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

(11) **EP 3 978 843 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
23.04.2025 Bulletin 2025/17

(21) Application number: **20815525.9**

(22) Date of filing: **12.05.2020**

(51) International Patent Classification (IPC):
F25D 17/06 *(2006.01)* ***F25D 11/02*** *(2006.01)*
F25D 17/04 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F25D 17/045; F25D 11/02; F25D 2317/066; F25D 2317/0683

(86) International application number:
PCT/CN2020/089787

(87) International publication number:
WO 2020/238614 (03.12.2020 Gazette 2020/49)

(54) SHIELDING DEVICE AND REFRIGERATOR HAVING THE SAME

ABSCHIRMVORRICHTUNG UND KÜHLSCHRANK DAMIT

DISPOSITIF DE PROTECTION ET RÉFRIGÉRATEUR COMPORTANT CELUI-CI

(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: **24.05.2019 JP 2019098052**

(43) Date of publication of application:
06.04.2022 Bulletin 2022/14

(73) Proprietors:
- **HAIER SMART HOME CO., LTD.**
  Qingdao, Shandong 266101 (CN)
- **QINGDAO HAIER REFRIGERATOR CO., LTD.**
  Quindao, Shandong 266101 (CN)
- **AQUA CO., LTD**
  Tokyo 103-0012 (JP)

(72) Inventors:
- **TOYOSHIMA, Masashi**
  Tokyo 103-0012 (JP)
- **KOMATSU, Hajime**
  Tokyo 103-0012 (JP)
- **WADA, Yoshihiko**
  Tokyo 103-0012 (JP)

(74) Representative: **Winter, Brandl - Partnerschaft mbB**
Alois-Steinecker-Straße 22
85354 Freising (DE)

(56) References cited:
WO-A1-2013/143383
WO-A1-2018/108139
CN-A- 108 302 872
CN-A- 108 302 874
CN-A- 108 332 489
CN-A- 108 759 245
CN-A- 109 751 816
CN-A- 112 313 462
JP-A- 2007 120 802
JP-A- 2007 155 146
US-A1- 2017 227 276

EP 3 978 843 B1

Description

TECHNICAL FIELD

[0001] The present invention relates to a shielding device and a refrigerator having the same, and particularly to a shielding device for properly closing an air passage connecting a cooling chamber with a storage compartment, and a refrigerator having the shielding device.

BACKGROUND

[0002] Conventionally, a refrigerator disclosed in patent document D1 (JP Patent Laid-open 2013-2664) is known in which a plurality of storage compartments are cooled properly by a cooler.

[0003] FIG. 12 illustrates a refrigerator 100 disclosed in D1. In the refrigerator 100 shown in the figure, a refrigerating compartment 101, a freezing compartment 102 and a vegetable compartment 103 are formed from top to bottom. A cooling chamber 104 accommodating a cooler 108 is formed on an inner side of the freezing compartment 102, an opening portion 106 is formed in a partition wall 105 which partitions the cooling chamber 104 from the freezing compartment 102, and the opening portion 106 is used to supply cold air to each storage compartment. In addition, a blower fan 107 for blowing cold air is disposed at the opening portion 106, and a blower cover 110 for covering the blower fan 107 is disposed on the side of the freezing compartment 102. A damper 114 is disposed in an air passage 109 through which the cold air supplied to the refrigerating compartment 101 flows.

[0004] The blower cover 110 is described in detail with reference to FIG. 13. The blower cover 110 is formed with a recess 111 having a substantially rectangular shape, and an opening portion 113 is formed by notching an upper portion of the recess 111. Here, when the blower cover 110 covers the blower fan 107, the opening portion 113 of the blower cover 110 communicates with the air passage 109 on the side of the main body of the refrigerator.

[0005] During operation of the refrigerator 100 with the above configuration, when the refrigerating compartment 101 and the freezing compartment 102 are cooled simultaneously, the blower cover 110 is separated from the blower fan 107, the damper 114 is opened, and the blower fan 107 rotates in this state. As such, part of the cold air cooled by the cooler 108 in the cooling chamber 104 is blown into the freezing compartment 102 by a blowing force of the blower fan 107. In addition, a remaining part of the cold air is blown into the refrigerating compartment 101 via the air passage 109, the damper 114 and the air passage 109. Thereby, both the freezing compartment 102 and the refrigerating compartment 101 are cooled.

[0006] On the other hand, when only the refrigerating compartment 101 needs to be cooled, the blower fan 107 is covered by the blower cover 110, the damper 114 is opened, and the blower fan 107 blows the cold air cooled by the cooler 108 in this state. When the blower cover 110 is in a closed state, the opening portion 113 formed in the upper portion of the blower cover 110 communicates with the air passage 109. Therefore, the cold air blown by the blower fan 107 is supplied to the refrigerating compartment 101 via the opening portion 113, the damper 114 and the air passage 109.

[0007] As described above, a plurality of storage compartments can be cooled with one cooler 108 by using the blower cover 110 formed with the opening portion 113.

[0008] However, the blower cover 110 having the abovementioned configuration closes the opening portion 106 of the cooling chamber 104 by moving backward, and opens the opening portion 106 of the cooling chamber 104 by moving forward. In addition, a driving mechanism for driving the blower cover 110 to move in a front-rear direction needs to be disposed.

[0009] The blower cover 110 needs a space for opening and closing operations in the front-rear direction. Therefore, in the interior of the refrigerator 100, a large space is required for opening and closing the blower cover 110. As a result, there occurs the following problem: an internal volume of the freezing compartment 102 formed in front of the blower cover 110 is reduced, and the amount of articles that can be accommodated in the freezing compartment 102 is limited. In addition, a driving sound is generated when the blower cover 110 is moved in the front-rear direction by a motor, and the driving sound might be uncomfortable to the user when it is loud.

[0010] CN 108 759 245 A describes an air-cooled refrigerator.

[0011] WO 2018/108 139 A1 and CN 108 302 874 A describe a branched air-feeding device and a refrigerator provided with the branched air-feeding device.

[0012] WO 2013/143 383 A1 describes a refrigerator comprising an airflow control device.

[0013] JP 2007 120 802 A describes a refrigerator whose interior is partitioned into a plurality of storage rooms.

SUMMARY

[0014] In view of the above problems, an object of the present invention is to provide a shielding device that does not occupy the internal volume of the refrigerator and exhibits a small driving sound, and a refrigerator having the shielding device.

[0015] In order to achieve the above-mentioned object, an embodiment of the present invention is a shielding device according to claim 1.

[0016] Another aspect of the present invention provides a refrigerator according to claim 8.

[0017] Effects of the present invention are as follows: the miniature of the structure can be achieved by using the rotatable shielding walls around the blower to open and close the air passages, thereby reducing the dimen-

sions of the shielding device as a whole in the thickness direction. In addition, the power is transmitted by the power transmission mechanism from a drive source to the rotatable shielding walls, thereby performing the opening and closing operation of the rotatable shielding walls well.

[0018] In addition, in the present invention, the rotatable shielding walls can be made in an upstanding state by gathering the cable radially to shorten its length, and conversely, the rotatable shielding walls can be made in a horizontally-lying state by releasing and extending the cable.

[0019] In addition, according to the refrigerator of the present invention, the dimensions of the shielding device as a whole in the thickness direction can be reduced, and the effective volume used as the storage compartments can be increased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1 is a front view showing the appearance of a refrigerator according to the present invention.

FIG. 2 is a side cross-sectional view showing an internal configuration of the refrigerator according to the present invention.

FIG. 3 is an enlarged side cross-sectional view showing a structure nearby a cooling chamber of the refrigerator according to the present invention.

FIG. 4 is a view showing a state after a shielding device of the refrigerator according to an example not part of the present invention is assembled, wherein FIG. 4(A) is a perspective view, FIG. 4(B) is a cross-sectional view taken along a section line A-A, and FIG. 4(C) is a schematic view of the configuration of an air passage as viewed from the rear.

FIG. 5 is a view of the shielding device according to an example not part of the present invention, wherein FIG. 5(A) is a perspective view, and FIG. 5(B) is an exploded perspective view.

FIG. 6 is a view showing the shielding device according to an example not part of the present invention, wherein FIG. 6(A) is an exploded view of rotatable shielding walls of the shielding device as viewed from the rear, and FIG. 6(B) is a view of a portion where gears mesh with each other.

FIG. 7 is a view showing a fully-closed state of the shielding device according to an example not part of the present invention, wherein FIG. 7(A) is a view showing the shielding device as viewed from the rear, and FIG. 7(B) is a perspective view showing a front cover after the shielding device is assembled.

FIG. 8 is a view showing a fully-opened state of the shielding device according to an example not part of the present invention, wherein FIG. 8(A) is a view showing the shielding device as viewed from the rear, and FIG. 8(B) is a perspective view of the front cover after the shielding device is assembled.

FIG. 9 is a view of a shielding device according to the present invention, wherein FIG. 9(A) is a perspective view of the shielding device in a closed state, and FIG. 9(B) is a perspective view of the shielding device in an open state.

FIG. 10 is an exploded perspective view of a shielding device according to a further embodiment of the present invention.

FIG. 11 is a view of a shielding device according to the present invention, wherein FIG. 11(A) is a view of an action of making the shielding device in an open state, and FIG. 11(B) is a view of an action of making the shielding device in a closed state.

FIG. 12 is an enlarged cross-sectional view of a refrigerator according to the background art.

FIG. 13 is a perspective view of a blower cover used in the refrigerator according to the background art.

DETAILED DESCRIPTION

[0021] The figures are only for illustrative purposes and cannot be understood as limiting the present invention; to better illustrate the embodiments, some parts of the figures may be omitted, enlarged or reduced, and do not represent the dimensions of the actual product; those skilled in the art appreciate that some well-known structures in the figures and depictions thereof may be omitted.

[0022] Hereinafter, a shielding device 70 and a refrigerator 10 will be described in detail based on the figures. In the following depictions, the same component is denoted by the same symbol in principle, and repeated depictions will be omitted. In addition, in the following depictions, directions such as up, down, front, back, left and right are appropriately used, wherein left and right indicate left and right when the refrigerator 10 is viewed from the rear.

[0023] FIG. 1 is a front view of the refrigerator 10 according to the present invention showing a schematic structure of the refrigerator 10. As shown in FIG. 1, the refrigerator 10 comprises a heat-insulating cabinet 11 as a main body, and storage compartments for storing foods and the like are formed in the heat-insulating cabinet 11. As for the storage compartments, the uppermost layer is the refrigerating compartment 15, an upper freezing

compartment 18 is below the refrigerating compartment 15, a lower freezing compartment 19 is below the upper freezing compartment 18, and the lowermost layer is a vegetable compartment 20. In addition, the upper freezing compartment 18 and the lower freezing compartment 19 are both storage compartments within a freezing temperature range, and they may be collectively referred to as a freezing compartment 17 in the following depictions. Here, the upper freezing compartment 18 may be partitioned in a left-right direction, and one side may be used as an ice making compartment.

[0024] The front of the heat-insulating cabinet 11 comprises an opening, the openings corresponding to the abovementioned storage compartments are each provided with a heat-insulating door 21, and these heat-insulating doors may be opened and closed freely. The refrigerating compartment 15 is divided in the left-right direction and the left and right parts are closed by respective heat-insulating doors 21. Upper and lower ends of the heat-insulating doors 21 on outer sides in a widthwise direction are rotatably mounted on the heat-insulating cabinet 11. In addition, the heat-insulating doors 23, 24 and 25 are integrally assembled with respective storage containers, may be drawn freely along the front of the refrigerator 10, and be supported by the heat-insulating cabinet 11. Specifically, the heat-insulating door 23 closes the upper freezing compartment 18, the heat-insulating door 24 closes the lower freezing compartment 19, and the heat-insulating door 25 closes the vegetable compartment 20.

[0025] FIG. 2 is a side cross-sectional view showing the schematic structure of the refrigerator 10. The heat-insulating cabinet 11 as the main body of the refrigerator 10 comprises a housing 12 made of a steel plate with an opening in the front, and a liner 13 made of a synthetic resin, disposed within the housing 12 with a gap between the liner 13 and the housing 12 and having an opening in the front. The gap between the housing 12 and the liner 13 is filled with a heat-insulating material 14 made of foamed polyurethane. In addition, each of the abovementioned heat-insulating doors 21 employs the same heat-insulating structure as the heat-insulating cabinet 11.

[0026] The refrigerating compartment 15 and the freezing compartment 17 located at the layer therebelow are partitioned by a heat-insulating partition wall 42. In addition, the upper freezing compartment 18 and the lower freezing compartment 19 disposed at the layer therebelow communicate with each other, and the cooled air, namely, the cold air may circulate freely. Furthermore, the freezing compartment 17 and the vegetable compartment 20 are partitioned by a heat-insulating partition wall 43.

[0027] The rear of the refrigerating compartment 15 is partitioned by a partition 65 made of a synthetic resin to form a refrigerating compartment cold air supply passage 29 for supplying cold air to the refrigerating compartment 15. In the refrigerating compartment cold air supply passage 29, air outlets 33 through which cold air flows into the refrigerating compartment 15 are formed. Here, a damper 22 as an air passage opening and closing means can be inserted in the refrigerating compartment cold air supply passage 29. The cold air may be supplied to the refrigerating compartment 15 via the refrigerating compartment cold air supply passage 29 by opening the damper 22. The cold air is not blown to the refrigerating compartment 15 by closing the damper 22.

