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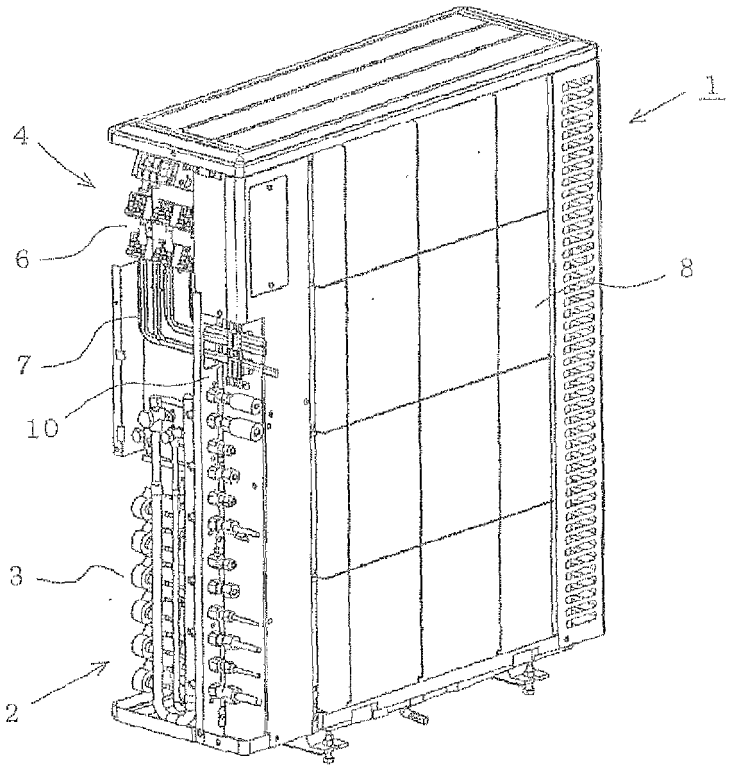
(54) Fixing structure for indoor/outdoor communication line of air conditioner

(57) In a multi-unit type air conditioner in which a plurality of indoor units are connected to one outdoor unit (1) through a plurality of indoor/outdoor communication lines (7), the plurality of communication lines (7) are fixed to a main body of the outdoor unit (1) by a communication-line fixture (10) collectively.

FIG. 2



EP 2 333 437 A2

Description

[Technical Field]

[0001] The present invention relates to a fixing structure for an indoor/outdoor communication line connecting an outdoor unit and indoor units to each other in a multi-unit type air conditioner in which a plurality of indoor units are connected to one outdoor unit.

[Background Art]

[0002] Fig. 10 is a perspective view illustrating a state in which a sectional panel of an outdoor unit of a prior-art air conditioner is removed, Fig. 11 is a front view around an electric-component mounting base in Fig. 10, and Fig. 12 is a side view of an essential part of Fig. 11. On one side of an outdoor unit 70, a compressor 72 and a pipeline 73 are installed at a lower part, while an electric-component mounting base 74 is disposed at an upper part, and a machine chamber 71 is provided in which a plurality of terminal blocks 75a to 75n corresponding to each of the indoor units and electric components and the like are disposed.

[0003] To each of the terminal blocks 75a to 75n, each of a plurality of indoor/outdoor communication lines 76a to 76n having one ends connected to the indoor units (not shown), respectively, is connected, and the indoor/outdoor communication lines 76a to 76n are bundled to one or more bundles and fixed to the electric-component mounting base 34 by band-shaped pressing fixtures 77a, 77b, and 77c. Reference numeral 78 denotes a heat exchanger installed from the other side face to the rear face of the machine chamber 71 and reference numeral 79 denotes a front panel having an outlet grill (not shown) and covering a front face and the other side face, and between the heat exchanger 78 and the front panel 79, an air-blowing chamber 81 in which a blower and the like are installed is disposed having a partition plate 80 between that and the machine chamber 71.

[0004] Also, such a cable holding structure is disclosed that includes a receiving fixture formed in a stepped shape and having a long hole through which a cable is inserted in a predetermined direction and a pressing fixture having a plurality of U-shaped bent portions mounted to the face of the receiving fixture, respectively, in which the cable inserted through the long hole is sandwiched between the receiving fixture and the U-shaped bent portions of the pressing fixture so as to be fixed (See Patent Literature 1, for example).

[Citation List]

[Patent Literature]

[0005] [PTL 1] Japanese Unexamined Utility Model Publication No. 1-87586 (pages 3 to 4, Fig. 1)

[Summary of Invention]

[Technical Problem]

[0006] In the prior-art fixing structure for indoor/outdoor communication lines shown in Figs. 10 to 12, since the indoor/outdoor communication lines 76a to 76n are fixed by the band-shaped pressing fixtures 77a to 77c, each of the pressing fixtures 77a to 77c needs an installation space for one or two of the indoor/outdoor communication lines 76a to 76n connected to each of the terminal blocks 75a to 75n, therefore, it was difficult to install the plurality of indoor/outdoor communication lines 76a to 76n in a small space.

[0007] Also, with the cable holding structure in Patent Literature 1, since the plurality of cables need to be inserted through the long hole of the receiving fixture formed in the stepped shape, installation is cumbersome and requires many processes, which is a problem.

[0008] The present invention was made in order to solve the above problems and an object thereof is to provide a fixing structure for an indoor/outdoor communication line of an air conditioner which can efficiently fix a plurality of indoor/outdoor communication lines connected to terminal blocks even in a small space and is inexpensive and excellent in assembling performance and serviceability.

[Solution to Problem]

[0009] A fixing structure for an indoor/outdoor communication line of an air conditioner according to the present invention fixes, in a multi-unit type air conditioner in which a plurality of indoor units are connected to one outdoor unit through a plurality of indoor/outdoor communication lines, the plurality of indoor/outdoor communication lines are fixed in a bundle to a main body of the outdoor unit by a communication-line fixture.

