



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.06.2013 Bulletin 2013/25

(51) Int Cl.:
F24F 13/20 (2006.01) F24F 1/32 (2011.01)

(21) Application number: **12196812.7**

(22) Date of filing: **12.12.2012**

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

- **Okada, Yuji**
Tokyo, 108-8215 (JP)
- **Mori, Hironori**
Tokyo, 108-8215 (JP)
- **Nisida, Yasuhiro**
Nagoya-shi, Aichi, 453-0862 (JP)
- **Yamami, Koji**
Nagoya-shi, Aichi, 450-0003 (JP)

(30) Priority: **16.12.2011 JP 2011275979**

(71) Applicant: **MITSUBISHI HEAVY INDUSTRIES, LTD.**
Tokyo 108-8215 (JP)

(74) Representative: **Intès, Didier Gérard André et al**
Cabinet Beau de Loménie
158, rue de l'Université
75340 Paris Cedex 07 (FR)

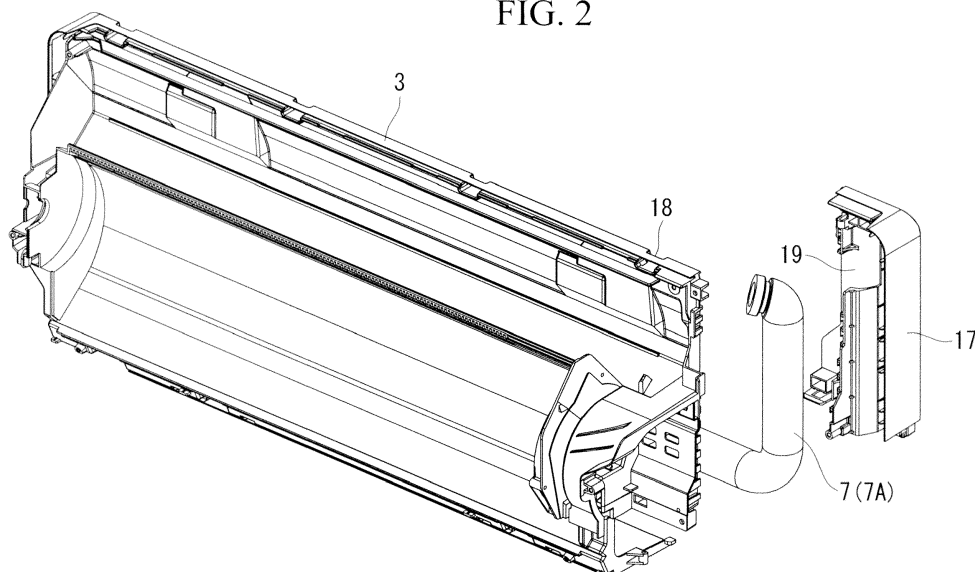
(72) Inventors:
• **Ito, Shingo**
Tokyo, 108-8215 (JP)

(54) **Wall-hanging air conditioner**

(57) Provided is a wall-hanging air conditioner capable of improving the assembling workability of a heat exchanger on a base body and securing a sufficient strength of the base body. The wall-hanging air conditioner includes a base body (3) to be assembled with a heat exchanger, an air blower, and the like. A refrigerant pipe (7) extended from the heat exchanger assembled on the

inner side of the base body (3) is extracted to the rear surface side of the base body (3) and the refrigerant pipe (7) is disposed along the rear surface of the base body (3). The base body (3) is separable in a longitudinal direction at a portion penetrated through by the refrigerant pipe (7) and divisible in right and left portions, and a divisible side pipe cover (17) is detachably/attachably mounted on the base body (3).

FIG. 2



Description

{Technical Field}

[0001] The present invention relates to a wall-hanging air conditioner to be installed on a wall surface.

{Background Art}

[0002] In a wall-hanging air conditioner to be installed on a wall surface in a room, a refrigerant pipe extending from a heat exchanger incorporated in a unit is allowed to penetrate through a base body of the unit and extracted to the rear surface side. Further, the refrigerant pipe is disposed along the rear surface of the base body, and is allowed to penetrate through the wall surface at an appropriate position and extracted to the outside of the room so that the refrigerant pipe is connected to an exterior unit (for example, see Patent Literature 1).

[0003] In such a wall-hanging air conditioner, the heat exchanger is inserted from a side surface of the unit during assembly. In recent years, however, a heat exchanger formed by being folded into an inverted V-shape is used in many cases. In this case, the heat exchanger disposed on the rear surface side is liable to contact a drain pan, which makes it difficult to assemble the heat exchanger. In view of this, Patent Literature 2 discloses a structure in which a notch through which a refrigerant pipe is allowed to penetrate is provided in an upper surface of a side portion of the base body, and the refrigerant pipe is extracted to the rear surface side from the inner surface side of the base body through the notch.

