



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.11.2012 Bulletin 2012/45

(51) Int Cl.:
F24F 1/00 (2011.01)

(21) Application number: **12166175.5**

(22) Date of filing: **30.04.2012**

(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

(72) Inventors:
• **Takeuchi, Nobuyuki**
Minato-Ku, Tokyo, 108-8215 (JP)
• **Nakamura, Takanori**
Minato-Ku, Tokyo, 108-8215 (JP)

(30) Priority: **06.05.2011 JP 2011103501**

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

(71) Applicant: **Mitsubishi Heavy Industries**
Tokyo 108-8215 (JP)

(54) **Ceiling-mounted air conditioner**

(57) Provided is a ceiling-mounted air conditioner that facilitates an attachment and detachment operation of a blower unit relative to a unit body regardless of the number of blower units and realizes improvement of deformation and vibration characteristics of a top plate of the unit body. In the ceiling-mounted air conditioner, the blower subunits (11A, 11B) are integrated with the support member (20A, 20B) bent substantially at a right angle, one surfaces of which are configured to be partition plates (22A, 22B) for partitioning an inside of the unit body (2) into an inlet region and an outlet region, and the other surfaces of which are configured to be support plates (21A, 21B) for supporting fans (18A, 18B, 18C) and motors (19A, 19B) of the blower subunits (11A, 11B). The blower subunits (11A, 11B) are slidably inserted between a pair of the rail members installed in parallel on an inner surface of a top plate from one end to the other end of the top plate of the unit body (2) from the aperture (26) provided in one side surface of the unit body (2), so as to be mounted into the unit body (2) through the support members (20A, 208).

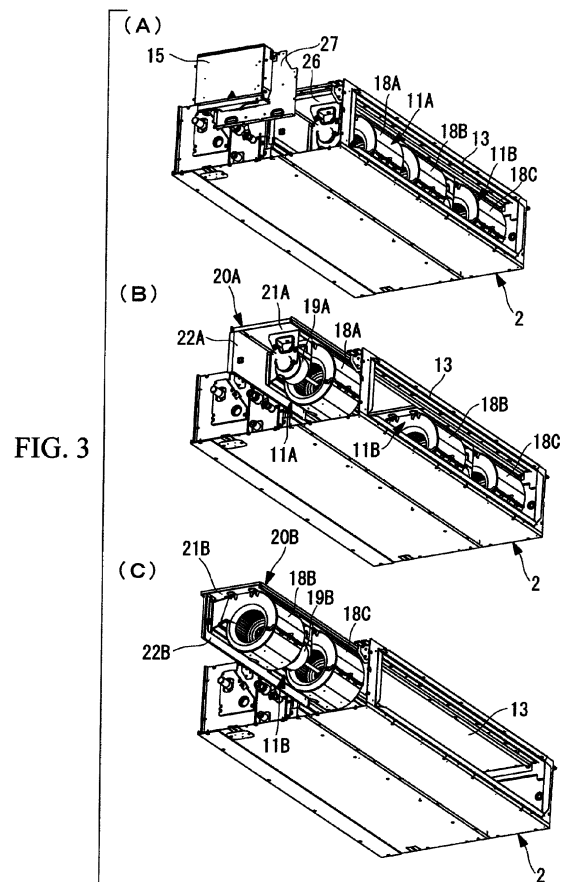


FIG. 3

Description

Technical Field

[0001] The present invention relates to a ceiling-mounted air conditioner of which unit body is mounted in a ceiling.

Background Art

[0002] In a ceiling-mounted air conditioner having a unit body installed in a ceiling, it is quite difficult to secure space for maintenance of the air conditioner. In reality, a maintenance operation is carried out through an inspection port provided in the ceiling, from which necessary components are taken out to a room. For this reason, a control box and other components are detachably attached to an outer side surface of the unit body, and a blower unit including a blower fan, a motor and other components is detachably/attachably mounted in the unit body so as to take out the whole blower unit from the unit body.

[0003] PTL1 discloses a blower unit detachably/attachably mounted in a unit body in that the unit body is provided with a pair of support rails on an upper panel of the unit body, and an impeller and a motor of a blower unit are integrally inserted slidably along the support rails into the unit body from an inspection port formed in a side panel, so that the impeller is mounted in a fan case fixed to a rear panel of the unit body.

[0004] PTL2 discloses an approach for facilitating a maintenance operation of an air conditioner, in which a pair of support fittings on which a fan motor base is mounted is attached to a pair of frames oppositely mounted on a base of a body, and the fan motor base equipped with a fan motor is inserted and mounted from above onto the pair of support fittings, and then is slidably moved to a predetermined setting position to be fixed there, thus the fan motor can be detachably/attachably mounted.

Citation List

Patent Literature

[0005]

PTL 1 Japanese Examined Patent Application, Publication No. Hei07-084930

PTL 2 the Publication of Japanese Examined Utility Model Registration No. 2561906

Summary of Invention

Technical Problem

[0006] However, in the configuration of the ceiling-mounted air conditioner disclosed in PTL1, the fan casing is fixed to the unit body, and only the impeller and the

motor of the blower unit can be slidably inserted and mounted into the unit body through the support rails. In the case of an air conditioner using a single blower unit, this may cause no inconvenience in attaching and detaching the blower unit in a maintenance operation. The above mentioned configuration however cannot be applied to an air conditioner using a dual-axis motor and a blower unit equipped with impellers on opposite ends of its motor shaft or an air conditioner using plural blower units.

[0007] PTL2 discloses the configuration in which the fan motor base integrated with the fan motor is inserted and mounted from above onto the pair of support fittings. Thus, predetermined space is required above the support fittings, which increases the unit body size, and this configuration cannot be applied to a ceiling-mounted air conditioner using a blower unit directly mounted to a top plate of a unit body.

