

30 In order to achieve the above objective, an embodiment of the present invention provides an indoor unit for an air conditioner comprising: a main body including a fan and a heat

exchanger; a casing which accommodates the main body; a front panel which is configured to be attachable to and detachable from the casing; and a left side panel and a right side panel which cover side surfaces of the casing respectively, wherein the casing is configured to be attachable to and detachable from the main body, and wherein the left side panel and the right side panel are configured to be attachable to and detachable from the casing.

According to the embodiment of the present invention, firstly, since the casing is configured to be attachable to and detachable from the main body, a service man can detach the casing from the main body of the indoor unit which is fixed on the wall.

Then, the casing which is detached from the main body is put on the floor. As such, it is easier for the service man to check the casing, the front panel, the left side panel and the right side panel, as compared with a condition where the indoor unit is fixed on the wall.

Secondly, the front panel is configured to be attachable to and detachable from the casing as well as the left side panel and the right side panel are configured to be attachable to and detachable from the casing. As such, it is much easier for the service man to change the front panel, the left side panel and/or the right side panel in the condition where the casing is put on the floor.

Thirdly, since the front panel, the left side panel and the right side panel are configured to be attachable to and detachable from the casing, the aesthetic appearance of the indoor unit corresponding to the taste of a user is improved.

Therefore, according to the embodiment of the present invention, it is possible that the service man can easily change each panel as well as that the aesthetic appearance of the indoor unit is improved.

In the indoor unit for the air conditioner of the embodiment of the present invention, the front panel covers an end part of each of the left side panel and the right side panel, and each of the left side panel and the right side panel is configured to be detachable from the casing by moving it along the side surface of the casing in the direction of the front side of the casing.

According to the embodiment of the present invention, unless each of the left side panel and the right side panel is moved along the side surface of the casing in the direction of the front side of the casing, the each of the left side panel and the right side panel is not able to detached from the casing.

Therefore, it is possible to prevent the each of the left side panel and the right side panel from falling down accidentally from the casing before the front panel is detached from the casing.

Additionally, the front panel is fixed to the casing via a first fastening mechanism.

According to the embodiment of the present invention, when the front panel is fixed to the casing, it is possible to prevent the front panel from falling down accidentally from the casing securely as well as to prevent the each of the left side panel and the right side panel from falling down accidentally from the casing more securely.

5 In the indoor unit for the air conditioner of the embodiment of the present invention, the indoor unit further comprises a bottom panel which covers a bottom surface of the casing and is configured to be attachable to and detachable from the casing.

 According to the embodiment of the present invention, since the bottom panel is configured to be attachable to and detachable from the casing, it is much easier for the service
10 man to change the bottom panel. Moreover, by changing the bottom panel, the aesthetic appearance of the indoor unit corresponding to the taste of a user is improved.

 In the indoor unit for the air conditioner of the embodiment of the present invention, the bottom panel is configured to be detachable from the casing by detaching the left side panel and the right side panel from the casing.

15 According to the embodiment of the present invention, only by detaching the left side panel and the right side panel from the casing, the bottom panel is able to be detached from the casing. Therefore, it is possible to realize the unity of work among the service men as well as to attach easily and securely the bottom panel to the casing by the left side panel and the right side panel.

20 In the indoor unit for the air conditioner of the embodiment of the present invention, a left side part and a right side part of the bottom panel are supported from below by the left side panel and the right side panel respectively.

 According to the embodiment of the present invention, only by detaching both the left side panel and the right side panel from the casing, the bottom panel is able to be detached from
25 the casing. Therefore, it is possible to prevent the bottom panel from falling down accidentally from the casing before both the left side panel and the right side panel are detached from the casing.

 In the indoor unit for the air conditioner of the embodiment of the present invention, each of the left side panel and the right side panel is fixed to the casing via a second fastening
30 mechanism.

 According to the embodiment of the present invention, when the each of the left side panel and the right side panel is fixed to the casing, it is possible to prevent the each of the left side panel and the right side panel from falling down accidentally from the casing more securely.

In the indoor unit for the air conditioner of the embodiment of the present invention, the bottom panel is fixed to the casing via a third fastening mechanism.