[0028] A freezing compartment cold air supply passage 31 is formed on an inner side of the freezing compartment 17, and cold air cooled by a cooler 45 flows through the freezing compartment cold air supply passage 31 into the freezing compartment 17. A cooling chamber 26 is formed on an inner side behind the freezing compartment cold air supply path 31. A cooler 45 is disposed in the cooling chamber and is an evaporator for cooling air circulating in the refrigerator. The freezing compartment cold air supply passage 31 is a space surrounded by a front cover 67 in the front and a partition 66 in the rear.

[0029] The cooler 45 is connected to a compressor 44, a heat radiator (not shown), and a capillary tube (not shown) as an expansion means via a refrigerant pipe, and is a member constituting a vapor compression type refrigeration cycle circuit.

[0030] FIG. 3 is a side cross-sectional view showing a structure nearby the cooling chamber 26 of the refrigerator 10. The cooling chamber 26 is disposed in an interior of the heat-insulating cabinet 11 and inside the freezing compartment cold air supply passage 31. The cooling chamber 26 and the freezing compartment 17 are partitioned by the partition 66 made of a synthetic resin.

[0031] The freezing compartment cold air supply passage 31 formed in the front of the cooling chamber 26 is a space formed between the cooling chamber 26 and the front cover 67 which made of the synthetic resin and assembled in the front of the cooling chamber 26, and is a passage through which the cold air cooled by the cooler 45 flows into the freezing compartment 17. The front cover 67 is formed with air outlets 34 which are openings through which cold air is blown into the freezing compartment 17.

[0032] An air return vent 38 for returning air from the freezing compartment 17 to the cooling chamber 26 is formed on a back side of a lower portion of the lower freezing compartment 19. Furthermore, an air return vent 28 is formed below the cooling chamber 26 and communicated with the air return vent 38, and sucks return cold air from respective storage compartments into the cooling chamber 26. The cold air returning through an air return vent 39 (FIG. 2) of the vegetable compartment 20 and a vegetable compartment cold air return passage 37 also flows into the air return vent 28.

[0033] In addition, a defrosting heater 46 is disposed below the cooler 45 to melt the frost attached to the cooler 45. The defrosting heater 46 is a resistive heater.

[0034] An air blowing vent 27 is formed in an upper

portion of the cooling chamber 26 and is an opening connected to the respective storage compartments. The air blowing vent 27 is an opening into which the cold air cooled by the cooler 45 flows, and enables the cooling chamber 26, the refrigerating compartment cold air supply passage 29 and the freezing compartment cold air supply passage 31 to be communicated with one another. The air blowing vent 27 is provided with a blower 47 that blows cold air to the freezing compartment 17 and the like from the front. In addition, a function of a damper is assumed by a rotatable shielding wall 71 of a shielding device 70 described later, so the damper may be omitted.

[0035] A shielding device 70 is disposed outside the air blowing vent 27 of the cooling chamber 26, to properly close the air passage connected to the air blowing vent 27. The shielding device 70 is covered by the front cover 67 from the front.

[0036] Reference is made to FIG. 4 through FIG. 8 to illustrate an example not part of the present invention.

[0037] Reference is made to FIG. 4 to illustrate a configuration in which the shielding device 70 for limiting the air passage is assembled. FIG. 4(A) is a perspective view of the partition 66 with the shielding device 70 being assembled, FIG. 4(B) is a cross-sectional view taken along line A-A of FIG. 4(A), and FIG. 4(C) is a view of the configuration of the air passage when the front cover 67 is viewed from the rear.

[0038] Referring to FIG. 4(A), in the partition 66, the air blowing vent 27 penetrating in a thickness direction is formed in an upper portion of the partition 66, and the blower 47 and the shielding device 70 are disposed in front of the air blowing vent 27. Here, the shielding device 70 is hidden by the partition 66. In addition, an opening section 59 formed on an upper end side of the partition 66 is communicated with the refrigerating compartment cold air supply passage 29 shown in FIG. 3.

[0039] Referring to FIG. 4(B), as described above, the freezing compartment cold air supply passage 31 is formed in a space surrounded by the partition 66 and the front cover 67. As described later, the freezing compartment cold air supply passage 31 is divided into a plurality of air passages. In addition, the shielding device 70 and a shielding wall driving mechanism 60 are disposed between the partition 66 and the front cover 67. The shielding device 70 shields the blower 47, and the shielding wall driving mechanism 60 drives the shielding device 70.

[0040] Referring to FIG. 4(C), a plurality of air passages are formed by partitioning an internal space of the front cover 67. Specifically, rib-shaped air passage partition walls 50 and 56 extending rearward from a rear main surface of the front cover 67 are formed. The rear ends of the air passage partition walls 50 and 56 abut against the partition 66 shown in FIG. 4(B).

[0041] Here, the air passage through which the cold air is blown and supplied is divided into a refrigerating compartment cold air supply passage 51, an upper freezing compartment cold air supply passage 52, and a lower freezing compartment cold air supply passage 53 in turn from top. The cold air flowing through the refrigerating compartment cold air supply passage 51 is blown through the opening section 59 to the refrigerating compartment 15 shown in FIG. 2. The cold air flowing through the upper freezing compartment cold air supply passage 52 is blown through the air outlet 34 to the upper freezing compartment 18 shown in FIG. 2. The cold air flowing through the lower freezing compartment cold air supply passage 53 is blown through the air outlet 34 to the lower freezing compartment 19 shown in FIG. 2. Here, the refrigerating compartment cold air supply passage 51, the upper freezing compartment cold air supply passage 52 and the lower freezing compartment cold air supply passage 53 spread around with the shielding device 70 as a center.

[0042] Reference is made to FIG. 5 to illustrate the configuration of the shielding device 70. FIG. 5(A) is a perspective view showing the shielding device 70, and FIG. 5(B) is an exploded perspective view showing the shielding device 70.

[0043] Referring to FIG. 5(A) and FIG. 5(B), the shielding device 70 compromises a support base 63, a rotatable shielding wall 71 and a shielding wall driving mechanism 60. The shielding device 70 is a device that shields the air passages of the cold air blown by the blower 47. The air passages connecting the cooling chamber 26 with respective storage compartments are made communicated by making the shielding device 70 in an open state, and, the air passages are cut off by making the shielding device 70 in a closed state.

[0044] Referring to FIG. 5(B), the blower 47 is disposed at a center of the support base 63 by fastening with screws. Although not shown here, the blower 47 has for example a centrifugal fan such as a turbo fan, and a blowing motor that rotates the centrifugal fan, and blows cold air outward in a radial direction.

[0045] The support base 63 is an integrally-formed member made of a synthetic resin, and has a substantially square shape as viewed from the rear. The rotatable shielding wall 71 which is capable of rotate is disposed on each side of the support base 63. A plurality of protrusions 58 are formed by protruding portions of the support base 63 towards the rear side. A cover plate 35 is mounted at the rear ends of the protrusions 58.

[0046] The cover plate 35 is a plate-shaped member having a substantially square shape as viewed from the rear, and is formed with an opening 36 at a center. The cold air entering through the opening 36 is blown around by the blower 47.

[0047] The shield wall driving mechanism 60 drives the rotatable shielding wall 71 to perform an opening or closing action. The shielding wall driving mechanism 60 comprises a drive motor 74 as a power source, a gear 811 as a power transmission device that transmits the power of the drive motor 74 to the rotatable shielding wall 71, and the like. The specific configuration of the shielding wall driving mechanism 60 will be described later with

reference to FIG. 6.

[0048] The drive motor 74 is disposed on at a lower left end side of the support base 63 and configured to generate a drive force for opening and closing the rotatable shielding wall 71.

[0049] The rotatable shielding wall 71 is a rectangular plate-shaped member formed of a synthetic resin, and is formed by the rotatable shielding walls 711-714. The specific configuration of the rotatable shielding wall 71 will be described later with reference to FIG. 6.

[0050] The shielding device 70 will be described in detail with reference to FIG. 6. FIG. 6(A) shows an exploded view of the shielding device 70, and FIG. 6(B) is an enlarged view showing a portion movably connecting the rotatable shielding wall 711 with the rotatable shielding wall 714. In FIG. 6(A), the support base 63 and the blower 47 are covered by the cover plate 35.

[0051] Referring to FIG. 6(A), the rotatable shielding wall 71 is formed by the rotatable shielding walls 711-714. The rotatable shielding wall 71 has long sides along the sides of the support base 63. The rotatable shielding wall 71 is mounted adjacent to the edges of the support base 63 and rotatable about an axis parallel to a plane of the support base 63. The rotatable shielding wall 71 is disposed on paths through which the cold air blown by the blower 47 circulates, and shields respective air passages. In addition, inner edges of the rotatable shielding walls 711-714 are mounted via a rotatable connection portion 64 and can rotate relative to the support base 63.

[0052] The rotatable shielding walls 711-714 are provided with gears such as a gear 811 as a power transmission mechanism for transmitting the power from the drive motor 74. Specifically, a gear 812 and a gear 813 are provided at both ends of the inner side of the rotatable shielding wall 711, and a gear 814 and a gear 815 are provided at both ends of the inner side of the rotatable shielding wall 712. In addition, a gear 816 and a gear 817 are provided at both ends of the inner side of the rotatable shielding wall 713, and a drive shaft 54 and a gear 811 are provided at both ends of the inner side of the rotatable shielding wall 714. The drive shaft 54 is a shaft that is rotated by the drive motor 74.

[0053] The gear 811 of the rotatable shielding wall 714 meshes with the gear 812 of the rotatable shielding wall 711. The gear 813 of the rotatable shielding wall 711 meshes with the gear 814 of the rotatable shielding wall 712. The gear 815 of the rotatable shielding wall 712 meshes with the gear 816 of the rotatable shielding wall 713.

[0054] Referring to FIG. 6(B), the gear 811 of the rotatable shielding wall 714 and the gear 812 of the rotatable shielding wall 711 are configured for example as bevel gears. With this configuration, it is possible to transmit power from the rotatable shielding wall 714 to the rotatable shielding wall 711 in directions that intersect perpendicularly. This configuration is also the same with the gear 813 of the rotatable shielding wall 711 and the gear 814 of the rotatable shielding wall 712, the gear 815 of the rotatable shielding wall 712 and the gear 816 of the rotatable shielding wall 713 shown in FIG. 6(A).

[0055] Reference is made again to FIG. 6 (A) to illustrate the opening or closing action of the shielding device 70. When the drive motor 74 rotates in one direction, the driving force of the drive motor 74 is transmitted to the rotatable shielding wall 711 via the gear 811 and the gear 812, and to the rotatable shielding wall 712 via the gear 813 and the gear 814, and to the rotatable shielding wall 713 via the gear 815 and the gear 816. As a result, the rotatable shielding walls 711-714 simultaneously rotate to a upstanding state, namely, a state in which the rotatable shielding walls perpendicularly intersect with the main surface of the support base 63.

[0056] When the drive motor 74 rotates in a reverse direction, the driving force of the drive motor 74 is transmitted to the rotatable shielding walls 711-714, and the rotatable shielding walls 711-714 simultaneously rotate to a horizontal state, namely, a state in which the rotatable shielding walls are substantially parallel to the support base 63.

[0057] FIG. 7 shows the configuration of the shielding device 70 in a fully closed state. FIG. 7(A) is a view of the shielding device 70 in the fully closed state as viewed from the rear, and FIG. 7(B) is a view of the front cover 67 on which the shielding device 70 in the fully closed state is mounted, as viewed from the rear. The fully closed state refers to a state in which all the air passages for supplying cold air are shielded by the rotatable shielding wall 71.

[0058] Referring to FIG. 7 (A), the driving force of the drive motor 74 is transmitted to the rotatable shielding walls 711-714 through the power transmission mechanism such as the gear 811, so that the rotatable shielding walls 711-714 are in an upstanding state relative to the main surface of the support base 63, namely, a state that the rotatable shielding walls close the air passages communicated with respective storage compartments. In addition, the blower 47 does not rotate in the fully closed state.

[0059] Referring to FIG. 7(B), the shielding device 70 prevents air from flowing from the blower 47 to the outside in the fully closed state. That is, in the fully closed state, all of the rotatable shielding walls 711-714 are in the upstanding state, the communication with the air passages for supplying cold air is cut off, and cold air is not supplied to the refrigerating compartment 15 and the freezing compartment 17 shown in FIG. 2. In addition, during a defrosting process of defrosting the cooler 45 shown in FIG. 2, the shielding device 70 is also in the fully closed state so that warm air does not flow from the cooling chamber 26 into the refrigerating compartment 15 and the freezing compartment 17.

[0060] FIG. 8 shows the configuration of the shielding device 70 in a fully open state. FIG. 8(A) is a view of the shielding device 70 in the fully opened state as viewed from the rear, and FIG. 8(B) is a view of the front cover 67 on which the shielding device 70 in the fully opened state is mounted, as viewed from the rear. The fully open state

refers to a state in which the communication with the air passages for supplying cold air are not shielded by the rotatable shielding wall 71 so that the cold air blown by the blower 47 flows by diffusing around.

[0061] Referring to FIG. 8(A), the shielding device 70, in the fully open state, does not hinder air from flowing from the blower 47 to the outside. That is, in the fully open state, due to the driving force of the drive motor 74, the rotatable shielding walls 711-714 are in a horizontally-lying state in which they lie horizontally substantially parallel to the main surface of the support base 63. Therefore, in the shielding device 70, the cold air blown from the blower 47 is blown to the refrigerating compartment 15 and the freezing compartment 17 without being interfered by the rotatable shielding walls 711-714.

