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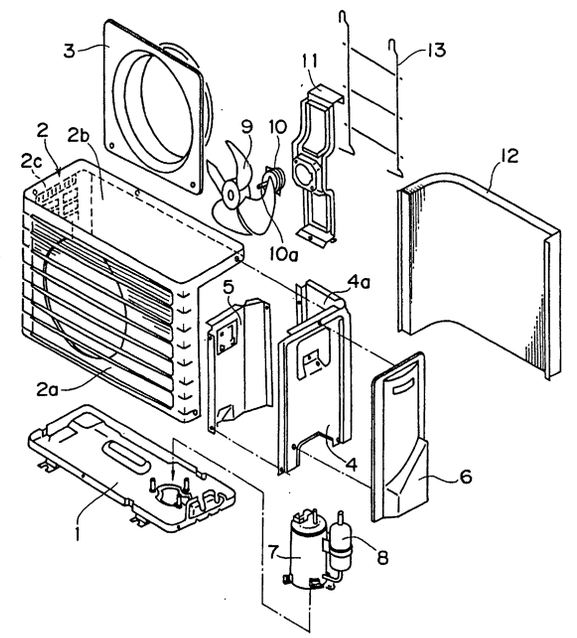
# (54) OUTDOOR UNIT OF AIR CONDITIONER

(57) An outdoor unit of an air conditioner capable of reducing the number of parts, increasing workability in assembly, and reducing a cost, comprising a compressor (7), a heat exchanger (12), and an air fan (9), all disposed in a casing, the casing comprising a bottom plate (1) and a casing front (2) mounted on the bottom plate (1) and formed by integrating together a front plate (2a), a top plate (2b), and a side plate (2c).

*Fig. 1*




EP 1 213 545 A1

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to an outdoor unit of an air conditioner.

### BACKGROUND ART

**[0002]** Conventionally, an outdoor unit of an air conditioner includes a unit shown in Fig. 4, in which a casing is formed from a bottom plate 22, a front 23, and a rear 24 (Japanese Utility Model Kokoku Publication HEI No. 4-2339). The front 23 is formed by curving a plate panel in an generally L shape and is provided with a front plate 23a and a top plate 23b. The rear 24 is formed by curving a plate panel in an generally U shape and is provided with a rear plate 24a and both side plates 24b and 24c. The outdoor unit is composed of a compressor 26, a heat exchanger 27, an air fan 28, a motor 29 and an electrical equipment box 30 disposed inside a casing 21 made up of the bottom plate 22, the front 23 and the rear 24.

**[0003]** The above-structured outdoor unit achieves improved assembling efficiency through integration of the front plate 23a and the top plate 23b as well as integration of the rear plate 24a and the side plates 24b and 24c.

**[0004]** However, the above-stated outdoor unit of the air conditioner is required to improve heat transfer efficiency for energy saving, so that in some cases the outdoor unit does not use the rear plate for reduction of passing air resistance on an intake side (rear side). In such cases, the outdoor unit of the air conditioner turns out to have the both side plates as individual components, resulting in increase in the number of components and generating a disadvantage of decreased assembling efficiency.

### DISCLOSURE OF INVENTION

**[0005]** Accordingly, it is an object of the present invention to provide an outdoor unit of an air conditioner capable of reducing the number of components, improving assembling efficiency, and achieving cost reduction.

**[0006]** In order to accomplish the above object, the present invention provides an outdoor unit of an air conditioner in which a compressor, a heat exchanger and an air fan are disposed inside a casing, characterized in that the casing includes a bottom plate and a one-piece casing front mounted on the bottom plate, said one-piece casing front including a front plate, a top plate and a side plate.

**[0007]** According to the outdoor unit of the air conditioner of the present invention, either of the both side plates is integrated with the front plate and the top plate to form the casing front with one-piece three-face structure. This makes it possible to reduce the number of components especially in the case where the rear plate is not used for reducing passing resistance of air taken in from the rear side, thereby improving assembling efficiency and achieving cost reduction.

**[0008]** In one embodiment of the outdoor unit of the air conditioner, the outdoor unit is characterized in that a side plate of the casing front is attached to an generally L-shaped one-piece member constituted of the integrally-molded front plate and top plate.