[Advantageous Effects of Invention]

[0010] According to the present invention, since the plurality of indoor/outdoor communication lines can be fixed to the main body of the outdoor unit efficiently in a bundle by the communication-line fixture, a fixing structure for an indoor/outdoor communication line which is inexpensive and excellent in assembling performance and serviceability even in a small space can be obtained.

[Brief Description of Drawings]

[0011]

Fig. 1 is an explanatory diagram of a fixing structure for an indoor/outdoor communication line of an air conditioner according to Embodiment 1 of the present invention.

Fig. 2 is a partially omitted perspective view of an

outdoor unit of the air conditioner.

Fig. 3 is a front view of an electric-component mounting portion in Fig. 2.

Fig. 4 is a side view illustrating a state in which a plurality of indoor/outdoor communication lines are fixed by a communication-line fixture in Fig. 3.

Fig. 5 is an exploded perspective view of the communication-line fixture in Fig. 4.

Fig. 6 is an explanatory diagram of a fixing structure for an indoor/outdoor communication line of an air conditioner according to Embodiment 2 of the present invention.

Fig. 7 is a side view illustrating a state in which a plurality of indoor/outdoor communication lines are fixed by a communication-line fixture in Fig. 6.

Fig. 8 is an exploded perspective view of the communication-line fixture in Fig. 7.

Fig. 9 is an explanatory diagram of a procedure for fixing the plurality of indoor/outdoor communication lines by the communication-line fixture in Fig. 8.

Fig. 10 is a perspective view illustrating a state in which a side panel of an outdoor unit of a prior-art air conditioner is removed.

Fig. 11 is a front view around an electric-component mounting base in Fig. 10.

Fig. 12 is a side view of an essential part of Fig. 11.

[Description of Embodiments]

[Embodiment 1]

[0012] Fig. 1 is an explanatory diagram of a fixing structure for an indoor/outdoor communication line of an air conditioner according to Embodiment 1 of the present invention, Fig. 2 is a partially omitted perspective view of an outdoor unit of the air conditioner, and Fig. 3 is a front view of an electric-component mounting portion in Fig. 2. At a lower part of a machine chamber 2 disposed on one side of an outdoor unit 1, a compressor (not shown), a pipeline 3 and the like are disposed, and an electric-component mounting portion 4 is disposed at an upper part. Reference numeral 8 denotes a heat exchanger disposed from the rear face to the other side face, and reference numeral 9 denotes a partition plate partitioning the machine chamber 2 from an adjacent air-blowing chamber.

[0013] At the upper part of the electric-component mounting portion 4, an electric component 5 and the like are disposed, and a plurality of terminal blocks 6a to 6f (hereinafter referred to simply as 6 in some cases) are installed below that. To the terminal blocks 6a to 6f, the other end of each of a plurality of indoor/outdoor communication lines 7a to 7f (hereinafter referred to simply as a communication line or might be indicated by reference numeral 7 in a bundle) having one end connected to each of indoor units (not shown) is connected, and the plurality of communication lines 7a to 7f are fixed to a main body (the partition plate 9 in this case) of the outdoor unit 1 in a bundle by a communication-line fixture 10.

[0014] Fig. 4 is an explanatory diagram illustrating a state in which the plurality of communication lines 7 are fixed in a bundle by the communication-line fixture 10, and Fig. 5 is an exploded perspective view of the communication-line fixture 10 in Fig. 4.

The communication-line fixture 10 includes, as shown in Fig. 5, a fixing base 11, a receiver 20, and a presser 30. They will be described below in detail.

[0015] The fixing base 11 has recess-shaped first and second holding portions 12a and 12b that hold the communication line 7 and screw insertion holes 14 and is constituted by fixing portions 13a to 13c disposed between the both holding portions 12a and 12b and at positions higher than the holding portions 12a and 12b on both sides and having the screw insertion holes 14, mounting pieces 15a and 15b extended downward from outer walls of the fixing portions 13b and 13c on both sides and then, folded outward and having screw insertion holes 16, and supporting pieces 17a and 17b extended downward from both sides of the holding portions 12a and 12b and then, folded outward.

[0016] The receiver 20 is formed having the length substantially equal to the length between the outer walls of the both fixing portions 13b and 13c of the fixing base 11 and the width substantially equal to the width of the fixing base 11 and has a main body portion 21 in which both end portions in the longitudinal direction are folded downward and engagement pieces 23a and 23b are disposed. At positions corresponding to the fixing portions 13a to 13c of the fixing base 11 on both-side edges of the main body portion 21, sandwiching portions 24a to 24c folded upward are disposed, respectively, and first and second receiving portions 25a and 25b for the communication lines 7 are disposed between the sandwiching portions 24a and 24b and between the sandwiching portions 24a and 24c. Between each of the opposing sandwiching portions 24a to 24c of the main body portion 21, screw insertions hole 22 (the screw insertion holes 22 on the both sides are long holes) are disposed corresponding to the screw insertion holes 14 disposed in the fixing portions 13a to 13c of the fixing base 11.

[0017] The presser 30 is formed having the length substantially equal to the length of a receiving plate 21 of the receiver 20 and the width substantially equal to an interval between inner walls of the opposing sandwiching portions 24a to 24c of the receiver 20. Projection-shaped first and second pressing portions 31a and 31b are disposed corresponding to the receiving portions 25a and 25b of the receiver 20, and between the pressing portions 31a and 31b and in the both end portions, mounting portions 32a to 32b which are folded downward from the pressing portions 31a and 31b and form flat portions are disposed corresponding to the sandwiching portions 24a to 24c of the receiver 20, and a screw insertion hole 33 is disposed in the flat portion of each of the mounting portions 32a to 32b corresponding to the screw insertion holes 22 of the receiver 20.

