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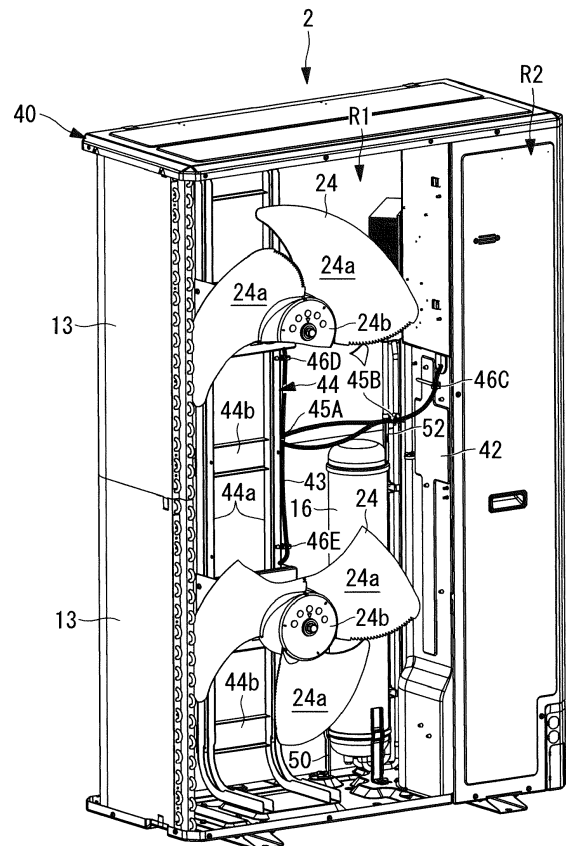
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(54) **OUTDOOR UNIT AND METHOD FOR ASSEMBLING THE OUTDOOR UNIT**

(57) To provide an outdoor unit having high durability where fixing of a cable connected to a fan motor is performed with high reliability at a low cost. An outdoor unit includes: an outdoor fan 24; a fan motor which drives the outdoor fan 24; a cable 43 connected to the fan motor; and a cable tie 46 and a metal clamp 45 forming a plurality of cable fixing portions which fix the cable 43 at a plurality of positions. An intermediate cable fixing portion is positioned at an intermediate portion between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable 43 is fixed by the cable fixing portions disposed on both sides of the intermediate cable fixing portion. The intermediate cable fixing portion is formed using a metal clamp 45 where, if fixing of the cable 43 by the intermediate cable fixing portion comes loose, the cable 43 is displaced to a position where the cable 43 interferes with a rotation locus of an outdoor fan 24.

FIG. 2



Description

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

[0001] The present invention relates to an outdoor unit equipped with a fixing portion which fixes a cable of a fan motor, and a method for assembling the outdoor unit.

2. DESCRIPTION OF RELATED ART

[0002] To transmit/receive a control signal and to supply power, a cable is connected to a fan motor which drives a fan provided in an outdoor unit of an air conditioning apparatus. The cable is fixed to the outdoor unit by fixtures at a plurality of predetermined positions in the inside of the outdoor unit (see Japanese Unexamined Patent Application, Publication No. 2008-138967, for example).

BRIEF SUMMARY OF THE INVENTION

[0003] A detachable cable tie made of a resin is used as a fixture which fixes a cable. However, the cable tie made of a resin may be broken due to deterioration with time so that the cable may be removed from the fixed position. When the cable is removed from the fixed position, there is a concern that the cable may come into contact with a rotating fan thus being damaged leading to disconnection of the cable. The disconnection of the cable obstructs the operation of an air conditioner.

[0004] In view of the above, a metal clamp may be adopted in place of a cable tie made of a resin. The metal clamp has higher durability than the cable tie made of a resin. However, the metal clamp has a problem that cost is increased.

[0005] In fixing the metal clamp at a predetermined position of the outdoor unit, it is necessary to fix the metal clamp by welding or by screws. When the metal clamp is fixed by welding, there is a concern that rust is formed at a welded portion. When the metal clamp is fixed by the screws, a step for forming screw holes is newly added and, at the same time, there is a concern that rust is formed at the newly formed screw holes. The formation of rust reduces the durability of the outdoor unit.

[0006] The present invention has been made under such circumstances, and it is an object of the present invention to provide an outdoor unit having high durability where fixing of a cable connected to a fan motor is performed with high reliability at a low cost, and a method for assembling the outdoor unit.

[0007] To solve the above-mentioned problem, an outdoor unit and a method for assembling the outdoor unit according to the present invention adopt the following solutions.

[0008] That is, the present invention is directed to an outdoor unit which includes: a fan; a fan motor configured

to drive the fan; a cable connected to the fan motor; and a plurality of cable fixing portions configured to fix the cable at a plurality of positions, wherein an intermediate cable fixing portion positioned at an intermediate portion between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable is fixed by the cable fixing portions disposed on both sides of the intermediate cable fixing portion is made of metal where, if fixture of the cable by the intermediate cable fixing portion comes loose, the cable is displaced to a position where the cable interferes with a rotation locus of the fan.

[0009] The cable of the fan motor which drives the fan is fixed to respective portions in the inside of the outdoor unit by the cable fixing portions. When the cable fixed by the cable fixing portion is removed from the cable fixing portion, the cable is displaced to the position where the cable interferes with a rotation locus of the fan. Accordingly, the cable is damaged by the fan. In view of the above, the intermediate cable fixing portion is positioned at an intermediate portion between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable fixing portions disposed on both sides of the intermediate cable fixing portion are fixed. The intermediate cable fixing portion is made of metal where, if the fixing of the cable by the intermediate cable fixing portion comes loose, the cable is displaced to the position where the cable interferes with a rotation locus of the fan. With the use of metal for forming the intermediate cable fixing portion, a breakage minimally occurs in the intermediate cable fixing portion due to deterioration with time compared to the case where a resin is used for forming the intermediate cable fixing portion. Accordingly, it is possible to reduce a possibility as much as possible that the cable is removed from the intermediate cable fixing portion due to the breakage of the intermediate cable fixing portion so that the cable is damaged by the fan. For this reason, the durability of the outdoor unit can be enhanced.

[0010] As the cable fixing portion, a clamp which grips the cable is typically used. When metal is used for forming the intermediate cable fixing portion, for example, plastically deformable metal is used for forming a portion which grips the cable. In this case, to avoid damage of the cable, a coating portion made of a resin, such as a heat shrinkable tube, is preferably provided on a metal portion.

