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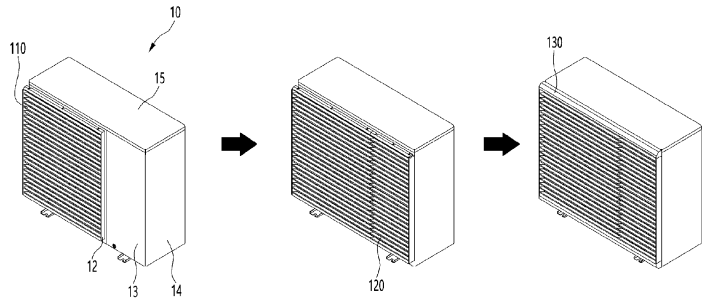
(54) **AN OUTDOOR UNIT OF AIR CONDITIONER**

(57) An outdoor unit of an air conditioner according to the present embodiment includes: a case forming an outer appearance; a barrier dividing an inner portion of the case into a heat exchange space and an electric space; a heat exchanger disposed in the heat exchange space; a fan disposed in the heat exchange space; a compressor disposed in the electric space; and a grille assembly detachably coupled to a front surface of the case, in which the grille assembly may include: a first grille plate coupled to the front surface of the case corresponding to the front of the heat exchange space; a second grille plate coupled to the front surface of the case corresponding to the front of the electric space; and a grille cover coupled to cover an upper portion of the first grille plate and an upper portion of the second grille plate.

FIG. 13



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Description

[0001] The present disclosure relates to an outdoor unit of an air conditioner.

[0002] An air conditioner is a device that cools and heats an indoor space by heat exchange between a refrigerant flowing in a heat exchange cycle and indoor air and outdoor air.

[0003] In detail, the air conditioner includes a compressor that compresses the refrigerant, an outdoor heat exchanger that exchanges heat between the refrigerant and outdoor air, and an indoor heat exchanger that exchanges heat between the refrigerant and indoor air.

[0004] The outdoor unit of the air conditioner may include a case, the compressor and the outdoor heat exchanger accommodated inside the case, and a fan for intake and exhaust of air.

[0005] Meanwhile, an outdoor unit cover may be provided on the outer surface of the outdoor unit to block sunlight from the outside or prevent rainwater or foreign substances from penetrating. The outdoor unit cover is installed to cover the upper surface or the side of the outdoor unit, and thus can block sunlight or prevent rainwater from penetrating.

[0006] However, the conventional outdoor unit cover is used to simply cover the upper surface or the side surface of the outdoor unit, so it cannot protect the front surface of the outdoor unit and the overall outer appearance of the outdoor unit is poor.

[0007] Additionally, when the outdoor unit cover is installed to cover the front surface of the outdoor unit, there is a problem in that the air forced to flow by the fan is blocked by the outdoor unit cover, resulting in air flow resistance.

[0008] (Patent Document 1) Korean Patent Publication No. 10-2022-0010865 (January 27, 2022)

An object of the present disclosure is to provide an outdoor unit of an air conditioner that can protect the front surface of the outdoor unit.

[0009] Another object of the present disclosure is to provide an outdoor unit of an air conditioner that can have a beautiful outer appearance of the front appearance of the outdoor unit.

[0010] Another object of the present disclosure is to provide an outdoor unit of an air conditioner that can prevent infiltration of rainwater or foreign substances from the outside.

[0011] Another object of the present disclosure is to provide an outdoor unit of an air conditioner in which a grille assembly can be stably coupled to the front surface of the outdoor unit.

[0012] Another object of the present disclosure is to provide an outdoor unit of an air conditioner in which the grille assembly can be easily installed and removed.

[0013] Another object of the present disclosure is to provide an outdoor unit of an air conditioner in which air flow resistance to air discharged through a grille assembly can be minimized.

[0014] The invention is specified by the independent claim. Preferred embodiments are defined by the dependent claims. The outdoor unit of the air conditioner according to an embodiment of the present disclosure includes a case that forms the outer appearance.

[0015] The outdoor unit includes a barrier dividing an inner portion of the case into a heat exchange space and an electric space.

[0016] The outdoor unit includes a heat exchanger disposed in the heat exchange space.

[0017] The outdoor unit includes a fan disposed in the heat exchange space.

[0018] The outdoor unit may further include a compressor disposed in the electric space.

[0019] The outdoor unit includes a grille assembly detachably coupled to a front surface of the case.

[0020] The grille assembly includes a first grille plate coupled to the front surface of the case corresponding to the front of the heat exchange space.

[0021] The grille assembly includes a second grille plate coupled to the front surface of the case corresponding to the front of the electric space.

[0022] The grille assembly includes a grille cover coupled to cover an upper portion of the first grille plate and an upper portion of the second grille plate.

[0023] A plurality of hook holes may be formed on the front surface of the case.

[0024] On a rear surface of the first grille plate, a first hook may be formed that is coupled to some hook holes among the plurality of hook holes

On the rear surface of the second grille plate, a second hook may be formed that is coupled to other hook holes among the plurality of hook holes.

[0025] The direction in which the first hook is coupled to some hook holes among the plurality of hook holes may be opposite to the direction in which the second hook is coupled to other hook holes among the plurality of hook holes.

[0026] The case may include a base panel.

[0027] The case may further include a first front panel erected on a front end portion of the base panel and forming a front surface of the heat exchange space.

[0028] The case may further include a second front panel erected on a front end portion of the base panel and forming a front surface of the electric space.

[0029] The first grille plate may be coupled to cover a front surface of the first front panel.

[0030] The second grille plate may be coupled to cover a front surface of the second front panel.

[0031] The fan may be disposed on the front of the heat exchanger.

[0032] The first grille plate may be disposed on the front of the fan.

[0033] The case may further include an orifice coupled to an inside of the first front panel

[0034] The fan may be disposed on the rear of the orifice.

[0035] The first grille plate may include a first plate

coupled to the front surface of the case.

[0036] The first grille plate may further include a first cover portion coupled to the upper end of the first plate.

[0037] The first grille plate may further include a first grille portion provided on a front surface of the first plate.

[0038] The first grille portion may be disposed on the front of the fan.

[0039] The first grille portion may include a plurality of horizontal ribs spaced apart from each other in a vertical direction.

[0040] The first grille portion may further include a plurality of longitudinal ribs that connect the plurality of horizontal ribs and are spaced apart from each other.

[0041] The second grille plate may include a second plate coupled to the front surface of the case.

[0042] The second grille plate may further include a second cover portion coupled to an upper end of the second plate.

[0043] The second grille plate may further include a second grille portion provided on a front surface of the second plate.

[0044] A front surface of the first grille portion and a front surface of the second grille portion may be disposed on the same plane.

[0045] An upper surface of the first cover portion and an upper surface of the second cover portion may be disposed on the same plane.

[0046] The grille cover may be coupled to cover the upper surface of the first cover portion and the upper surface of the second cover portion.

[0047] The grille cover may include a front surface portion forming a front surface thereof.

[0048] The grille cover may further include an upper surface portion forming an upper surface thereof.

[0049] The grille cover may further include side portions forming both sides thereof.

[0050] An upper portion of each of the first grille plate and the second grille plate may be inserted and accommodated inside the grille cover.

[0051] The rear and bottom surfaces of the grille cover may be open.

[0052] A first coupling groove may be formed on the upper surface of each of the first grille plate and the second grille plate.

[0053] A coupling rib may be formed on the grille cover, which extends rearward from the front surface portion and is coupled to the first coupling groove.

[0054] The coupling rib may include a first rib extending rearward from a rear surface of the front surface portion.

[0055] The coupling rib may further include a second rib extending downward from an end portion of the first rib.

[0056] The second rib may be engaged with an inside of the first coupling groove.

[0057] A second coupling groove may be formed on each side of the first grille plate and the second grille plate.

[0058] A coupling protrusion may be formed on the grille cover, which extends inward from the side portion and is coupled to the second coupling groove.

[0059] The coupling protrusion may include a first protrusion extending from an inner surface of the side portion toward an inner center.

[0060] The coupling protrusion may further include a second protrusion extending from the inner surface of the side portion toward the inner center and spaced upward from the first protrusion.

[0061] An insertion groove may be formed at a front end portion of each of the first grille plate and the second grille plate.

[0062] An insertion portion may be formed in the grille cover, which extends rearward from a lower end of the front surface portion and is coupled to the insertion groove.

BRIEF DESCRIPTION OF THE DRAWINGS

[0063]

FIG. 1 is a front perspective view illustrating an outdoor unit of an air conditioner according to an embodiment of the present disclosure.

FIG. 2 is a front perspective view illustrating the outdoor unit in a state where the grille assembly is coupled according to an embodiment of the present disclosure.

FIG. 3 is a rear perspective view illustrating the front panel in a state where the grille assembly is coupled.

FIG. 4 is a front perspective view illustrating a first grille plate according to an embodiment of the present disclosure.

FIG. 5 is a rear view illustrating the first grille plate.

FIG. 6 is a top view illustrating the first grille plate.

FIG. 7 is a front perspective view illustrating a second grille plate according to an embodiment of the present disclosure.

FIG. 8 is a rear view illustrating the second grille plate.

FIG. 9 is a top view illustrating the second grille plate.

FIG. 10 is a front perspective view illustrating a grille cover according to an embodiment of the present disclosure.

FIG. 11 is a rear view of the grille cover illustrating a portion of the rear of the grille cover.

FIG. 12 is a bottom view illustrating the grille cover.

FIG. 13 is a view illustrating the assembly sequence of the grille assembly.

FIGS. 14 and 15 are views illustrating a method for coupling the first hook of the first grille plate to the first hook hole of the first front panel.

FIGS. 16 and 17 are views illustrating a method for coupling the coupling rib of the grille cover to the first coupling groove of the first grille plate.

FIGS. 18 and 19 are views illustrating a method for coupling the coupling protrusion of the grille cover to the second coupling groove of the first grille plate.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0064] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings.

[0065] In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which the disclosure may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the disclosure, and it is understood that other embodiments may be utilized and that logical structural, mechanical, electrical, and chemical changes may be made without departing from the scope of the disclosure. To avoid detail not necessary to enable those skilled in the art to practice the disclosure, the description may omit certain information known to those skilled in the art. The following detailed description is, therefore, not to be taken in a limiting sense.

[0066] Also, in the description of embodiments, terms such as first, second, A, B, (a), (b) or the like may be used herein when describing components of the present disclosure. Each of these terminologies is not used to define an essence, order or sequence of a corresponding component but used merely to distinguish the corresponding component from other component(s). It should be noted that if it is described in the specification that one component is "connected," "coupled" or "joined" to another component, the former may be directly "connected," "coupled," and "joined" to the latter or "connected", "coupled", and "joined" to the latter via another component.

[0067] FIG. 1 is a front perspective view illustrating an outdoor unit of an air conditioner according to an embodiment of the present disclosure, and FIG. 2 is a front perspective view illustrating the outdoor unit in a state where the grille assembly is coupled according to an embodiment of the present disclosure.