[0008] The present invention has been made in the light of the above facts, and has an object to provide a ceiling-mounted air conditioner that facilitates attachment and detachment of a blower unit to a unit body regardless of the number of blower units, as well as realizes improvement of deformation and vibration characteristics of the top plate of the unit body.

Solution to Problem

[0009] In order to solve the problems, the present invention provides a ceiling-mounted air conditioner including a unit body in a box shape mounted in a ceiling, and a heat exchanger and a blower unit that are mounted in the unit body, wherein the unit body includes: a support member bent substantially at a right angle, one surface of which is configured to be a partition plate for partitioning an inside of the unit body into an inlet region and an outlet region, and the other surface of which is configured to be a support plate for supporting at least one fan and at least one motor of the blower unit, and the blower unit is integrated with the support member. In this ceiling-mounted air conditioner, the unit body further includes: a pair of rail members installed in parallel at a predetermined distance therebetween on an inner surface of a top plate from one end to the other end of the top plate of the unit body; and an aperture provided in one side surface of the unit body, and the blower unit is slidably inserted between the rail members from the aperture so as to be mounted into the unit body through the support member.

[0010] In the ceiling-mounted air conditioner including the blower unit mounted in the unit body according to the present invention, the unit body includes: a support member bent substantially at a right angle, one surface of which is configured to be a partition plate for partitioning an inside of the unit body into an inlet region and an outlet region, and the other surface of which is configured to be a support plate for supporting at least one fan and at least one motor of the blower unit, and the blower unit is

integrated with the support member. In this ceiling-mounted air conditioner, the unit body further includes: a pair of rail members installed in parallel at a predetermined distance therebetween on an inner surface of a top plate from one end to the other end of the top plate of the unit body; and an aperture provided in one side surface of the unit body, and the blower unit is slidably inserted between the rail members from the aperture so as to be mounted into the unit body through the support member. When maintaining the blower unit, the blower unit is drawn to one side of the unit body together with the support member from the aperture provided on the one side surface of the unit body along the pair of the rail members, and the blower subunit integrated with the support member is taken out to the outside, so as to carry out the inspection and maintenance operation thereof. Accordingly, the above described configuration facilitates a maintenance operation applied on the blower unit taken out from the unit body mounted in the ceiling, and enhances efficiency of the operation. Furthermore, the pair of the rail members can also serve as the reinforcement member for the top plate of the unit body, thereby providing a required level of improvement in deformation and vibration characteristics of the top plate where the blower unit is mounted without increasing the thickness of the top plate.

[0011] In the above described ceiling-mounted air conditioner according to the present invention, the blower unit may have an outlet port of the fan projecting into the outlet region through the partition plate of the support member.

[0012] According to the above described configuration, the configuration of the outlet port of the fan included in the blower unit projecting through the partition plate of the support member into the outlet region can directly introduce the outlet air blowing from the outlet port of the fan into the outlet region in the unit body, which is partitioned by the partition plate. As a result, it is unnecessary to provide a wind shielding member or the like between the partition plate partitioning the inside of the unit body and the outlet port of the fan of the blower unit, thereby simplifying the structure of the unit body.

[0013] In any one of the above described ceiling-mounted air conditioner according to the present invention, the rail members may be formed of a plate member whose cross section is bent in a crank shape and whose rail portions are oppositely fixed to an inner surface of the top plate of the unit body.

[0014] According to the present invention, the rail members are formed of a plate member whose cross section is bent in a crank shape and whose rail portions are oppositely fixed to an inner surface of the top plate of the unit body. Configuring one side of the plate member having the cross section bent into a crank shape to be the attachment portion to the top plates, and configuring the other side thereof to be the rail portions oppositely mounted to the inner surface of the top plate of the unit body enable the plate member in the crank shape to serve

as the pair of the rail members allowing the blower unit to be slidably inserted and mounted into the unit body as well as the reinforcement member for the top plate. Accordingly, using the rail members for installing the blower unit as the reinforcement member for the top plate improves deformation and vibration characteristics of the top plate of the unit body at a required level, thereby simplifying the structure of the unit body and reducing the cost.

[0015] In any one of the above described ceiling-mounted air conditioner according to the present invention, a cover may be detachably attached to the aperture, and may serve as an attachment seat for a control box.

[0016] According to the present invention, the cover is detachably attached to the aperture of the unit body, and is also used as the attachment seat for the control box. Accordingly, when the blower unit in the unit body is maintained, the cover together with the control box is detached so that the blower unit can be taken out from the aperture for the maintenance. In addition to this, the cover is also used as the attachment seat for the control box, and the control box can be mounted onto the outer side surface of the unit body. Without complicating the attachment and detachment operation at the time of maintenance, the cover can also be used as the attachment seat for the control box, thereby simplifying the structure of the unit body and reducing the cost.

[0017] In any one of the above described ceiling-mounted air conditioner according to the present invention, the blower unit may include plural pairs of the fans and the motors, the plural pairs of the fans and the motors may be divided into at least two blower subunits, and each of the subunits may be individually inserted slidably through the pair of the rail members so as to be mounted in the unit body.

[0018] According to the present invention, the blower unit includes plural pairs of the fans and the motors, the plural pairs of the fans and the motors are divided into at least two blower subunits, and each of the subunits is individually inserted slidably through the pair of the rail members so as to be mounted in the unit body. Hence, even if the plural pairs of fans and motors are provided, and attached into or detached from the unit body, the plural pairs of the fans and the motors can be handled in the blower subunits divided in at least two individual subunits, each of which is individually inserted into or taken out of the unit body. Accordingly, it is unnecessary to integrally handle the plural pairs of the fans and the motors, which facilitates handling of these components at the time of maintenance without enlarging the inspection port provided on the ceiling in a wasteful manner. If the plural pairs of the fans and the motors are divided into at least two blower subunits, for example, if there are two pairs of fans and motors, they may be divided into: (1) one blower subunit including two pairs of fans and motors, or (2) two blower subunits, each including one pair of a fan and a motor; if there are three pairs of fans and motors, they may be divided into: (1) three blower subunits, each including one pair of a fan and a motor, or (2)

two blower subunits, one including one pair of a fan and a motor and the other including two pairs of fans and motors, and if there are four pairs of fans and motors, they may be divided into: (1) four subunits, each including one pair of a fan and a motor, or (2) three subunits, each of two including one pair of a fan and a motor, and the other one including two pairs of fans and motors, or (3) two subunits, each including two pairs of fans and motors.