[0011] In the outdoor unit according to the present invention, the intermediate cable fixing portion is fixed at a predetermined position together with a screw which fixes another member.

[0012] The intermediate cable fixing portion is fixed together with the screw which fixes another member forming the outdoor unit. Accordingly, it is unnecessary to newly form a screw hole for fixing the intermediate cable fixing portion. With such a configuration, it is possible to avoid a risk that rust is formed due to the formation of a new screw hole. The screw which fixes another member

can be used in common and hence, the number of parts can be suppressed.

[0013] As the screw which fixes another member, for example, a screw used in assembling a motor base of the fan motor, or a screw used in a baffle plate which partitions the outdoor unit into a control box and a machine chamber may be used.

[0014] In the outdoor unit according to the present invention, the cable fixing portions other than the intermediate cable fixing portion are made of a resin without using metal.

[0015] The cable fixing portions other than the intermediate cable fixing portion have no possibility of causing the cable to interfere with the rotation locus of the fan even if the fixing of the cable comes loose. Accordingly, such cable fixing portions are made of a resin without using metal. With such a configuration, cost can be reduced.

[0016] A method for assembling an outdoor unit according to the present invention is directed to a method for assembling an outdoor unit including: a fan; a fan motor configured to drive the fan; a cable connected to the fan motor; and a plurality of cable fixing portions configured to fix the cable at a plurality of positions, wherein an intermediate cable fixing portion positioned between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable is fixed by the cable fixing portions disposed on both sides of the intermediate cable fixing portion is made of metal where, if fixture of the cable by the intermediate cable fixing portion comes loose, the cable is displaced to a position where the cable interferes with a rotation locus of the fan.

[0017] Metal is used for forming the fixing portion which may obstruct the operation of the outdoor unit and hence, the outdoor unit having high durability can be realized at a low cost.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0018]

Fig. 1 is a diagram showing a refrigerant circuit of an air conditioner according to one embodiment of the present invention;

Fig. 2 is a perspective view showing an outdoor unit in Fig. 1;

Fig. 3 is a partially enlarged perspective view showing a main part in Fig. 2;

Fig. 4 is a perspective view showing a metal clamp mounted on a motor base;

Fig. 5 is a perspective view showing the metal clamp mounted on a bracket which fixes a receiver;

Fig. 6 is a perspective view showing a displacement of a cable when fixing of the cable to the motor base comes loose; and

Fig. 7 is a perspective view showing a displacement

of the cable when fixing of the cable to the bracket which fixes the receiver comes loose.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Hereinafter, one embodiment of an outdoor unit and a method for assembling the outdoor unit according to the present invention are described with reference to drawings.

[0020] Fig. 1 is a refrigerant circuit diagram of a multi-type air conditioning system where a plurality of indoor units are connected to one outdoor unit. A plurality of outdoor units may be used.

[0021] As shown in Fig. 1, the multi-type air conditioning system (air conditioner) 1 is configured such that a plurality of indoor units 3A, 3B are connected in parallel to one outdoor unit 2. The plurality of indoor units 3A, 3B are connected with each other in parallel such that branching units 6 are interposed between the indoor units 3A, 3B and gas-side piping 4 and liquid-side piping 5 which are connected to the outdoor unit 2.

[0022] The outdoor unit 2 includes: an inverter-driven compressor 10 which compresses a refrigerant; a four-way switching valve 12 which switches the circulation direction of the refrigerant; an outdoor heat exchanger 13 which causes the refrigerant and outside air to perform heat exchange; a supercooling coil 14 integrally formed with the outdoor heat exchanger 13; an outdoor expansion valve (EEVH) 15; a receiver 16 which stores a liquid refrigerant; a supercooling heat exchanger 17 which supplies supercooling to the liquid refrigerant; a supercooling expansion valve (EEVSC) 18 which controls an amount of the refrigerant to be divided to the supercooling heat exchanger 17; an accumulator 19 which separates a liquid component from a refrigerant gas sucked into the compressor 10, and causes only a gas component to be sucked into the compressor 10 side; a gas-side operation valve 20; and a liquid-side operation valve 21.

[0023] An oil separator 26 is connected to the discharge side of the compressor 10 by way of discharge piping 25. In the oil separator 26, a lubricant oil (oil) in the form of mist in a compressed refrigerant is separated from the refrigerant. The refrigerant, from which the lubricant oil in the form of mist is separated in the oil separator 26, is guided to the four-way switching valve 12.

[0024] Oil return piping 35 is provided for the accumulator 19. The liquid refrigerant which is separated in the accumulator 19 is returned to suction piping 34 together with the lubricant oil through the oil return piping 35. A capillary portion 36 is provided in the oil return piping 35. The capillary portion 36 is used as a fixed throttle which reduces pressures of the liquid refrigerant and the lubricant oil passing through the capillary portion 36.

[0025] The above-mentioned respective equipment on the outdoor unit 2 side are sequentially connected through refrigerant piping 22 thus forming a known outdoor-side refrigerant circuit 23. An outdoor fan (fan) 24 is provided in the outdoor unit 2, and the outdoor fan 24

blows outside air to the outdoor heat exchanger 13.

[0026] The gas-side piping 4 and the liquid-side piping 5 are refrigerant piping connected to the gas-side operation valve 20 and the liquid-side operation valve 21 of the outdoor unit 2. At the time of installation work at a site, lengths of the gas-side piping 4 and the liquid-side piping 5 are suitably set corresponding to distances between the outdoor unit 2 and the plurality of indoor units 3A, 3B connected to the outdoor unit 2. The plurality of branching units 6 are provided at middle portions of the gas-side piping 4 and the liquid-side piping 5. An appropriate number of indoor units 3A, 3B are connected to the gas-side piping 4 and the liquid-side piping 5 by way of the branching units 6. With such configurations, a closed refrigeration cycle 7 of one system is formed.

[0027] Each of the indoor units 3A, 3B includes: an indoor heat exchanger 30 which causes indoor air to perform heat exchange with a refrigerant so as to cool or heat the indoor air, and supplies the cooled or heated indoor air so as to perform indoor air conditioning; an indoor expansion valve (EEVC) 31; an indoor fan 32 which causes indoor air to circulate through the indoor heat exchanger 30; and an indoor controller 33. The indoor units 3A, 3B are connected to the branching units 6 by way of branched gas-side piping 4A, 4B and branched liquid-side piping 5A, 5B on the indoor side.

[0028] In the above-mentioned multi-type air conditioning system 1, a cooling operation is performed as follows.

