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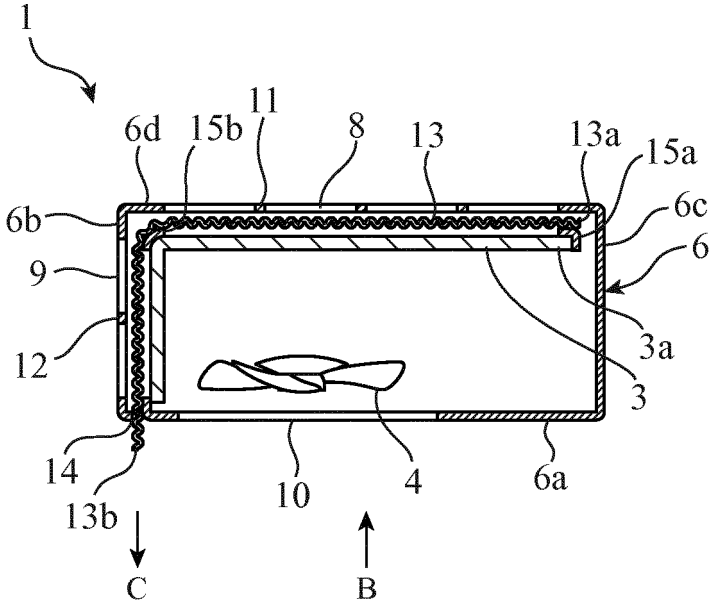
(54) OUTDOOR UNIT AND ASSEMBLY METHOD FOR OUTDOOR UNIT

(57) A casing 2 of an outdoor unit 1 having intake openings 8, 9 to take in air is provided. A heat exchanger 3 is housed in the casing 2, and arranged such that a surface thereof is exposed from the intake openings 8, 9. First and second inner frames 15a, 15b are arranged between the heat exchanger 3 and the casing 2 to guide arrangement and pulling out of a protective member 13 that covers the surface of the heat exchanger 3 exposed from the intake openings 8, 9. A slit hole 14 is provided to pull out the protective member 13 outside the casing 2.

FIG.3



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Description

TECHNICAL FIELD

[0001] The present invention relates to a technique for preventing an exposed surface of a heat exchanger housed in an outdoor unit from being damaged.

BACKGROUND ART

[0002] In an outdoor unit of an air conditioner, an opening is formed on its casing for supplying outside air to a heat exchanger housed in the casing. In such an outdoor unit of an air conditioner, the heat exchanger is exposed from the opening of the casing, and thus, there is a risk that an object may contact the exposed heat exchanger. Therefore, for the purpose of protecting the exposed heat exchanger, for example, Patent Literature 1 discloses a packaging apparatus for an outdoor unit that covers the surface of the heat exchanger with a corrugated cardboard. In addition, Patent Literature 2 discloses an outdoor unit of an air conditioner in which a protection net composed of a plurality of vertical bars and a plurality of horizontal bars are attached to cover a heat exchanger to be adjacent to an opening of an outer casing of an outdoor unit. Further, Patent Literature 3 discloses an outdoor unit for a refrigerating air conditioning device in which in a rear guard composed of a plurality of vertical bars and a plurality of horizontal bars, an end portion of a part of the horizontal bars is secured to a securing part and a hole part of the main body of the outdoor unit, and an end portion of a part thereof is held with a side panel.

CITATION LIST

PATENT LITERATURE

[0003]

Patent Literature 1: Japanese Patent Application Laid-open No. 2006-123956
Patent Literature 2: Japanese Patent Application Laid-open No. H09-26162 (1997-26162)
Patent Literature 3: Japanese Patent Application Laid-open No. 2009-168260

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] However, in the packaging apparatus for an outdoor unit of the above Patent Literature 1, the corrugated cardboard is inserted into a part between a surface of the heat exchanger, and each of the upper frame and the lower frame of the outdoor unit housing. Thus, for a removing procedure of the corrugated cardboard, the following three works are required: a handle forming work (Work 1); a pulling work of the upper part of the corrugated cardboard (Work 2); and a pulling work of the lower part of the corrugated cardboard (Work 3). Therefore, there is a problem that a removing work thereof is not easy. Further, there is a problem that when the clearance between the opening of the heat exchanger and a surface of the wall for installation is small, a sufficient space for pulling-out work cannot be secured.

[0005] In addition, in the outdoor unit of each of Patent Literature 2 and Patent Literature 3 mentioned above, for the purpose of protecting the heat exchanger, the protection net composed of the plurality of horizontal bars and the plurality of vertical bars are attached thereto, and there are problems that the protection net cannot prevent the heat exchanger from damaging sufficiently, and that the protection net cannot be easily attached thereto.

[0006] The present invention is made to solve the above-described problems, and an object thereof is to provide an outdoor unit having a configuration in which in carriage and installation of an outdoor unit housing, a protective member that protects the heat exchanger exposed from the outdoor unit housing can be easily attached thereto, and a configuration in which the protective member can be easily removed from the outdoor unit housing after the installation of the outdoor unit is finished even in a narrow space.

SOLUTION TO PROBLEM

[0007] An outdoor unit of an air conditioner according to the invention includes: a main body having an opening to take in air; a heat exchanger housed in the main body, and arranged such that a surface of the heat exchanger is exposed to the opening; a guide member arranged between the heat exchanger and the main body to guide arrangement and pulling out of a protective member that covers the surface of the heat exchanger exposed from the opening; and a slit

hole to pull out the protective member outside the main body.

ADVANTAGEOUS EFFECTS OF INVENTION

[0008] According to the present invention, in carriage and installation of the outdoor unit, a protective member that protects a heat exchanger exposed from an outdoor unit housing can be easily attached thereto, and the protective member can be easily removed from the inside of the outdoor unit housing after the installation of the outdoor unit is finished.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

Fig. 1 is a perspective view of an outdoor unit according to Embodiment 1 viewed from a front side thereof;
Fig. 2 is a perspective view of the outdoor unit according to Embodiment 1 viewed from a back side thereof;
Fig. 3 is a sectional view taken along the line A-A of Fig. 1;
Fig. 4 is a view showing a protective member to be inserted into the outdoor unit according to Embodiment 1;
Fig. 5 is a sectional view of an outdoor unit according to Embodiment 2;
Fig. 6 is a perspective view of an outdoor unit according to Embodiment 3 viewed from a front side thereof;
Fig. 7 is a perspective view of the outdoor unit according to Embodiment 3 viewed from a back side thereof; and
Fig. 8 is a sectional view taken along the line A-A of Fig. 6.

