical connection; and it may be a direct connection, or may be an indirect connection through an intermediate medium, and may be internal communication between two elements. Specific meanings of the above terms in the present disclosure may be understood by those skilled in the art according to specific situations.

[0012] FIG. 1 is a schematic structural diagram of a refrigerator, in accordance with some embodiments of the present disclosure, and the refrigerator is approximately in a shape of a cuboid. An appearance of the refrigerator is defined by a storage compartment 100 defining a storage space and a plurality of door bodies 200 provided in the storage compartment 100. The door body 200 includes a door shell 210 located outside the storage compartment 100, a door liner 220 located inside the storage compartment 100, an upper end cover 230, a lower end cover 240 and a foamed layer located among the door shell 210, the door liner 220, the upper end cover 230 and the lower end cover 240.

[0013] The storage compartment 100 has a box body 300 with openings, and the storage compartment 100 is vertically divided into a freezing compartment 110 located below and a refrigerating compartment 120 located above. Each of separated spaces may have an independent storage space. In detail, the freezing compartment 110 is located at a lower side of the storage com-

partment 100 and may be selectively covered by a drawer type freezing compartment door. A space above the freezing compartment 110 is divided into left and right spaces, so as to form the refrigerating compartments 120, respectively. The refrigerating compartment 120 may be selectively opened or closed through a refrigerating compartment door pivotally mounted on the refrigerating compartment 120.

[0014] FIG. 2 is a schematic diagram showing an assembly structure of a preservation box, a vacuuming joint assembly and a mounting base, in accordance with some embodiments of the present disclosure. FIG. 3 is a schematic structural diagram of the vacuuming joint assembly shown in FIG. 2 after being rotated upward (the preservation box being omitted). Referring to FIGS. 1 to 3, the refrigerator in some embodiments of the present disclosure further includes a preservation box 400 and a vacuuming assembly 500.

[0015] A storage cavity 410 is formed in the preservation box 400. The preservation box 400 is detachably connected to the door body 200 (specifically, the door liner 220), so as to facilitate the removal of the preservation box 400 from the door body 200 and improve the convenience of use of the preservation box 400.

[0016] The preservation box 400 includes a box body and a cover body, and the cover body is provided with a vacuuming interface portion 420. The vacuuming interface portion 420 is used to cooperate with the vacuuming assembly 500, so that the vacuuming assembly 500 communicates with the storage cavity 410 and vacuums the storage cavity 410.

[0017] The vacuuming assembly 500 may make the preservation box 400 achieve a vacuum state inside thereof. The vacuum state here is not an absolute vacuum state, but is actually a low-pressure state, so as to improve the preservation effect of the items stored in the preservation box 400. Exemplarily, a vacuum degree in the preservation box 400 is 0.6 MPa to 0.9 MPa inclusive.

[0018] The vacuuming assembly 500 includes a vacuum pump 530, a vacuuming pipeline 520 and a vacuuming joint assembly 510. The vacuuming pipeline 520 communicates the vacuum pump 530 with the vacuuming joint assembly 510. The vacuuming joint assembly 510 is detachably connected to the vacuuming interface portion 420. The vacuum pump 530 provides vacuuming power for the entire vacuuming assembly 500.

[0019] When it is necessary to vacuumize the storage cavity 410, the vacuuming joint assembly 510 is communicated with the storage cavity 410. That is, the vacuuming joint assembly 510 is connected to the vacuuming interface portion 420. In this case, the vacuum pump is turned on, and the air in the storage cavity 410 may be discharged to the vacuum pump through the vacuuming joint assembly 510 and the vacuuming pipeline 520, so as to achieve the negative pressure in the storage cavity 410.

[0020] In some embodiments of the present disclosure, referring to FIG. 1, the door liner 220 is provided

with a shelf 260. The preservation box 400 is directly placed in the shelf 260, so as to achieve the detachable connection between the preservation box 400 and the door liner 220. When it is necessary to remove the preservation box 400 from the refrigerator, the preservation box 400 may be directly removed from the shelf 260.

[0021] The vacuum pump 530 may be mounted on the upper end cover 230 of the door body, and the vacuuming pipeline 520 drawn from the vacuuming joint assembly 510 may extend to the upper end cover 230 through the foamed layer of the door body 200 and communicate with the vacuum pump 530.

[0022] The start and stop of the vacuum pump 530 may be controlled by means of a key switch. Referring to FIG. 2, the mounting base 600 is provided with the key switch 900, and the key switch 900 is coupled to the vacuum pump 530 for communication. By pressing the key switch 900, the vacuum pump 530 is turned on, and the vacuuming assembly 500 starts to vacuumize the storage cavity 410. After the vacuuming is completed, the key switch 900 is pressed again, and the vacuum pump 530 stops operating.

[0023] FIG. 4 is a cross-sectional view of a vacuuming joint assembly, in accordance with some embodiments of the present disclosure. FIG. 5 is a schematic structural diagram of a lower cover body of the vacuuming joint assembly shown in FIG. 4. FIG. 6 is a schematic structural diagram of an upper cover body of the vacuuming joint assembly shown in FIG. 4. FIG. 7 is a cross-sectional view of another vacuuming joint assembly, in accordance with some embodiments of the present disclosure. Referring to FIGS. 4 to 7, the vacuuming joint assembly 510 includes an upper cover body 511 and a lower cover body 512, the upper cover body 511 is of a flat plate structure, and the lower cover body 512 includes a bottom plate 5125 and a peripheral side plate 5126. After connecting (e.g., clamping) the upper cover body 511 and the lower cover body 512, an airflow channel is formed between the upper cover body 511 and the lower cover body 512. The vacuuming pipeline 520 is connected to the upper cover body 511 or the lower cover body 512 and communicated with the airflow channel.

[0024] In a case where the vacuuming joint assembly 510 is connected to the vacuuming interface portion 420, specifically, the lower cover body 512 is connected to the vacuuming interface portion 420, the airflow channel is communicated with the storage cavity 410. In this case, the vacuum pump 530 is turned on, and the air in the storage cavity 410 may be discharged to the vacuum pump 530 through the airflow channel and the vacuuming pipeline 520.

[0025] The vacuuming pipeline 520 is led out from the upper cover body 511 or the lower cover body 512 and extends to the mounting base 600, and then leads to the vacuum pump 530. The vacuuming pipeline 520 is hidden between the upper cover body 511 and the lower cover body 512, and is hidden in the mounting base 600, so as to prevent the vacuuming pipeline 520 from being

exposed.

[0026] The present disclosure provides two examples of the vacuuming joint assembly 510, the first example is that the vacuuming pipeline 520 is connected to the lower cover body 512, and the second example is that the vacuuming pipeline 520 is connected to the upper cover body 511, and details will be described below.

[0027] In the first example, the vacuuming pipeline 520 is connected to the lower cover body 512, referring to FIGS. 4 to 6.

[0028] The upper cover body 511 is provided with an annular upper cover protruding portion 5111, and the upper cover protruding portion 5111 extends toward the lower cover body 512.

[0029] The lower cover body 512 is provided with an annular lower cover protruding portion (marked as the lower cover protruding portion I 5121) correspondingly, and the lower cover protruding portion I 5121 extends toward the upper cover body 511. The lower cover body 512 is provided with a lower cover air inlet 5127 in a region surrounded by the lower cover protruding portion I 5121. The lower cover protruding portion I 5121 is provided with a first pipe joint 5251, and the vacuuming pipeline 520 is connected to the first pipe joint 5251.

[0030] After the upper cover body 511 and the lower cover body 512 are clamped together, the upper cover protruding portion 5111 is inserted into the inner periphery of the lower cover protruding portion I 5121, and a top end of the lower cover protruding portion I 5121 abuts against the upper cover body 511. The upper cover protruding portion 5111 and the lower cover protruding portion I 5121 enclose a cavity, and the lower cover air inlet 5127 and the first pipe joint 5251 communicate with the cavity, so as to form the airflow channel. When vacuuming, the air in the storage cavity 410 flows through the lower cover air inlet 5127, the cavity enclosed by the upper cover protruding portion 5111 and the lower cover protruding portion I 5121, the first pipe joint 5251 to the vacuuming pipeline 520 in sequence.