[0018] Subsequently, an example of a fixing procedure of the indoor/outdoor communication line 7 by means of the communication-line fixture 10 configured as above will be described while referring to Figs. 3 to 5.

First, at a predetermined position of the main body (the partition plate 9, in this case) of the outdoor unit 1, the fixing pieces 15a and 15b and the supporting pieces 17a and 17b of the fixing base 11 are brought into contact, and the screws inserted through the screw insertion holes 16 of the mounting pieces 15a and 15b are screwed into the partition plate 9 so that the fixing base 11 is fixed onto the partition plate 9 (the main body of the indoor unit 1).

[0019] Subsequently, the plurality of indoor/outdoor communication lines 7 connected to the terminal blocks 6 (Fig. 4 shows the case of the communication lines 7e, 7f, and 7n) are placed on the holding portions 12a and 12b of the fixing base 11, the receiver 20 is placed on top of it, and the engagement pieces 23a and 23b are fitted with the both side walls of the fixing portions 13a and 13b of the fixing base 11. As a result, the communication lines 7 are sandwiched between the holding portions 12a and 12b of the fixing base 11 and the receiving portions 25a and 25b of the receiver 20.

[0020] Subsequently, the plurality of communication lines 7 (the case of the communication lines 7b, 7c, 7a, and 7d is shown in Fig. 4) are placed on the receiving portions 25a and 25b of the receiver 20. Then, the presser 30 is fitted between the sandwiching portions 24a to 24c from above the receiver 20 so that the communication lines 7 are sandwiched between the receiving portions 25a and 25b of the receiver 20 and the pressing portions 31a and 31b of the presser 30.

[0021] Finally, screws 35, which are fixing member, are inserted through the screw insertion holes 33, 22, and 14 disposed in the presser 30, the receiver 20, and the fixing base 11, screwed into nuts 36 disposed on the rear faces of the fixing portions 13a to 13c of the fixing base 11 and integrally fixed. The case in which the screw 35 is screwed into the nut 36 disposed on the rear face of the fixing base 11 is shown, but the nut may be omitted and the screw insertion hole 14 of the fixing base 11 is used as a screw hole, through which the screw 35 may be screwed into.

[0022] As a result, the plurality of indoor/outdoor communication lines 7 are bundled by the communication-line fixture 10 and fixed to the main body of the outdoor unit 1.

Also, if each of the communication lines 7 is to be removed for maintenance or the like, the communication line can be easily taken out by loosening the screw 35 of the communication-line fixture 10 and by removing the presser 30 or the presser 30 and the receiver 20.

[0023] According to the present embodiment, since the plurality of indoor/outdoor communication lines 7 having one ends connected to the indoor units and the other ends to the terminal blocks 6 of the outdoor unit are stacked in double by the communication-line fixture 10 and fixed to the main body of the outdoor unit 1 collectively, the large number of communication lines 7 can be easily fixed even in a small space, and assembling performances and serviceability can be improved.

[Embodiment 2]

[0024] Fig. 6 is an explanatory diagram of a fixing structure for an indoor/outdoor communication line of an air conditioner according to Embodiment 2 of the present invention, Fig. 7 is an explanatory diagram illustrating a state in which a plurality of indoor/outdoor communication lines are fixed in a bundle by a communication-line fixture in Fig. 6, and Fig. 8 is an exploded perspective view of the communication-line fixture in Fig. 7. The same reference numerals are given to the same portions as those in Embodiment 1.

[0025] The communication-line fixture 10 according to this embodiment is formed by a fixing base 40, a plurality of pressers 50, and a receiver 60.

The fixing base 40 has a main body portion 41 having a substantially U-shaped section, in which free ends of both-side plates are folded outward and provided with mounting pieces 43a and 43b having screw insertion holes 44a and 44b, and receiving portions 42a and 42b for the first and second communication lines 7 are disposed on the top face. In the center part in the width direction on the top face, screw insertion holes 45a and 45b are disposed vertically, and the two screw insertion holes 45a and 45b are arranged side by side between the receiving portions 42a and 42b. In the vicinity of the four corners on the top face, respective screw insertion holes 46 are disposed.

[0026] Each of the pressers 50 is formed having a length substantially half of that of the length of the fixing base 40 and the width smaller than the width of the main body portion 41. A projection-shaped pressing portion 51 is disposed corresponding to the one receiving portions 42a (or 42b) of the fixing base 40, and the both end portions of the pressing portion 51 are folded downward and then folded outward, and mounting pieced 52a and 52b in which screw insertion holes 53 are disposed are provided. The pressers 50 in the same structure are used in plural (the case of four pressers is shown in the figure).

[0027] The receiver 60 has a main body portion 61 having a substantially U-shaped section formed having the length substantially equal to the length of the fixing base 40 and the width formed slightly larger than the width of the presser 50, fixing pieces 63a to 63c extended downward from both end portions and the center part in the longitudinal direction of the both side walls of the main body portion 61 and then, folded outward are disposed, and screw insertion holes 64 corresponding to the screw insertion holes 46 of the fixing base 40 are disposed in the fixing pieces 63a and 63b on the both end portions. Receiving portions 62a and 62b for the first and second communication lines 7 are disposed on the top face, and screw insertion holes 65a and 65b are disposed at positions corresponding to the screw insertion holes 45a and

45b of the fixing base 40 at the center part in the width direction of the top face.

[0028] Subsequently, a procedure to fix the plurality of indoor/outdoor communication lines 7 by the communication-line fixture 10 configured as above in a bundle will be described referring to Figs. 7 and 9.

First, the mounting pieces 43a and 43b of the fixing base 10 are brought into contact with the predetermined positions on the main body (the partition plate 9 in this case) of the outdoor unit 1, the screw inserted through the screw insertion holes 44a and 44b are screwed into the partition plate 9, and the fixing base 10 is fixed.