{Citation List}

{Patent Literature}

[0004]

{PLT 1}

Japanese Examined Utility Model Application, Publication No. Sho 62-2419

{PLT 2}

Japanese Unexamined Patent Application, Publication No. 2005-188831

{Summary of Invention}

{Technical Problem}

[0005] However, as described above, in the structure in which the notch through which the refrigerant pipe is allowed to penetrate is provided in the base body, there is a possibility that the strength of the base body to be assembled with a heat exchanger, an air blower, a front panel, or the like is lowered. Further, to allow the refrigerant pipe to penetrate through the notch, it is necessary to move the heat exchanger downward along the notch

from an upper portion of the base body, which is not necessarily favorable in terms of assembly workability.

{Solution to Problem}

[0006] The present invention has been made in view of the above-mentioned circumstances, and therefore it is an object of the present invention to provide a wall-hanging air conditioner capable of improving assembling workability of a heat exchanger on a base body and securing a sufficient strength of the base body.

[0007] To solve the above-mentioned problem, the wall-hanging air conditioner of the present invention employs the following solutions.

That is, a wall-hanging air conditioner according to the present invention includes: a base body to be assembled with a heat exchanger, an air blower, and the like; and a refrigerant pipe extended from the heat exchanger assembled on an inner surface side of the base body, the refrigerant pipe being extracted to a rear surface side of the base body and disposed along the rear surface of the base body. The base body is separable in a longitudinal direction at a portion penetrated through by the refrigerant pipe and divisible into right and left portions, and a divisible side pipe cover is detachably/attachably mounted on the base body.

[0008] According to the present invention, the base body is separable in the longitudinal direction at the portion penetrated through by the refrigerant pipe and divisible into the right and left portions, and the divisible side pipe cover is detachably/attachably mounted on the base body. Accordingly, the divisible side pipe cover is dismounted and the heat exchanger is incorporated into the base body in a state where one side of the portion through which the refrigerant pipe is allowed to penetrate is opened, thereby enabling positioning and incorporation of the refrigerant pipe directly to the penetrated portion of the base body with no limitation on the direction in which the heat exchanger is incorporated. After that, the side pipe cover is mounted on the base body, thereby enabling assembly of the heat exchanger on the base body in a state where the refrigerant pipe extended from the heat exchanger is allowed to penetrate to the rear surface side of the base body. Consequently the assembling workability of the heat exchanger can be drastically improved without the need to allow the refrigerant pipe extended from the heat exchanger to penetrate through a through-hole or to move the refrigerant pipe downward along a notch.

[0009] Further, in the wall-hanging air conditioner of the present invention, a screwing portion and an engagement portion may be provided between at least two upper and lower portions between the base body and the side pipe cover, and the side pipe cover may be engaged with the base body by the engagement portion and may be screwed to be detachably/attachably mounted.

[0010] According to the present invention, the screwing portion and the engagement portion are provided be-

tween at least two upper and lower portions between the base body and the side pipe cover, and after the side pipe cover is engaged with the base body by the engagement portion, the side pipe cover is screwed to be detachably/attachably mounted. Therefore, the side pipe cover divisible from the base body can be detachably/attachably mounted on the base body by the screwing portion and the engagement portion which are provided at least two upper and lower portions at the divided right and left positions. Accordingly, the coupling strength of the divided side pipe cover can be relatively easily secured.

[0011] Furthermore, in the wall-hanging air conditioner of the present invention, the side pipe cover may be divided into right and left portions at a side position relative to a mounting portion on an installation plate at which the base body is installed on a wall surface.

[0012] According to the present invention, the side pipe cover is divided into right and left portions at the side position relative to the mounting portion on the installation plate at which the base body is installed on the wall surface. Accordingly, the right and left divided positions of the base body do not overlap the mounting portion on the installation plate, thereby avoiding the situation in which the division of the base body has an adverse effect on the installation strength of the air conditioner. Consequently, the installation workability can be maintained and secured, regardless of the division of the base body.

{Advantageous Effects of Invention}

[0013] According to the present invention, the divisible side pipe cover is dismounted and the heat exchanger is incorporated into the base body in a state where one side of the portion through which the refrigerant pipe is allowed to penetrate is opened, thereby enabling positioning and incorporation of the refrigerant pipe directly to the penetrating portion of the base body with no limitation on the direction in which the heat exchanger is incorporated. After that, the side pipe cover is mounted on the base body, thereby enabling assembly of the heat exchanger on the base body in a state where the refrigerant pipe extended from the heat exchanger is allowed to penetrate to the rear surface side of the base body. Consequently the assembling workability of the heat exchanger can be drastically improved without the need to allow the refrigerant pipe extended from the heat exchanger to penetrate through a through-hole or to move the refrigerant pipe downward along a notch.