[0029] A refrigerant gas is compressed by the compressor 10 so that a refrigerant gas of high-temperature and high-pressure is discharged from the compressor 10. Such a refrigerant gas is made to circulate toward the outdoor heat exchanger 13 side by the four-way switching valve 12. In the outdoor heat exchanger 13, the refrigerant gas is subjected to heat exchange with outside air blown by the outdoor fan 24 thus being condensed and liquefied. The liquid refrigerant is further cooled by the supercooling coil 14. Thereafter, the liquid refrigerant passes through the outdoor expansion valve 15 and, then, is temporarily stored in the receiver 16.

[0030] A circulation amount of the liquid refrigerant is adjusted in the receiver 16. In the process where the liquid refrigerant is made to pass through the liquid refrigerant piping side through the supercooling heat exchanger 17, a portion of the liquid refrigerant is divided from the liquid refrigerant piping. The portion of the liquid refrigerant is subjected to heat exchange with an adiabatically expanded refrigerant in the supercooling expansion valve 18 so that supercooling is applied to the liquid refrigerant. The liquid refrigerant passes through the liquid-side operation valve 21, and is guided to the liquid-side piping 5 from the outdoor unit 2. Then, the liquid refrigerant is divided to the branched liquid-side piping 5A, 5B of the respective indoor units 3A, 3B by way of the branching units 6.

[0031] The liquid refrigerant divided to the branched liquid-side piping 5A, 5B flows into the respective indoor units 3A, 3B. The liquid refrigerant is adiabatically ex-

panded in the indoor expansion valve 31 thus being formed into a gas/liquid two-phase flow and, then, is made to flow into the indoor heat exchanger 30. In the indoor heat exchanger 30, indoor air which is made to circulate by the indoor fan 32 and the refrigerant are subjected to heat exchange so that the indoor air is cooled, and the cooled indoor air is supplied so as to perform indoor cooling. On the other hand, a refrigerant is gasified, reaches the branching units 6 by way of the branched gas-side piping 4A, 4B, and is merged with a refrigerant gas from another indoor unit in the gas-side piping 4.

[0032] The refrigerant gas merged in the gas-side piping 4 returns to the outdoor unit 2 again. The refrigerant gas passes through the gas-side operation valve 20 and the four-way switching valve 12, and is merged with a refrigerant gas from the supercooling heat exchanger 17. Thereafter, the refrigerant gas is introduced into the accumulator 19. In the accumulator 19, a liquid component contained in the refrigerant gas is separated from the refrigerant gas, and only a gas component is sucked into the compressor 10. The gas component is compressed again in the compressor 10. By repeating the above-mentioned cycle, a cooling operation is performed. The liquid refrigerant separated in the accumulator 19 is stored in a bottom portion of the accumulator 19, and is guided to the suction piping 34 by way of the oil return piping 35 together with the lubricant oil.

[0033] On the other hand, a heating operation is performed as follows.

[0034] A refrigerant gas is compressed by the compressor 10 so that a refrigerant gas of high-temperature and high-pressure is discharged from the compressor 10. Such a refrigerant gas is made to circulate toward the gas-side operation valve 20 side by way of the four-way switching valve 12. The refrigerant gas of high pressure passes through the gas-side operation valve 20 and the gas-side piping 4 and, then, is discharged from the outdoor unit 2. The gas refrigerant passes through the branching units 6, and the branched gas-side piping 4A, 4B on the indoor side, and is introduced into the plurality of indoor units 3A, 3B.

[0035] The refrigerant gas of high-temperature and high-pressure which is introduced into the indoor units 3A, 3B is subjected to heat exchange with indoor air which is made to circulate through the indoor fan 32 in the indoor heat exchanger 30. The indoor air which is heated in this manner is injected into a room so as to perform heating. On the other hand, a refrigerant which is condensed and liquefied in the indoor heat exchanger 30 passes through the indoor expansion valve 31, and the branched liquid-side piping 5A, 5B, and reaches the branching units 6. Then, the refrigerant is merged with a refrigerant from another indoor unit, and returns to the outdoor unit 2 through the liquid-side piping 5. At the time of performing heating, in the indoor units 3A, 3B, a degree of opening of the indoor expansion valve 31 is controlled through the indoor controller 33 such that a refrigerant

outlet temperature or a degree of refrigerant supercooling of the indoor heat exchanger 30 which functions as a condenser assumes a control target value.

[0036] The refrigerant returned to the outdoor unit 2 reaches the supercooling heat exchanger 17 through the liquid-side operation valve 21. In the same manner as performing cooling, supercooling is applied to the refrigerant and, thereafter, the refrigerant is made to flow into the receiver 16, and is temporarily stored in the receiver 16. With such operations, a circulation amount of the refrigerant is adjusted. The liquid refrigerant is supplied to the outdoor expansion valve 15 thus being adiabatically expanded. Thereafter, the liquid refrigerant passes through the supercooling coil 14, and is made to flow into the outdoor heat exchanger 13.

[0037] In the outdoor heat exchanger 13, outside air blown from the outdoor fan 24 and the refrigerant are subjected to heat exchange. The refrigerant absorbs heat from the outside air thus being vaporized and gasified. The refrigerant passes through the four-way switching valve 12 from the outdoor heat exchanger 13, and is merged with a refrigerant gas from the supercooling heat exchanger 17. Thereafter, the refrigerant is introduced into the accumulator 19. In the accumulator 19, a liquid component contained in the refrigerant gas is separated from the refrigerant gas, and only a gas component is sucked into the compressor 10. The gas component is compressed again in the compressor 10. By repeating the above-mentioned cycle, a heating operation is performed. The liquid refrigerant separated in the accumulator 19 is stored in the bottom portion of the accumulator 19, and is guided to the suction piping 34 by way of the oil return piping 35 together with the lubricant oil.

<Structure of outdoor unit>

[0038] Fig. 2 shows a structure of the outdoor unit 2. The outdoor unit 2 includes a casing 40 having a rectangular parallelepiped shape. Respective equipment is installed in the casing 40. Fig. 2 shows a state where a front surface of the casing 40 is removed. A baffle plate 42 made of sheet metal extending in the vertical direction is provided in the casing 40. A fan chamber R1 is formed on the left side of the baffle plate 42, and the outdoor fans 24 and the like are installed in the fan chamber R1. A machine chamber R2 is formed on the right side of the baffle plate 42, and a compressor 10 (see Fig. 1), an electrical box and the like are disposed in the machine chamber R2.