[0031] In some embodiments of the present disclosure, a sealing loop 513 is provided between a top surface of the lower cover protruding portion I 5121 and the upper cover body 511, so as to seal the airflow channel and improve the vacuuming effect.

[0032] In some embodiments of the present disclosure, an annular lower cover protruding portion II 5122 is further provided in a region surrounded by the lower cover protruding portion I 5121, and the lower cover protruding portion II 5122 has a certain gathering and guiding effect on the airflow. A vent hole 51221 may be provided on the lower cover protruding portion II 5122 to facilitate air circulation.

[0033] In some embodiments of the present disclosure, the bottom plate 5125 of the lower cover body is provided with a plurality of screw mounting columns 51251, and the plurality of screw mounting columns 51251 are symmetrically arranged around the outer periphery of the lower cover protruding portion I 5121. The

upper cover body 511 is provided with a plurality of screw mounting countersinks 5114 correspondingly. Screw 514 passes between screw mounting column 51251 and screw mounting countersink 5114, so as to achieve the fixed installation of the upper cover body 511 and the lower cover body 512.

[0034] A rear end of the peripheral side plate 5126 of the lower cover body is provided with a clamping groove 51261, and a rear end of the upper cover body 511 is provided with a hook 5115 correspondingly. The clamping groove 51261 is clamped with the hook 5115, which may further improve the connection reliability between the upper cover body 511 and the lower cover body 512.

[0035] In some embodiments of the present disclosure, a surface of the upper cover body 511 is provided with a decorative plate 5116, such as an acrylic plate. The decorative plate 5116 covers the screw mounting countersinks 5114 and the screws 514, so as to improve the aesthetics of the vacuuming joint assembly 510.

[0036] In some embodiments of the present disclosure, the lower cover body 512 is provided with a lower cover inserting portion 5123. The lower cover inserting portion 5123 is provided with a soft rubber portion 5124, the soft rubber portion 5124 is used for sealing with the vacuuming interface portion 420.

[0037] Referring to FIG. 4, the vacuuming interface portion 420 includes a groove portion 421 disposed on the preservation box 400. A vent 422 is provided in a region surrounded by the groove portion 421, and a pressure relief valve 423 is provided at the vent 422.

[0038] When the vacuuming joint assembly 510 is connected to the vacuuming interface portion 420 for vacuuming, the soft rubber portion 5124 is sealed and clamped in the groove portion 421. The air in the storage cavity 410 flows to the lower cover air inlet 5127 through the vent 422, and then flows to the vacuuming pipeline 520 through the airflow channel. After the vacuuming is completed, the vacuuming joint assembly 510 is separated from the vacuuming interface portion 420, and the pressure relief valve 423 blocks the vent 422 to maintain the negative pressure in the storage cavity 410.

[0039] In the present disclosure, the soft rubber portion 5124 has a certain height. In a case where the vacuuming joint assembly 510 is connected to the vacuuming interface portion 420, there is a certain distance between the lower cover body 512 and the pressure relief valve 423. The distance provides space for the up-down displacement of the pressure relief valve 423, and further forms an air buffering cavity 515. The air buffering cavity 515 buffers the air flow to facilitate the air circulation.

[0040] In some embodiments of the present disclosure, a concave portion 5128 is formed on the lower cover body 512 in the region surrounded by the lower cover inserting portion 5123. The concave portion 5128 is recessed toward a direction proximate to the upper cover body 511, and the lower cover air inlet 5127 is disposed at the concave portion 5128. The concave portion 5128 may gather and guide the air to facilitate the air circulation.

tion.

[0041] In some embodiments of the present disclosure, an arc transition portion 5129 is formed between the lower cover inserting portion 5123 and the outer peripheral surface of the lower cover body 512. Specifically, the arc transition portion 5129 is formed between the lower cover inserting portion 5123 and the peripheral side plate 5126 of the lower cover body. The arc transition portion 5129 prevents the lower cover body 512 from being excessively proximate to an upper end surface of the preservation box 400, and provides an operating space for the user to perform displacement operations on the vacuuming joint assembly 510.

[0042] In some embodiments of the present disclosure, the rear end of the peripheral side plate 5126 of the lower cover body is provided with a through hole 51263. The vacuuming pipeline 520 led out from the first pipe joint 5251 enters an interior of the mounting base 600 through the through hole 51263. The through hole 51263 extends in the vertical direction. When the vacuuming joint assembly 510 is displaced, the through hole 51263 provides a large space for the vacuuming pipeline 520 to move.

[0043] In the second example, the vacuuming pipeline 520 is connected to the upper cover body 511, referring to FIG. 7. Most of the structures of the vacuuming joint assembly 510 shown in FIG. 7 are same as that of the vacuuming joint assembly 510 shown in FIG. 4, and only the differences between the two vacuuming joint assemblies 510 will be described below.

[0044] The upper cover body 511 is provided with an annular upper cover protruding portion 5111. The upper cover protruding portion 5111 extends toward the lower cover body 512. The upper cover protruding portion 5111 is provided with a first pipe joint 5251. The vacuuming pipeline 520 is connected to the first pipe joint 5251. The lower cover body 512 is provided with an annular lower cover protruding portion (marked as the lower cover protruding portion I 5121). The lower cover protruding portion 5121 extends toward the upper cover body 511. The lower cover 512 is provided with a lower cover air inlet 5127 in the region surrounded by the lower cover protruding portion I 5121. The upper cover protruding portion 5111 is inserted into an outer periphery of the lower cover protruding portion I 5121 and abuts against the lower cover body 512.

[0045] A sealing loop 513 is provided between a lower end of the upper cover protruding portion 5111 and the lower cover body 512, so as to improve the airtightness of the airflow channel.

[0046] In some embodiments of the present disclosure, referring to FIG. 1, the vacuuming joint assembly 510 is provided proximate to a side of the door body 200 hinged with the box body 300 of the refrigerator. In this way, the torque borne by the vacuuming joint assembly 510 is small when the door body 200 is opened or closed, which is conducive to improving the stability of the vacuuming joint assembly 510.

[0047] In some other embodiments, the vacuuming joint assembly 510 may also be provided away from the side of the door body 200 hinged with the box body 300. In this way, the vacuuming joint assembly 510 is closer to the user side, which is convenient for the user to perform related operations on the vacuuming joint assembly 510.

[0048] In some embodiments of the present disclosure, with continuing reference to FIGS. 1 to 3, the door body 200 is provided with a mounting base 600, and the vacuuming joint assembly 510 is rotatably disposed on the mounting base 600. When it is necessary to remove the preservation box 400 from the door body 200, the vacuuming joint assembly 510 may be rotated to be separated from the preservation box 400, that is to say, the vacuuming joint assembly 510 is separated from the vacuuming interface portion 420.

[0049] The installation of the vacuuming joint assembly 510 is achieved through the mounting base 600. On one hand, it is convenient to manufacture the door body 200. There is no requirement for the door body 200 to get excessive structural changes, and the door body 200 only needs corresponding adaptive structural adjustments according to the structure of the mounting base 600. On the other hand, according to the installing manner of the vacuuming joint assembly 510, only a partial structure of the mounting base 600 needs to be adjusted. Considering the above two aspects, installation of the vacuuming joint assembly 510 through the mounting base 600 may significantly reduce manufacturing cost as well as research and development cost.

[0050] In addition, the mounting base 600 provides a certain installation space for the layout of the vacuuming pipeline 520 and the installation of related electrical components used for controlling the start and stop of the vacuuming assembly 500.

[0051] In some embodiments of the present disclosure, the structure of the mounting base 600 may be schematically illustrated with reference to FIG. 8, and the mounting base 600 is provided with a first magnet 617. The structure of the vacuuming joint assembly 510 may be schematically illustrated with reference to FIG. 4, and a second magnet 5112 is provided on the vacuuming joint assembly 510 correspondingly. In a case where the vacuuming joint assembly 510 is rotated upward, the first magnet 617 may be attracted to the second magnet 5112.

[0052] In a case where the vacuuming joint assembly 510 is not in use, the vacuuming joint assembly 510 may be rotated upward, and the vacuuming joint assembly 510 may be maintained in the state shown in FIG. 3 through the attraction between the first magnet 617 and the second magnet 5112. In this case, the vacuuming joint assembly 510 is proximate to the door liner 220, so as to avoid occupying the refrigerating space in the refrigerating compartment.

