

INDOOR AIR-CONDITIONING UNIT HAVING A DETACHABLE AIR GUIDE

FIELD OF INVENTION

The invention relates to an air conditioning system, and in particular, to a removable air
5 guider of the air conditioning system.

BACKGROUND

The air conditioning system is one of the modern home life essential electrical appliances.
The system is designed to heat and/or cool a specific interior region of a building and is
10 usually placed adjacent to an exterior wall of the building so that air can be exhausted
through the wall to the outdoor atmosphere.

The maintenance of air conditioning system requires a lot of effort with the removal of
various parts. The conventional air conditioning systems includes a first air guider and a
15 second air guider connected to each other. A front heat exchanger and a rear heat
exchanger are obliquely positioned in the system. The air drawn from a top inlet, is passed
through an air filter as well as the heat exchangers, and is endowed with a momentum by a
cross flow fan, of cylindrical shape, which lies between the air guiders and and a stabilizer.
The stabilizer is mounted between the cross flow fan and an adjustable vane.

20 During the maintenance of the cross flow fan, the workman needs to remove the air
guiders, the stabilizer and the front heat exchanger along with a front chassis and the
adjustable vane. This activity not only demands lot of time but also has the risk of damage
to the heat exchanger. Further, in traditional air conditioning systems, the screw to fix the
25 cross flow fan with a fan motor is deeply hidden making it difficult for the workman to
detach the cross flow fan out during its maintenance activity.

Thus, it is desirable to reduce the number of parts to be removed for easy and secure
maintenance of the cross flow fan. Also, a provision should be provided on the chassis part
30 of the system to easily pull out the air conditioning unit from the window or wall. Further,
the design of air guiders need to be adjusted to make the cross flow fan screw visible and
accessible for the workman. This will not only minimize the effort involved in
maintenance but also avoid the risk of damage to the parts.

SUMMARY

The present invention provides an air conditioning system having detachable air guiders. A second air guider is removably connected to a first air guider. The space between an upper edge of the first air guider and an upper edge of a front heat exchanger is greater than the diameter of a cross flow fan. This enables the removal of the cross flow fan by removing the second air guider, without necessity of removing the front heat exchanger.

In a second aspect of the present invention, a stabilizer is combined to the second air guider. This enables easy removal of the cross flow fan by removing the second air guider along with the stabilizer. Thus, the stabilizer will not block the cross flow fan from coming out through a gap.

In a third aspect of the present invention, a step is created on a front and a back side of a rear chassis of the air conditioning system. This enables easy gripping of the air conditioning unit and pulling it out from a wall or a window for maintenance activity.

In a fourth aspect of the present invention, a fitting line of the first air guider and the second air guider is fixed and offset from a screw which is used to connect the cross flow fan with a fan motor. This makes the screw visible and accessible for a workman to remove and detach the cross flow fan from a fan motor shaft.

These and other objects, features and advantages of the invention will be fully understood from the following detailed description of the invention and in view of the accompanying drawings.

BRIEF DESCRIPTIONS OF THE DRAWINGS

FIG. 1 illustrates a cross-section view of an air conditioning unit having a front top discharge means for discharging the cold air;

FIG. 2 illustrates a cross-section view of an air conditioning system embodying the teachings of the present invention;

FIG. 3 illustrates an exterior perspective view of the air conditioning system shown in **FIG. 2**; and

FIG. 4 illustrates a perspective view of the cabinet shown in **FIG. 2** with a front cover section removed to reveal the air conditioning equipment housed therein.

DETAILED DESCRIPTION

5 The following detailed description is made with reference to the figures. Exemplary embodiments are described to illustrate the subject matter of the disclosure, not to limit its scope, which is defined by the appended claims. Those skilled in the art will recognize that the various elements described and/or shown may be arranged in various combinations and configurations without departing from the scope of the disclosure.

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FIG. 1 is a cross sectional view of an indoor air-conditioning unit (100) having a front top discharge means for discharging the cold air. The indoor air-conditioning unit (100) has a chassis body (108) that includes a first air guider (102) and a second air guider (104) connected to each other. The chassis body (108) of the indoor air-conditioning unit (100) further includes a front heat exchanger (114) and a rear heat exchanger (116). The air drawn from a first inlet (152), a second inlet (154) and a third inlet (156) is passed through an air filter (112) as well as the front and rear heat exchangers (114) and (116), and is endowed with a momentum by a cross flow fan (110), of cylindrical shape, which lies between the first and second air guiders (102) and (104) and a stabilizer (128). The stabilizer (128) is mounted between the cross flow fan (110) and an adjustable vane (126).

FIG. 2 illustrates a cross-sectional view of a chassis body (108) of an air conditioning system. The chassis body (108) encloses a front heat exchanger (114) and a rear heat exchanger (116) obliquely positioned with respect to each other in the chassis body (108). It should be clearly understood that different types of heat exchangers such as shell and tube, U tube, shell and coil, helical, plate etc. can be used for the purpose. In a further embodiment, the indoor air-conditioning unit (100) of the present invention can have more than two heat exchangers.