[0039] The outdoor heat exchanger 13 which is bent in a substantially L shape is disposed so as to form a side surface (a left side surface in Fig. 2) and a back surface of the fan chamber R1. The outdoor heat exchanger 13 is divided into two halves in the vertical direction.

[0040] Two outdoor fans 24 are disposed in the vertical direction corresponding to the outdoor heat exchanger 13 which is divided into two halves in the vertical direction.

In the drawing, a lower portion of the upper outdoor fan 24 and an upper portion of the lower outdoor fan 24 are partially omitted so as to show the structure behind such portions. In an actual unit, three blades 24a having the same shape are mounted on a hub 24b at equal angular intervals. One outdoor fan 24 may be used, or three or more outdoor fans 24 may be used.

[0041] A fan motor is connected to each outdoor fan 24. The fan motor is concealed by a back surface of the hub 24b of the outdoor fan 24 so that the fan motor is not shown in the drawing. A cable 43 for performing transmission/reception of a control signal and supplying power is connected to each fan motor. Each fan motor is fixed to a motor base 44.

[0042] The motor base 44 includes: column portions 44a disposed on the left and right sides and extending in the vertical direction; and a plurality of cross beams 44b. The cross beams 44b extend in the lateral direction (horizontal direction) while being arranged at predetermined intervals in the height direction. The cross beams 44b are fixed to both column portions 44a using screws.

[0043] Cable ties (cable fixing portions) 46 and metal clamps (cable fixing portion, intermediate cable fixing portion) 45 are fixed to the column portion 44a of the motor base 44. The cable ties 46 and the metal clamps 45 are provided for fixing the cables 43 to the predetermined positions.

[0044] In the description made hereinafter, the cable tie is denoted by a reference numeral 46. When the cable ties at respective positions are distinguished from each other, a capital letter is added to the end of the reference numeral 46. A metal clamp is denoted by a reference numeral 45. When the metal clamps at respective positions are distinguished from each other, a capital letter is added to the end of the reference numeral 45.

[0045] As shown in Fig. 3 which shows a main part of Fig. 2 in an enlarged manner, the cable ties 46D, 46E are mounted at positions in the vicinity of the upper and lower outdoor fans 24. A metal clamp 45A is mounted at an intermediate portion between these cable ties 46D, 46E.

[0046] The cable ties 46D, 46E are detachable, and are made of a resin. The cable tie 46 has a shape shown in Fig. 5, for example. The cable tie 46 is configured to fix the cable 43 in a state where the cable 43 is made to pass through an annular portion of the cable tie 46.

[0047] The metal clamp 45 grips the cable 43 in a state where a plastically deformable metal plate having a flat plate shape is bent. Fig. 4 shows a state where a metal plate 45a of the metal clamp 45 extends in a planar shape before the metal plate 45a is bent. The metal plate 45a is coated by a resin such as a heat shrinkable tube. As shown in Fig. 4, the metal clamp 45 is fixed to the motor base 44 by a screw 47 which fixes the column portion 44a and the cross beam 44b of the motor base 44. That is, the metal clamp 45, the column portion 44a, and the cross beam 44b are fastened together by the screw 47.

[0048] As shown in Fig. 2, the receiver 16 is disposed

on the side of the baffle plate 42 of the fan chamber R1. The receiver 16 has a cylindrical shape. The receiver 16 is mounted on a bottom plate of the casing 40 upright by way of a leg portion 50 fixed to a lower portion of the receiver 16. An upper portion of the receiver 16 is fixed to the baffle plate 42 by way of a bracket 52.

[0049] As shown in Fig. 5, the bracket 52 is formed of: a receiver-side bracket 52a fixed to the receiver 16; and a baffle plate-side bracket 52b fixed to the baffle plate 42 side. A fixed end portion 52b1 of the baffle plate-side bracket 52b is fixed to the baffle plate 42 by spot welding.

[0050] A distal end portion of the receiver-side bracket 52a and a distal end portion of the baffle plate-side bracket 52b are fixed with each other in an overlapping manner by a screw 54. With the use of the screw 54, a metal clamp 45B is fixed to the bracket 52. That is, the receiver-side bracket 52a, the baffle plate-side bracket 52b, and the metal clamp 45B are fastened together by the screw 54.

[0051] In this embodiment, Fig. 2 and Fig. 3 show two metal clamps 45, that is, the metal clamp 45A fixed to the motor base 44 and the metal clamp 45B positioned on the side of the metal clamp 45A and fixed to the bracket 52 of the receiver 16. A cable tie 46C is disposed on the machine chamber R2 side (the right side in the drawing) of the metal clamp 45B, and is fixed to the baffle plate 42.

[0052] The cables 43 are routed around as described below. That is, the cables 43 extend from the respective fan motors of the upper and lower outdoor fans 24, and are fixed at fixed positions by the cable ties 46D, 46E and the metal clamp 45A mounted on the column portion 44a of the motor base 44. Thereafter, the cables 43 pass through an area above the receiver 16. Then, the cables 43 are fixed at the fixed position by the metal clamp 45B mounted on the bracket 52 disposed above the receiver 16. Thereafter, the cables 43 are fixed by the cable tie 46C mounted on the baffle plate 42 thus being guided to the electrical box in the machine chamber R2.

[0053] Fig. 6 shows a state where the metal clamp 45A mounted on the motor base 44 is formed of the cable tie 46A made of a resin, and fixing of the cable 43 comes loose due to deterioration of the cable tie 46A with time. Different from Fig. 2 and Fig. 3, Fig. 6 is a view of the outdoor unit as viewed from the back surface side of the motor base 44.

[0054] As shown in Fig. 6, in the case where the fixing of the cable by the cable tie 46A at a position A comes loose, even when fixing of the cable by the cable ties 46B, 46D forming the fixing portions disposed adjacent to the cable tie 46A is maintained, the cable 43 interferes with the blade 24a of the outdoor fan 24 at a position denoted by a reference character P1. Accordingly, when a locus of the cable 43 uses a straight line passing through the respective fixing portions of the cable tie 46B and the cable tie 46C as an axis of rotation, and the locus of the cable 43 interferes with a rotation locus of the blade 24a of the outdoor fan 24, as in the case of this embodiment, it is more preferable to adopt the metal clamp 45A

having higher durability than a clamp made of a resin at the position of the cable tie 46A.

[0055] Fig. 7 shows a state where the metal clamp 45B mounted on the bracket 52 disposed above the receiver 16 is formed of the cable tie 46B made of a resin, and fixing of the cable 43 comes loose due to deterioration of the cable tie 46B with time. Different from Fig. 2 and Fig. 3, Fig. 7 is a view of the outdoor unit as viewed from the back surface side of the motor base 44.

