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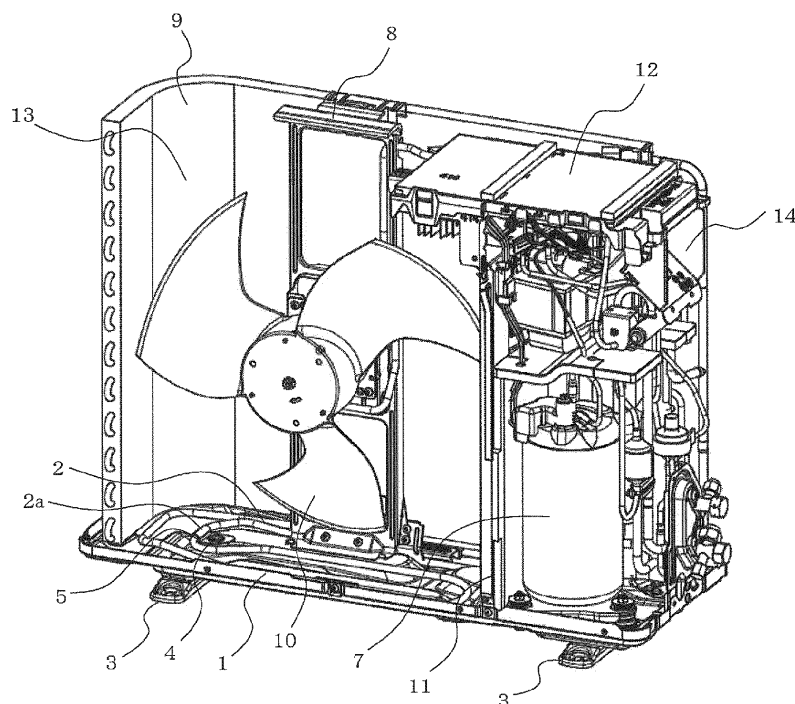
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(54) **Outdoor unit of air-conditioning apparatus**

(57) A bottom plate 1 has a projecting portion 1 a that upwardly projects at a portion thereof to which a heater support 5 is attached, and a leg 3 is disposed at a portion

that at least includes a position below a screw hole 1 b formed in the projecting portion 1 a.

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Description

[Technical Field]

[0001] The present invention relates to an outdoor unit of an air-conditioning apparatus, and particularly relates to protection of a tip end portion of a screw used to secure an anti-freeze heater.

[Background Art]

[0002] In some conventional outdoor units of air-conditioning apparatuses, an anti-freeze heater is pressed against an upper surface of a bottom plate with a heater support and secured with a screw (see Patent Literature 1).

[Citation List]

[Patent Literature]

[0003] [Patent Literature 1] Japanese Patent No. 3882910 (see, for example, paragraphs [0014] and [0016], and figures 1 to 3)

[Summary of Invention]

[Technical Problem]

[0004] In the above-described type of the conventional outdoor unit of the air-conditioning apparatus, a heater support, which is used to press a pipe portion of the anti-freeze heater against the upper surface of the bottom plate and secure the anti-freeze heater with the screw, has a structure in which a tip end portion of the screw is exposed to a lower surface of the bottom plate on the ground side. This may cause a safety problem in installation of the outdoor unit. Thus, a screw cover is welded to the lower surface of the bottom plate so as to cover the tip end portion of the screw, thereby ensuring the safety during the installation of the air-conditioning apparatus.

However, there is a problem with this method in that the number of components is increased due to use of the screw cover. There also is a problem with this method in that the design of the appearance is degraded by a projection, which includes the screw cover, projecting from the lower surface of the bottom plate, projecting only at a portion where the anti-freeze heater is secured with the screw.

[0005] The present invention is proposed to overcome the above-described problems. An object of the present invention is to provide an outdoor unit of an air-conditioning apparatus, with which the safety during installation is ensured without increasing the number of components and the design of the appearance of the outdoor unit is not degraded.

[Solution to Problem]

[0006] An outdoor unit of an air-conditioning apparatus according to the present invention includes a bottom plate, on an upper surface of which a heat exchanger and an anti-freeze heater are disposed, a heater support that presses the anti-freeze heater against the upper surface of the bottom plate and is secured to the bottom plate with a screw, and a leg disposed on a lower surface of the bottom plate. In the outdoor unit, the bottom plate has a projecting portion that upwardly projects at a portion to which the heater support is attached, and the leg is disposed at a portion that at least includes a position below a screw hole formed in the projecting portion.

