

(Translation)

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DESCRIPTION**OUTDOOR UNIT FOR SEPARATE TYPE AIR CONDITIONER**

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Technical Field

The present invention relates to an outdoor unit of a separate type air conditioner which comprises an indoor unit and an outdoor unit.

10 **Background Art**

An outdoor unit of a conventional separate type air conditioner comprises the following elements as shown in Fig. 4(a) front view and Fig. 4(b) side view:

base plate 1;

15 side plate 2 defining both lateral faces and a rear face having an opening;

front plate 3 having an opening;

screws 4 for fixing side plate 2 and front plate 3 to base plate 1;

top plate 5; and

20 screws 6 for fixing top plate 5 to side plate 2 and front plate 3.

As Fig. 4(c) shows in its top, the outdoor unit accommodates as shown with broken lines heat exchanger 7, fan motor 8, compressor 9, power supply board 10 and terminal block 12. Heat exchanger 7 exchanges heat between heat carriers and outside air. Fan motor 8 spins the fan and supplies outside
25 air to heat exchanger 7 so that heat can be efficiently exchanged. Power supply board 10 powers a fan motor (not shown) of an indoor unit (not shown), fan motor 8 and the compressor in the outdoor unit, and at the same time, it

controls cooperative operation of the indoor unit and outdoor unit. Terminal block 12 relays electric wires for coupling the indoor unit (not shown) and for coupling the commercial power line.

As cross sections in Fig. 4(d) and Fig. 4(e) illustrate, elastic sealing members 11 are bonded on fit sections between side plate 2 and top plate 5 as well as between front plate 3 and top plate 5. Fig. 4(e) is taken on lines E—E of Fig. 4(d) and illustrates an entire circumference of the outdoor unit. Sealing member 11 prevents rainwater from invading power-supply-board 10 as well as terminal block 12.

This construction of the conventional outdoor unit permits sealing member 11 to peel off with ease when top plate 5 is mounted because of little gap between side plate 2 and top plate 5 as well as between front plate 3 and top plate 5. Further, bonding sealing member 11 to the fit sections needs bonding procedure and cost. In addition to this, since the outdoor unit is disposed outside in general, sealing members 11 are exposed to the weather, and thus direct sun-shine raises the temperature of sealing members 11. Sealing members 11 therefore deteriorates, loses the elasticity and is vulnerable to damages.

The present invention solves the problems discussed above and provides an outdoor unit which is free from sealing member 11 and yet can prevent rainwater from invading power supply board 10 and terminal block 12 in the outdoor unit.

Disclosure of Invention

An outdoor unit of a separate type air conditioner according to the present invention provides a rib (string-shaped protrusion)—unitarily formed with at least one of a side plate or a top plate—at a fit section between the side

plate and the top plate, both plates making up an outer housing. The rib prevents rainwater from invading the outdoor unit.

In this description, the side plate defines three elevational faces, i.e. both lateral faces and rear face as shown in Fig. 4(a) and Fig. 4(b); however, it is not limited to these three faces, and it can define at least one of four elevational faces. The side plate described in this description thus can define all four faces. If a front and a rear faces are unitarily formed with a top plate, the side plate would define two lateral faces opposite to each other.

According to this structure, a rib for preventing rainwater from invading the outdoor unit is provided to at least one of the side plate or top plate so that rainwater can be blocked from entering onto a power supply board and a terminal block. Because no sealing member is used in this structure, the problem of the peeling off is solved, and a bonding process is eliminated, which contributes to reduce the cost.

It is preferable to provide a rib on an entire outer circumference of the fit section of the side plate or an entire inner circumference of the top plate. This structure assures a more positive block against the invasion of rainwater.

It is further preferable to provide ribs both on the entire outer circumference of the fit section of the side plate and the entire inner circumference of the top plate. This structure assures still more positive block against the invasion of rainwater.

Brief Description of Drawings

Fig. 1(a), Fig. 1(b) and Fig. 1(c) are a front, side and plan views of an outdoor unit in accordance with a first exemplary embodiment of the present invention. Fig. 1(d) is a cross section taken on lines A-A of Fig. 1(a).

Fig. 2(a), Fig. 2(b) and Fig. 2(c) are a front, side and plan views of an

outdoor unit in accordance with a second exemplary embodiment of the present invention. Fig. 2(d) is a cross section taken on lines B—B of Fig. 2(a).

Fig. 3(a), Fig. 3(b) and Fig. 3(c) are a front, side and plan views of an outdoor unit in accordance with a third exemplary embodiment of the present invention. Fig. 3(d) is a cross section taken on lines C—C of Fig. 3(a).

Fig. 4(a), Fig. 4(b) and Fig. 4(c) are a front, side and plan views of a conventional outdoor unit. Fig. 4(d) is a cross section taken on lines D—D of Fig. 4(c), and Fig. 4(e) is a cross sectional plan view taken on lines E—E of Fig. 4(d).