According to the embodiment of the present invention, when the bottom panel is fixed to the casing, it is possible to prevent the bottom panel from falling down accidentally from the casing more securely.

BRIEF DESCRIPTION OF DRAWINGS

The principle of the present invention and its advantages will become apparent in the following description taking in consideration with the accompanying drawings in which:

- 10 FIG.1 is a perspective view of an indoor unit 1;
FIG.2 is a development view of the indoor unit 1;
FIG.3 is a front view of a front panel 40;
FIG.4 is a rear view of the front panel 40;
FIG.5 is an explanation view about an engagement state where the front panel 40 is engaged
- 15 with a casing 20;
FIG.6 is the explanation view about a disengagement state where the front panel 40 is not engaged with the casing 20;
FIG.7 is the explanation view about the relation between the casing 20 and a right side panel 50b;
- 20 FIG.8 is a perspective view of a bottom panel 60;
FIG.9A is an enlarged view of a portion A encircled with a broken line, in FIG.8;
FIG.9B is an enlarged view of a portion B encircled with a broken line, in FIG.8;
FIG.10 is the explanation view about the relation between the casing 20 with a main body 10 and the bottom panel 60;
- 25 FIG.11 is the casing 20 when viewed from below; and
FIG.12 is the explanation view about the relation between the bottom panel 60 and the right side panel 50b.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

- 30 Hereinafter, an embodiment of the present invention will be described in detail with reference to the drawings.

An air conditioner includes an indoor unit 1 provided in a room and an outdoor unit (not shown) connected to the indoor unit 1 by piping and provided outside the room. The indoor unit

1 sucks air from the room, adjusts a temperature or humidity thereof and then blows out the air to the room, thereby performing air-conditioning in the room.

As shown in FIG.1 and FIG.2, the indoor unit 1 includes a main body 10 including a fan 12, a heat exchanger 14, etc., a casing 20 which accommodates the main body 10, a front panel 40 which covers a front surface of the casing 20, a left side panel 50a and a right side panel 50b which cover side surfaces of the casing 20 respectively, and a bottom panel 60 which covers a bottom surface of the casing 20.

Here, the front surface, the bottom surface, and the side surfaces which consist of a left surface and a right surface are surfaces expressed with reference to a state in which the indoor unit 1 is installed. Therefore, the front surface is a front side surface of the indoor unit 1, the bottom surface is a surface on the side of the floor of the room, and the side surfaces are right and left surfaces in a lateral direction toward the wall surface sides of the room.

The casing 20 is a member which covers the main body 10 and is formed to open to the rear side of the casing 20 in a state where the indoor unit 1 is fixed on the wall. The casing 20 includes a body portion 22 which is formed in substantially a horizontally elongated rectangular parallelepiped shape having an air inlet port formed at a top surface and the front surface and an air outlet port formed at a lower portion thereof, and side portions 24,24 which are provided on both right and left end sides of the body portion 22. Namely, the casing 20 covers the surfaces of the main body 10 excluding a rear surface of the main body 10.

The casing 20 is configured to be attachable to and detachable from the main body 10, so that a service man can detach the casing 20 from the main body 10 of the indoor unit 1 which is fixed on the wall.

A pair of grooves 30,30 are provided at the front side of the casing 20, and the groove 30 is formed in a shape so that a plate member 42 of the front panel 40 to be described later is insertable into the groove 30. Also, a notch part 30a is provided in each of the groove 30, and is formed at a position corresponding to a tip of the plate member 42.

As shown in FIG.2, plural catch members 32 are provided at the lower portion of the front side of the casing 20, and the catch member 32 is formed as a latching hole. In each catch member 32, a catch member engagement part (not shown) is formed so that a caught member 44 of the front panel 40 to be described later is engaged with the catch member engagement part. The number of the catch members 32 is 4 in FIG.1, but there is no limit on the number of the catch members 32.

As shown in FIG.2 and FIG.7, the side portion 24 of the casing 20 includes 2 first hooks 34,34. Each first hook 34 is formed in an U-shaped slit so as to open on the front side of the casing 20.

