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(54) **FRONT SUCTION/DISCHARGE TYPE OUTDOOR UNIT FOR AIR CONDITIONER**

VORDERE ANSAUG/AUSSTOSS-AUSSENEINHEIT FÜR EINE KLIMAANLAGE

UNITE FRONTALE EXTERIEURE DE TYPE ASPIRATION-REFOULEMENT POUR CLIMATISEUR

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Description

TECHNICAL FIELD

[0001] The present invention relates to an outdoor unit for an air conditioner, and more particularly to, a front suction/discharge type outdoor unit for an air conditioner.

BACKGROUND ART

[0002] An air conditioner implying a cooler, a heater or both of them is classified into a window type and a split type. In the case of the cooler, a split type air conditioner includes an indoor unit installed indoors for cooling a room, and an outdoor unit coupled to the indoor unit through refrigerant pipe lines and installed outdoors to contact air, for performing condensation heat exchange between outdoor air and a refrigerant gas in a condenser as a cooling medium, and supplying the condensed refrigerants to an evaporator of the indoor unit through the refrigerant pipe lines. The indoor unit is comprised of the evaporator for performing cooling heat exchange for evaporating the refrigerants and absorbing evaporation heat from indoor air, and a ventilating fan for circulating indoor air, and the outdoor unit is comprised of a compressor for compressing the refrigerant gas and supplying the compressed gas to the condenser, the air-cooled condenser for condensing the refrigerant gas supplied from the compressor, and a cooling fan for forcibly ventilating outdoor air to the air-cooled condenser to cool and condense the refrigerant gas. The compressor, the air-cooled condenser and the cooling fan of the outdoor unit are installed in an outdoor unit casing composing the outer appearance. The conventional hexahedral outdoor unit casing has an air suction unit for sucking air to the air-cooled condenser at its three sides, and an air discharge unit for externally discharging air absorbing condensation heat from the refrigerant gas by the heat exchange in the air-cooled condenser on its top surface.

[0003] However, the conventional outdoor unit for the air conditioner is restricted in installation spaces due to high density and strict environment regulations of cities, and increases civil applications due to noise and heat. Especially, in a common residential area such as large-scaled apartment buildings, the outdoor units must be installed in indoor verandas to improve the appearance and prevent noise.

[0004] In order to solve the foregoing problems, Japanese Laid-Open Patent Application 6-101873 suggests an air conditioner mounted building where an indoor unit of an air conditioner is installed indoors or adjacent to a room intended to be air-conditioned, and an outdoor unit of the air conditioner is installed outdoors, wherein an opening is formed on the outer wall or roof, a louver is installed in the opening, the outdoor unit of the air conditioner is disposed in the louver, and suction/discharge of the indoor unit is performed through a gap between louver plates.

[0005] In addition, Japanese Laid-Open Patent Application 3-213928 discloses a built-in type outdoor unit for an air conditioner including an outdoor unit main body for the air conditioner which is built in the wall and which includes a frame having the same size and thickness as the wall, a suction hole for heat exchange air installed on the same surface as the outdoor unit main body, and a discharge hole for heat exchanged air.

[0006] Document JP 11 118 199 discloses an outdoor unit of an air conditioner comprising an air-cooled condenser especially manufactured to cope with a given specification, such as different pitch of fin, different size of fin, the different pitch of tube and the different number of rows of tubes, this resulting in inevitably deteriorating its productivity.

[0007] Recently, the outdoor unit requires high heat exchange efficiency due to increase of air conditioning capacity. Differently from the general three-surface suction type outdoor unit, a front suction/discharge type outdoor unit sucks air through its front surface, namely one surface. Such a small suction unit reduces heat exchange efficiency. Nevertheless, there has never been suggested a structure or arrangement for improving heat exchange efficiency in a front suction/discharge type outdoor unit which inevitably has a small suction area of outdoor air.

DISCLOSURE OF THE INVENTION

[0008] The present invention is achieved to solve the above problems. An object of the present invention is to provide a front suction/discharge type outdoor unit for an air conditioner which can achieve high heat exchange efficiency at least equivalent to a general outdoor unit, by using a structure of a condenser for allowing the condenser to be wholly evenly used in the outdoor unit.

[0009] In order to achieve the above-described object of the invention, there is provided a front suction/discharge type outdoor unit for a split-type air conditioner according to claim 1.

[0010] In the outdoor unit casing, the cooling fan is possibly disposed at the upper side of the air-cooled condenser, the first area corresponds to the upper area of the air-cooled condenser, and the second area corresponds to the lower area of the air-cooled condenser. The cooling fan may be disposed at the lower side of the air-cooled condenser, the first area corresponds to the lower area of the air-cooled condenser, and the second area corresponds to the upper area of the air-cooled condenser. The cooling fan may be disposed at the right/left side of the air-cooled condenser, the first area corresponds to the area relatively adjacent to the cooling fan, and the second area corresponds to the area relatively far from the cooling fan.

[0011] The air-cooled condenser is divided into a first area condenser and a second area condenser. The first area condenser and the second area condenser are individually manufactured and installed to be adjacent to

each other. The air-cooled condenser is formed by individually manufacturing and installing a plurality of condensers of the same standard to be adjacent to each other. Here, the heat exchange quantity is larger in the first area than in the second area, by setting a number of the condensers composing the first area larger than that of the condensers composing the second area. Preferably, two sets of condensers compose the first area, and one set of condenser composes the second area.

[0012] Preferably, the outdoor unit casing further includes a passage forming member between the outdoor unit casing and the air-cooled condenser, for preventing outdoor air sucked from the outside of the building through the front surface unit from being sucked to the cooling fan without passing through the air-cooled condenser.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will become better understood with reference to the accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein;

Fig. 1 is a partially-cut perspective-sectional view illustrating a front suction/discharge type outdoor unit for an air conditioner in accordance with a preferred embodiment of the present invention;

Fig. 2 is a perspective view illustrating disassembly of the outdoor unit of Fig. 1;

Fig. 3A is an enlarged front view illustrating an example, not covered by the claims of a dotted part of Fig. 2;

Fig. 3B is a side-sectional view illustrating another example of an air-cooled condenser, not covered by the claims;

Fig. 4 is a perspective view illustrating an example of individually-manufactured and installed air-cooled condensers not covered by the claims; and

Figs. 5A and 5B are concept views illustrating installation of a plurality of condensers of the same standard in accordance with the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0014] A front suction/discharge type outdoor unit for an air conditioner in accordance with the present invention will now be described in detail with reference to the accompanying drawings.

[0015] Figs. 1 and 2 illustrate the front suction/discharge type outdoor unit for the air conditioner in accordance with the preferred embodiment of the present invention.

[0016] An external frame 4 is fixedly installed in an opened space linked to the outside of a building on an outer wall 2 of a residential and/or commercial building, and an internal frame 6 is fixedly installed inside the external frame 4. If necessary, the internal and external frames 4 and 6 can be incorporated. An inside area of the internal frame 6 is divided into a suction area 7a and a discharge area 7b. A plurality of louver blades 8 are installed in each area, so that air can be sucked or discharged through gaps between the louver blades 8 as indicated by arrows of Fig. 1.