[Advantageous Effects of Invention]

[0007] With the outdoor unit of the air-conditioning apparatus according to the present invention, the safety during the installation is ensured without increasing the number of components and the design of the appearance of the outdoor unit is not degraded.

[Brief Description of Drawings]

[0008]

[Fig. 1] Fig. 1 is a perspective view illustrating the interior of an outdoor unit of an air-conditioning apparatus according to Embodiment.

[Fig. 2] Fig. 2 is a perspective view illustrating a bottom plate and a region around the bottom plate of the outdoor unit of the air-conditioning apparatus according to Embodiment.

[Fig. 3] Fig. 3 is a sectional view of the bottom plate and a region around the bottom plate taken along line X-X in Fig. 2 seen in the arrow direction.

[Fig. 4] Fig. 4 is a sectional view of the bottom plate and a region around the bottom plate taken along line Y-Y in Fig. 2 seen in the arrow direction.

[Description of Embodiment]

[0009] Embodiment of the present invention will be described below with reference to the drawings.

Embodiment

[0010] Fig. 1 is a perspective view illustrating the interior of an outdoor unit of an air-conditioning apparatus according to Embodiment.

The exterior of the outdoor unit is defined by a front surface panel (not shown) that covers the front, a rear surface panel (not shown) that covers the back, a top plate (not shown) that covers the top, side plates (not shown) that cover the sides, and a bottom plate 1 that defines a bottom portion. Legs 3 are provided on the lower surface of the bottom plate 1. The outdoor unit is supported by

the legs 3.

The interior of the outdoor unit is separated into an air-sending device chamber 13 and a machine chamber 14 by a separator 11, which is a sheet metal part. The air-sending device chamber 13 and the machine chamber 14 are respectively defined on the left and right in the outdoor unit in front view.

[0011] A heat exchanger 9, a motor support 8, and a propeller fan 10 are housed in the air-sending device chamber 13. The side surface and the entire rear surface of the heat exchanger 9 are disposed on the upper surface of the bottom plate 1. The motor support 8 extends from lower to upper portions of the heat exchanger 9. The propeller fan 10 is attached to a motor (not shown), which is attached to the motor support 8. A pipe-shaped anti-freeze heater 2 having a pipe portion 2a is also housed in the air-sending device chamber 13. Part of the pipe portion 2a is pressed against the upper surface of the bottom plate 1 with a heater support 5 and secured with a screw 4.

A lower portion of the motor support 8 can be secured to a rise portion of the bottom plate 1 with the screw 4, and an upper portion of the motor support 8 having a hook shape can be retained at the heat exchanger 9.

[0012] When the propeller fan 10 is operated, air is introduced into the inside of the outdoor unit through, for example, air inlets (not shown) provided in the side plates and the rear surface panel of the outdoor unit. The air having been introduced is exhausted toward the front side of the outdoor unit through an air outlet (not shown) provided in the front surface by the propeller fan 10. In so doing, a refrigerant in the heat exchanger 9 is cooled by the air having been introduced during, for example, cooling operation. The air having passed through the heat exchanger 9 is heated by exchanging heat with the refrigerant. The bottom plate 1 has a drain path formed therein near the heat exchanger 9, and the pipe portion 2a of the anti-freeze heater 2 is disposed along the drain path so as to prevent water from freezing in the drain path.

[0013] A compressor 7 and an electrical unit 12 are housed in the machine chamber 14. The compressor 7 is disposed on the upper surface of the bottom plate 1. The electrical unit 12 is disposed at an upper portion of the separator 11 so as to be parallel to the bottom plate 1. During, for example, cooling operation, the refrigerant delivered from an indoor unit (not shown) is compressed by the compressor 7 and delivered to the heat exchanger 9 through a refrigerant pipe. The electrical unit 12 supplies power to various components.

[0014] Fig. 2 is a perspective view illustrating the bottom plate and a region around the bottom plate of the outdoor unit of the air-conditioning apparatus according to Embodiment. Fig. 3 is a sectional view of the bottom plate and a region around the bottom plate taken along line X-X in Fig. 2 seen in the arrow direction. Fig. 4 is a sectional view of the bottom plate and the region around the bottom plate taken along line Y-Y in Fig. 2 seen in the arrow direction.

The bottom plate 1 has projections and recesses, which are shapes formed by drawing, so as to provide strength to the bottom plate 1. A circular drain hole 1c, through which water is discharged, is formed in a substantially central portion of the bottom plate 1. Drain water produced in the outdoor unit flows through the drain path formed in the bottom plate 1 and is discharged to the outside of the outdoor unit through this drain hole 1c.