DESCRIPTION OF EMBODIMENTS

[0010] Hereinafter, some embodiments for carrying out the present invention will be described in accordance with the accompanying drawings to explain the invention in more detail.

Embodiment 1

[0011] A configuration of an outdoor unit of an air conditioner (hereinafter, referred to as the "outdoor unit") and a protective member of the outdoor unit will be described with reference to Figs. 1 to 3. Note that, since the present embodiment is characterized by a point of including a configuration for installing a protective member for preventing a heat exchanger from damaging to the outdoor unit, and a point of providing the protective member, descriptions for the other configurations will be simplified.

[0012] Fig. 1 is a perspective view of the outdoor unit according to Embodiment 1 viewed from a front side thereof, Fig. 2 is a perspective view of the outdoor unit viewed from a back side thereof, and Fig. 3 is a sectional view taken along the line A-A of Fig. 1.

[0013] The outdoor unit 1 according to this Embodiment 1 is arranged out of doors, and configures an air conditioner for adjusting an indoor temperature or humidity together with an indoor unit (not depicted) to be arranged indoors. As shown in Figs. 1 to 3, the outdoor unit 1 includes a casing (main body) 2 in a rectangular parallelepiped shape, and further includes a heat exchanger 3, an outdoor fan 4, and a compressor (not depicted) housed inside the casing 2, and so on.

[0014] The casing 2 is composed of a top surface panel 5 constituting an upper surface of the outdoor unit 1, a main body panel 6 constituting a side surface part of the outdoor unit 1, and a base 7 constituting a bottom surface of the outdoor unit 1. A surface viewed from the arrow B direction in Fig. 1 is defined as the front surface 6a of the main body panel 6, a side surface on the left of the main body panel 6 when viewed from the arrow B direction is defined as the left side surface 6b, a side surface on the right of the main body panel 6 when viewed from the arrow B direction is defined as the right side surface 6c, and a surface at a position opposite to the front surface 6a is defined as the back surface 6d of the main body panel 6.

[0015] Rectangular intake openings 8, 9 are formed in the back surface 6d and left side surface 6b of the main body panel 6, and an exhaust opening 10 for blowing out the air that is taken in from outside to the casing 2 via the intake openings 8, 9 is formed in the front surface 6a of the main body panel 6.

[0016] Protective nets 11, 12 to cover the heat exchanger 3 are formed on the intake openings 8, 9, respectively. Each of the protective nets 11, 12 has a lattice shape constituted by a plurality of vertical bars and a plurality of horizontal bars, and has a function of preventing an object from contacting the heat exchanger 3. The protective nets 11, 12 may be formed integrally with the back surface 6d and left side surface 6b of the main body panel 6, or may be configured such that a protective net constituted as an individual member is fit into each of the intake openings 8, 9.

[0017] An outdoor fan 4 is arranged between the exhaust opening 10 and the heat exchanger 3. The outdoor fan 4

takes in the outside air from the intake openings and makes the air pass the heat exchanger 3, and after that, the air is exhausted from the exhaust opening 10. In the example of Fig. 1, two outdoor fans 4 are arranged in a stack in the vertical direction of the casing 2, and two exhaust openings 10 corresponding to the two outdoor fans 4 are formed. Here, the arrangement number of the outdoor fans is not limited to two, but is appropriately changeable.

[0018] The heat exchanger 3 has a plurality of thin fins and a copper tube (not shown in the drawings) passing through the thin fins and in which a refrigerant flows, and performs heat exchange between the outside air taken in from the intake openings 8, 9, and the refrigerant flowing in the copper tube. The heat exchanger 3 is arranged inside the casing 2 in the vicinity of the intake openings 8, 9 in a standing state to close the intake openings 8, 9, and part thereof is exposed from the protective nets 11, 12 of the intake openings 8, 9. Since the heat exchanger 3 closes the intake openings 8, 9, namely, the two surfaces of the main body panel 6 (the left side surface 6b and back surface 6d), it is arranged to form an L-shape in a sectional shape taken along the line A-A as shown in Fig. 3.

[0019] Next, the protective member 13 for preventing the heat exchanger 3 from damaging will be described.

[0020] The protective member 13 to cover the heat exchanger 3 exposed from the protective nets 11, 12 formed in the intake openings 8, 9 is provided between the back surface 6d and the left side surface 6b of the main body panel 6, and the heat exchanger 3. The protective member 13 is, for example, attached at the production process of the outdoor unit 1, and detached after carrying and installing works thereof are finished. In this manner, damaging of the exposed heat exchanger 3 is prevented at the carrying and installing processes of the outdoor unit 1.

[0021] Fig. 4 is a view showing the protective member of the outdoor unit according to Embodiment 1.

[0022] The protective member 13 has continuous folds in the short-length direction thereof, and the plurality of folds are formed at fine intervals in the longitudinal direction thereof. Due to such a configuration, the protective member 13 becomes bendable freely along the folds extending in the short-length direction. The protective member 13 is formed of a soft material such as a corrugated board. As shown in Fig. 3, an end portion 13a of the protective member 13 is inserted to a position similar to an end portion 3a of the heat exchanger 3, and an opposite end portion 13b of the protective member 13 is arranged to be projected by a slight amount from a slit hole 14 that is provided in the front surface 6a of the main body panel 6.

[0023] Next, the slit hole 14, a first inner frame (first guide member) 15a and a second inner frame (second guide member) 15b as components for arranging the protective member 13 inside the casing 2 will be described.

[0024] The slit hole 14 is formed in an area where the end portion 13b of the protective member 13 is positioned when the protective member 13 is arranged inside the casing 2 to close the intake openings 8, 9. Fig. 3 shows the slit hole 14 that is formed in such an area in parallel with the exhaust openings 10, with the longitudinal direction of the aperture of the hole to be oriented to the vertical direction of the front surface 6a. The opening of the slit hole 14 has a shape such that the short-length direction side of the protective member 13 can pass through it.