[0029] Then, one or two communication lines 7 are placed on the one receiving portion 42a (or 42b) of the fixing base 40, the top thereof is covered by the presser 50a, the mounting pieces 52a and 52b are brought into contact with the top face of the fixing base 40, and the screw inserted through the screw insertion holes 53 of the mounting pieces 52a and 52b are inserted through the screw insertion holes 45a, screwed into nuts disposed on the rear face and fixed. As a result, the communication lines 7 are sandwiched between the fixing base 40 and the presser 50a and fixed.

Similarly, the communication lines 7 are placed on the other receiving portion 42b of the fixing base 40, sandwiched between the presser 50b and the fixing base 40 and fixed (the pressers 50a and 50b might be described as first pressers).

[0030] Subsequently, the receiver 60 is fitted with the both pressers 50a and 50b from above, and the fixing pieces 63a to 63c are brought into contact with the top face of the fixing base 40. Then, the screws inserted through the screw holes 64 disposed in the fixing pieces 63a and 63b are inserted through the screw insertion holes 46 of the fixing base 40 and screwed into the nuts disposed on the rear face and fixed.

[0031] Subsequently, the communication lines 7 are placed on the one receiving portion 62a (or 62b) on the top face of the receiver 60 and sandwiched and fixed by the presser 50c in the same way as the above. Also, in the same way, the communication lines 7 placed on the other receiving portion 62b are sandwiched by the presser 50d and fixed (the pressers 50c and 50d may be described as second pressers). As a result, the plurality of communication lines 7 are fixed by the communication-line fixture 10 collectively. In the above description, the case in which the screws are inserted through the screw insertion holes 45a, 45b, and 46 disposed in the fixing base 40 and the screw insertion holes 65a and 65b disposed in the receiver 60 by disposing the nuts on the rear face side is shown, but the nuts may be omitted and screw holes are disposed instead of the screw insertion holes 45a, 45b, 46, 65a, and 65b so that the screws are inserted into the screw holes.

[0032] In this embodiment, too, substantially the same effects as those in Embodiment 1 can be obtained, but moreover, since the plurality of small-sized pressers 50 are disposed so as to fix the communication lines 7, the pressers 50 can be used as appropriate in accordance with the number of the communication lines 7 to be fixed, and in maintenance or the like, it is only necessary to remove only the pressers 50 or the pressers 50 and the receiver 60 of the targeted communication lines 7, and the operation is easy.

[Reference Signs List]

[0033]

1: outdoor unit
6: terminal block
7: communication line
10: communication-line fixture
11: fixing base
12a, 12b: first and second holding portions
20: receiver
23a, 23b: engagement piece
24a, 24b: sandwiching portion
25a, 25b: first and second receiving portions
30: presser
31a, 31b: first and second pressing portions
40: fixing base
42a, 42b: first and second receiving portions
50: presser
51: pressing portion
60: receiver
62a, 62b: first and second receiving portions

Claims

1. A fixing structure for an indoor/outdoor communication line of a multi-unit type air conditioner in which a plurality of indoor units are connected to one outdoor unit (1) through a plurality of indoor/outdoor communication lines (7),
wherein said plurality of indoor/outdoor communication lines (7) are fixed to a main body of said outdoor unit (1) collectively by a communication-line fixture (10).

2. The fixing structure for the indoor/outdoor communication line of the air conditioner of claim 1,
wherein said communication-line fixture (10) includes:

a fixing base (11) that has recess-shaped first and second holding portions (12a,12b) and is fixed onto the main body of said outdoor unit (1), in which the indoor/outdoor communication lines (7) are placed on said holding portions (12a, 12b);
a receiver (20) that has first and second receiving portions (25a,25b) and sandwiching portions (24a,24b,24c) on both side edges and is disposed on said fixing base (11) and locked onto

the fixing base (11) by engagement pieces (23a, 23b) disposed at both end portions, in which the indoor/outdoor communication lines (7) are placed on said receiving portions (25a,25b);
a presser (30) that has projection-shaped first and second pressing portions (31a,31b) and is disposed on said receiver (20) by being sandwiched by the sandwiching portions (24a,24b, 24c); and
fixing member that fixes the presser (30) and said receiver (20) onto said fixing base (11).

3. The fixing structure for the indoor/outdoor communication line of the air conditioner of claim 1, wherein said communication-line fixture (10) includes:

a fixing base (40) that has a main body portion having a substantially C-shaped section and is fixed onto the main body of said outdoor unit (1), in which the indoor/outdoor communication lines (7) are placed on first and second receiving portions (42a,42b) on top face thereof;
a first presser (50a, 50b) whose width is smaller than that of the fixing base (40) and whose length is approximately half that of the fixing base (40), having a projection-shaped pressing portion (51), and is disposed on the receiving portion (42a,42b) of said fixing base (40) and fixed onto the fixing base (40);
a receiver (60) whose width is larger than the presser (50a,50b), being formed into a substantially C-shaped section, and being fixed onto said fixing base (40) while covering said presser (50a,50b), in which the indoor/outdoor communication lines (7) are placed on first and second receiving portions (62a,62b) on top face thereof; and
a second presser (50c,50d) that has the same structure as that of said first presser (50a,50b) and that is disposed on the receiving portion (62a,62b) of the receiver (60) and fixed onto the receiver (60).