[0017] An open angle of the louver blades 8 is manually or electromotively controlled by using a driving device (not shown). If necessary, the louver blades 8 can be maintained in an open state at a predetermined angle by predetermining a suction/discharge direction of air.

[0018] On the other hand, an outdoor unit 10 fixedly installed at the inside of the outer wall 2 of the building to contact the external frame 4 and/or internal frame 6 includes an outdoor unit casing comprised of components of Fig. 2. In addition, outdoor unit components of Fig. 2 are installed in the outdoor unit casing.

[0019] In the outdoor unit casing, a front surface unit facing the suction area 7a and the discharge area 7b of the internal frame 6 is opened to be linked to the outside of the building. The opened front surface unit is divided into a suction unit 11 a and a discharge unit 11 b to correspond to the suction area 7a and the discharge area 7b of the internal frame 6. The outdoor unit casing also includes both side units 12a and 12b formed at both ends of the front surface unit, a rear surface unit 12c formed to face the front surface unit, a bottom surface unit 14 formed at the lower ends of the front surface unit, the both side units 12a and 12b and the rear surface unit 12c, and a top surface unit 16 formed at the upper ends of the front surface unit, the both side units 12a and 12b and the rear surface unit 12c. The both side units 12a and 12b, the rear surface unit 12c, the bottom surface unit 14 and the top surface unit 16 are closed to form, preferably, a rectangular parallelepiped outdoor unit casing. A mesh shaped front grill 60 is additionally installed on the front surface unit of the outdoor unit 10 to prevent invasion of animals (for example, rats). For convenience' sake, reference numeral 60 is used for both the opened front surface unit and the front grill. For easy transportation and installation, the outdoor unit casing can be divided into a suction casing corresponding to the suction unit 11 a, and a discharge casing corresponding to the discharge unit 11 b.

[0020] A plurality of leg members 18a, 18b, 18c and 18d are externally protruded from the bottom surface unit 14. The leg members 18a, 18b, 18c and 18d are installed on the bottom of the building, for example a veranda of an apartment building, for supporting heavy load of the outdoor unit 10. Preferably, four leg members 18a, 18b, 18c and 18d are formed in consideration of the shape of the bottom surface unit 14. A leg reinforcing member 19 for coupling and reinforcing the leg members 18a, 18b,

18c and 18d is formed below the bottom surface unit 14 in the horizontal direction. The leg members 18a, 18b, 18c and 18d further include screws (not shown) for controlling height. Accordingly, when the bottom of the building, for example the veranda of the apartment building is not flat, they can stably position the outdoor unit 10. If the two leg members 18a and 18b disposed in the forward direction (toward the outer wall of the building) among the leg members 18a, 18b, 18c and 18d further include transport wheels (not shown), it is much easier to transport the heavy load outdoor unit 10.

[0021] A compressor 20 for compressing a refrigerant gas supplied from an indoor unit to the outdoor unit casing, and an air-cooled condenser 30 for performing condensed heat exchange between the refrigerant gas supplied from the compressor 20 and outdoor air are installed in the suction unit 11 a of the outdoor unit 10.

[0022] In the front suction/discharge type outdoor unit 10 sucking outdoor air through one surface, namely the opened front surface unit 60, the present invention is intended to improve heat exchange efficiency by efficiently inducing outdoor air sucked through the opened front surface unit 60 to the air-cooled condenser 30, and exchanging heat between outdoor air and refrigerants through the air-cooled condenser 30. For this, a passage forming member is formed between the outdoor unit casing and the air-cooled condenser 30 in order to prevent outdoor air sucked from the outside of the building through the front surface unit 60 from being sucked to a cooling fan 40 discussed later without passing through the air-cooled condenser 30.

[0023] As shown in Fig. 2, the air-cooled condenser 30 is fixedly supported on the both side units 12a and 12b and/or the bottom surface unit 14 by top covers 32a, 32b and 32c and/or side covers 34a and 34b. Therefore, the both side units 12a and 12b, the side covers 34a and 34b and the top covers 32a, 32b and 32c form passages, to prevent outdoor air sucked through the opened front surface unit 60 from being sucked to the cooling fan 40 without passing through the air-cooled condenser 30. It is notable that the passage forming member can be varied and modified according to the shape of the condenser 30.

[0024] In accordance with one embodiment of the present invention, the air-cooled condenser 30 is formed by forming condenser brackets 36a and 36b at its both ends, inserting condenser tubes into a plurality of holes formed on the condenser brackets 36a and 36b, inserting condenser fins therebetween, and coupling the condenser tubes protruded from the plurality of holes by bent tubes. The side covers 34a and 34b are coupled to one-side ends of the condenser brackets 36a and 36b by using a special fastening member, and the side cover 34b is coupled to the side unit 12b of the outdoor unit casing by using a special fastening member, thereby fixedly installing the condenser 30 in the outdoor unit casing. If necessary, as described above, the condenser 30 can be coupled to the bottom surface unit 14 or the top

covers 32a, 32b and 32c. However, the condenser 30 is stably fixedly installed in the outdoor unit casing merely by coupling the condenser brackets 36a and 36b formed at both ends of the condenser 30 to the side covers 34a and 34b in the length direction, and coupling the side covers 34a and 34b to the both side units 12a and 12b of the outdoor unit casing.

[0025] In addition, as discussed later, the air-cooled condenser 30 can be formed at a wanted height, by individually manufacturing a plurality of sets of condensers and disposing one set of condenser on another set of condenser. In this case, the condenser 30 is stably fixedly installed in the outdoor unit casing merely by coupling the condenser brackets 36a and 36b to the side covers 34a and 34b by using a special fastening member, and coupling the side covers 34a and 34b to the both side units 12a and 12b of the outdoor unit casing by using a special fastening member.

[0026] The air-cooled condenser 30 can be manufactured in a plate shape, and transformed into a U shape as shown in Fig. 2 according to a bending process, to widen an absolute heat exchange area.

[0027] As described above, in the air-cooled condenser 30, the plurality of rows of condenser tubes are formed in a zigzag shape between the plurality of condenser fins. Accordingly, outdoor air sucked through the opened front surface unit 60 passes between the fins of the air-cooled condenser 30, and exchanges heat with the refrigerant gas flowing through the tubes. As a result, the refrigerant gas of the tubes is removed its condensed heat by outdoor air and condensed, and outdoor air passes through the air-cooled condenser 30, increases a temperature by absorbing condensed heat, and is externally discharged through the opened front surface unit 60 by the cooling fan 40 discussed later.

[0028] The discharge unit 11 b of the outdoor unit 10 has a cooling fan 40 for supplying outdoor air to the air-cooled condenser 30 through the suction area 7a, and discharging heat-exchanged air through the discharge area 7b. One example of the cooling fan 40 is a sirocco fan. Still referring to Fig. 2, the cooling fan 40 has its orifices face the upper and lower parts. However, the cooling fan 40 can also be formed to have its orifices face the both side units 12a and 12b of the outdoor unit casing. A cooling fan supporting member 42 is provided to support the cooling fan 40. In more detail, a housing of the cooling fan 40 can be fixedly installed on a cooling fan bracket 44 and a fan front 46. The shapes of the cooling fan bracket 44 and the fan front 46 for fixing the cooling fan 40 can be varied and modified according to intentions of the designer.

