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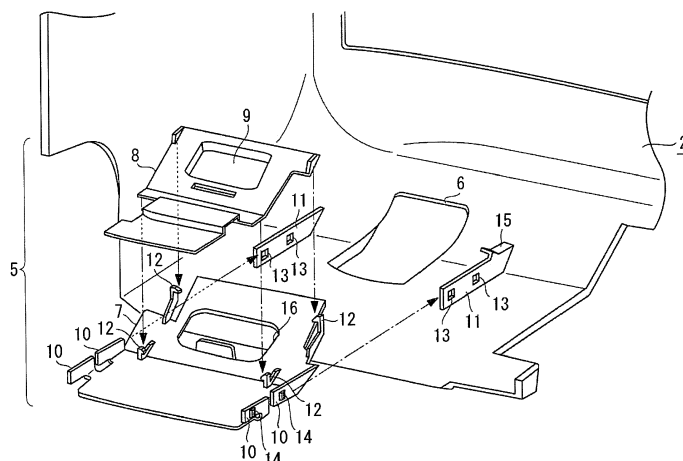
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(54) **AIR CONDITIONING APPARATUS**

(57) There is provided an air conditioning apparatus that is easily assembled and capable of reducing the influence of defective molding occurring on the front of a front panel while preventing a claw section from being damaged. The air conditioning apparatus includes a front panel 2, and a plate 5 provided on a back surface of the front panel 2, the air conditioning apparatus further including at least one plate-shaped claw section 10 provided upright against the plate 5 along an end of the plate 5 and having a convex-shaped protrusion 14 formed

therein, and at least one fixed plate 11 fixed to the back surface of the front panel 2 and having a hole 13, in which the protrusion 14 is fitted, formed therein, in which the claw section 10 is a member which is long along the end of the plate 5, and has one end in a longitudinal direction as a fixed end and another end in the longitudinal direction as a free end, and the protrusion 14 is formed at the other end in the longitudinal direction of the claw section 10.

FIG. 2



Description

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

[0001] The present invention relates to an air conditioning apparatus.

2. DESCRIPTION OF RELATED ART

[0002] An indoor unit in an air conditioning apparatus (e.g., a wall-mounted room air conditioner) includes a display section which displays an operation status or the like by turning a light emitting element such as a light emitting diode (LED) on and off, and a light receiving section which receives infrared light from a remote control. A front panel in the indoor unit is provided with a transmission plate to improve the appearance of a product by concealing componentry such as the display section and the light receiving section. The transmission plate uses such a transmission member, which differs in material from another portion of the front panel as to transmit visible light emitted by the display section and infrared light received by the light receiving section.

[0003] Japanese Unexamined Patent Application, Publication No. 2001-4165 discloses a technique for improving designability to enable remote control receiving in a wide range by providing a plurality of transparent light receiving windows which differ in light receiving direction and gradually decrease in cross-sectional area in a wall-mounted air conditioner.

[0004] Conventionally, a transmission plate 51, described above, is fitted in claw sections 52 formed on a rear surface of a front panel 50 in an indoor unit and is thus fixed to the front panel 50, as illustrated in Figs. 6 and 7.

[0005] The claw section 52 is provided upright from the rear surface of the front panel 50, and has a shape bent toward the transmission plate 51. The claw section 52 formed in the front panel 50 is small in length, i.e., has a length which is substantially the same as the plate thickness of the transmission plate 51, and thus an amount of deflection is small. Therefore, in an assembling process of the indoor unit, the transmission plate 51 is not easily assembled. In some cases, the claw section 52 may be damaged when the transmission plate 51 is assembled.

[0006] When the wall thickness of the claw section 52 is made large to increase the strength of the claw section 52, defective molding such as a sink may occur on the front of the front panel 50. Therefore, a measure to increase the wall thickness of the claw section 52 to prevent the claw section 52 from being damaged is not easily taken.

BRIEF SUMMARY OF THE INVENTION

[0007] The present invention has been made in view of such circumstances, and is directed to providing an air conditioning apparatus that is easily assembled and capable of reducing the influence of defective molding occurring on the front of a front panel while preventing a claw section from being damaged.

[0008] To solve the aforementioned problem, an air conditioning apparatus according to an aspect of the present invention adopts the following solutions. An aspect of the present invention is an air conditioning apparatus comprising, a front panel, a plate provided on a back surface of the front panel, at least one claw section which is plate-shaped and provided upright against the plate along an end of the plate and having a convex-shaped protrusion formed therein, and at least one fixed plate fixed to the back surface of the front panel and having a hole, in which the protrusion is fitted, formed therein, wherein the claw section is a member which is long along the end of the plate, and has one end in a longitudinal direction as a fixed end and another end in the longitudinal direction as a free end, and the protrusion is formed at the other end in the longitudinal direction of the claw section.