**[0009]** According to the outdoor unit of the air conditioner in the above embodiment, the generally L-shaped member integrally-molded with the front plate and the top plate makes it possible to simplify a mold compared with the case of molding the one-piece structure comprised of the front plate, the top plate and the side plate. In addition, efficiency in assembling is improved by introducing in advance into an assembly line and assembling the casing front with use of the side plate and the L-shaped one-piece member including the front plate and the top plate.

**[0010]** In one embodiment of the outdoor unit of the air conditioner, the outdoor unit is characterized in that a bellmouth is formed on the front plate of the casing front.

**[0011]** According to the outdoor unit of the air conditioner in the above embodiment, forming a bellmouth on the front plate of the casing front implements further reduction of the number of components, thereby enabling further improvement of assembling efficiency.

### BRIEF DESCRIPTION OF DRAWINGS

**[0012]**

Fig. 1 is an exploded perspective view showing an outdoor unit of an air conditioner according to a first embodiment of the present invention;
Fig. 2 is an exploded perspective view showing a casing front of the outdoor unit of the air conditioner;
Fig. 3(A) is an exploded perspective view showing a casing front of an outdoor unit of an air conditioner according to a second embodiment of the present invention;
Fig. 3(B) is a perspective view showing the casing front after assembly of that shown in Fig. 3(A); and
Fig. 4 is an exploded perspective view showing a prior art outdoor unit of an air conditioner.

### BEST MODE FOR CARRYING OUT THE INVENTION

**[0013]** Hereinbelow, the outdoor unit of the air conditioner in the present invention will be described in detail in the embodiments thereof with reference to the accompanying drawings.

#### First Embodiment

**[0014]** Fig. 1 is an exploded perspective view showing

an outdoor unit of an air conditioner in the first embodiment of the present invention. As shown in Fig. 1, on a bottom plate 1, there is mounted a one-piece plastic casing front 2 forming a front plate 2a, a top plate 2b and a side plate 2c. A bellmouth 3 is attached to the casing front 2, and a side plate 4 is attached to the right side of the casing front 2. A partition plate 5 is attached inside the casing front 2, the partition plate 5 being generally parallel to the side plate 4 with certain spacing therefrom. A rear 4a extending to the partition plate 5 is provided on the rear end of the side plate 4. A side cover 6 is placed on the external side face of the side plate 4. Between the side plate 4 and the partition plate 5, there is formed a machine chamber for accommodating a compressor 7, an accumulator 8, an electrical equipment box (unshown) and the like. A lower end of a motor supporting member 11 is fixed to the bottom plate 1, while an upper end of the motor supporting member 11 is fixed to the top plate 2b side of the casing front 2. A motor 10 is attached to the motor supporting member 11 so that an output shaft 10a would be generally parallel. An air fan 9 is attached to the output shaft 10a of the motor 10. An generally L-shaped heat exchanger 12 is disposed on the rear side of the motor supporting member 11 inside the casing front 2 and in the vicinity of the side plate 2c inside the casing front 2. Further, on the rear side of the heat exchanger 12, there is mounted a ladder-shaped protection member 13 for protecting the heat exchanger 12.

**[0015]** Fig. 2 is an exploded perspective view showing a casing front 2 and a bellmouth 3 of the outdoor unit of the air conditioner. As shown in Fig. 2, the casing front 2 is provided with a front plate 2a having a circular outlet 14, a top plate 2b extending with an generally right-angled curve from the top end of the front plate 2a, and a side plate 2c extending with an generally right-angled curve from the side end of the front plate 2a. The bellmouth 3 is attached to the rear side of the front plate 2a without using screws (unshown). A reinforcing member 15 having an generally L shape cross section is attached to the rear side of the side plate 2c without using screws (unshown). The reinforcing member 15 is attached to the side plate 2c because placing a reinforcing flange on the rear side of the side plate 2c is not applicable due to restrictions relating to molding.

**[0016]** Thus, in the outdoor unit of the air conditioner according to the present invention, the one-piece casing front 2 is formed by integrating the front plate 2a, the top plate 2b and the side plate 2c shown in Fig 2, which makes it possible to reduce. the number of components especially in the case where the rear plate is not used for reducing passing resistance of air taken in from the rear side, thereby improving assembling efficiency and achieving cost reduction.

Second Embodiment

**[0017]** Fig. 3(A) is an exploded perspective view showing a casing front of an outdoor unit of an air conditioner in the second embodiment of the present invention. The outdoor unit of the air conditioner in the second embodiment has the same structure as the outdoor unit of the air conditioner in the first embodiment except the casing front.