[0029] In addition, a control box 50 for controlling the operation of the outdoor unit 10 is installed at the inside of the rear surface unit 12c, preferably in the suction unit 11 a, and refrigerant pipe lines which the refrigerant gas evaporated in the indoor unit is sucked through, and a valve assembly 52, a path of the refrigerant pipe lines which the refrigerants condensed in the outdoor unit 10

are discharged through are installed below the control box 50.

[0030] In accordance with the present invention, in order to wholly evenly use the air-cooled condenser 30 in the front suction/discharge type outdoor unit, a heat exchange quantity is increased in the area of the condenser 30 having a relatively high air velocity and large air volume, and decreased in the area of the condenser 30 having a relatively low air velocity and small air volume. That is, the condenser 30 is divided into a first area relatively adjacent to the cooling fan 40 and a second area relatively far from the cooling fan 40, and the heat exchange quantity is larger in the first area than in the second area.

[0031] Fig. 3A is an enlarged front view illustrating an example, not covered by the claims of a dotted part of the center of the air-cooled condenser 30 of Fig. 2. Because the cooling fan 40 is disposed at the upper side of the air-cooled condenser 30, as indicated by arrows, a volume of outdoor air sucked through the upper area 90 of the air-cooled condenser 30 is larger than that of outdoor air sucked through the lower area 92 of the air-cooled condenser 30. In addition, an air velocity is higher in the upper area 90 than in the lower area 92. In accordance with the present invention, the heat exchange quantity is varied in the upper area 90 and the lower area 92 in order to reflect unbalance of the air volume and velocity in each area for improvements of heat exchange efficiency.

[0032] For this, still referring to Fig. 3A, a pitch of fins 80 of the condenser 30 can be set smaller in the upper area 90 having the high air velocity and large air volume than in the lower area 92 having the low air velocity and small air volume. That is, the fins 80 of the condenser 30 are relatively dense in the upper area 90, and relatively sparse in the lower area 92. Accordingly, the heat exchange quantity is larger in the upper area 90 than in the lower area 92, so that the air-cooled condenser 30 can be wholly evenly used.

[0033] Fig. 3B is a side-sectional view illustrating another example of an air-cooled condenser not covered by the claims. A pitch of tubes 82 of the condenser 30 can be set smaller in the upper area 90 having the high air velocity and large air volume than in the lower area 92 having the low air velocity and small air volume. That is, the tubes 82 of the condenser 30 are relatively dense in the upper area 90, and relatively sparse in the lower area 92. Therefore, the heat exchange quantity is larger in the upper area 90 than in the lower area 92, so that the air-cooled condenser 30 can be wholly evenly used.

[0034] Still referring to Fig. 3B, a number of rows of the tubes 82 of the condenser 30 can be set larger in the upper area 90 having the high air velocity and large air volume than in the lower area 92 having the low air velocity and small air volume. Preferably, the number of the rows of the tubes 82 of the condenser 30 is equal to or more than three in the upper area 90, and equal to or less than two in the lower area 92. Accordingly, the heat

exchange quantity is larger in the upper area 90 than in the lower area 92, so that the air-cooled condenser 30 can be wholly evenly used.

[0035] Many efforts and expenses may be required to divide one condenser into the upper and lower areas 90 and 92, and vary the pitch of the fins, the pitch of the tubes and the number of the rows of the tubes in each area. According to another aspect of the present invention, the air-cooled condenser is divided into a condenser corresponding to the first area relatively adjacent to the cooling fan 40, and a condenser corresponding to the second area relatively far from the cooling fan 40. The condensers are individually manufactured and installed to be adjacent to each other, to compose the air-cooled condenser.

[0036] Fig. 4 is a schematic view of such concept. As depicted in Fig. 4, upper and lower condensers 86 and 88 are individually manufactured, the upper condenser 86 is disposed on the lower condenser 88 in arrow A direction, and the upper and lower condensers 86 and 88 are fixedly installed in the outdoor unit casing by using a special fastening member (not shown, for example, side covers, etc.), to compose one air-cooled condenser. Fig. 4 shows installation of the condenser without the bending process. If the condenser needs to be bent or curved to widen the heat exchange area, a heat exchanger obtained after the bending and/or curving process can also be installed.

[0037] Here, a pitch of fins 80, a pitch of tubes 82 or a number of rows of the tubes 82 can be set differently in the upper condenser 86 and the lower condenser 88. Still referring to Fig. 4, in the upper condenser 86, the fins 80 and the tubes 82 are relatively dense and the number of the rows of the tubes 82 is three, and in the lower condenser 88, the fins 80 and the tubes 82 are relatively sparse and the number of the rows of the tubes 82 is two. As a result, the heat exchange quantity is larger in the upper area 90 than in the lower area 92, so that the air-cooled condenser can be wholly evenly used.

[0038] As described above, the condenser can be stably fixedly installed in the outdoor unit casing merely by coupling condenser brackets 36a and 36b to side covers 34a and 34b by using a special fastening member, and coupling the side covers 34a and 34b to both side units 12a and 12b of the outdoor unit casing by using a special fastening member.

[0039] According to the present invention a plurality of condensers of the same standard can be individually manufactured and installed to be adjacent to each other, to compose one air-cooled condenser. The heat exchange quantity is larger in a first area relatively adjacent to the cooling fan than in a second area relatively far from the cooling fan, by setting a number of the condensers composing the first area larger than that of the condensers composing the second area.

[0040] Figs. 5A and 5B show one example of the above structure. As illustrated in Figs. 5A and 5B, two or three sets of condensers of the same standard (for example,

same pitch of fins, same pitch of tubes and same number of rows of tubes) are installed in the upper area 90, and one or two sets of condensers of the same standard are installed in the lower area 92. Accordingly, the heat exchange quantity is larger in the upper area 90 than in the lower area 92, so that the air-cooled condenser can be wholly evenly used. In this case, efforts and expenses for manufacturing condensers of different standards can be saved, and the objects of the present invention can be achieved. Although not illustrated, the cooling fan is installed in the upper side. As shown in Fig. 5A, the two sets of condensers are installed in the upper area 90 having the high air velocity and large air volume, and one set of condenser is installed in the lower area 92 having the low air velocity and small air volume, thereby overcoming unbalance of heat exchange in the upper and lower areas 90 and 92.

[0041] Although the shape of side covers may be varied, the condenser is stably fixedly installed in the outdoor unit casing merely by coupling condenser brackets of each condenser to the side covers by using a special fastening member, and coupling the side covers to both side units of the outdoor unit casing by using a special fastening member.

[0042] The above examples can be used in the front suction/discharge type outdoor unit for the air conditioner in which the cooling fan is installed in the upper side and the air-cooled condenser is installed in the lower side. However, if necessary, the cooling fan and the air-cooled condenser can be installed in the opposite sides or the right and left sides. In any of the cases, when the heat exchange quantity is larger in the first area relatively adjacent to the cooling fan than in the second area relatively far from the cooling fan, the heat exchange is active in the area having the high air velocity and large air volume and less active in the area having the low air velocity and small air volume. Thus, the air-cooled condenser can be wholly evenly used and the heat exchange efficiency can be improved.

[0043] The operation of the front suction/discharge type outdoor unit for the air conditioner in accordance with the present invention will now be described.