[0009] According to such a configuration, when the protrusion formed in the claw section is fitted in the hole in the fixed plate, the plate is fixed to the front panel. The claw section is a plate material which is long along the end of the plate, and the one end and the other end in the longitudinal direction of the claw section are the fixed end and the free end, respectively. Thus, the length of a range in which the claw section is deflected can be made large, and an amount of the deflection of the claw section can also be made large. The claw section, which is deflected at the time of the assembling, is installed in not the front panel but the plate. Therefore, even if the plate thickness of the claw section is set large so that the claw section is not easily damaged, molding of the front panel is not affected.

[0010] In the air conditioning apparatus, at least one claw sections is provided on each of two sides opposite to each other of the plate, and at least one fixed plates is installed to each of the two sides opposite to each other of the plate.

[0011] According to the configuration, when the protrusion formed in the claw section is fitted in the hole in the fixed plate, the plate remains sandwiched between the fixed plates provided on both the sides thereof, and is stably fixed to the front panel.

[0012] In the air conditioning apparatus, the at least one claw section may include two or more claw sections installed on one side of the plate, and the claw sections may be installed in the same plane.

[0013] According to the configuration, the two or more claw sections are provided on one side of the plate. Therefore, the plate is fixed to the front panel. Thus, the plate does not easily move in a vertical direction and a

horizontal direction with respect to a plate surface of the front panel.

[0014] According to the present invention, the air conditioning apparatus is easily assembled, and can reduce the influence of defective molding occurring on the front of the front panel while preventing the claw section from being damaged.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0015]

FIG. 1 is a perspective view illustrating an indoor unit in an air conditioning apparatus according to an embodiment of the present invention.

FIG. 2 is an exploded perspective view illustrating a front panel and a plate in the indoor unit according to the embodiment of the present invention.

FIG. 3 is a perspective view illustrating the front panel and the plate in the indoor unit according to the embodiment of the present invention.

FIG. 4 is a perspective view illustrating the plate in the indoor unit according to the embodiment of the present invention.

FIG. 5 is a partially plan view illustrating the plate in the indoor unit according to the embodiment of the present invention.

FIG. 6 is a perspective view illustrating a front panel and a transmission plate in a conventional indoor unit.

FIG. 7 is a longitudinal sectional view illustrating the front panel and the transmission plate in the conventional indoor unit.

DETAILED DESCRIPTION OF THE INVENTION

[0016] An indoor unit 1 in an air conditioning apparatus according to an embodiment of the present invention will be described below with reference to the drawings.

[0017] The indoor unit 1 in the air conditioning apparatus is of a wall-mounted type, for example, and an air blower (cross flow fan) and a drive motor and a heat exchanger therefor are assembled and contained in a base main body (not illustrated). As illustrated in Fig. 1, a front panel 2 is installed on the front of the indoor unit 1 to cover a front surface of a front cover (not illustrated) assembled in the base main body, and a blowoff port 3 assembled in the base main body is provided in a lower part of the indoor unit 1. The blowoff port 3 is provided with a louver, a flap 4, and the like for wind direction adjustment.

[0018] For example, a plate 5 is installed in a portion, positioned adjacent to the blowoff port 3, of the front panel 2. The plate 5 transmits, while covering componentry such as a display section and a light receiving section provided inside the indoor unit 1, visible light emitted by the display section and infrared light received by the light

receiving section. The display section includes a light emitting element such as a LED, and displays an operation status or the like of the indoor unit 1 by turning the light emitting element on and off. The light receiving unit receives infrared light irradiated from a remote control.

[0019] An opening 6 is formed, as illustrated in Figs. 1 and 2, in the front panel 2 in the portion where the plate 5 is installed, and the plate 5 installed from a rear surface of the front panel 2 is exposed to the front of the front panel 2.

[0020] The plate 5 includes a main body section 7 fixed to the front panel 2, and a lens section 8 fixed to the main body section 7, as illustrated in Figs. 2 to 4. A claw section 10 is formed in the main body section 7. When the claw section 10 is fitted in a fixed plate 11 in the front panel 2, the main body section 7 is fixed to the front panel 2. The lens section 8 includes a lens 9 which collects light. The lens section 8 is composed of a material which transmits visible light or infrared light. The lens section 8 is fitted in and fixed to the main body section 7 by the claw section 12 formed in the main body section 7, for example. In the main body section 7, an opening 16 is formed at a position corresponding to the lens 9 in the lens section 8. When the main body section 7 and the lens section 8 are combined with each other, the lens 9 is exposed from the opening 16.

[0021] The present invention is not limited to not only a case where the plate 5 includes separate members, i.e., the main body section 7 and the lens section 8 but also a case where the plate 5 includes only a single member. The plate 5 may include three or more members. The plate 5 need not necessarily include a lens, which collects light, although a member having a material, which transmits visible light or infrared light, is used, as described above, for the plate 5.