Advantageous Effects of Invention

[0019] According to the present invention, when the blower unit is maintained, the blower unit is drawn to one side of the unit body together with the support member from the aperture provided on the one side surface of the unit body along the pair of the rail members, and the blower subunit integrated with the support member is taken out to the outside, so as to carry out the maintenance operation thereof. Accordingly, the above described configuration facilitates a take out the blower unit from the unit body mounted in the ceiling and a maintenance operation, and enhances efficiency of the operation. Furthermore, the pair of the rail members can also serve as the reinforcement member for the top plate of the unit body, thereby providing a required level of improvement in deformation and vibration characteristics of the top plate where the blower unit is mounted without increasing the thickness of the top plate.

Brief Description of Drawings

[0020]

Fig. 1 Figure 1 is a schematic side view illustrating an installation state of a ceiling-mounted air conditioner according to one embodiment of the present invention.

Fig. 2 Figure 2 is a perspective view illustrating a unit body of the ceiling-mounted air conditioner of Figure 1, viewed from below with a part of a bottom plate thereof removed.

Fig. 3 Figures 3 (A), (B), (C) are perspective views illustrating states of taking out the blower unit mounted in the unit body of Figure 2.

Fig. 4 Figure 4 is an expanded sectional view illustrating a mounting section where the blower unit is mounted in the unit body of Figure 2.

Description of Embodiments

[0021] Hereinafter descriptions will be provided on one embodiment of the present invention with reference to Figure 1 to Figure 4.

Figure 1 is a schematic side view illustrating an installation state of a ceiling-mounted air conditioner according to one embodiment of the present invention, and Figure 2 is a perspective view illustrating a unit body thereof viewed from below with a part of a bottom plate thereof

removed. Descriptions will now be provided on a duct-type ceiling-mounted air conditioner as one example of the ceiling-mounted air conditioner.

As illustrated in Figure 1, a unit body 2 of the ceiling-mounted air conditioner 1 is hung in a ceiling through plural hanging bolts provided in the vertical direction to a beam of a building.

[0022] The ceiling-mounted air conditioner 1 is configured to suck room air from a room through an inlet grill 3, a sound absorbing chamber 4 and an inlet duct 5, and heat exchange the sucked air with refrigerant to cool or heat the air, and then supply this air through an outlet duct 6, a sound absorbing chamber 7 and an outlet grill 8 toward the room. An inspection port 10 is formed in a ceiling plane 9 for the sake of an inspection or maintenance of the unit body 2 of the ceiling-mounted air conditioner 1.

[0023] The unit body 2 is formed in a box shape, and includes inside the unit body 2 an indoor heat exchanger (not illustrated) for heat exchanging room air with the refrigerant, a blower unit 11 including plural blower subunits for circulating room air, a drain pan (not illustrated) for receiving drain water generated in the indoor heat exchanger, a drain pump (not illustrated) for discharging drain water collected in the drain pan to the outside and other components, as illustrated in Figure 2. Outside of the unit body 2, the unit body 2 also includes fittings 12 for the hanging bolts provided at four positions on both the right and left side surfaces of the unit body 2, an inlet port 13 and an outlet port 14 that are disposed on both the longitudinal side surfaces, which are connected to the inlet duct 5 and the outlet duct 6 respectively, and a control box 15 is further provided on a side surface (the left side surface of Figure 2) of the unit body 2.

[0024] The blower unit 11 is mounted inside the unit body 2, and the blower unit 11 is divided into an inlet region 16 where room air is sucked through the inlet duct 5 and an outlet region 17 into which outlet air is blown from the blower unit 11. The indoor heat exchanger (not illustrated) and others are disposed in the outlet region 17, where the air is cooled or heated by the heat exchanger, and then is supplied from the outlet port 14 through the outlet duct 6 toward the room.

[0025] The blower unit 11 of the present embodiment includes three sirocco fans 18A, 18B, 18C (hereinafter also referred to simply as "fans") and two motors 19A, 19B. The blower subunit 11A is configured by coupling the sirocco fan 18A to the motor shaft of the motor 19A, and the blower subunit 11B is configured by coupling the sirocco fans 18B and 18C to opposite ends of the motor shaft of the motor 19B that is a dual shaft motor, so as to integrate two fans and one motor in the blower subunit 11B. In this way, plural pairs of the fans and the motors are divided into plural blower subunits 11A, 11B, so as to provide at least two individual blower subunits (blower subunits 11A, 11B).

[0026] The blower subunits 11A, 11B are mounted through brackets or the like to respective support mem-

bers 20A, 20B (see Figure 3, Figure 4) each of which is formed by bending a plate member substantially at a right angle, thereby integrating the blower subunits 11A, 11B with the respective support members 20A, 20B. One horizontal surfaces of the support members 20A, 20B are configured to be support plates 21A, 21B that mount and support the sirocco fans 18A, 18B, 18C and the motors 19A, 19B through brackets or the like, and the other vertical surface of the support members 20A, 20B are configured to be partition plates 22A, 22B that divide the inside of the unit body 2 into the inlet region 16 and the outlet region 17.