[0044] The refrigerant gas supplied from the indoor unit through the refrigerant pipe lines of the valve assembly 52 is compressed through the compressor 20 and supplied to the condenser 30. Because the cooling fan 40 is operated, air sucked through the gaps between the louver blades 8 of the suction area 7a and the front surface unit of the outdoor unit casing evenly passes between the fins formed on the air-cooled condenser 30 through the wind path of the top covers 32a, 32b and 32c, the both side units 12a and 12b and the side covers 34a and 34b, obtains condensed heat from the refrigerant gas flowing through the condenser tubes inserted between the fins, passes through the cooling fan 40 with a high temperature, and is externally discharged through the gaps between the louver blades 8 of the discharge area 7b.

[0045] The front suction/discharge type outdoor unit for the air conditioner has been described in detail on the basis of the preferred embodiments and drawings. However, it is understood that the present invention should not be limited to these preferred embodiments but various changes and modifications can be made by one skilled in the art within the scope of the present invention as hereinafter claimed.

Claims

1. A front suction/discharge type outdoor unit for a split-type air conditioner, comprising:

an outdoor unit casing having a front surface unit opened to face the outside of a building, both side units (12a, 12b) formed at both ends of the front surface unit, a rear surface unit (12c) formed to face the front surface unit, a bottom surface unit (14) formed at the lower ends of the front surface unit, the both side units (12a, 12b) and the rear surface unit (12c), and a top surface unit (16) formed at the upper ends of the front surface unit, the both side units (12a, 12b) and the rear surface unit (12c);

a compressor (20) for compressing a refrigerant gas supplied from an indoor unit to the outdoor unit casing;

a cooling fan (40) installed in the outdoor unit casing, for sucking outdoor air from the outside of the building through the front surface unit, and discharging air heat-exchanged in the outdoor unit casing to the outside of the building through the front surface unit; and

an air-cooled condenser (30) installed in the outdoor unit casing, for condensing the refrigerant gas supplied from the compressor (20) by exchanging heat between the refrigerant gas and outdoor air sucked by the cooling fan (40),

characterized in that the air-cooled condenser (30) is divided into a first area condenser (86) and a second area condenser (88) and **in that** the air-cooled condenser (30) is formed by installing a plurality of individually manufactured condensers (86, 88) with the same standard to be adjacent to each other, wherein a number of the condensers with the same standard in a first area (90) relatively adjacent to the cooling fan (40) is larger than that of the condensers with the same standard in a second area (92) relatively far from the cooling fan (40), whereby the heat exchange quantity in the first area (90) is larger than that in the second area (92).

2. The outdoor unit of claim 1, wherein, in the outdoor unit casing, the cooling fan (40) is disposed at the upper side of the air-cooled condenser (30), the first

area (90) corresponds to the upper area of the air-cooled condenser (30), and the second area (92) corresponds to the lower area of the air-cooled condenser (30).

3. The outdoor unit of claim 1, wherein, in the outdoor unit casing, the cooling fan (40) is disposed at the lower side of the air-cooled condenser (30), the first area corresponds to the lower area of the air-cooled condenser (30), and the second area corresponds to the upper area of the air-cooled condenser (30). 5
4. The outdoor unit of claim 1, wherein, in the outdoor unit casing, the cooling fan (40) is disposed at the right/left side of the air-cooled condenser, the first area corresponds to the area relatively adjacent to the cooling fan, and the second area corresponds to the area relatively far from the cooling fan (40). 10
5. The outdoor unit of claim 1, wherein three sets of condensers with the same standard compose the first area, and two sets of condensers with the same standard compose the second area. 15
6. The outdoor unit of claim 1, wherein two sets of condensers with the same standard compose the first area, and one set of condensers with the same standard composes the second area. 20
7. The outdoor unit of any one of claims 1 to 6, wherein the outdoor unit casing further comprises a passage forming member (12a, 12b, 34a, 34b, 32a, 32b, 32c) between the outdoor unit casing and the air-cooled condenser (30), for preventing outdoor air sucked from the outside of the building through the front surface unit (60) from being sucked to the cooling fan (40) without passing through the air-cooled condenser (30). 25

Patentansprüche

1. Außeneinheit von der Art mit frontaler Ansaugung/Austragung für ein geteiltes Klimagerät, umfassend:

eine Ummantelung der Außeneinheit mit einer Vorderflächeneinheit, die offen ist, um zur Außenseite eines Gebäudes gerichtet zu sein, zwei Seiteneinheiten (12a, 12b), die an den beiden Enden der Vorderflächeneinheit gebildet sind, eine Rückflächeneinheit (12c), die gebildet ist, um zur Vorderflächeneinheit gerichtet zu sein, eine Unterflächeneinheit (14), die an den unteren Enden der Vorderflächeneinheit, der beiden Seiteneinheiten (12a, 12b) und der Rückflächeneinheit (12c) gebildet ist, und eine Oberflächeneinheit (16), die an den oberen Enden der Vorderflächeneinheit, der beiden Sei-

teneinheiten (12a, 12b) und der Rückflächeneinheit (12c) gebildet ist;
einen Verdichter (20) zum Verdichten eines Kühlgases, das von einer Inneneinheit an die Ummantelung der Außeneinheit geliefert wird;
einen Lüfter (40), der in der Ummantelung der Außeneinheit installiert ist, um Außenluft von außerhalb des Gebäudes durch die Vorderflächeneinheit anzusaugen, und wärmeausgetauschte Luft in der Ummantelung der Außeneinheit zum Äußern des Gebäudes durch die Vorderflächeneinheit auszutragen; und
einen luftgekühlten Kondensator (30), der in der Ummantelung der Außeneinheit installiert ist, um das Kühlgas zu kondensieren, das von dem Verdichter (20) durch den Wärmeaustausch zwischen dem Kühlgas und der durch den Lüfter (40) angesaugten Außenluft geliefert wird,

dadurch gekennzeichnet, dass der luftgekühlte Kondensator (30) in einen Erstbereich-Kondensator (86) und einen Zweitbereich-Kondensator (88) unterteilt ist, und dass der luftgekühlte Kondensator (30) gebildet wird, indem eine Vielzahl von individuell hergestellten Kondensatoren (86, 88) nach demselben Modell installiert wird, um aneinander angrenzend zu sein, wobei die Anzahl der Kondensatoren nach demselben Modell in einem ersten Bereich (90), der relativ nah an dem Lüfter (40) ist, größer ist als diejenige der Kondensatoren nach demselben Modell in einem zweiten Bereich (92), der von dem Lüfter (40) relativ weit entfernt ist, wodurch die Wärmeaustauschmenge in dem ersten Bereich (90) größer ist als in dem zweiten Bereich (92).