[0053] In some embodiments of the present disclosure, the second magnet 5112 is fixed in the region surrounded by the upper cover protruding portion 5111 by

means of gluing or the like, so as to achieve the fixed installation of the second magnet 5112 in the vacuuming joint assembly 510. In a case where the installation structure of the second magnet 5112 fails, the lower cover protruding portion II 5122 also has a certain protective effect on the second magnet 5112, so as to prevent the second magnet 5112 from falling and covering the lower cover air inlet 5127 and thus affecting the vacuuming process.

[0054] In some embodiments of the present disclosure, the upper cover body 511 is further provided with a plurality of third magnets 5113, and the plurality of third magnets 5113 are symmetrically arranged on the outer periphery of the second magnet 5112, that is to say, the plurality of third magnets 5113 are symmetrically arranged around the outer periphery of the upper cover protruding portion 5111. The plurality of third magnets 5113 and the second magnet 5112 have an attraction effect, thereby further positioning the second magnet 5112 and improving the stability of the second magnet 5112. Correspondingly, the bottom plate 5125 of the lower cover body is provided with a column 51252, and column 51252 abuts against the third magnet 5113, so as to improve the installation reliability of the third magnets 5113 and prevent the third magnets 5113 from falling.

[0055] In the vacuuming joint assembly 510 shown in FIG. 7, the second magnet 5112 is disposed in the region surrounded by the upper cover protruding portion 5111. In this case, the lower cover protruding portion I 5121 protects the second magnet 5112, so as to prevent the second magnet 5112 from falling due to failure of the installation structure and covering the lower cover air inlet 5127, which affects the vacuuming process.

[0056] FIG. 8 is a schematic structural diagram of a mounting base (separate structures), in accordance with some embodiments of the present disclosure. FIG. 9 is a schematic structural diagram of the mounting base shown in FIG. 8 viewed from a back side. FIG. 10 is a schematic structural diagram of a mounting substrate of the mounting base shown in FIG. 8. FIG. 11 is a schematic structural diagram of a mounting cover plate of the mounting base shown in FIG. 8. FIG. 12 is a schematic structural diagram of a mounting base (one-piece structure), in accordance with some embodiments of the present disclosure. FIG. 13 is a schematic structural diagram of the mounting base shown in FIG. 12 viewed from a back side. FIG. 14 is a schematic diagram showing an assembly structure of a mounting base and a side frame of a door body, in accordance with some embodiments of the present disclosure. FIG. 15 is a schematic diagram showing a partial structure of a side frame of a door body, in accordance with some embodiments of the present disclosure.

[0057] Referring to FIGS. 8 to 15 for the schematic structural diagrams of the mounting base 600, and with reference to FIGS. 2 and 3, the mounting base 600 is disposed on the door body 200. At least a part of the mounting base 600 is exposed on an inner side of the

door 200 (i.e., the door liner 220), and another part of the mounting base 600 is disposed in the foamed layer of the door body 200.

[0058] The vacuuming joint assembly 510 is connected to the part of the mounting base 600 exposed from the door liner 220, and the vacuuming joint assembly 510 is somewhat an external connection manner, which is convenient for disassembly and assembly.

[0059] A part of the mounting base 600 is disposed in the foamed layer of the door body 200, on one hand, the installation reliability of the mounting base 600 may be improved, and on the other hand, an installation space may be provided for the vacuuming pipeline 520 and wiring of the related electrical components of the vacuuming assembly 500.

[0060] In some embodiments of the present disclosure, the mounting base 600 includes a mounting substrate 610 and a mounting cover plate 620. The mounting substrate 610 is disposed in the foamed layer of the door body 200. A cavity 613 is formed in the mounting substrate 610, and the cavity 613 provides the installation space for the vacuuming pipeline 520 and the wiring of the related electrical components of the vacuuming assembly 500. A side of the cavity 613 facing the door liner 220 includes an opening 614. The mounting cover plate 620 is disposed at the opening 614. The mounting cover plate 620 is exposed, and the vacuuming joint assembly 510 is connected to the mounting cover plate 620.

[0061] In some embodiments of the present disclosure, the mounting substrate 610 and the mounting cover plate 620 are separate structures. As shown in FIGS. 8 to 11, an inner wall of the cavity 613 is provided with a plurality of hook portions 618, and the mounting cover plate 620 is provided with a plurality of buckle portions 623 correspondingly. The mounting substrate 610 and the mounting cover plate 620 are assembled through one-to-one engagement of the plurality of hook portions 618 and the plurality of buckle portions 623.

[0062] In the case where the mounting substrate 610 and the mounting cover plate 620 are of a separate structure, the mounting cover plate 620 may be removed in a case where maintenance and inspection of the vacuuming pipeline 520 or electrical components located in the cavity 613 is required, so as to facilitate maintenance.

[0063] In other embodiments, the mounting substrate 610 and the mounting cover plate 620 are integrally formed. As shown in FIGS. 12 and 13, the one-piece structure is convenient for manufacturing.

[0064] In some embodiments of the present disclosure, the mounting cover plate 620 is provided with an opening portion 621. The opening portion 621 communicates with the cavity 613. An outer periphery of the opening portion 621 is provided with an extending portion 622. The extending portion 622 extends toward a side of the refrigerator compartment. The vacuuming joint assembly 510 is connected to the extending portion 622. Specifically, the lower cover body 512 is connected to the extending portion 622.

[0065] In the present disclosure, the extending portion 622 is surrounded on a left side, a right side and a lower side of the opening portion 621. The left and right sides of the peripheral side plate 5126 of the lower cover body 512 are rotatably connected to the left and right sides of the extending portion 622, respectively. The opening portion 621 faces the cavity 613, specifically a lower cavity 6132. The lower side of the extending portion 622 limits the range of turning downward of the vacuuming joint assembly 510.

[0066] In some embodiments of the present disclosure, referring to FIGS. 5 and 8, the left and right sides of the peripheral side plate 5126 of the lower cover body 512 are provided with an annular boss 51262 respectively. The extending portion 622 is provided with round holes 6221 correspondingly. The annular bosses 51262 are rotatably disposed in the round holes 6221, so as to achieve the connection between the lower cover body 512 and the extending portion 622 and the rotation therebetween, thereby achieving the rotatable setting of the vacuuming joint assembly 510.

[0067] A side wall of the cavity 613 is provided with a second pipe joint 5252. The vacuuming pipeline 520 led out from the vacuuming joint assembly 510 (i.e., the first pipe joint 5251) is led out to the vacuum pump 530 through the opening portion 621, the cavity 613 and the second pipe joint 5252.

[0068] In some embodiments of the present disclosure, the second pipe joint 5252 is disposed on a side portion of the cavity 613, as shown in FIG. 9.

[0069] In other embodiments, the second pipe joint 5252 is disposed at a bottom portion of the cavity 613, as shown in FIG. 13.

[0070] In some embodiments of the present disclosure, the mounting substrate 610 includes a first mounting substrate 611 and a second mounting substrate 612 that are integrally formed. The cavity 613 is provided on the first mounting substrate 611. The mounting cover plate 620 is connected to the first mounting substrate 611. The second mounting substrate 612 extends toward the side frame 250 of the door body and is connected to the side frame 250 of the door body. During manufacturing of the refrigerator, the second mounting substrate 612 is connected to the side frame 250 of the door body first, so as to achieve a pre-positioning of the mounting substrate 610, and then, the door body 200 is foamed, so as to avoid displacement of the mounting substrate 610 during the foaming process of the door body 200.

[0071] In some embodiments of the present disclosure, referring to FIGS. 14 and 15, the side frame 250 of the door body facing the side of the foamed layer is provided with a limiting portion 251. The limiting portion 251 is of a plate-shaped structure. The limiting portion 251 is provided with a clamping groove portion 2511, and the second mounting substrate 612 is provided with a first protruding portion 6121 correspondingly. The first protruding portion 6121 is clamped in the clamping groove portion 2511, so as to achieve the connection between

the mounting substrate 610 and the side frame 250 of the door body.