[0062] Referring to FIG. 8(B), the flow resistance can be reduced and the amount of cold air supplied by the blower 47 may be increased by making all the rotatable shielding walls 711-714 included in the shielding device 70 in the horizontally-laying, open state. Specifically, with the rotatable shielding wall 711 being in the open state, cold air is blown to the refrigerating compartment cold air supply passage 51, and the cold air is blown out to the refrigerating compartment 15 shown in FIG. 2 through the refrigerating compartment cold air supply passage 29. In addition, with the rotatable shielding wall 712 and the rotatable shielding wall 714 being in the open state, the cold air is blown to the upper freezing compartment cold air supply passage 52 and then blown out through the air outlet 34 to the upper freezing compartment 18 shown in FIG. 2. In addition, the rotatable shielding wall 713 is in the open state, cold air can be supplied to the freezing compartment 19 (FIG. 2) via the lower freezing compartment cold air supply passage 53 and the air outlet 34.

[0063] Here, the rotatable shielding walls 711-714 may also made be in a half-open state. Specifically, it is possible to make the rotatable shielding walls 711-714 in the half-open state by stopping halfway the drive motor 74 as a stepping motor upon transition from the fully closed state shown in FIG. 7(A) to the fully open state shown in FIG. 8(A) as instructed by a control device not shown. The amount of the cold air blown to the freezing compartment 17 can be accurately adjusted by making the rotatable shielding walls 711-714 in the half-open state.

[0064] In addition, referring to FIG. 2, a damper 22 can be inserted in the refrigerating compartment cold air supply passage 29, and the rotatable shielding wall 711 shown in FIG. 7(A) may be further omitted. That is, the shielding device 70 only comprises the rotatable shielding wall 712, the rotatable shielding wall 713 and the rotatable shielding wall 714. In addition, the rotatable shielding wall 712, the rotatable shielding wall 713 and the rotatable shielding wall 714 can be in the fully closed state, the fully open state, and the half-open state. A degree of freedom of supplying cold air to the refrigerating compartment 15 and the freezing compartment 17 can be freely adjusted through such a setting.

[0065] Reference is made to FIG. 9 through FIG. 11 to illustrate the configuration of the shielding device 90 according to the present invention. FIG. 9(A) is a perspective view showing the shielding device 90 in a closed state, FIG. 9(B) is a perspective view showing the shielding device 90 in an open state, and FIG. 10 is an exploded perspective view showing the shielding device 90 in detail. FIG. 11(A) is a view showing a method of making the shielding device 90 in a fully open state, and FIG. 11(B) is a view showing a method of making the shielding device 90 in a fully closed state.

[0066] Referring to FIG. 9(A), the shielding device 90 surrounds the blower 94 from around, and comprises a plurality of rotatable shielding walls 91 that open and close the air passages. The blower 94 is disposed at a center of a rear surface of the support base 96 having a substantially circular disc shape. An end side of the rotatable shielding wall 91 is rotatably mounted on a periphery of the support base 96 via a rotatable connection portion 93. As an example, twelve rotatable shielding walls 91 are mounted on the periphery of the support base 96. In the closed state, the rotatable shielding walls 91 are in an upstanding state with respect to a main surface of the support base 96. In other words, an annular wall formed by a plurality of rotatable shielding walls 91 is formed on the periphery of the support base 96.

[0067] In addition, the shielding device 90 comprises a cable 92 serving as a power transmission mechanism that transmits a driving force for opening and closing the rotatable shielding walls 91. Specifically, a cable pass-through portion 95 is formed at an inside end of each rotatable shielding wall 91. The cable 92 passes through the cable pass-through portions 95 of the respective rotatable shielding walls 91, and assumes a substantially ring shape as a whole. Therefore, when a diameter of the ring shape of the cable 92 is reduced by tightening the cable 92, the rotatable shielding walls 91 each rotate from the rotatable connection portion 93 as a starting point until stand up, and are in a upstanding state which the rotatable shielding walls 91 intersect substantially perpendicularly with respect to the main surface of the support base 96. Supply of cold air to respective storage compartments can be stopped by making the shielding device 90 in the closed state as shown in FIG. 9(A).

[0068] FIG. 9(B) shows the shielding device 90 in the fully open state. Here, the respective rotatable shielding walls 91 are in the fully opened state in which they are substantially parallel to the main surface of the support base 96. The rotatable shielding walls 91 can be made in the fully open state by loosening the cable 92 to enlarge the diameter of the ring shape of the cable 92 so that the rotatable shielding walls 92 rotate radially outside until lying horizontally. Cold air can be blown into respective storage compartments by making the shielding device 90 in the fully open state, as shown in FIG. 9(B).

[0069] The specific configuration of the shielding device 90 will be described with reference to the exploded perspective view of FIG. 10. The shielding device 90

comprises a cover 97, a blower 94, a cable cover 88, rotatable shielding walls 91, a support base 96, a cable-rotating body 86, a cover 99, and a drive motor 89 in turn starting from a rear side.

[0070] The cover 97 has a substantially circular shape, and is formed with an opening portion 82 through which the cold air blown by the blower 94 enters. The cover 97 blocks the blower 94 from the rear side.

[0071] The blower 94, like the above-mentioned blower 47, blows the cold air entering through the opening portion 82 towards outside in a circumferential direction. The blower 94 is mounted on the support base 96 via a blower mounting portion 87.

[0072] The cable cover 88 is formed of a plate material which is in substantially circular ring shape, and protects the cable 92 from the rear, thereby ensuring a space for allowing the cable 92 to move.

[0073] The plurality of rotatable shielding walls 91 are disposed around the blower 94, and rotate to perform actions of opening and closing the air passages distributed around the blower 94.

[0074] The support base 96 is formed of a plate material that is in a substantially ring shape, and is provided with the rotatable shielding walls 91 and the cable 92. The support base 96 is circumferentially formed with rotatable connection portions 98 corresponding to the rotatable connection portions 93 of the rotatable shielding walls 91 (see FIG. 9(A). The respective rotatable connection portions 93 of the rotatable shielding walls 91 are rotatably connected with the rotatable connection portions 98 of the support base 96. In addition, a section of the cable 92 is fixed on the support base 96. In addition, a groove 85 is formed in an inside portion of the support base 96. The groove 85 is formed elongated in the circumferential direction. An end of the cable 92 is connected to the cable-rotating body 86 via the groove 85.

[0075] The cable-rotating body 86 is formed of a plate material that is in a substantially disc shape, and is disposed in front of the support base 96. The cable-rotating body 86 is connected to the other end of the cable 92. In addition, the cable-rotating body 86 is connected to the drive motor 89 via a gear not shown here. Therefore, when the drive motor 89 rotates in one direction, the cable-rotating body 86 also rotates in the same direction. Conversely, when the drive motor 89 rotates in a reverse direction, the cable-rotating body 86 also rotates in the reverse direction.

[0076] The cover 99 is made of a plate material having a substantially disc shape and configured to protects the cable-rotating body 86 from the front. The drive motor 89 is mounted on the cover 99.

[0077] The cable 92 has a cable end 921 on one end side and a cable end 922 on the other end side. The cable end 921 is fixed to the rotatable connection portion 98 via a cable fixing portion 84 described later, and the position of the cable end 921 does not change even if the cable-rotating body 86 rotates. The cable end 922 is fixed to the cable-rotating portion 86 via a cable fixing portion 83 described later, and changes positions in the circumferential direction of the cable-rotating body 86 as the cable-rotating body 86 rotates.

[0078] Reference is made to FIG. 11 to illustrate a specific method of opening and closing the rotatable shielding walls 91 by operating the cable 92. FIG. 11(A) shows the shielding device 90 in an open state, and FIG. 11(B) shows the shielding device 90 in a closed state.

[0079] Referring to FIG. 11(A), as described above, one end of the cable 92 is fixed to the support base 96 shown in FIG. 10 via the cable fixing portion 84. The position of the cable fixing portion 84 does not change. On the other hand, the other end of the cable 92 is fixed to the cable-rotating body 86 shown in FIG. 10 via the cable fixing portion 83. As the cable-rotating body 86 rotates, the position of the cable fixing portion 83 moves along the groove 85. Here, when the cable-rotating body 86 rotates counterclockwise driven by the driving force of the drive motor 89 shown in FIG. 10, the cable fixing portion 83 also moves counterclockwise in the groove 85. The cable 92 is then released in the opposite circumferential direction, so the circular ring-shaped cable 92 expands in diameter. In addition, as stated above, the cable 92 runs through the cable pass-through portions 95 of the respective rotatable shielding walls 91. Therefore, the rotatable shielding walls 91 rotate simultaneously until they tilt towards outside and get in in the horizontally-lying state. With the rotatable shielding walls 91 being in the horizontally-lying state, the cold air blown by the air blower 94 by rotating is supplied to the refrigerating compartment 15, the freezing compartment 17 and the vegetable compartment 20 shown in FIG. 2 via the refrigerating compartment cold air supply passage 51, the upper freezing compartment cold air supply passage 52 and the lower freezing compartment cold air supply passage 53 shown in FIG. 9(B).

[0080] Reference is made to FIG. 11(B) to illustrate a method of making the rotatable shielding walls 91 in the closed state. First, driven by the driving force of the drive motor 89 shown in FIG. 10, the cable-rotating body 86 rotates in the reverse direction, namely, in the clockwise direction. Upon doing so, the cable fixing portion 83 at a point where the cable-rotating body 86 is connected with the cable 92 also moves clockwise inside the groove 85. As a result, the ring-shaped cable 92 is reduced in diameter, and the respective rotatable shielding walls 91 rotate simultaneously to stand up with respect to the main surface of the shielding device 90. As a result, the respective rotatable shielding walls 91 are in a closed state in which they stand up and surround the blower 94 from around. When the shielding device 90 is in the closed state, the cold air is not blown to the respective storage compartments shown in FIG. 2.

[0081] In the shielding device 90, the rotatable shielding walls 91 can be made in the open state expanding the diameter of the ring-shaped cable 92, and be made in the closed state by reducing the diameter. Therefore, the opening and closing operation of the shielding device

90 can be achieved with a simple configuration. In addition, the shielding device 90 performs the opening and closing operation in a diameter direction of the blower 94 and does not move in the axial direction of the blower 94, namely, in a depth direction of the refrigerator 10. Therefore, the volume occupied by the shielding device 90 can be reduced in the depth direction of the refrigerator 10, and the effective volume used as the storage compartments can be increased.

[0082] Here, the rotatable shielding devices 90 can also be made in a half-open state. Specifically, it is possible to make the rotatable shielding walls 91 in the half-open state by stopping halfway the drive motor 89 as a stepping motor upon transition from the fully closed state shown in FIG. 9(A) to the fully open state shown in FIG. 9(A) as instructed by a control device not shown. The amount of the cold air blown to the freezing compartment 17 can be accurately adjusted by making the rotatable shielding walls 91 in the half-open state.

[0083] In addition, referring to FIG. 2, a damper 22 can be inserted in the refrigerating compartment cold air supply passage 29, and the rotatable shielding walls 91 at an upper end portion shown in FIG. 9(A) can be further omitted. In addition, the rotatable shielding walls 91 can be in the fully closed state, the fully open state and the half-open state. A degree of freedom of supplying cold air to the refrigerating compartment 15 and the freezing compartment 17 can be freely adjusted through such a setting.

Description of Reference Signs

[0084]

10 refrigerator
11 Heat-insulating cabinet
12 housing
13 Liner
14 heat-insulating material
15 Refrigerating compartment
17 Freezing compartment
18 Upper freezing compartment
19 Lower freezing compartment
20 Vegetable compartment
21 Heat-insulating door
22 Damper
23 Heat-insulating door
24 Heat-insulating door
25 Heat-insulating door
26 Cooling chamber
27 Air blowing vent
28 Air return vent
29 Refrigerating compartment cold air supply passage
31 Freezing compartment cold air supply passage
33 Air outlet
34 Air outlet
35 Cover plate
36 Opening
37 Vegetable compartment cold air return passage
38 Air return vent
39 Air return vent
42 Heat-insulating partition wall
43 Heat-insulating partition wall
44 Compressor
45 Cooler
46 Defrosting heater
47 Blower
50 Air passage partition wall
51 Refrigerating compartment cold air supply passage
52 Upper freezing compartment cold air supply passage
53 Lower freezing compartment cold air supply passage
54 Drive shaft
56 Air passage partition wall
58 protrusion
59 Opening section
60 Shielding wall driving mechanism
63 Support base
64 Rotatable connection portion
65 Partition
66 Partition
67 Front cover
70 Shielding device
71, 711, 712, 713, 714 Rotatable shielding wall
74 drive motor
811, 812, 813, 814, 815, 816, 817 gear
82 Opening section
83 Cable fixing portion
84 Cable fixing portion
85 Groove
86 Cable-rotating body
87 Blower mounting portion
88 Cable cover
89 Drive motor
90 Shielding device
91 Rotatable shielding wall
92 cable
921 Cable end
922 Cable end
93 Rotatable connection portion
94 Blower
95 Cable pass-through portion
96 Support base
97 Cover
98 Rotatable connection portion
99 Cover
100 Refrigerator
101 Refrigerating compartment
102 Freezing compartment
103 Vegetable compartment
104 Cooling chamber
105 Partition Wall
106 Opening portion

107 Blower fan
108 Cooler
109 Air passage
110 Blower cover
111 Recess
113 Opening portion
114 Damper

Claims

1. A shielding device (90) for a blower (94) for a refrigerator (10), wherein the shielding device (90) is configured to close air passages through which cold air is blown, the shielding device (90) comprising:

   a plurality of rotatable shielding walls (91) disposed from the outside in the radial direction surrounding a support base (96) for a blower (94) and configured to rotate to open and close the air passages, and
   a shielding wall driving mechanism (86, 89, 92) configured to drive the rotatable shielding walls (91) to rotate,
   the shielding wall driving mechanism (86, 89, 92) comprises a drive source (89), and a power transmission mechanism (86, 92) for transmitting power from the drive source (89) to the rotatable shielding walls (91),
   the plurality of rotatable shielding walls (91) are disposed in a ring shape along an outer circumference of the support base (96),
   the power transmission mechanism (86, 92) comprises a cable (92) passing through the rotatable shielding walls (91),
   the cable (92) passes through cable pass-through portions (95) formed at an inside end of each of the rotatable shielding walls (91),
   when a diameter of the ring shape of the cable (92) is reduced by tightening the cable (92), the rotatable shielding walls (91) each rotate until stand up in relation to the surface of the support base (96) and make the shielding device (90) in the closed state,
   the rotatable shielding walls (91) can be made in the fully open state by loosening the cable (92) to enlarge the diameter of the ring shape of the cable (92), so that the rotatable shielding walls (91) rotate towards the outside in the radial direction until lying horizontally, parallel to the surface of the support base (96).