2. Außeneinheit nach Anspruch 1, wobei in der Ummantelung der Außeneinheit der Lüfter (40) auf der oberen Seite des luftgekühlten Kondensators (30) angeordnet ist, der erste Bereich (90) dem oberen Bereich des luftgekühlten Kondensators (30) entspricht und der zweite Bereich (92) dem unteren Bereich des luftgekühlten Kondensators (30) entspricht. 40
3. Außeneinheit nach Anspruch 1, wobei in der Ummantelung der Außeneinheit der Lüfter (40) auf der unteren Seite des luftgekühlten Kondensators (30) angeordnet ist, der erste Bereich dem unteren Bereich des luftgekühlten Kondensators (30) entspricht und der zweite Bereich dem oberen Bereich des luftgekühlten Kondensators (30) entspricht. 45
4. Außeneinheit nach Anspruch 1, wobei in der Ummantelung der Außeneinheit der Lüfter (40) auf der rechten/linken Seite des luftgekühlten Kondensators angeordnet ist, der erste Bereich dem Bereich entspricht, der relativ nahe an dem Lüfter liegt, und der zweite Bereich dem Bereich entspricht, der von dem

Lüfter (40) relativ weit entfernt ist.

5. Außeneinheit nach Anspruch 1, wobei drei Gruppen von Kondensatoren nach demselben Modell den ersten Bereich bilden und zwei Gruppen von Kondensatoren nach demselben Modell den zweiten Bereich bilden. 5
6. Außeneinheit nach Anspruch 1, wobei zwei Gruppen von Kondensatoren nach demselben Modell den ersten Bereich bilden und eine Gruppe von Kondensatoren nach demselben Modell den zweiten Bereich bildet. 10
7. Außeneinheit nach einem der Ansprüche 1 bis 6, wobei die Ummantelung der Außeneinheit ferner ein einen Durchgang bildendes Element (12a, 12b, 34a, 34b, 32a, 32b, 32c) zwischen der Ummantelung der Außeneinheit und dem luftgekühlten Kondensator (30) umfasst, um zu verhindern, dass Außenluft, die von außerhalb des Gebäudes durch die Vorderflächeneinheit (60) angesaugt wird, zum Lüfter (40) angesaugt wird, ohne durch den luftgekühlten Kondensator (30) zu gehen. 15 20 25

Revendications

1. Unité d'environnement extérieur à aspiration/refoulement avant pour conditionneur d'air à deux blocs, comprenant : 30
 - un boîtier d'unité d'environnement extérieur possédant une unité de surface avant ouverte pour faire face à la partie extérieure d'un bâtiment, deux unités latérales (12a, 12b) formées aux deux extrémités de l'unité de surface avant, une unité de surface arrière (12c) formée pour faire face à l'unité de surface avant, une unité de surface inférieure (14) formée aux extrémités inférieures de l'unité de surface avant, des deux unités latérales (12a, 12b) et de l'unité de surface arrière (12c), et une unité de surface supérieure (16) formée aux extrémités supérieures de l'unité de surface avant, des deux unités latérales (12a, 12b) et de l'unité de surface arrière (12c) ; 35
 - un compresseur (20) pour comprimer un gaz réfrigérant distribué d'une unité d'environnement intérieur au boîtier d'unité d'environnement extérieur ; 40
 - un ventilateur de refroidissement (40) installé dans le boîtier d'unité d'environnement extérieur, pour aspirer de l'air d'environnement extérieur à partir de la partie extérieure du bâtiment à travers l'unité de surface avant, et refouler de l'air ayant subi un échange de chaleur dans le boîtier d'unité d'environnement extérieur vers la 45 50

partie extérieure du bâtiment à travers l'unité de surface avant ; et

un condenseur à refroidissement à air (30) installé dans le boîtier d'unité d'environnement extérieur, pour condenser le gaz réfrigérant distribué à partir du compresseur (20) en échangeant de la chaleur entre le gaz réfrigérant et l'air d'environnement extérieur aspiré par le ventilateur de refroidissement (40),

caractérisé en ce que le condenseur à refroidissement à air (30) est divisé en un condenseur de première zone (86) et un condenseur de seconde zone (88) et **en ce que** le condenseur à refroidissement à air (30) est formé en installant une pluralité de condenseurs fabriqués individuellement (86, 88) avec la même norme pour qu'ils soient adjacents les uns aux autres, dans lequel un nombre des condenseurs avec la même norme dans une première zone (90) relativement adjacente au ventilateur de refroidissement (40) est plus important que celui des condenseurs avec la même norme dans une seconde zone (92) relativement éloignée du ventilateur de refroidissement (40), moyennant quoi la quantité d'échange de chaleur dans la première zone (90) est supérieure à celle dans la seconde zone (92).

2. Unité d'environnement extérieur selon la revendication 1, dans lequel, dans le boîtier d'unité d'environnement extérieur, le ventilateur de refroidissement (40) est disposé sur le côté supérieur du condenseur à refroidissement à air (30), la première zone (90) correspond à la zone supérieure du condenseur à refroidissement à air (30), et la seconde zone (92) correspond à la zone inférieure du condenseur à refroidissement à air (30). 35
3. Unité d'environnement extérieur selon la revendication 1, dans lequel, dans le boîtier d'unité d'environnement extérieur, le ventilateur de refroidissement (40) est disposé sur le côté inférieur du condenseur à refroidissement à air (30), la première zone correspond à la zone inférieure du condenseur à refroidissement à air (30), et la seconde zone correspond à la zone supérieure du condenseur à refroidissement à air (30). 40 45
4. Unité d'environnement extérieur selon la revendication 1, dans lequel, dans le boîtier d'unité d'environnement extérieur, le ventilateur de refroidissement (40) est disposé sur le côté droit/gauche du condenseur à refroidissement à air, la première zone correspond à la zone relativement adjacente au ventilateur de refroidissement, et la seconde zone correspond à la zone relativement éloignée du ventilateur de refroidissement (40). 50 55
5. Unité d'environnement extérieur selon la revendica-

tion 1, dans lequel trois jeux de condenseurs avec la même norme composent la première zone, et deux jeux de condenseurs avec la même norme composent la seconde zone.

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6. Unité d'environnement extérieur selon la revendication 1, dans lequel deux jeux de condenseurs avec la même norme composent la première zone, et un jeu de condenseurs avec la même norme compose la seconde zone.

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7. Unité d'environnement extérieur selon une quelconque des revendications 1 à 6, dans lequel le boîtier d'unité d'environnement extérieur comprend en outre un élément de formation de passage (12a, 12b, 34a, 34b, 32a, 32b, 32c) entre le boîtier d'unité d'environnement extérieur et le condenseur à refroidissement à air (30), pour empêcher l'air d'environnement extérieur aspiré à partir de la partie extérieure du bâtiment à travers l'unité de surface avant (60) d'être aspiré dans le ventilateur de refroidissement (40) sans passer à travers le condenseur à refroidissement à air (30).

