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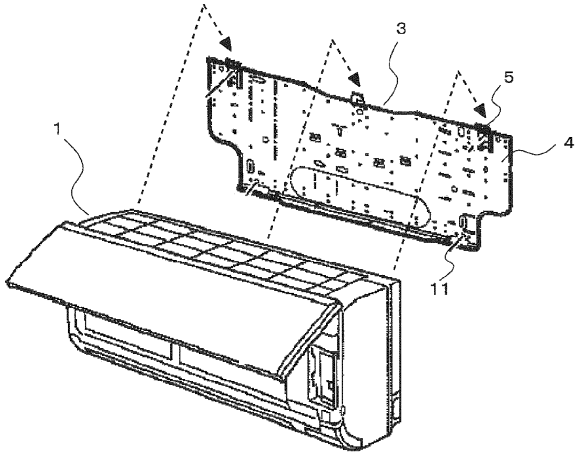
(54) Air-conditioning apparatus

(57) A mounting device 3 includes a mounting device main plate 4, an upper support piece 5 disposed at an upper end of the mounting device main plate 4, and a lower support piece 11 disposed at a lower end of the mounting device main plate 4. The upper support piece 5 includes one upper end portion 6, right and left end portions 7, and two base portions 8. A first end of the right end portion and a first end of the left end portion are contiguous to corresponding ends of the upper end portion 6. A first end of one of the base portions 8 and a first end of the other base portion are respectively contiguous to the a second end of the right end portion and a second end of the left end portion 7. The base portions 8 are each partially contiguous to an upper end of the mounting device main plate 4. The upper support piece 5 has a two-ply structure that includes the upper end portion 6, the right and left end portions 7 and the two base portions 8 and that is folded double.

F I G. 3



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Description

[Technical Field]

[0001] The present invention relates to an air-conditioning apparatus with a mounting device used for installation of the air-conditioning apparatus on a wall surface.

[Background Art]

[0002] Conventionally, a mounting device for an air-conditioning apparatus includes a support piece that projects forward from an upper end of a mounting device main plate. Further, support pieces orthogonally bent from the upper end and projecting upward (thus being Z-shaped) are disposed on the right and left sides of the mounting device. The air-conditioning apparatus includes catches at a rear upper surface and the respective catches are latched onto the right and left support pieces to enable installation of the air-conditioning apparatus in the mounting device (see Patent Literature 1).

[Citation List]

[Patent Literature]

[0003] [Patent Literature 1] Japanese Unexamined Patent Application Publication No. 4-208326 (for example, see the upper left on page 2 and Fig. 1)

[Summary of Invention]

[Technical Problem]

[0004] The above-described conventional mounting device for the air-conditioning apparatus is formed of a steel plate material. Even if the support piece is folded back 180 degrees at the upper end so as to form a two-ply structure, accidentally hitting by the air-conditioning apparatus against the support piece during installation of the air-conditioning apparatus may result in the support piece becoming bent due to the support piece having insufficient strength. Recently, air-conditioning apparatuses have increased in weight in association with improvements in air conditioning capability and high efficiency. This increase in weight may lead to buckling of the support piece and squashing of the top surface of the support piece during installation of the air-conditioning apparatus.
As a result, installation becomes difficult, the air-conditioning apparatus is inclined leftward or rightward after installation, or similar problem occurs. This causes a problem of deterioration in installability.

[0005] The present invention has been made to overcome the above-described problems. An object of the present invention is to provide an air-conditioning apparatus with a mounting device that suppresses deterioration in installability of the air-conditioning apparatus.

[Solution to Problem]

[0006] An air-conditioning apparatus according to the present invention includes a mounting device thereof having a mounting device main plate, an upper support piece disposed at an upper end of the mounting device main plate, and a lower support piece disposed at a lower end of the mounting device main plate. The upper support piece includes one upper end portion, right and left end portions, and two base portions. A first end of the right end portion and a first end of the left end portion are respectively contiguous to one and the other of second ends of the upper end portion. A first end of one of the base portions and a first end of the other base portion are respectively contiguous to
a second end of the right end portion and a second end of the left end portion. The base portions are each partially contiguous to an upper end of the mounting device main plate. The upper support piece has a two-ply structure that includes the upper end portion, the right and left end portions, and the two base portions and that is folded double.

[Advantageous Effects of Invention]

[0007] The mounting device for an air-conditioning apparatus of the present invention provides a support piece with higher strength than conventional ones, thus suppressing deterioration in the installability of the air-conditioning apparatus.