2. The shielding device (90) according to claim 1, wherein at a center of the support base (96) a blower (94) is disposed.

3. The shielding device (90) according to claim 2, wherein the rotatable shielding wall which is capable of rotate is disposed around the perimeter of the support base (96).

4. The shielding device (90) according to claim 2, wherein a plurality of protrusions are formed by protruding portions of the support base (96) towards the rear side, and a cover plate is mounted at the rear ends of the protrusions.

5. The shielding device (90) according to claim 2, wherein the support base (96) is circumferentially formed with rotatable connection portions (98) corresponding to the rotatable connection portions (98) of the rotatable shielding walls (91); and the respective rotatable connection portions (98) of the rotatable shielding walls (91) are rotatably connected with the rotatable connection portions (98) of the support base (96).

6. The shielding device (90) according to claim 2, wherein the shielding device (90) comprises a cover (97), a cable cover (88), rotatable shielding walls (91), support base (96), a cable-rotating body (86), a cover (99), and a drive motor (89), in turn starting from a rear side; and a groove (85) is formed in an inside portion of the support base (96);
   the groove (85) is formed elongated in the circumferential direction; an end of the cable (92) is connected to the cable-rotating body (86) via the groove (85).

7. The shielding device (90) according to claim 2, wherein the cable-rotating body (86) is formed of a plate material that is in a disc shape, and is disposed in front of the support base (96).

8. A refrigerator (10), wherein the refrigerator (10) comprises:

   a freezing circuit having a cooler for cooling air to be supplied through air passages to storage compartments,
   a cooling chamber formed with an air blowing vent communicated with the storage compartments, the cooler being disposed in the cooling chamber,
   a blower (94) configured to blow air supplied through the air blowing vent to the storage compartments, and
   the shielding device (90) according to any of claims 1 to 7 at least partially closing the air passages.

Patentansprüche

1. Abschirmvorrichtung (90) für ein Gebläse (94) für einen Kühlschrank (10), wobei die Abschirmvorrich-

tung (90) so konfiguriert ist, dass sie Luftkanäle verschließt, durch die kalte Luft geblasen wird, wobei die Abschirmvorrichtung (90) Folgendes aufweist:

eine Mehrzahl von drehbaren Abschirmwänden (91), die von außen in radialer Richtung angeordnet sind und eine Trägerbasis (96) für ein Gebläse (94) umgeben und so konfiguriert sind, dass sie sich drehen, um die Luftkanäle zu öffnen und zu schließen, und
einen Abschirmwand-Antriebsmechanismus (86, 89, 92), der so konfiguriert ist, dass er die drehbaren Abschirmwände (91) antreibt, um sie zu drehen,
wobei der Abschirmwand-Antriebsmechanismus (86, 89, 92) eine Antriebsquelle (89) und einen Kraftübertragungsmechanismus (86, 92) zum Übertragen von Kraft von der Antriebsquelle (89) auf die drehbaren Abschirmwände (91) aufweist,
die Mehrzahl von drehbaren Abschirmwände (91) ringförmig entlang eines Außenumfangs der Trägerbasis (96) angeordnet sind,
der Kraftübertragungsmechanismus (86, 92) ein Kabel (92) aufweist, das durch die drehbaren Abschirmwände (91) hindurchgeht,
das Kabel (92) durch Kabeldurchlassabschnitte (95) hindurchgeht, die an einem inneren Ende jeder der drehbaren Abschirmwände (91) ausgebildet sind, wobei wenn ein Durchmesser der Ringform des Kabels (92) durch Festziehen des Kabels (92) verringert wird, die drehbaren Abschirmwände (91) jeweils rotieren, bis sie in Bezug auf die Oberfläche der Trägerbasis (96) aufrecht stehen und die Abschirmvorrichtung (90) in den geschlossenen Zustand bringen,
wobei die drehbaren Abschirmwände (91) durch Lösen des Kabels (92) in den vollständig geöffneten Zustand gebracht werden können, um den Durchmesser der Ringform des Kabels (92) zu vergrößern, so dass sich die drehbaren Abschirmwände (91) in radialer Richtung nach außen drehen, bis sie horizontal parallel zur Oberfläche der Trägerbasis (96) liegen.

2. Abschirmvorrichtung (90) nach Anspruch 1, wobei in einer Mitte der Trägerbasis (96) ein Gebläse (94) angeordnet ist.

3. Abschirmvorrichtung (90) nach Anspruch 2, wobei die drehbare Abschirmwand, die sich drehen kann, um den Umfang der Trägerbasis (96) herum angeordnet ist.

4. Abschirmvorrichtung (90) nach Anspruch 2, wobei eine Mehrzahl von Vorsprüngen durch nach hinten vorstehende Abschnitte der Trägerbasis (96) gebildet wird und eine Abdeckplatte an den hinteren Enden der Vorsprünge angebracht ist.

5. Abschirmvorrichtung (90) nach Anspruch 2, wobei die Trägerbasis (96) in Umfangsrichtung mit drehbaren Verbindungsabschnitten (98) ausgebildet ist, die den drehbaren Verbindungsabschnitten (98) der drehbaren Abschirmwände (91) entsprechen; und die jeweiligen drehbaren Verbindungsabschnitte (98) der drehbaren Abschirmwände (91) drehbar mit den drehbaren Verbindungsabschnitten (98) der Trägerbasis (96) verbunden sind.

6. Abschirmvorrichtung (90) nach Anspruch 2, wobei die Abschirmvorrichtung (90) eine Abdeckung (97), eine Kabelabdeckung (88), drehbare Abschirmwände (91), eine Trägerbasis (96), einen Kabeldrehkörper (86), eine Abdeckung (99) und einen Antriebsmotor (89) aufweist, wiederum beginnend von einer Rückseite; und eine Nut (85) in einem inneren Abschnitt der Trägerbasis (96) ausgebildet ist; die Nut (85) länglich in Umfangsrichtung ausgebildet ist; ein Ende des Kabels (92) über die Nut (85) mit dem Kabeldrehkörper (86) verbunden ist.

7. Abschirmvorrichtung (90) nach Anspruch 2, wobei der Kabeldrehkörper (86) aus einem Plattenmaterial gebildet ist, welches eine Scheibenform aufweist, und vor der Trägerbasis (96) angeordnet ist.

8. Kühlschrank (10), wobei der Kühlschrank (10) aufweist:

einen Gefrierkreislauf mit einem Kühler zum Kühlen von Luft, die durch Luftkanäle zu Lagerfächern zugeführt wird,
eine Kühlkammer, die mit einer Luftausblasöffnung ausgebildet ist, welche mit den Lagerfächern in Verbindung steht, wobei der Kühler in der Kühlkammer angeordnet ist,
ein Gebläse (94), das so konfiguriert ist, dass es Luft, die durch die Luftausblasöffnung zugeführt wird, zu den Lagerfächern bläst, und
die Abschirmvorrichtung (90) gemäß einem der Ansprüche 1 bis 7, welche die Luftkanäle zumindest teilweise verschließt.

Revendications

1. Dispositif de protection (90) pour un ventilateur (94) pour un réfrigérateur (10), dans lequel le dispositif de protection (90) est configuré pour fermer des passages d'air à travers lesquels de l'air froid est soufflé, le dispositif de protection (90) comprenant ;

une pluralité de parois de protection rotatives (91) disposées depuis l'extérieur dans la direction radiale entourant une base de support (96)

pour un ventilateur (94) et configurées pour tourner pour ouvrir et fermer les passages d'air, et

un mécanisme d'entraînement de paroi de protection (86, 89, 92) configuré pour entraîner les parois de protection rotatives (91) en rotation,

le mécanisme d'entraînement de paroi de protection (86, 89, 92) comprend une source d'entraînement (89) et un mécanisme de transmission de puissance (86, 92) pour transmettre de la puissance depuis la source d'entraînement (89) aux parois de protection rotatives (91),

la pluralité de parois de protection rotatives (91) sont disposées en une forme annulaire le long d'une circonférence externe de la base de support (96),

le mécanisme de transmission de puissance (86, 92) comprend un câble (92) passant à travers les parois de protection rotatives (91),

le câble (92) passe à travers des parties de passage traversant de câble (95) formées au niveau d'une extrémité intérieure de chacune des parois de protection rotatives (91),

lorsqu'un diamètre de la forme annulaire du câble (92) est réduit en serrant le câble (92), les parois de protection rotatives (91) tournent chacune jusqu'à se dresser par rapport à la surface de la base de support (96) et amènent le dispositif de protection (90) dans l'état fermé,

les parois de protection rotatives (91) peuvent être amenées dans l'état entièrement ouvert en desserrant le câble (92) pour agrandir le diamètre de la forme annulaire du câble (92) de telle sorte que les parois de protection rotatives (91) tournent vers l'extérieur dans la direction radiale jusqu'à se trouver horizontalement parallèles à la surface de la base de support (96).

2. Dispositif de protection (90) selon la revendication 1, dans lequel un ventilateur (94) est disposé au centre de la base de support (96).

3. Dispositif de protection (90) selon la revendication 2, dans lequel la paroi de protection rotative qui peut tourner, est disposée autour du périmètre de la base de support (96).

4. Dispositif de protection (90) selon la revendication 2, dans lequel une pluralité de saillies sont formées par des parties de la base de support (96) faisant saillie vers le côté arrière, et une plaque de recouvrement est montée au niveau des extrémités arrière des saillies.

5. Dispositif de protection (90) selon la revendication 2, dans lequel la base de support (96) est formée de manière circonférentielle avec des parties de liaison rotatives (98) correspondant aux parties de liaison rotatives (98) des parois de protection rotatives (91) ; et les parties de liaison rotatives respectives (98) des parois de protection rotatives (91) sont reliées de manière rotative aux parties de liaison rotatives (98) de la base de support (96).

6. Dispositif de protection (90) selon la revendication 2, dans lequel le dispositif de protection (90) comprend un couvercle (97), un couvercle de câble (88), des parois de protection rotatives (91), une base de support (96), un corps de rotation de câble (86), un couvercle (99) et un moteur d'entraînement (89), à leur tour en partant d'un côté arrière ; et une rainure (85) est formée dans une partie intérieure de la base de support (96) ; la rainure (85) est formée allongée dans la direction circonférentielle ; une extrémité du câble (92) est reliée au corps de rotation de câble (86) au moyen de la rainure (85).

7. Dispositif de protection (90) selon la revendication 2, dans lequel le corps de rotation de câble (86) est formé d'un matériau en plaque qui est en forme de disque, et est disposé devant la base de support (96).

8. Réfrigérateur (10), dans lequel le réfrigérateur (10) comprend ;

un circuit de congélation présentant un refroidisseur pour refroidir de l'air à fournir au moyen de passages d'air à des compartiments de stockage,

une chambre de refroidissement formée d'un évent de soufflage d'air communiquant avec les compartiments de stockage, le refroidisseur étant disposé dans la chambre de refroidissement,

un ventilateur (94) configuré pour souffler de l'air fourni au moyen de l'évent de soufflage d'air vers les compartiments de stockage, et

le dispositif de protection (90) selon l'une quelconque des revendications 1 à 7 fermant au moins partiellement les passages d'air.