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FIG. 1

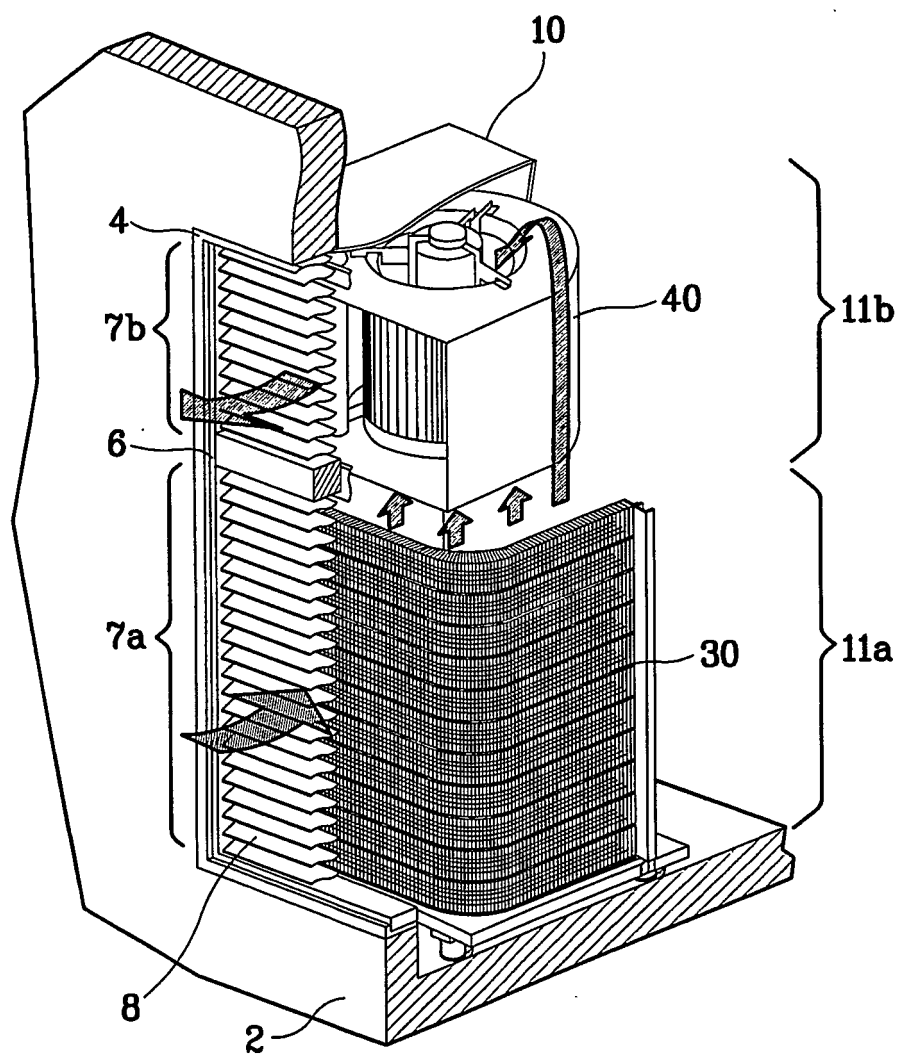


FIG. 2

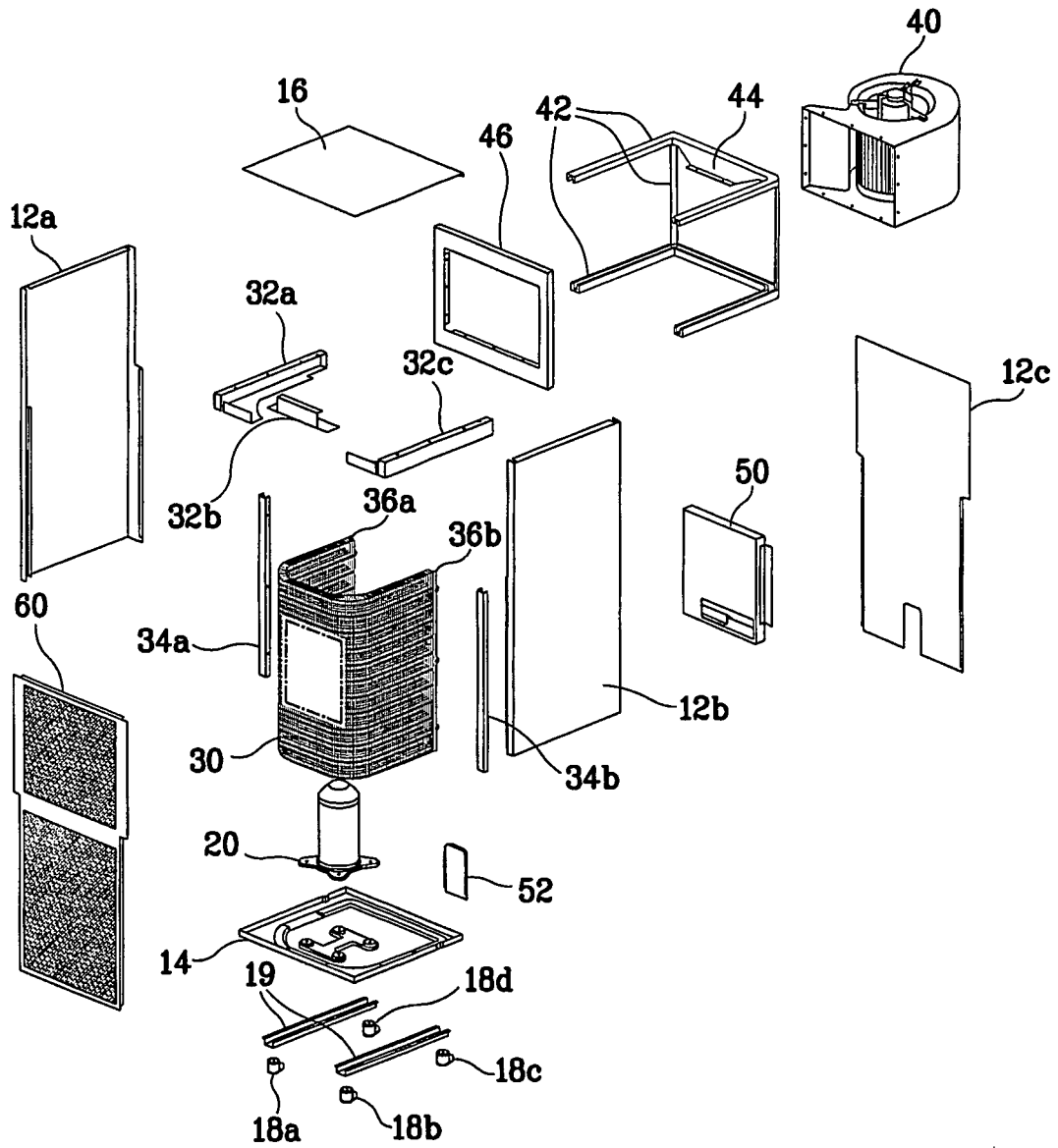


FIG. 3A