[0025] The first inner frame 15a and the second inner frame 15b are provided to stand at two places as shown in Fig. 3, being positions which are between the heat exchanger 3 and the main body panel 6, and which do not hinder the heat exchanging operation of the heat exchanger 3. To be more specific, the first inner frame 15a is provided to stand at a position on which the end portion 3a of the heat exchanger 3 abuts, and the second inner frame 15b is provided to stand at a position on which a bending part of the L-shaped heat exchanger 3 abuts. The first inner frame 15a has a function of guiding the arrangement of the end portion 13a of the inserted protective member 13, and the second inner frame 15b has a function of guiding the protective member 13 to be bent along the shape of the heat exchanger 3, and also a function of guiding the protective member to be moved outside the casing 2 through the slit hole 14. As shown in Fig. 3, the surfaces (the outer peripheral shape thereof) on which the first inner frame 15a and the second inner frame 15b contact the protective member 13 are curved; thus, the protective member 13 can be arranged without damaging the heat exchanger 3, and the protective member 13 can be pulled out from the slit hole 14 without damaging the heat exchanger 3.

[0026] When the carriage of the outdoor unit 1 and the installation thereof to a destination place are finished, the end portion 13b of the protective member 13 projecting from the slit hole 14 is held, and the protective member 13 is pulled out in the arrow C direction. The protective member 13 is moved toward the slit hole 14 with changing its own shape along the outer peripheral shape of the second inner frame 15b. In this manner, the whole protective member 13 can be pulled out smoothly from the slit hole 14 without damaging the heat exchanger 3.

[0027] Next, an example of an assembling method of the outdoor unit 1 will be described.

[0028] First, in a state where the front surface 6a and right side surface 6c of the main body panel 6 are assembled to the base 7 of the casing 2, the heat exchanger 3, outdoor fan 4, compressor and so on are placed thereon. Further, the first inner frame 15a and second inner frame 15b are provided to stand at predetermined positions on the side of the back surface 6d of the heat exchanger 3. Next, the protective member 13 is arranged to cover the heat exchanger 3 along the first inner frame 15a and second inner frame 15b, and the end portion 13b is made to be projected by a predetermined amount from the slit hole 14 that is formed in the front surface 6a of the main body panel 6. Thereafter, the back surface 6d and left side surface 6b of the main body panel 6 are assembled thereto, and the top surface panel 5 is fitted thereto. Note that, the assembling method cannot be limited to the above one.

[0029] As described above, according to this Embodiment 1, since it is configured to include: the first inner frame 15a and the second inner frame 15b that guide the arrangement, bending and movement of the protective member 13 provided between the back surface 6d and left side surface 6b of the main body panel 6, and the heat exchanger 3; and the slit hole 14 for pulling out the protective member 13 outside the casing 2, the attachment work of the protective member of the heat exchanger can be easily achieved, and further, the protective member can be easily removed from the casing after the installation of the outdoor is finished. In this manner, in the carrying work or in the installing work of the outdoor unit, damage of the heat exchanger can be easily prevented.

[0030] Further, according to this Embodiment 1, since it is configured that the protective member 13 freely bendable in a predetermined direction is arranged between the heat exchanger 3 and the intake openings 8, 9, and that one end of the protective member 13 is arranged to be projected from the slit hole 14 by a slight amount, the protective member can be arranged in accordance with the shape of the heat exchanger, and further, after the installation of the outdoor unit is finished, the protective member can be easily removed by pulling out the one end of the protective member being projected.

[0031] In addition, according to this Embodiment 1, since the surfaces where the first inner frame 15a and the second inner frame 15b contact the protective member 13 are configured to be curved, the whole protective member can be pulled out smoothly from the slit hole without damaging the heat exchanger.

Embodiment 2

[0032] In Embodiment 1 described above, the outdoor unit 1 having a heat exchanger 3 whose sectional shape taken along the line A-A is formed to be the L-shape is exemplified. This Embodiment 2 shows a case in which a protective member is applied to an outdoor unit having a heat exchanger 3b formed in a U-shape in the sectional shape taken along the line A-A. Fig. 5 is a sectional view of the outdoor unit according to Embodiment 2, which is obtained in the portion corresponding to the line A-A shown in Fig. 1.

[0033] Perspective views of an outdoor unit 1a in Embodiment 2 as viewed from the front surface 6a and back surface 6d are the same as those of Fig. 1 and Fig. 2 shown in Embodiment 1, and hence descriptions thereof will be omitted.

[0034] In addition, a composition in which the outdoor unit 1a includes a casing 2 in a rectangular parallelepiped shape, and a heat exchanger 3b, an outdoor fan 4, a compressor, and so on that are housed inside the casing 2 is the same as that of Embodiment 1.

[0035] In this Embodiment 2, in the main body panel 6 of the casing 2, a right side surface 6c is also provided with an intake opening 21 in a rectangular shape, in addition to the back surface 6d and a left side surface 6b. A protective net 22 having a lattice shape constituted by a plurality of vertical bars and a plurality of horizontal bars is formed in the intake opening 21 of the right side surface 6c. The constitution of that protective net 22 is the same as that of each of the protective nets 11, 12 shown in Embodiment 1.

[0036] The heat exchanger 3b in Embodiment 2 is arranged inside the casing in the vicinity of the intake openings 8, 9 and the intake opening 21 in a standing state to close the intake openings 8, 9 and the intake opening 21, and parts of the heat exchanger are exposed from the protective nets 11, 12, 22 of the intake openings 8, 9, 21. Since the heat exchanger 3b closes the intake openings 8, 9, 21, namely, three surfaces of the main body panel 6, the exchanger is arranged such that the horizontal sectional shape is formed in the U-shape as shown in Fig. 5. Here, a configuration and a function of the heat exchanger 3b itself are the same as those of the heat exchanger 3 shown in Embodiment 1, and hence descriptions thereof will be omitted.

[0037] Next, a protective member 23 used for the outdoor unit 1a according to Embodiment 2 will be described. Note that, similarly to that of the protective member 13 in Embodiment 1, the protective member 23 has folds each of which is continuous in the short-length direction thereof, and a plurality of folds is formed at fine intervals in the longitudinal direction thereof. Here, an illustration thereof will be omitted. Due to such a configuration, the protective member 23 becomes bendable freely along the folds extending in the short-length direction. The protective member 23 is formed of a soft material such as a corrugated board. As shown in Fig. 5, an end portion 23a of the protective member 23 is inserted to a similar position to an end portion 3c of the heat exchanger 3b, and the opposite end portion 23b of the protective member 23 is arranged to be projected by a slight amount from a slit hole 14 provided in the front surface 6a of the main body panel 6. As compared with the protective member 13 in Embodiment 1, the length of the protective member 23 in the longitudinal direction is set to be longer by the amount that closes the intake opening 21 of the right side surface 6c.

