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(71) Applicant: **Toshiba Carrier Corporation**
Kawasaki-Shi,
Kanagawa 212-8585 (JP)

(72) Inventor: **KAMATA, Kenji**
Fuji-shi, Shizuoka 416-8521 (JP)

(74) Representative: **Gramm, Lins & Partner**
Patent- und Rechtsanwälte PartGmbB
Frankfurter Straße 3 C
38122 Braunschweig (DE)

(54) **INDOOR UNIT FOR AIR CONDITIONER**

(57) An indoor unit for air conditioner according to the present embodiment includes: a cross flow fan that forms an air flow of suctioning indoor air from an air inlet port and blowing out the air from an air outlet port; a fan motor that drives the cross flow fan; a holding case that holds the fan motor therein; a fitting portion to which the holding case holding the fan motor therein is fitted; a vibration damping member that is accommodated inside the holding case along with the fan motor and absorbs vibration generated when the fan motor is driven; and a compressing section that compresses the vibration damping member inside the holding case with the holding case holding the fan motor therein being fitted to the fitting portion.

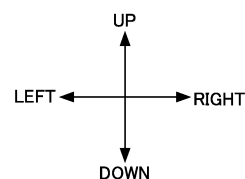
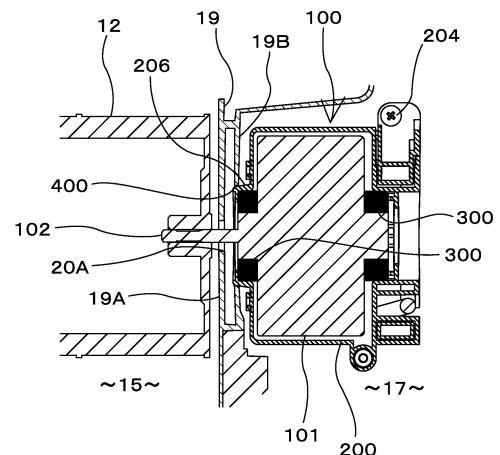


Fig.2

EP 3 988 848 A1

Description

Technical Field

[0001] An embodiment of the present invention relates to an indoor unit for air conditioner.

Background Art

[0002] As disclosed in Patent Literature 1, for example, an indoor unit for air conditioner configured such that a cross flow fan for forming an air flow is driven by a fan motor is adapted to hold the fan motor inside a holding case, incorporate the holding case inside the indoor unit, and fix a portion of the holding case on an opposite side of a motor shaft through screwing, for example. With this configuration, it is possible to easily perform an operation of attaching the fan motor to the inside of the indoor unit and to improve manufacturability of the indoor unit. In addition, it is also possible to easily perform an operation of detaching the fan motor from the inside of the indoor unit and to improve maintenance properties of the indoor unit.

Citation List

Patent Literature

[0003] Patent Literature 1: Japanese Patent Laid-Open No. 2012-

Summary of Invention

Technical Problem

[0004] However, although the fan motor is strongly fixed at the portion of the holding case on the opposite side of the motor shaft, the fan motor is not sufficiently fixed at a portion of the holding case on the side of the motor shaft in the configuration in the related art. There is thus a concern that vibration generated when the fan motor is driven cannot sufficiently be absorbed, and there is also a concern that noise generated due to the vibration of the fan motor cannot sufficiently be curbed.

[0005] Thus, the present embodiment provides an indoor unit for air conditioner capable of sufficiently curbing vibration and noise generated when a fan motor is driven.

Solution to Problem

[0006] An indoor unit for air conditioner according to the present embodiment includes: a cross flow fan that forms an air flow of suctioning indoor air from an air inlet port and blowing out the air from an air outlet port; a fan motor that drives the cross flow fan; a holding case that holds the fan motor therein; a fitting portion to which the holding case holding the fan motor therein is fitted; a vibration damping member that is accommodated inside

the holding case along with the fan motor and absorbs vibration generated when the fan motor is driven; and a compressing section that compresses the vibration damping member inside the holding case with the holding case holding the fan motor therein being fitted to the fitting portion.

Brief Description of Drawings

[0007]

[Figure 1] Figure 1 is a front view schematically illustrating a configuration example of inside of an indoor unit for air conditioner according to the present embodiment.

[Figure 2] Figure 2 is an enlarged view schematically illustrating a configuration example of a fan motor and a surrounding part thereof according to the present embodiment and illustrating an exemplary state in which the fan motor has been attached.

[Figure 3] Figure 3 is a perspective view schematically illustrating a configuration example of the fan motor according to the present embodiment.