[0027] As illustrated in Figure 4, the sirocco fans 18A, 18B, 18C are mounted to the support members 20A, 20B such that the outlet port 23 of the fan case of each sirocco fan projects into the outlet region 17 through the partition plates 22A, 22B. Flanges are provided in the vicinity of the support plates 21A, 21B and the partition plates 22A, 22B of the support members 20A, 20B at a right angle therebetween, respectively, so as to secure enough strength to serve as the support members 20A, 20B.

[0028] In order to detachably/attachably mount the blower subunits 11A, 11B in the unit body 2, a pair of rail members 24, 25 are installed in parallel at a predetermined distance therebetween on an inner surface of the top plate 2A of the unit body 2 from one end to the other end in the lateral (right and left) direction of the top plate 2A, as illustrated in Figure 4. The pair of the rail members 24, 25 is formed of a thick plate member whose cross section is bent in a crank shape. One side of the plate member formed in a crank shape is configured to be attachment portions 24A, 25A to be attached to the top plate 2A, and the other side thereof is configured to be the rail portions 24B, 25B, which are oppositely fixed to the inner surface of the top plate 2A.

[0029] The support plates 21A, 21B of the support members 20A, 20B can be slidably inserted between the pair of the rail members 24, 25 from one end of the unit body 2. An aperture 26 is provided in one side surface of the unit body 2, which allows each of the blower subunits 11A, 11B to be individually inserted slidably between the rail members 24, 25 from one side surface (left side surface in the present embodiment) of the unit body 2, as illustrated in Figure 3(A). In this way, the plural blower subunits 11A, 11B are slidably supported to the pair of the rail members 24, 25 through the support members 20A, 20B so as to be inserted into or taken out from the unit body 2.

[0030] The aperture 26 can be closed by a detachable/attachable cover 27, and detaching this cover 27 allows the blower subunits 11A, 11B to be taken out one by one from the unit body 2. The cover 27 also serves as an attachment seat for the control box 15, on whose outer surface the cover 27 is detachably/attachably disposed, as illustrated in Figure 2 and Figure 3(A).

[0031] In the above described embodiment, the blower unit 11 including the three sirocco fans 18A, 18B, 18C and the two motors 19A, 19B is divided into the two blower

subunits 11A and 11B. Division of the plural pairs of the fans and the motors into at least two blower subunits in such a manner is for the sake of taking out the blower unit 11 smoothly through the inspection port 10 without enlarging this inspection port 10. In this embodiment, the blower unit 11 is so divided as to make the blower subunit 11B the largest blower subunit that integrates the two sirocco fans, for example.

[0032] The dividing option into plural subunits depending on the number of fans and motors can be considered as follows: for example, if there are two pairs of fans and motors, they may be divided into: (1) one blower subunit including two pairs of fans and motors, or (2) two blower subunits, each including one pair of a fan and a motor; if there are three pairs of fans and motors, they may be divided into: (1) three blower subunits, each including one pair of a fan and a motor, or (2) two blower subunits, one including one pair of a fan and a motor and the other including two pairs of fans and motors, as similar to the present embodiment; and if there are four pairs of fans and motors, they may be divided into: (1) four subunits, each including one pair of a fan and a motor, or (2) three subunits, each of two including one pair of a fan and a motor, and the other one including two pairs of fans and motors, or (3) two subunits, each including two pairs of fans and motors.

[0033] According to the present embodiment employing the above described configuration, the following operations and effects can be achieved.

When the above described air conditioner 1 is started up, the blower unit 11 is activated to rotate the three sirocco fans 18A, 18B, 18C so as to suck the room air through the intake grill 3, the sound absorbing chamber 4 and the intake duct 5 into the intake region 16 of the unit body 2, where the sucked air is supplied toward the outlet region 17 by the sirocco fans 18A, 18B, 18C. The air is cooled or heated by the indoor heat exchanger disposed in the outlet region 17, thereafter, is supplied through the outlet duct 6, the sound absorbing chamber 7 and the outlet grill 8 toward the room for the purpose of air-conditioning the room.

[0034] When an inspection or maintenance is required for the air conditioner 1, the inspection port 10 provided in the ceiling plane 9 is opened to access the unit body 2. Equipment such as the control box 15 attached to the outside of the unit body 2 can be inspected and maintained by simply opening the cover of the control box 15 or detaching the control box 15. Equipment installed inside the unit body 2, however, is usually taken out from the unit body 2 through the inspection port 10 toward the room.

[0035] In the present embodiment, the inspection and or maintenance for the blower subunits 11A, 11B mounted in the unit body 2 are carried out as follow.

As illustrated in Figure 3(A), the cover 27 along with the control box 15 is detached from the unit body 2 so as to open the aperture 26. Then, the blower unit 11 can be taken out to one side of the unit body 2. Since the blower

unit 11 is divided into plural individual blower subunits (blower subunits 11A, 11B), the frontmost blower subunit 11A together with the support member 20A is drawn to one side of the unit body 2 along the pair of the rail members 24, 25, as illustrated in Figure 3(B), so as to take out the blower subunit 11A from the unit body 2. Taking out the blower subunit 11A through the inspection port 10 toward the room makes it possible to apply a certain inspection and or maintenance to the blower subunit 11A.

[0036] Next, the posterior blower subunit 11B can be taken out from the unit body 2 by drawing the support member 20B, to which the blower subunit 11B is attached, to one side of the unit body 2 along the pair of the rail members 24, 25, in the same manner as the blower subunit 11A, as illustrated in Figure 3(C). The blower subunit 11B in which the two sirocco fans 18B, 18C are integrated has a length substantially twice the length of the blower subunit 11A, and this length is long enough to pass through the inspection port 10, and a certain inspection and or maintenance can be applied to the blower subunit 11B by taking out the blower subunit 11B through the inspection port 10 toward the room.