[0038] Next, the slit hole 14, a first inner frame (second guide member) 15a, a second inner frame (second guide member) 15b, and a third inner frame 15c (first guide member) as components for arranging the protective member 23 inside the casing 2 will be described.

[0039] When the protective member 23 is arranged inside the casing 2 to close the intake openings 8, 9, 21, similarly to that of Embodiment 1, the slit hole 14 is formed in the area where the end portion 23b of the protective member 23 is positioned. The opening of the slit hole 14 has a shape in which the short-length side of the protective member 23

can pass through it.

[0040] As shown in Fig. 5, the first inner frame 15a, second inner frame 15b, and third inner frame 15c are provided to stand at positions between the heat exchanger 3b and the main body panel 6 where they do not hinder heat exchanging operation of the heat exchanger 3b. Each of the first inner frame 15a and second inner frame 15b is provided to stand at a position on which a bending part of the U-shaped heat exchanger 3b abuts, and the third inner frame 15c is provided to stand at a position on which the end portion 3c of the heat exchanger 3b abuts. The third inner frame 15c has a function of guiding the arrangement of the end portion 23a of the inserted protective member 23, and each of the first inner frame 15a and the second inner frame 15b has a function of guiding the protective member 23 to be bent along the shape of the heat exchanger 3, and guiding the protective member to be moved outside the casing 2 through the slit hole 14. As shown in Fig. 5, the surface (outer peripheral shape) of each of the first inner frame 15a, second inner frame 15b and third inner frame 15c contacting the protective member 23 is curved; thus, the protective member 23 can be arranged without damaging the heat exchanger 3b, and the protective member 23 can be pulled out from the slit hole 14 without damaging the heat exchanger 3b.

[0041] When carriage of the outdoor unit 1a and installation thereof to a destination place are finished, the end portion 23b of the protective member 23 projecting from the slit hole 14 is held, and the protective member 23 is pulled out in the arrow C direction. The protective member 23 is moved toward the slit hole 14 as the shape is changed along the outer peripheral shapes of the first inner frame 15a and the second inner frame 15b. In this manner, the whole protective member 23 can be pulled out smoothly from the slit hole 14 without damaging the heat exchanger 3b.

[0042] Here, an assembling method of the outdoor unit 1a is similar to that shown in Embodiment 1.

[0043] As described above, according to this Embodiment 2, it is configured to include: the first inner frame 15a, second inner frame 15b, and third inner frame 15c that guide the arrangement, bending and movement of the protective member 23 to be arranged between the back surface 6d, left side surface 6b, and right side surface 6c of the main body panel 6, and the heat exchanger 3b; and the slit hole 14 for pulling out the protective member 23 outside the casing 2. As a result, the protective member of the heat exchanger can be easily attached thereto, and further the protective member can be easily removed from the casing after the installation of the outdoor unit is finished. In this manner, in the carrying work or in the installing work of the outdoor unit, damage of the heat exchanger can be easily prevented.

[0044] In addition, according to this Embodiment 2, since it is configured that the protective member 23 freely bendable in a predetermined direction is arranged between the heat exchanger 3b and the intake openings 8, 9, 21, and that one end of the protective member 23 is arranged to be projected from the slit hole 14, the protective member can be arranged in accordance with the shape of the heat exchanger, and further, after the installation of the outdoor unit is finished, the protective member can be easily removed by pulling out the projected end of the protective member.

[0045] Further, according to this Embodiment 2, it is configured to arrange the protective member 23 to protect the heat exchanger 3b arranged on the left and right side surfaces 6b, 6c, and the back surface 6d of the main body panel 6 of the casing 2; thus, even in the outdoor unit that the heat exchanger is exposed in the two side surfaces and the back surface of the main body panel in the casing, the heat exchanger can be protected in the carrying work and the installing work, and after the installation, the protective member can be easily pulled out from the front surface. Further, even when the installation place is a space such that the two side surfaces and the back surface of the main body panel are narrow, the protective member can be easily pulled out from the front surface.

[0046] Furthermore, according to this Embodiment 2, since the surface where each of the first inner frame 15a, second inner frame 15b, and third inner frame 15c contacts the protective member 23 is configured to be curved, the whole protective member can be pulled out smoothly from the slit hole without damaging the heat exchanger.

Embodiment 3

[0047] In this Embodiment 3, a configuration will be shown in which a protective member can be pulled out from the right side surface 6c when the outdoor unit is viewed from the front surface 6a.

[0048] Fig. 6 is a perspective view of the outdoor unit according to Embodiment 3 viewed from the front side thereof, and Fig. 7 is a perspective view of the outdoor unit viewed from the back side thereof. Fig. 8 is a sectional view taken along the line A-A in Fig. 6.

[0049] A composition in which an outdoor unit 1b includes a casing 2 in a rectangular parallelepiped shape, and includes a heat exchanger 3, an outdoor fan 4, and a compressor, and so on inside the casing 2 is the same as that of Embodiment 1.

[0050] In a main body panel 6 of the casing 2, a back surface 6d and a left side surface 6b are provided with rectangular intake openings 8, 9, respectively, and a front surface 6a of the main body panel 6 is provided with an exhaust opening 10. Protective nets 11, 12 are formed in intake openings 8, 9, respectively. As shown in Fig. 8, the heat exchanger 3 is arranged to close the intake openings 8, 9, that is, to have an L-shape in a sectional shape taken along the line A-A.

[0051] The protective member 13 is freely bendable along folds formed in the short-length direction thereof, similarly to that of Embodiment 1, and is formed of a soft material such as a corrugated board. As shown in Fig. 8, an end portion

13b of the protective member 13 is inserted to the position similar to the end portion 3d of the heat exchanger 3, and the end portion 13b of the protective member 13 is arranged to be projected by a slight amount from the slit hole 31 provided in the right side surface 6c of the main body panel 6.

[0052] The slit hole 31 is formed in an area where an end portion 13a of the protective member 13 is positioned when the protective member 13 is arranged inside the casing 2 to cover the intake openings 8, 9. The slit hole 31 has a shape in which the short-length side of the protective member 13 can pass through it.