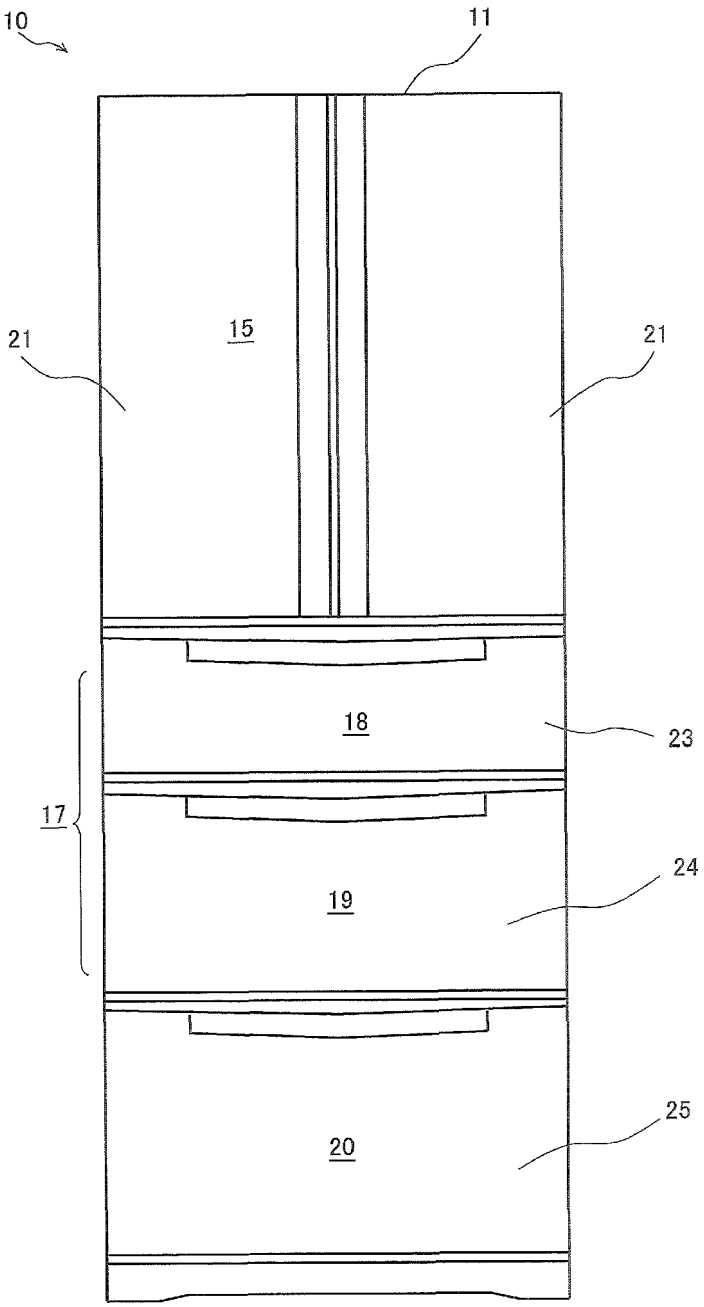

Fig. 1

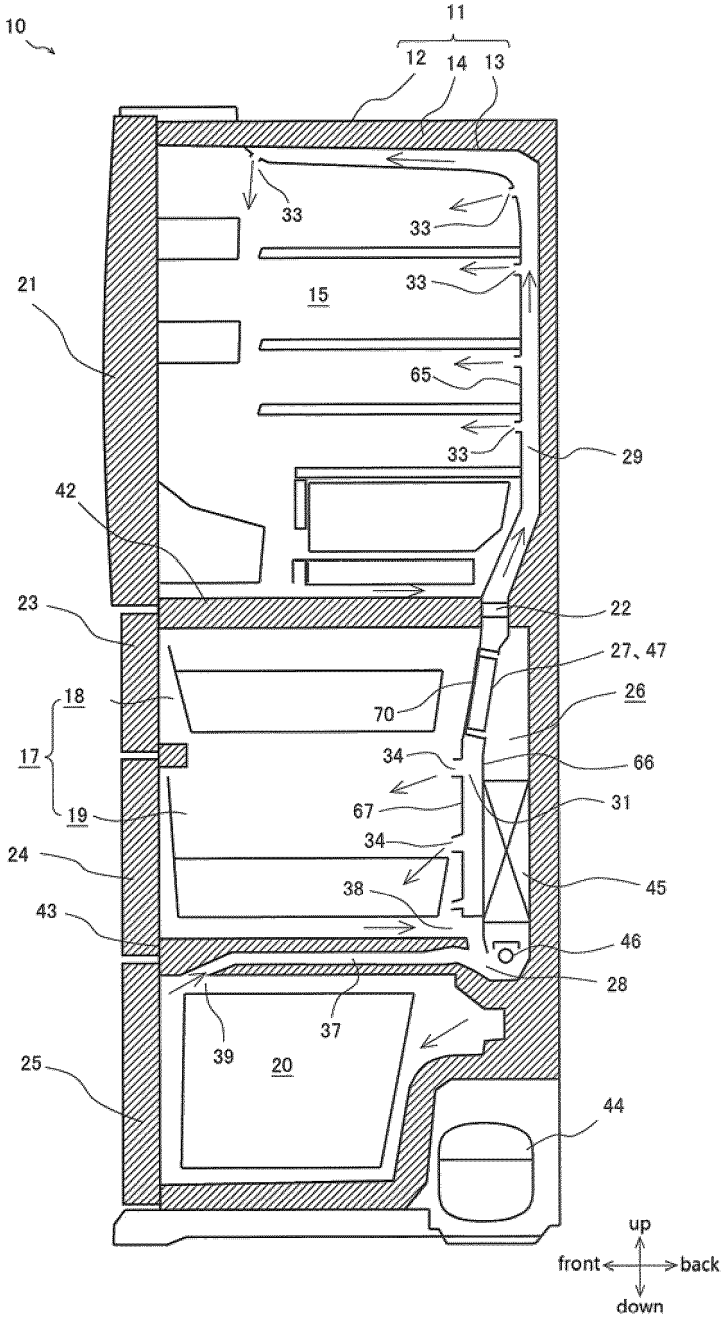
10
11
12
14
13
33
33
33
21
15
65
33
29
42
23
22
27、47
18
70
26
17
34
66
67
31
19
34
24
38
45
43
46
28
37
39
20
25
44
up
front
back
down

Fig. 2

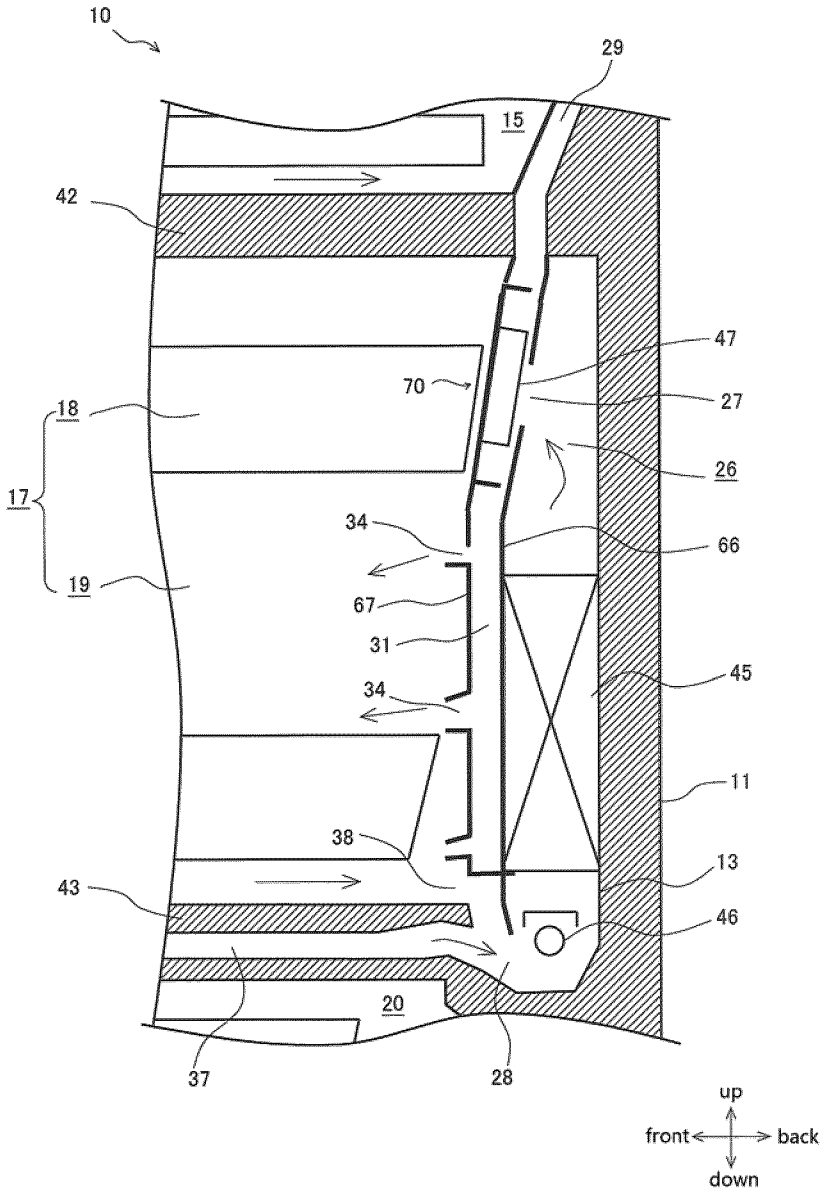
10
29
15
42
47
70
27
18
26
17
34
66
19
67
31
45
34
11
38
13
43
46
20
37
28
up
front
back
down

Fig. 3

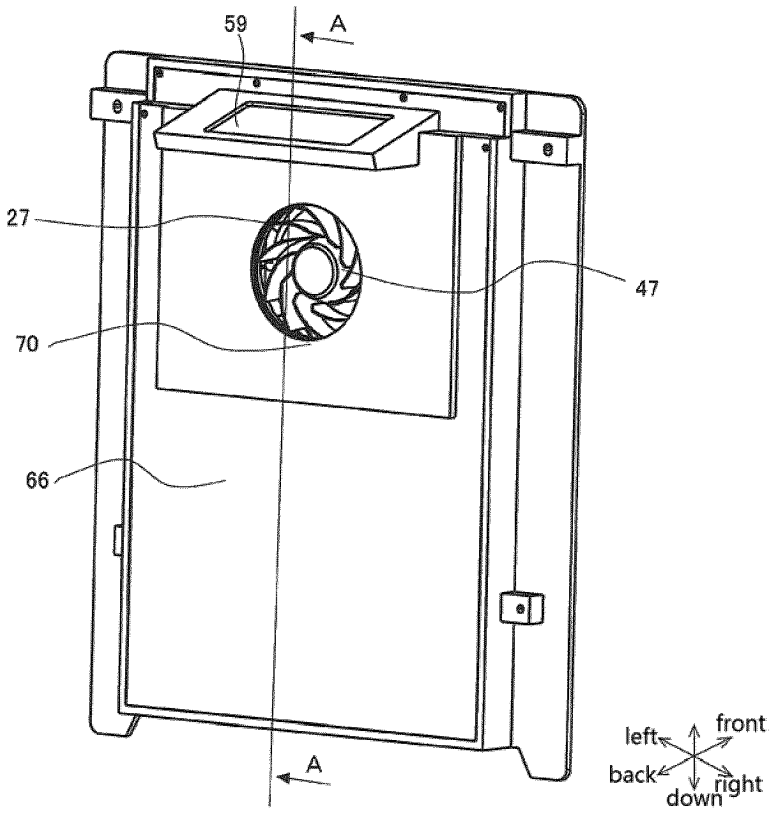
59
A
27
47
70
66
A
left
front
back
right
down

Fig. 4(A)

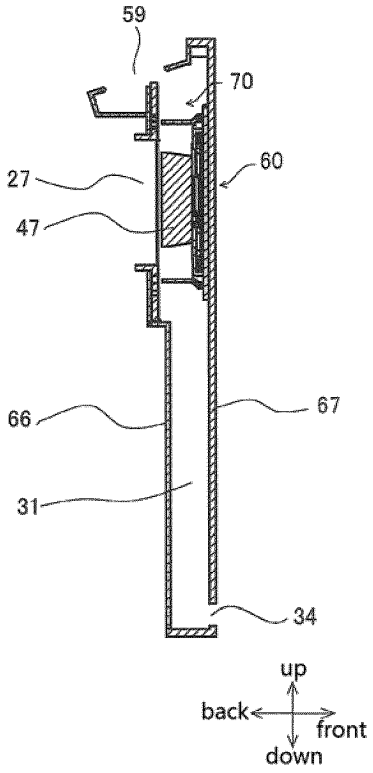
59
70
60
27
47
66
67
31
34
up
back
front
down

Fig. 4(B)

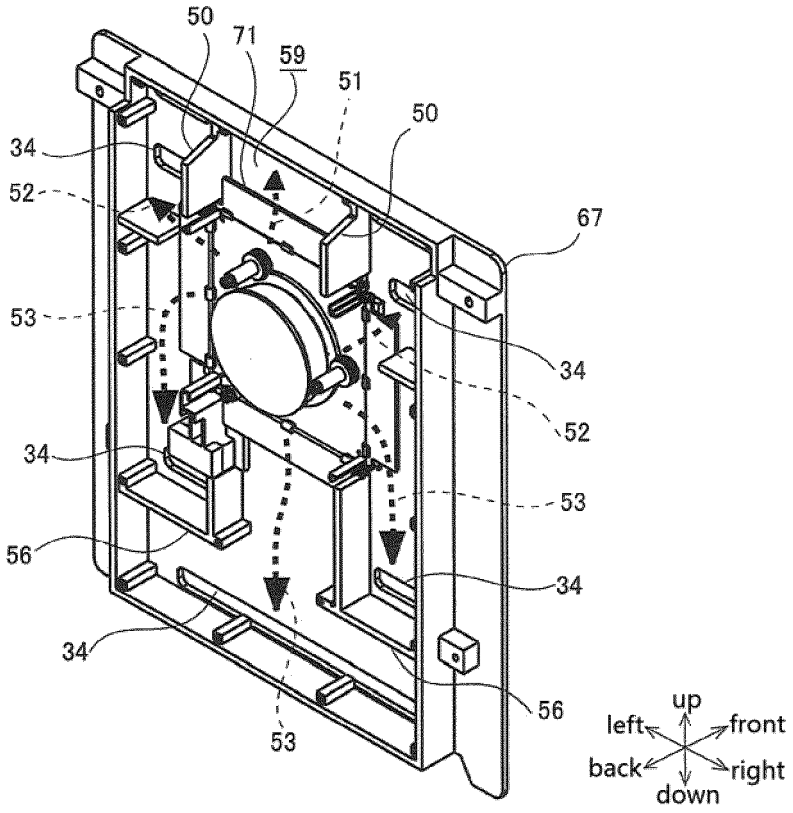
50
71
59
51
50
34
52
67
53
34
52
34
53
56
34
34
56
53
up
left
front
back
right
down