[Brief Description of Drawings]

[0008]

[Fig. 1] Fig. 1 is an overall plan view of an air-conditioning apparatus according to an Embodiment of the present invention.
[Fig. 2] Fig. 2 is a cross-sectional view of the air-conditioning apparatus according to the Embodiment of the present invention taken along the line A-A of Fig. 1.
[Fig. 3] Fig. 3 is a perspective view when the air-conditioning apparatus according to the Embodiment of the present invention is installed in a mounting device.
[Fig. 4] Fig. 4 is a detailed drawing of an upper portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.
[Fig. 5] Fig. 5 is a detailed drawing of a lower portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.
[Fig. 6] Fig. 6 is a cross-sectional view taken along the line A-A of Fig. 1 while the air-conditioning apparatus according to the Embodiment of the present invention is being installed in the mounting device.

[Fig. 7] Fig. 7 is a cross-sectional view taken along the line A-A of Fig. 1 when the air-conditioning apparatus according to the Embodiment of the present invention is installed in the mounting device.

[Fig. 8] Fig. 8 is a view illustrating a support state of the upper portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

[Fig. 9] Fig. 9 is a view illustrating a support state of the lower portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

[Fig. 10] Fig. 10 is a cross-sectional view of the mounting device for the air-conditioning apparatus according to an Embodiment of the present invention taken along the line B-B of Fig. 4.

[Fig. 11] Fig. 11 is an expanded view of an upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

[Fig. 12] Fig. 12 is a view illustrating the upper support piece when the upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention is folded 180 degrees.

[Fig. 13] Fig. 13 is a perspective view of a Z-shaped upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

[Fig. 14] Fig. 14 is a front view of the Z-shaped upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

[Description of Embodiments]

[0009] The Embodiments of the present invention will be described with reference to the drawings.

Embodiment

[0010] Fig. 1 is an overall plan view of an air-conditioning apparatus according to an Embodiment of the present invention. Fig. 2 is a cross-sectional view of the air-conditioning apparatus according to the Embodiment of the present invention taken along the line A-A of Fig. 1.

[0011] The exterior of an air-conditioning apparatus body 1 according to the Embodiment is covered with a casing 2. The air-conditioning apparatus body 1 includes a heat exchanger 15 and a blast fan 16 therein. The casing 2 has an air inlet 13 at the top surface. Air received from the air inlet 13 is heat-exchanged by the heat exchanger 15. The heat-exchanged air is delivered from an air outlet 14 disposed at the front lower portion of the casing 2 to the room interior by the blast fan 16.

[0012] Fig. 3 is a perspective view of the air-conditioning apparatus according to the Embodiment of the present invention installed in a mounting device. Fig. 4 is a detailed drawing of an upper portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention. Fig. 5 is a detailed drawing of a lower portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

A mounting device 3 is screwed to a wall. The air-conditioning apparatus body 1 is secured to the wall by installing the air-conditioning apparatus body 1 in the mounting device 3 secured in place.

The mounting device 3 is formed of a steel plate. The mounting device 3 includes a mounting device main plate 4, an upper support piece 5 disposed at the upper end of the mounting device main plate 4, and a lower support piece 11 disposed at the lower end of the mounting device main plate 4. The upper support piece 5 is, as illustrated in Fig. 4, constituted by an upper end portion 6, right and left end portions 7, and base portions 8. The first and second ends of the upper end portion 6 are respectively contiguous to a first end of the right end portion 7 and a first end of the left end portion 7 (upper ends in the paper). The second end of the right end portion 7 and the second end of the left end portion 7 (lower ends in the paper) are respectively contiguous to a first end of the right base portion 8 and a first end of the left base portion 8. The respective right and left base portions 8 are each partially contiguous to the upper end of the mounting device main plate 4. The upper end portion 6, the right and left end portions 7 disposed to the right and to the left, and the right and left base portions 8, and the mounting device main plate 4 surround a hole 17 having an approximately trapezoidal shape.

Here, the sizes and the shapes of the upper end portion 6, the right and left end portions 7, and the base portions 8 are not particularly limited. The sizes and the shapes may be determined in accordance with the size and the shape of the mounting device main plate 4, the size and the weight of the air-conditioning apparatus body 1, or similar specifications. For example, when viewed from the front surface of Fig. 4, the upper support piece 5 may be formed in an approximately trapezoidal shape.