[0056] As shown in Fig. 7, in the case where the fixing of the cable by the cable tie 46B comes loose, even when fixing of the cable by the cable ties 46A, 46C is maintained, the cable 43 interferes with the blade 24a of the outdoor fan 24 at the position denoted by a reference character P2. Accordingly, when a locus of the cable 43 uses a straight line passing through the respective fixing portions of the cable tie 46A and the cable tie 46C as an axis of rotation, and the locus of the cable 43 interferes with a rotation locus of the blade 24a of the outdoor fan 24, as in the case of this embodiment, it is more preferable to adopt the metal clamp 45B having higher durability than a clamp made of a resin at the position of the cable tie 46B.

[0057] As described above, according to this embodiment, the following manner of action and effects can be acquired.

[0058] The intermediate cable fixing portion positioned at the intermediate portion between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable fixing portions disposed on both sides of the intermediate cable fixing portion are fixed is formed using the metal clamp 45 where, if the fixing of the cable 43 by the intermediate cable fixing portion comes loose, the cable 43 is displaced to the position where the cable 43 interferes with a rotation locus of the outdoor fan 24. By forming the intermediate cable fixing portion using the metal clamp 45, a breakage minimally occurs in the intermediate cable fixing portion due to deterioration with time compared to the case where the cable tie 46 made of a resin is used for forming the intermediate cable fixing portion. Accordingly, it is possible to reduce a possibility as much as possible that the cable 43 is removed from the intermediate cable fixing portion due to the breakage of the intermediate cable fixing portion so that the cable 43 is damaged by the outdoor fan 24. For this reason, the durability of the outdoor unit 2 can be enhanced.

[0059] The metal clamp 45 forming the intermediate cable fixing portion is fixed together with the screws 47, 54 which fix another member (the motor base 44 or the bracket 52) forming the outdoor unit 2. Accordingly, it is unnecessary to newly form a screw hole for fixing the metal clamp 45. With such a configuration, it is possible to avoid a risk that rust is formed due to the formation of a new screw hole. The screws 47, 54 which fix the motor base 44 or the bracket 52 can be used in common and hence, the number of parts can be suppressed.

[0060] The cable fixing portions other than the cable

fixing portion at the position where the metal clamp 45 is used for forming the intermediate cable fixing portion have no possibility of causing the cable 43 to interfere with the rotation locus of the outdoor fan 24 even when the fixing of the cable 43 comes loose. Accordingly, such cable fixing portions are formed using the cable ties 46 made of a resin without using metal. With such a configuration, cost can be reduced.

[0061] In this embodiment, as the intermediate cable fixing portion which is formed using the metal clamp 45, the cable fixing portion of the motor base 44 and the cable fixing portion of the bracket 52 for the receiver 16 are described. However, the present invention is not limited to such cable fixing portions. The present invention is also applicable to an intermediate cable fixing portion at another position provided that the intermediate cable fixing portion is positioned at the intermediate portion between cable fixing portions disposed on both sides of the intermediate cable fixing portion, and when fixing of a cable by the intermediate cable fixing portion comes loose, the cable is displaced to the position where the cable interferes with a rotation locus of a fan.

[0062] In this embodiment, the screws 47, 54 which fix the motor base 44 or the bracket 52 is described as a screw which fixes the metal clamp 45. However, the present invention is not limited to such screws. The screw may be a screw used in equipment in the fan chamber R1 of the outdoor unit 2.

[Reference Signs List]

[0063]

- 1 multi-type air conditioning system (air conditioner)
- 2 outdoor unit
- 3A, 3B indoor unit
- 10 compressor
- 13 outdoor heat exchanger
- 16 receiver
- 24 outdoor fan (fan)
- 24a blade
- 24b hub
- 40 casing
- 42 baffle plate
- 43 cable
- 44 motor base
- 44a column portion
- 44b cross beam
- 45, 45A, 45B metal clamp (cable fixing portion, intermediate cable fixing portion)
- 45a metal plate
- 46, 46A, 46B, 46C, 46D, 46E cable tie (cable fixing portion)
- 47 screw
- 50 leg portion
- 52 bracket
- 52a receiver-side bracket
- 52b baffle plate-side bracket

- 52b1 fixed end portion
- 54 screw
- R1 fan chamber
- R2 machine chamber

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Claims

1. An outdoor unit comprising:
 - a fan;
 - a fan motor configured to drive the fan;
 - a cable connected to the fan motor; and
 - a plurality of cable fixing portions configured to fix the cable at a plurality of positions, wherein an intermediate cable fixing portion positioned at an intermediate portion between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable is fixed by the cable fixing portions disposed on both sides of the intermediate cable fixing portion is made of metal where, if fixture of the cable by the intermediate cable fixing portion comes loose, the cable is displaced to a position where the cable interferes with a rotation locus of the fan.
2. The outdoor unit according to claim 1, wherein the intermediate cable fixing portion is fixed at a predetermined position together with a screw which fixes another member.
3. The outdoor unit according to claim 1 or 2, wherein the cable fixing portions other than the intermediate cable fixing portion are made of a resin without using metal.
4. A method for assembling an outdoor unit including:
 - a fan;
 - a fan motor configured to drive the fan;
 - a cable connected to the fan motor; and
 - a plurality of cable fixing portions configured to fix the cable at a plurality of positions, wherein an intermediate cable fixing portion positioned between the cable fixing portions disposed on both sides of the intermediate cable fixing portion in a state where the cable is fixed by the cable fixing portions disposed on both sides of the intermediate cable fixing portion is made of metal where, if fixture of the cable by the intermediate cable fixing portion comes loose, the cable is displaced to a position where the cable interferes with a rotation locus of the fan.