Fig. 4(C)

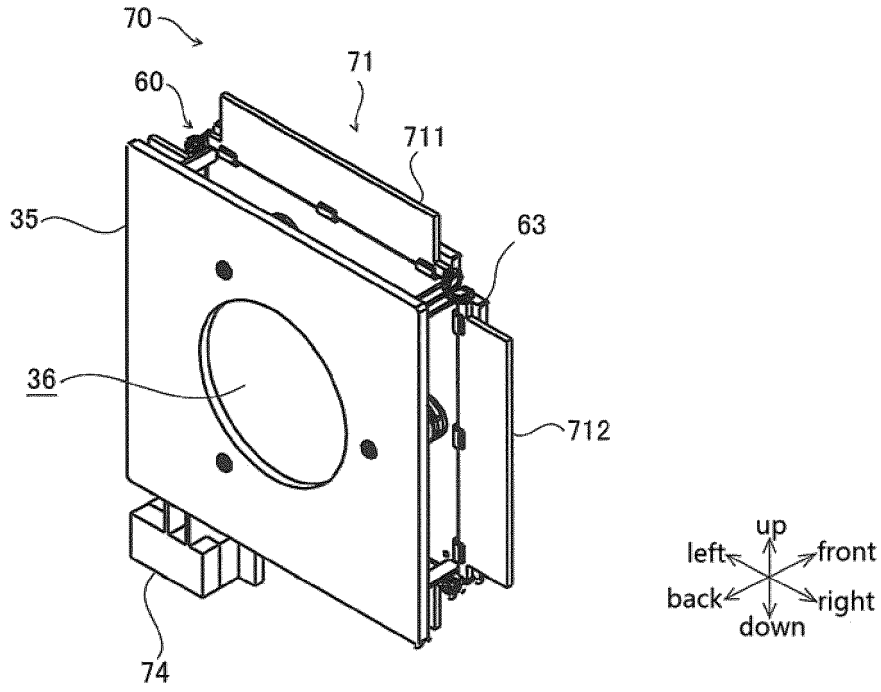
70
71
60
711
35
63
36
712
74
up
left
front
back
right
down

Fig. 5(A)

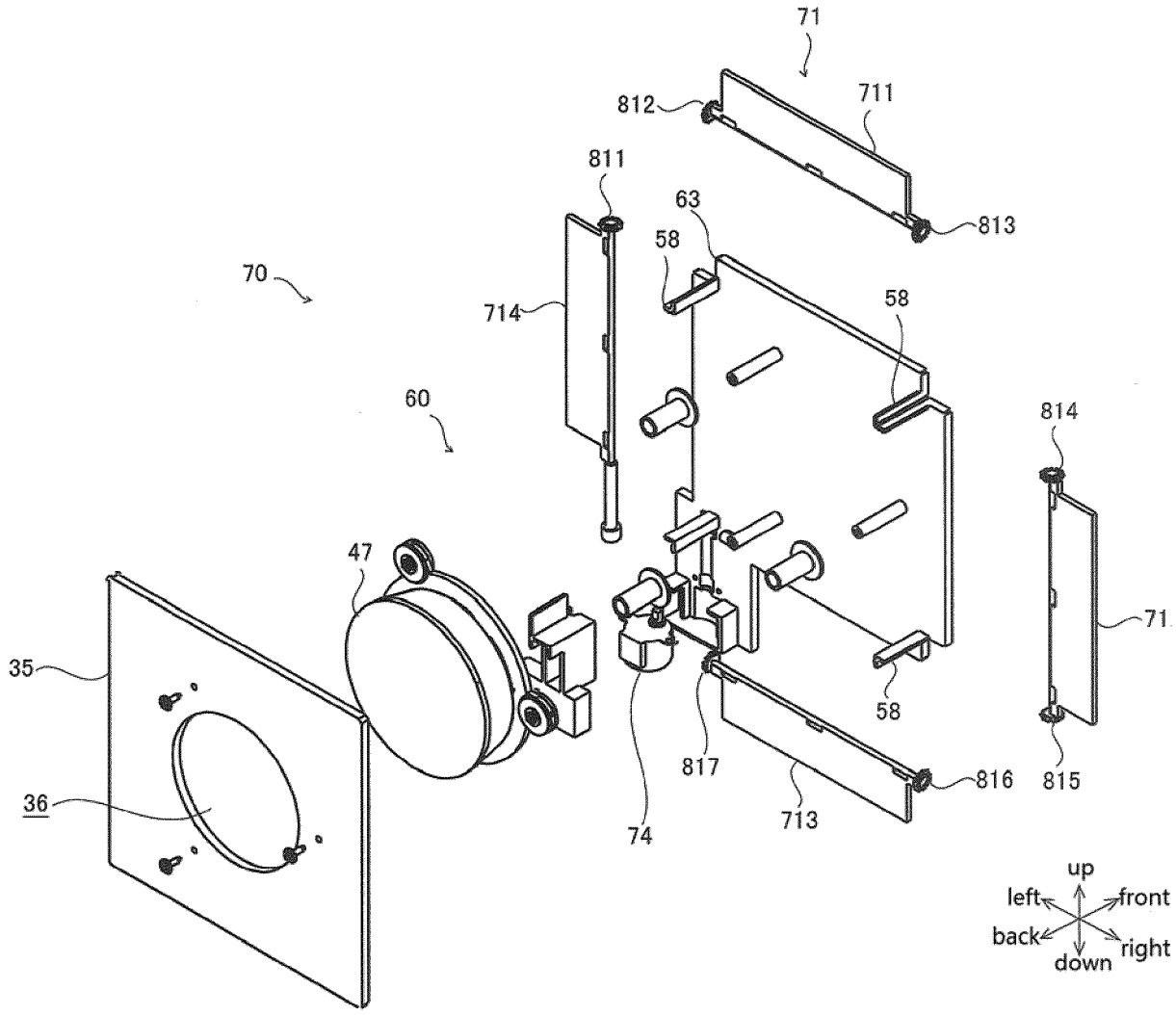
71
812
711
811
63
813
58
70
714
58
60
814
47
71
35
58
817
816
815
36
74
713
up
left
front
back
right
down

Fig. 5(B)

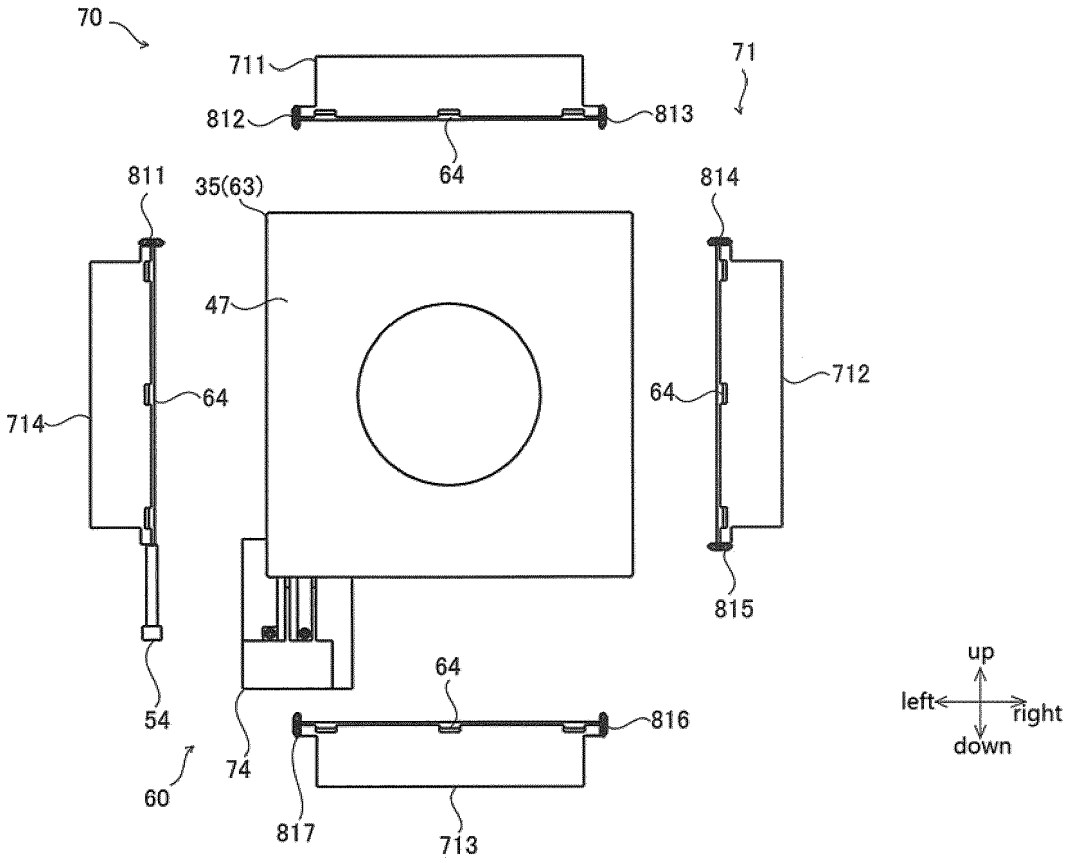
70
711
71
812
813
64
811
35(63)
814
47
64
712
714
64
54
64
816
74
60
817
713
815
up
left
right
down

Fig. 6(A)

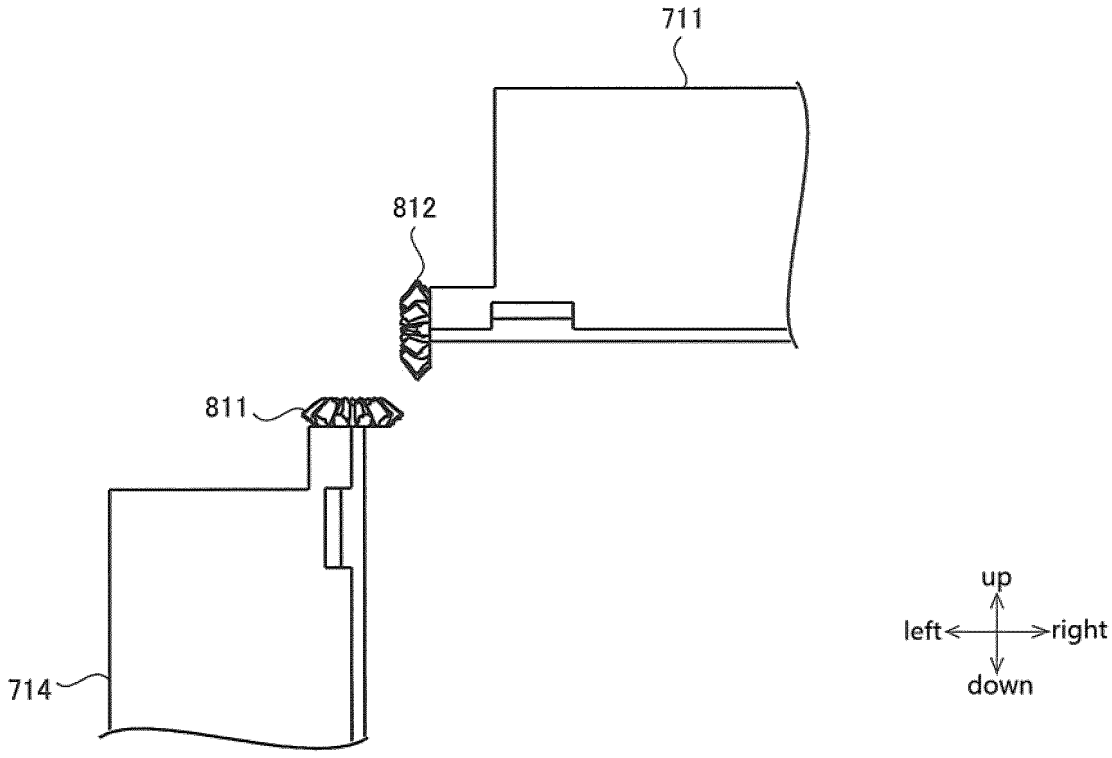
711
812
811
714
up
left
right
down

Fig. 6(B)