[Figure 4] Figure 4 is an enlarged view schematically illustrating a configuration example of the fan motor and the surrounding part thereof according to the present embodiment and illustrating an exemplary state in which the fan motor has been detached.

Description of Embodiment

[0008] Hereinafter, an embodiment according to an indoor unit for air conditioner will be described with reference to the drawings. An indoor unit 10 for air conditioner illustrated as an example in Figure 1 constitutes an air conditioner along with an outdoor unit provided outdoor, which is not illustrated. The indoor unit 10 includes a cross flow fan 12 and the like inside a rectangular indoor unit main body section 11 constituting an outline thereof. An air inlet port 13 is provided at an upper portion of the indoor unit main body section 11, and an air outlet port 14 is provided at a lower portion of the indoor unit main body section 11. Also, a blowing passage 15 is provided inside the indoor unit main body section 11 from the air inlet port 13 to the air outlet port 14. An air filter, which is not illustrated, a heat exchanger, which is not illustrated, the cross flow fan 12, a louver 16, and the like are provided inside the blowing passage 15 from an upstream side, which is a side of the air inlet port 13, toward a downstream side, which is a side of the air outlet port 14.

[0009] The air filter captures foreign matters included in air suctioned from the air inlet port 13. The heat exchanger performs heat exchange with the air suctioned from the air inlet port 13 and heats or cools the air. The cross flow fan 12 forms an air flow of suctioning indoor air from the air inlet port 13 and blowing out the air from the air outlet port 14 through the blowing passage 15. The louver 16 adjusts a direction of the air blown out from

the air outlet port 14.

[0010] Also, a fan motor 100 for driving the cross flow fan 12 is included inside the indoor unit main body section 11. In this case, the fan motor 100 is included inside a machine chamber 17 provided on the right side of the blowing passage 15 when seen from the front side of the indoor unit 10, inside the indoor unit main body section 11.

[0011] Next, a configuration example of the fan motor 100 will be described in detail. As illustrated as an example in Figure 2 as well, the fan motor 100 includes a substantially columnar-shaped motor main body section 101 and a motor shaft 102. A stator and a rotor, which are not illustrated, are accommodated inside the motor main body section 101. The motor main body section 101 has a known configuration in which a columnar-shaped rotor is rotatably included inside the annular-shaped stator. The motor shaft 102 is included to rotate integrally with the rotor as a rotation center shaft of the rotor. The motor shaft 102 is configured to project from one end surface of the fan motor 100 in an axial direction, in this case, the end surface on the left side when seen from the front side of the indoor unit 10 but not to project from the other end surface of the fan motor 100 in the axial direction, in this case, the end surface on the right side when seen from the front side of the indoor unit 10.

[0012] Also, as illustrated as an example in Figure 3, the fan motor 100 is adapted to be incorporated inside the machine chamber 17 in a state in which the fan motor 100 is held inside a holding case 200. The entire holding case 200 is made of a resin material, for example. The holding case 200 has substantially a circular shape and accommodates the entire motor main body section 101 of the fan motor 100. The holding case 200 is formed by a combination of a plurality of, in this case, two case forming members 201A and 201B.

[0013] At a part of the holding case 200 on one end side in the axial direction, in this case, the part on the left side when seen from the front side of the indoor unit 10, a locking projection 202A provided at the case forming member 201A is locked at a locking frame portion 202B provided at the case forming member 201B. In this manner, a state in which the case forming member 201A and the case forming member 201B are assembled is maintained.

[0014] Also, at a part of the holding case 200 on the other end side in the axial direction, in this case, the part on the right side when seen from the front side of the indoor unit 10, a screw hole portion 203A provided at the case forming member 201A and a screw hole portion 203B provided at the case forming member 201B are fastened together with a screw 204. In this manner, the state in which the case forming member 201A and the case forming member 201B are assembled is maintained.

[0015] Also, a plurality of window portions 205 are provided in a circumferential surface of the holding case 200. In this case, the window portions 205 are hole portions

opened in a rectangular shape. Note that this can be implemented with the shape, the size, the number, and the like of the window portions 205 appropriately changed. The window portions 205 are in a state in which a side circumferential surface of the motor main body section 101 of the fan motor 100 is exposed therefrom. Therefore, the holding case 200 can discharge heat generated from the fan motor 100, particularly from the motor main body section 101 at the time of driving to outside through the window portions 205. Thus, the heat generated from the fan motor 100 is unlikely to be held inside the holding case 200.

[0016] Also, a compressing section 206 is provided at a center location of one end surface of the holding case 200 in the axial direction, in this case, the end surface on the left side when seen from the front side of the indoor unit 10. The compressing section 206 is included integrally with the one end surface of the holding case 200 in the axial direction and projects in substantially a circular shape from the one end surface of the holding case 200 in the axial direction toward the left side. Also, the compressing section 206 has a plurality of, in this case, four slits 206a in an outer edge portion thereof. In this case, the plurality of slits 206a are disposed at equal intervals at the outer edge portion of the compressing section 206.