[0068] Referring to FIGS. 1 and 2, the outdoor unit 10 of an air conditioner according to an embodiment of the present disclosure includes a case that forms an outer appearance of the outdoor unit.

[0069] The case may include a base panel 11 forming the bottom surface of the outdoor unit 10, a first front panel 12 erected on one side of the front end portion of the base panel 11, and a second front panel 13 erected on the other side of the front end portion of the base panel 11.

[0070] The case may further include a side panel 14 erected on the side of the base panel 11 and a top panel 15 forming the upper surface of the outdoor unit 10.

[0071] The outdoor unit 10 may further include an orifice 16 coupled to the first front panel 12, a fan 17 disposed behind the orifice 16, and a heat exchanger erected on the upper surface of the base panel 11. The fan 17 may be disposed on the front of the heat exchanger.

[0072] The outdoor unit 10 may further include a barrier erected on the upper surface of the base panel 11.

[0073] The barrier can divide the upper space of the base panel 11 into a heat exchange space on the left and an electric space on the right. The heat exchanger may be disposed in the heat exchange space. The heat exchanger may be bent and extended along the side and rear end portions of the base panel 11 to define the side and the rear surface of the heat exchange space.

[0074] One side end portion of the first front panel 12 may be coupled to the front end portion of the heat exchanger, and the other side end portion may be coupled to the front end portion of the barrier. The rear end portion of the barrier may be connected to the side end portion of the heat exchanger.

[0075] The outdoor unit 10 may further include a compressor and a heat storage tank erected on the upper surface of the base panel 11 corresponding to the electric space.

[0076] The refrigerant that has passed through the heat storage tank may be guided to the heat exchanger along the refrigerant pipe. The refrigerant that has passed through the heat exchanger may pass through an expansion valve and then be guided to the heat exchanger of the indoor unit. The refrigerant that has passed through the indoor unit may pass through a gas-liquid separator and then be recovered by the compressor.

[0077] When the fan 17 rotates, outdoor air is introduced into the outdoor unit 10 through the short side portion of the heat exchanger forming the side of the outdoor unit 10 and the long side portion of the heat exchanger forming the rear surface of the outdoor unit 10.

[0078] The air that has passed through the heat exchanger flows from the rear surface to the front surface of the fan 17, passes through the orifice 16, and then can be discharged to the outside of the outdoor unit 10.

[0079] A portion of the plurality of blades constituting the fan 17 can be accommodated inside the orifice 16 so that all air forced to flow by the fan 17 passes through the orifice 16.

[0080] The outdoor unit 10 may further include a grille assembly 100 detachably coupled to the front surface of the outdoor unit 10.

[0081] The grille assembly 100 is installed on the front surface of the outdoor unit 10 to protect the front surface of the outdoor unit 10. The grille assembly 100 can block rainwater or foreign substances introduced into the front surface of the outdoor unit 10 from the outside. The grille assembly 100 can cover the entire front surface of the outdoor unit 10 to improve the outer appearance of the front surface of the outdoor unit 10.

[0082] The grille assembly 100 may include a first grille plate 110, a second grille plate 120, and a grille cover 130 coupled to the front surface of the outdoor unit 10.

[0083] The first grille plate 110 may be coupled to the front surface of the outdoor unit 10 and cover a portion of the front surface of the outdoor unit 10. The first grille plate 110 may be detachably coupled to the front surface

of the first front panel 12. The first grille plate 110 may cover a portion of the orifice 16 where the fan 17 is accommodated.

[0084] The second grille plate 120 may be coupled to the front surface of the outdoor unit 10 and cover another portion of the front surface of the outdoor unit 10. The second grille plate 120 may be detachably coupled to the front surface of the second front panel 13. The second grille plate 120 may be disposed on a side of the first grille plate 110.

[0085] The first grille plate 110 and the second grille plate 120 may be connected to each other. The first grille plate 110 and the second grille plate 120 may be disposed side by side in the left and right direction on the front surface of the outdoor unit 10. The front surface of the first grille plate 110 and the front surface of the second grille plate 120 may be disposed on the same plane.

[0086] The grille cover 130 is coupled to the first grille plate 110 and the second grille plate 120, and has a function of fixing the first grille plate 110 and the second grille plate 120. The grille cover 130 may be coupled to the upper portion of the first grille plate 110 and the upper portion of the second grille plate 120.

[0087] The grille cover 130 may be coupled to cover the upper portion of the first grille plate 110 and the upper portion of the second grille plate 120. The grille cover 130 may be disposed on the upper end of the front surface of the outdoor unit 10. A portion of the grille cover 130 may be disposed on the upper end of the first front panel 12, and another portion of the grille cover 130 may be disposed on the upper end of the second front panel 13.

[0088] Hereinafter, the first grille plate, the second grille plate, and the grille cover according to an embodiment of the present disclosure will be described in detail with reference to the drawings.

[0089] FIG. 3 is a rear perspective view illustrating the front panel in a state where the grille assembly is coupled, FIG. 4 is a front perspective view illustrating a first grille plate according to an embodiment of the present disclosure, FIG. 5 is a rear view illustrating the first grille plate, and FIG. 6 is a top view illustrating the first grille plate.

[0090] Referring to FIGS. 3 to 6, the first grille plate 110 may be coupled to the front surface of the first front panel 12 and cover the front surface of the first front panel 12.

[0091] The first grille plate 110 may have a shape corresponding to the shape of the front surface of the first front panel 12. For example, the first grille plate 110 may have a square panel shape.

[0092] The first grille plate 110 may include a first plate 111 coupled to the front surface of the first front panel 12, a first cover portion 112 coupled to the upper end of the first plate 111, and a first grille portion 113 provided on the front surface of the first plate 111.

[0093] The first plate 111 may define both sides and the rear surface of the first grille plate 110, the first cover portion 112 may define the upper surface of the first grille plate 110, and the first cover portion 112 may define the front surface of the first grille plate 113.

[0094] The first plate 111 is formed in a shape corresponding to the front surface of the first front panel 12 and can be coupled to the front surface of the first front panel 12. The first plate 111 may be formed as a square panel with a constant thickness in the front and rear direction.

[0095] The first plate 111 may include a first hook 111a to be coupled to the first front panel 12.

[0096] The first hook 111a may be formed to extend rearward from the rear surface of the first plate 111. A plurality of first hooks 111a may be formed on the rear surface of the first plate 111. The plurality of first hooks 111a may be disposed to be spaced apart along the rear edge of the first plate 111.

[0097] The first hook 111a may be inserted into and fastened to the first hook hole 12a formed in the first front panel 12.

[0098] The first hook hole 12a may be formed to penetrate from the front surface to the rear surface of the first front panel 12. The first hook hole 12a may be formed at an edge of the first front panel 12. A plurality of first hook holes 12a may be formed to be spaced apart from each other along the edge of the first front panel 12.

[0099] The first plate 111 may further include a through-hole 111b formed at a point corresponding to the orifice 16 of the first front panel 12.

[0100] The through-hole 111b may be formed in the center of the first plate 111. The through-hole 11 1b may be formed by penetrating from the front surface to the rear surface of the first plate 111.

[0101] The through-hole 111b may be formed in a shape corresponding to the orifice 16. The through-hole 111b is disposed to face the orifice 16, so that air passing through the orifice 16 can be discharged to the outside of the outdoor unit 10 through the first grille portion 113.

[0102] The first cover portion 112 may be mounted on the upper surface of the first plate 111.

[0103] For example, the first cover portion 112 may be formed in a plate shape that is narrow in the front and rear direction and long in the left and right direction. The first cover portion 112 may be coupled to the upper end of the first plate 111. When the first cover portion 112 is coupled to the first plate 111, the upper surface of the first plate 111 may be covered by the first cover portion 112.

[0104] The first cover portion 112 may include a first coupling groove 112a for being coupled to the grille cover 130.

[0105] The first coupling groove 112a may be formed on the upper surface of the first cover portion 112. The first coupling groove 112a may be formed by cutting a portion of the upper surface of the first cover portion 112. A plurality of first coupling grooves 112a may be formed. The plurality of first coupling grooves 112a may be disposed to be spaced apart in the longitudinal direction on the upper surface of the first cover portion 112.

[0106] The first cover portion 112 may further include a second coupling groove 112b for being coupled to the grille cover 130.

[0107] The second coupling groove 112b may be

formed on the side of the first cover portion 112. The second coupling groove 112b may be formed by recessing a portion of the side of the first cover portion 112. The second coupling groove 112b may be formed on one of both sides of the first cover portion 112. For example, the second coupling groove 112b may be formed on the left side of both sides of the first cover portion 112.

[0108] The first grille portion 113 may include a plurality of ribs to form a grille shape. The first grille portion 113 may be provided on the front surface of the first plate 111. The first grille portion 113 may protrude from the inside to the front surface of the first plate 111.

[0109] The first grille portion 113 may include a plurality of horizontal ribs 113a extending in the horizontal direction and a plurality of longitudinal ribs 113b extending in the vertical direction.

[0110] The plurality of horizontal ribs 113a may be formed entirely on the front surface of the first plate 111. The plurality of horizontal ribs 113a may be disposed to be spaced apart in the vertical direction on the front surface of the first plate 111. The plurality of horizontal ribs 113a may be spaced apart from each other at equal intervals.

[0111] The plurality of longitudinal ribs 113b may be formed on a portion of the front surface of the first plate 111. For example, the plurality of longitudinal ribs 113b may be provided in a corresponding area of the first plate 111 facing the through-hole 111b. The plurality of longitudinal ribs 113b may be disposed to cover the through-hole 111b.

[0112] The plurality of longitudinal ribs 113b may be formed only in the area of the circular flow path portion forming the air flow path. The plurality of longitudinal ribs 113b may be disposed to connect two adjacent horizontal ribs 113a. The plurality of longitudinal ribs 113b may be disposed at irregular intervals between the plurality of horizontal ribs 113a.

[0113] Due to the configuration of the horizontal ribs 113a and the longitudinal ribs 113b, exposure of the fan 17 to the outside of the outdoor unit 10 can be minimized. In addition, since the horizontal ribs 113a and longitudinal ribs 113b cover the orifice 16 where the fan 17 is accommodated, it is possible to prevent rainwater or foreign substances from penetrating from the outside.

[0114] FIG. 7 is a front perspective view illustrating a second grille plate according to an embodiment of the present disclosure, FIG. 8 is a rear view illustrating the second grille plate, and FIG. 9 is a top view illustrating the second grille plate.

[0115] Referring to FIGS. 3, 7 to 9, the second grille plate 120 may be coupled to the front surface of the second front panel 13 and cover the front surface of the second front panel 13.

[0116] The second grille plate 120 may have a shape corresponding to the shape of the front surface of the second front panel 13. For example, the second grille plate 120 may have a square panel shape.

[0117] In this embodiment, the second grille plate 120 may be formed smaller than the first grille plate 110. However, it is not limited to this, and when the second front panel 13 is formed larger than the first front panel 12, the second grille plate 120 may be formed larger than the first grille plate 110.