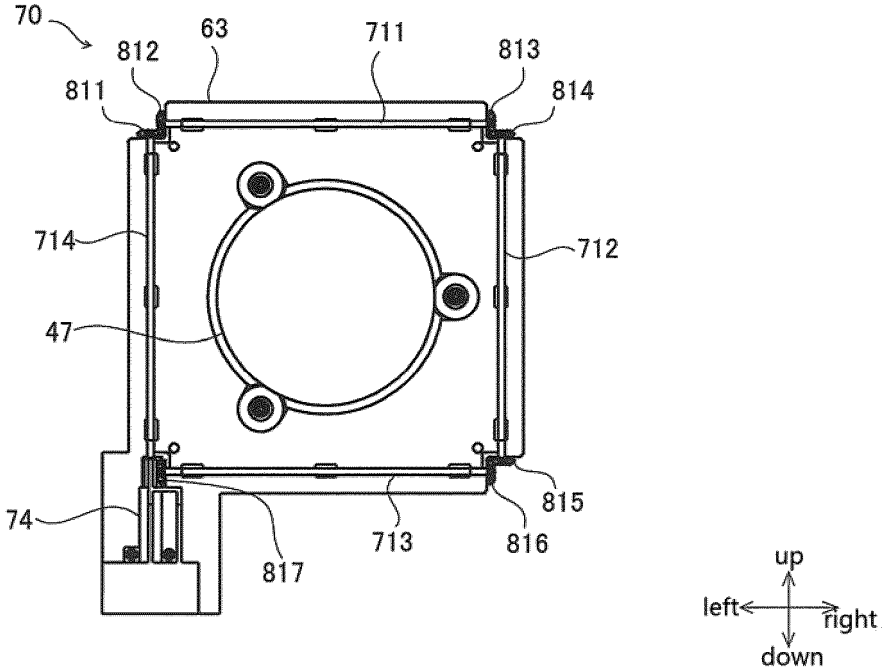
70
812
63
711
813
811
814
714
712
47
74
815
713
816
817
up
left
right
down

Fig. 7(A)

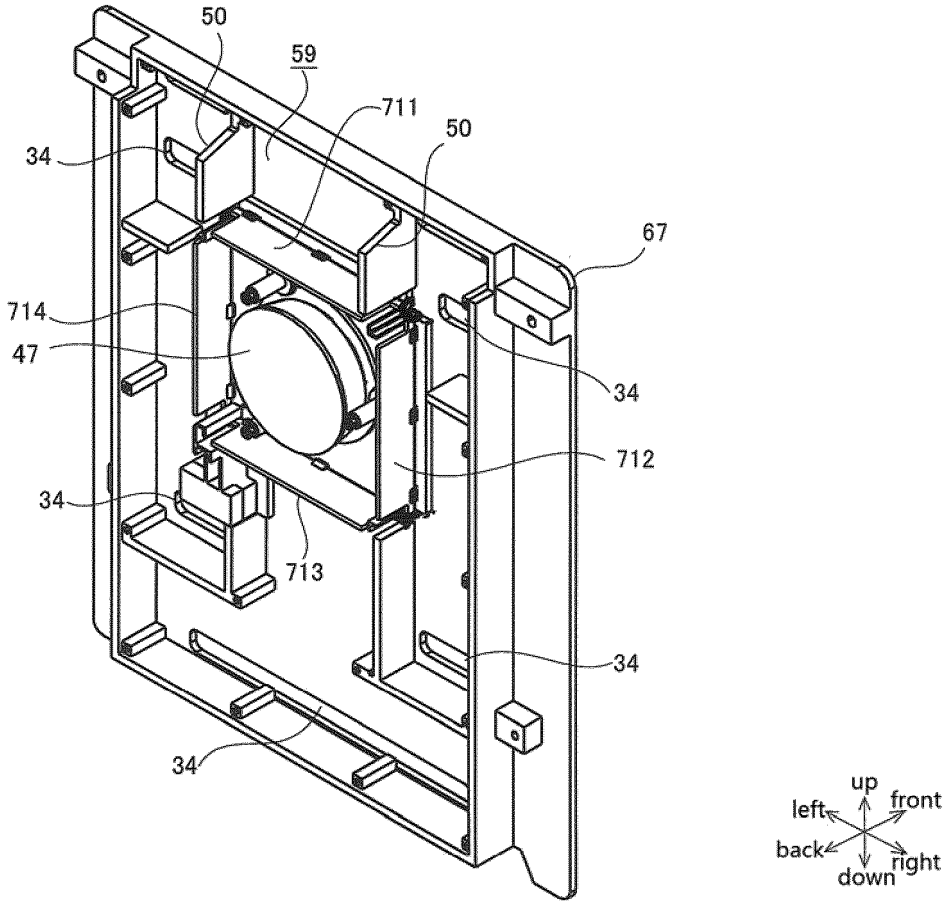
50
59
711
50
34
67
714
47
34
712
34
713
34
34
up
front
left
back
right
down

Fig. 7(B)

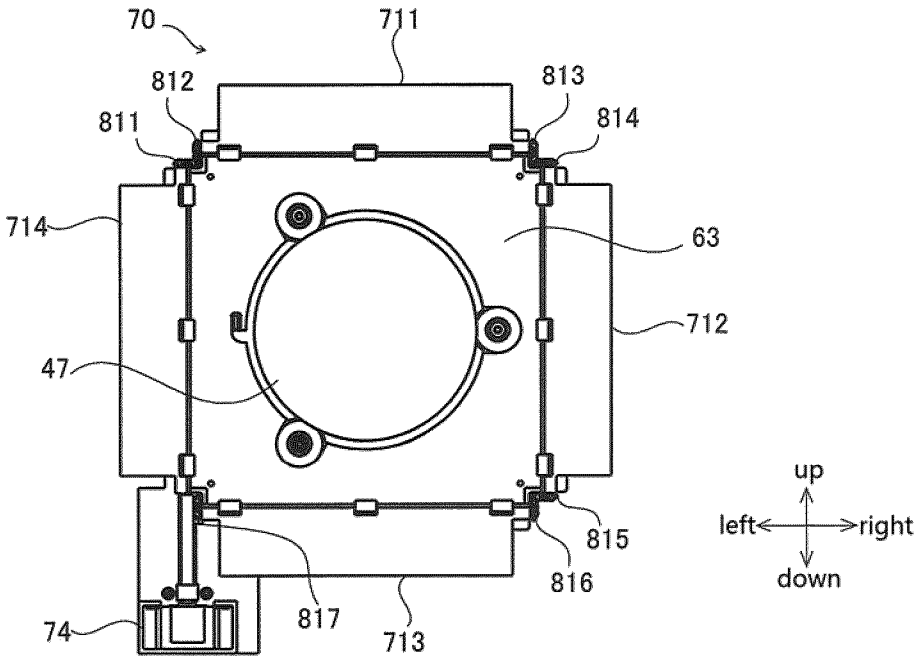
70
711
812
813
811
814
714
63
712
47
815
816
817
713
74
up
left
right
down

Fig. 8(A)

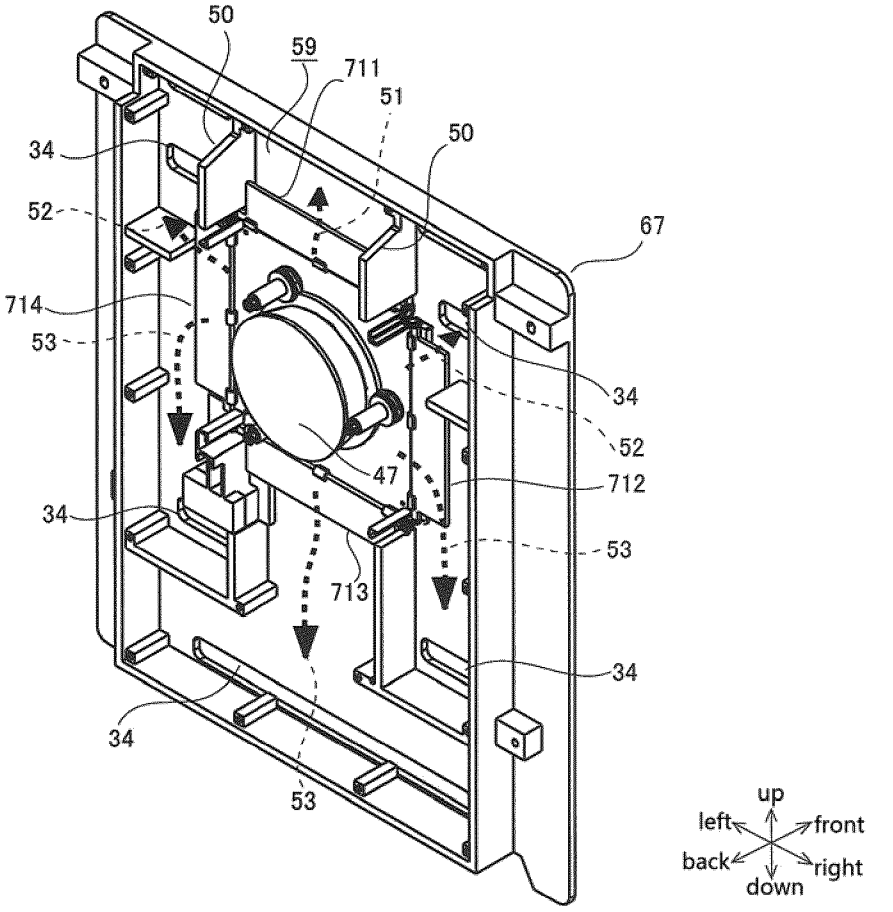
50
59
711
51
50
34
52
67
714
53
34
52
47
712
34
53
713
34
34
53
up
left
front
back
right
down

Fig. 8(B)

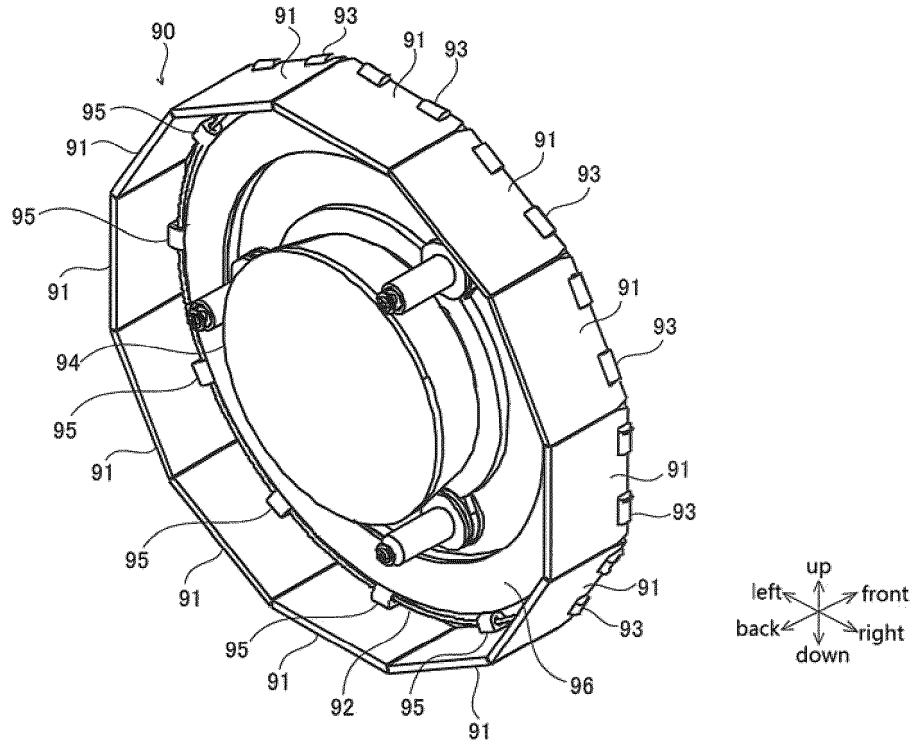
90
91
93
95
94
92
96
up
left
front
back
right
down

Fig. 9(A)

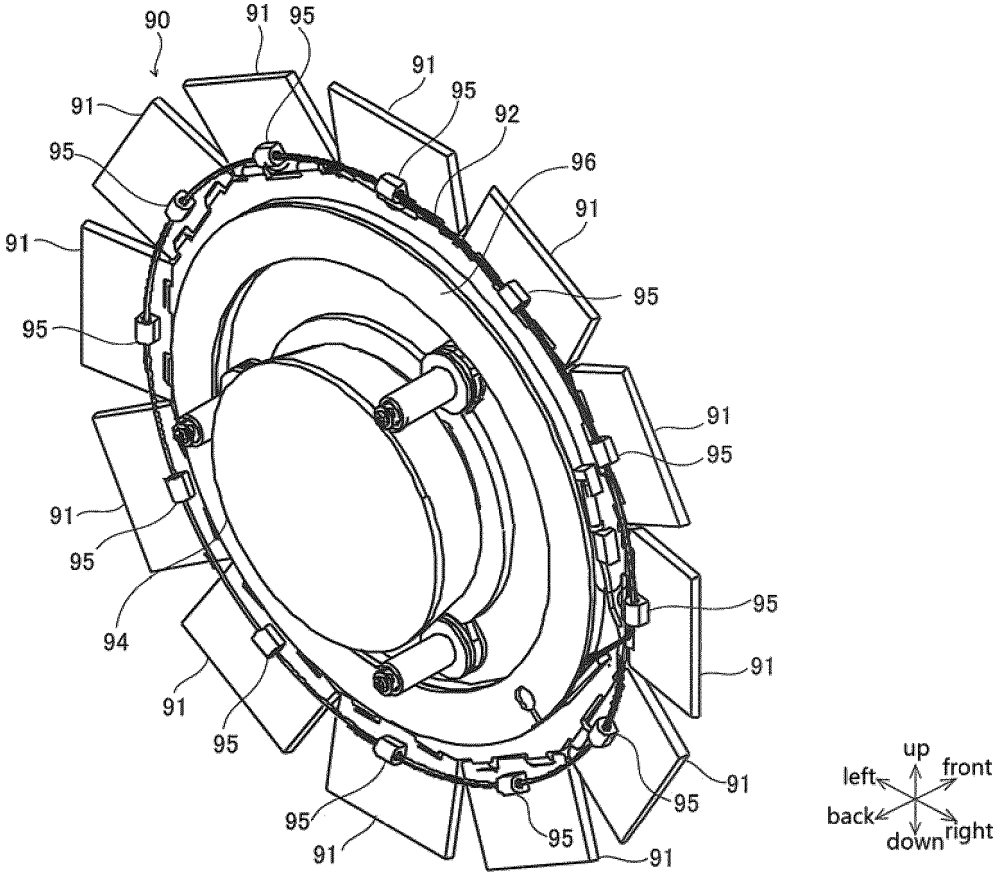
90
91
95
92
96
94
up
left
front
back
right
down