4. The air conditioner comprising the fixing structure of any one of claims 1 to 3.

FIG. 1

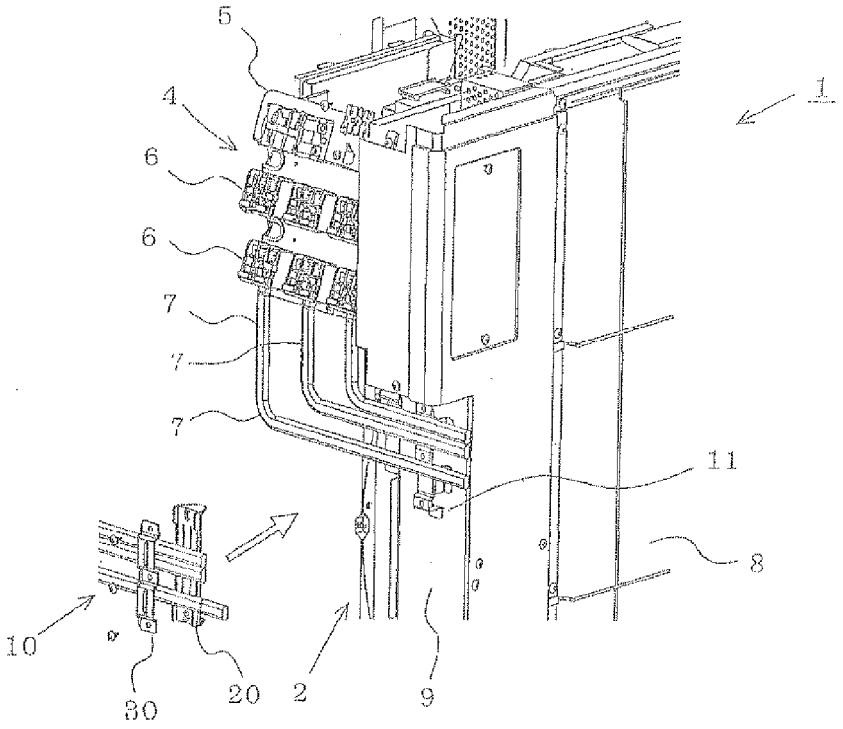
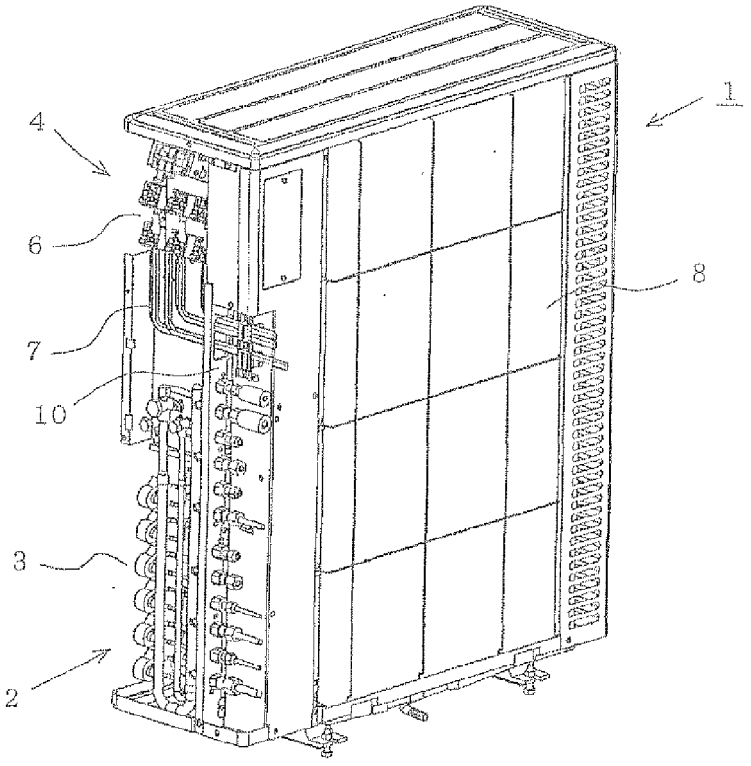


FIG. 2



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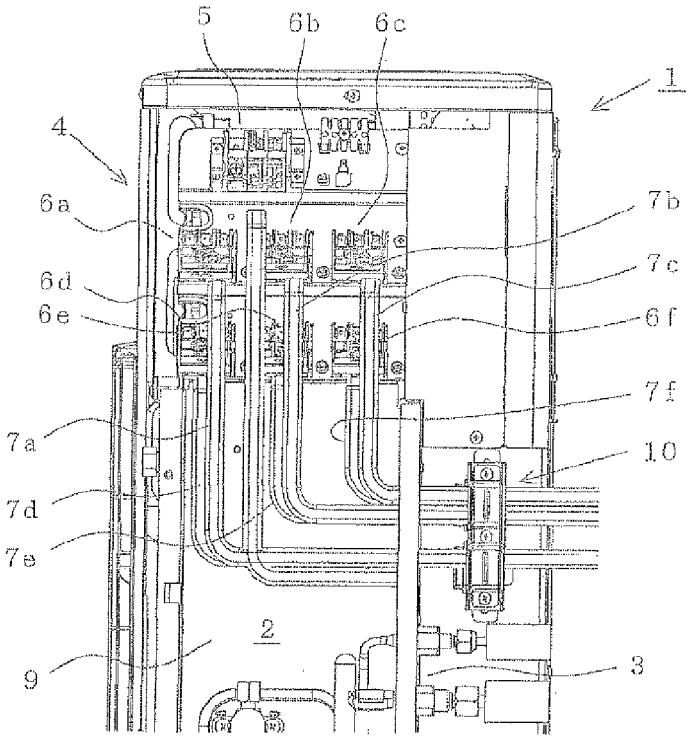
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FIG. 4

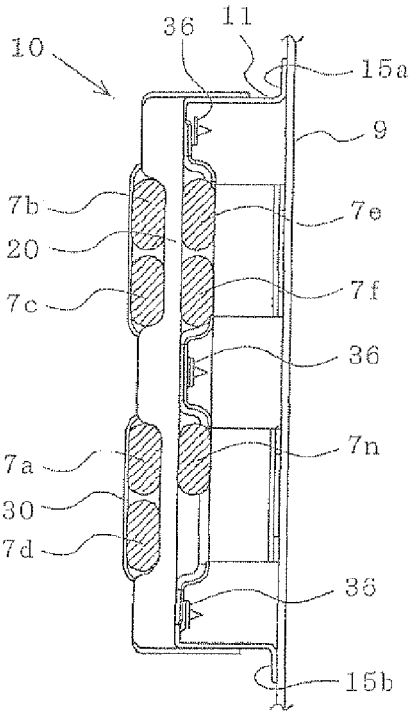
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FIG. 5