[0022] The fixed plate 11 is installed to correspond to the portion where the plate 5 is installed, as illustrated in Figs. 2 and 3, on the rear surface of the front panel 2. The fixed plate 11 is provided almost perpendicularly to the rear surface of the front panel 2. The fixed plate 11 is a member which is long in one direction, and has its long side provided along the rear surface of the front panel 2 and its short side corresponding to a direction vertical to a plate surface of the front panel 2.

[0023] The fixed plate 11 includes two fixed plates 11 installed on the rear surface of the front panel 2 to respectively correspond to two sides opposite to each other of the plate 5. The fixed plates 11 are parallel to each other. Thus, when a protrusion 14 formed in the claw section 10 is fitted in a hole 13 in the fixed plate 11, the plate 5 remains sandwiched between the fixed plates 11 provided on both the sides thereof, and is stably fixed to the front panel 2.

[0024] The fixed plate 11 has two holes 13 formed therein. The two holes 13 are provided side by side along a longitudinal direction of the fixed plate 11. At a position where the plate 5 is installed in the front panel 2, the position and the size of the hole 13 are set so that the

protrusion 14 in the claw section 10 is fitted in the hole 13.

[0025] The fixed plate 11 may be provided with an inhibition section 15 to position the plate 5 and prevent movement in the vertical direction of the plate 5, i.e., floating of the plate 5 from the front panel 2. The inhibition section 15 has a plate surface in a direction perpendicular to the fixed plate 11. When the plate 5 is installed in the front panel 2, an end of the plate 5 is accommodated between the inhibition section 15 and the front panel 2.

[0026] The claw sections 10 are respectively installed along the end of the plate 5 on the two sides opposite to each other of the plate 5, i.e., two sides opposite to each other of the main body section 7 in the present embodiment. The claw section 10 is provided almost perpendicularly to a plate surface of the main body section 7. The claw section 10 is a member which is long in one direction, and has its long side provided almost parallel to an end of the main body section 7 and its short side corresponding to a direction vertical to the plate surface of the main body section 7.

[0027] The claw section 10 includes a total of four claw sections 10, two of which are installed on each of the two sides opposite to each other of the main body section 7. The claw sections 10 installed on one side and the claw sections 10 installed on the other side are parallel to each other. The two claw sections 10 installed on the one side are installed in the same plane. Thus, the two claw sections 10 are provided on the one side of the main body section 7. Therefore, the plate 5 does not easily move in a vertical direction and a horizontal direction with respect to the plate surface of the front panel 2.

[0028] One end in the longitudinal direction of each of the claw sections 10 is a fixed end fixed to the main body section 7, and the other end thereof in the longitudinal direction is a free end. That is, the claw section 10 is provided to rise in a direction perpendicular to the main body section 7, and is provided in a substantially horizontal direction along the end of the main body section 7 at a position spaced apart from the main body section 7. Therefore, the length L of a range in which the claw section 10 is deflected can be made large and as a result, an amount of the deflection can also be made large, as illustrated in Fig. 5.

[0029] A convex-shaped protrusion 14 projecting with respect to a plate surface of each of the claw sections 10 is formed at the other end in the longitudinal direction, i.e., at the free end of the claw section 10. At a position where the plate 5 is installed in the front panel 2, the protrusion 14 is fitted in the hole 13.

[0030] If the plate 5 is assembled in the aforementioned front panel 2, the lens section 8 is first fitted in and integrated with the main body section 7 in the plate 5 in the present embodiment. The plate surface of the claw section 10 in the plate 5 with which the lens section 8 is integrated is slid along the plate surface of the fixed plate 11 in the front panel 2. While the protrusion 14 in the claw section 10 is not fitted in the hole 13 in the fixed plate 11 but contacts the plate surface of the fixed plate 11, the

claw section 10 is deflected by being pressed from the fixed plate 11.

[0031] At the position where the plate 5 is installed in the front panel 2, the protrusion 14 in the claw section 10 is fitted in the hole 13 so that the deflection of the claw section 10 is released. As a result, the protrusion 14 remains fitted in the hole 13 so that the plate 5 is fixed to the front panel 2. That is, the plate 5 is prevented from moving in directions vertical and horizontal to the plate surface, i.e., floating from the front panel 2 and moving along the front panel 2.

[0032] While a case where the two claw sections 10 are provided on each of the two sides opposite to each other of the plate 5 (the two sides opposite to each other of the main body section 7 in the present embodiment) has been described in the aforementioned embodiment, the present invention is not limited to this example. Only one claw section 10 may be provided or three or more claw sections 10 may be provided on each of the sides of the plate 5.

[0033] As described above, according to the present embodiment, the claw section 10 is a plate material which is long along the end of the plate 5, and the one end and the other end in the longitudinal direction of the claw section 10 are the fixed end and the free end, respectively. Thus, the length L of the range in which the claw section 10 is deflected can be made large, as illustrated in Fig. 5, unlike in the conventional example illustrated in Figs. 6 and 7. As a result, the amount of the deflection of the claw section 10 can be made larger than in the conventional example. Therefore, when the plate 5 is assembled in the front panel 2, the claw section 10 is not easily damaged.