[0118] The second grille plate 120 may include a second plate 121 coupled to the front surface of the second front panel 13, a second cover portion 122 coupled to the upper end of the second plate 121, and a second grille portion 123 provided on the front surface of the second plate 121.

[0119] The second plate 121 defines both sides and the rear surface of the second grille plate 120, the second cover portion 122 defines the upper surface of the second grille plate 120, and the second grille portion 123 may define the front surface of the second grille plate 123.

[0120] The second plate 121 is formed in a shape corresponding to the front surface of the second front panel 13 and can be coupled to the front surface of the second front panel 13. The second plate 121 may be formed as a square panel with a constant thickness in the front and rear direction.

[0121] The thickness of the second plate 121 may be formed to be the same as the thickness of the first plate 111.

[0122] The second plate 121 may include a second hook 121a to be coupled to the second front panel 13.

[0123] The second hook 121a may be formed to extend rearward from the rear surface of the second plate 121. A plurality of second hooks 121a may be formed on the rear surface of the second plate 121. The plurality of second hooks 121a may be disposed to be spaced apart along the rear edge of the second plate 121.

[0124] The second hook 121a may be inserted into and fastened to the second hook hole 13a formed in the second front panel 13.

[0125] The second hook hole 12a may be formed to penetrate from the front surface to the rear surface of the second front panel 13. The second hook hole 13a may be formed at the edge of the second front panel 13. A plurality of second hook holes 13a may be formed to be spaced apart along the edge of the second front panel 13.

[0126] The second cover portion 122 may be mounted on the upper surface of the second plate 121. The second cover portion 122 may be formed to correspond to the shape of the first cover portion 112.

[0127] For example, the second cover portion 122 may be formed in a plate shape that is narrow in the front and rear direction and long in the left and right direction. The second cover portion 122 may be coupled to the upper end of the second plate 121. When the second cover portion 122 is coupled to the second plate 121, the upper surface of the second plate 121 may be covered by the second cover portion 122.

[0128] The second cover portion 122 may include a first coupling groove 122a for being coupled to the grille cover 130. The first coupling groove 122a of the second

cover portion 122 may be formed to correspond to the shape of the first coupling groove 112a of the first cover portion 112.

[0129] The first coupling groove 122a may be formed on the upper surface of the second cover portion 122. The first coupling groove 122a may be formed by cutting a portion of the upper surface of the second cover portion 122. A plurality of first coupling grooves 122a may be formed. The plurality of first coupling grooves 122a may be disposed to be spaced apart in the longitudinal direction on the upper surface of the second cover portion 122.

[0130] The second cover portion 122 may further include a second coupling groove 122b for being coupled to the grille cover 130. The second coupling groove 122b of the second cover portion 122 may be formed to correspond to the shape of the second coupling groove 112b of the first cover portion 112.

[0131] The second coupling groove 122b may be formed on the side of the second cover portion 122. The second coupling groove 122b may be formed by recessing a portion of the side of the second cover portion 122. The second coupling groove 122b may be formed on one of both sides of the second cover portion 122. For example, the second coupling groove 122b may be formed on the right side of both sides of the second cover portion 122.

[0132] The second grille portion 123 may include a plurality of ribs to form a grille shape. The second grille portion 123 may be provided on the front surface of the second plate 121. The second grille portion 123 may protrude from the inside to the front surface of the second plate 121.

[0133] The second grille portion 123 may include a plurality of horizontal ribs extending in the horizontal direction.

[0134] The plurality of horizontal ribs may be formed entirely on the front surface of the second plate 121. The plurality of horizontal ribs may be disposed to be spaced apart in the vertical direction on the front surface of the second plate 121. The plurality of horizontal ribs may be spaced apart from each other at equal intervals.

[0135] The upper surface of the first cover portion 112 and the upper surface of the second cover portion 122 may be disposed on the same plane. The grille cover 130 may be coupled to cover the upper surface of the first cover portion 112 and the upper surface of the second cover portion 122.

[0136] The front surface of the first grille portion 113 and the front surface of the second grille portion 123 may be disposed on the same plane.

[0137] FIG. 10 is a front perspective view illustrating a grille cover according to an embodiment of the present disclosure, FIG. 11 is a rear view of the grille cover illustrating a portion of the rear of the grille cover, and FIG. 12 is a bottom view illustrating the grille cover.

[0138] Referring to FIGS. 2, 10 to 12, the grille cover 130 may be coupled and fixed to the upper portions of the first grille plate 110 and the second grille plate 120, respectively.

[0139] The grille cover 130 may be narrow in the front and rear direction and long in the left and right direction. The grille cover 130 may be formed in the shape of a rod or stick extending in the left and right direction.

[0140] For example, the grille cover 130 may include a front surface portion 131 forming the front surface, an upper surface portion 132 forming the upper surface, and side portions 133 forming both sides. The front surface, upper surface, and both sides of the grille cover 130 may be closed, and the rear surface and the lower surface may be open. At least a portion of the upper surface 132 of the grille cover 130 may be formed to be inclined.

[0141] The grille cover 130 may further include a plurality of coupling ribs 134 to be coupled to the first grille plate 110 and the second grille plate 120.

[0142] The plurality of coupling ribs 134 may be formed to extend inward from the inner surface of the grille cover 130. The plurality of coupling ribs 134 may be disposed to be spaced apart from each other in the longitudinal direction of the grille cover 130 on the inner surface of the grille cover 130.

[0143] Some of the plurality of coupling ribs 134 are coupled to the first coupling groove 112a of the first grille plate 110, and some of the remaining coupling ribs 134 are coupled to the first coupling groove 122a of the second grille plate 1210.

[0144] In this embodiment, the coupling ribs 134 are comprised of a total of six, with three coupling ribs 134 coupled to the first grille plate 110 and the remaining three coupling ribs 134 being coupled to the second grille plate 120.

[0145] However, it is not limited to this, and the number of coupling ribs 134 may vary according to the number of the first coupling groove 112a of the first grille plate 110 and the first coupling groove 122a of the second grille plate 120.

[0146] The plurality of coupling ribs 134 may include a first rib 134a extending rearward from the front surface portion 131 of the grille cover 130, and a second rib 134b extending downward from the first rib 134a, respectively.

[0147] The first rib 134a may extend rearward from the rear surface of the front surface portion 131 of the grille cover 130. The first rib 134a may extend horizontally to the ground to face the upper surface portion 132 of the grille cover 130.

[0148] The second rib 134b may extend downward from the end portion of the first rib 134a. The second rib 134b may extend vertically from the rear end portion of the first rib 134a.

[0149] Some of the first ribs 134a of the plurality of coupling ribs 134 are supported on the upper surface of the first cover portion 112 of the first grille plate 110, and some of the second ribs 134b of the plurality of coupling ribs 134 may be inserted into the first coupling groove 112a of the first grille plate 110. The second rib 134b may be engaged to the inside of the first coupling groove 112a.

[0150] When the second rib 134b is coupled to the first

coupling groove 112a, forward movement of the second rib 134b may be restricted. In other words, when the grille cover 130 is fixed to the first grille plate 110, movement in the front and rear direction may be restricted.

[0151] The first ribs 134a of the remaining portion of the plurality of coupling ribs 134 are supported on the upper surface of the second cover portion 122 of the second grille plate 120, and the second ribs 134b of the remaining portion of the plurality of coupling ribs 134 may be inserted into the first coupling groove 122a of the second grille plate 120. The second rib 134b may be engaged to the inside of the first coupling groove 122a using a hook method.

[0152] When the second rib 134b is coupled to the first coupling groove 122a, forward movement of the second rib 134b may be restricted. In other words, when the grille cover 130 is fixed to the second grille plate 120, movement in the front and rear direction may be restricted.

[0153] Additionally, the grille cover 130 may further include a coupling protrusion 135 to be coupled to the first grille plate 110 and the second grille plate 120.

[0154] The coupling protrusion 135 may be formed to protrude inward from the side portion 133 of the grille cover 130. The coupling protrusions 135 may be formed on one side portion 133 and the other side portion 133 of the grille cover 130, respectively.

[0155] The coupling protrusion 135 formed on one side portion 133 of the grille cover 130 is coupled to the second coupling groove 112b of the first grille plate 110 and the coupling protrusion 135 formed on the other side portion 133 of the grille cover 130 may be coupled to the second coupling groove 122b of the second grille plate 120.

[0156] The coupling protrusion 135 may include a first protrusion 135a protruding inward from the side portion 133 of the grille cover 130. The coupling protrusion 135 may further include a second protrusion 135b protruding inward from the side portion 133 of the grille cover 130.

[0157] The first protrusion 135a may protrude from the inner surface of the side portion 133 of the grille cover 130 toward the inner center. The first protrusion 135a may be formed at the lower end portion of the side portion 133 of the grille cover 130.

[0158] The second protrusion 135b may protrude from the inner surface of the side portion 133 of the grille cover 130 toward the inner center. The second protrusion 135b may be disposed to be spaced upward from the first protrusion 135a. The first protrusion 135a and the second protrusion 135b may be spaced apart in the vertical direction.

[0159] The first protrusion 135a may protrude further inward than the second protrusion 135b. The length of the portion where the first protrusion 135a protrudes in the inward direction may be formed to be longer than the length of the portion where the second protrusion 135b protrudes in the inward direction.

[0160] The first protrusion 135a and the second protrusion 135b may extend from the side portion 133 of the grille cover 130 in the front and rear direction, respectively.

[0161] The second protrusion 135b may be formed to increase in width or thickness from the rear end portion to the front end portion. In other words, the width or thickness of the front end portion of the second protrusion 135b may be greater than the width or thickness of the rear end portion of the second protrusion 135b.

[0162] The first protrusion 135a and the second protrusion 135b formed on one side portion 133 of the grille cover 130 may be received and coupled to the second coupling groove 112b of the first grille plate 110, and the first protrusion 135a and the second protrusion 135b formed on the other side portion 133 of the grille cover 130 may be received and coupled to the second coupling groove 122b of the second grille plate 120.

[0163] When the coupling protrusion 135 is coupled to the second coupling grooves 112b and 122b, movement of the coupling protrusion 135 in the vertical direction and in the left and right direction may be restricted. That is, when the grille cover 130 is fixed to the first grille plate 110 and the second grille plate 120, movement in the vertical direction and the left and right directions may be restricted.

[0164] The grille cover 130 may further include a recessed portion 136 that is recessed in the side portion 133 of the grille cover 130.

[0165] The recessed portion 136 may be formed by being recessed from the inner surface of the side portion the grille cover 130 toward the outside. The recessed portion 136 may extend from the grille cover 130 in the front and rear direction.

[0166] The second protrusion 135b may be formed in the recessed portion 136. The second protrusion 135b may protrude from the depression 136 toward the inner center.

[0167] Hereinafter, the assembly sequence of the grille assembly will be described in detail with reference to the drawings.

[0168] FIG. 13 is a view illustrating the assembly sequence of the grille assembly, and FIGS. 14 and 15 are views illustrating a method for coupling the first hook of the first grille plate to the first hook hole of the first front panel.