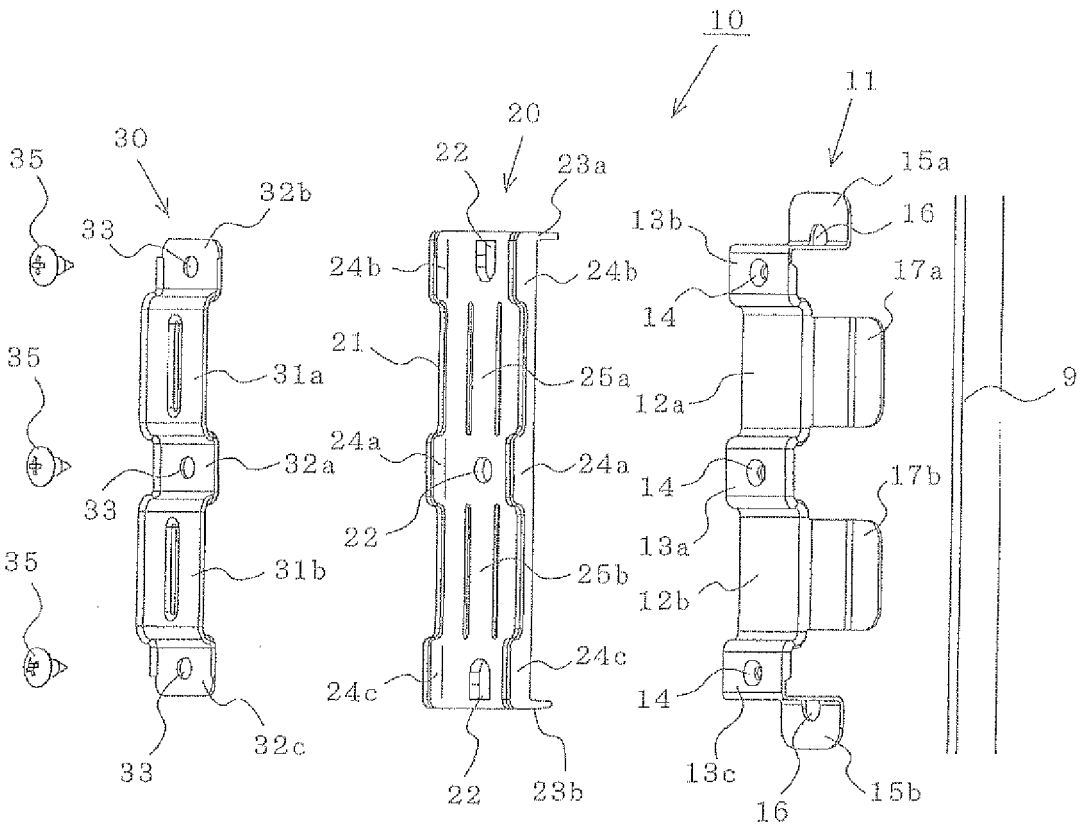
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FIG. 6