[0037] Even if the ceiling-mounted air conditioner 1 is equipped with the blower unit 11 installed on the top plate 2A of the unit body 2 and including the plurality of the blower subunits 11A, 11B, or even if the ceiling-mounted air conditioner 1 has the blower subunit 11B using the dual-shaft motor 19B, drawing out the blower subunits 11A, 11B together with the support members 20A, 20B along the rail members 24, 25 so as to take out the blower subunits 11A, 11B from the unit body 2 makes it possible to readily perform an inspection and or maintenance on the blower unit 11 in the room. Further, the pair of the rail members 24, 25 installed on the top plate 2A of the unit body 2 can also serve as a reinforcement member for the top plate 2A.

[0038] As described above, according to the present embodiment, the blower subunits 11A, 11B together with the support members 20A, 20B are drawn along the pair of the rail members 24, 25 to one side of the unit body 2 and the support members 20A, 20B integrated with the blower subunits 11A, 11B are taken out to the outside, so as to carry out the inspection and maintenance operation thereof. Accordingly, the above described configuration of the present embodiment facilitates the take out the blower subunits 11A, 11B from the unit body 2 mounted in the ceiling and the inspection and maintenance operation, and enhances efficiency of the operation. Furthermore, the pair of the rail members 24, 25 can also serve as the reinforcement member for the top plate 2A of the unit body 2, thereby providing a required level of improvement in deformation and vibration characteristics of the top plate 2A where the blower unit 11 is mounted without increasing the thickness of the top plate 2A.

[0039] Each outlet port 23 of the sirocco fans 18A, 18B, 18C included in the blower unit 11 projects through the partition plates 22A, 22B of the support members 20A, 20B into the outlet region 17. Accordingly, the outlet air

blowing from each outlet port 23 of the sirocco fans 18A, 18B, 18C can be directly introduced into the outlet region 17 in the unit body 2, which is partitioned by the partition plates 22A, 22B. As a result, it is unnecessary to provide a wind shielding member or the like between the partition plates 22A, 22B partitioning the inside of the unit body 2 and the outlet port 23 of the sirocco fans 18A, 18B, 18C, thereby simplifying the structure of the unit body 2.

[0040] The pair of the rail members 24, 25 is formed of a plate member whose cross section is bent in a crank shape, and the rail portions 24B, 25B thereof are oppositely fixed to the inner surface of the top plate 2A of the unit body 2. Configuring one side of the plate member having the cross section bent into a crank shape to be the attachment portions 24A, 25A to the top plate 2A, and configuring the other side thereof to be the rail portions 24B, 25B oppositely mounted to the inner surface of the top plate 2A of the unit body 2 enables the plate member in the crank shape to serve as the pair of the rail members 24, 25 allowing the blower subunits 11A, 11B to be slidably inserted and mounted into the unit body 2 as well as the reinforce member for the top plate 2A. Accordingly, using the rail members 24, 25 for installing the blower unit as the reinforcement member for the top plate 2A improves deformation and vibration characteristics of the top plate 2A of the unit body 2 at a required level, thereby simplifying the structure of the unit body 2 and reducing the cost.

[0041] In the present embodiment, the cover 27 is detachably/attachably provided to the aperture 26 of the unit body 2, and is also used as the attachment seat for the control box 15. Accordingly, when the blower subunits 11A, 11B in the unit body 2 are maintained, the cover 27 along with the control box 15 is detached so that the blower subunits 11A, 11B can be taken out from the aperture 26 for the maintenance. At the same time, the cover 27 is also used as the attachment seat for the control box 15, and the control box 15 can be mounted onto the outer side surface of the unit body 2. Without complicating the attachment and detachment operation at the time of maintenance, the cover 27 can also be used as the attachment seat for the control box 15, thereby simplifying the structure of the unit body 2, thus reducing the cost.

[0042] The blower unit 11 includes plural pairs of the sirocco fans 18A, 18B, 18C and the motors 19A, 19B, and is divided into at least two individual blower subunits (blower subunits 11A, 11B), and the blower subunits 11A, 11B are individually inserted and mounted into the unit body 2 slidably along the pair of the rail members 24, 25. Hence, even if the plural pairs of the fans and the motors are provided, and attached or detached into the unit body 2, the plural pairs of the sirocco fans 18A, 18B, 18C and the motors 19A, 19B can be handled in the blower subunits 11A, 11B divided into at least two individual subunits, each of which is individually inserted into or taken out from the unit body 2. Accordingly, it is unnecessary to integrally handle the plural pairs of the sirocco fans 18A, 18B, 18C and the motors 19A, 19B, which fa-

facilitates the handling these components at the time of maintenance without enlarging the inspection port 10 provided on the ceiling plane 9 in a wasteful manner.

[0043] The present invention is not limited to the invention according to the above described embodiment, and may be appropriately modified without departing from the spirit and scope of the invention. For example, the blower unit 11 has been described by using the example having the three sirocco fans 18A, 18B, 18C and the two motors 19A, 19B, but the number of the sirocco fans and the motors of the present invention may not be limited to this, and may be three or more or less.

The fans have been described by using the example of sirocco fans, but the present invention is not limited to this, may be applicable to a case using other fans, not to mention such as propeller fans.