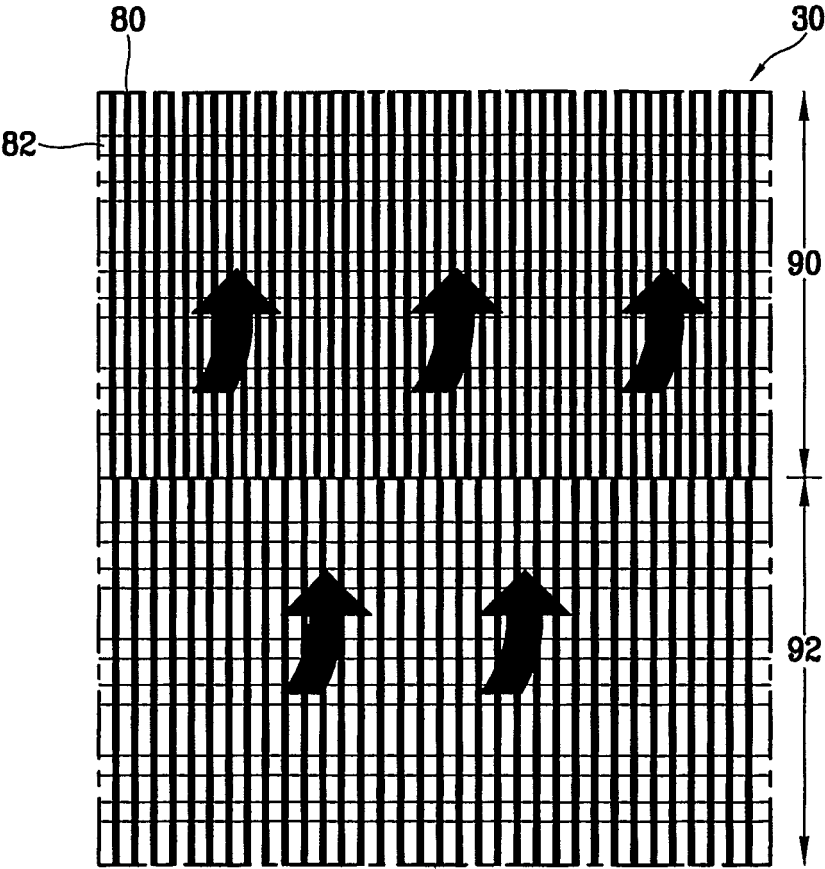


FIG. 3B

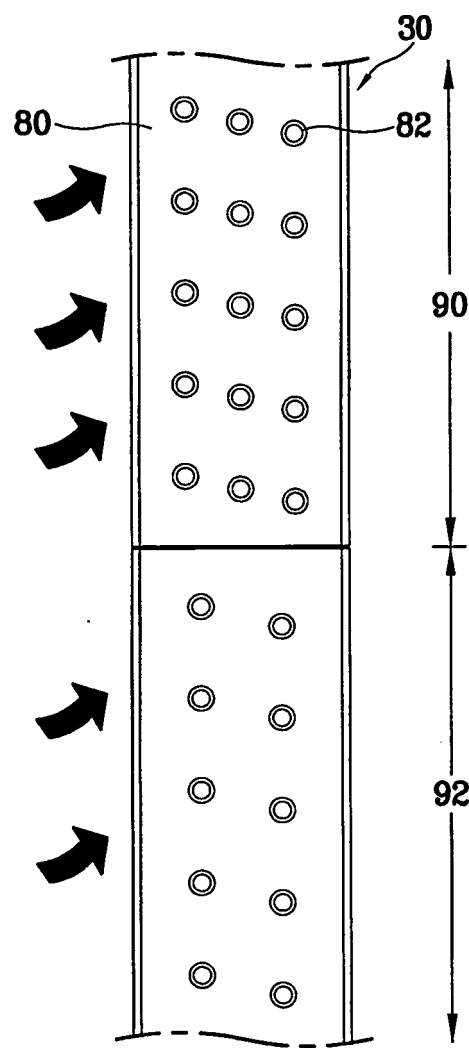


FIG. 4

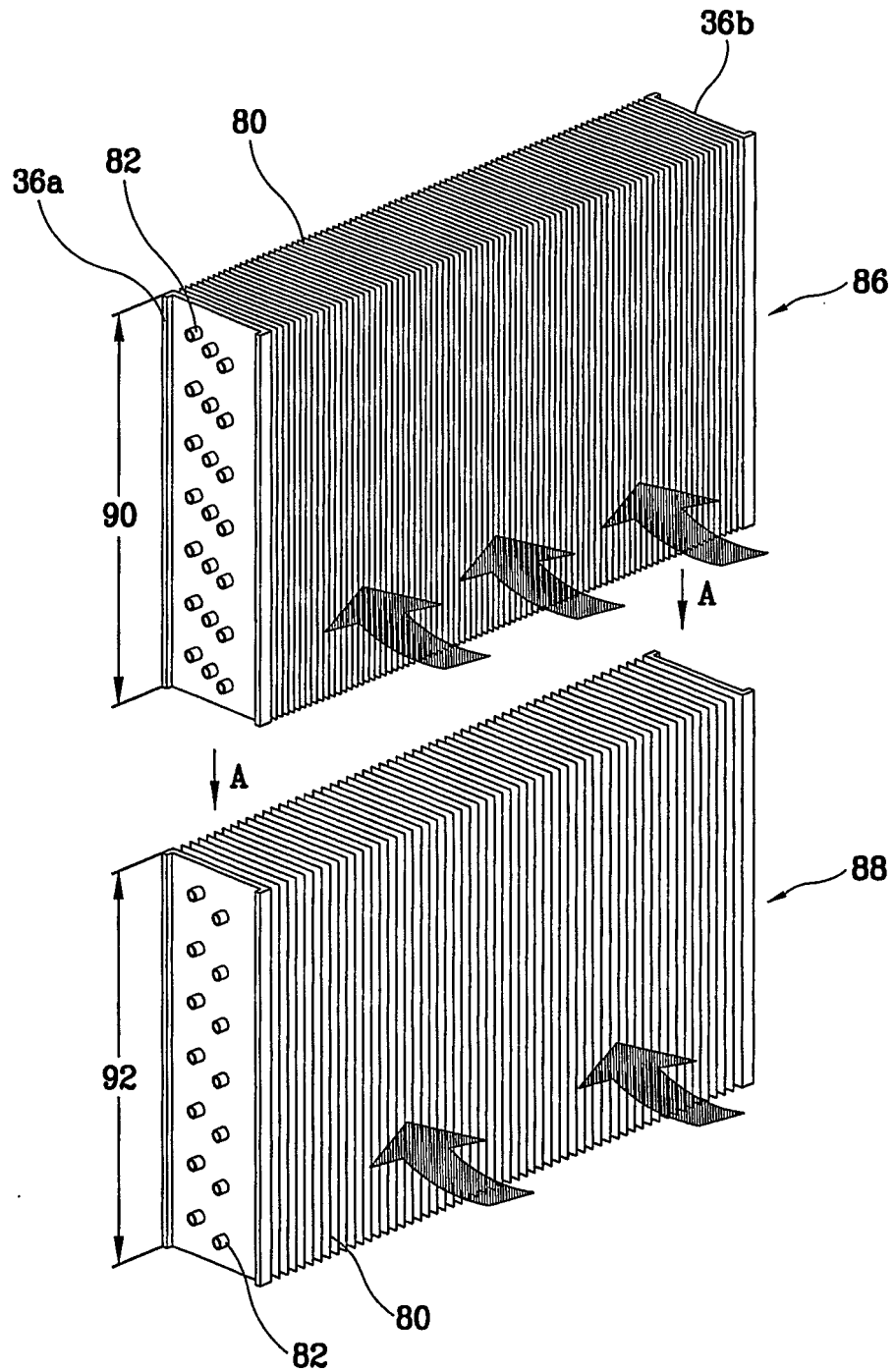


FIG. 5A