[0015] The anti-freeze heater 2 is disposed on the upper surface of the bottom plate 1, and the pipe portion 2a of the anti-freeze heater 2 is disposed so as to conform to the shape formed in the bottom plate 1 by drawing. Part of the pipe portion 2a of the anti-freeze heater 2 is pressed against the upper surface of the bottom plate 1 with the heater support 5 and secured with a screw 4.

The bottom plate 1 has a projecting portion 1a that upwardly projects at a portion thereof to which the heater support 5 is attached. The projecting portion 1a has a screw hole 1b having an increased thickness through a burring process.

[0016] The heater support 5 has an arch portion 5a at its part. The arch portion 5a has a substantially arch shape that conforms to the sectional shape of the pipe portion 2a of the anti-freeze heater 2 so as to press the part of the pipe portion 2a of the anti-freeze heater 2. Other part of the heater support 5 has a shape that conforms to the part of the upper surface of the bottom plate 1 where the heater support 5 is disposed. The heater support 5 has a screw hole 5b at a position superposed with the screw hole 1b.

[0017] On the lower surface of the bottom plate 1, for example, two legs 3 are provided so as to be parallel to the lower surface. One of the legs 3 is disposed in a portion that at least includes a position below the screw hole 1b. That is, the screw hole 1b is positioned above one of the legs 3. Thus, there is a space 6 formed between the screw hole 1b and one of the legs 3.

[0018] The projecting portion 1a projects upward so that, when the screw 4 is screwed into the screw hole 1b such that a tip end portion 4a of the screw 4 is oriented to the lower surface of the bottom plate 1, the tip end portion 4a of the screw 4 is not brought into contact with the leg 3 positioned below the screw hole 1b. That is, the length by which the projecting portion 1a projects is longer than the length of the screw 4 in the design. The reason for this is to avoid the following situation: in the case where the tip end portion 4a of the screw 4 is in contact with the leg 3, and accordingly, the screw 4 is not entirely tightened in engagement with the thread of the screw hole 1b, the securement of the anti-freeze heater 2 to the upper surface of the bottom plate 1 is loosened, and work efficiency is degraded.

[0019] The anti-freeze heater 2 is secured to the upper surface of the bottom plate 1 by disposing the heater support 5 such that the arch portion 5a covers the part of the pipe portion 2a of the anti-freeze heater 2 disposed near the screw hole 1b and such that the screw hole 1b and the screw hole 5b are superposed with each other,

and by screwing the screw 4 into the screw hole 1b through the screw hole 5b.

In this state, the screw 4 is contained within the space 6 formed between the leg 3 and the screw hole 1b, which is formed in the projecting portion 1a of the bottom plate 1.

[0020] Thus, the leg 3 serves as a screw cover. This allows ensuring the safety during the installation of the outdoor unit without increasing the number of components. Furthermore, since the screw 4 is not visible from the outside of the outdoor unit and there is no projection on the lower surface of the bottom plate 1, the design of the appearance is not degraded.

[0021] Although two legs 3 are provided in Embodiment, the number of legs 3 may be changed as long as the outdoor unit can be supported. However, at least one of the legs 3 needs to be provided at a portion that at least includes the position below the screw hole 1b.

[Reference Signs List]

[0022] 1 bottom plate, 1a projecting portion, 1b screw hole, 1c drain hole, 2 anti-freeze heater, 2a pipe portion, 3 leg, 4 screw, 4a tip end portion, 5 heater support, 5a arch portion, 5b screw hole, 6 space, 7 compressor, 8 motor support, 9 heat exchanger, 10 propeller fan, 11 separator, 12 electrical unit, 13 air-sending device chamber, and 14 machine chamber.

Claims

1. An outdoor unit of an air-conditioning apparatus, the outdoor unit comprising:

a bottom plate (1);
a heat exchanger (9) and an anti-freeze heater (2) that are disposed on an upper surface of the bottom plate (1);
a heater support (5) that presses the anti-freeze heater (2) against the upper surface of the bottom plate (1) and is secured to the bottom plate (1) with a screw (4); and
a leg (3) disposed on a lower surface of the bottom plate (1),
wherein the bottom plate (1) has a projecting portion that upwardly projects at a portion to which the heater support (5) is attached, and
wherein the leg (3) is disposed at a portion that at least includes a position below a screw hole (1b) formed in the projecting portion (1a).