30 A drain pan (118), in shape of a trough, is molded into a base section of the chassis body (108). In an embodiment, the drain pan (118) is placed at the bottom of chassis body. The drain pan (118) is arranged to catch the condensate that might run off the obliquely positioned front heat exchanger (114) and the rear heat exchanger (116). The drain pan (118) also carries the condensate away from the chassis body (108) through a drain line

(not shown in figure). The cross flow fan (110) is rotatably mounted between the front heat exchanger (114) and the rear heat exchanger (116).

The pair of air guiders, the first air guider (102) and the second air guider (104), are connected to each other in a detachable manner. The first air guider (102) and the second air guider (104) control the direction of airflow inside the chassis body (108). The air drawn from a top inlet (not shown in figure) is passed through an air filter (112) and the front heat exchanger (114) and the rear heat exchanger (116), and it is endowed with a momentum by the cross flow fan (110).

A point on an upper edge of the front heat exchanger (114) is denoted as 'p' and a point on an upper edge of the first air guider (102) is denoted as 'q' as shown in **FIG. 2**. The direct gap between p and q is denoted as 'A'. The diameter of the cross flow fan (110) is defined as 'B'. According to an embodiment of the present invention, the direct gap 'A' between upper edge of the front heat exchanger (114) and the upper edge of the first air guider (102) is greater than the diameter 'B' of the cross flow fan (110). The relation can be mathematically shown as $A > B$.

During the maintenance of the cross flow fan (110), it can be easily removed from the chassis body (108) by removing the front portion (124) and the second air guider (104) as shown in **FIG. 2**. Since the second air guider (104) is removably attached to the first air guider (102), there is no need to remove the first air guider (102) for performing maintenance. Also, as shown in **FIG. 2**, since the gap $A > B$, there is no need to remove the front heat exchanger (114) to remove the cross flow fan (110). This arrangement enables easy maintenance of the cross flow fan (110) and also avoids damage to the front heat exchanger (114).

In **FIG. 2**, a stabilizer (128) in form of a sector is connected to the second air guider (104) and mounted on a side of the cross flow fan (110). Since the stabilizer (128) is connected to the second air guider (104), during maintenance of the cross flow fan (110), the stabilizer (128) is removed along with the second air guider (104) for taking out the cross flow fan (110) as shown in **FIG. 2**. This enables easy removal of the cross flow fan (110) avoiding any blockage due to the stabilizer (128).

Referring now to **FIG. 3**, which shows an exterior perspective view of the indoor air-conditioning unit (100) of the present invention. The indoor air-conditioning unit (100) contains a rear chassis portion of a chassis body (108) to support the front heat exchanger (114) and the rear heat exchanger (116) and the cross flow fan (110). The rear chassis
5 portion of the chassis body (108) contains a step (130) and step (134) on the back of the rear chassis portion of the chassis body (108). The steps (130) and (134) enable easy holding of the chassis body (108) while detaching it from a window or a wall.

Referring to **FIG. 4**, the first air guider (102) and the second air guider (104) are
10 connected to each other through a fitting line (138). According to an embodiment of the present invention, the fitting line (138) connecting the first air guider (102) and the second air guider (104) is fixed and offset from a screw (140) connecting the cross flow fan (110) with a fan motor shaft (142). For maintenance of the cross flow fan (110), the second air
15 guider (104) is detached from the first air guider (102) for removal of the cross flow fan (110) from the air conditioning system. Since the fitting line (138) is fixed and away from the screw (140), the screw (140) is visible to the workman who can easily remove it using a screwdriver or any other tool. The cross flow fan (110) can then be easily detached from the fan motor shaft (142).

20 Those skilled in the art will recognize that the present disclosed subject matter may be manifested in a variety of forms other than the specific embodiments described and contemplated herein. Accordingly, departure in form and detail may be made without departing from the scope and spirit of the present disclosure as described in the appended claims.

CLAIMS

1. An indoor air-conditioning unit (100) comprising:
 - a chassis body (108) housing:
 - 5 a first air guider (102);
 - a second air guider (104), the second air guider (104) being connected to the first air guider (102), wherein the second air guider (104) is removable from the first air guider (102);
 - a heat exchanger unit having a first heat exchanger (114) and a second heat
 - 10 exchanger (116);
 - a cross flow fan (110), the cross flow fan (110) being rotatably mounted between the first air guider (102) and the heat exchanger unit wherein a space between an upper edge of the first air guider (102) and an upper edge of the first heat exchanger (114) is greater than a diameter of the cross-flow fan to enable the cross
 - 15 flow fan to be removed by removing a front portion (124) of the chassis body(108) and the second air guider (104).
2. The indoor air-conditioning unit (100) of claim 1 further comprises a stabilizer (128), wherein the stabilizer (128) is connected to the second air guider (104).
- 20 3. The indoor air-conditioning unit (100) of claim 1 further comprises a rear chassis, wherein the chassis contains a front side step (130) and a back side step (134).
4. The indoor air-conditioning unit (100) of claim 1, wherein a fitting line of the first air
- 25 guider (102) and the second air guider (104) is fixed and offset from a screw (140) connecting the cross flow fan (110) with a fan motor shaft (142).