[0169] FIGS. 16 and 17 are views illustrating a method for coupling the coupling rib of the grille cover to the first coupling groove of the first grille plate, and FIGS. 18 and 19 are views illustrating a method for coupling the coupling protrusion of the grille cover to the second coupling groove of the first grille plate.

[0170] Referring to FIG. 13, as described above, the grille assembly 100 may be assembled on the front surface of the outdoor unit 10.

[0171] The first grille plate 110 and the second grille plate 120 are first assembled on the front surface of the outdoor unit 10, and then the grille cover 130 can be assembled on the upper sides of the first grille plate 110 and the second grille plate 120.

[0172] The first grille plate 110 may be first assembled

on the front surface of the outdoor unit 10 and then the second grille plate 120 may be assembled. Alternatively, the second grille plate 120 may be first assembled on the front surface of the outdoor unit 10 and then the first grille plate 110 may be assembled.

[0173] Referring to FIGS. 14 and 15, after positioning the first grille plate 110 in the front of the first front panel 12, the first hook 111a of the first grille plate 110 is passed through the first hook hole 12a of the first front panel 12.

[0174] Then, the first hook 111a that has passed through the first hook hole 12a is pushed toward the center of the first front panel 12, so that the inner groove of the first hook 111a is inserted into the inside of the first hook hole 12a.

[0175] When the first hook 111a is completely coupled to the first hook hole 12a, the lower surface of the first hook 111a may be supported by a rib extending from the lower edge of the first hook hole 12a.

[0176] When the first hook 111a is coupled to the first hook hole 12a, the first grille plate 110 may be restricted from moving in the front and rear direction. In other words, when the first grille plate 110 is fixed to the first front panel 12, the movement of the first grille plate 110 in the front and rear direction may be restricted.

[0177] In the same way, after placing the second grille plate 120 in the front of the second front panel 13, the second grille plate 120 can be assembled to the second front panel 13 using the second hook 121a of the second grille plate 120.

[0178] However, the first hook 111a of the first grille plate 110 and the second hook 121a of the second grille plate 120 may be formed in a left-right symmetrical shape.

[0179] The direction in which the first hook 111a is coupled to the first hook hole 12a may be opposite to the direction in which the second hook 121a is coupled to the second hook hole 13a.

[0180] Referring to FIGS. 16 and 17, in a state where the first grille plate 110 and the second grille plate 120 are assembled to the outdoor unit 10, the grille cover 130 is coupled to the upper portions of the first grille plate 110 and the second grille plate 120.

[0181] Specifically, after inserting the lower end portion of the grille cover 130 into the lower end portion of the first cover portion 112, the coupling rib 134 of the grille cover 130 is coupled to the first coupling groove 112a of the first grille plate 110.

[0182] At this time, an insertion portion 137 extending rearward from the lower end portion may be formed on the front surface portion 131 of the grille cover 130, and an insertion groove 112c for inserting the insertion portion 137 may be formed on the front end portion of the first cover portion 112.

[0183] When the lower end portion of the grille cover 130 is inserted into the lower end portion of the first cover portion 112, the grille cover 130 is rotated so that the coupling rib 134 is inserted into the first coupling groove 112a of the first grille plate 110.

[0184] At this time, the first rib 134a of the coupling rib 134 is supported on the upper surface of the first cover portion 112 of the first grille plate 110, and the second rib 134b of the coupling rib 134 may be engaged with the first coupling groove 112a of the first grille plate 110 in a hook manner.

[0185] In a state where the second rib 134b is coupled to the first coupling groove 112a, forward movement of the second rib 134b may be restricted. In other words, in a state where the grille cover 130 is fixed to the first grille plate 110, the movement of the first grille plate in the front and rear direction may be restricted.

[0186] In the same way, the grille cover 130 can be coupled to the second grille plate 120 using the coupling rib 134.

[0187] Referring to FIGS. 18 and 19, the coupling protrusion 135 of the grille cover 130 is coupled to the second coupling groove 112b of the first grille plate 110.

[0188] When the coupling protrusion 135 is inserted into the second coupling groove 112b, a portion 112d of the side of the first cover portion 112 may be inserted into the recessed portion 136 of the grille cover 130. Specifically, the portion 112d of the side of the first cover portion 112 may be fitted into the inner space formed by the recessed portion 136 and the second protrusion 135b. The inner space may be formed to become narrower in width from the rear end portion to the front end portion, corresponding to the shape of the second protrusion 135b.

[0189] In the same way, the grille cover 130 can be coupled to the second grille plate 120 using the coupling protrusion 135.

[0190] In a state where the coupling protrusion 135 is coupled to the second coupling grooves 112b and 122b, the movement of the coupling protrusion 135 in the vertical direction and the left and right direction may be restricted. In other words, in a state where the grille cover 130 is fixed to the first grille plate 110 and the second grille plate 120, the movement of the coupling protrusion 135 in the vertical direction and both side direction may be restricted.

[0191] The outdoor unit of the air conditioner according to the embodiment of the present disclosure configured as described above has the following effects.

[0192] First, since a grille assembly is provided that covers the entire front surface of the outdoor unit, the front surface of the outdoor unit is protected and the outer appearance of the front surface of the outdoor unit is improved.

[0193] Second, since the first grille plate, the second grille plate, and the grille cover that constitute the grille assembly can be easily assembled sequentially on the front surface of the outdoor unit, disassembly and assembly of the grille assembly are facilitated.

[0194] Third, the portion of the grille assembly corresponding to the front of the fan is provided with a number of ribs that form an air flow path, thereby minimizing air flow resistance to the air discharged by the fan and

preventing infiltration of rainwater or foreign substances from the outside.

[0195] Fourth, in a state where the first grille plate and the second grille plate are coupled to the front surface of the outdoor unit, multiple coupling portions of the grille cover can be coupled to the first grille plate and the second grille plate, respectively, so that the grille assembly can be stably coupled to the outdoor unit.

Claims

1. An outdoor unit of an air conditioner comprising:

a case forming an outer appearance;
a barrier dividing an inner portion of the case into a heat exchange space and an electric space;
a heat exchanger disposed in the heat exchange space;
a grille assembly (100) detachably coupled to a front surface of the case,
wherein the grille assembly (100) includes:

a first grille plate (110) coupled to the front surface of the case corresponding to a front of the heat exchange space;
a second grille plate (120) coupled to the front surface of the case corresponding to a front of the electric space; and
a grille cover (130) coupled to cover an upper portion of the first grille plate (110) and an upper portion of the second grille plate (120).

2. The outdoor unit of an air conditioner of claim 1,

wherein a plurality of hook holes (12a, 13a) is formed on the front surface of the case,
wherein, on a rear surface of the first grille plate (110), a first hook (111a) is formed that is coupled to some hook holes among the plurality of hook holes (12a, 13a), and
wherein, on the rear surface of the second grille plate (120), a second hook (121a) is formed that is coupled to other hook holes among the plurality of hook holes (12a, 13a).

3. The outdoor unit of an air conditioner of claim 2, wherein the direction in which the first hook (111a) is coupled to some hook holes among the plurality of hook holes (12a, 13a) is opposite to the direction in which the second hook (121a) is coupled to other hook holes among the plurality of hook holes (12a, 13a).

4. The outdoor unit of an air conditioner of any one of claims 1 to 3, wherein the case includes:

a base panel (11);
a first front panel (12) erected on a front end portion of the base panel (11) and forming a front surface of the heat exchange space; and
a second front panel (13) erected on another front end portion of the base panel (11) and forming a front surface of the electric space.

5. The outdoor unit of an air conditioner of claim 4,

wherein the first grille plate (110) is coupled to cover a front surface of the first front panel (12), and
wherein the second grille plate (120) is coupled to cover a front surface of the second front panel (13).

6. The outdoor unit of an air conditioner of any one of claims 1 to 5,

further comprising a fan (17) disposed in the heat exchange space;
wherein the fan (17) is disposed on a front of the heat exchanger, and
wherein the first grille plate (110) is disposed on a front of the fan (17).

7. The outdoor unit of an air conditioner of any one of claims 4 to 6,

wherein the case further includes an orifice (16) coupled to an inside of the first front panel (12), and
wherein the fan (17) is disposed on a rear of the orifice (16).

8. The outdoor unit of an air conditioner of claim 6 or 7, wherein the first grille plate (110) includes:

a first plate (111) coupled to the front surface of the case;
a first cover portion (112) coupled to an upper end of the first plate (111); and
a first grille portion (113) provided on a front surface of the first plate (111), and
wherein the first grille portion (113) is disposed on the front of the fan (17).

9. The outdoor unit of an air conditioner of claim 8, wherein the first grille portion (113) includes:

a plurality of horizontal ribs (113a) spaced apart from each other in a vertical direction; and
a plurality of longitudinal ribs (113b) that connect the plurality of horizontal ribs (113a) and are spaced apart from each other.

10. The outdoor unit of an air conditioner of claim 8 or 9,

wherein the second grille plate (120) includes:

a second plate (121) coupled to the front surface of the case;
a second cover portion (122) coupled to an upper end of the second plate (121); and
a second grille portion (123) provided on a front surface of the second plate (121), and
wherein a front surface of the first grille portion (113) and a front surface of the second grille portion (123) are disposed on a same plane.

11. The outdoor unit of an air conditioner of claim 10,

wherein an upper surface of the first cover portion (112) and an upper surface of the second cover portion (122) are disposed on the same plane, and
wherein the grille cover (130) is coupled to cover the upper surface of the first cover portion (112) and the upper surface of the second cover portion (122).

12. The outdoor unit of an air conditioner of any one of claims 1 to 11, wherein the grille cover (130) includes:

a front surface portion (131) forming a front surface thereof;
an upper surface portion (132) forming an upper surface thereof; and
side portions (133) forming both sides thereof, and
wherein an upper portion of each of the first grille plate (110) and the second grille plate (120) is inserted and accommodated inside the grille cover (130).

13. The outdoor unit of an air conditioner of any one of claims 1 to 12, wherein a rear surface and a bottom surface of the grille cover (130) are open.

14. The outdoor unit of an air conditioner of claim 12 or 13,

wherein a first coupling groove (112a) is formed on the upper surface of each of the first grille plate (110) and the second grille plate (120), and
wherein a coupling rib (134) is formed on the grille cover (130), which extends rearward from the front surface portion (131) and is coupled to the first coupling groove (112a).

15. The outdoor unit of an air conditioner of claim 14, wherein the coupling rib (134) includes:

a first rib (134a) extending rearward from a rear surface of the front surface portion (131); and
a second rib (134b) extending downward from an end portion of the first rib (134a), and
wherein the second rib (134b) is engaged with an inside of the first coupling groove (112a).

Amended claims in accordance with Rule 137(2) EPC.