[0072] In the present disclosure, the limiting portion 251 is provided with a plurality of reinforcing ribs 2513 extending in a horizontal direction, so as to improve the strength of the limiting portion 251. The clamping groove portion 2511 is formed between some of the reinforcing ribs 2513. The displacement of the mounting substrate 610 may be limited through the clamping between the clamping groove portion 2511 and the first protruding portion 6121.

[0073] In some embodiments of the present disclosure, the limiting portion 251 is further provided with a blocking rib 2512, and the second mounting substrate 612 is provided with a second protruding portion 6122 correspondingly. Along the horizontal direction, the blocking rib 2512 abuts against the second protruding portion 6122, thereby improving the limiting reliability of the mounting substrate 610.

[0074] In some embodiments of the present disclosure, referring to FIG. 9, the mounting substrate 610 is provided with a plurality of supporting columns 616. The supporting columns 616 extend toward an outer side wall of the door body 200 (i.e., the door shell 210) and abuts against the outer side wall of the door body 200, so as to further improve the installation stability of the mounting substrate 610 in the foamed layer.

[0075] In some embodiments of the present disclosure, referring to FIG. 10, the cavity 613 is provided with a dividing plate 615 therein. The dividing plate 615 divides the cavity 613 into two spaces arranged up and down. The two spaces are an upper cavity 6131 and a lower cavity 6132 respectively.

[0076] In some embodiments of the present disclosure, the second pipe joint 5252 is disposed on a side wall of the lower cavity 6132. The vacuuming pipeline 520 led out from the first pipe joint 5252 is connected to the second pipe joint 5252 through the lower cavity 6132. The upper cavity 6131 is used for wiring of electrical components of the vacuuming assembly 500, and a wire hole 6133 for wiring is provided on a side wall of the upper cavity 6131.

[0077] By means of the dividing plate 615, the upper cavity 6131 is used for wiring, and the lower cavity 6132 is used for piping, and wires and pipes are separated from each other, which on one hand makes the internal structure more regular, and on the other hand facilitates maintenance and inspection.

[0078] For the integrated mounting base 600, referring to FIGS. 12 and 13, the dividing plate 615 and the mounting substrate 610 are also an integrally formed structure, and the upper cavity 6131 and the lower cavity 6132 arranged up and down may be automatically formed inside the cavity 613 through a molding process.

[0079] In a case where the vacuuming joint assembly 510 is rotatable, in some embodiments of the present disclosure, the first magnet 617 is disposed on the mounting substrate 610, specifically the first mounting substrate

611, and the first magnet 617 is located above the mounting cover plate 620. In this way, after the vacuuming joint assembly 510 is rotated upward, the first magnet 617 may be attracted to the second magnet 5112.

[0080] In the above description of the embodiments, specific features, structures, materials or characteristics may be combined in any suitable manner in any one or more embodiments or examples.

[0081] The foregoing descriptions are merely specific implementation of the present disclosure, but the protection scope of the present disclosure is not limited thereto, and changes or replacements that any person skilled in the art could readily conceive of within the technical scope disclosed by the present disclosure shall be within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the protection scope of the claims.

Claims

1. A refrigerator, **characterized in that**, comprises:

a storage compartment;
a door body for opening or closing the storage compartment; a preservation box, a storage cavity being provided in the preservation box; the preservation box being provided with a vacuuming interface portion, and the preservation box being connected to the door body;
a vacuuming assembly the vacuuming assembly including a vacuum pump, a vacuuming pipeline and a vacuuming joint assembly; the vacuuming pipeline communicating the vacuum pump and the vacuuming joint assembly; in a case where the vacuuming joint assembly is connected to the vacuuming interface portion, the vacuuming assembly being capable of vacuuming the storage cavity;
the vacuuming joint assembly including an upper cover body and a lower cover body; an airflow channel being provided between the upper cover body and the lower cover body; the vacuuming pipeline being connected to the upper cover body or the lower cover body, and communicated with the airflow channel; the lower cover body being connected to the vacuuming interface portion to communicate the airflow channel and the storage cavity.

2. The refrigerator according to claim 1, **characterized in that**,

the upper cover body is provided with an annular upper cover protruding portion, and the upper cover protruding portion extends toward the lower cover body;
the lower cover body is provided with an annular

lower cover protruding portion; the lower cover protruding portion extends toward the upper cover body; the lower cover body is provided with a lower cover air inlet in a region surrounded by the lower cover protruding portion; the lower cover protruding portion is provided with a first pipe joint, and the vacuuming pipeline is connected to the first pipe joint;
the upper cover protruding portion is inserted into an inner periphery of the lower cover protruding portion, and a top end of the lower cover protruding portion abuts against the upper cover body.

3. The refrigerator according to claim 2, **characterized in that**,
a sealing loop is provided between the top end of the lower cover protruding portion and the upper cover body.

4. The refrigerator according to claim 1, **characterized in that**,

the upper cover body is provided with an annular upper cover protruding portion; the upper cover protruding portion extends toward the lower cover body; the upper cover protruding portion is provided with a first pipe joint; the vacuuming pipeline is connected to the first pipe joint;
the lower cover body is provided with an annular lower cover protruding portion; the lower cover protruding portion extends toward the upper cover body; the lower cover body is provided with a lower cover air inlet in a region surrounded by the lower cover protruding portion;
the upper cover protruding portion is inserted into an outer periphery of the lower cover protruding portion and abuts against the lower cover body.

5. The refrigerator according to claim 4, **characterized in that**,
a sealing loop is provided between a bottom end of the upper cover protruding portion and the lower cover body.

6. The refrigerator according to any one of claims 2 to 5, **characterized in that**,
the lower cover body is provided with a lower cover inserting portion; the lower cover inserting portion is provided with a soft rubber portion the soft rubber portion is used for sealing and connecting the vacuuming interface portion.

7. The refrigerator according to claim 6, **characterized in that**,
a concave portion is provided on the lower cover body in a region surrounded by the lower cover in-

serting portion; the concave portion is recessed toward a direction proximate to the upper cover body, and the lower cover air inlet is disposed at the concave portion.

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8. The refrigerator according to claim 6, **characterized in that**,

an arc transition portion is provided between the lower cover inserting portion and an outer peripheral surface of the lower cover body.

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9. The refrigerator according to any one of claims 2 to 5, **characterized in that**,

the lower cover body is provided with a screw mounting column, the upper cover body is provided with a corresponding screw mounting countersink (5114), and a screw passes between the screw mounting column and the screw mounting countersink.

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10. The refrigerator according to claim 9, **characterized in that**,

a surface of the upper cover body is provided with a decorative plate, and the decorative plate covers the screw mounting countersink.