[0017] The compressing section 206a has a plurality of, in this case, four compressing piece portions 206b between the slits 206a by having the plurality of slits 206a. The plurality of compressing piece portions 206b can be elastically deformed inward in the radial direction of the compressing section 206 in response to an application of external force. Also, pressing portions 206c for pressing vibration damping rubbers 300, which will be described later, are provided at distal end portions of the plurality of compressing piece portions 206b. The plurality of pressing portions 206c are disposed in an annular shape around the motor shaft 102.

[0018] Also, the vibration damping rubbers 300 are accommodated inside the holding case 200 along with the motor main body section 101 of the fan motor 100. The vibration damping rubbers 300 are an example of the vibration damping member, and in this case, the vibration damping rubbers 300 are accommodated inside the compressing section 206 of the holding case 200. The vibration damping rubbers 300 have an annular shape and are disposed inside the compressing section 206 to surround the motor shaft 102 of the fan motor 100. The vibration damping rubbers 300 mainly have a function of absorbing vibration generated when the fan motor is driven.

[0019] Note that the vibration damping rubbers 300 are accommodated not only on the side of the motor shaft 102 but also on the opposite side of the motor shaft 102 inside the motor case 200. In this case, the vibration damping rubbers 300 on the opposite side of the motor shaft 102 are formed of the same material as that of the vibration damping rubbers 300 on the side of the motor

shaft 102 and are formed into the same size, the same shape, and the same thickness. However, the vibration damping rubbers 300 on the opposite side of the motor shaft 102 may be formed of a different material from that of the vibration damping rubbers 300 on the side of the motor shaft 102 or may be formed into a different size, a different shape, and a different thickness.

[0020] Also, as illustrated as an example in Figure 2, a partitioning wall section 19 that partitions the blowing passage 15 and the machine chamber 17 is provided inside the indoor unit main body section 11. The partitioning wall section 19 is a wall section of multiple layers, in this case, double layers, and includes a blowing passage-side wall section 19A and a machine chamber-side wall section 19B. The blowing passage-side wall section 19A is provided with a shaft insertion hole 20A opened in a circular shape. The motor shaft 102 of the fan motor 100 is inserted into the shaft insertion hole 20A from the side of the machine chamber 17 toward the side of the blowing passage 15. Then, a distal end portion of the motor shaft 102 of the fan motor 100 inserted into the shaft insertion hole 20A is coupled to the cross flow fan 12 inside the blowing passage 15. In this manner, the fan motor 100 is configured to be able to rotate the cross flow fan 12 via the motor shaft 102.

[0021] On the other hand, the machine chamber-side wall section 19B is provided with a fitting hole portion 400 opened in a circular shape. The fitting hole portion 400 is an example of the fitting portion. An opening diameter of the fitting hole portion 400 is larger than an opening diameter of the shaft insertion hole 20A. Also, the axial center of the fitting hole portion 400 is configured to conform to the axial center of the shaft insertion hole 20A. The compressing section 206 of the holding case 200 holding the motor main body section 101 of the fan motor 100 therein is fitted into the fitting hole portion 400.

[0022] Here, as illustrated as an example in Figure 4, a size DA, that is, a diameter dimension DA of the fitting hole portion 400 is slightly smaller than a size DB of the compressing section 206 in a natural state in which the compressing section 206 is not fitted into the fitting hole portion 400, in other words, the size DB, that is, the diameter dimension DB of the compressing section 206 in a state in which the plurality of compressing piece portions 206b are not elastically deformed. In this case, the size DA of the fitting hole portion 400 is at least slightly smaller than the size DB of the distal end portion of the compressing section 206 in the natural state. Note that it is only necessary for the size DA of the fitting hole portion 400 to be smaller than the diameter dimension of any site between the distal end portion and the proximal end portion of the compressing section 206 in the natural state.

[0023] With the aforementioned configuration, the plurality of compressing piece portions 206b are pressed against an inner circumferential surface of the fitting hole portion 400, and the compressing piece portions 206b are elastically deformed inward in the radial direction,

with the compressing section 206 of the holding case 200 being fitted into the fitting hole portion 400. In this manner, the vibration damping rubbers 300 inside the compressing section 206 are pressed and compressed by the plurality of compressing piece portions 206b.

