(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 575 331 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.06.2025 Bulletin 2025/26

(21) Application number: **23903696.5**

(22) Date of filing: **26.09.2023**

(51) International Patent Classification (IPC):
F24F 1/0047 *(2019.01)* ***F24F 13/32*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F24F 1/0047; F24F 13/32

(86) International application number:
PCT/KR2023/014901

(87) International publication number:
WO 2024/128492 (20.06.2024 Gazette 2024/25)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **13.12.2022 KR 20220173826**

(71) Applicant: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do 16677 (KR)

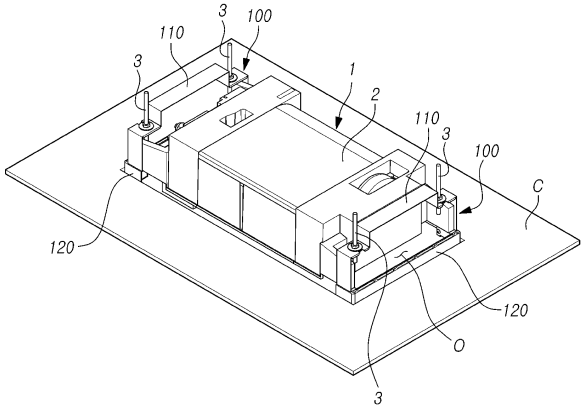
(72) Inventors:
- **JEON, Mingu**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **KIM, Donghyun**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **PARK, Wooyoung**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **SEO, Yongho**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **YOON, Joonho**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **LEE, Buyoun**
  Suwon-si, Gyeonggi-do 16677 (KR)
- **HONG, Jinwoo**
  Suwon-si, Gyeonggi-do 16677 (KR)

(74) Representative: **Walaski, Jan Filip et al**
Venner Shipley LLP
200 Aldersgate
London EC1A 4HD (GB)

(54) STRUCTURE FOR INSTALLING CEILING-TYPE INDOOR UNIT

(57) A structure for installing an indoor unit according to an embodiment of the present disclosure may comprise: hanger members installed so as to be affixed to the ceiling and provided so as to hold an indoor unit; and lower members coupled to the bottom of the hanger members, and each provided with a peripheral rib horizontally extending outward from at least a portion of the bottom to come in contact with a ceiling-capping surface.

FIG. 1



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Description

[Technical Field]

[0001] Various embodiments of the disclosure relate to a structure for installing a ceiling-type indoor unit.

[Background Art]

[0002] An air conditioner is a device that forms a series of cycles performed by a compressor, a condenser, an expansion valve, and an evaporator in a cooling/heating system in order to cool a room by repeatedly sucking in hot air from the room, exchanging heat with a low-temperature refrigerant, and then discharging it into the room, or the air conditioner heats the room by an opposite process for cooling the room. Typically, an air conditioner includes indoor units installed mainly inside of a building, and the outdoor units installed outside of a building.

[0003] One type of indoor unit may be fixed to a ceiling. A ceiling-fixed indoor unit may be installed by fixing the indoor unit in the inner space of the ceiling above the ceiling surface by means of full-threaded bolts fixed to the ceiling wall above the ceiling surface and one or more nuts fastened to the full-threaded bolts. When installing the indoor unit on the ceiling in such a manner, a sufficient working space is required to fasten the full-threaded bolts and the nuts and adjust the fastening height. However, it is not easy to secure a sufficient working space in a narrow space inside the ceiling, and the space limitation makes it difficult to install the indoor.

[Disclosure of Invention]

[Solution to Problem]

[0004] Various embodiments of the disclosure may reduce installation difficulty by installing a ceiling-mounted indoor unit using a predetermined working space without significant efforts.

[0005] An installation structure for an indoor unit according to an embodiment of the disclosure may comprise a hanger member installed to be fixed to a ceiling wall and configured to mount the indoor unit, and a lower member coupled to a lower portion of hanger member and including an edge rib extending horizontally outwardly from at least a portion of a lower end to contact a ceiling surface.

[0006] According to an embodiment, the edge rib may be configured to be visible when viewed from below the ceiling surface.

[0007] According to an embodiment, the hanger member may include a support surface configured to be bent horizontally inward to support the indoor unit at a lower portion thereof.

[0008] According to an embodiment, the support surface may include an opening.

[0009] According to an embodiment, the installation structure may comprise a fixing member provided to, if the indoor unit may be mounted on the support surface, pass through the opening to fix the indoor unit on the support surface.