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Best Mode for Carrying Out the Invention

(Exemplary Embodiment 1)

The first exemplary embodiment of the present invention is demonstrated hereinafter with reference to Fig. 1(a) - Fig. 1(d). The same elements used in the prior art shown in Fig. 4(a) - Fig. 4(e) are denoted with the like numerals, and the descriptions thereof are omitted here.

As shown in Fig. 1(a) - Fig. 1(d), a housing of an outdoor unit comprises side plate 2 and top plate 5. On the upper end of side plate 2, rib 13 is provided over the entire length with which top plate 5 overlaps. The cross section of rib 13 shows a half circle. When top plate 5 covers side plate 2, the top section of rib 13 disposed on side plate 2 contacts to an inner face of top plate 5, thereby eliminating a gap between side plate 2 and top plate 5. This construction—free from sealing member 11 which has been employed in a conventional outdoor unit—can prevent rainwater from invading power supply board 10 and terminal block 12 in the outdoor unit. Regarding sealing member 11, refer to Fig. 4(d) and Fig. 4(e).

Rib 13 also increases the rigidity in periphery of the upper end of side

plate 2. This effect suppresses distortion on the upper end of side plate 2 so that linearity of the upper end can be heightened, and a fit with top plate 5 can be thus more accurately maintained.

The present invention is independent of a method of forming rib 13; however, rib 13 can be formed at a low cost and with ease through the following method:

One method is to provide a groove and a protrusion—both fitting with rib 13—to inner and outer stamping dies employed in press working for the side plate. Another method is to use two rollers, a first roller has a groove and a second one has a protrusion, and both of the groove and protrusion fit with rib 13. Press and the upper end periphery of side plate 2 with the two rollers and roll the roller, thereby forming rib 13 with ease.

(Exemplary Embodiment 2)

Rib 13 is unitarily formed with top plate 5 over an entire circumference of the section overlapping side plate 2 and front plate 3. Top plate 5 shown in Fig. 2(a) - Fig. 2(d) illustrates this embodiment. This structure allows rib 13 provided to top plate 5 to contact with the outer faces of side plate 2 and front plate 3 so that gaps are eliminated. This construction—free from sealing member 11 which has been employed in a conventional outdoor unit—can prevents rainwater from invading power supply board 10 and terminal block 12 in the outdoor unit. Regarding sealing member 11, refer to Fig. 4(d) and Fig. 4(e).

Rib 13 also increases the rigidity in periphery of the upper end of side plate 2. This effect suppresses distortion on the upper end of side plate 2 so that linearity of the upper end can be heightened, and a fit with top plate 5 can be thus more accurately maintained.

(Exemplary embodiment 3)

Ribs 13, of which cross section shows a half circle, are provided over an entire length of side plate 2 and over an entire circumference of top plate 5 respectively. Each rib 13 is unitarily formed with side plate 2 and top plate 5 respectively. Side plate 2 and top plate 5 of a housing of an outdoor unit shown in Fig. 3(a) - Fig. 3(d) illustrate this embodiment. This construction allows rib 13 on side plate 2 to contact with an inner face of top plate 5 as well as rib 13 on top plate 5 to contact with an outer face of side plate 2. Gaps between top plate 5 and side plate 2 are thus eliminated. The outdoor unit is thus sealed with a double layer of rib 13. This construction—free from sealing member 11 which has been employed in a conventional outdoor unit—can prevent rainwater from invading power supply board 10 and terminal block 12 in the outdoor unit. Regarding sealing member 11, refer to Fig. 4(d) and Fig. 4(e).

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Industrial Applicability

A housing of an outdoor unit comprises a side plate and a top plate. On a fit section between the side and top plate, a rib formed unitarily with at least one of the side plate or top plate is provided at the fit section. The rib prevents rainwater from invading the housing. This construction eliminates a sealing member employed in a conventional outdoor unit. As a result, no peeling off problem of the sealing member occurs and a process of bonding the sealing member can be omitted. These effects can lower the cost and also clear a worn-out problem of the sealing member. The present invention thus produces great advantages for the industrial application.

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CLAIMS



1. An outdoor unit of a separate type air conditioner, said outdoor unit comprising:

5 a housing including a top plate and a side plate fit with said top plate;
and

a heat exchanger, a compressor and a power supply board, each accommodated in said housing,

wherein a rib, preventing invasion of rainwater, is provided unitarily
10 with at least one of said top plate and said side plate.

2. The outdoor unit as defined in Claim 1, wherein said rib is provided over an entire length of outer face of said side plate.

15 3. The outdoor unit as defined in Claim 1, wherein said rib is provided over an entire inner circumference of said top plate.

4. The outdoor unit as defined in Claim 1, wherein said ribs are provided over an entire length of outer face of said side plate and over an
20 entire inner circumference of said top plate respectively.

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