1. An outdoor unit of an air conditioner comprising:

a case forming an outer appearance, wherein the case includes a top panel (15) forming an upper surface of the outdoor unit;
a barrier dividing an inner portion of the case into a heat exchange space and an electric space;
a heat exchanger disposed in the heat exchange space;
a grille assembly (100) detachably coupled to a front surface of the case,
wherein the grille assembly (100) includes:

a first grille plate (110) coupled to the front surface of the case corresponding to a front of the heat exchange space; and
a second grille plate (120) coupled to the front surface of the case corresponding to a front of the electric space;
characterized in that
the grille assembly (100) further includes:

a grille cover (130) coupled to cover an upper portion of the first grille plate (110) and an upper portion of the second grille plate (120),
wherein the grille cover (130) is disposed between the top panel (15) and the grille assembly (100).

2. The outdoor unit of an air conditioner of claim 1,

wherein a plurality of hook holes (12a, 13a) is formed on the front surface of the case, wherein, on a rear surface of the first grille plate (110), a first hook (111a) is formed that is coupled to some hook holes among the plurality of hook holes (12a, 13a), and
wherein, on the rear surface of the second grille plate (120), a second hook (121a) is formed that is coupled to other hook holes among the plurality of hook holes (12a, 13a).

3. The outdoor unit of an air conditioner of claim 2, wherein the direction in which the first hook (111a) is coupled to some hook holes among the plurality of hook holes (12a, 13a) is opposite to the direction in which the second hook (121a) is coupled to other hook holes among the plurality of hook holes (12a, 13a).

4. The outdoor unit of an air conditioner of any one of claims 1 to 3, wherein the case includes:

a base panel (11);
a first front panel (12) erected on a front end portion of the base panel (11) and forming a front surface of the heat exchange space; and
a second front panel (13) erected on another front end portion of the base panel (11) and forming a front surface of the electric space.

5. The outdoor unit of an air conditioner of claim 4,

wherein the first grille plate (110) is coupled to cover a front surface of the first front panel (12), and
wherein the second grille plate (120) is coupled to cover a front surface of the second front panel (13).

6. The outdoor unit of an air conditioner of any one of claims 1 to 5,

further comprising a fan (17) disposed in the heat exchange space;
wherein the fan (17) is disposed on a front of the heat exchanger, and
wherein the first grille plate (110) is disposed on a front of the fan (17).

7. The outdoor unit of an air conditioner of any one of claims 4 to 6,

wherein the case further includes an orifice (16) coupled to an inside of the first front panel (12), and
wherein the fan (17) is disposed on a rear of the orifice (16).

8. The outdoor unit of an air conditioner of claim 6 or 7, wherein the first grille plate (110) includes:

a first plate (111) coupled to the front surface of the case;
a first cover portion (112) coupled to an upper end of the first plate (111); and
a first grille portion (113) provided on a front surface of the first plate (111), and
wherein the first grille portion (113) is disposed on the front of the fan (17).

9. The outdoor unit of an air conditioner of claim 8, wherein the first grille portion (113) includes:

a plurality of horizontal ribs (113a) spaced apart from each other in a vertical direction; and
a plurality of longitudinal ribs (113b) that connect the plurality of horizontal ribs (113a) and are spaced apart from each other.

10. The outdoor unit of an air conditioner of claim 8 or 9, wherein the second grille plate (120) includes:

a second plate (121) coupled to the front surface of the case;
a second cover portion (122) coupled to an upper end of the second plate (121); and
a second grille portion (123) provided on a front surface of the second plate (121), and
wherein a front surface of the first grille portion (113) and a front surface of the second grille portion (123) are disposed on a same plane.

11. The outdoor unit of an air conditioner of claim 10,

wherein an upper surface of the first cover portion (112) and an upper surface of the second cover portion (122) are disposed on the same plane, and
wherein the grille cover (130) is coupled to cover the upper surface of the first cover portion (112) and the upper surface of the second cover portion (122).

12. The outdoor unit of an air conditioner of any one of claims 1 to 11, wherein the grille cover (130) includes:

a front surface portion (131) forming a front surface thereof;
an upper surface portion (132) forming an upper surface thereof; and
side portions (133) forming both sides thereof, and
wherein an upper portion of each of the first grille plate (110) and the second grille plate (120) is inserted and accommodated inside the grille cover (130).

13. The outdoor unit of an air conditioner of any one of claims 1 to 12, wherein a rear surface and a bottom surface of the grille cover (130) are open.

14. The outdoor unit of an air conditioner of claim 12 or 13,

wherein a first coupling groove (112a) is formed on the upper surface of each of the first grille plate (110) and the second grille plate (120), and
wherein a coupling rib (134) is formed on the grille cover (130), which extends rearward from the front surface portion (131) and is coupled to the first coupling groove (112a).

15. The outdoor unit of an air conditioner of claim 14, wherein the coupling rib (134) includes:

a first rib (134a) extending rearward from a rear surface of the front surface portion (131); and
a second rib (134b) extending downward from an end portion of the first rib (134a), and
wherein the second rib (134b) is engaged with an inside of the first coupling groove (112a).

FIG. 1

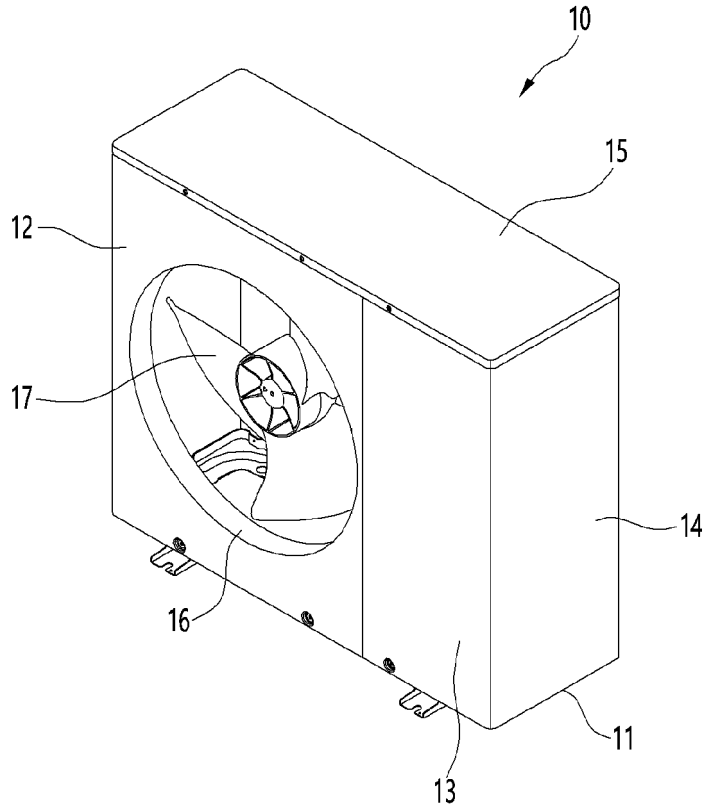

FIG. 2

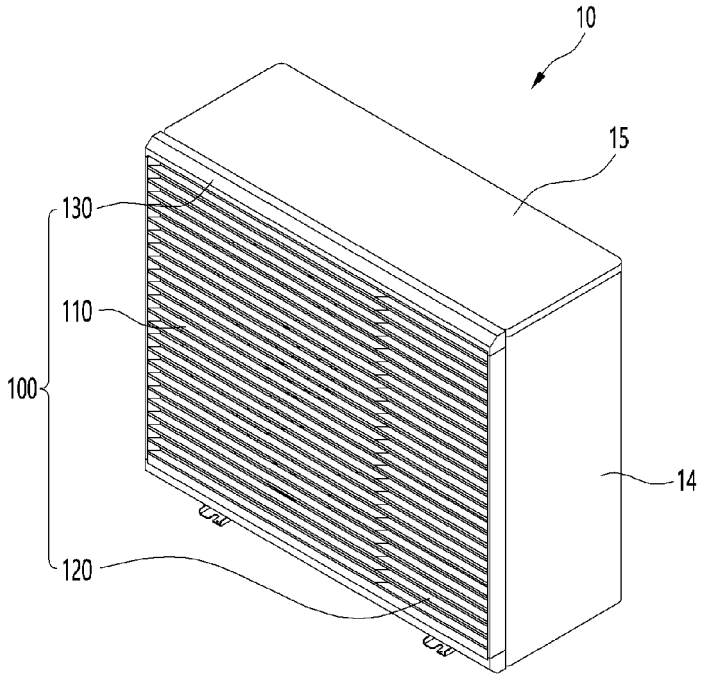

FIG. 3

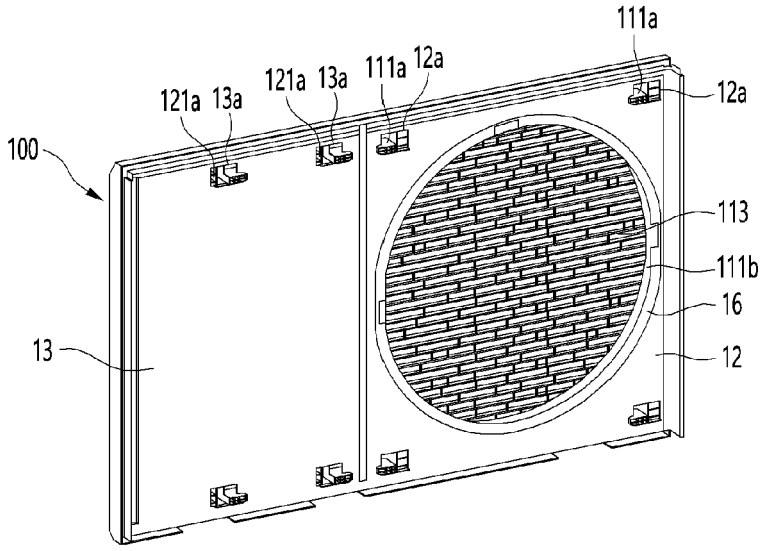
111a
12a
121a
13a
121a
13a
111a
12a
100
113
111b
16
13
12

FIG. 4

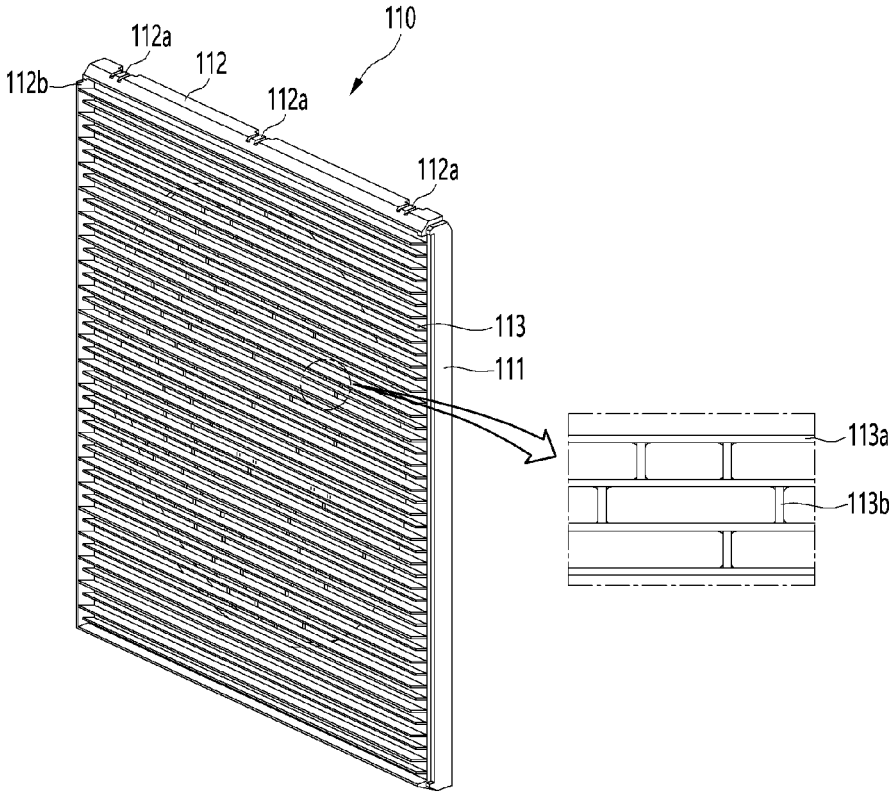
110
112a
112b
112
112a
112a
113
111
113a
113b