While in this Embodiment, the three upper support pieces 5 are disposed in the right, left, and center portions of the mounting device main plate 4, and the two lower support pieces 11 are disposed in the right and left portions of the mounting device main plate 4, it is only necessary to dispose two upper support pieces 5 and two lower support pieces 11 at least two positions (right and left) on either side. Alternatively, if the upper support piece 5 or the lower support piece 11 is integrally formed from right to left, it is only necessary to dispose it at one position.

The reason for disposing the three upper support pieces 5 in the right, left, and center portions is as follows. Even if one of the right and left upper support pieces 5 is damaged, the air-conditioning apparatus body 1 is supported at the center upper support piece 5. In such a case, the air-conditioning apparatus body 1 becomes inclined, thus

making the damage noticeable.

[0013] Fig. 6 is a cross-sectional view taken along the line A-A of Fig. 1 while the air-conditioning apparatus according to the Embodiment of the present invention is being installed in the mounting device. Fig. 7 is a cross-sectional view taken along the line A-A of Fig. 1 in the case where the air-conditioning apparatus according to the Embodiment of the present invention is installed in the mounting device. Fig. 8 is a view illustrating a support state of the upper portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention. Fig. 9 is a view illustrating a support state of the lower portion of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

The casing 2 includes an upper catch 9 on the upper back surface and a lower catch 10 on the lower back surface.

First, as illustrated in Fig. 8, the upper catch 9 is latched onto the upper support piece 5. Then, the lower portion of the casing 2 is pushed in the arrow direction in Fig. 6, and the lower catch 10 is latched onto the lower support piece 11 as illustrated in Fig. 9. Thus, the air-conditioning apparatus body 1 is installed in the mounting device 3 as illustrated in Fig. 7.

[0014] Fig. 10 is a cross-sectional view of the mounting device for the air-conditioning apparatus according to an Embodiment of the present invention taken along the line B-B of Fig. 4.

When the upper catch 9 is latched onto the upper support piece 5, the upper support piece 5 may accidentally hit the air-conditioning apparatus body 1. Therefore, the upper support piece 5 requires strength so as not to be bent by the impact. When the upper catch 9 is latched onto the upper support piece 5, the upper support piece 5 requires strength so as not to be squashed by the weight of the air-conditioning apparatus body 1.

Accordingly, the upper support piece 5 includes the upper end portion 6, the right and left end portions 7, and the base portions 8, which are illustrated in Fig. 4 and is continuously folded 180 degrees into two so as to form a two-ply structure without cutting. This results in the steel plates being in close contact with one another as illustrated in Fig. 10. As illustrated in Fig. 8, to shape the upper catch 9 so as to be latched onto the upper support piece 5, the upper support piece 5 is orthogonally bent toward the front of the mounting device 3 and further orthogonally bent upward. Thus, the cross-sectionally Z-shaped upper support piece 5 is completed.

[0015] Fig. 11 is an expanded view of the upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention. Fig. 12 is a view illustrating the upper support piece when the upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention is folded 180 degrees. Fig. 13 is a perspective view of a Z-shaped upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention. Fig. 14 is a front view of the Z-shaped upper support piece of the mounting device for the air-conditioning apparatus according to the Embodiment of the present invention.

As illustrated in Fig. 11, the upper support piece 5 includes notches 12 that have narrow widths at boundary portions between the upper end portion 6 and the right and left end portions 7 of the upper support piece 5. The notches 12 prevent surplus material from overlapping when bending the upper support piece 5. As illustrated in Fig. 12, even if the upper support piece 5 is folded double by being folded 180 degrees, the surplus material does not overlap at the boundary portions between the upper end portion 6 and the right and left end portions 7. This allows formation of a two-ply structure in which the steel plates are in close contact with one another, thus obtaining higher strength.

By providing the notches 12, the abrasion of a die caused by surplus material may be improved. Accidental cutting of a hand on the surplus material is also prevented.

The size and the shape of the notch 12 is not particularly limited insofar as the surplus material does not overlap.

[0016] As described above, the upper support piece 5 forms a two-ply structure in which the upper support piece 5 is in close contact with not only the upper end portion 6 but also the right and left end portions 7 and the base portions 8. Accordingly, the upper support piece 5 is not bent even if the air-conditioning apparatus body 1 hits the upper support piece 5, or is not squashed by the weight of the air-conditioning apparatus body 1, thus obtaining the upper support piece 5 with high strength.