[0034] The claw section 10, which is deflected at the time of the assembling, is installed in not the front panel 2 but the plate 5. Therefore, even if the plate thickness of the claw section 10 is set large so that the claw section 10 is not easily damaged, molding of the front panel 2 is not affected. That is, when the plate thickness of the claw section 52 in the conventional example illustrated in Figs. 6 and 7 is made large, defective molding such as a sink may occur on the front of the front panel 50. However, the front of the front panel 2 is not affected by a sink or the like in the present embodiment.

Reference Signs List

[0035]

- 1 : Indoor unit
- 2 : Front panel
- 3 : Blowoff port
- 4 : Flap
- 5 : Plate

6	: Opening	(5).
7	: Main body section	3.
8	: Lens section	5
9	: Lens	
10	: Claw section	10
11	: Fixed plate	
12	: Claw section	
13	: Hole	15
14	: Protrusion	
15	: Inhibition section	20
50	: Front panel	
51	: Transmission plate	
52	: Claw section	25

Claims

1. An air conditioning apparatus (1) **characterized in that** it comprises:
 - a front panel (2);
 - a plate (5) provided on a back surface of the front panel (2) ;
 - at least one claw section (10) which is plate-shaped and provided upright against the plate (5) along an end of the plate (5) and having a convex-shaped protrusion (14) formed therein; and
 - at least one fixed plate (11) fixed to the back surface of the front panel (2) and having a hole (13), in which the protrusion (14) is fitted, formed therein,
 - wherein the claw section (10) is a member which is long along the end of the plate (5), and has one end in a longitudinal direction as a fixed end and another end in the longitudinal direction as a free end, and
 - the protrusion (14) is formed at the other end in the longitudinal direction of the claw section (10).
2. The air conditioning apparatus according to claim 1, wherein,
 - at least one claw sections (10) is provided on each of two sides opposite to each other of the plate (5), and at least one fixed plates (11) is installed to each of the two sides opposite to each other of the plate