[0053] As shown in Fig. 8, a second inner frame 15b (second guide member) and a fourth inner frame 15d (first guide member) are provided to stand at two places, each of which is a position that is between the heat exchanger 3 and the main body panel 6, and that does not hinder the heat exchanging operation of the heat exchanger 3. To be more specific, the second inner frame 15b is provided to stand at a position on which a bending part of the L-shaped heat exchanger 3 abuts, and the fourth inner frame 15d is provided to stand at a position on which the end portion 3d of the heat exchanger 3 abuts. The fourth inner frame 15d has a function of guiding the arrangement of the inserted protective member 13, and the second inner frame 15b has a function of guiding the protective member 13 to be bent along the shape of the heat exchanger 3 when the protective member 13 is pulled out, and guiding the protective member 13 to be moved outside the casing 2 through the slit hole 31. The surfaces (outer peripheral shape) where the second inner frame 15b and the fourth inner frame 15d contact the protective member 13 are curved; thus, the protective member 13 can be arranged without damaging the heat exchanger 3, and the protective member 13 can be pulled out from the slit hole 31 without damaging the heat exchanger 3.

[0054] When carriage of the outdoor unit 1b and installation thereof to a destination place are finished, the end portion 13a of the protective member 13 projecting from the slit hole 31 is held, and the protective member 13 is pulled out in the arrow D direction. The protective member 13 is moved toward the slit hole 31 as the shape is changed along the outer peripheral shape of the second inner frame 15b. In this manner, the whole protective member 13 can be pulled out smoothly from the slit hole 31 without damaging the heat exchanger 3.

[0055] Next, an example of an assembling method of the outdoor unit 1b will be described.

[0056] First, in a state where the front surface 6a and right side surface 6c of the main body panel 6 are assembled to a base 7 of the casing 2, the heat exchanger 3, outdoor fan 4, compressor and so on are placed thereon. Further, the second inner frame 15b and fourth inner frame 15d are provided to stand at predetermined positions on the side of the back surface 6d of the heat exchanger 3. Next, the protective member 13 is arranged to cover the heat exchanger 3 along the second inner frame 15b and fourth inner frame 15d, and the end portion 13a is arranged to project by a predetermined amount from the slit hole 31 that is formed in the right side surface 6c of the main body panel 6. Thereafter, the back surface 6d and left side surface 6b of the main body panel 6 are assembled thereto, and a top surface panel 5 is fitted to the assembled body. Note that, the assembling method cannot be limited to the above one.

[0057] As described above, according to this Embodiment 3, since it is configured to include: the second inner frame 15b and fourth inner frame 15d that guide the arrangement, bending and movement of the protective member 13 to be arranged between the back surface 6d and left side surface 6b of the main body panel 6, and the heat exchanger 3; and the slit hole 31 for pulling out the protective member 13 outside the casing 2, the protective member of the heat exchanger can be easily attached thereto, and further the protective member can be easily removed from the casing after the installation of the outdoor unit is finished. In this manner, damage of the heat exchanger can be easily prevented in the carrying work or in the installing work of the outdoor unit.

[0058] Further, according to this Embodiment 3, since it is configured that the protective member 13 freely bendable in a predetermined direction is arranged between the heat exchanger 3 and the intake openings 8, 9, and that one end of the protective member 13 is arranged with projected from the slit hole 31 by a slight amount, the protective member can be arranged in accordance with the shape of the heat exchanger, and further after the installation of the outdoor unit is finished, the protective member can be easily removed by pulling out the projected end of the protective member.

[0059] In addition, even in the case where it is impossible to secure a foothold in front of the outdoor unit in the installation place such as an outer wall on the second floor, or also in the case where the left and back side spaces of the outdoor unit are narrow when the outdoor unit is viewed from the front, the protective member can be pulled out from the right side when the outdoor unit is viewed from the front.

[0060] In addition, according to this Embodiment 3, since the surfaces where the second inner frame 15b and the fourth inner frame 15d contact the protective member 13 are configured to be curved, the whole protective member can be pulled out smoothly from the slit hole without damaging the heat exchanger.

[0061] Additionally, the shapes of the first inner frame 15a, second inner frame 15b, third inner frame 15c, and fourth inner frame 15d are not limited to those described in Embodiments 1 to 3 described above, but can be appropriately changed. So long as the shape is capable of smoothly pulling out the protective member, any shape can be adopted, such as a rod formed to be cylindrical shape provided to stand, for example. In addition, the number of the inner frames to be placed is not limited to those shown in Embodiments 1 to 3 mentioned above, but can be appropriately changed.

[0062] It should be noted that any embodiments can be combined to each other freely, modification of any configuration element in the embodiments and omission of any configuration element in the embodiments can be made in the present

invention without departing from the scope of the invention.

INDUSTRIAL APPLICABILITY

[0063] The outdoor unit according to the present invention has a configuration in which a simple protective member for preventing a heat exchanger from damage can be easily placed in a casing, and the protective member can be easily pulled out from the slit hole. As a result, it is suitable as protection means of a heat exchanger in an outdoor unit to be installed in a narrow space.

REFERENCE SIGNS LIST

[0064]

1, 1a, 1b:	outdoor unit
2:	casing
3, 3b:	heat exchanger
3a, 3c, 3d:	end portion
4:	outdoor fan
5:	top surface panel
6:	main body panel
6a:	front surface
6b:	left side surface
6c:	right side surface
6d:	back surface
7:	base
8, 9, 21:	intake opening
10:	exhaust opening
11, 12, 22:	protective net
13, 23:	protective member
13a, 13b, 23a, 23b:	end portion
14, 31:	slit hole
15a:	first inner frame
15b:	second inner frame
15c:	third inner frame
15d:	fourth inner frame

Claims

1. An outdoor unit of an air conditioner comprising:

a main body having an opening to take in air;
a heat exchanger housed in the main body, and arranged such that a surface of the heat exchanger is exposed from the opening;
a guide member arranged between the heat exchanger and the main body to guide arrangement and pulling out of a protective member that covers the surface of the heat exchanger exposed from the opening; and
a slit hole to pull out the protective member outside the main body.

2. The outdoor unit according to claim 1, wherein
the opening is formed in each of a back surface and one side surface of the main body,
the heat exchanger has an L-shape as a horizontal sectional shape and exposes the surface from the opening formed in each of the back surface and the one side surface of the main body,
the guide member includes at least a first guide member that guides arrangement of an end portion of the protective member inserted into the main body, and a second guide member that guides that the inserted protective member is bent along the L-shape of the heat exchanger, and guides that the protective member is moved outside the main body along the L-shape, and
the slit hole is formed in a front surface of the main body.