{Brief Description of Drawings}

[0014]

{Fig. 1}

Fig. 1 is an exploded perspective view of a wall-hanging air conditioner according to an embodiment of the present invention;

{Fig. 2}

Fig. 2 is an exploded perspective view of a base body of the wall-hanging air conditioner illustrated in Fig. 1; {Fig. 3}

Fig. 3 is a perspective view of an assembled state of the base body illustrated in Fig. 2;

{Fig. 4}

Fig. 4 is a front view illustrating only a side portion when the base body illustrated in Fig. 3 is viewed from an inner surface side;

{Fig. 5}

Fig. 5 is a perspective view when the base body illustrated in Fig. 4 is viewed from the lower side of the rear surface;

{Fig. 6}

Fig. 6 is a cross-sectional view of a lower screwing portion of the base body illustrated in Fig. 4; and {Fig. 7}

Fig. 7 is a cross-sectional view of an upper screwing portion of the base body illustrated in Fig. 4.

{Description of Embodiments}

[0015] Hereinafter, an embodiment of the present invention will be described with reference to Figs. 1 to 7. Fig. 1 illustrates an exploded perspective view of a wall-hanging air conditioner.

A wall-hanging air conditioner 1 includes an installation plate 2 to be installed on a wall surface; a base body 3 to be mounted on the installation plate 2; an air blower (cross-flow fan) 4 to be assembled with the base body 3; a drive motor 5 for driving the air blower 4; a heat exchanger 6 to be assembled with the base body 3; a refrigerant pipe 7 which is extended backward from one side of the heat exchanger 6; a control box 8 to be assembled with the base body 3; an outlet assembly 9 to be assembled with the base body 3; a front cover 10 to be assembled with the base body 3 so as to cover the front surface, upper and lower surfaces and right and left surfaces of each instrument; an air filter to be incorporated into the front cover 10; a cleaning mechanism 11 for cleaning the air filter; and a front panel 12 to be mounted on the front cover 10 so as to cover the front surface of the front cover 10, for example.

[0016] The base body 3 is mounted on the installation plate 2 which is installed on the wall surface, to thereby install and support the air conditioner 1. A drain pan and a part of an air duct of the cross-flow fan 4 are formed relative to the back-surface-side heat exchanging part of the heat exchanger 6 formed by being bent in an inverted V-shape. The drain pan and the part of the air duct of the cross-flow fan 4 are integrally formed. The cross-flow fan 4 includes a cylindrical vane wheel disposed horizontally along the air duct of base body 3, and is rotatably supported on the base body 3 through the drive motor 5.

[0017] The heat exchanger 6 is a fin-and-tube type heat exchanger formed by being folded in an inverted V-shape, and is disposed so as to cover the upper surface

and the front surface of the cross-flow fan 4. The refrigerant pipe 7 for circulating a refrigerant from one side of the heat exchanger 6 is extended backward. Note that this refrigerant pipe 7 has a structure (see Fig. 6) in which two pipes, i.e., a liquid pipe and a gas pipe, are accommodated in an auxiliary pipe 7A which has a large diameter and thermal insulating properties. The outlet assembly 9, which includes a drain pan 13, a stabilizer 14 that forms the air duct of the cross-flow fan 4, and an outlet 15 that incorporates a louver and a flap for wind direction adjustment, for example, is assembled at a lower portion of the front-surface-side heat exchanging part of the heat exchanger 6.

[0018] The control box 8 is incorporated into a right side portion of the base body 3, and controls the operation of the air conditioner 1 by using a command from a remote controller. The front cover 10 covers the front surface, the upper and lower surfaces, and the right and left surfaces of the above-mentioned instruments incorporated into the base body 3. A suction grill 16 for sucking the air within the room is formed on the upper surface and the front surface of the front cover 10. This suction grill 16 incorporates the air filter that collects dust which is contained in the air within the room and sucked through the suction grill 16, and the cleaning mechanism 11 that removes the dust collected by the air filter from the filter surface and automatically cleans the air filter. At the front surface of the suction grill 16, a front panel 12 is openably/closably assembled with the upper portion as a fulcrum.

[0019] Further, upon assembly of the heat exchanger 6 on the base body 3, it is necessary to allow the refrigerant pipe 7, which extends backward from one side of the heat exchanger 6, to penetrate through the base body 3 and be extracted to the rear surface side. In this regard, in this embodiment, the base body 3 is structured to be separable in a longitudinal direction at a portion through which the refrigerant pipe 7 is allowed to penetrate and to be divisible into right and left portions as illustrated in Fig. 2. Further, the side pipe cover 17, which is structured to be divisible from the base body 3, is detachably/attachably mounted to the base body 3. Fig. 3 illustrates a state in which the refrigerant pipe 7 is allowed to penetrate and the side pipe cover 17 is mounted on the base body 3 (in this case, however, the heat exchanger 6 and the like are omitted).

[0020] The side pipe cover 17 is divided into right and left portions at a side position relative to the mounting portion 18 for mounting the base body 3 on the installation plate 2 installed on the wall surface, and has a notch 19 formed therein through which the refrigerant pipe 7 is allowed to penetrate. The notch 19 is formed on the rear surface side of the base body 3 and extended downward from the penetrating position. As illustrated in Fig. 5, the refrigerant pipe 7 is extended downward and is then disposed in one of the left direction (direction illustrated in the figure) and the right direction along the lower portion on the rear surface of the base body 3.