Fig. 9(B)

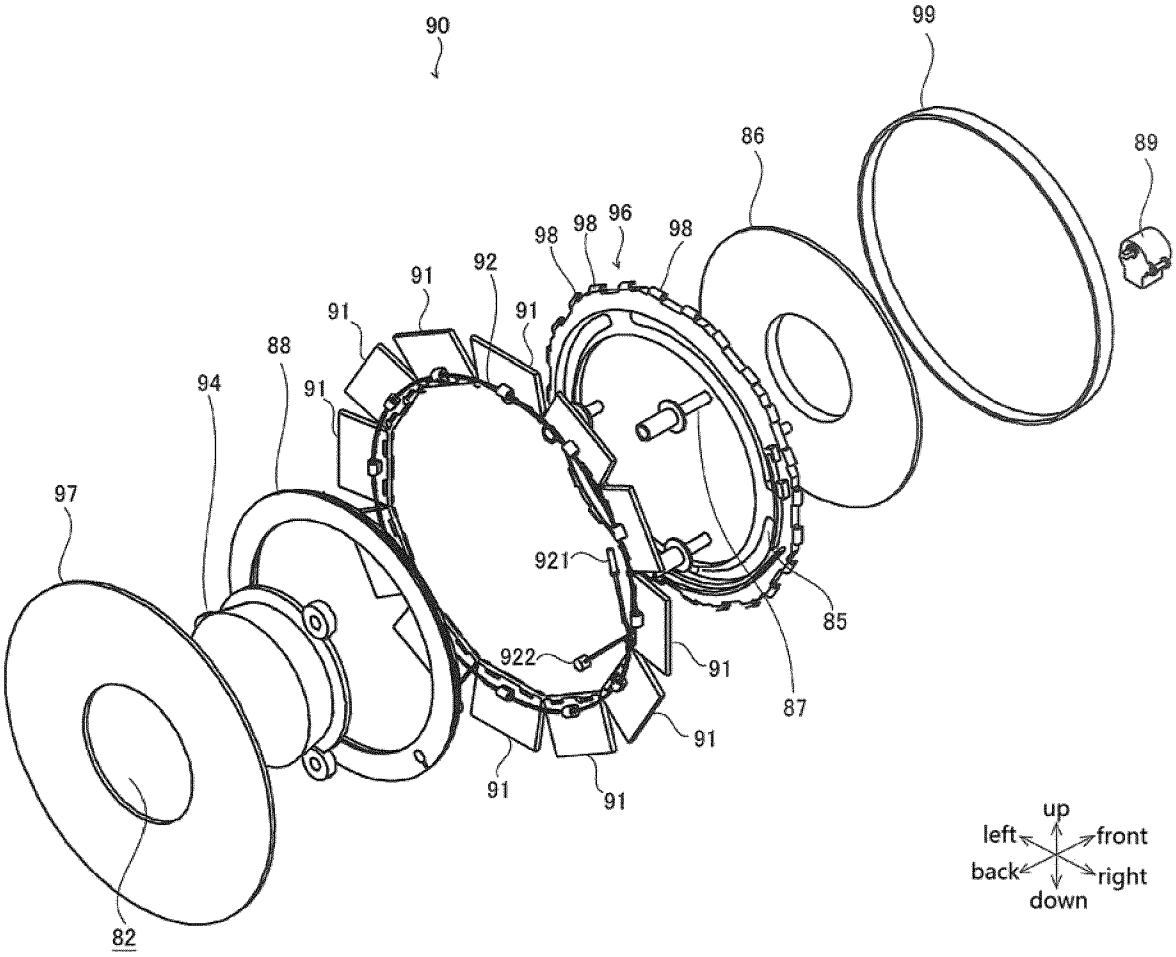
90
99
86
89
98
98
96
98
92
91
91
91
88
91
94
97
921
85
922
91
87
91
91
91
82
up
left
front
back
right
down

Fig. 10

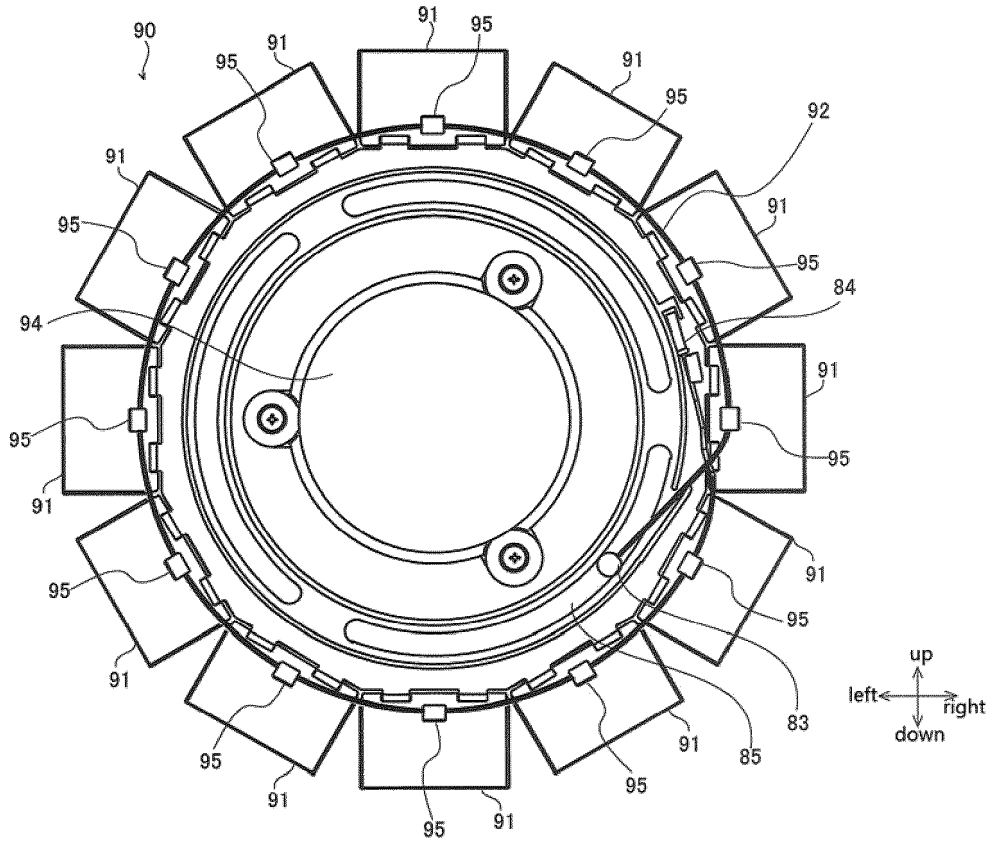

Fig. 11(A)

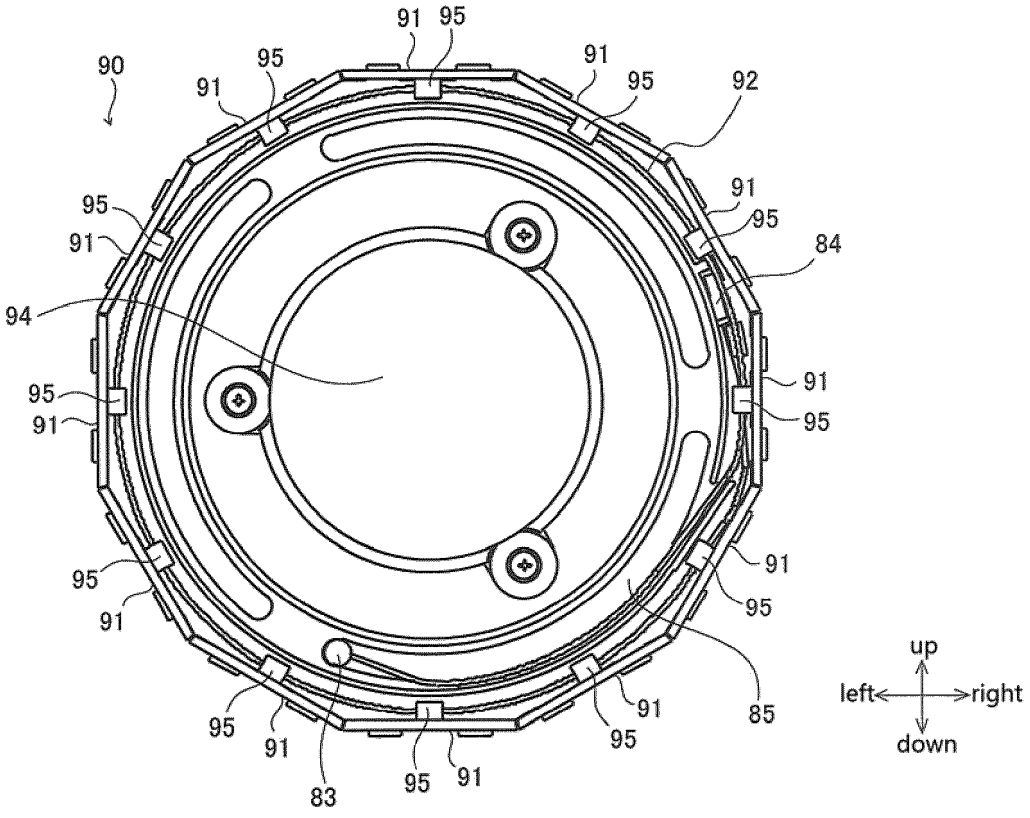

Fig. 11(B)

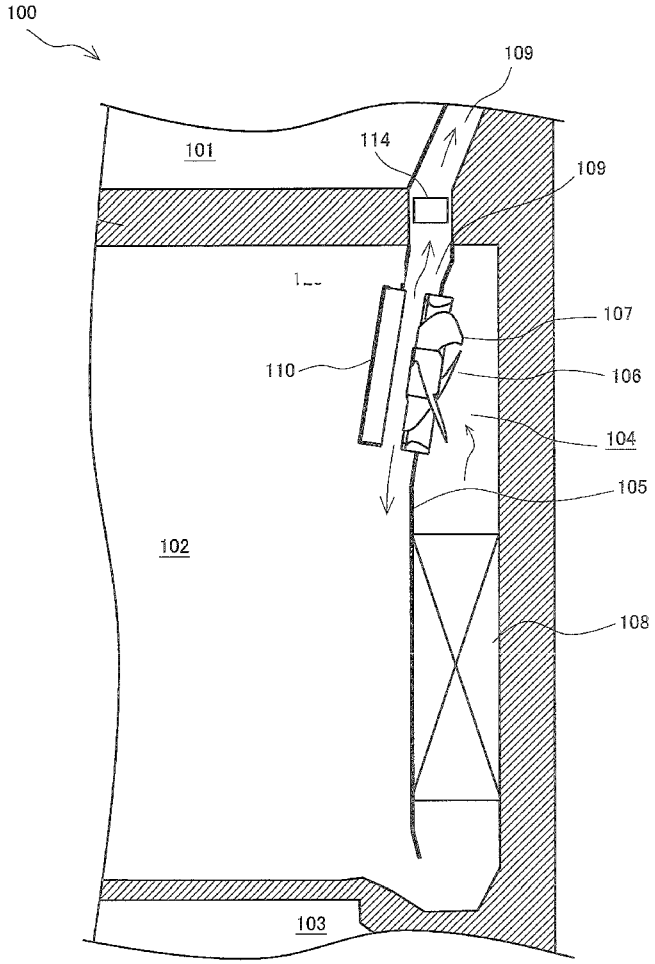
100
109
101
114
109
107
110
106
104
105
102
108
103

Fig. 12

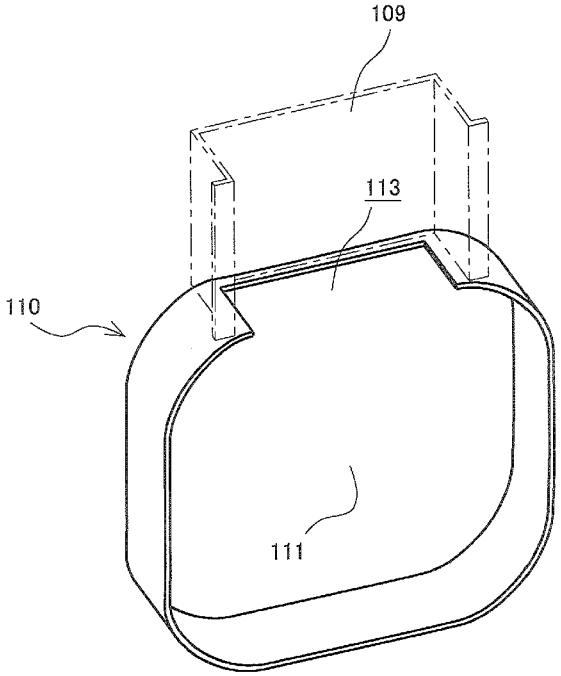
109
113
110
111

Fig. 13

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

- JP 2013002664 A **[0002]**
- CN 108759245 A **[0010]**
- WO 2018108139 A1 **[0011]**
- CN 108302874 A **[0011]**
- WO 2013143383 A1 **[0012]**
- JP 2007120802 A **[0013]**