{Reference Signs List}

[0044]

1	Ceiling-mounted air conditioner	
2	Unit body	
2A	Top plate	
11	Blower unit	
11A, 11B	Blower subunit	
15	Control box	
16	Inlet region	
17	Outlet region	
18A, 18B, 18C	Sirocco fan (fan)	
19A, 19B	Motor	
20A, 20B	Support member	
21A, 21B	Support plate	
22A, 22B	Partition plate	
23	Outlet port	
24, 25	Rail member	
24B, 25B	Rail portion	
26	Aperture	
27	Cover	

Claims

1. A ceiling-mounted air conditioner comprising a unit body (2) in a box shape mounted in a ceiling, and a heat exchanger and a blower unit (11) that are mounted in the unit body, **characterized in that** the unit body includes:

a support member (20A,20B) bent substantially at a right angle, one surface of which is configured to be a partition plate (22A, 22B) for partitioning an inside of the unit body into an inlet region and an outlet region, and the other surface of which is configured to be a support plate (21A,21B) for supporting at least one fan (18A, 18B,18C)and at least one motor (19A,19B) of the blower unit,
in that the blower unit is integrated with the support member,

in that the unit body further includes:

a pair of rail members (24,25) installed in parallel at a predetermined distance therebetween on an inner surface of a top plate (2A) from one end to the other end of the top plate of the unit body; and
an aperture (26) provided in one side surface of the unit body,
and
in that the blower unit (11) is slidably inserted between the rail members from the aperture (26) so as to be mounted into the unit body through the support member.

2. The ceiling-mounted air conditioner according to claim 1, wherein the blower unit (11) has an outlet port (23) of the fan projecting into the outlet region through the partition plate (22A,22B) of the support member.
3. The ceiling-mounted air conditioner according to claim 1 or 2, wherein the rail members (24,25) are formed of a plate member whose cross section is bent in a crank shape and whose rail portions (24B,25B) are oppositely fixed to an inner surface of the top plate (2A) of the unit body.
4. The ceiling-mounted air conditioner according to any one of claims 1 to 3, wherein a cover (27) is detachably attached to the aperture (26), and serves as an attachment seat for a control box (15).
5. The ceiling-mounted air conditioner according to any one of claims 1 to 4, wherein the blower unit (11) includes plural pairs of the fans

(18A,18B,18C) and the motors (19A,19B), the plural pairs of the fans and the motors are divided into at least two individual blower subunits (11A,11B), and each of the subunits is individually inserted slidingly through the pair of the rail members (24,25) to be mounted in the unit body.