[0021] Further, as illustrated in Figs. 4, 6, and 7, the

side pipe cover 17 is structured to be detachably/attachably coupled to the base body 3 through screwing portions 20 and 21 and engagement portions 24 and 25, which are provided at least two upper and lower portions, in the state where the refrigerant pipe 7 is allowed to penetrate. The screwing portions 20 and 21 are used to fasten and fix screws 22 and 23 to screw boss portions 20A and 21A, which are integrally formed on the side pipe cover 17, through screw holes provided in the base body 3.

[0022] Furthermore, the engagement portions 24 and 25 are provided on a matching surface between the base body 3 and the side pipe cover 17, and include a plurality of trapezoidal convex and concave portions 24A and 24B and 25A and 25B which engage with each other by relative sliding in the front-and-back direction. Note that the trapezoidal convex and concave portions 24A and 24B and 25A and 25B are convex and concave portions with a larger width at the leading end side of each of the convex portions 24A and 25A and at the fillet side of each of the concave portions 24B and 25B.

[0023] Thus, the side pipe cover 17 is dismounted upon assembly of the heat exchanger 6 and the refrigerant pipe 7 with respect to the base body 3. After assembly of the heat exchanger 6 and the refrigerant pipe 7, two predetermined upper and lower engagement portions 24 and 25 are allowed to engage by allowing the convex and concave portions 24A and 24B and the convex and concave portions 25A and 25B to engage with each other. Further, the screws 22 and 23 are screwed into the two upper and lower screw boss portions 20A and 21A and fastened and fixed, thereby being integrally, strongly coupled to the base body 3.

[0024] With the structure described above, according to this embodiment, the following operation and effect can be obtained.

During assembly of the wall-hanging air conditioner 1, upon assembly of the heat exchanger 6 and the refrigerant pipe 7 with respect to the base body 3, the side pipe cover 17 is dismounted from the base body 3. As a result, the entire side surface at the penetrating portion of the refrigerant pipe 7 is opened. In this state, the heat exchanger 6 formed by being bent in an inverted V-shape is inserted from the side surface side of the base body 3, thereby allowing the refrigerant pipe 7, which is extended from one side surface of the heat exchanger 6, to be positioned directly at the penetrating portion of the base body 3.

[0025] In this state, the side pipe cover 17 is positioned at the side surface where the base body 3 is divided from the side, and the convex and concave portions 24A and 24B and 25A and 25B of the engagement portions 24 and 25, which are provided at two upper and lower portions, are allowed to engage with each other to be locked. After that, the screws 22 and 23 are screwed into the screw boss portions 20A and 21A, which are provided at the two upper and lower screwing portions 20 and 21, and fastened fixed from the side of the base body 3, there-

by allowing the side pipe cover 17 to be integrally coupled to the base body 3.

[0026] In this manner, the base body 3 for assembling the instruments such as the heat exchanger 6 constituting the wall-hanging air conditioner 1 is structured to be separable in the longitudinal direction at a portion through which the refrigerant pipe 7 is allowed to penetrate, and to be divisible in right and left portions. Thus, the divisible side pipe cover 17 can be detachably/attachably assembled with the base body 3. Accordingly, when the divisible side pipe cover 17 is detached and the heat exchanger 6 is incorporated into the base body 3 in the state where one side surface of the portion through which the refrigerant pipe 7 is allowed to penetrate is opened, thereby enabling positioning and incorporation of the refrigerant pipe 7 directly to the penetrating portion of the base body 3 with no limitation on the direction in which the heat exchanger 6 is incorporated. After that, the side pipe cover 17 is mounted on the base body 3, thereby enabling assembly of the heat exchanger 6 with the base body 3 in the state where the refrigerant pipe 7 is allowed to penetrate through the rear surface side.

[0027] Therefore, according to this embodiment, there is no need to allow the refrigerant pipe 7 extended from the heat exchanger 6 to penetrate through a through-hole or to move the refrigerant pipe 7 downward along a notch. This leads to an improvement in the assembling workability of the heat exchanger 6 and enhancement of the assembling workability thereof.

[0028] Further, the screwing portions 20 and 21 and engagement portions 24 and 25 are provided at least two upper and lower portions between the base body 3 and the side pipe cover 17. The side pipe cover 17 is allowed to engage with the base body 3 by the engagement portions 24 and 25 and is screwed to be detachably/attachably mounted. Therefore, the side pipe cover 17 divisible from the base body 3 can be detachably/attachably mounted on the base body 3 by the screwing portions 20 and 21 and the engagement portions 24 and 25 which are provided at at least two upper and lower portions at the divided right and left positions. Accordingly, the coupling strength of the divided side pipe cover 17 can be relatively easily secured.

[0029] Furthermore, in this embodiment, the side pipe cover 17 is divided into right and left portions at a side position relative to the mounting portion 18 on the installation plate 2 at which the base body 3 is installed on the wall surface. Accordingly, the right and left divided positions of the base body 3 do not overlap the mounting portion 18 on the installation plate 2, thereby avoiding the situation in which the division of the base body 3 has an adverse effect on the installation strength of the air conditioner 1. Consequently, the installation workability can be maintained and secured, regardless of the division of the base body 3.