FIG. 1

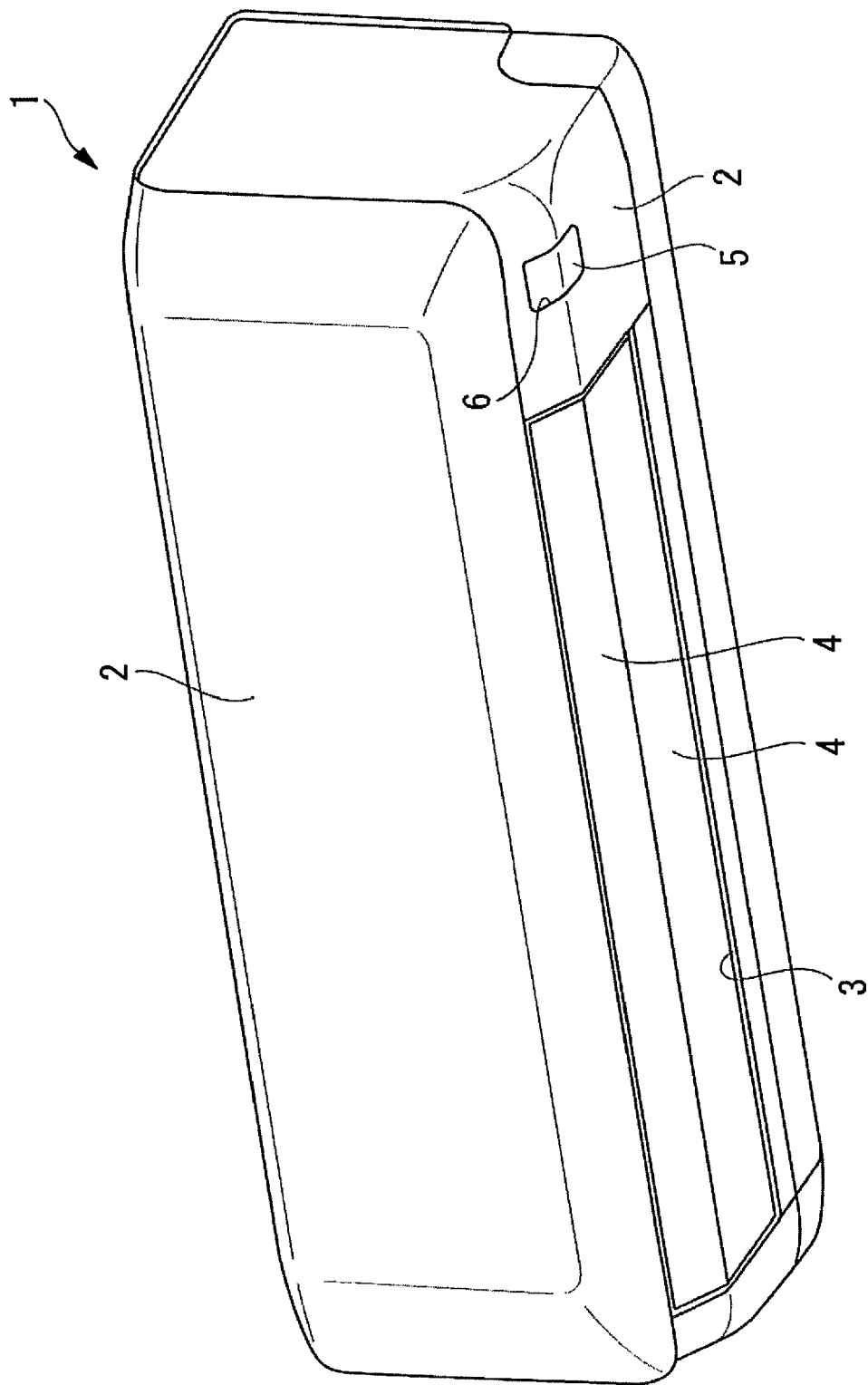


FIG. 2

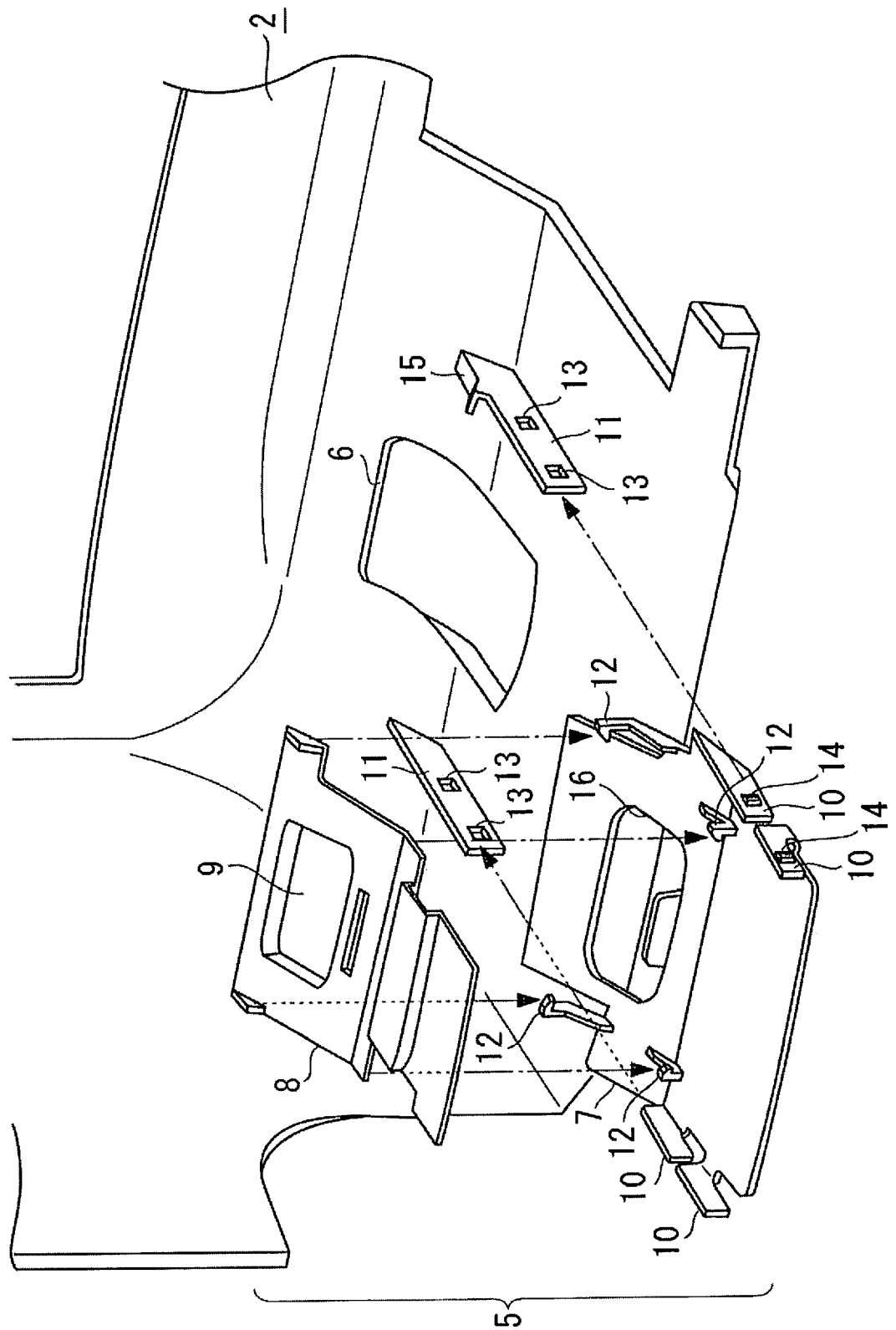