[0010] According to an embodiment, the hanger member may include a bend portion bent downward to be perpendicular to the support surface, and a second bend portion bent to be parallel to the support surface, under the first bend portion.

[0011] According to an embodiment, the lower member may be configured to be partially inserted into a space defined by the support surface, the first bend portion, and the second bend portion.

[0012] According to an embodiment, the installation structure may be disposed to overlap a portion of the indoor unit when viewed from thereabove in a state in which the indoor unit may be installed.

[0013] According to an embodiment, the lower member may be formed to contact at least a portion of an edge of an opening of the ceiling surface for the indoor unit to be positioned.

[0014] According to an embodiment, the hanger member may include a through portion configured to allow a full-threaded bolt fixed to the ceiling wall to pass therethrough.

[0015] According to an embodiment, the installation structure may comprise a lower nut provided to be fastened to the full-threaded bolt to be positioned under the through portion to adjust a height of the hanger member, and an upper nut provided to be fastened to the full-threaded bolt to be positioned above the through portion to fix a movement of the hanger member.

[0016] According to an embodiment, the hanger member may include a steel or stainless steel material.

[0017] According to an embodiment, the lower member may include a plastic material.

[0018] According to an embodiment, a plurality of installation structures may be disposed in each corner of an opening of the ceiling surface where the indoor unit is positioned.

[0019] According to an embodiment, the lower member may have the same shape as an opening of the ceiling surface for the indoor unit to be positioned. A plurality of hanger members may be coupled to the lower member.

[0020] According to various embodiments of the disclosure, since the indoor unit installation structure is installed in the inner space of the ceiling before installing the indoor unit, it may be easy for the worker to install the installation structure using the ceiling inner space where the indoor unit is absent and then mount the indoor unit on the installation structure, allowing for easier installation of the indoor unit.

[0021] Effects achievable in example embodiments of the disclosure are not limited to the above-mentioned effects, but other effects not mentioned may be apparently derived and understood by one of ordinary skill in the art to which example embodiments of the disclosure pertain, from the following description. In other words,

unintended effects in practicing embodiments of the disclosure may also be derived by one of ordinary skill in the art from example embodiments of the disclosure.

[Brief Description of Drawings]

[0022]

FIG. 1 is a view illustrating a state in which an indoor unit of an air conditioner is installed on a ceiling by an installation structure according to an embodiment;
FIG. 2 is a perspective view illustrating an installation structure according to an embodiment;
FIG. 3 is an exploded view illustrating an installation structure according to an embodiment;
FIG. 4 is a front view illustrating an installation structure according to an embodiment;
FIG. 5 is a rear view illustrating an installation structure according to an embodiment;
FIG. 6 is a cross-sectional view taken along line A-A' of FIG. 5;
FIGS. 7A to 7D are views illustrating a process of installing an indoor unit on a ceiling using an installation structure according to an embodiment;
FIG. 8 is a view illustrating a state in which an indoor unit is installed using a conventional installation structure, as viewed from an above view;
FIG. 9 is a view illustrating a state in which an indoor unit is installed using an installation structure, as viewed from an above view, according to an embodiment;
FIG. 10 is a view illustrating a state in which an installation structure is fixed to a ceiling according to an embodiment; and
FIG. 11 is a view illustrating a state in which an installation structure is fixed to a ceiling according to an embodiment.

[0023] Reference may be made to the accompanying drawings in the following description, and specific examples that may be practiced are shown as examples within the drawings. Other examples may be utilized and structural changes may be made without departing from the scope of the various examples.

[Mode for the Invention]

[0024] Hereinafter, embodiments of the disclosure are described in detail with reference to the drawings so that those skilled in the art to which the disclosure pertains may easily practice the disclosure. However, the disclosure may be implemented in other various forms and is not limited to the embodiments set forth herein. The same or similar reference denotations may be used to refer to the same or similar elements throughout the specification and the drawings. Further, for clarity and brevity, no description is made of well-known functions and configurations in the drawings and relevant descriptions.

[0025] FIG. 1 is a view illustrating a state in which an indoor unit of an air conditioner is installed on a ceiling by an installation structure according to an embodiment.