In this Embodiment, the mounting device 3 is formed of a steel plate; however, other materials may be employed as long as their strength is equal to or more than that of the steel plate.

Obtaining the upper support piece 5 with high strength allows the formation of the mounting device 3 with a steel plate thinner than conventional ones. This is advantageous from the viewpoint of natural resource conservation.

[Reference Signs List]

[0017] 1 air-conditioning apparatus body, 2 casing, 3 mounting device, 4 mounting device main plate, 5 upper support piece, 6 upper end portion, 7 right and left end portions, 8 base portion, 9 upper catch, 10 bottom latch portion, 11 lower support piece, 12 notches, 13 air inlet, 14 air outlet, 15 heat exchanger, 16 blast fan, 17 hole

Claims

1. An air-conditioning apparatus, comprising
a mounting device (3) for the air-conditioning apparatus,
the mounting device (3) including:

a mounting device main plate (4);
an upper support piece (5) disposed at an upper end of the mounting device main plate (4); and
a lower support piece (11) disposed at a lower end of the mounting device main plate (4), wherein

the upper support piece (5) includes:

one upper end portion (6);
right and left end portions (7) including a right end portion and a left end portion, a first end of the right end portion and a first end of the left end portion being respectively contiguous to first and second ends of the upper end portion (6); and
two base portions (8), a first end of one of the base portions (8) and a first end of the other base portion being respectively contiguous to a second end of the right end portion and a second end of the left end portion, the base portions (8) being each partially contiguous to an upper end of the mounting device main plate (4), and wherein

the upper support piece (5) has a two-ply structure that includes the upper end portion (6), the right and left end portions (7) and the two base portions (8), and that is folded double.

2. The air-conditioning apparatus of claim 1, wherein
the upper support piece (5) forms the two-ply structure that includes the upper end portion (6), the right and left end portions (7) and the base portions (8) and that is continuously formed without notches and folded double.

3. The air-conditioning apparatus of claim 1 or 2, wherein
the upper support piece (5) includes notches (12) at boundary portions between the upper end portion (6) and the right and left end portions (7).

4. The air-conditioning apparatus of any one of claims 1 to 3, wherein
the upper support pieces (5) are disposed in at least two positions and the lower support pieces (11) are disposed in at least two positions.