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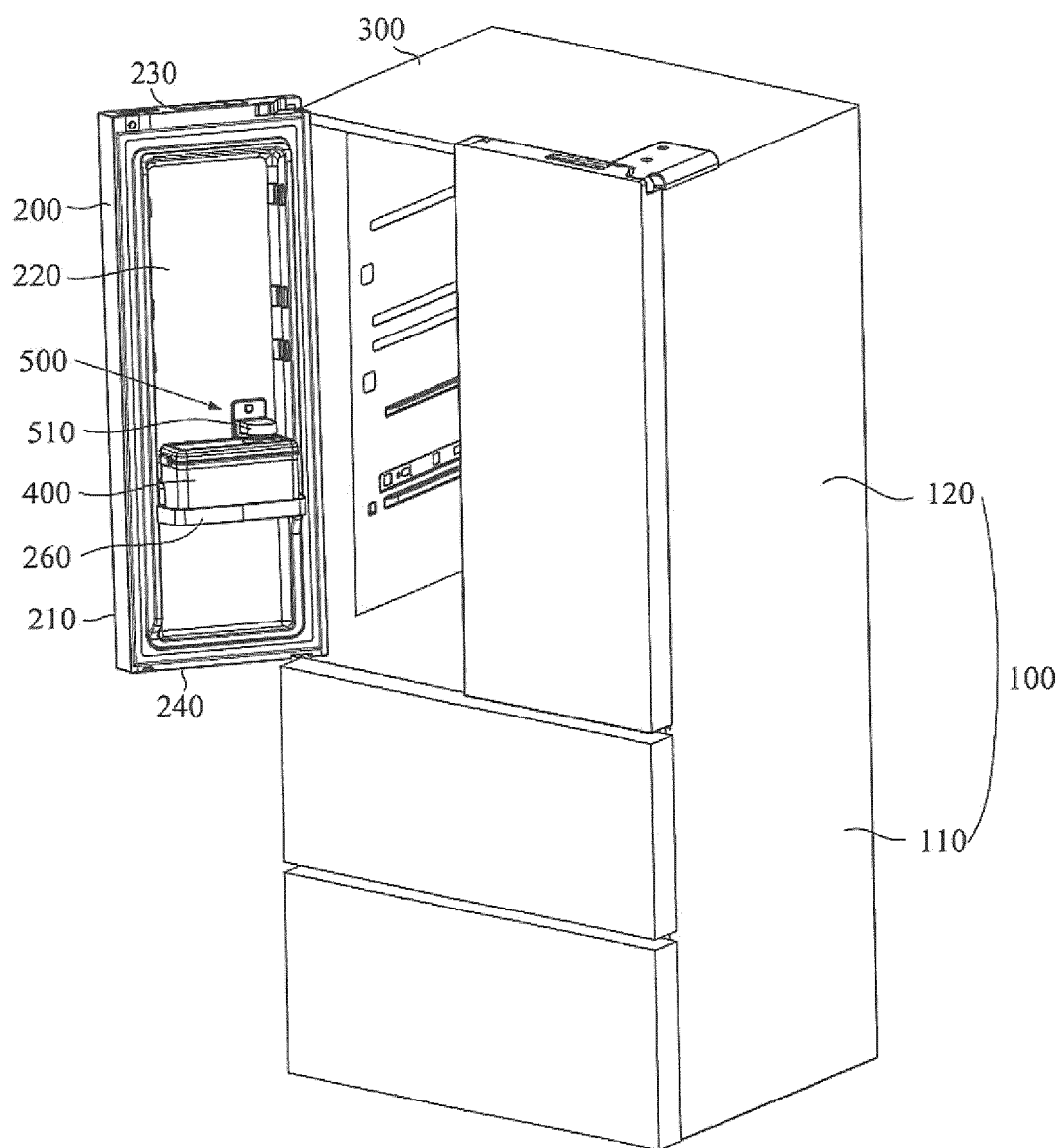