FIG. 5

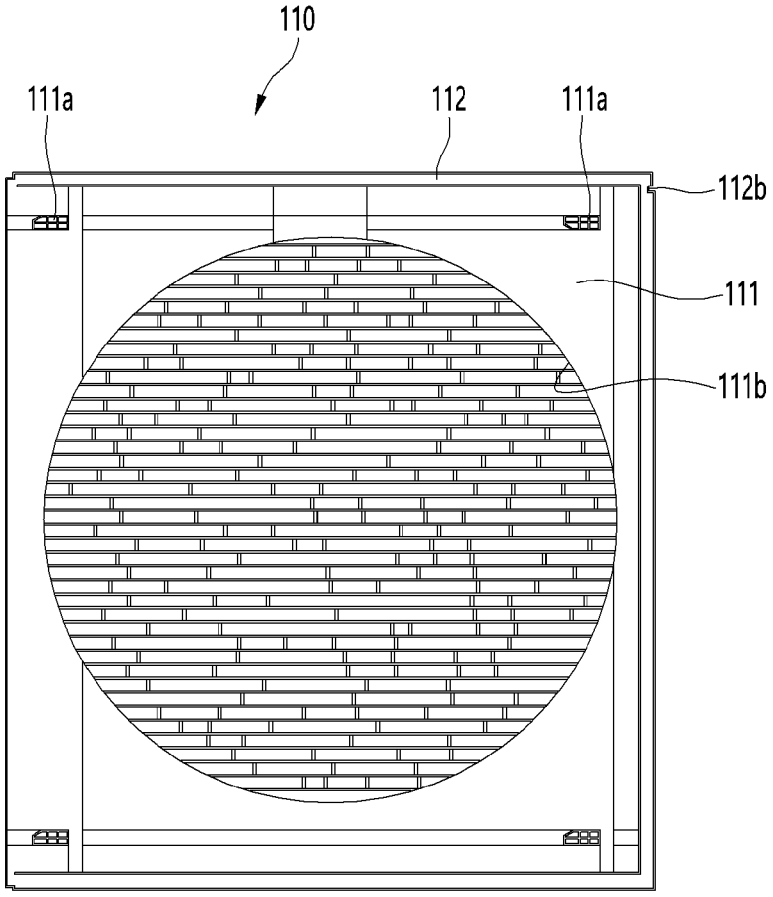
110
111a
112
111a
112b
111
111b

FIG. 6

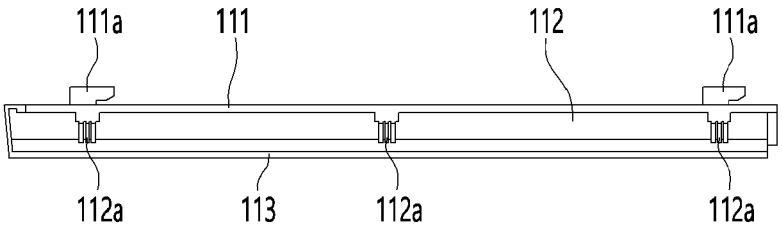
111a
111
112
111a
112a
113
112a
112a

FIG. 7

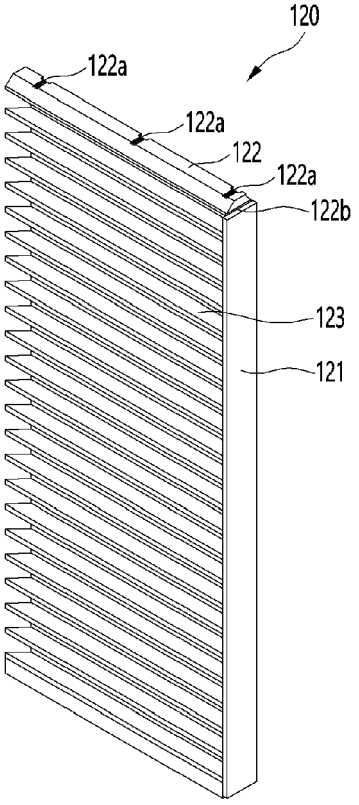

FIG. 8

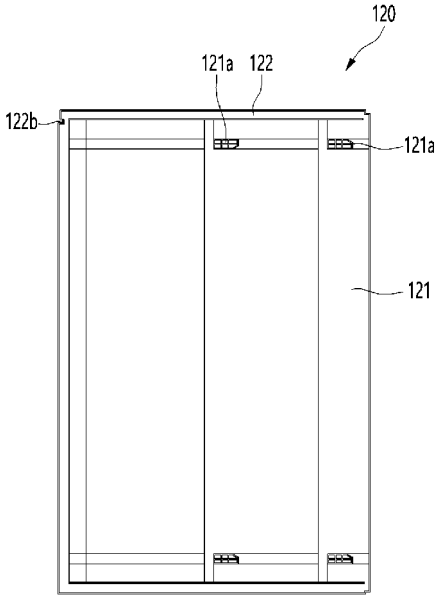

FIG. 9

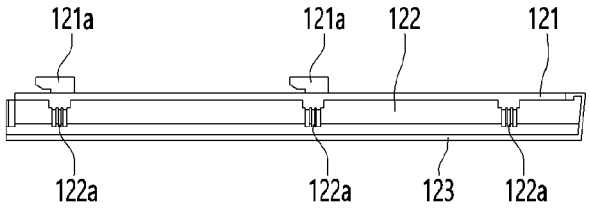

FIG. 10

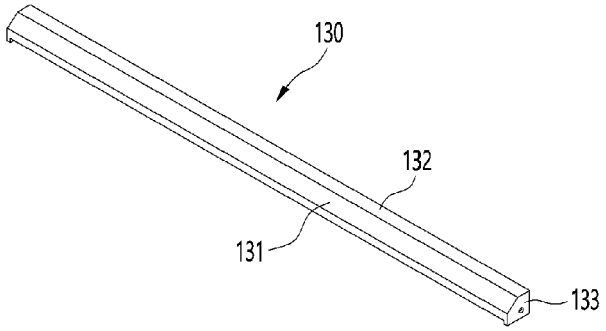

FIG. 11

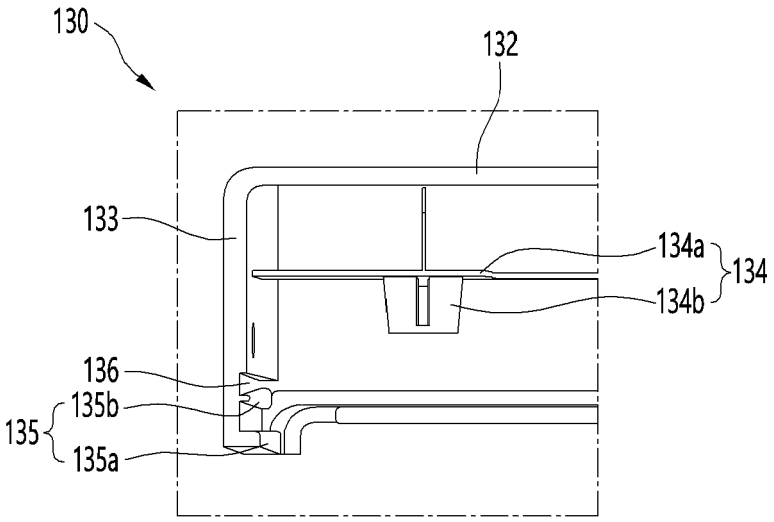

FIG. 12

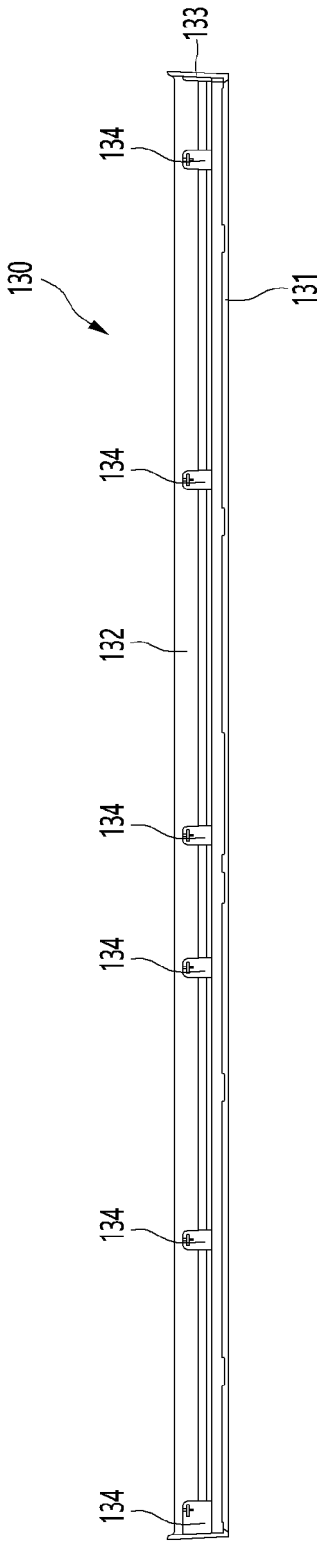

FIG. 13

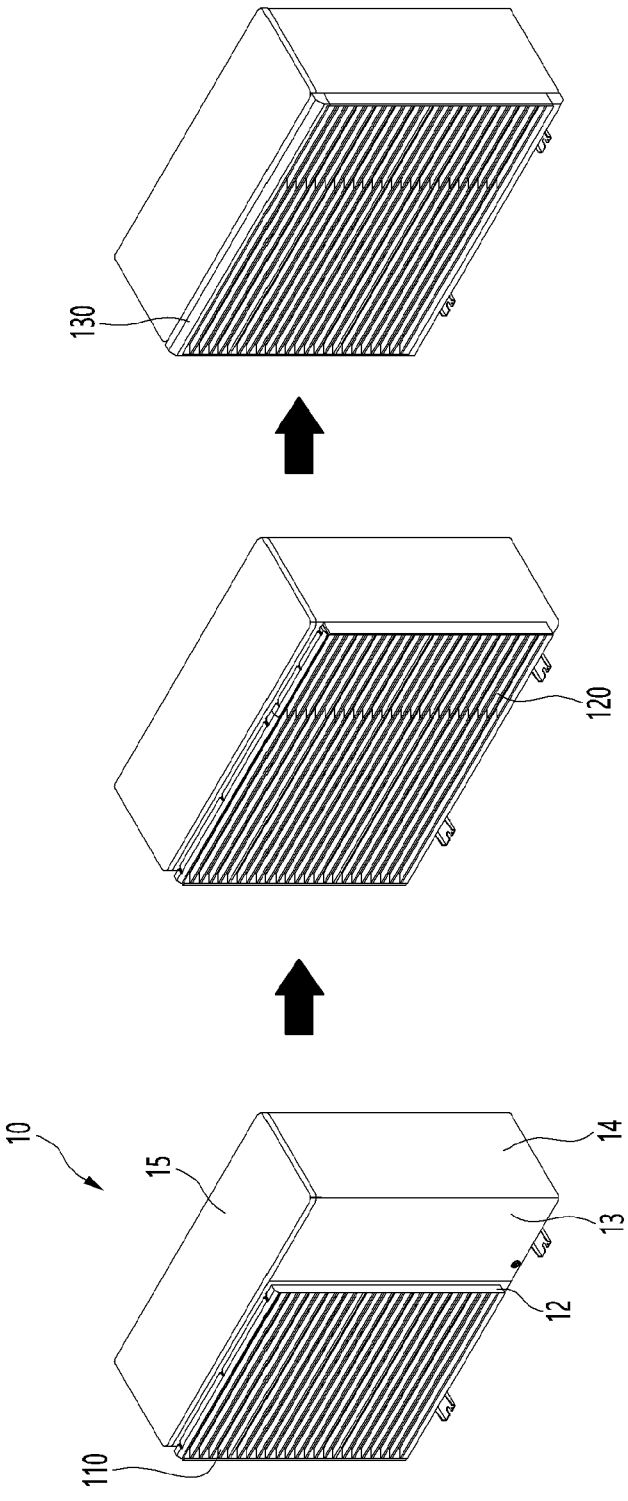

FIG. 14

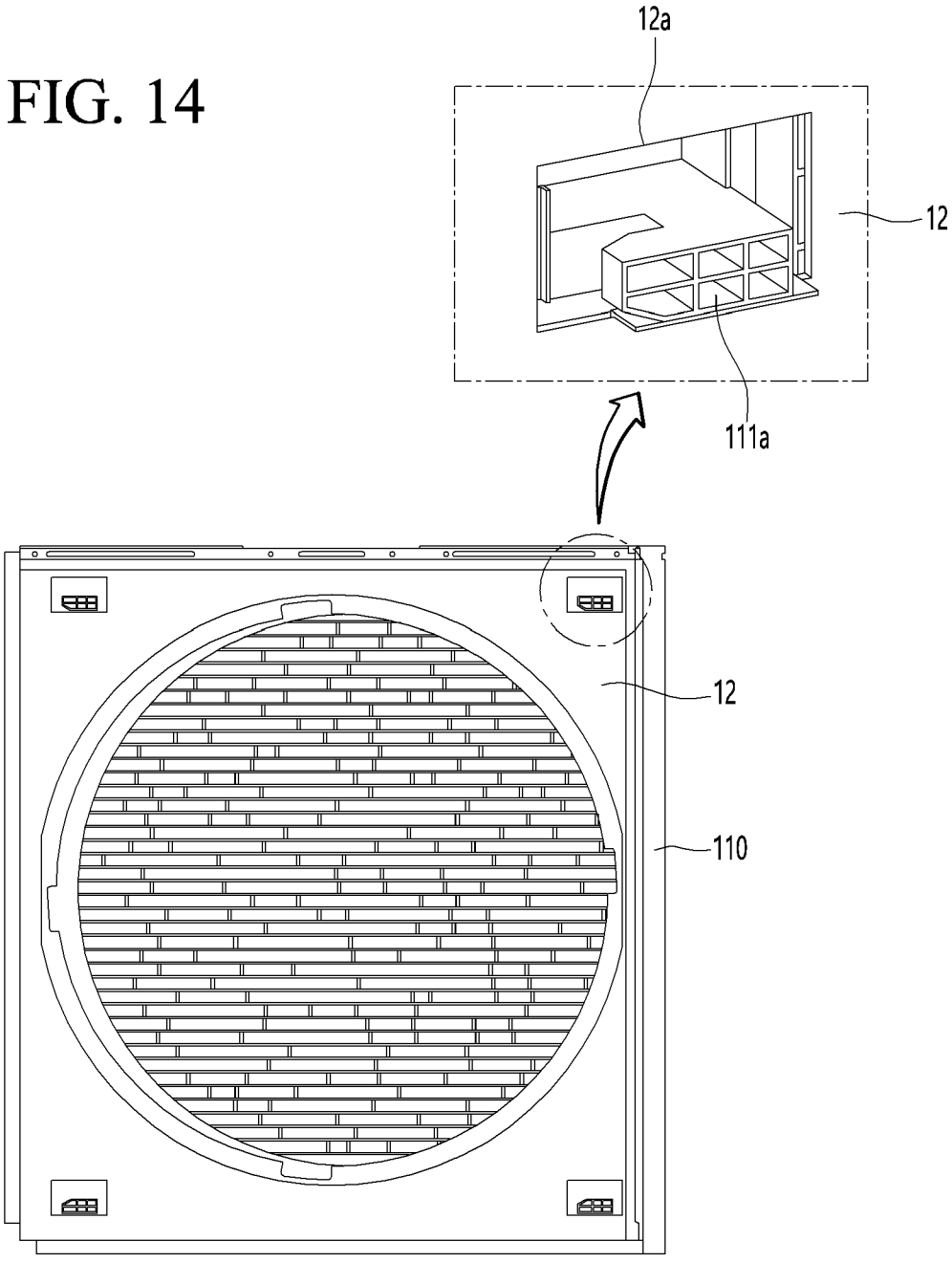

FIG. 15

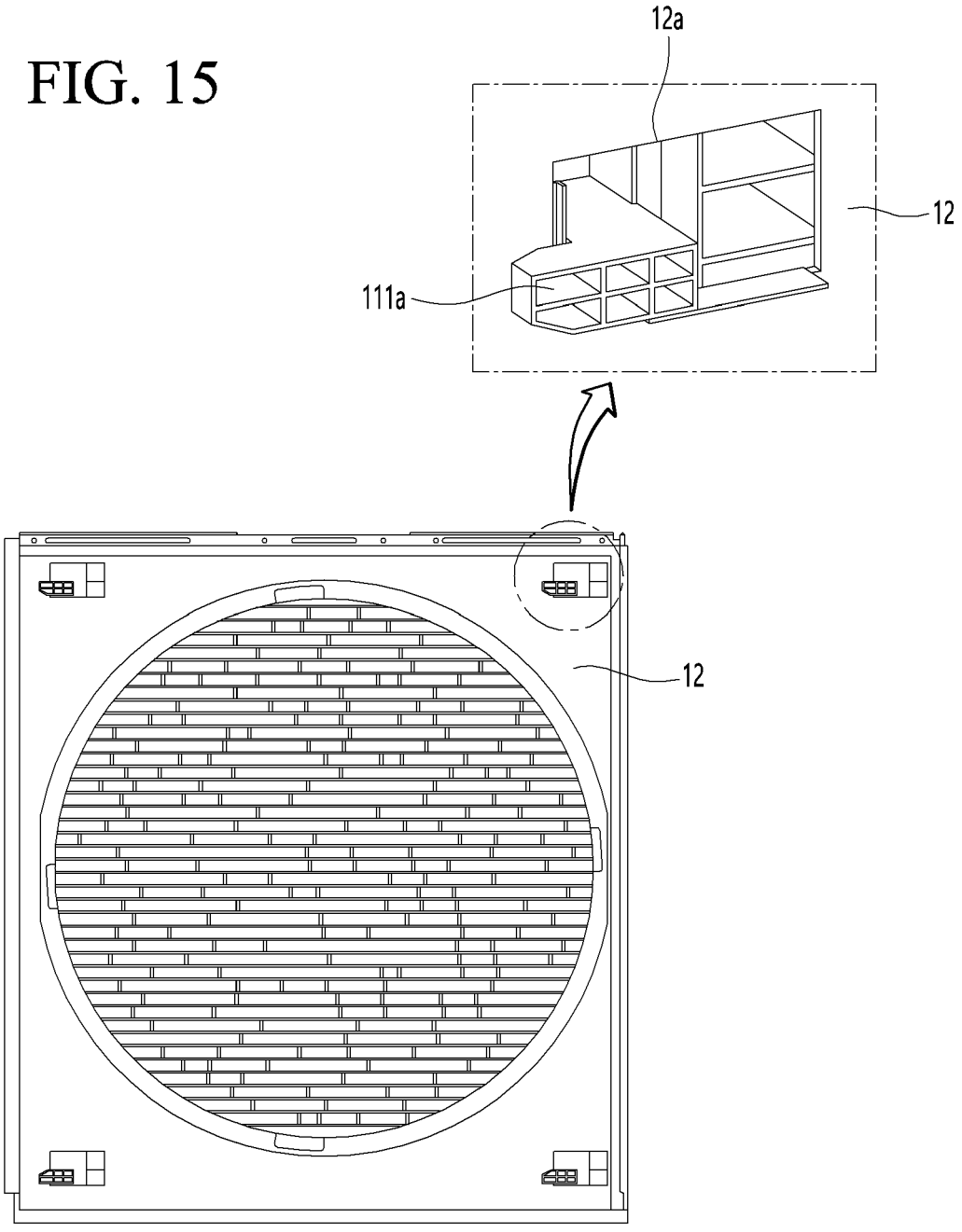

FIG. 16

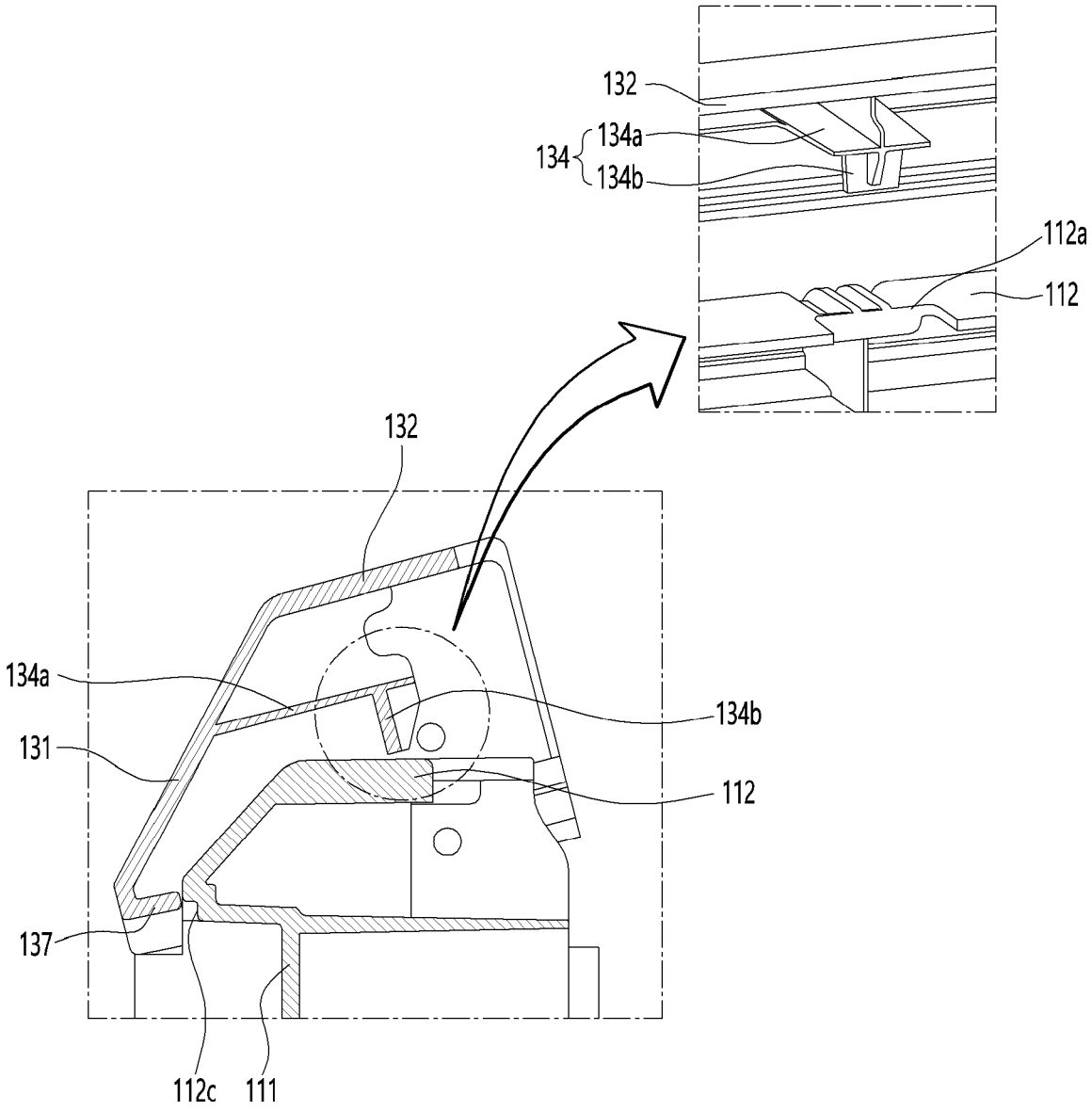

FIG. 17

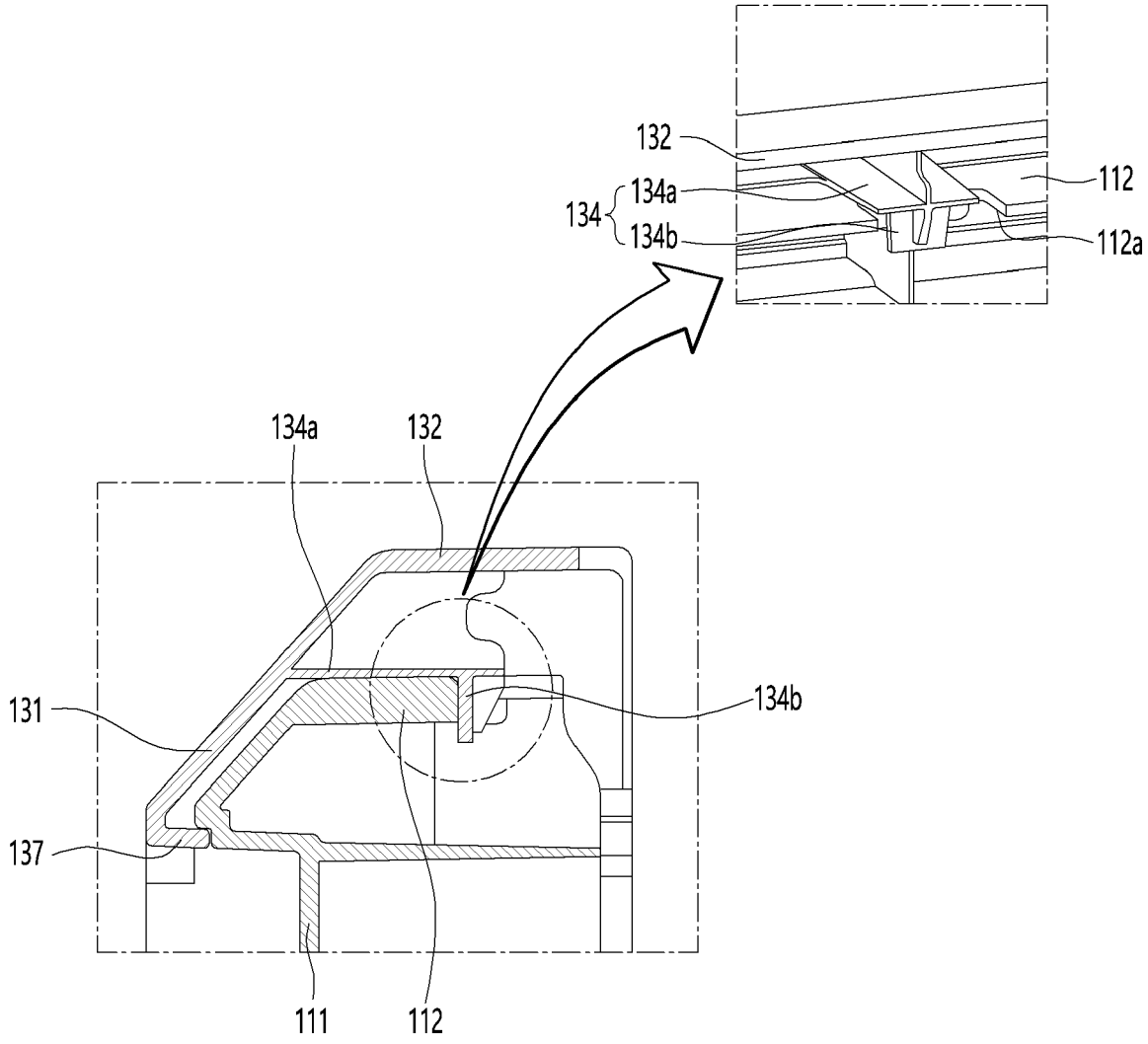

FIG. 18

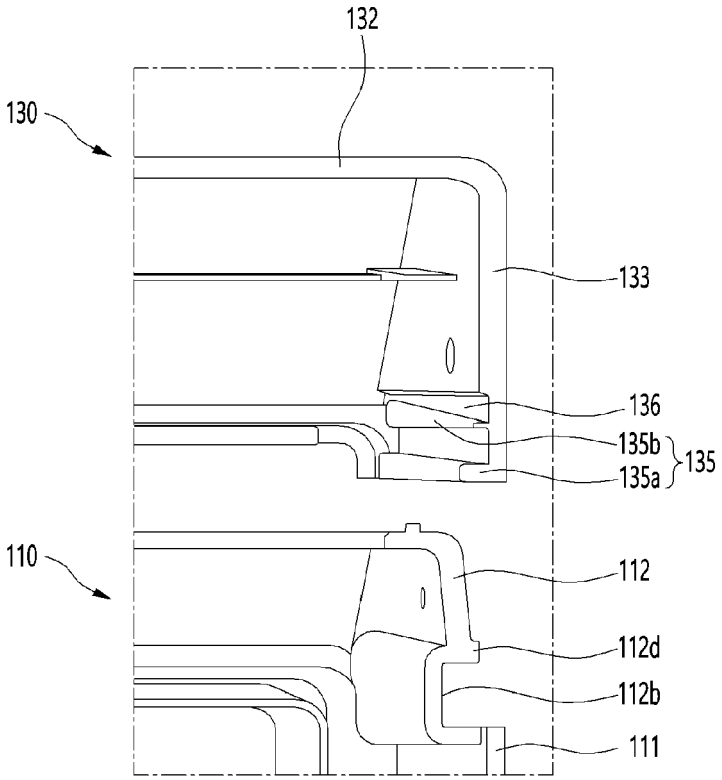