FIG. 1

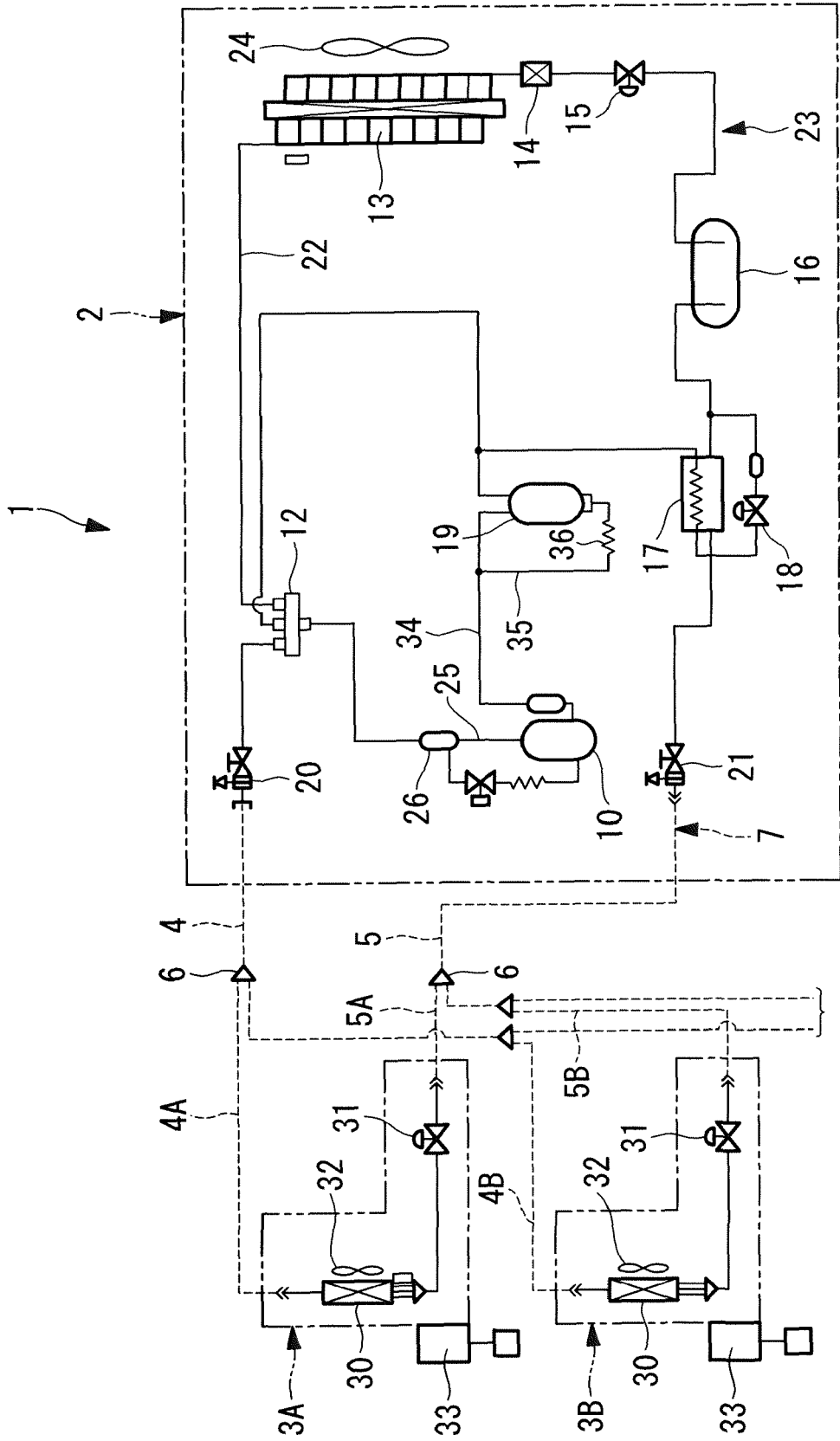


FIG. 2

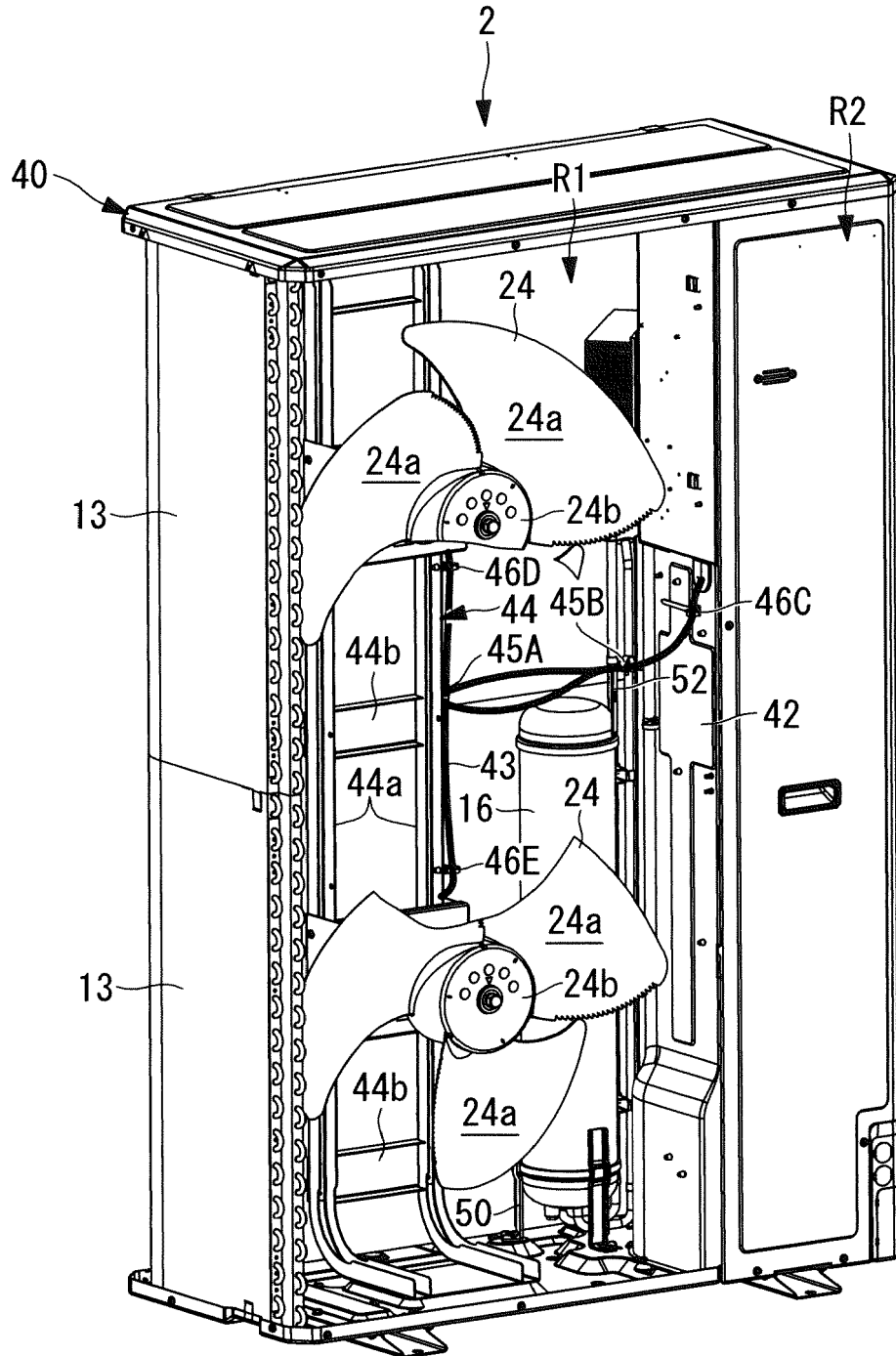


FIG. 3

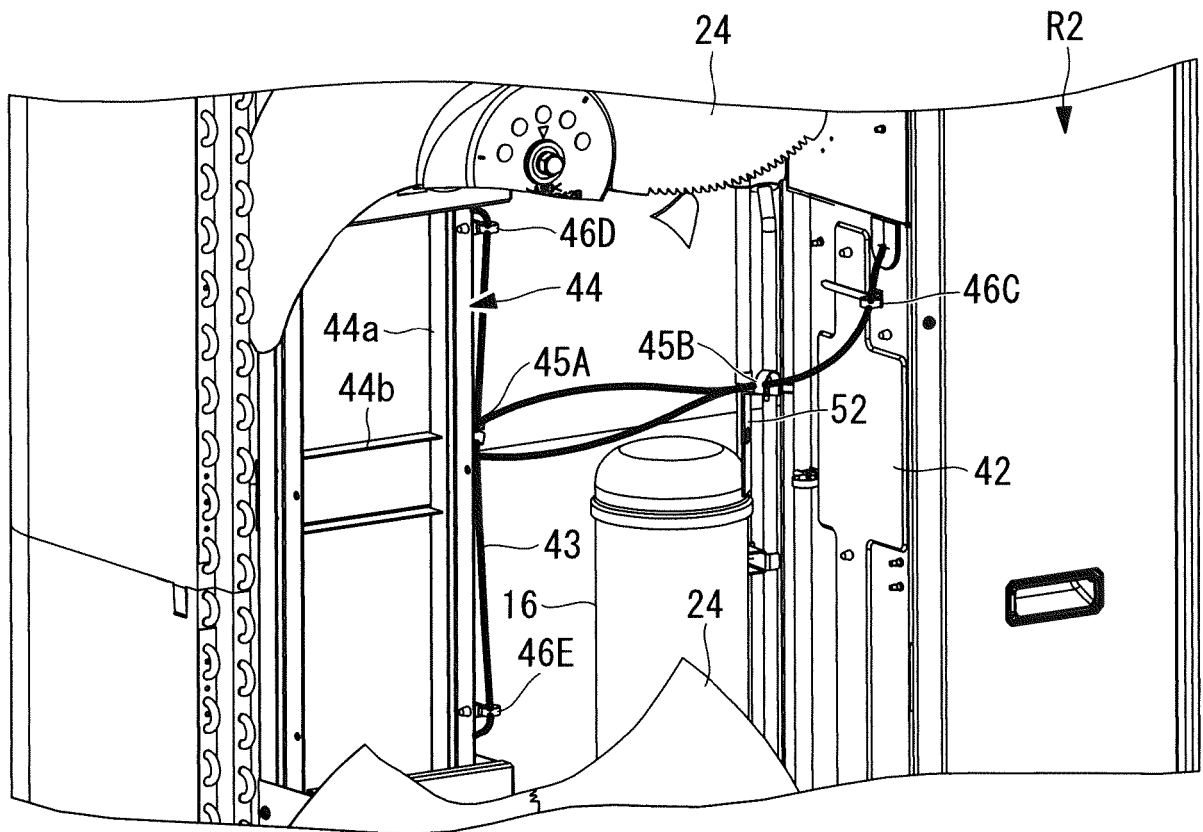