5. The air-conditioning apparatus of any one of claims 1 to 4, wherein
the mounting device (3) is made of steel.

FIG. 1

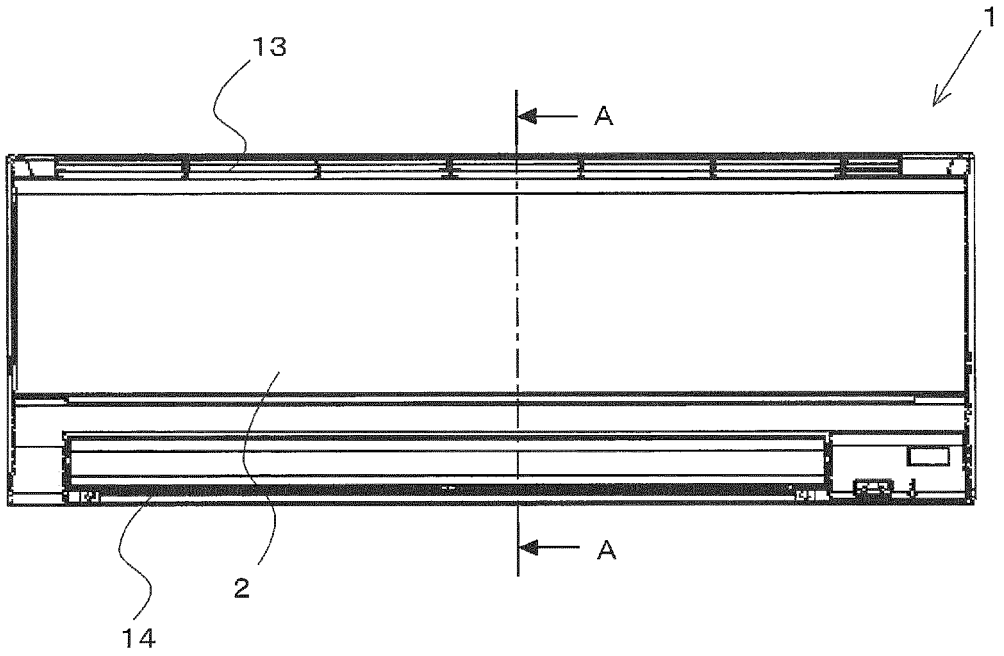


FIG. 2

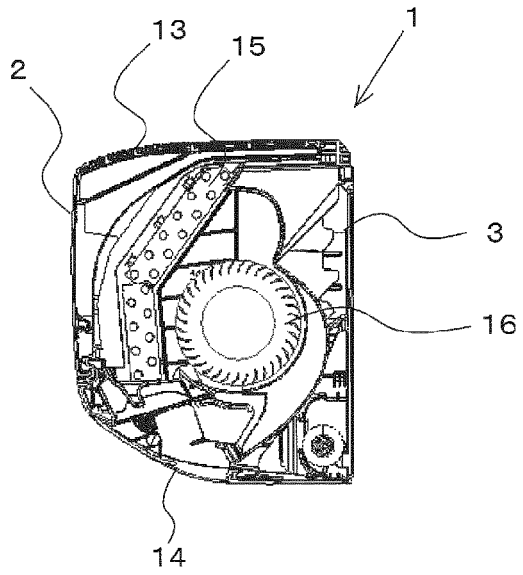


FIG. 3

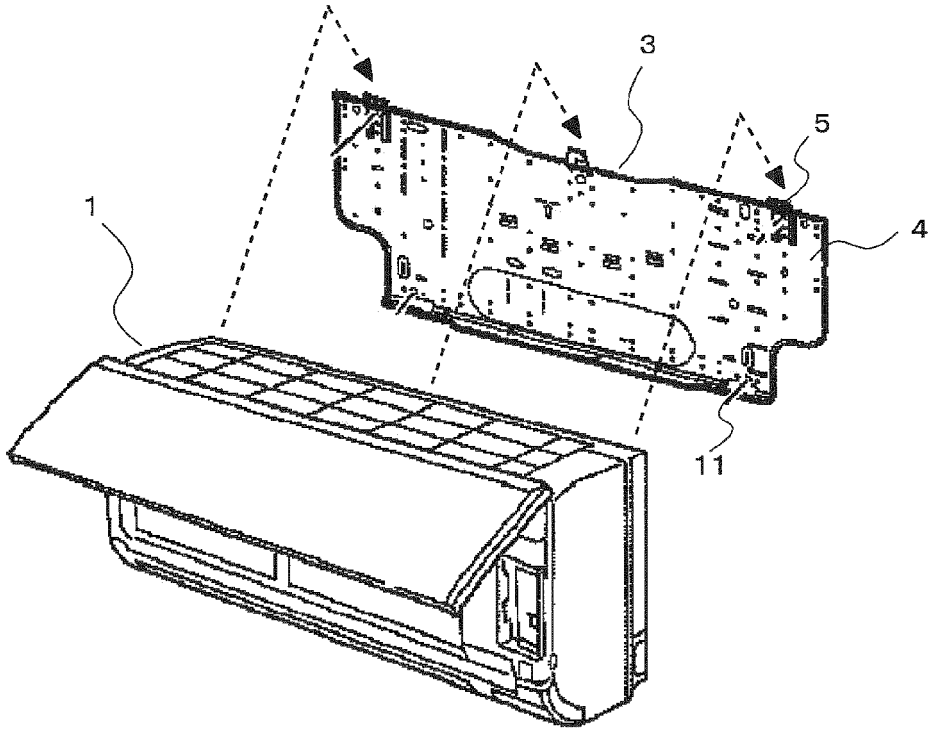


FIG. 4

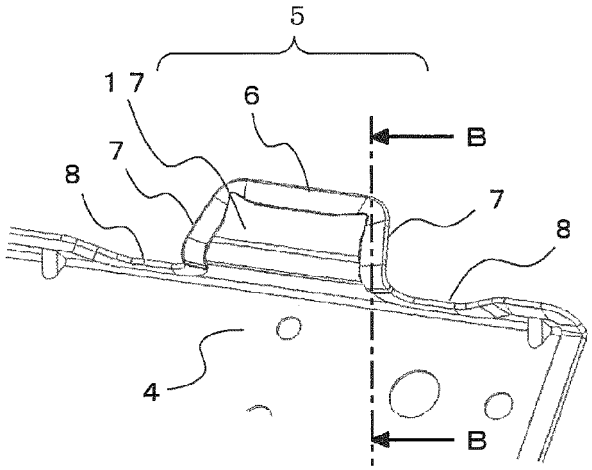