[0024] Also, a side circumferential surface of the compressing section 206, that is, side surfaces of the plurality of compressing piece portions 206b have a tapered shape that gradually becomes thinner toward the side of the fitting hole portion 400, that is, from the proximal end portion toward the distal end portion. Therefore, the plurality of compressing piece portions 206b are further elastically deformed inward in the radial direction with the compressing section 206 being fitted into the fitting hole portion 400, and it is thus possible to further enhance compression strength of the vibration damping rubbers 300.

[0025] According to the indoor unit 10 for air conditioner in the present embodiment, it is possible to compress the vibration damping rubbers 300 inside the compressing section 206 of the holding case 200 with the elastically deforming compressing section 206 with the compressing section 206 of the holding case 200 holding the motor main body section 101 of the fan motor 100 therein being fitted into the fitting hole portion 400. With this configuration, it is possible to enhance fixing strength on the side of the motor shaft 102 of the fan motor 100 with the compressed vibration damping rubbers 300. Therefore, according to the indoor unit 10, it is possible to sufficiently fix the fan motor 100 not only at a part on the opposite side of the motor shaft 102 fixed with the screw 204 but also at a part of the holding case 200 on the side of the motor shaft 102 and to sufficiently curb vibration and noise generated when the fan motor 100 is driven, as compared with the configuration in the related art.

[0026] Also, according to the indoor unit 10, the compressing section 206 is included integrally with the holding case 200. With this configuration, it is possible to fit the compressing section 206 into the fitting hole portion 400 at the same time with the attachment of the holding case 200 holding the motor main body section 101 of the fan motor 100 therein to the inside of the indoor unit main body section 11. Therefore, it is possible to easily perform the operation of attaching the fan motor 100 to the inside of the indoor unit main body section 11 and thus to improve manufacturability of the indoor unit 10.

[0027] Also, according to the indoor unit 10, the compressing section 206 has the plurality of slits 206a. With this configuration, it is possible to easily cause the compressing section 206 to be elastically deformed when the compressing section 206 is fitted into the fitting hole portion 400 and to further efficiently perform the compression of the vibration damping rubbers 300.

[0028] Also, according to the indoor unit 10, the plurality of slits 206a are disposed at equal intervals at the outer edge portion of the compressing section 206. With this configuration, it is possible to uniformly perform the compression of the vibration damping rubbers 300 with

the compressing section 206 from the outer circumferential portions of the vibration damping rubbers 300 and to perform absorption of vibration through the vibration damping rubbers 300 in an unbiased manner.

[0029] Also, according to the indoor unit 10, the side circumferential surface of the compressing section 206, that is, the surface abutting on the inner circumferential surface of the fitting hole portion 400 when the fan motor 100 is assembled has a tapered shape that gradually becomes thinner toward the side of the fitting hole portion 400. With this configuration, it is possible to enhance compression strength of the vibration damping rubbers 300 with the compressing section 206 and to further reliably perform the compression of the vibration damping rubbers 300 by the compressing section 206 being fitted into the fitting hole portion 400.

[0030] Also, according to the indoor unit 10, the size of the fitting hole portion 400 is slightly smaller than the size of the compressing section 206 in the natural state in which the compressing section 206 is not fitted into the fitting hole portion 400. With this configuration, it is possible to enhance compression strength of the vibration damping rubbers 300 with the compressing section 206 and to further reliably perform the compression of the vibration damping rubbers 300 by the compressing section 206 being fitted into the fitting hole portion 400.

[0031] Note that the present embodiment is not limited to the aforementioned embodiment and can be variously modified or expanded without departing from the gist thereof. For example, the vibration damping member is not limited to the vibration damping rubbers configured of a rubber material, and various materials can be applied as long as the materials have a characteristic of absorbing vibration.

[0032] For example, it is only necessary for the compression of the vibration damping rubbers 300 to be achieved by about 1 mm in a case in which the diameter of the vibration damping rubbers 300 is 42 mm, for example. In this case, the compression rate of the vibration damping rubbers 300 is 1 mm/42 mm, which is about 2%. Also, the compression rate of the vibration damping rubbers 300 can be set in some range, and for example, the compression rate is preferably set between about 1% to about 3%. In order to realize such a compression rate, it is only necessary to set a configuration of each component, such as the size and the shape of the compressing section 206, the number and the interval of the slits 206a, the number, the shape, the size, and the disposition position of the compressing piece portions 206b, the size and the shape of the fitting hole portion 400, and the size and the shape of the vibration damping rubbers 300, for example.

[0033] Also, the number of slits 206a provided at the compressing section 206 can be appropriately changed, and may be three or less, or may be a plural number such as five or more. Also, the intervals of the slits 206a may not be equal intervals, and a configuration in which intervals of the plurality of slits 206a are not uniform may also

be employed. Moreover, the holding case 200 may be configured of a metal material, for example, at least as long as the compressing section 206 can be configured to be elastically deformable.