FIG. 4

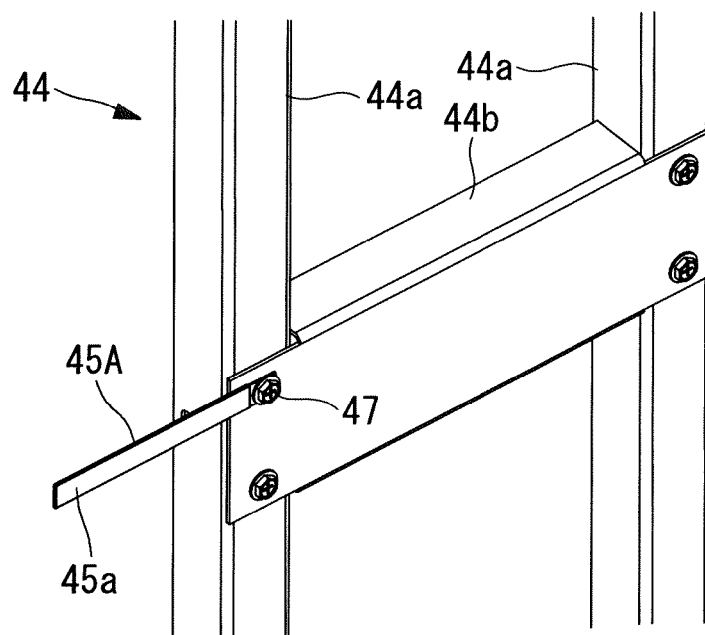


FIG. 5

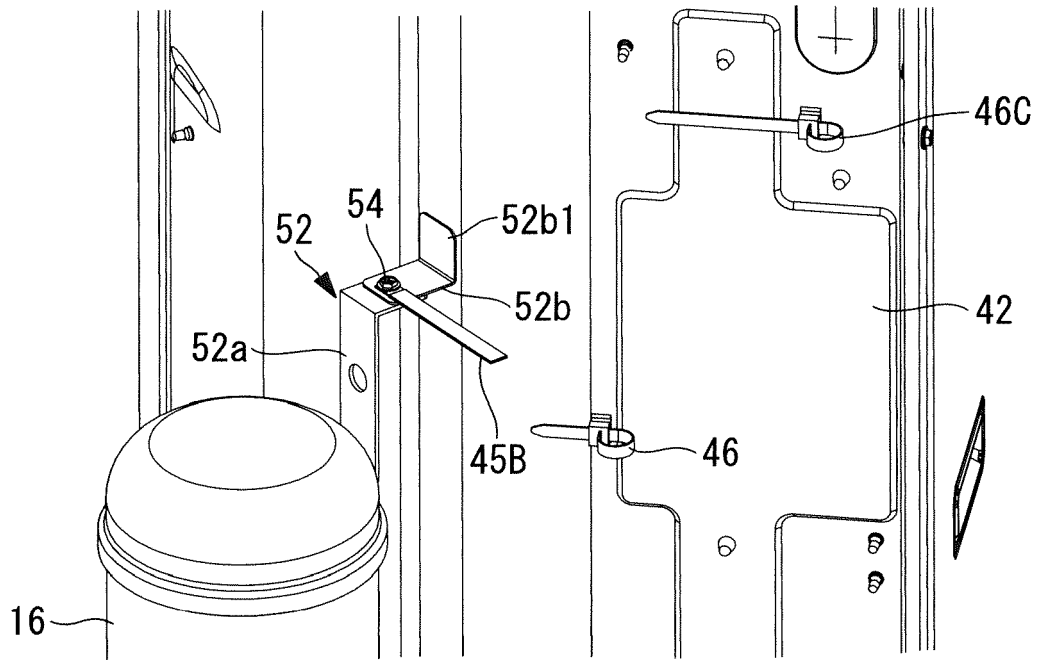


FIG. 6