[0030] Note that the present invention is not limited to the invention set forth in the embodiment described above, but can be modified as needed without departing

from the gist of the present invention. For example, in the embodiment described above, the refrigerant pipe 7 is structured to be accommodated in the auxiliary pipe 7A having thermal insulating properties. However, the auxiliary pipe 7A is not necessarily provided and may be omitted. Other means may be used instead of the auxiliary pipe 7A.

[0031] Also, the assembly structure for the base body 3 of the side pipe cover 17 is not limited to the structure of the embodiment described above. Other coupling structure may be employed. As for the entire structure of the wall-hanging air conditioner 1, the structure of the embodiment described above is illustrated by way of example only. The present invention can also be applied to wall-hanging air conditioners of various structures including a base body, as a matter of course.

{Reference Signs List}

[0032]

1	WALL-HANGING AIR CONDITIONER
2	INSTALLATION PLATE
3	BASE BODY
4	AIR BLOWER (CROSS-FLOW FAN)
6	HEAT EXCHANGER
7	REFRIGERANT PIPE
7A	AUXILIARY PIPE
17	SIDE PIPE COVER
18	MOUNTING PORTION
20, 21	SCREWING PORTION
24, 25	ENGAGEMENT PORTION

Claims

1. A wall-hanging air conditioner comprising:

a base body (3) to be assembled with a heat exchanger (6), an air blower (4), and the like; and a refrigerant pipe (7) extended from the heat exchanger (6) assembled on an inner surface side of the base body (3), the refrigerant pipe (7) being extracted to a rear surface side of the base body (3) and disposed along the rear surface of the base body (3),

wherein the base body (3) is separable in a longitudinal direction at a portion penetrated through by the refrigerant pipe (7) and divisible into right and left portions, and a divisible side pipe cover (17) is detachably/attachably mounted on the base body (3).

2. The wall-hanging air conditioner according to claim 1, wherein

a screwing portion (20, 21) and an engagement portion (24, 25) are provided between at least two upper and lower portions between the base body (3) and

the side pipe cover (17), and
after the side pipe cover (17) is engaged with the
base body (3) by the engagement portion (24, 25),
the side pipe cover (17) is screwed to be detachably/
attachably mounted.

5

3. The wall-hanging air conditioner according to claim
1 or 2, wherein the side pipe cover (17) is divided
into right and left portions at a side position relative
to a mounting portion on an installation plate (2) at
which the base body (3) is installed on a wall surface.