[0026] Referring to FIG. 1, the indoor unit 1 of the air conditioner may be installed hung to the ceiling inside a building. For example, the indoor unit 1 may be installed by an installation structure 100 pre-installed in the space where the indoor unit 1 is to be installed. The indoor unit 1 may be installed on the ceiling, e.g., by mounting or coupling the body 2 to the installation structure 100. The installation structure 100 may be installed on the ceiling, e.g., by being coupled to full-threaded bolts 3 fixed to the ceiling wall. A plurality of installation structures 100 in which the hanger member 110 and the lower member 120 are coupled may be installed to mount the indoor unit 1, but the disclosure is not limited thereto.

[0027] The ceiling surface C may form an opening O. The shape of the opening O may be substantially rectangular, but is not limited thereto. The lower member 120 of the installation structure 100 may be disposed adjacent to the opening O. For example, some of the edges of the opening O may contact the lower member 120. The ceiling surface C may be disposed to be spaced apart from the ceiling wall (e.g., the ceiling wall W of FIG. 4) by a predetermined distance. The indoor unit 1 may be installed so that a vent for cooling or heating is positioned in the opening O of the ceiling surface C.

[0028] The indoor unit 1 may be installed to be positioned between the ceiling surface C and the ceiling wall. When the indoor unit 1 is installed on the ceiling, a portion of the ceiling surface C may be removed to secure an area of the indoor unit 1 and a working space for installing the indoor unit 1. The indoor unit may be installed at a position corresponding to the opening O of the ceiling surface C to cool or heat the indoor space. FIG. 2 is a perspective view of an installation structure according to an embodiment. FIG. 3 is an exploded view illustrating an installation structure according to an embodiment. FIG. 4 is a front view illustrating an installation structure according to an embodiment. FIG. 5 is a rear view illustrating an installation structure according to an embodiment. FIG. 6 is a cross-sectional view taken along line A-A' of FIG. 5.

[0029] For convenience of description, FIGS. 2 to 6 illustrate a state in which the installation structure 100 is coupled to the full-threaded bolt 3. Although FIGS. 3 to 6 illustrate only one of the plurality of installation structures 100, the other installation structures 100 may also have substantially the same configuration and shape as the installation structure 100 illustrated in FIGS. 3 to 6.

[0030] Referring to FIGS. 2 to 6, the installation structure 100 may include a hanger member 110 or a lower member 120. After the installation structure 100 is coupled to the full-threaded bolt 3 and installed on the ceiling, the indoor unit 1 may be installed on the ceiling by mounting the indoor unit 1 on the hanger member 110. If the installation structure 100 is coupled to the full-threaded bolt 3, the lower member 120 may contact the surroundings of the opening (e.g., the opening O of

the ceiling surface (e.g., the ceiling surface C of FIG. 1)). After installing the installation structure 100, the worker may install the indoor unit 1 by mounting the indoor unit 1 on the installation structure 100, so the worker may install the indoor unit 1 more conveniently by eliminating the need for coupling with fastening members (e.g., full-threaded bolts and nuts) in a state in which the heavy indoor unit is held between the ceiling wall and the ceiling surface according to the conventional installation method.

[0031] According to an embodiment, the hanger member 110 may be installed to be fixed to the ceiling wall W. The hanger member 110 may be formed of, e.g., a fire-resistant material. The hanger member 110 may include, e.g., a steel or stainless material, but is not limited thereto. Therefore, the installation structure 100 may be maintained in its shape without being burned or melted by fire, preventing indoor unit 1 from falling even if a fire occurs.

[0032] According to an embodiment, the hanger member 110 may include an upper portion 110a, a first side portion 110b, and a second side portion 110c. The hanger member 110 may have a shape with an open lower side. According to an embodiment, the hanger member 110 may provide a mounting space 111 in which a portion of the indoor unit 1 is mounted. The mounting space 111 may be defined by the upper portion 110a, the first side portion 110b, and the second side portion 110c.

[0033] According to an example, the hanger member 110 may include a through portion 112 configured to allow the full-threaded bolt 3 fixed to the ceiling wall W to pass therethrough. The through portion 112 may be positioned, e.g., in the upper portion 110a of the hanger member 110. According to an example, the hanger member 110 may include an insertion portion 113 provided to be open to allow the full-threaded bolt 3 to be inserted into the through portion 112 when the installation structure 100 is installed.