As shown in FIG.10 and FIG.11, the bottom surface of the casing 20 includes a pair of
5 second hooks 36,36. Each of second hooks 36,36 is formed in an U-shaped slit so as to open to a center side of the bottom surface of the casing 20.

As shown in FIG.1 and FIG.2, the front panel 40 is configured to be attachable to and detachable from the body portion 22 of the casing 20 to cover a front surface of the casing 20 and to suck the air into the casing 20 through the air inlet port from a space between the front
10 panel 40 and the casing 20.

As described above, the front panel 40 includes the plate member 42 which is insertable into the groove 30 of the casing 20, at the rear side of the front panel 40. Moreover, as shown in FIG.2 to FIG.6, a columnar projection 42a is provided at the tip of the plate member 42 of the front panel 40, so that the columnar projection 42a is engaged with the notch part 30a of the
15 groove 30 in a state where the front panel 40 is attached to the casing 20 as well as is rotated along the inside surface of the notch part 30a.

As such, since the front panel 40 can be opened simply by rotating the columnar projection 42a along the inside surface of the notch part 30a. As a result, the left side panel 50a, the right side panel 50b and the bottom panel 60 can be attached or detached simply by opening
20 the front panel 40 without detaching the front panel 40 from the casing 20.

As shown in FIG.4, plural caught members 44, each of which is an “engagement claw”, are provided at the lower portion of the rear side of the front panel 40. The caught member 44 is formed to be engaged with the catch member engagement part of the casing 20.

Namely, when the caught member 44 of the front panel 40 is engaged with the catch
25 member engagement part of the catch member 32 of the casing 20, a first fastening mechanism by the caught member 44 and the catch member 32 is configured between the front panel 40 and the casing 20. Namely, the front panel 40 is fixed to the casing 20 via the first fastening mechanism.

The configuration of the first fastening mechanism is not limited to the caught member
30 44 and the catch member 32, so long as the front panel 40 is engaged with the casing 20. For example, the second fastening mechanism may be configured by different flexible hook shaped members.

As shown in FIG.1 to FIG.4, for the purpose of avoiding the left side panel 50a and the right side panel 50b from moving to the front side of the casing 20, the front panel 40 includes a

left side bending portion 46a and a right side bending portion 46b at a left side edge part and at a right side edge part respectively. The left side bending portion 46a and the right side bending portion 46b are formed to be bent backward.

As such, the front panel 40 covers an end part of each of the left side panel 50a and the right side panel 50b by the left side bending portion 46a and the right side bending portion 46b, thereby the front panel 40 avoids the left side panel 50a and the right side panel 50b from moving to the front side of the casing 20. Therefore, it is possible to prevent the each of the left side panel 50a and the right side panel 50b from falling down accidentally from the casing 20 more securely.

As shown in FIG.2, the left side panel 50a and the right side panel 50b are the members that cover the side surface of the casing 20 and configured to be attachable to and detachable from the casing 20.

The left side panel 50a and the right side panel 50b include first U-shaped protrusions 52,52. For the purpose of preventing each of the left side panel 50a and the right side panel 50b from falling down accidentally from the casing 20 more securely, each of first U-shaped protrusions 52,52 is formed to be engageable with the first hook 34 of the casing 20 (See FIG.7.).

As such, when the each of the left side panel 50a and the right side panel 50b is engaged with the first hooks 34,34 of the casing 20, a second fastening mechanism by the protrusions 52,52 of the left and right side panel 50a,50b and the first hook 34 is configured between the left and right side panels 50a,50b and the casing 20. Namely, each of the left side panel 50a and the right side panel 50b is fixed to the casing 20 via the second fastening mechanism.

The configuration of the second fastening mechanism is not limited to the second protrusions 52,52 and the first hook 34, so long as the each of the left side panel 50a and the right side panel 50b is engaged with the casing 20. For example, the second fastening mechanism may be configured by different flexible hook shaped members.

Moreover, the left side panel 50a (the right side panel 50b) includes a support portion 54 which supports the left side part (the right side part) of the bottom panel 60 from below. As such, the bottom panel 60 is supported by the support portion 54 as well as arranged sandwiched between the bottom surface of the casing 20 and the support portion 54 of the left side panel 50a (the right side panel 50b). Therefore, it is possible to prevent the bottom panel 60 from falling down accidentally from the casing 20 before both the left side panel 50a and the right side panel 50b are detached from the casing 20.