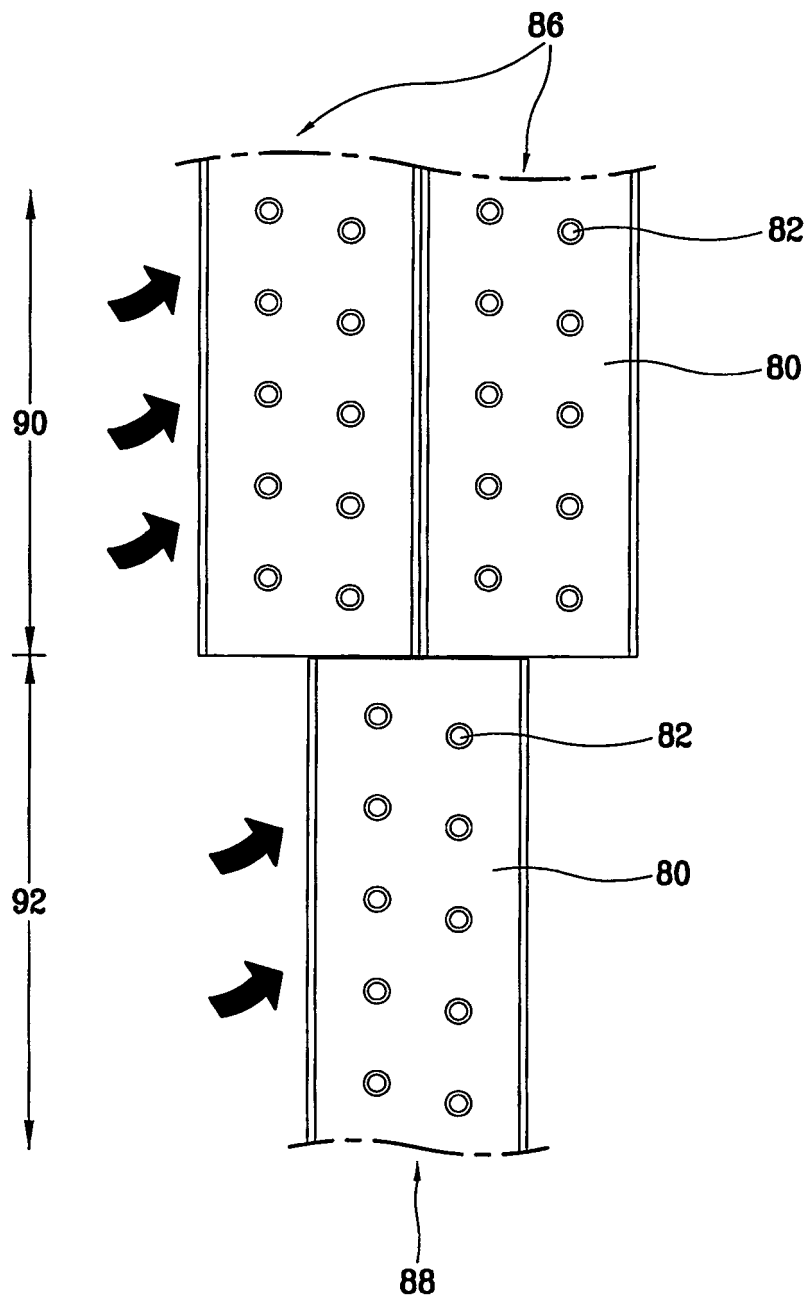
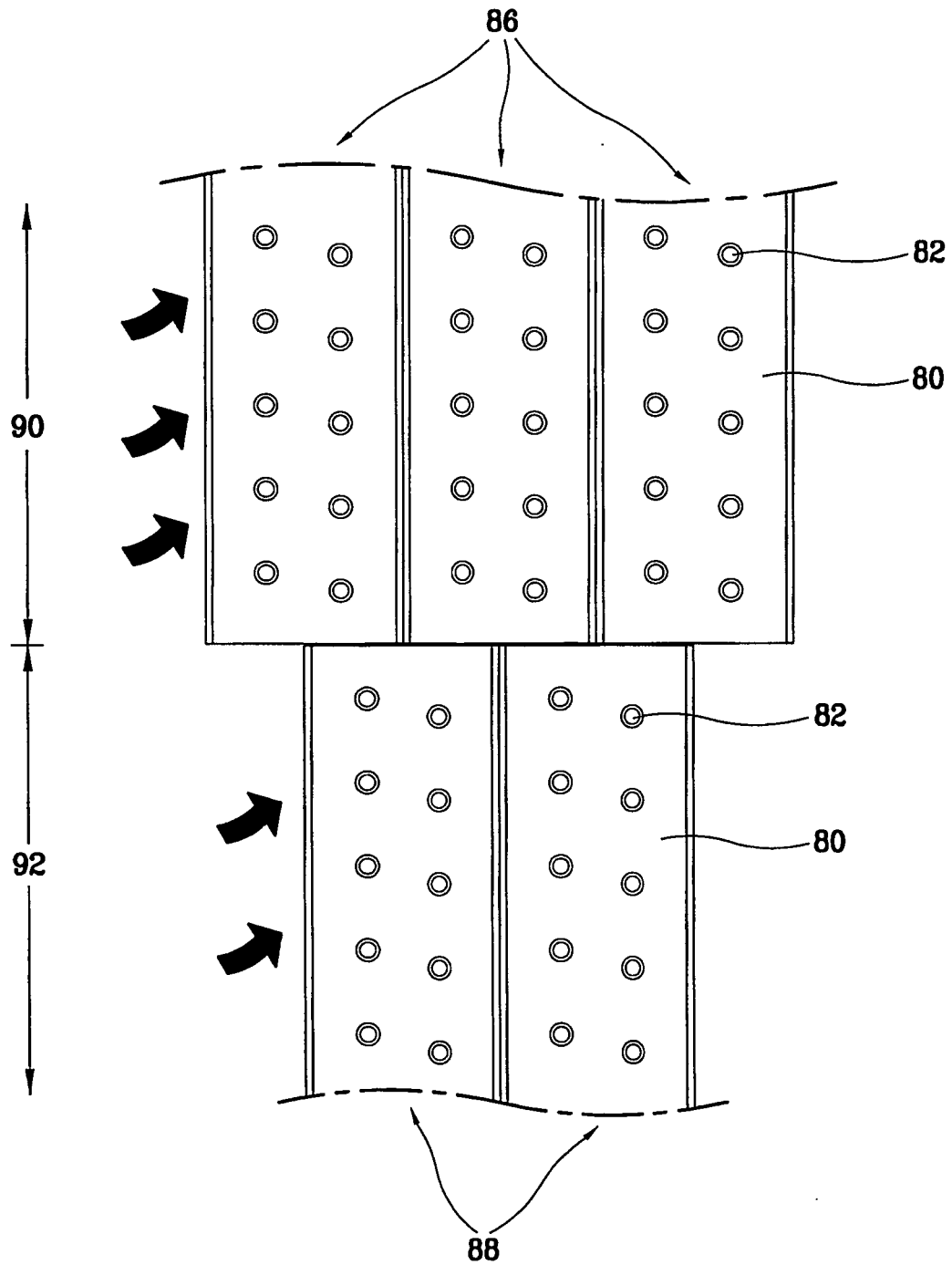


FIG. 5B



REFERENCES CITED IN THE DESCRIPTION

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