10

15

20

25

30

35

40

45

50

55

FIG. 1

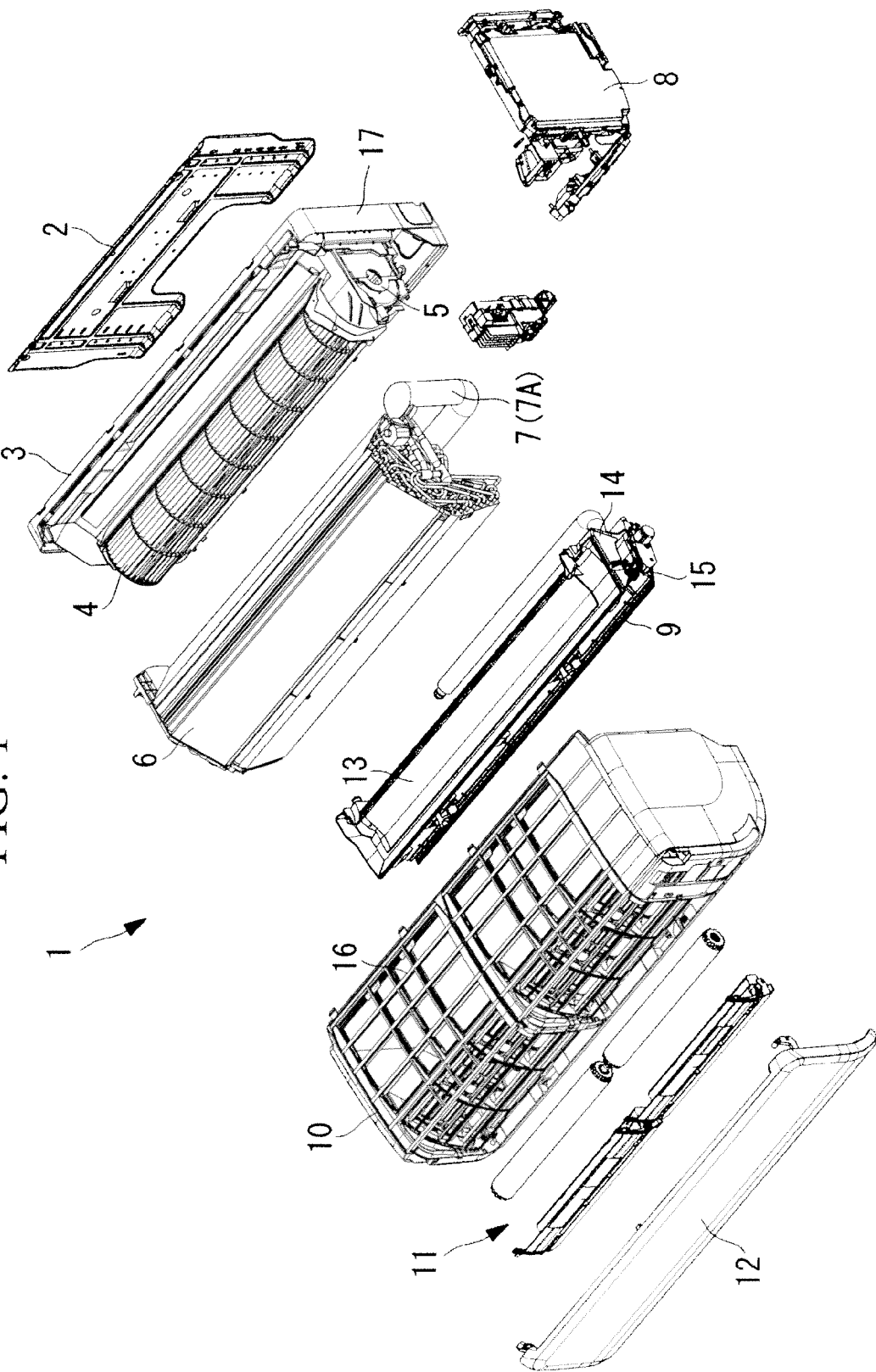


FIG. 2

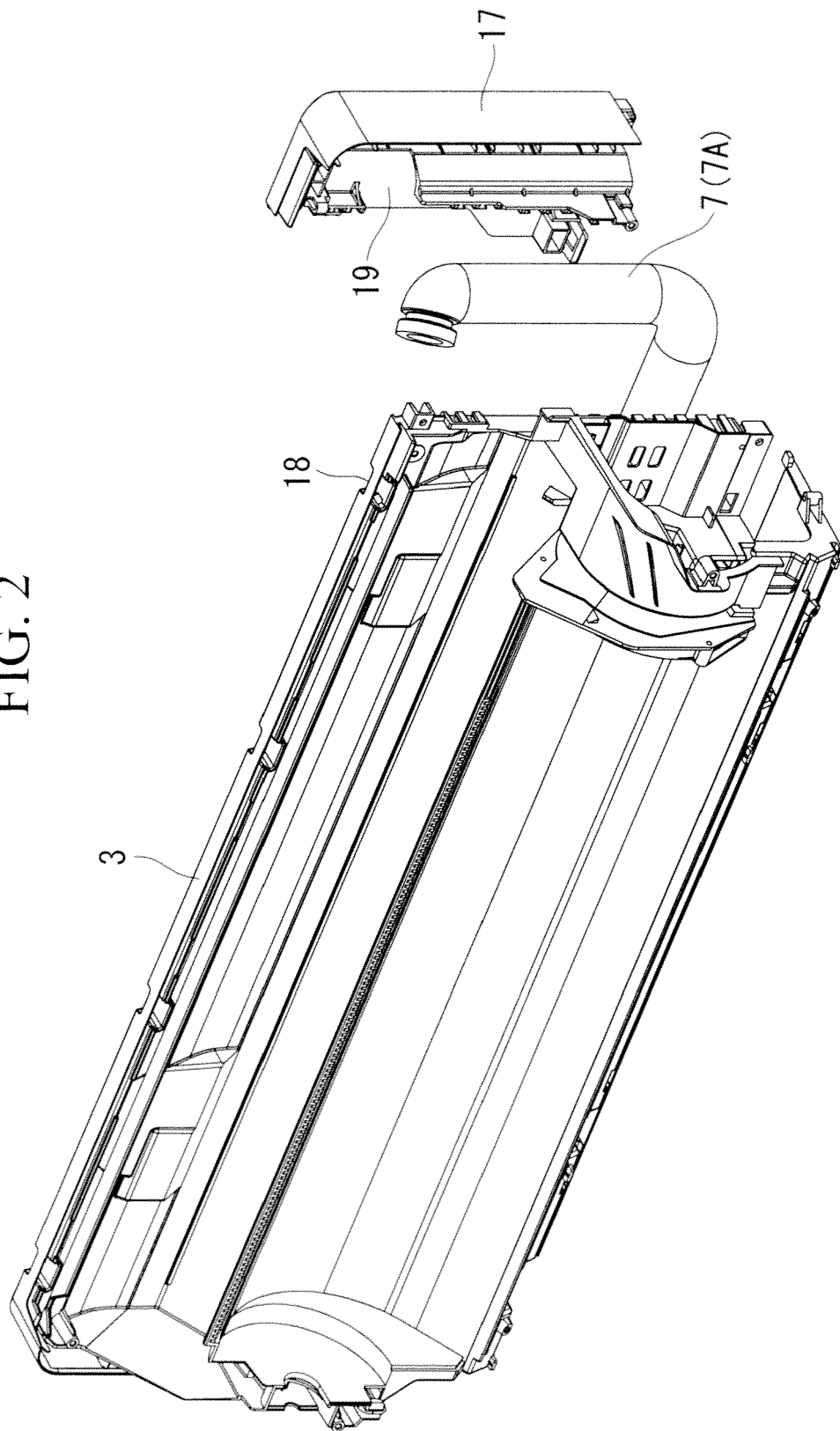


FIG. 3