Furthermore, each of the left side panel 50a and the right side panel 50b includes a pair of first locking claws 56,56. As shown in FIG.12, the pair of first locking claws 56,56 are formed

to be insertable into an approximately rectangular first locking hole 62 of the bottom panel 60. The first locking hole 62 is formed in the approximately rectangular shape to extend along the short-side direction of the bottom panel 60.

Namely, the first hook 34 is formed in an U-shaped slit so as to open on the front side of the casing 20 as well as the pair of first locking claws 56,56 are formed to be insertable into the approximately rectangular first locking hole 62 of the bottom plate. As such, after the engagement between the first hooks 34,34 of the casing 20 and the first protrusions 52,52 is released, each of the left side panel 50a and the right side panel 50b can be detachable from the casing 20 by moving it along the side surface of the casing 20 in the direction of the front side of the casing 20.

As a result, unless each of the left side panel 50a and the right side panel 50b is moved along the side surface of the casing 20 in the direction of the front side of the casing 20, the each of the left side panel 50a and the right side panel 50b is not able to detached from the casing 20. Therefore, it is possible to prevent the each of the left side panel 50a and the right side panel 50b from falling down accidentally from the casing 20 before the front panel 40 is detached from the casing 20.

As shown in FIG.2, FIG.8 to FIG.10 and FIG.12, the bottom panel 60 is a member that covers the bottom surface of the casing 20 and configured to be attachable to and detachable from the casing 20. As such, it is much easier for the service man to change the bottom panel 60. Moreover, by changing the bottom panel 60, the aesthetic appearance of the indoor unit 1 corresponding to the taste of a user is improved.

As described above, the left side part (the right side part) of the bottom panel 60 is supported by the support portion 54 of the left side panel 50a (the right side panel 50b) from below. As such, the bottom panel 60 is configured to be detachable from the casing 20 by detaching the left side panel 50a and the right side panel 50b from the casing 20.

As such, only by detaching the left side panel 50a and the right side panel 50b from the casing 20, the bottom panel 60 is able to be detached from the casing 20. Therefore, it is possible to realize the unity of work among the service men as well as to attach easily and securely the bottom panel 60 to the casing 20 by the left side panel 50a and the right side panel 50b.

Moreover, as shown in FIG.8, FIG.9A and FIG.10, the bottom panel 60 includes second protrusions 64,64 which are engaged with the second hooks 36,36 of the casing 20 respectively.

As such, when the second protrusions 64,64 of the bottom panel 60 are engaged with the second hooks 36,36 of the casing 20, a third fastening mechanism by the second protrusion 64 and the second hook 36 is configured between the bottom panel 60 and the casing 20. Namely,

the bottom panel 60 is fixed to the casing 20 via a third fastening mechanism. Therefore, it is possible to prevent the bottom panel 60 from falling down accidentally from the casing 20 more securely.

The configuration of the third fastening mechanism is not limited to the second protrusion 64 and the second hook 36, so long as the bottom panel 60 is engaged with the casing 20. For example, the third fastening mechanism may be configured by different flexible hook shaped members.

Furthermore, as shown in FIG.8 to FIG.10, the bottom panel 60 includes second locking claws 66 which are formed to be engaged with second locking holes 38 of the bottom surface of the casing 20. The second locking claw 66 is formed in an approximately L-shaped cross section, so as to raise from the bottom panel 60. The tip of the second locking claw 66 is formed to be directed toward the rear side of the casing 20 in a state where the bottom plate is attached to the casing 20. The second locking hole 38 of the bottom surface is formed in the approximately rectangular shape to extend along the short-side direction of the casing 20.

As such, when the bottom panel 60 is detached from the casing 20, the bottom panel 60 can be detached from the casing 20 by moving the bottom panel 60 along the bottom surface of the casing 20 in the direction of front side of the casing 20.

Next, a method for detaching the panels from the indoor unit 1 is described in details with reference to FIG.2 to FIG.12.