FIG. 3

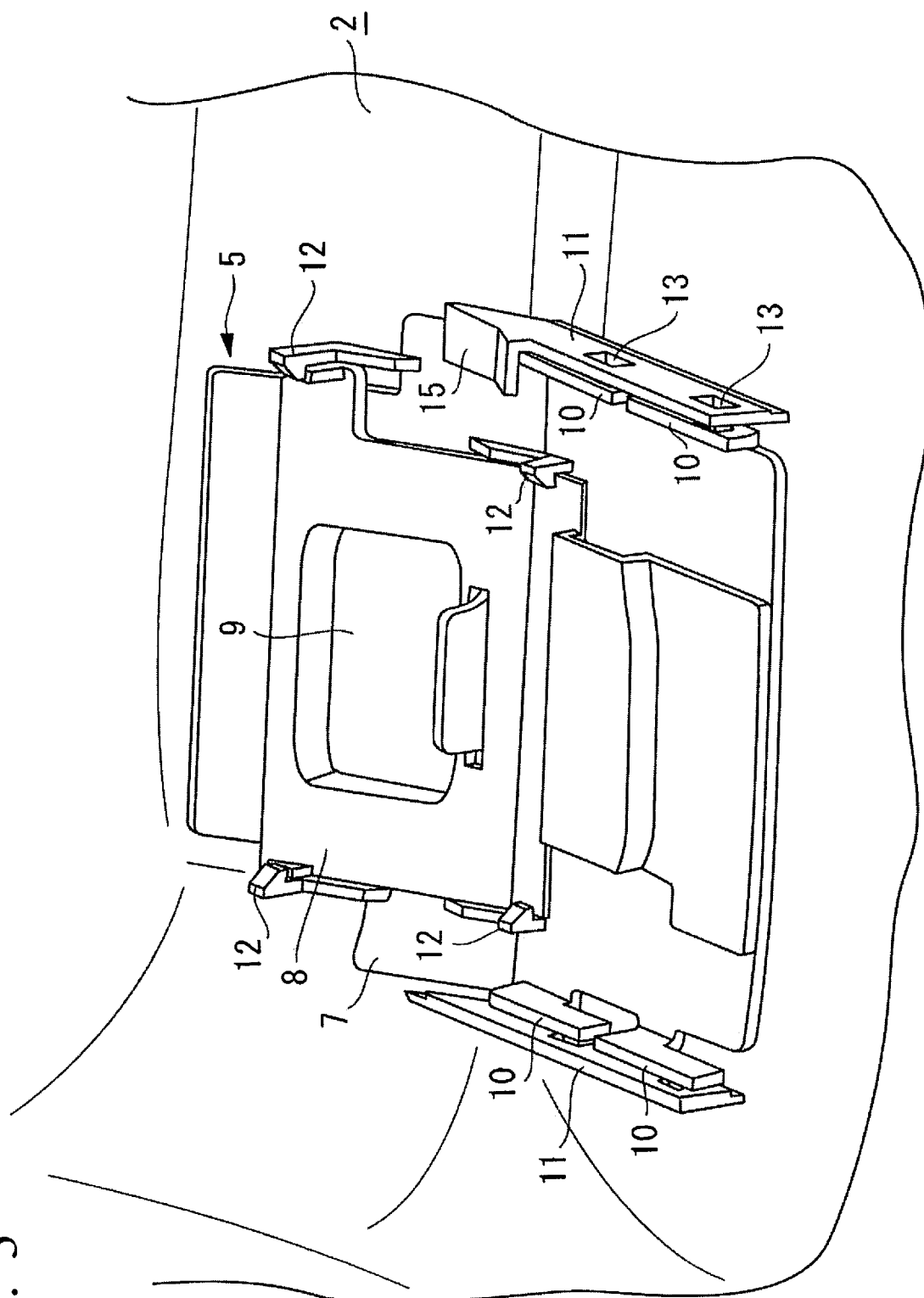


FIG. 4

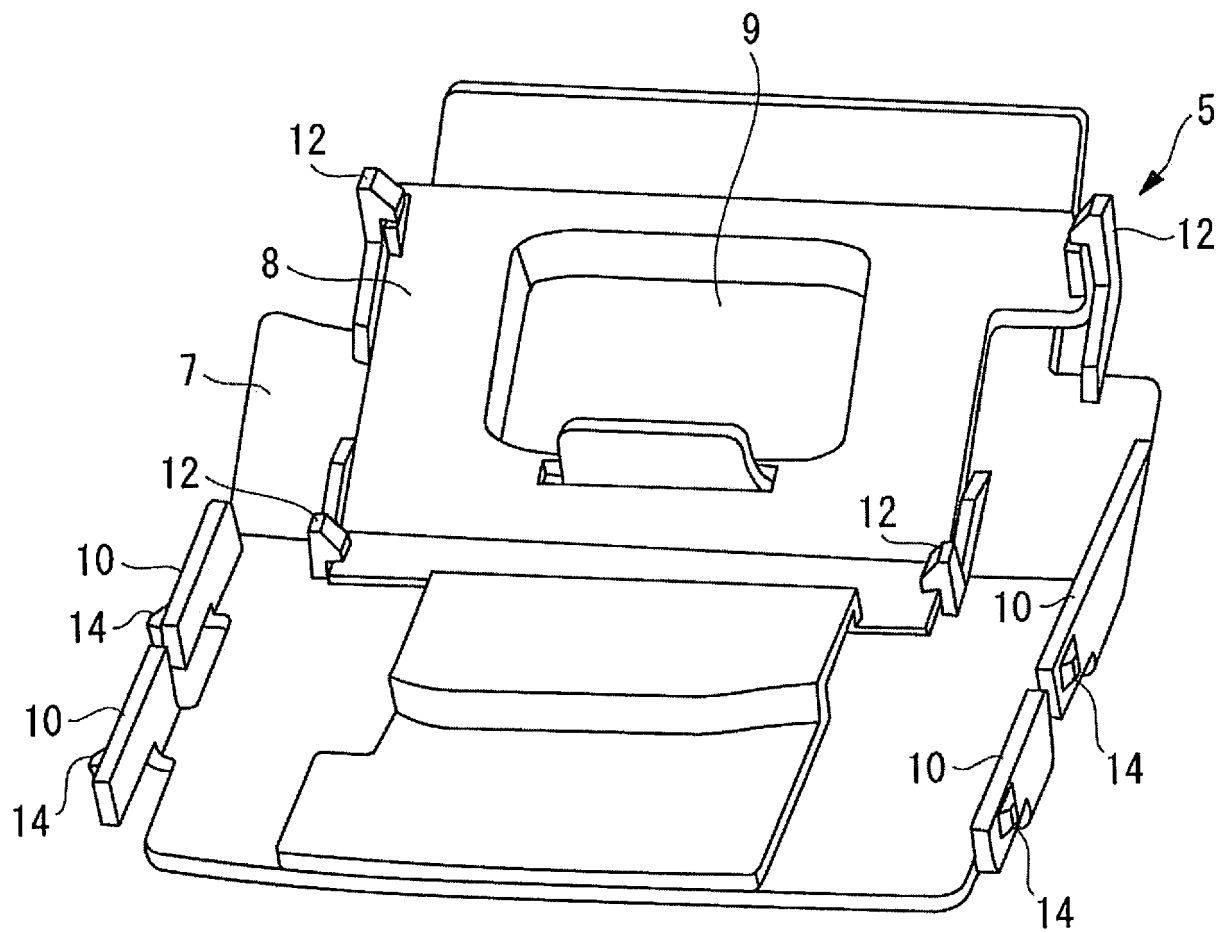