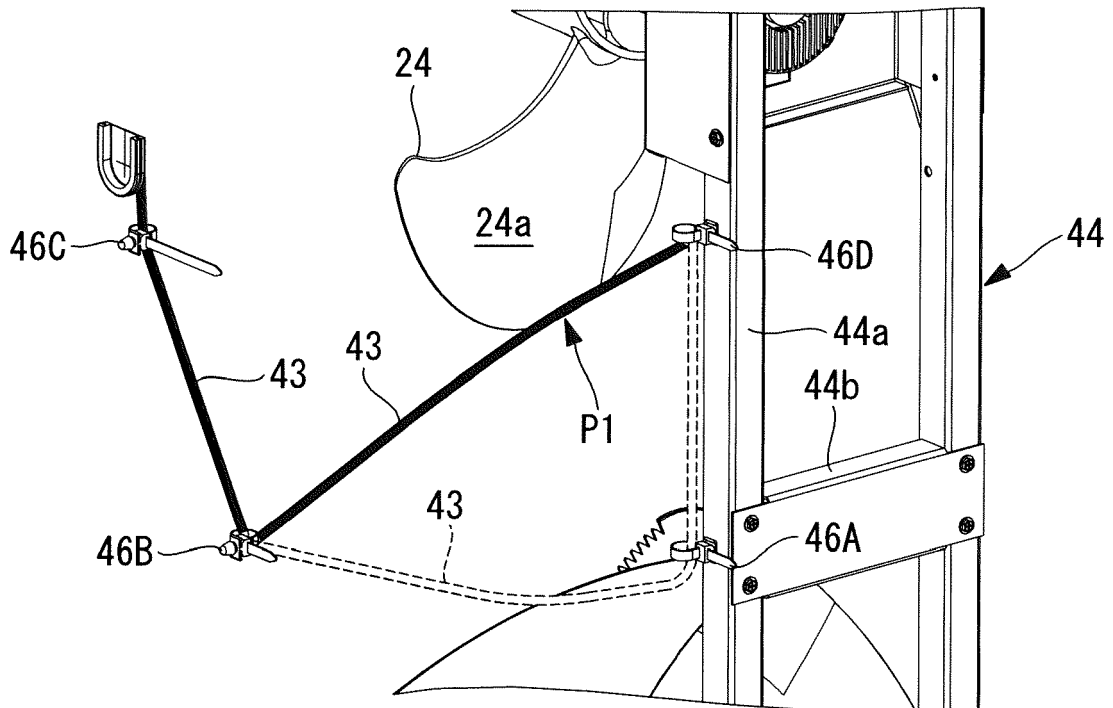
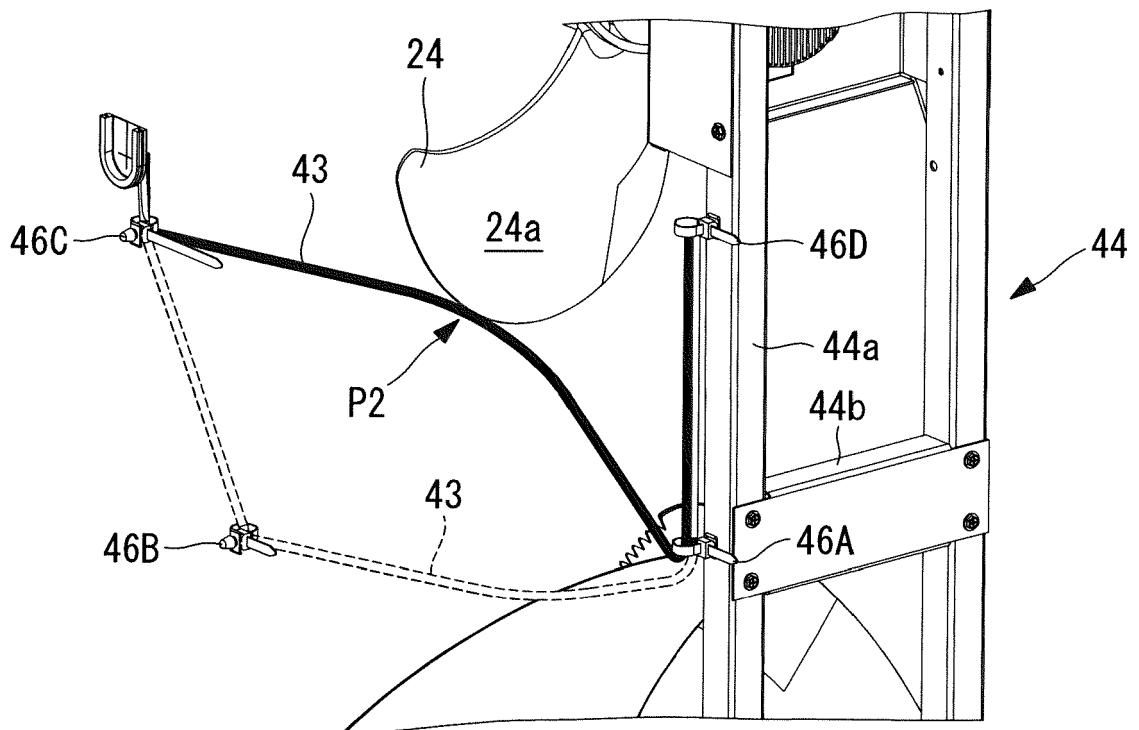


FIG. 7





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