3. The outdoor unit according to claim 1, wherein
the opening is formed in each of a back surface and both side surfaces of the main body,
the heat exchanger has a U-shape in a horizontal sectional shape and exposes the surface from the opening formed in each of the back surface and both the side surfaces of the main body,
the guide member includes at least a first guide member that guides arrangement of an end portion of the protective member inserted into the main body, and second and third guide members that guide the inserted protective member to be bent along the U-shape of the heat exchanger, and also guide that the protective member is moved outside the main body along the U-shape, and
the slit hole is formed in a front surface of the main body.

4. The outdoor unit according to claim 1, wherein
the opening is formed in each of a back surface and one side surface of the main body,
the heat exchanger has an L-shape as a horizontal sectional shape and exposes the surface from the opening formed in each of the back surface and the one side surface of the main body,
the guide member includes at least a first guide member that guides arrangement of an end portion of the protective member inserted into the main body, and a second guide member that guides that the inserted protective member is bent along the L-shape of the heat exchanger, and guides that the protective member is moved outside the main body along the L-shape, and
the slit hole is formed in another side surface of the main body.

5. The outdoor unit according to claim 1, further comprising:

the protective member arranged between the heat exchanger and the main body and being bent along the guide member to cover the surface of the heat exchanger exposed from the opening.

6. The outdoor unit according to claim 5, wherein the protective member has a length capable of being inserted through the slit hole and has an area that covers the surface of the heat exchanger exposed from the opening, and one end portion of the protective member projects from the slit hole in a state where the protective member is inserted into the main body.

7. An assembly method of an outdoor unit of an air conditioner comprising:

attaching a heat exchanger and a guide member to a main body panel of the outdoor unit;
arranging a protective member to cover the heat exchanger along the guide member;
pulling out an end portion of the protective member from a slit hole formed in the main body panel by a predetermined amount; and
attaching the main body panel to cover the protective member.