FIG. 5

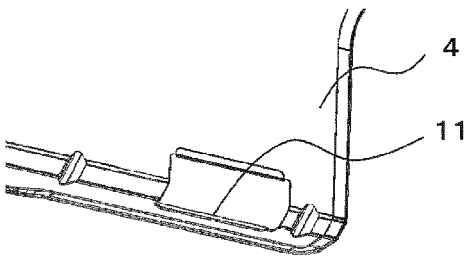


FIG. 6

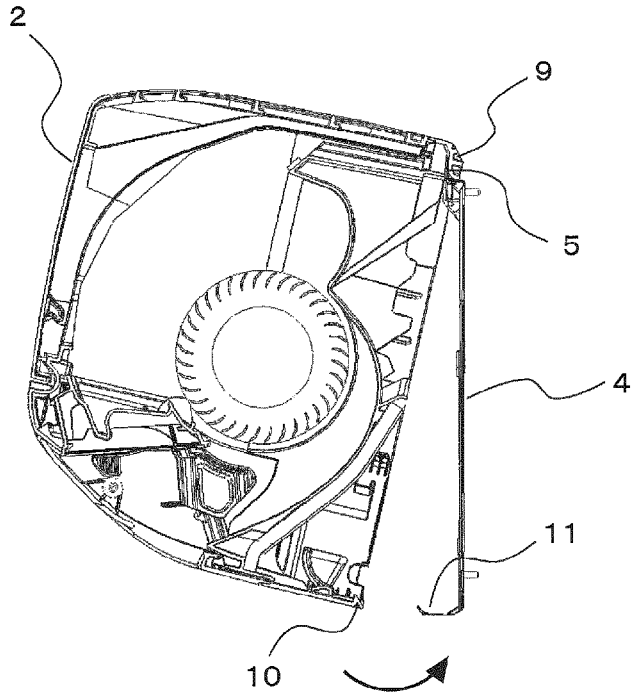


FIG. 7

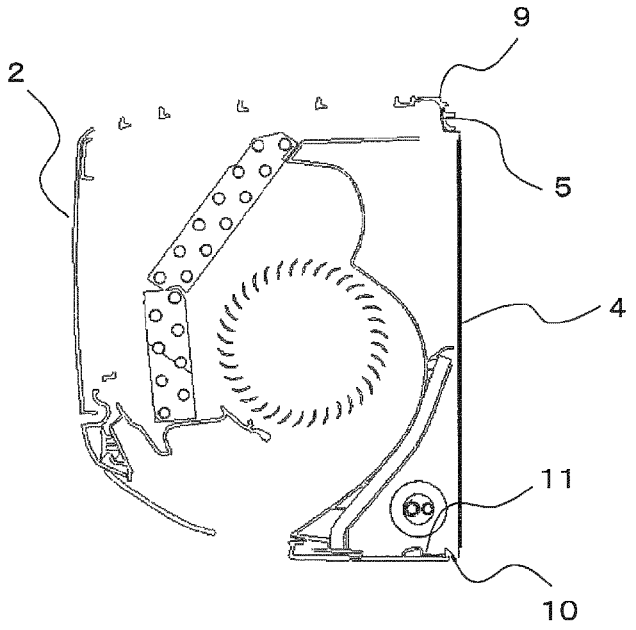


FIG. 8

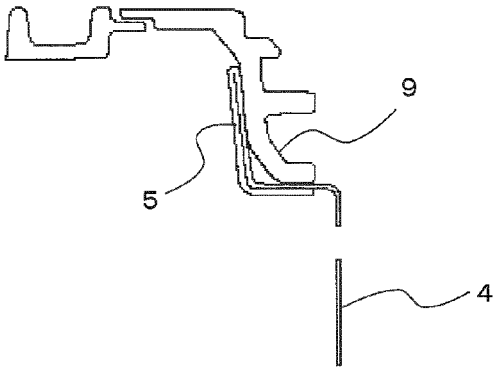


FIG. 9

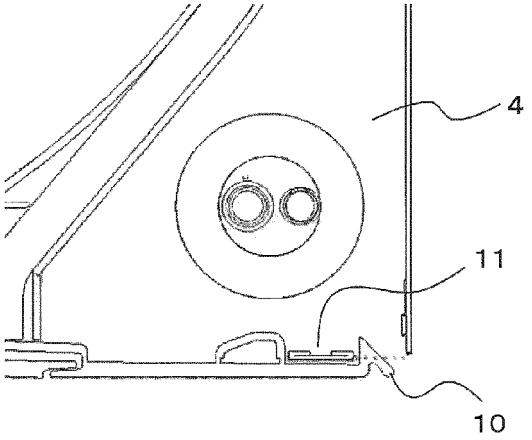


FIG. 10

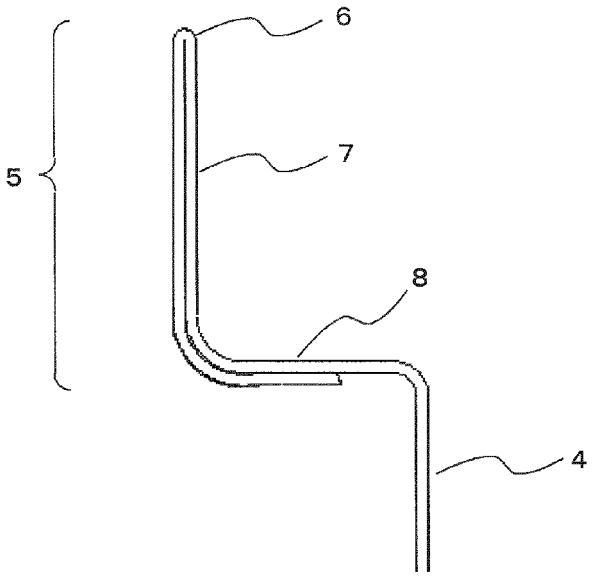