[0034] Also, the compressing section 206 is not limited to the circular shape and can be implemented with the shape appropriately changed to, for example, a triangular shape, a quadrangular shape, an oval shape, or a polygonal shape. Also, the fitting hole portion 400 is not limited to the circular shape and can be implemented with the shape appropriately changed to, for example, a triangular shape, a quadrangular shape, an oval shape, or a polygonal shape. In addition, the shapes of the compressing section 206 and the fitting hole portion 400 are not necessarily the same and may be different. Thus, a configuration in which a quadrangular compressing section 206 is fitted into a circular fitting hole portion 400, for example, may be employed.

[0035] Note that the present embodiment has been presented as an example and is not intended to limit the scope of the invention. The novel embodiment can be implemented in other various forms, and various omissions, replacements, and modifications can be made without departing from the gist of the invention. The present embodiment and modifications thereof are included in the scope and the gist of the invention and are also included in the invention described in the claims and a scope equivalent thereto.

Claims

1. An indoor unit for air conditioner comprising:

a cross flow fan that forms an air flow of suctioning indoor air from an air inlet port and blowing out the air from an air outlet port;
a fan motor that drives the cross flow fan;
a holding case that holds the fan motor therein;
a fitting portion to which the holding case holding the fan motor therein is fitted;
a vibration damping member that is accommodated inside the holding case along with the fan motor and absorbs vibration generated when the fan motor is driven; and
a compressing section that compresses the vibration damping member inside the holding case with the holding case holding the fan motor therein being fitted to the fitting portion.

2. The indoor unit for air conditioner according to claim 1, wherein the compressing section is included integrally with the holding case.

3. The indoor unit for air conditioner according to claim 1 or 2, wherein the compressing section has slits.

4. The indoor unit for air conditioner according to claim

3, wherein the slits are disposed at equal intervals at an outer edge portion of the compressing section.

5. The indoor unit for air conditioner according to any one of claims 1 to 4, wherein the compressing section has a tapered shape that gradually becomes thinner toward a side of the fitting portion. 5
6. The indoor unit for air conditioner according to any one of claims 1 to 5, wherein a size of the fitting portion is smaller than a size of the compressing section in a natural state in which the compressing section is not fitted to the fitting portion. 10

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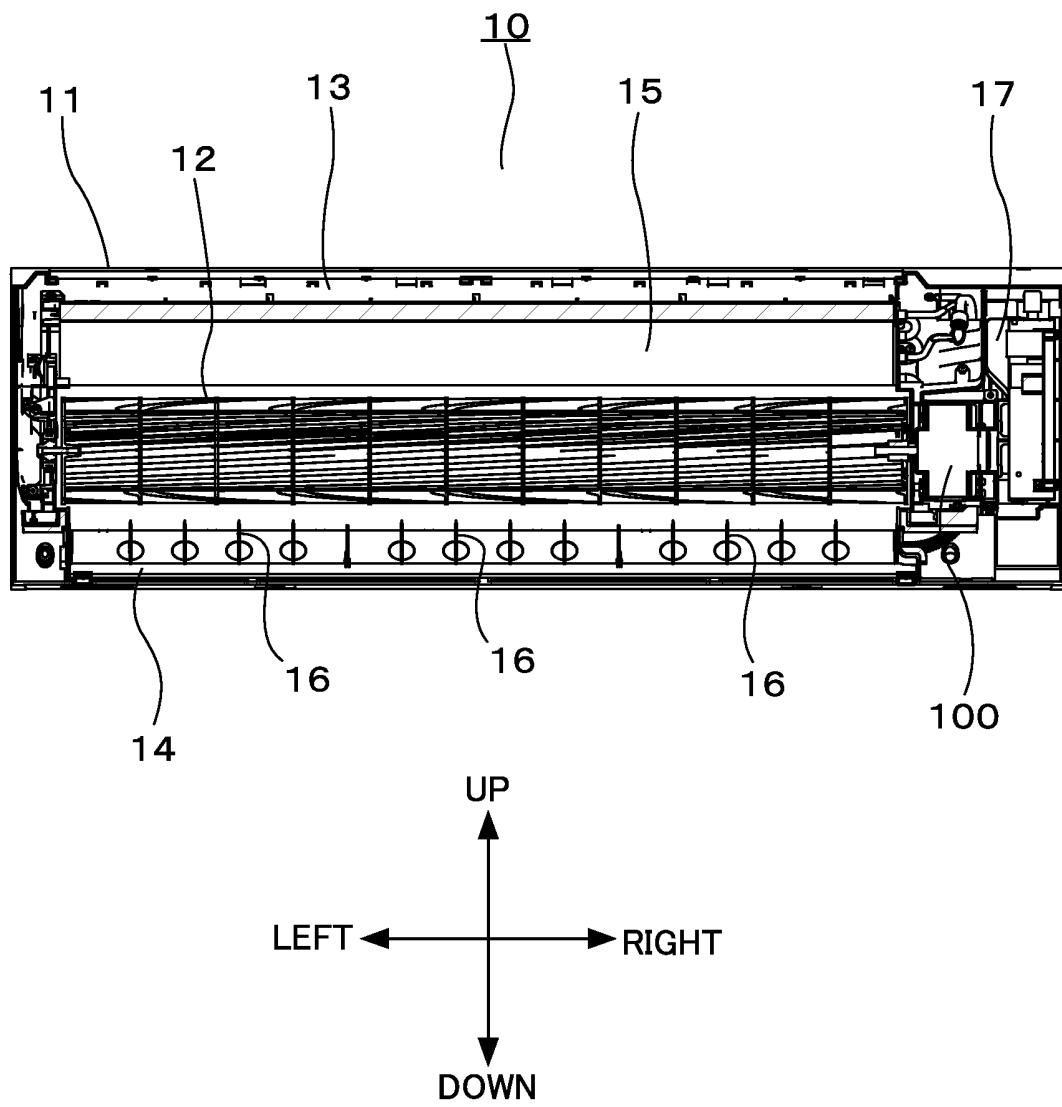