FIG. 5

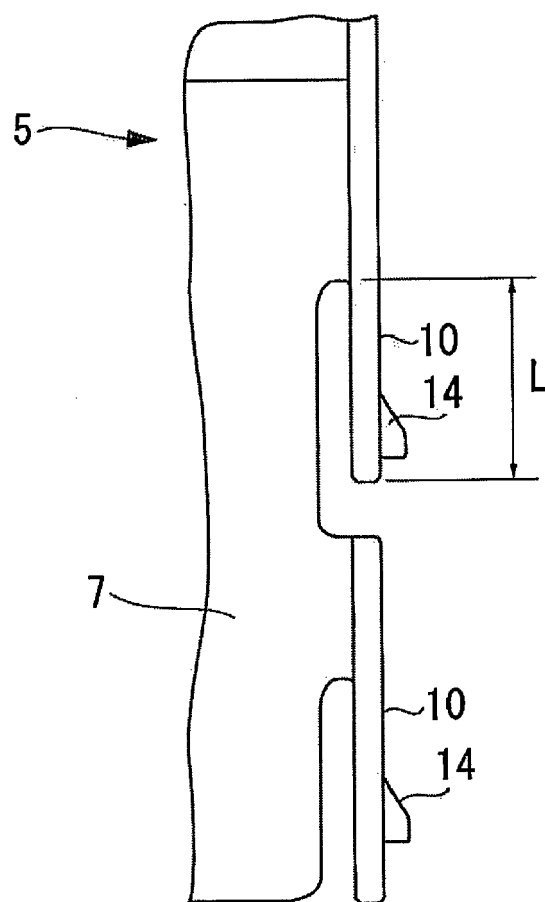


FIG. 6

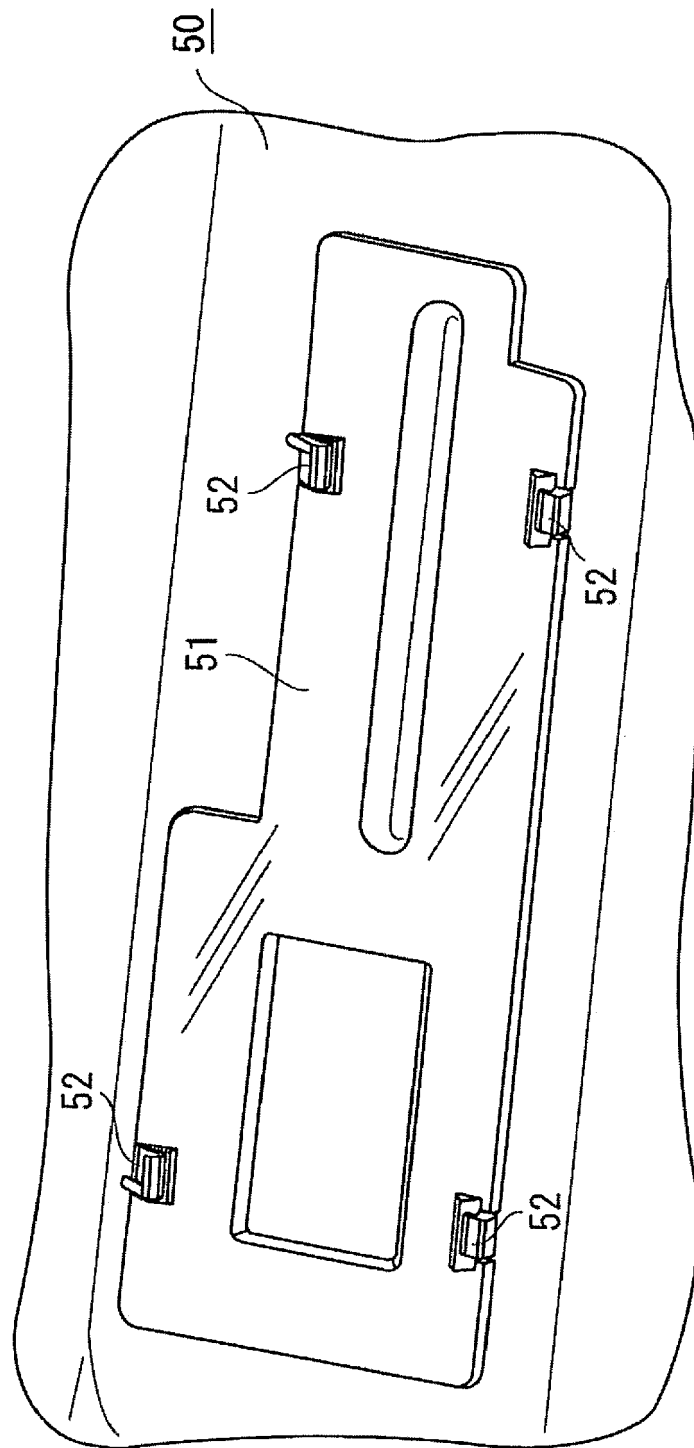