10

15

20

25

30

35

40

45

50

55

FIG. 1

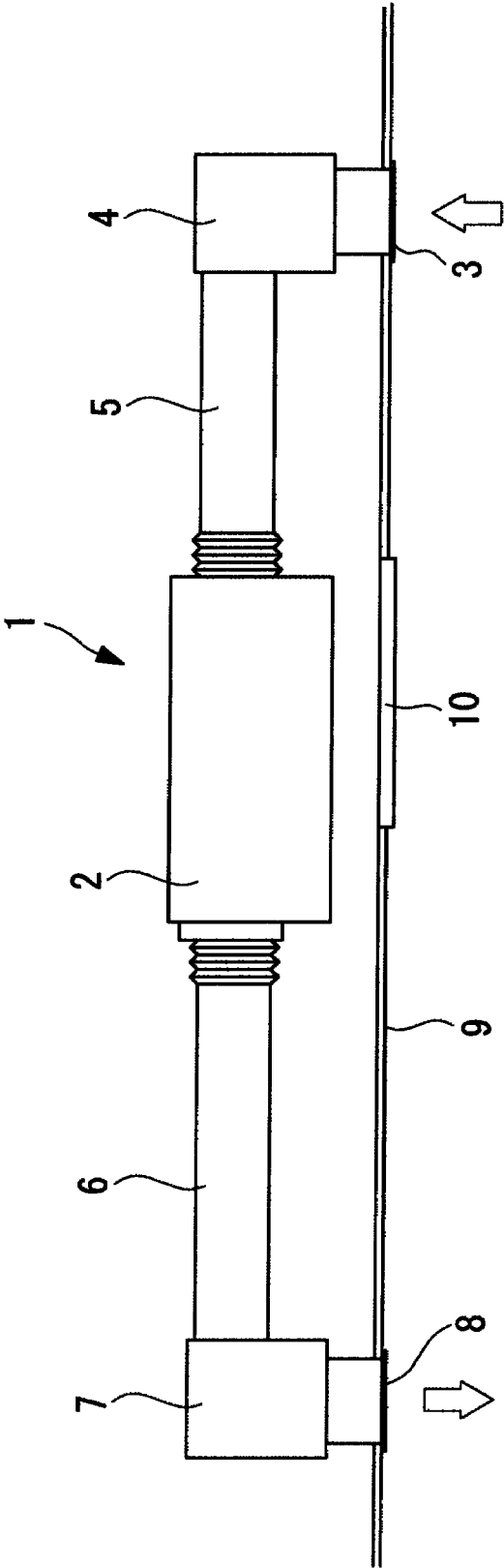


FIG. 2

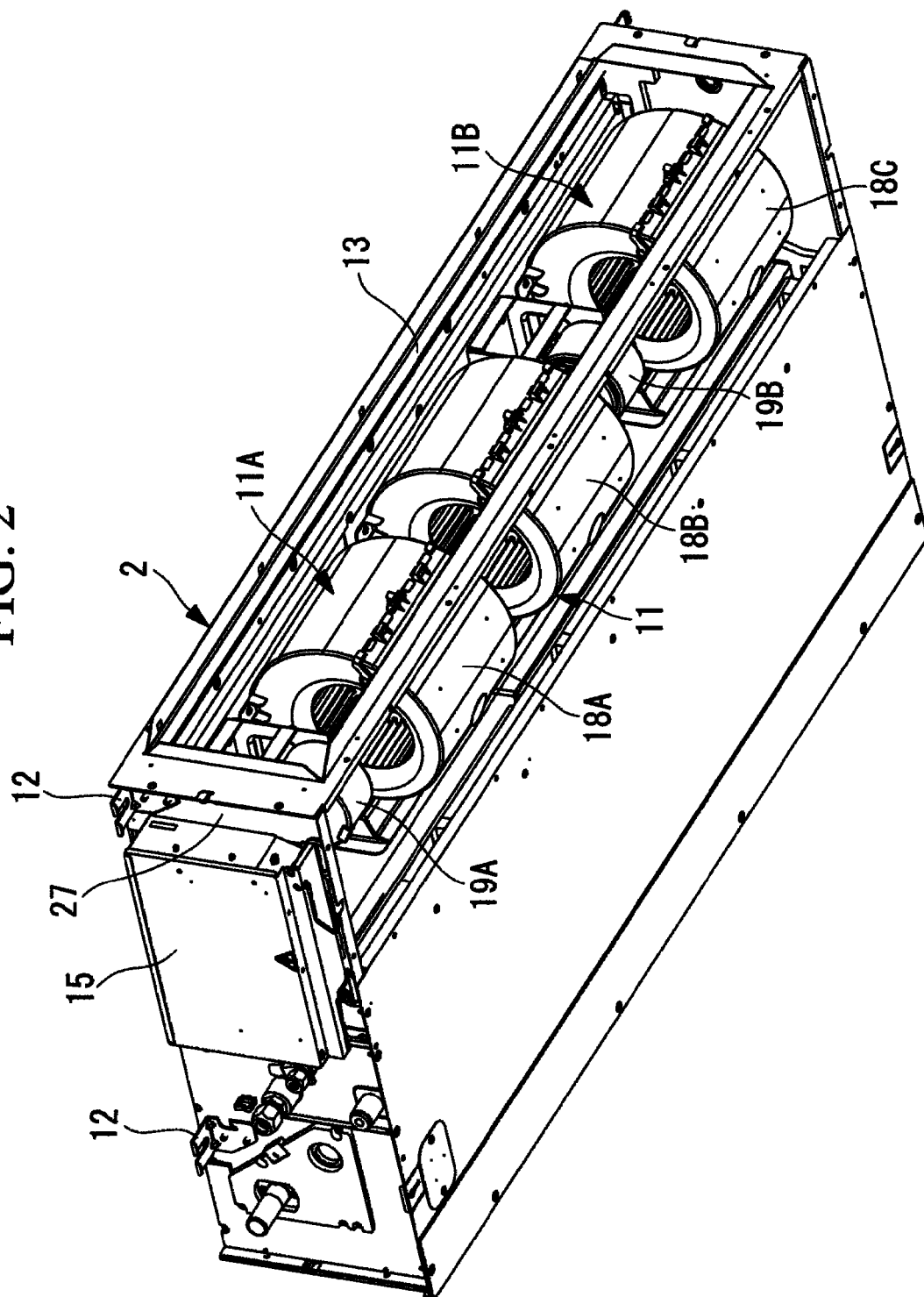


FIG. 3

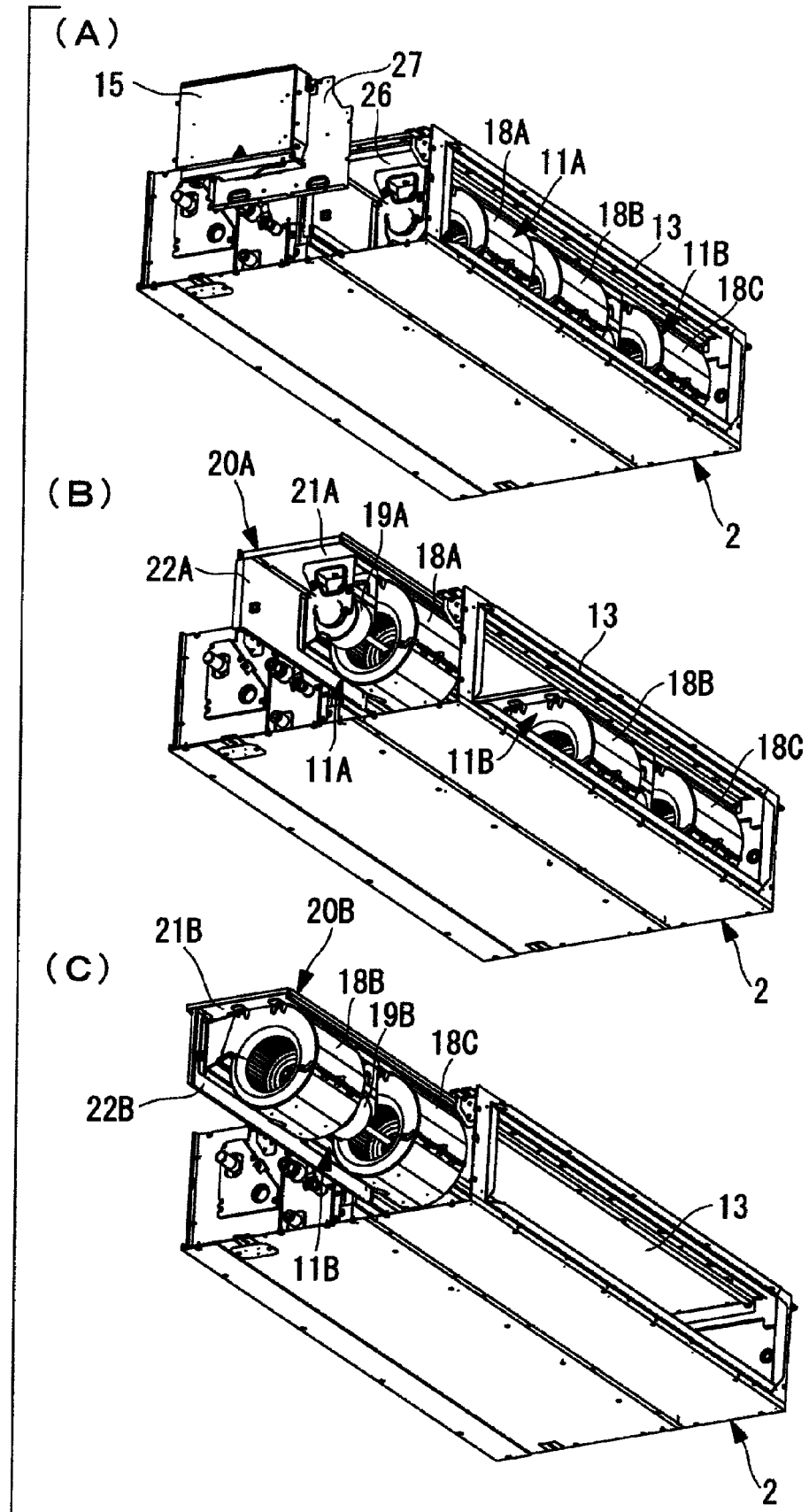
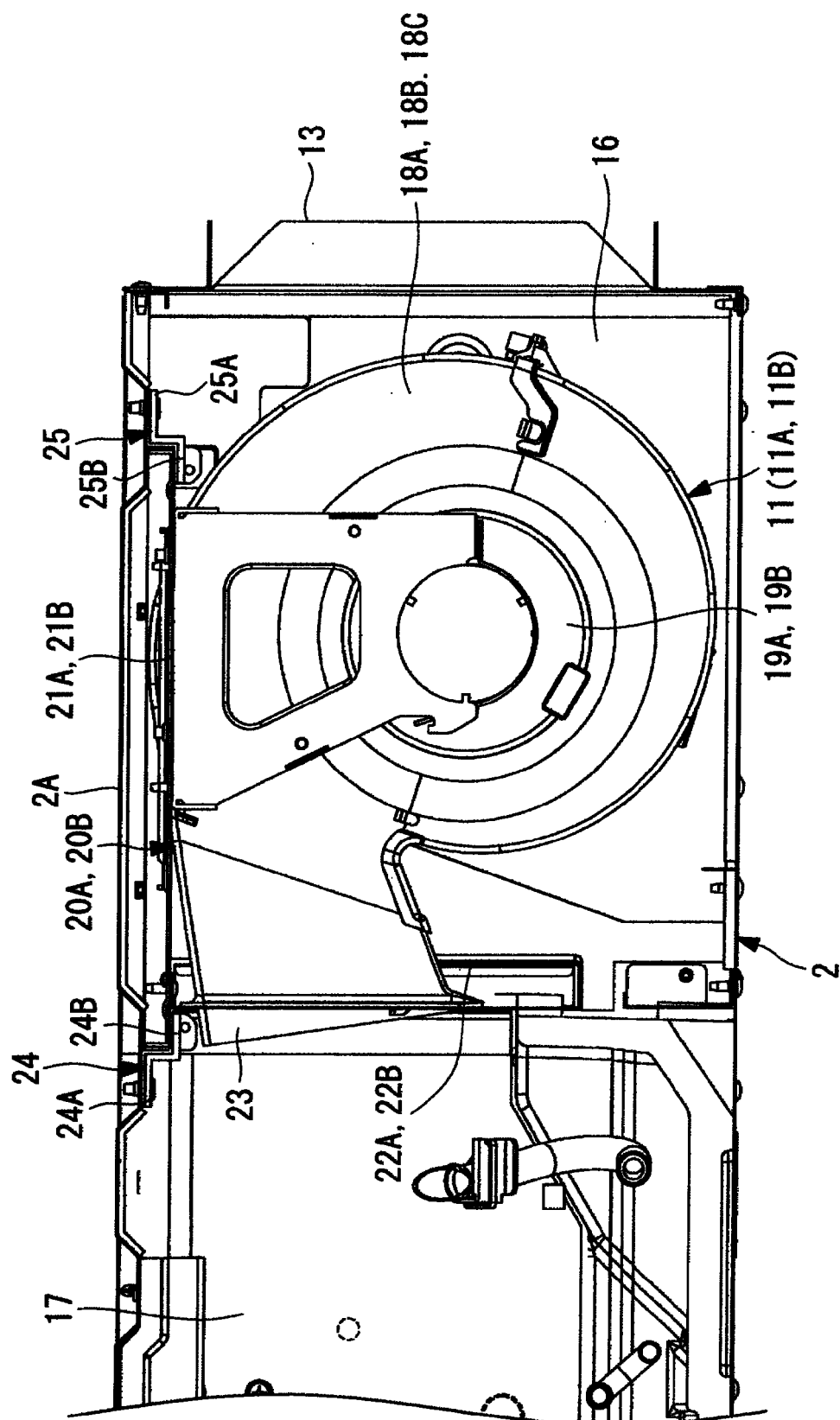


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 12 16 6175

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 108 897 A1 (HITACHI APPLIANCES INC [JP]) 14 October 2009 (2009-10-14) * column 8; claim 1; figures 1-6 *	1-5	INV. F24F1/00
Y	WO 2009/119524 A1 (TOSHIBA CARRIER CORP [JP]; OKUDA KENJI [JP]) 1 October 2009 (2009-10-01) * abstract; figure all *	1-5	
Y	JP 10 332169 A (HITACHI LTD) 15 December 1998 (1998-12-15) * abstract; figures 1,3,5,8,9,10,11,12 *	5	
A	EP 1 103 768 A2 (ROSENBERG VENTILATOREN GMBH [DE]) 30 May 2001 (2001-05-30) * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
Place of search		Date of completion of the search	Examiner
Munich		27 June 2012	Decking, Oliver
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 6175

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-06-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2108897 A1	14-10-2009	EP 2108897 A1	14-10-2009
		JP 2009250545 A	29-10-2009

WO 2009119524 A1	01-10-2009	NONE	

JP 10332169 A	15-12-1998	NONE	

EP 1103768 A2	30-05-2001	DE 29920574 U1	13-04-2000
		EP 1103768 A2	30-05-2001

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 HEI07084930 B [0005]
- JP 2561906 B [0005]