FIG. 1

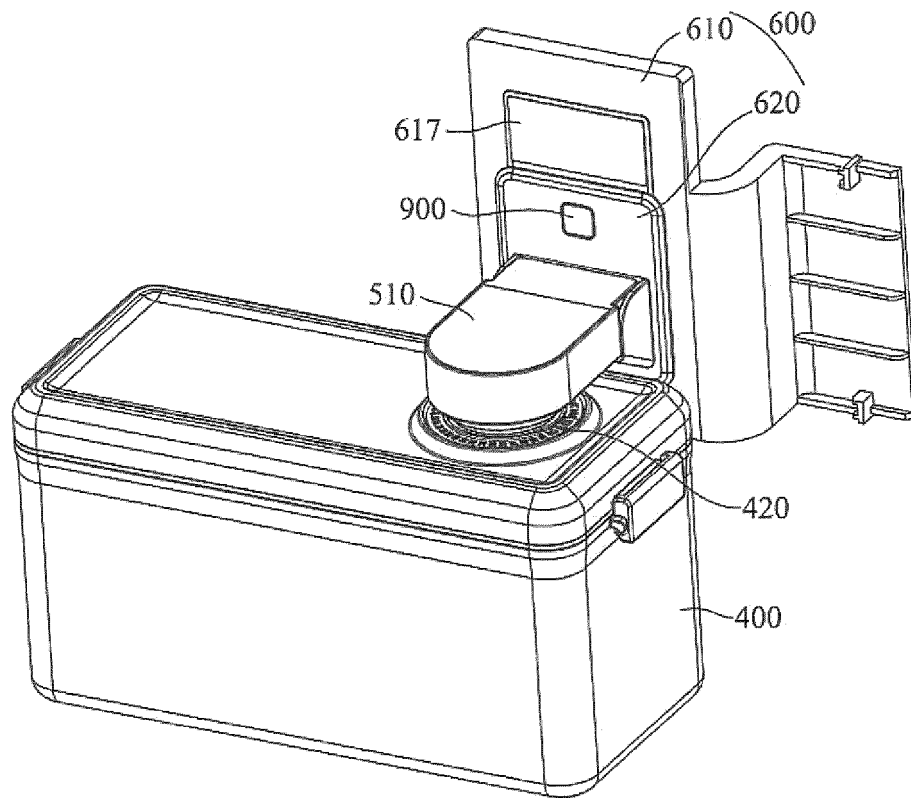


FIG. 2

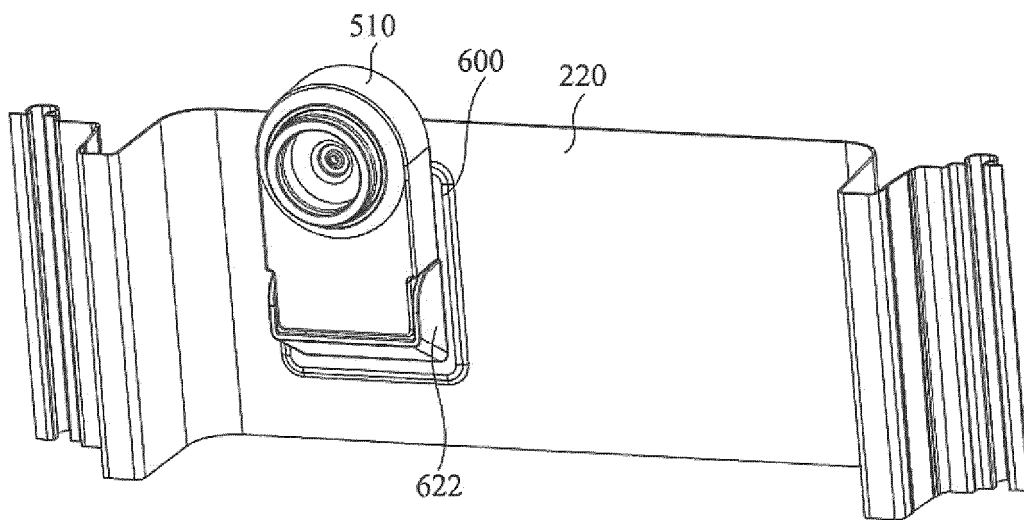


FIG. 3

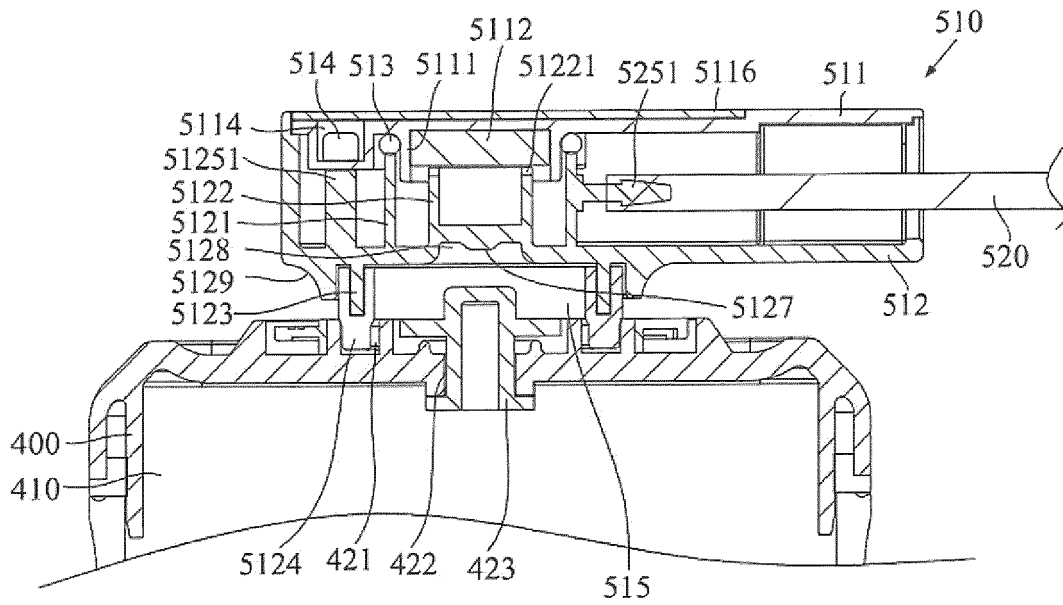


FIG. 4

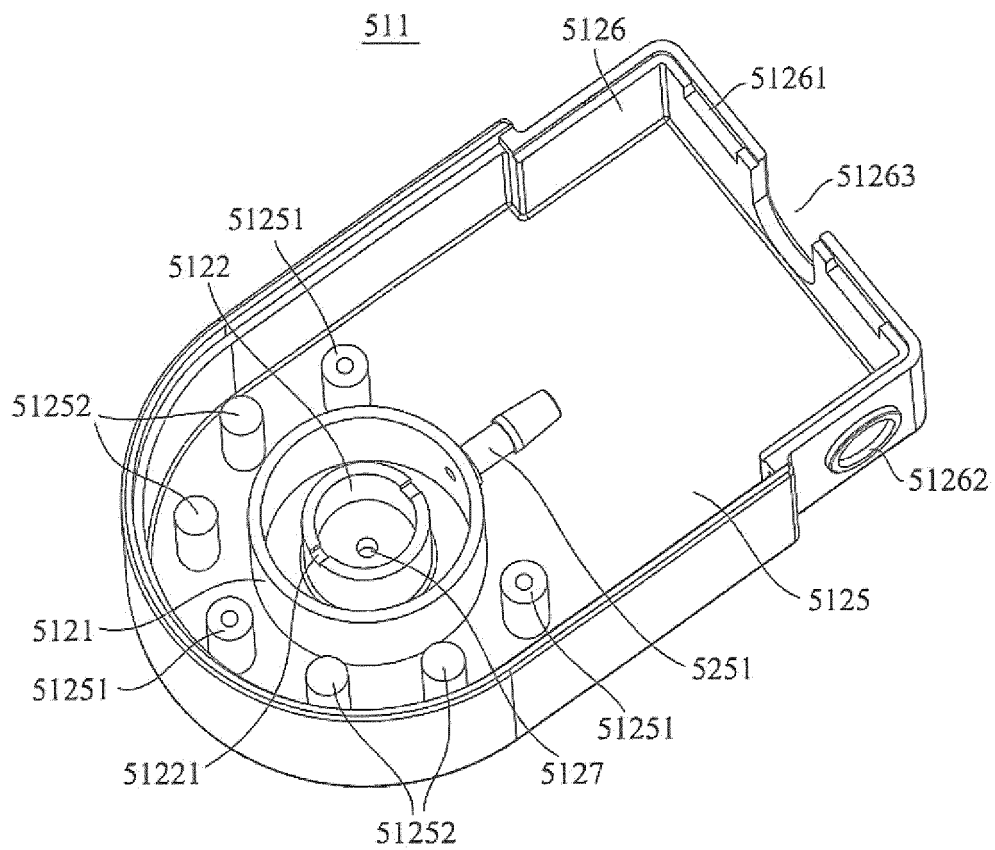


FIG. 5

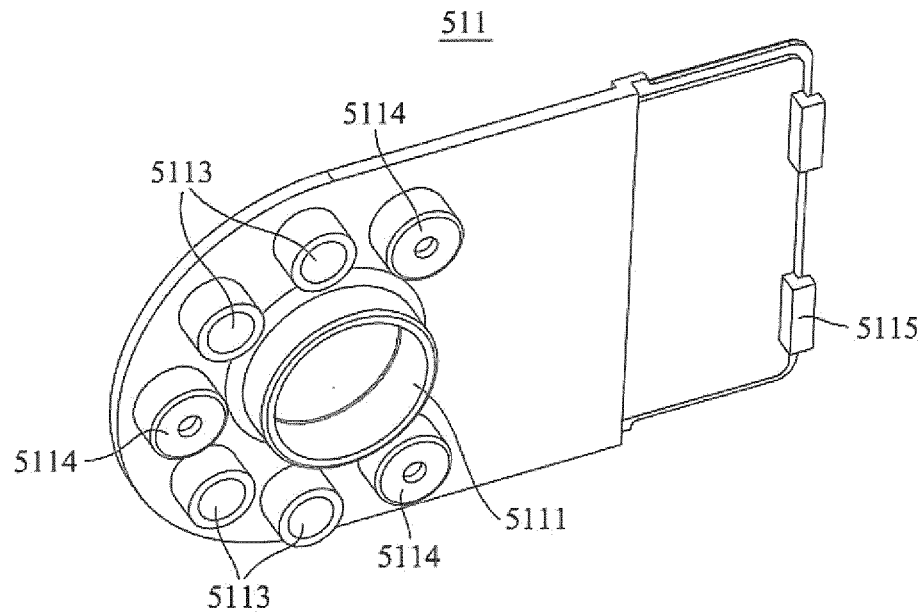


FIG. 6

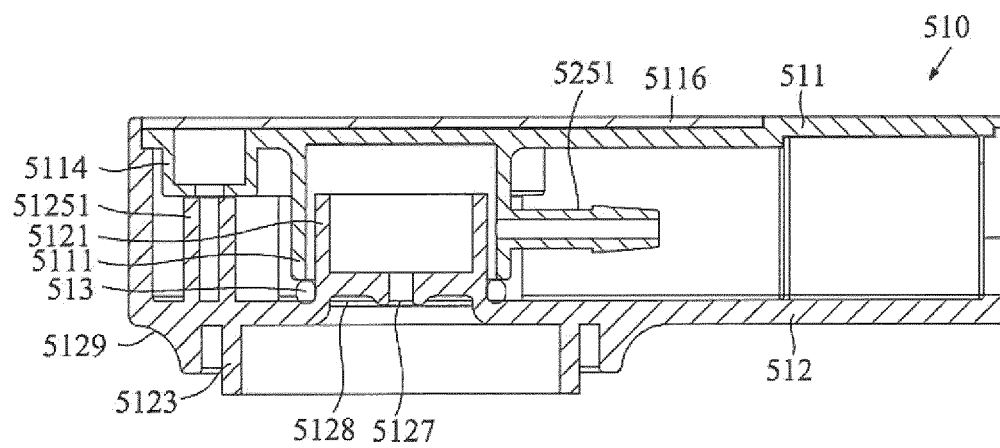


FIG. 7

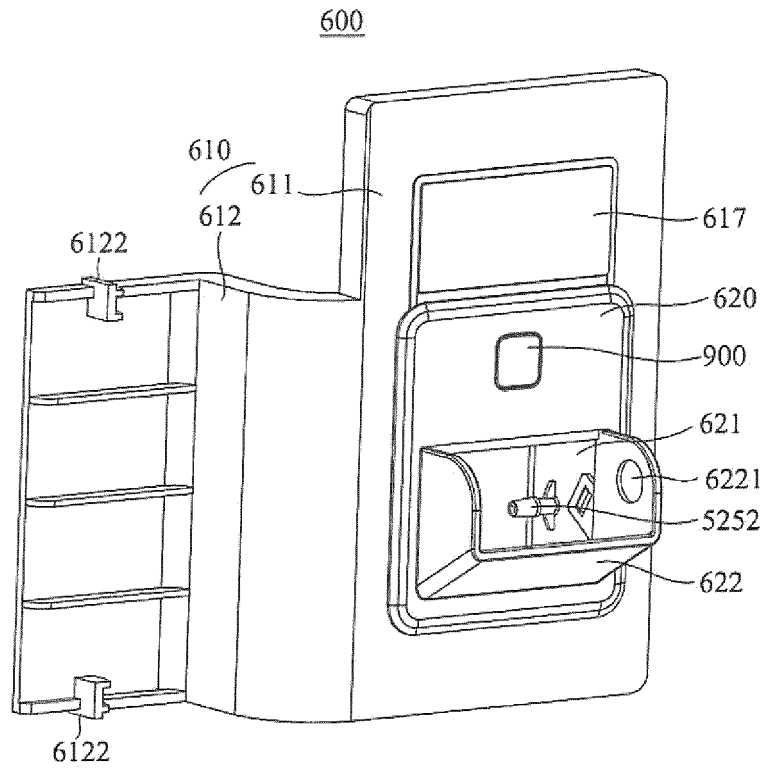


FIG. 8

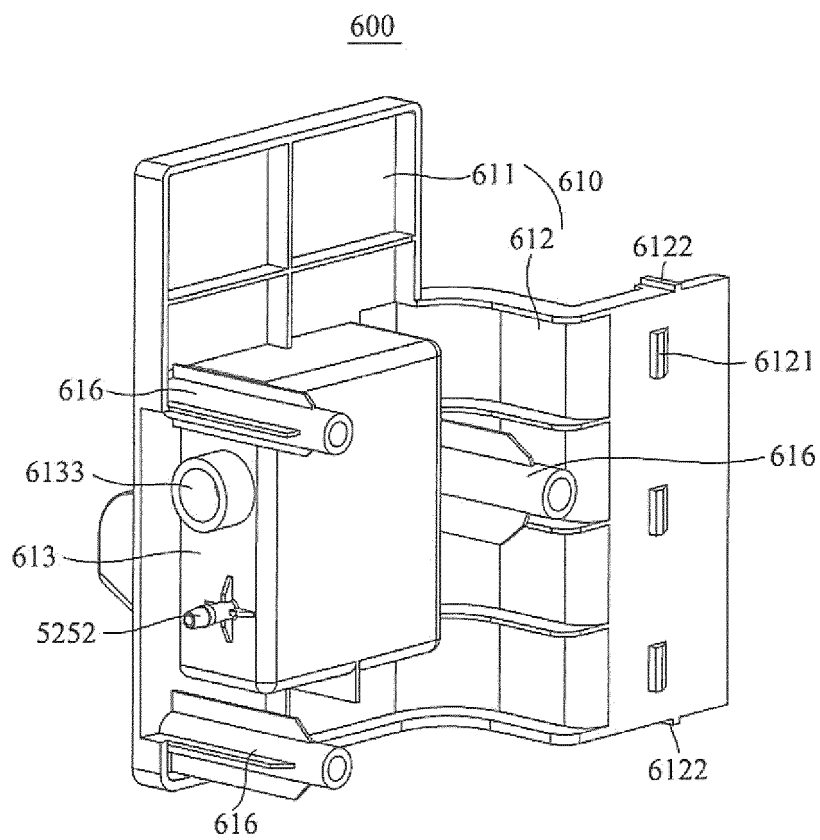


FIG. 9

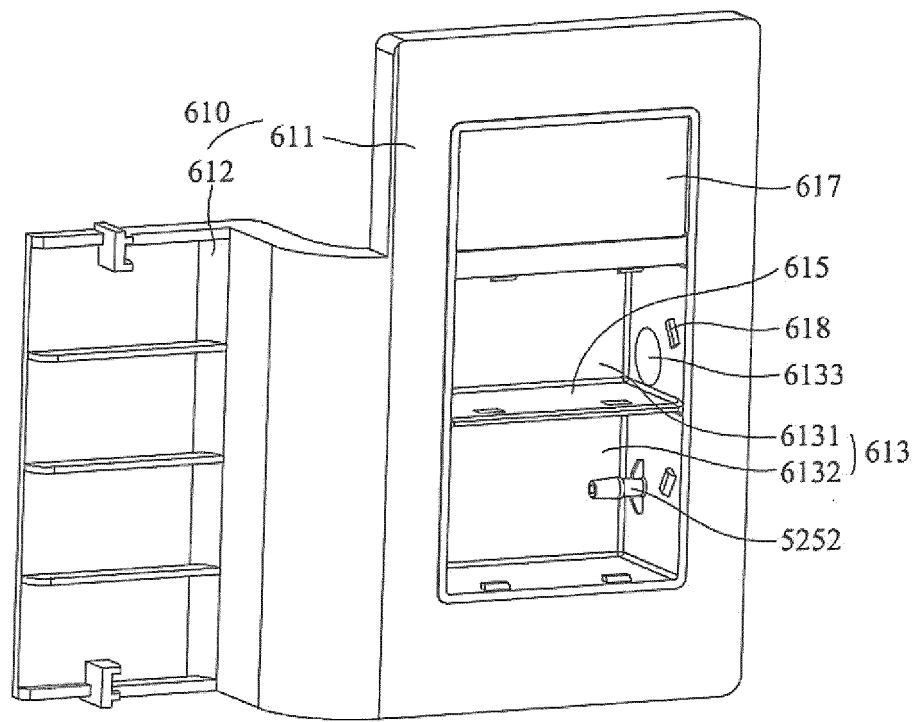


FIG. 10

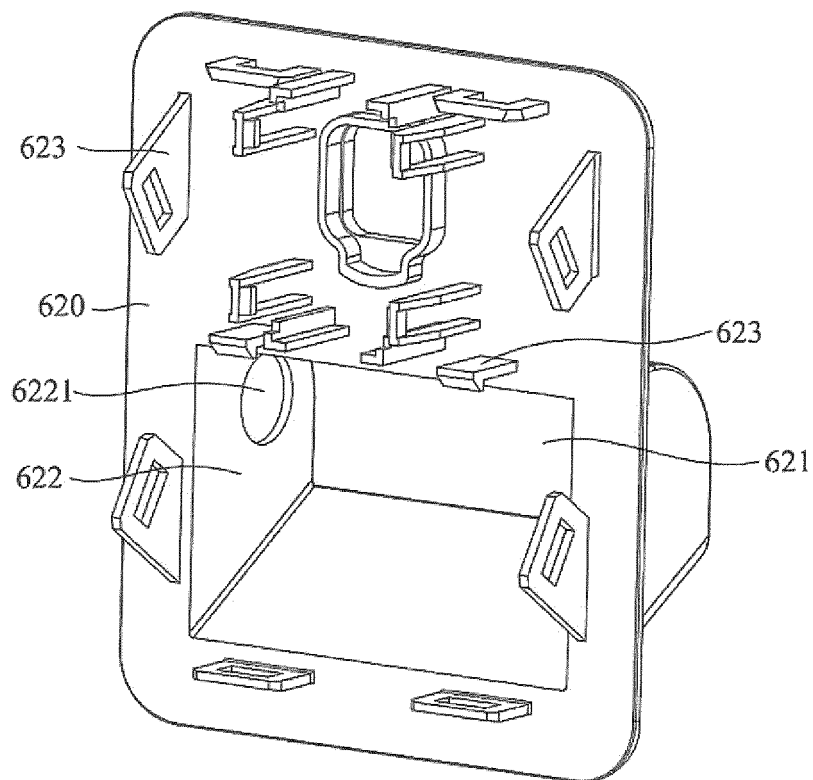


FIG. 11

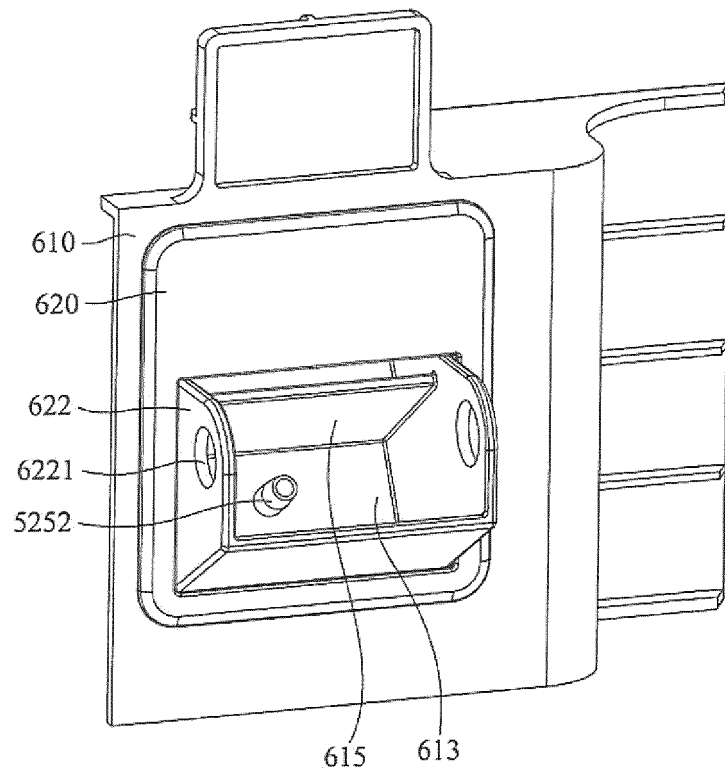


FIG. 12

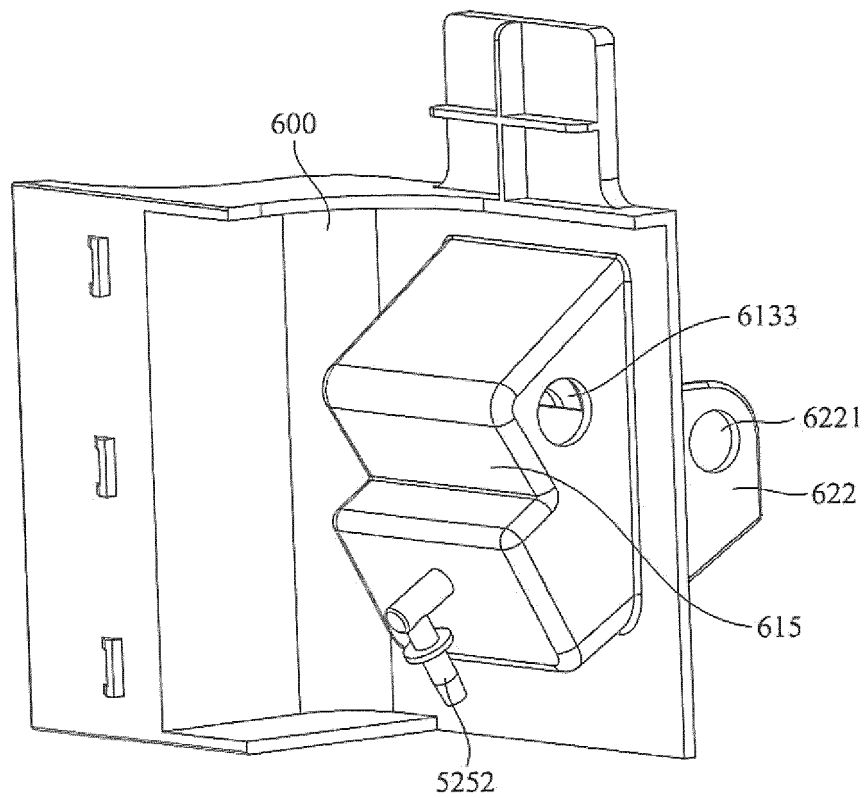


FIG. 13

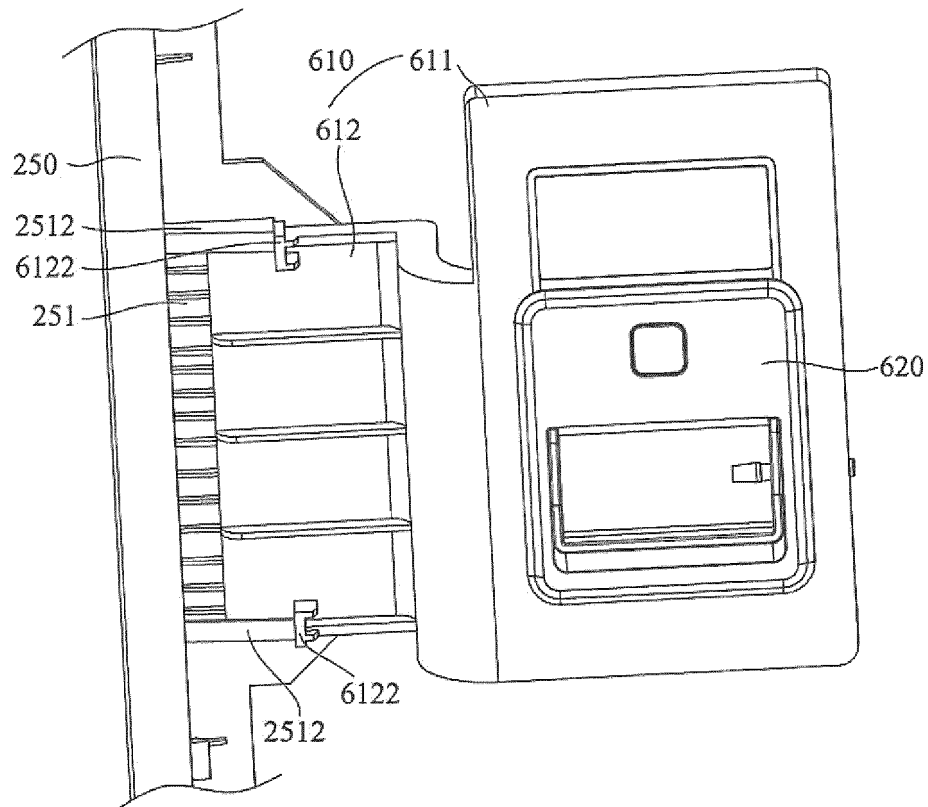


FIG. 14

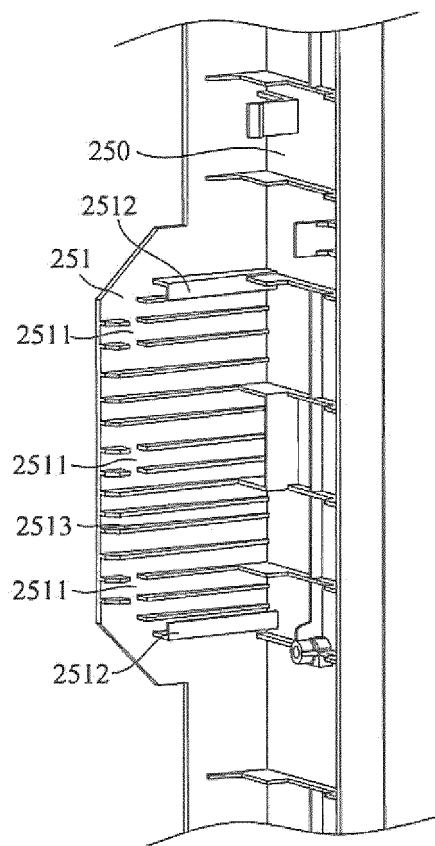


FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/094262

A. CLASSIFICATION OF SUBJECT MATTER

F25D 25/02(2006.01)i; F25D 11/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F25D11 F25D23 F25D17 F25D25 F25D29 F16L

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)