Fig.1

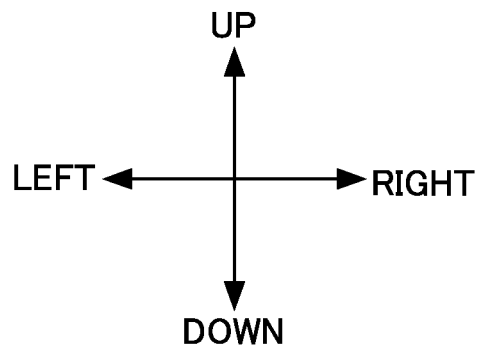
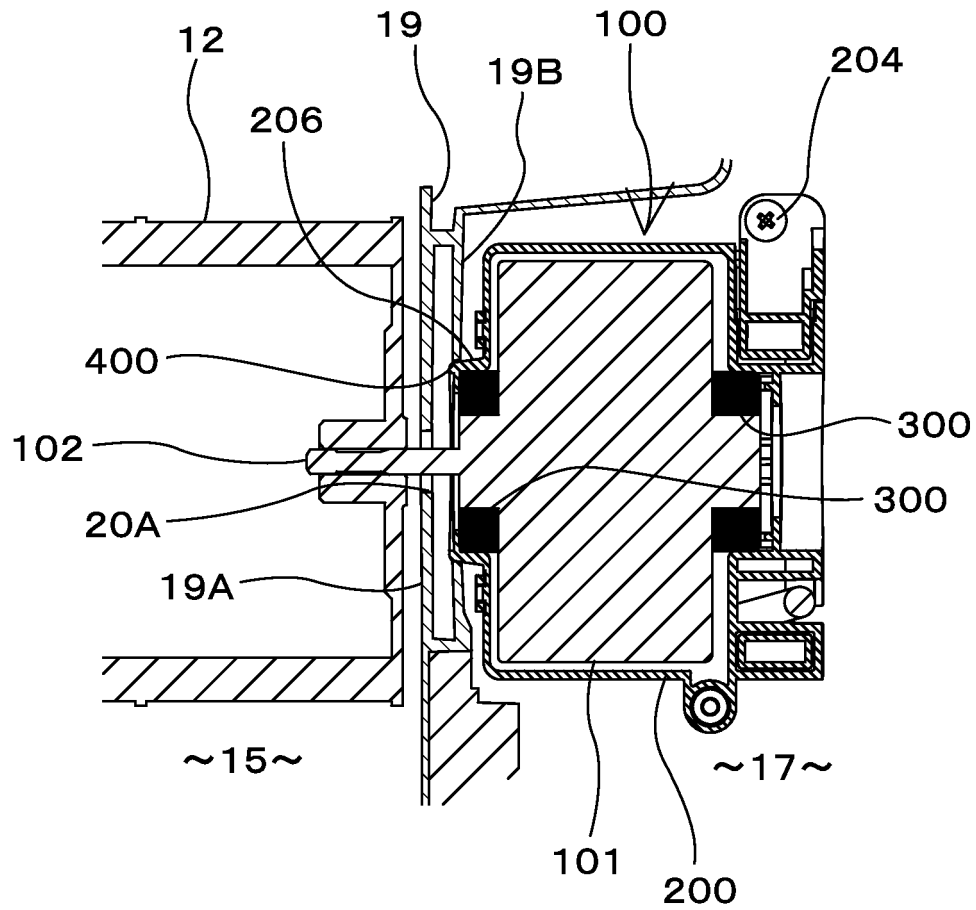