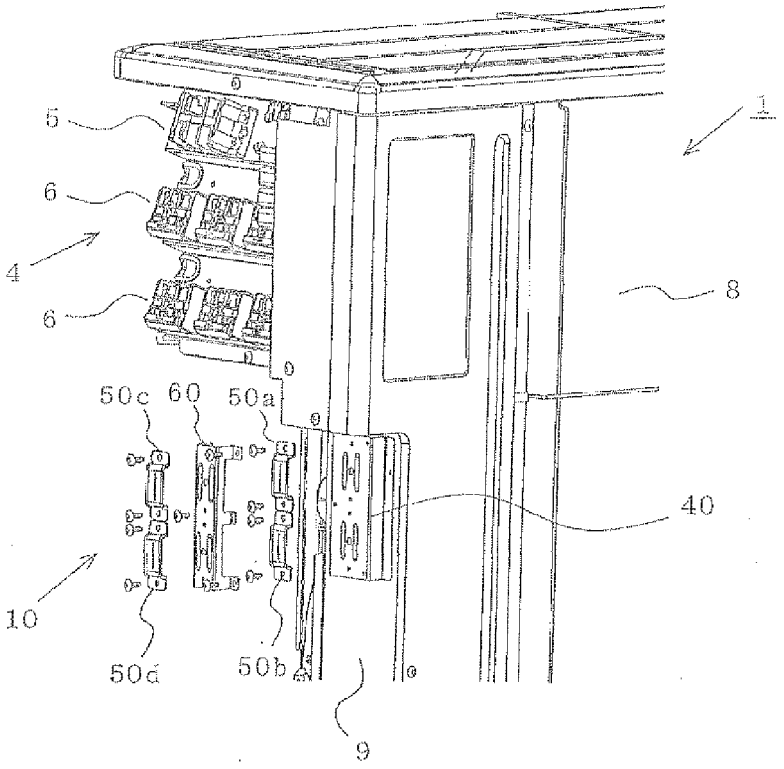

FIG. 7

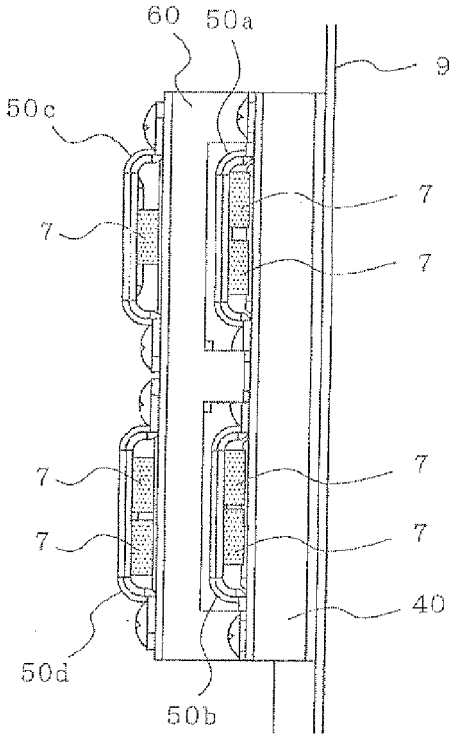

FIG. 8

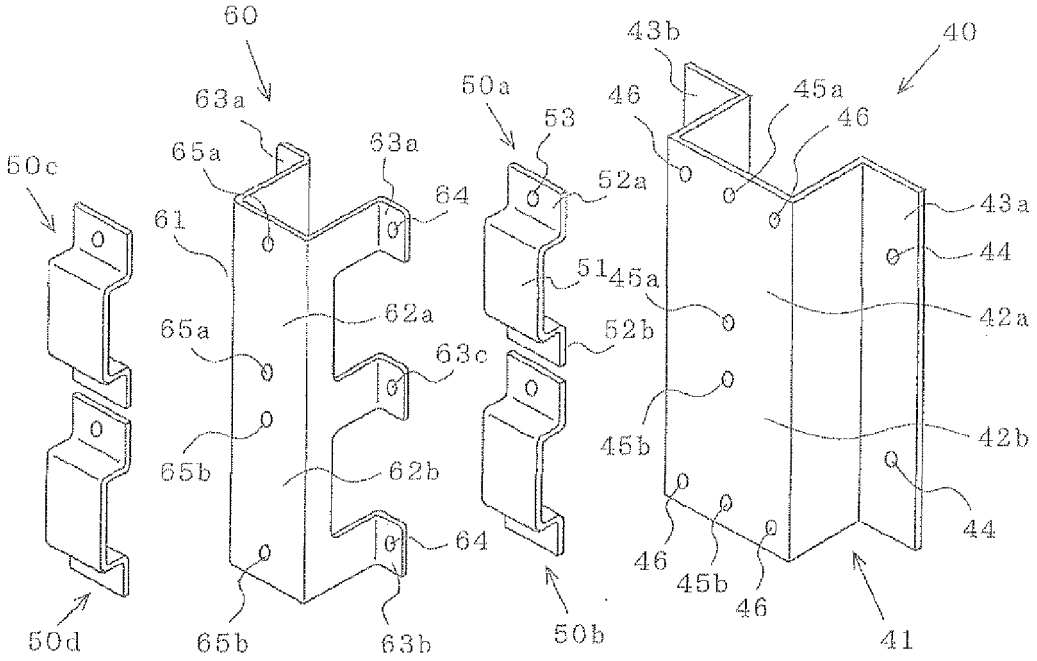
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FIG. 9

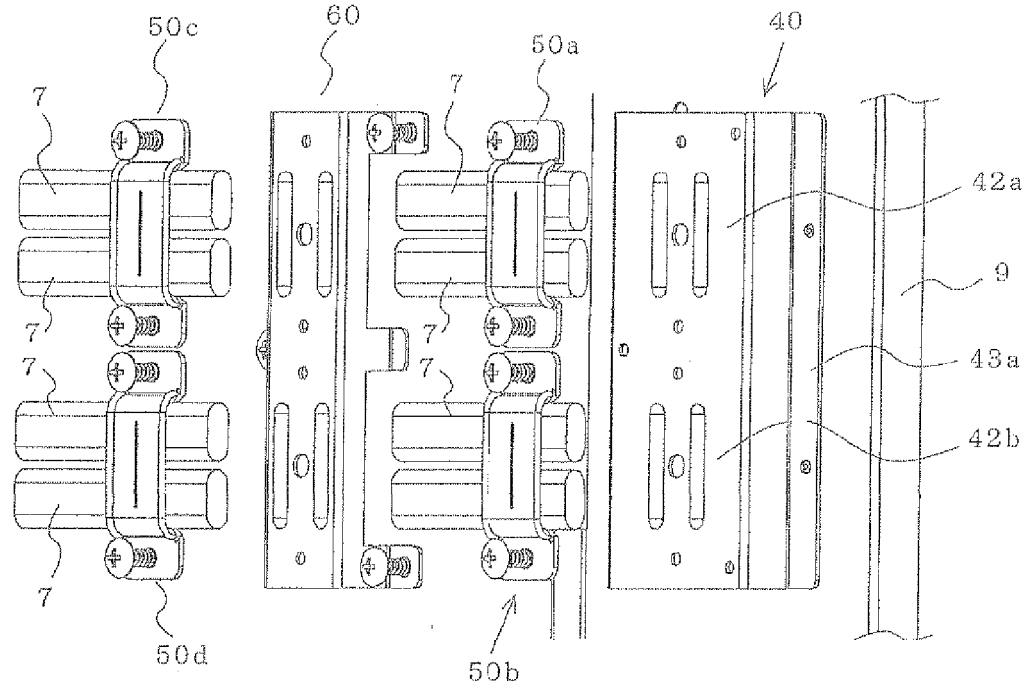
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FIG. 10