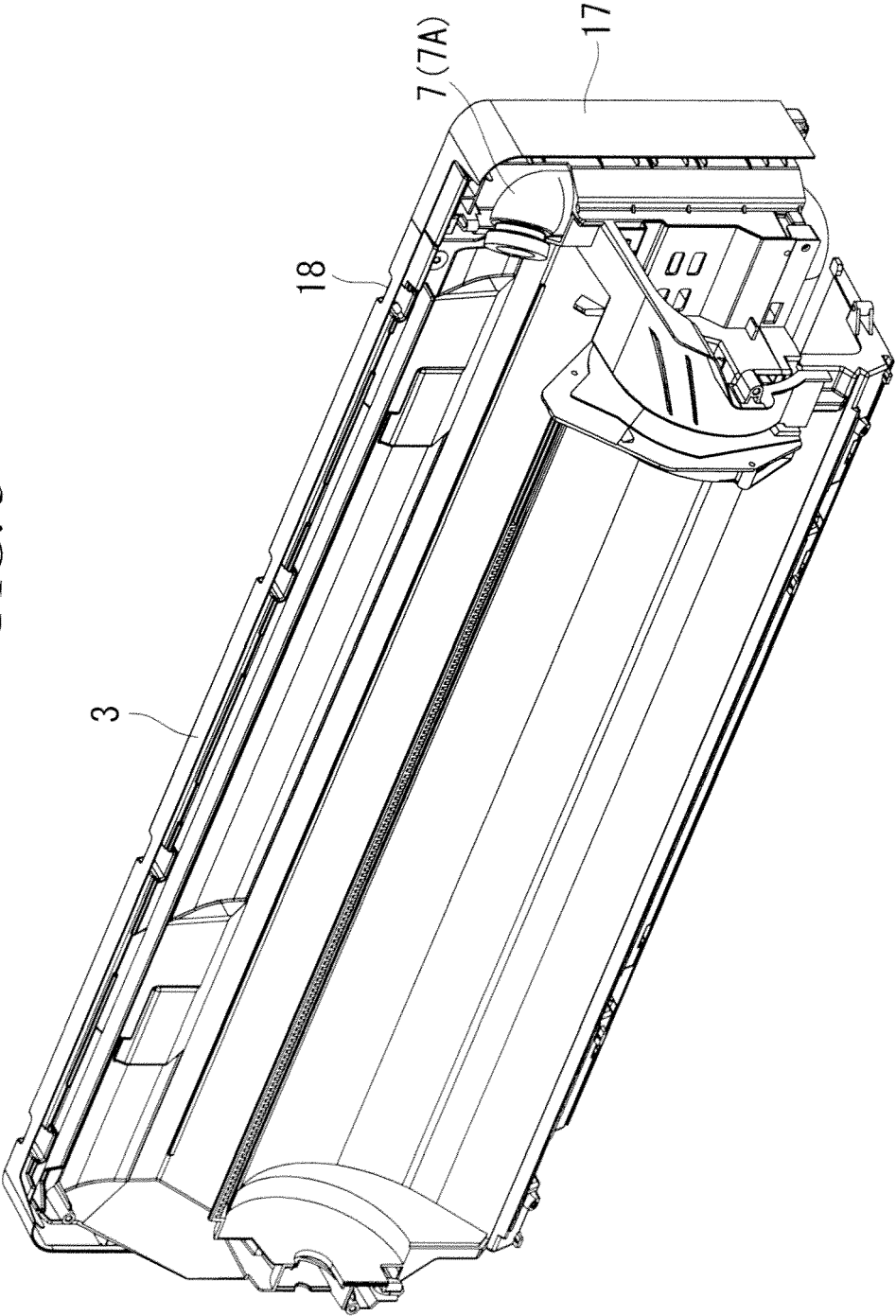


FIG. 4

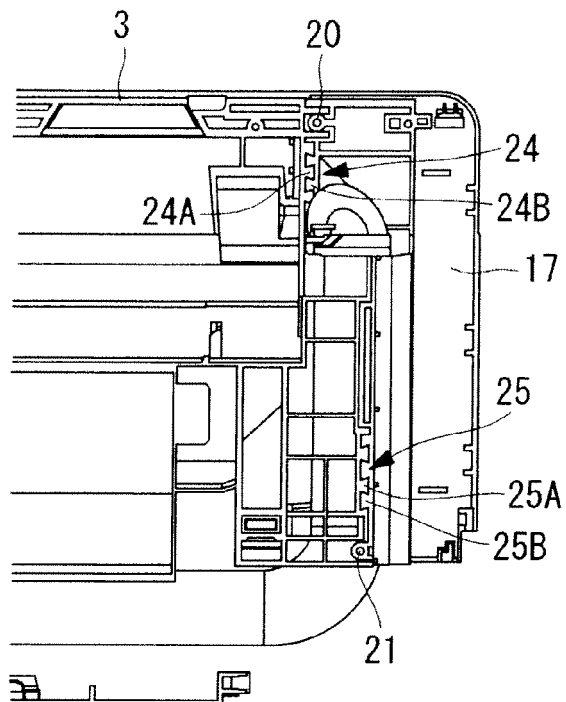


FIG. 5

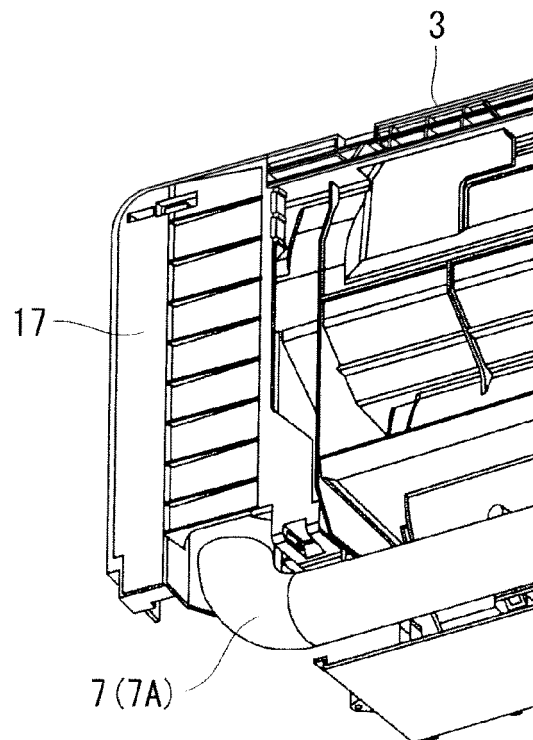


FIG. 6

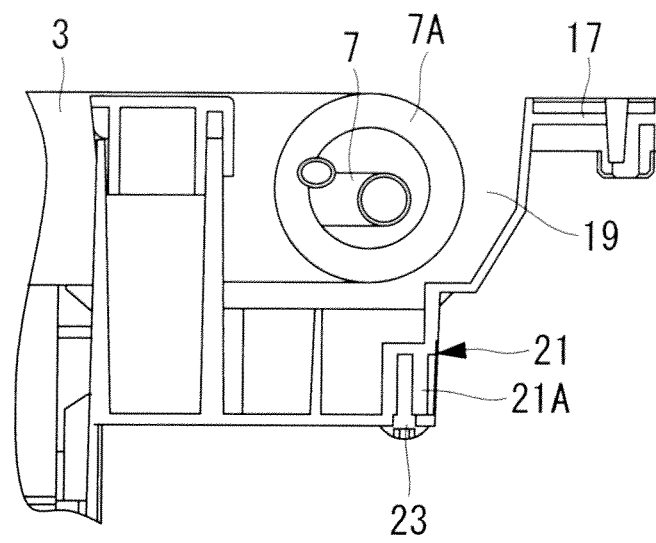