**[0018]** As shown in Fig. 3(A), the casing front 10 is provided with an generally L-shaped member 16 formed through integral molding of a front plate 16a having a circular outlet 17 and a top plate 16b extending with an generally right-angled curve from the top end of the front plate 16a, and a side plate 18 attached to the side end of the front plate 16a of the generally L-shaped member 16 with using screws (unshown). A bellmouth 3 is attached to the front plate 16a of the casing front 10. Thus, as shown in Fig. 3(B), the front plate 16a, the top plate 16b, and the side plate 18 are integrated to form the casing front 10.

**[0019]** The outdoor unit of the air conditioner with use of the casing front 10 has the same effect as the outdoor unit of the air conditioner in the first embodiment. Furthermore, attaching the side plate 18 of the casing front 10 to the generally L-shaped member 16 formed through integral molding of the front plate 16a and the top plate 16b makes it possible to simplify a mold compared to the case of molding the three-face one-piece structure with the front plate 16a, the top plate 16b and the side plate 18 being integrated.

**[0020]** Although the side plates 2c and 18 are placed on the left side of the casing fronts 2 and 10 in the first and second embodiments, the side plate may obviously be placed on the right side of the casing front.

**[0021]** Also, although the bellmouth 3 is provided on the casing fronts 2 and 10 in the first and second embodiments, the bellmouth may be formed on the front plate of the casing front, which implements further reduction of the number of components, thereby achieving further improvement of assembling efficiency.

## Claims

1. An outdoor unit of an air conditioner in which a compressor (7), a heat exchanger (12) and an air fan (9) are disposed inside a casing, **characterized in that**

   the casing includes a bottom plate (1) and a one-piece casing front (2) mounted on the bottom plate (1), said one-piece casing front (2) including a front plate (2a), a top plate (2b) and a side plate (2c).

2. The outdoor unit of an air conditioner as defined in Claim 1, **characterized in that**

   a side plate (18) of the casing front (10) is attached to an generally L-shaped one-piece member (16) constituted of the integrally-molded front plate (16a) and top plate (16b).

**3.** The outdoor unit of an air conditioner as defined in Claim 1 or 2, **characterized in that**

a bellmouth is formed on the front plate of the casing front.