Normally, the indoor unit 1 is attached on the upper portion of the wall in the room. Firstly, for the purpose of improving the aesthetic appearance of the indoor unit 1 by changing each panel, the casing 20 with the panels 40, 50a, 50b, 60 is detached from the main body 10 of the indoor unit 1 which is fixed on the wall. Since the casing 20 is configured to be detachable from the main body 10, a service man can detach the casing 20 from the main body 10 of the indoor unit 1 which is fixed on the wall.

Secondly, the casing 20 which is detached from the main body 10 is put on the floor. As such, it is easier for the service man to check the casing 20, the front panel 40, the left side panel 50a, the right side panel 50b and the bottom panel 60, as compared with a condition where the indoor unit 1 is fixed on the wall.

The front panel 40 includes the left side bending portion 46a and the right side bending portion 46b at a left side edge part and at a right side edge part respectively. Since the left side bending portion 46a and the right side bending portion 46b are formed to be bent backward and to cover an end part of each of the left side panel 50a and the right side panel 50b, the front panel

40 avoids the left side panel 50a and the right side panel 50b from moving to the front side of the casing 20.

Moreover, the engagement between the first hooks 34,34 of the casing 20 and the first U-shaped protrusions 52,52 of the left and right side panels 50a,50b, the engagement between
5 the first locking claws 56,56 of the left and right side panels 50a, 50b and the first locking hole 62 of the bottom panel 60, the engagement between the second locking holes 38 of the casing 20 and the second locking claws 66 of the bottom panel 60, and the engagement between the second hooks 36,36 of the casing 20 and the second protrusions 64,64 of the bottom panel 60 are formed.

10 As such, while the casing 20 with the front panel 40, the left side panel 50a, the right side panel 50b, and the bottom panel 60 is moved from the attached position to the floor, it is possible to prevent each of the front panel 40, the left side panel 50a, the right side panel 50b, and the bottom panel 60 from falling down accidentally from the casing 20 more securely,

Thirdly, in case that front panel 40 is changed, since the front panel 40 is configured to
15 be detachable from the casing 20, the front panel 40 is detached from the casing 20, by releasing the engagement between the catch members 32 of the casing 20 and the caught member 44 of the front member.

On the other hand, in case that front panel 40 is not changed, the front panel 40 is opened simply by rotating the columnar projection 42a of the front panel 40 along the inside surface of
20 the notch part 30a of the casing 20, by releasing the engagement between the catch members 32 of the casing 20 and the caught member 44 of the front member.

In any case, the left side bending portion 46a and the right side bending portion 46b of the front panel 40 do not cover an end part of each of the left side panel 50a and the right side panel 50b, thereby the left side panel 50a and the right side panel 50b can be movable along the
25 side surface of the casing 20 in the direction of the front side of the casing 20.

Fourthly, the left side panel 50a and/or the right side panel 50b is detached from the casing 20 by releasing the engagement between the first hooks 34,34 of the casing 20 and the first U-shaped protrusions 52,52 of the left side panel 50a and/or the right side panel 50b.

Then, by moving the left and the right side panels 50a, 50b along the side surface of the
30 casing 20 in the direction of the front side of the casing 20 and releasing the engagement between the first locking claws 56,56 of the left and right side panels 50a, 50b and first locking hole 62 of the bottom panel 60, the left and right side panels 50a, 50b are detached from the casing 20.

In case that each of the left and the right side panels 50a, 50b is moved along the side surface of the casing 20 in the direction of the front side of the casing 20, the each of the left and right side panels 50a, 50b is detached from the casing 20.

Finally, by releasing the engagement between the second hooks 36,36 of the casing 20 and the second licking claws 64,64 of the bottom panel 60, and then by moving the bottom panel 60 along the bottom surface of the casing 20 in the direction of front side of the casing 20, the bottom panel 60 is detached from the casing 20.

The casing 20 with the front panel 40, the left side panel 50a, the right side panel 50b, and the bottom panel 60 is attached to the main body 10 by a reverse procedure.

10 Namely, in a state where the front panel 40 is opened or detached from the casing 20, after the bottom panel 60 is attached to the casing 20, the left side panel 50a and the right side panel 50b are attached to the casing 20. After that, the front panel 40 is firmly attached to the casing 20.