Fig.2

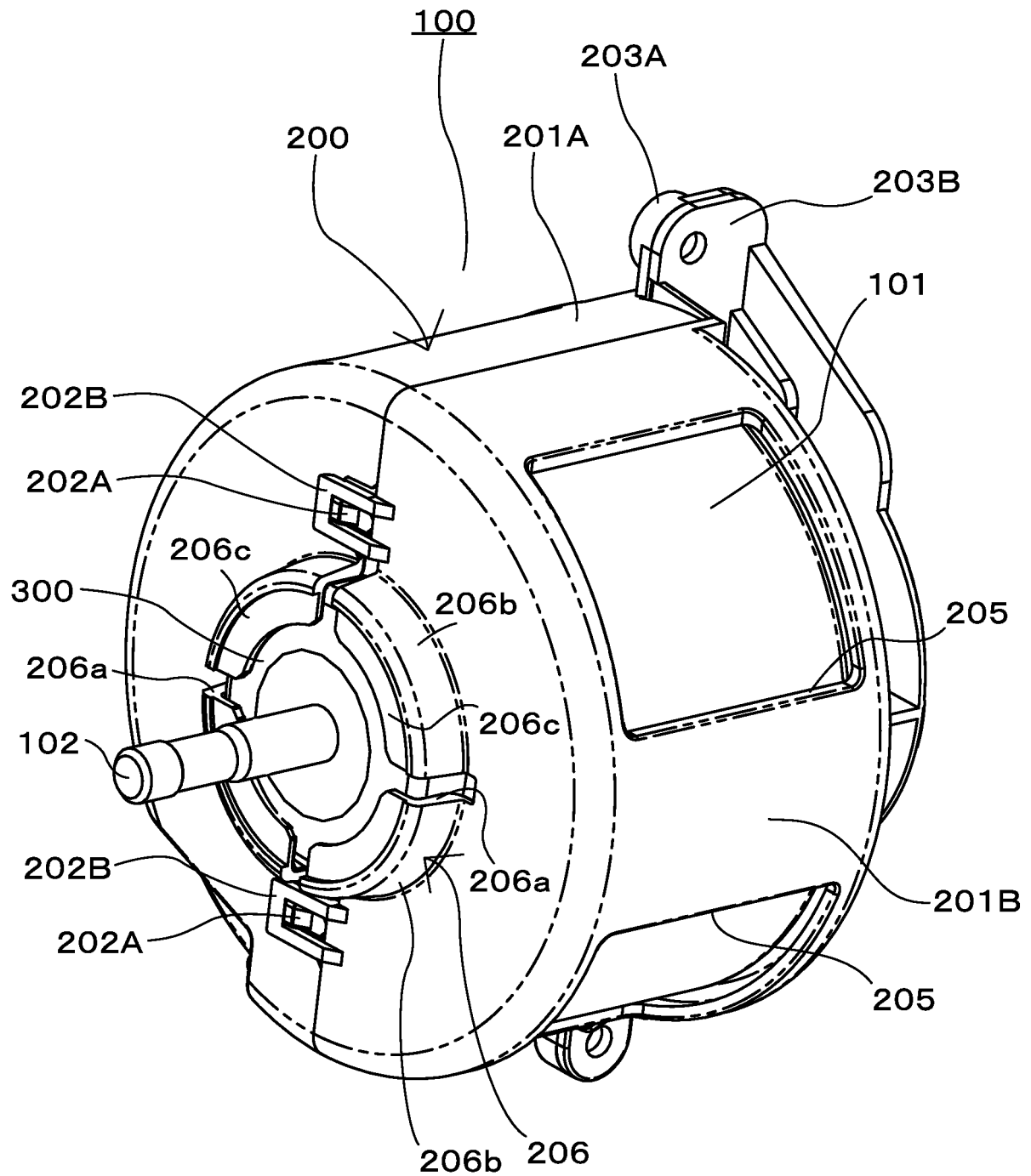


Fig.3

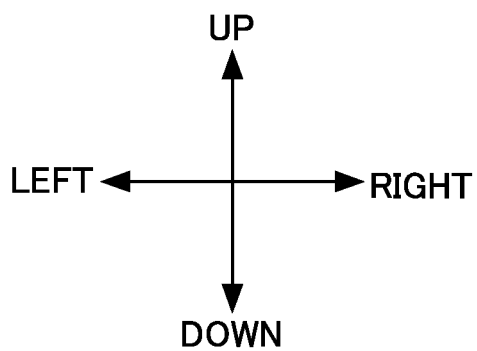
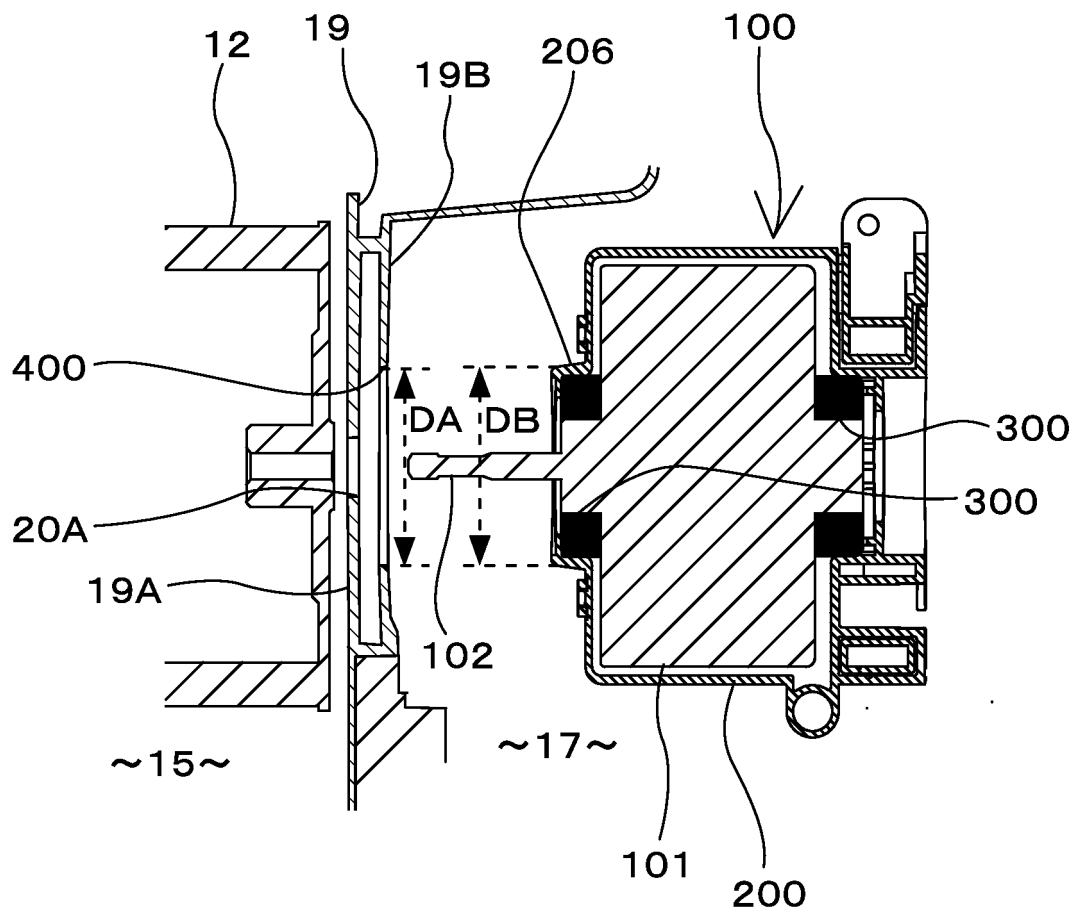


Fig.4

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/024734

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F24F1/0025 (2019.01) i, F24F13/24 (2006.01) i

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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)

Int.Cl. F24F1/0025, F24F13/24

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-71157 A (TOSHIBA CARRIER CORPORATION) 08 March 2002, paragraphs [0013]-[0034], fig. 1-9 & CN 1449479 A	1-6
A	JP 2002-161887 A (DAIKIN INDUSTRIES, LTD.) 07 June 2002, entire text, all drawings (Family: none)	1-6
A	JP 2004-144318 A (MITSUBISHI ELECTRIC CORP.) 20 May 2004, entire text, all drawings (Family: none)	1-6

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

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Date of the actual completion of the international search
12 July 2019 (12.07.2019)Date of mailing of the international search report
23 July 2019 (23.07.2019)

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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/024734

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2003-254549 A (DAIKIN INDUSTRIES, LTD.) 10 September 2003, entire text, all drawings (Family: none)	1-6
A	JP 2011-74886 A (PANASONIC CORP.) 14 April 2011, entire text, all drawings (Family: none)	1-6

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