FIG. 11

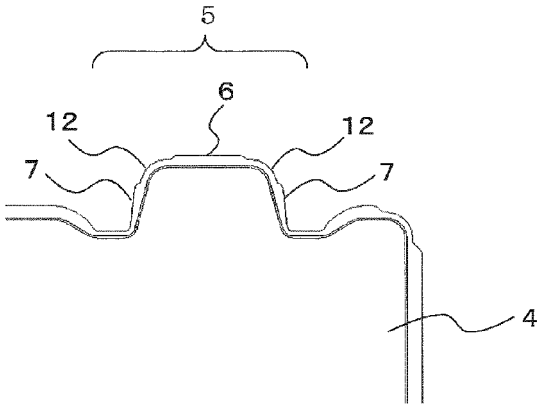


FIG. 12

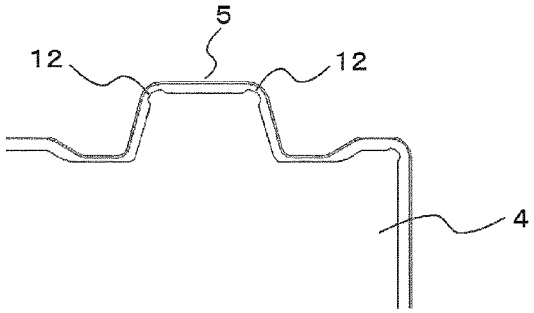


FIG. 13

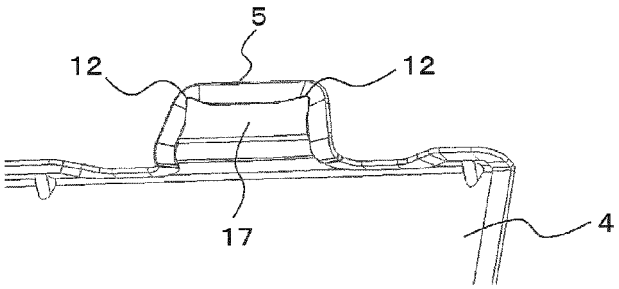
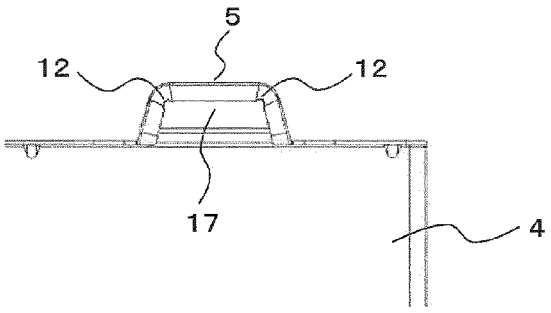


FIG. 14



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4208326 A **[0003]**