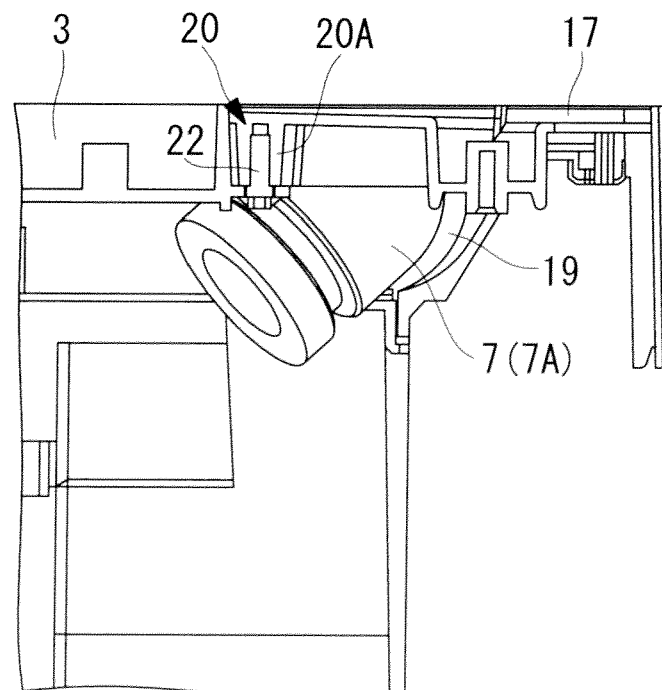


FIG. 7



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 SHO622419 B [0004]
- JP 2005188831 A [0004]