2. The outdoor unit of the air-conditioning apparatus of claim 1,

wherein the projecting portion (1a) projects upward so that a tip end portion (4a) of the screw is not brought into contact with the leg (3) positioned below the screw hole (1b) when the screw (4) is screwed into the screw hole (1b) with the tip end portion (4a)

being oriented to a lower surface of the bottom plate.

FIG. 1

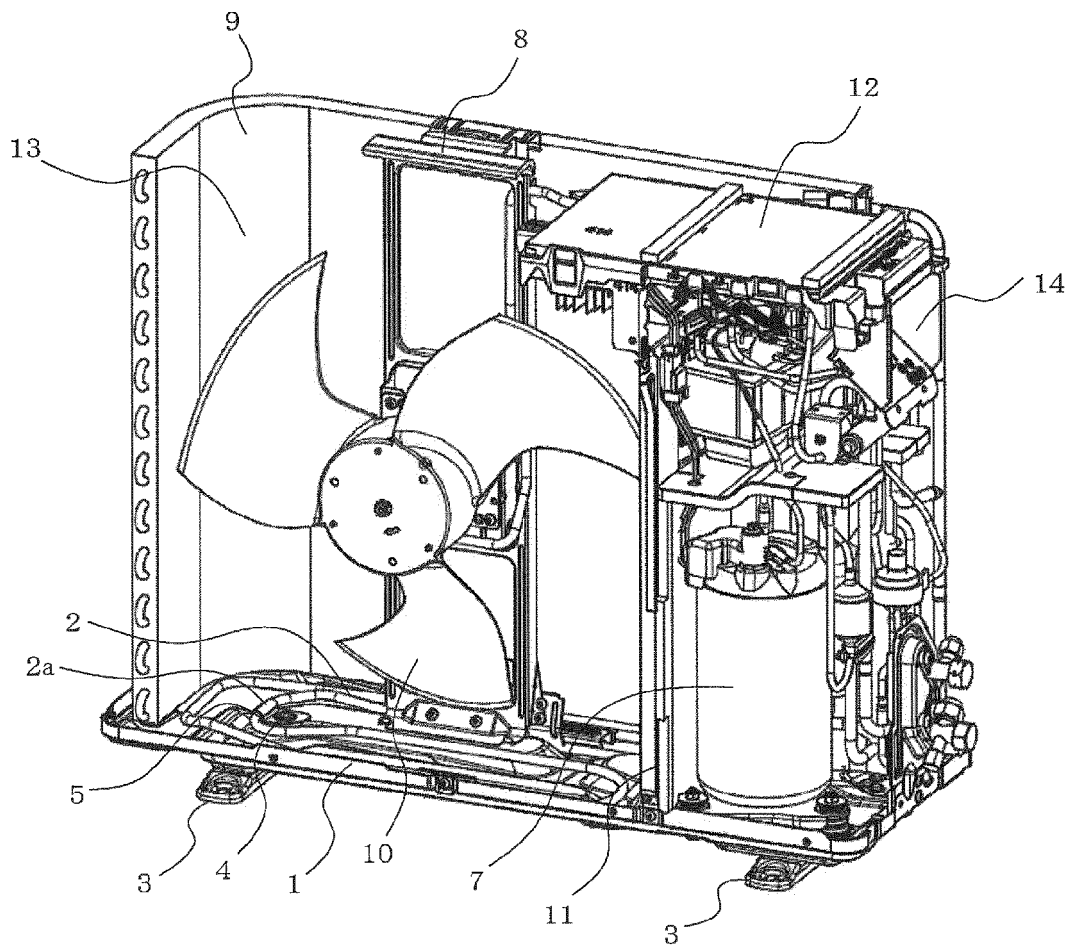


FIG. 2

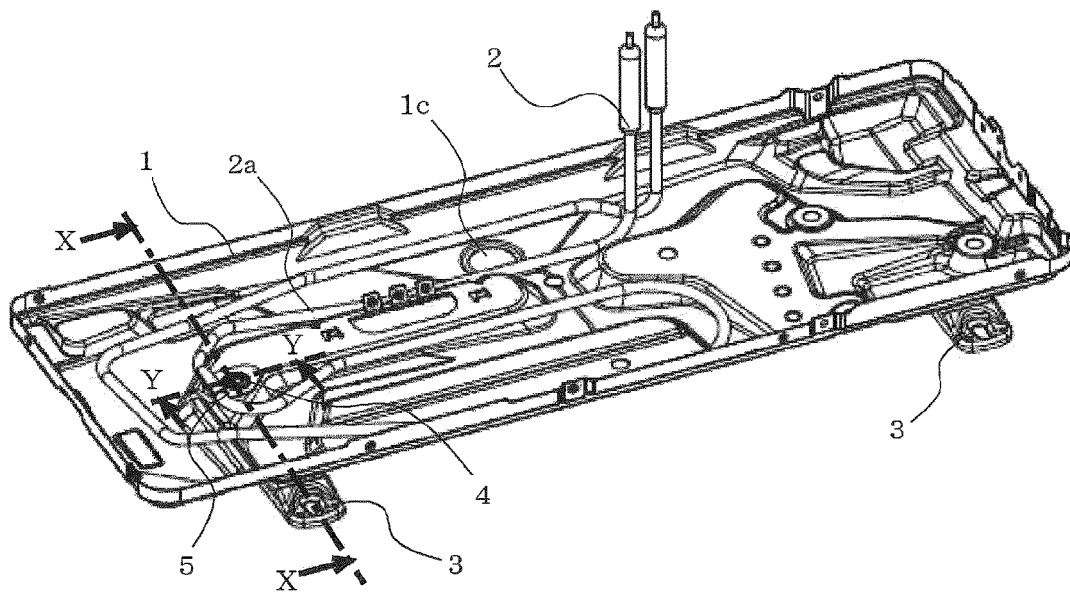


FIG. 3

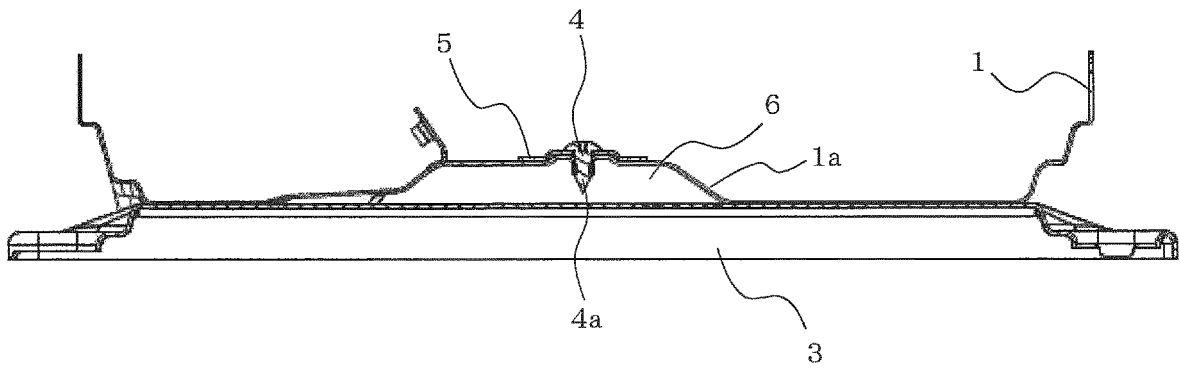
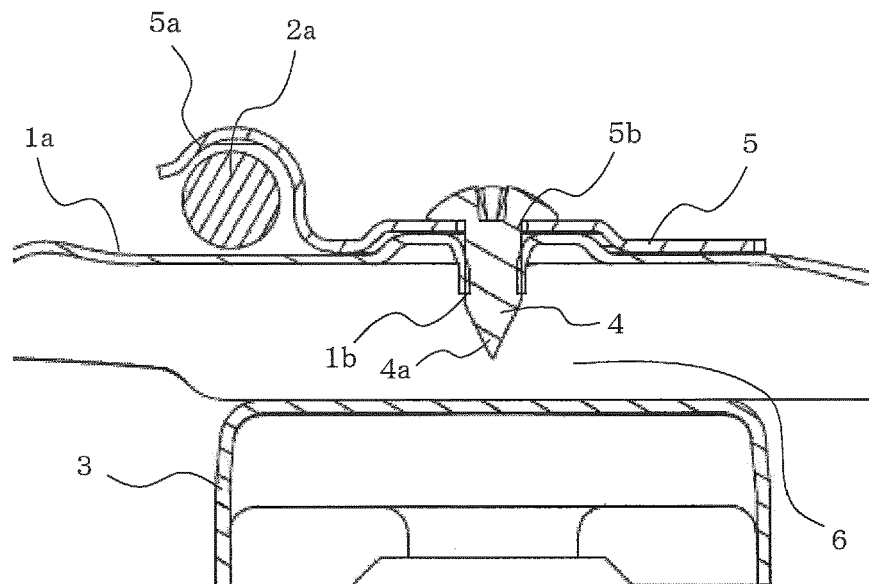


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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