FIG.1

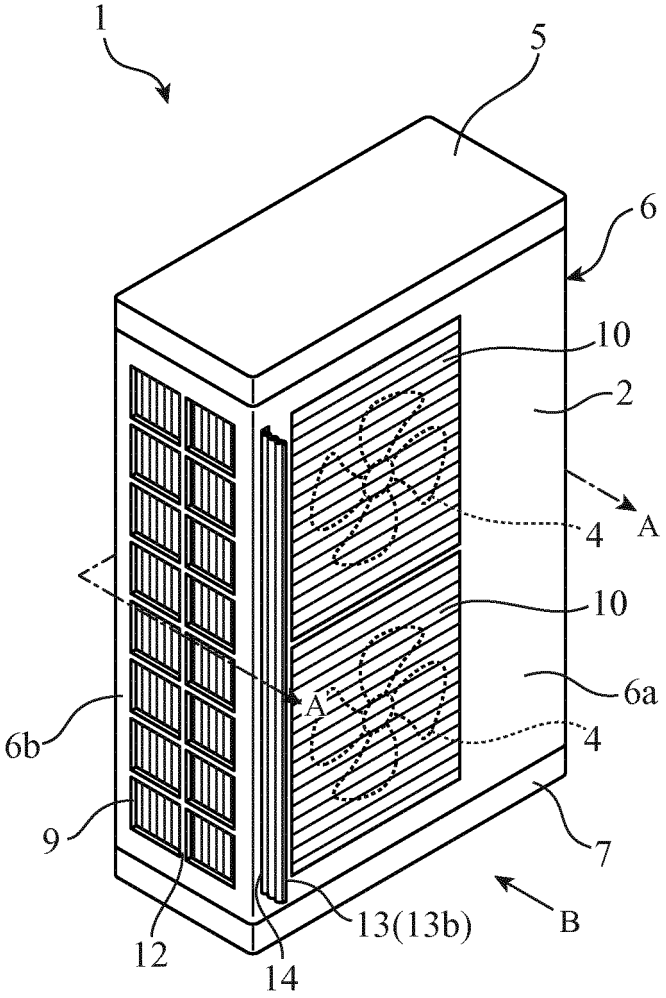


FIG.2

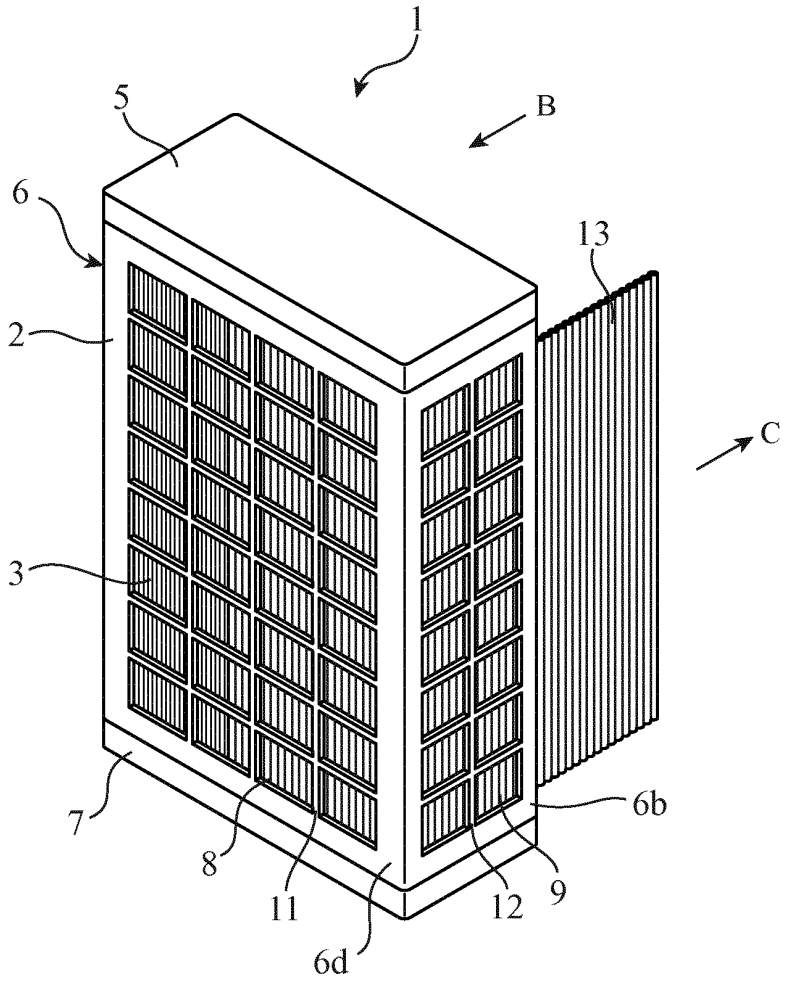

1
5
B
6
13
2
C
3
7
8
11
12
9
6b
6d

FIG.3

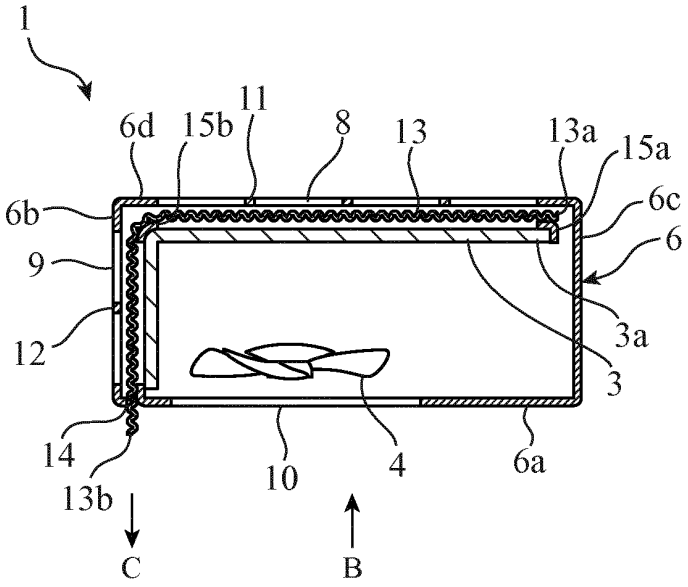

1
6d
15b
11
8
13
13a
15a
6b
6c
6
9
3a
12
3
14
13b
10
4
6a
C
B

FIG.4

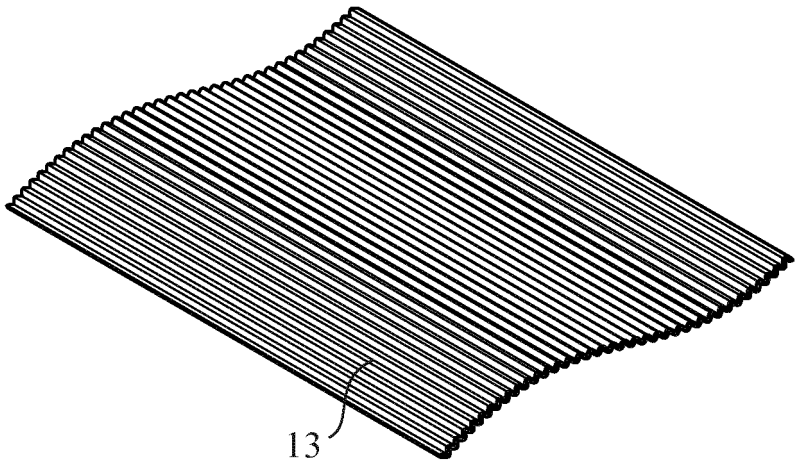

13

FIG.5

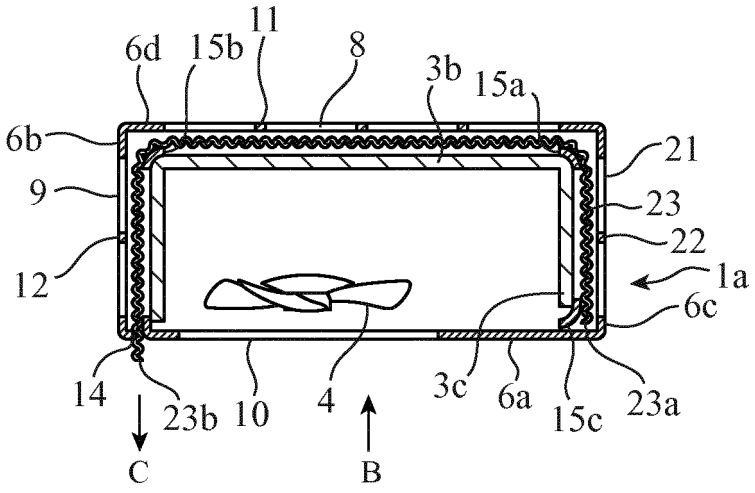

11
6d
15b
8
3b
15a
6b
21
9
23
22
12
1a
6c
14
23b
10
4
3c
6a
15c
23a
C
B

FIG.6

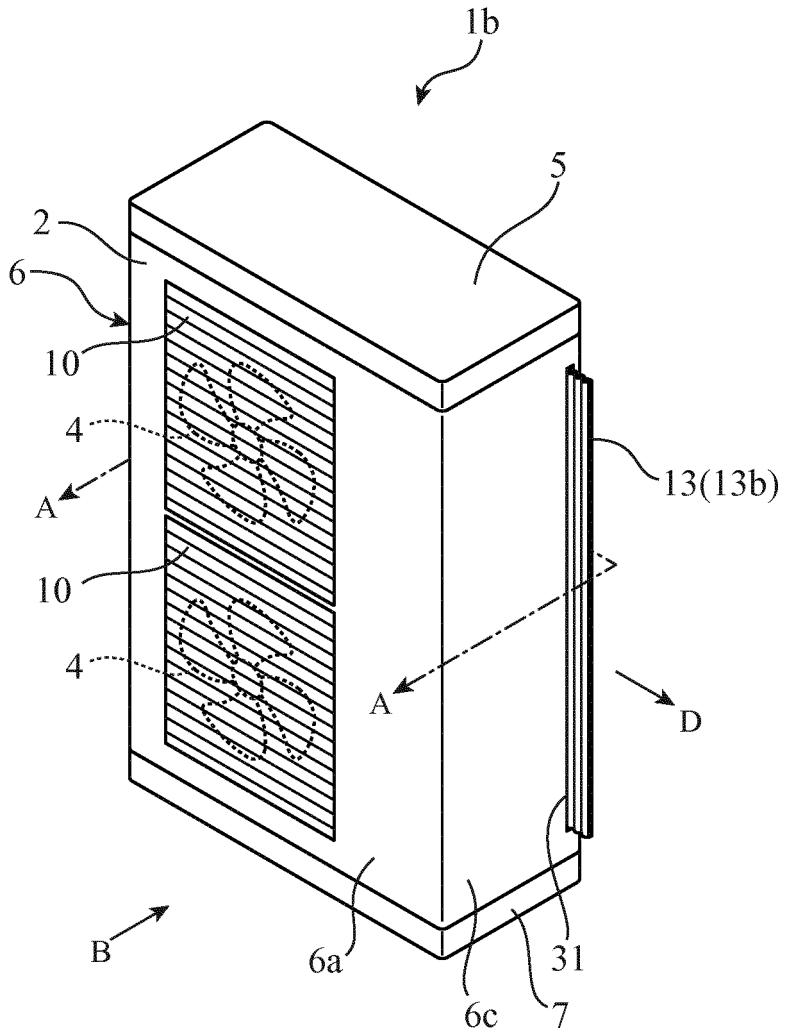


FIG.7

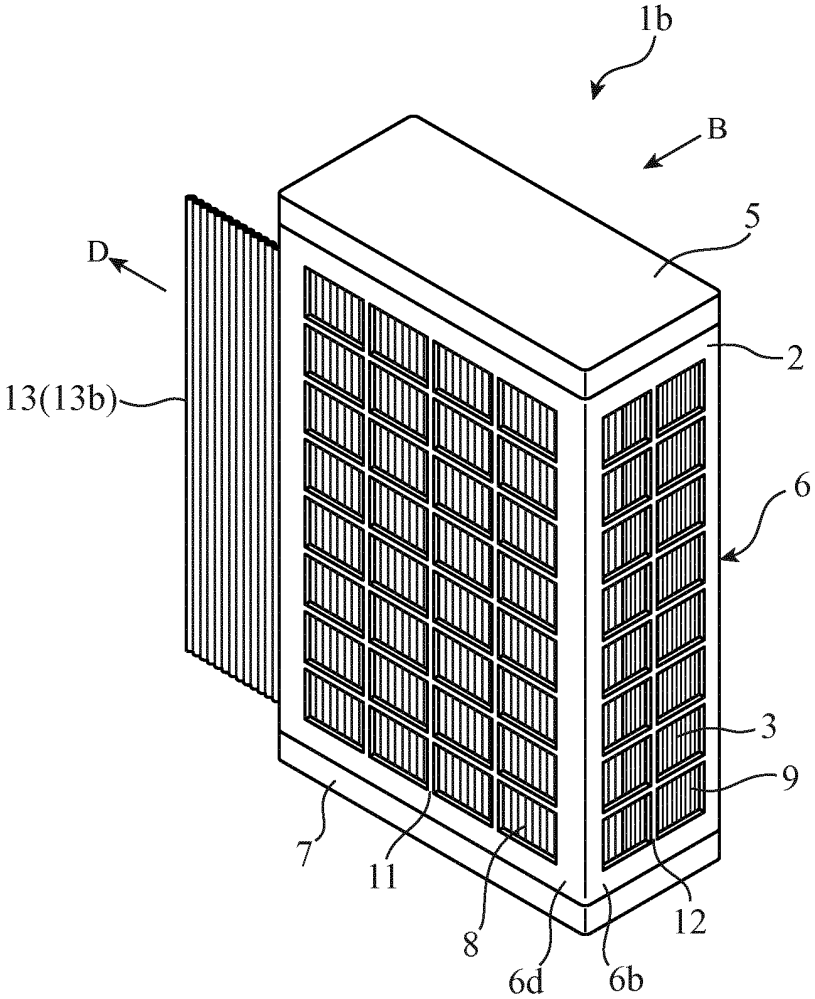
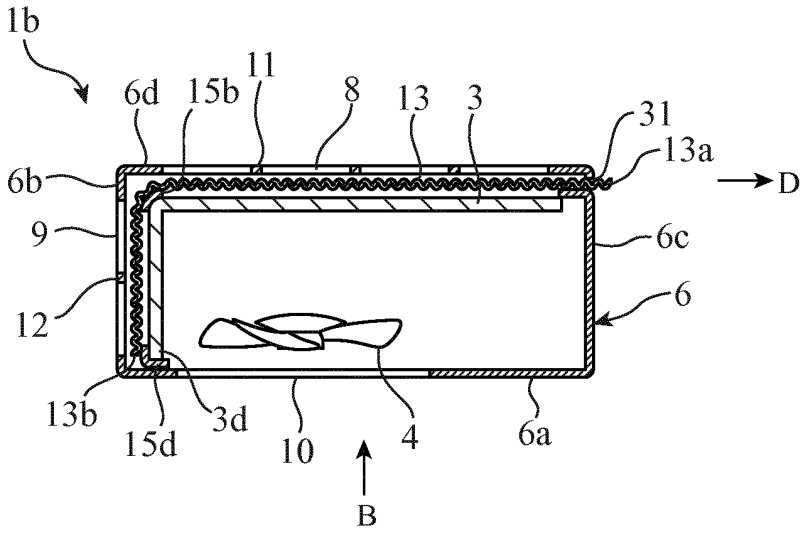

1b
B
5
D
2
13(13b)
6
3
9
7
11
8
6d
6b
12

FIG.8


1b
6d
15b
11
8
13
3
31
13a
D
6b
9
6c
12
6
13b
15d
3d
10
4
6a
B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/063984

A. CLASSIFICATION OF SUBJECT MATTER
F24F1/58(2011.01)i, *F24F1/56*(2011.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24F1/58, F24F1/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 098130/1985(Laid-open No. 006619/1987) (Mitsubishi Electric Corp.), 16 January 1987 (16.01.1987), entire text; all drawings (Family: none)	1-7
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 173849/1979(Laid-open No. 090670/1981) (Sanyo Electric Co., Ltd.), 20 July 1981 (20.07.1981), entire text; all drawings (Family: none)	1-7

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 August, 2014 (14.08.14)	26 August, 2014 (26.08.14)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/063984

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 200787/1986(Laid-open No. 108036/1988) (Daikin Industries, Ltd.), 12 July 1988 (12.07.1988), entire text; all drawings (Family: none)	1-7
A	JP 2009-030895 A (Sanyo Electric Co., Ltd.), 12 February 2009 (12.02.2009), claims; paragraphs [0012] to [0038]; fig. 1 to 5 (Family: none)	1-7
A	JP 2012-242022 A (Daikin Industries, Ltd.), 10 December 2012 (10.12.2012), claims; paragraphs [0038] to [0058]; fig. 8 & CN 202853004 U	1-7
A	JP 2005-114246 A (Hoshizaki Electric Co., Ltd.), 28 April 2005 (28.04.2005), paragraphs [0019] to [0046]; fig. 1 to 11 (Family: none)	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2006123956 A **[0003]**
- JP H0926162199726162 A **[0003]**
- JP 2009168260 A **[0003]**