15 After the casing 20 to which the front panel 40, the left and right side panels 50a, 50b and the bottom panel 60 is attached is assembled, the assembled casing 20 is attached to the main body 10 which is fixed on the wall.

20 According to the indoor unit 1, since the front panel 40, the left and right side panels 50a, 50b and the bottom panel 60 are configured to be attachable to and detachable from the casing 20, it is much easier for the service man to change the front panel 40, the left side panel 50a and/or the right side panel 50b and the bottom panel 60 in the condition where the casing 20 is put on the floor. As such, the aesthetic appearance of the indoor unit 1 corresponding to the taste of a user is improved.

Therefore, it is possible that the service man can easily change each panel as well as that the aesthetic appearance of the indoor unit 1 is improved.

25 Moreover, only by detaching the left side panel 50a and the right side panel 50b from the casing 20, the bottom panel 60 is able to be detached from the casing 20. Therefore, it is possible to realize the unity of work among the service men as well as to attach easily and securely the bottom panel 60 to the casing 20 by the left side panel 50a and the right side panel 50b.

30 Although specific embodiments of the invention have been disclosed and described as well as illustrated in the accompanying drawings, it is simply for the purpose of better understanding of the principle of the present invention and it is not as a limitation of the scope and spirit of the teaching of the present invention. Adaption and modification to various structures such as design or material of the invention, mounting mechanism of various parts and

elements or embodiments are possible and apparent to a skilled person without departing from the scope of the present invention which is to be determined by the claims.

List of reference:

- 1: indoor unit
- 5 10: main body
- 12: fan
- 14: heat exchanger
- 20: casing
- 22: body portion
- 10 24: side portion
- 30: groove
- 30a: notch part
- 32: catch member
- 34: first hook
- 15 36: second hook
- 38: second locking hole
- 40: front panel
- 42: plate member
- 42a: projection
- 20 44: caught member (engagement claw)
- 46a: left side bending portion
- 46b: right side bending portion
- 50a: left side panel
- 50b: right side panel
- 25 52: first protrusion
- 54: support portion
- 56: first locking claw
- 60: bottom panel
- 62: first locking hole
- 30 64: second protrusion
- 66: second locking claw

CLAIMS

1. An indoor unit (1) for an air conditioner comprising:
 - a main body (10) including a fan (12) and a heat exchanger (14);
 - a casing (20) which accommodates the main body (10);
 - 5 a front panel (40) which is configured to be attachable to and detachable from the casing (20); and
 - a left side panel (50a) and a right side panel (50b) which cover side surfaces of the casing (20) respectively;
 - wherein the casing (20) is configured to be attachable to and detachable from the main
 - 10 body (10), and
 - wherein the left side panel (50a) and the right side panel (50b) are configured to be attachable to and detachable from the casing (20).
2. The indoor unit (1) of claim 1, wherein the front panel (40) covers an end part of each
- 15 of the left side panel (50a) and the right side panel (50b), and wherein each of the left side panel (50a) and the right side panel (50b) is configured to be detachable from the casing (20) by moving it along the side surface of the casing (20) in the direction of the front side of the casing (20).
- 20 3. The indoor unit (1) of claim 2, wherein the front panel (40) is fixed to the casing (20) via a first fastening mechanism.
4. The indoor unit (1) of any one of claims 1 to 3, wherein the indoor unit (1) further comprises a bottom panel (60) which covers a bottom surface of the casing (20) and is configured
- 25 to be attachable to and detachable from the casing (20).
5. The indoor unit (1) of claim 4, wherein the bottom panel (60) is configured to be detachable from the casing (20) by detaching the left side panel (50a) and the right side panel (50b) from the casing (20).
- 30 6. The indoor unit (1) of claim 5, wherein a left side part and a right side part of the bottom panel (60) are supported from below by the left side panel (50a) and the right side panel (50b) respectively.

7. The indoor unit (1) of any one of claims 1 to 6, wherein each of the left side panel (50a) and the right side panel (50b) is fixed to the casing (20) via a second fastening mechanism.
- 5 8. The indoor unit (1) of any one of claims 1 to 7, wherein the bottom panel (60) is fixed to the casing (20) via a third fastening mechanism.