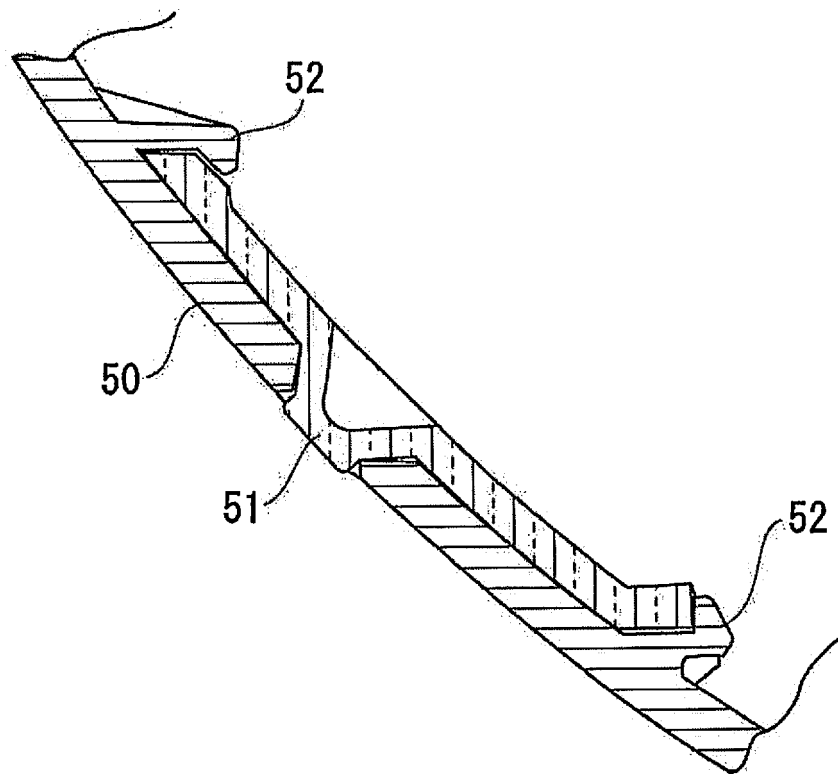


FIG. 7





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