*Fig. 1*

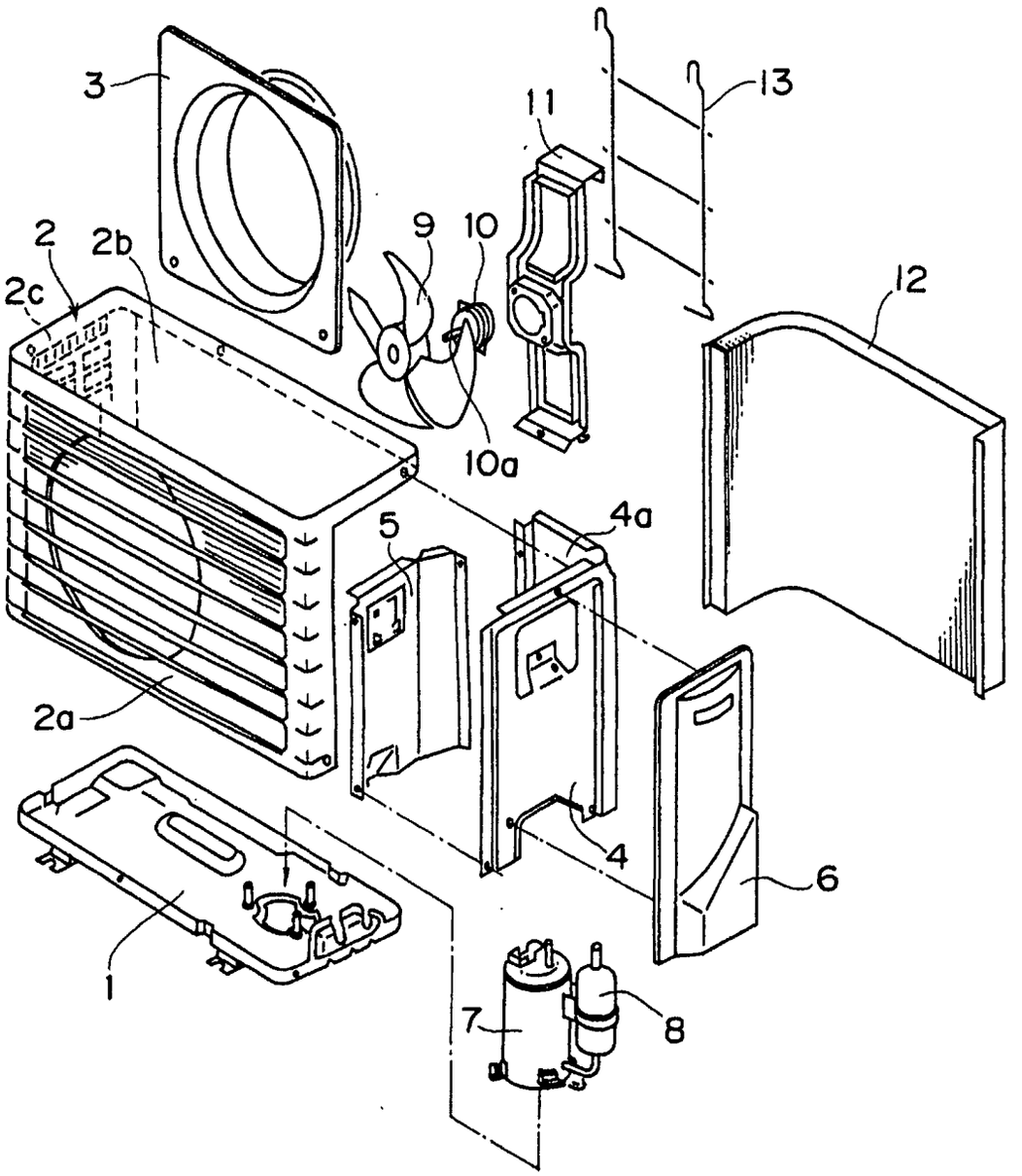


Fig. 2

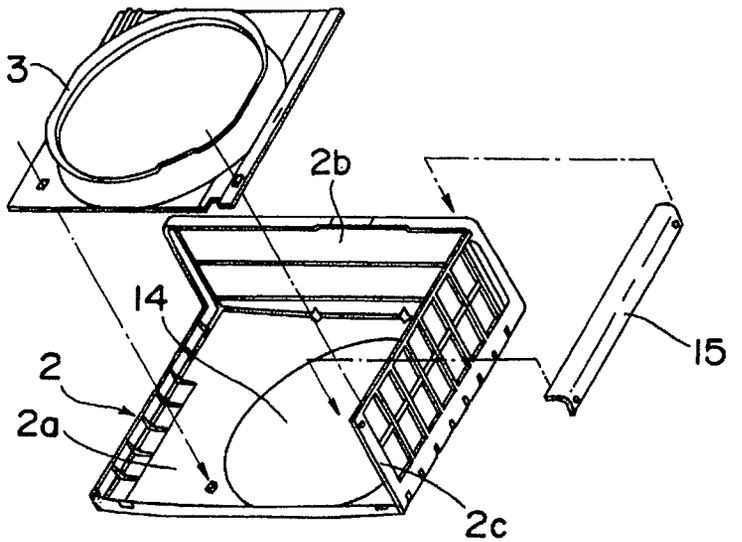



Fig. 3

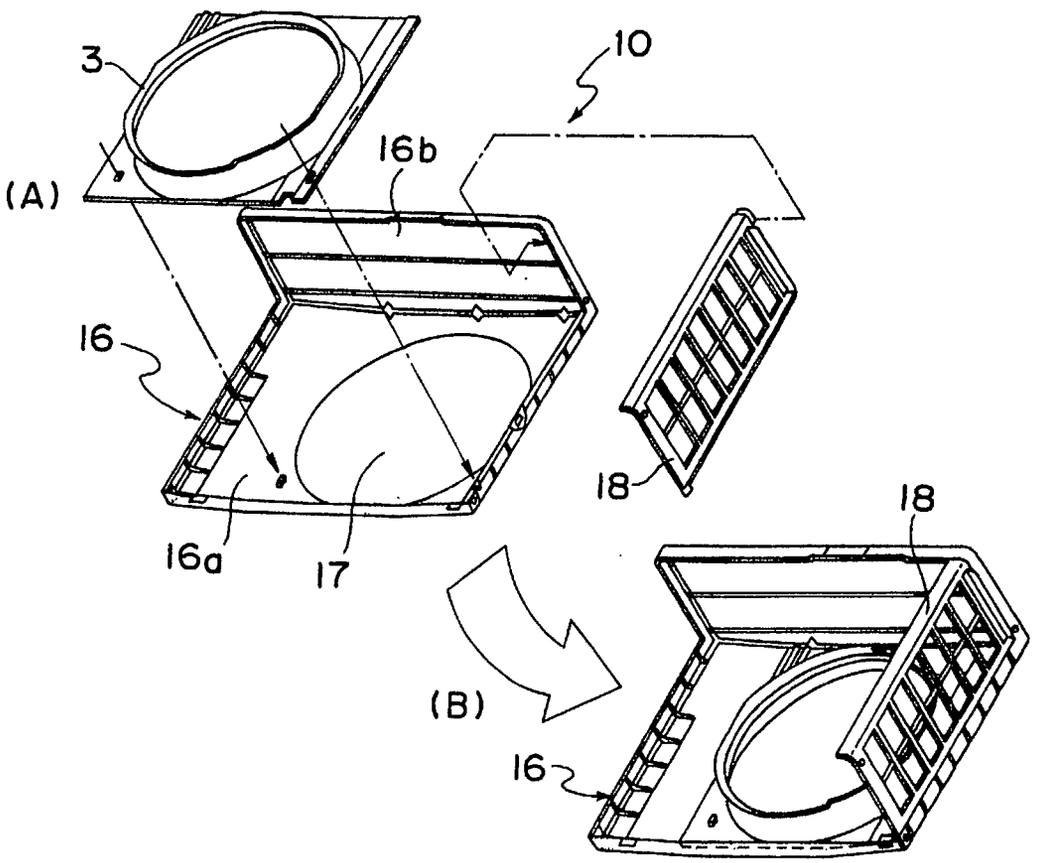
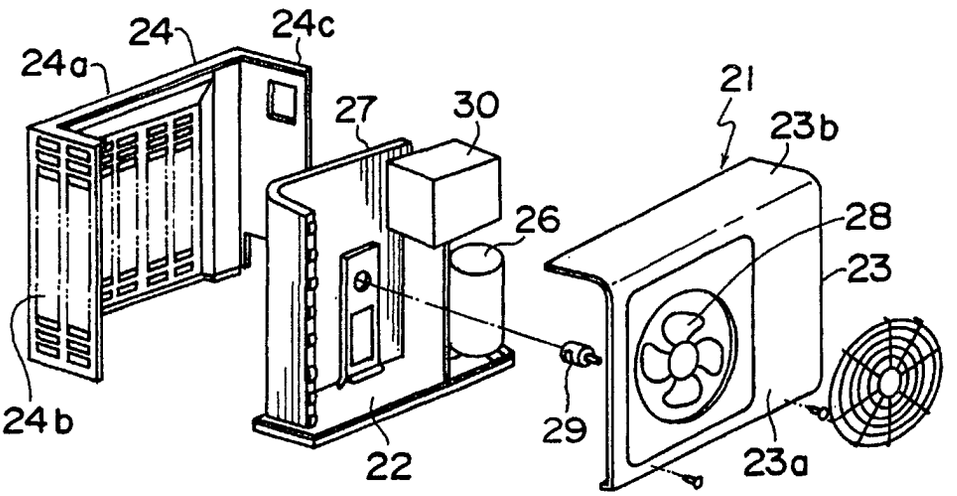


*Fig. 4*



## INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP00/04958

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] F24F 5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] F24F 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-1999
Kokai Jitsuyo Shinan Koho 1971-1999 Jitsuyo Shinan Toroku Koho 1996-1999

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | JP, 10-160201, A (Daikin Industries, Ltd.), 27 November, 1996 (27.11.96), page 4, left column, lines 2 to 15; Fig.1 (Family: none) | 1 |
| X | JP, 11-118209, A (Fujitsu General Limited), 20 October, 1997 (20.10.97), page 2, left column, lines 41 to 50; page 2,right column, lines 1 to 15 (Family: none) | 2 |
| Y | JP, 11-005252, A (FUNAI ELECTRIC CO., LTD.), 18 June, 1997 (18.06.97), page 2, left column, lines 22 to 50; page 2,right column, lines 1 to 2 (Family: none) | 3 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
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| 16 August, 2000 (16.08.00) | 29 August, 2000 (29.08.00) |
| Name and mailing address of the ISA/ Japanese Patent Office | Authorized officer |
| Facsimile No. | Telephone No. |

Form PCT/ISA/210 (second sheet) (July 1992)