CNABS, CNTXT, CNKI, DWPI: 门 盒 容 器 真 空 负 压 接 door box container vacuum negative pressure connect+ link+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 111578589 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 August 2020 (2020-08-25) description, paragraphs [0020]-[0093] and figures 1-15	1-10
E	CN 111578591 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 August 2020 (2020-08-25) description, paragraphs [0019]-[0094] and figures 1-15	1-10
E	CN 111578588 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 August 2020 (2020-08-25) description, paragraphs [0019]-[0106] and figures 1-15	1-10
X	KR 20060041509 A (LG ELECTRONICS INC.) 12 May 2006 (2006-05-12) description page 5 paragraph 8 to page 6 paragraph 3 and figures 1, 4, 5	1
A	KR 20150047363 A (LG ELECTRONICS INC.) 04 May 2015 (2015-05-04) entire document	1-10
A	CN 1967112 A (LG ELECTRONICS (TIANJIN) ELECTRICAL APPLIANCES CO., LTD.) 23 May 2007 (2007-05-23) entire document	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

19 January 2021

Date of mailing of the international search report

27 January 2021

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
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Authorized officer

Facsimile No. (86-10)62019451

Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No. PCT/CN2020/094262

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 105650990 A (QINGDAO HAIRI HIGH-TECH MODEL CO., LTD.) 08 June 2016 (2016-06-08) entire document	1-10
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2020/094262

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	111578589	A	25 August 2020	None			
CN	111578591	A	25 August 2020	None			
CN	111578588	A	25 August 2020	None			
KR	20060041509	A	12 May 2006	KR	100632017	B1	04 October 2006
KR	20150047363	A	04 May 2015	KR	102158531	B1	22 September 2020
CN	1967112	A	23 May 2007	None			
CN	105650990	A	08 June 2016	None			

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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