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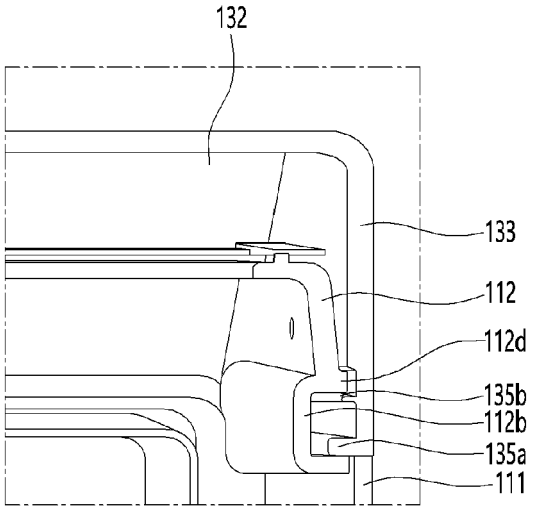
FIG. 19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Application Number
EP 24 15 1440

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 3 705 731 A1 (DAIKIN IND LTD [JP]; DAIKIN EUROPE NV [BE]) 9 September 2020 (2020-09-09) * the whole document *	1-15	INV. F24F1/54 F24F1/56 F24F1/58 F24F13/84 F04D29/70 F24F13/82
Y	EP 4 102 143 A1 (PANASONIC IP MAN CO LTD [JP]) 14 December 2022 (2022-12-14) * the whole document *	1-15	
Y	US 2023/243524 A1 (SUN WOONG [KR] ET AL) 3 August 2023 (2023-08-03) * the whole document *	1-15	
Y	EP 3 587 941 A1 (MITSUBISHI ELECTRIC CORP [JP]) 1 January 2020 (2020-01-01) * the whole document *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

F24F
F04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 June 2024	Decking, Oliver

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17-06-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3705731 A1	09-09-2020	EP 3705731 A1	09-09-2020
		WO 2020184493 A1	17-09-2020
EP 4102143 A1	14-12-2022	EP 4102143 A1	14-12-2022
		JP 2022187051 A	19-12-2022
US 2023243524 A1	03-08-2023	CN 117940712 A	26-04-2024
		EP 4368902 A1	15-05-2024
		US 2023243524 A1	03-08-2023
EP 3587941 A1	01-01-2020	CN 110291333 A	27-09-2019
		EP 3587941 A1	01-01-2020
		JP 6808013 B2	06-01-2021
		JP WO2018154686 A1	07-11-2019
		US 2019368753 A1	05-12-2019
		WO 2018154686 A1	30-08-2018

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Patent documents cited in the description

- KR 1020220010865 **[0008]**