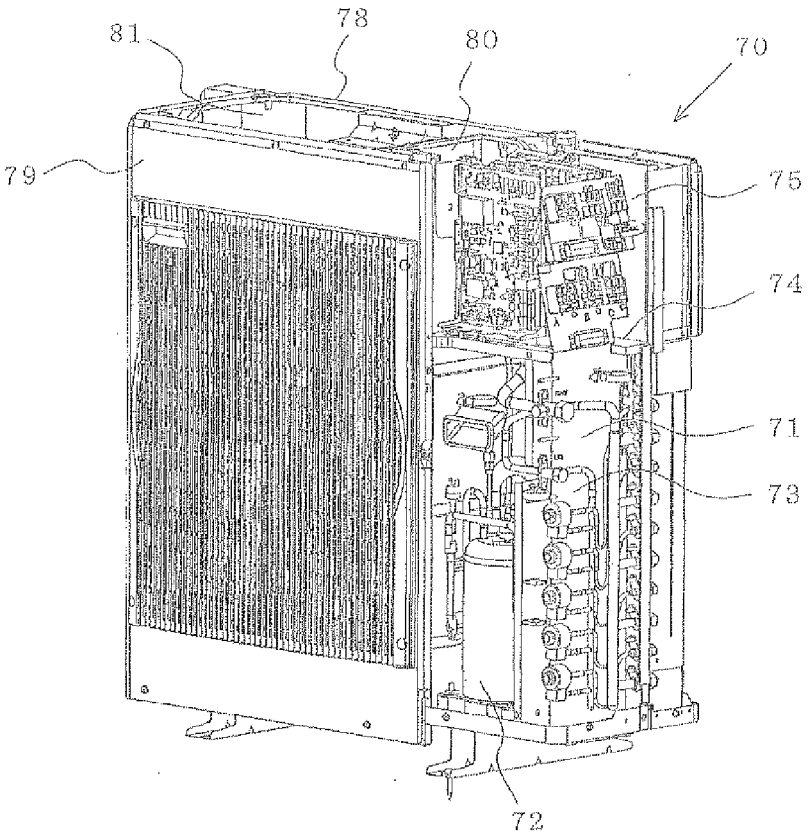
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FIG. 11

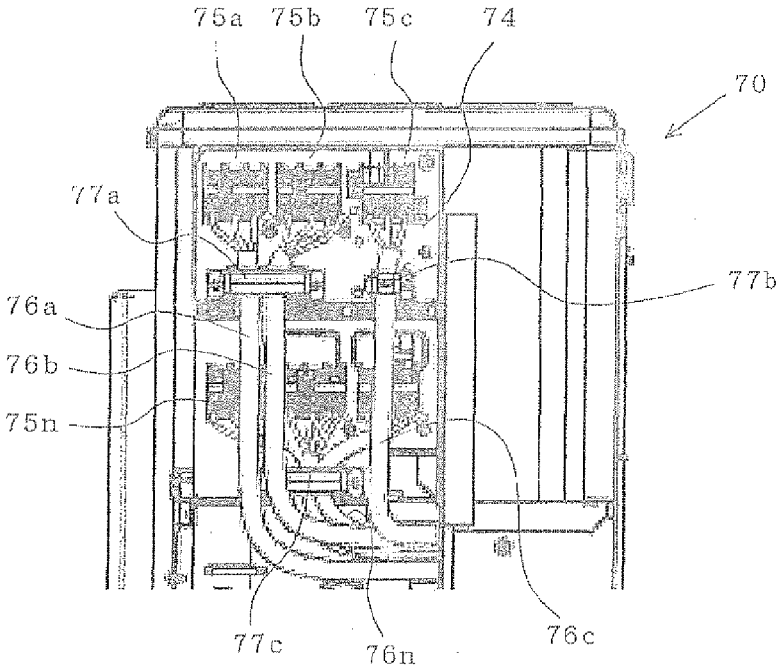
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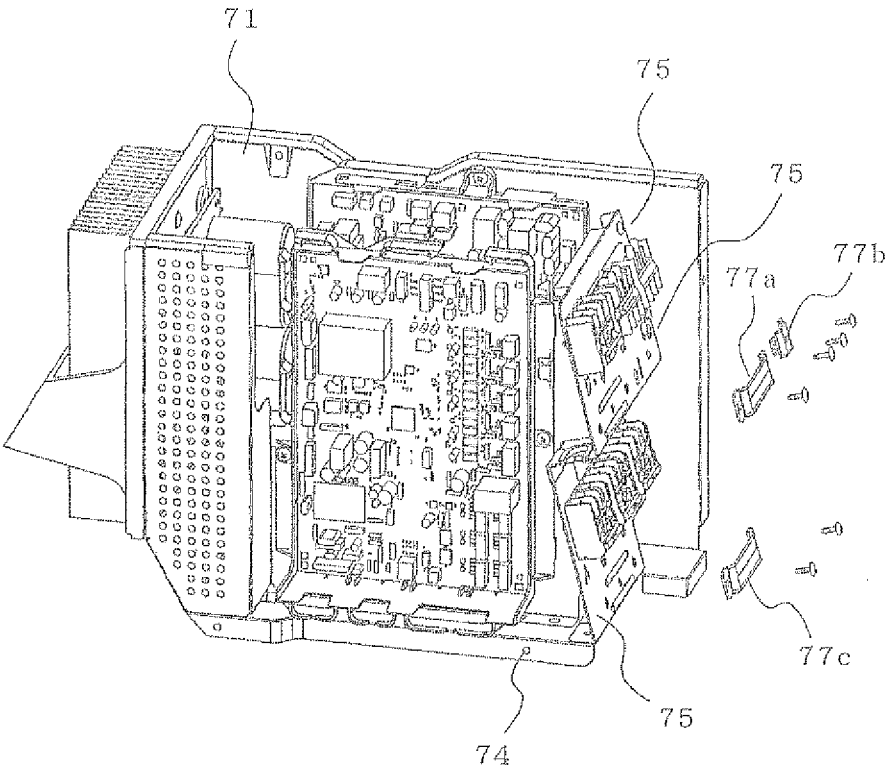
FIG. 12



REFERENCES CITED IN THE DESCRIPTION

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