[0034] An upper nut 4 and a lower nut 5 may be fastened to the full-threaded bolt 3 inserted into the through portion 112 of the hanger member 110. The lower nut 5 may be fastened to the full-threaded bolt 3 so as to be positioned under the through portion 112. By adjusting the height of the lower nut 5, the height of the hanger member 110 may be adjusted. The upper nut 4 may be fastened to the full-threaded bolt 3 so as to be positioned above the through portion 112. The upper nut 4 may fix the movement of the hanger member 110. The worker may adjust the height of the installation structure 100 using the lower nut 5 and then tighten the upper nut 4 to fix the movement of the hanger member 110. The full-threaded bolt 3 may be inserted into the through portion 112 in a state in which the upper nut 4 is fastened to be positioned above the through portion 112. The upper nut 4 and the lower nut 5 may be, e.g., washer-integrated nuts.

[0035] According to an embodiment, the hanger member 110 may be configured to mount the indoor unit 1. The hanger member 110 may include a support surface 114 for mounting or supporting the indoor unit 1. The support surface 114 may be positioned on each of the first side portion 110b and the second side portion 110c. The support surface 114 may be positioned under the hanger member 110 and may extend toward the inside of the hanger member 110. Here, the inside may refer to a direction toward the mounting space 111. The support surface 114 may extend in, e.g., a horizontal direction. The support surface 114 may extend, e.g., in a direction perpendicular to the first side portion 110b or the second side portion 110c. The first support surface 114 formed on the first side portion 110b and the second support surface 114 formed on the second side portion 110c may be positioned at substantially the same height.

[0036] According to an embodiment, the support surface 114 may include an opening 1141. According to an embodiment, the installation structure 100 may include a fixing member 130 (or a fastening member). The fixing member 130 may pass through the opening 1141 of the support surface 114. If the indoor unit 1 is mounted on the support surface 114, the fixing member 130 may pass through the opening 1141 of the support surface 114 to be fastened to the indoor unit 1. As the fixing member 130 is fastened to the indoor unit 1, the indoor unit 1 may be fixedly coupled to the installation structure 100. Therefore, it is possible to prevent the indoor unit 1 from moving with respect to the installation structure 100 due to vibration generated while the indoor unit 1 is operating.

[0037] According to an embodiment, the hanger member 110 may include a first bend portion 115 and a second bend portion 116. The first bend portion 115 and the second bend portion 116 may be provided on the first side portion 110b and the second side portion 110c, respectively. The first bend portion 115 may be bent downward to be perpendicular to the support surface 114. The second bend portion 116 may be bent to be parallel to the support surface 114 under the first bend portion 115. The second bend portion 116 may be formed to face the support surface 114, for example.

[0038] According to an example, the lower member 120 may be coupled to a lower portion of the hanger member 110. The lower member 120 may be coupled to the hanger member 110 by, e.g., a fixing member 130 (or a fastening member). According to an example, the lower member 120 may be manufactured by an injection method. The lower member 120 may be formed of, e.g., a plastic material, but is not limited thereto.

[0039] According to an embodiment, the lower member 120 may include a vertical surface 121 and an edge rib 122. The edge rib 122 may horizontally extend outward from the vertical surface 121. The edge rib 122 may extend from at least a portion of a lower end of the vertical surface 121, but is not limited thereto, may extend from another portion of the vertical surface 121. The edge rib 122 may be a portion in contact with the ceiling surface C when the installation structure 100 is coupled to the full-threaded bolt 3. For example, the installation structure 100 may be installed so that the edge rib 122 faces the

ceiling surface C.

[0040] According to an example, the lower member 120 may be formed to contact at least a portion of the edge of the opening O of the ceiling surface C for positioning the indoor unit 1. For example, the vertical surface 121 of the lower member 120 may be formed to contact at least a portion of the edge of the opening O of the ceiling surface C.

[0041] According to an example, the edge rib 122 may be configured to be visible when viewed from below the ceiling surface C. The edge rib 122 may contact the lower surface of the ceiling surface C, for example. The edge rib 122 may support the ceiling surface C. The shape of the edge rib 122 is not limited to the foregoing, and may be configured to be invisible when viewed from below the ceiling surface C. In this case, the edge rib 122 may contact the upper surface of the ceiling surface C.

[0042] According to an example, the lower member 120 may be configured so that a portion of the lower member 120 is inserted into the insertion space defined by the support surface 114, the first bend portion 115, and the second bend portion 116. For example, a portion of the vertical surface 121 of the lower member 120 may be inserted into the insertion space. The portion of the vertical surface 121 inserted into the insertion space may be formed to be positioned on the same plane as at least one of the first side surface 111b of the first side portion 110b or the second side surface 111c of the second side portion 110c.

[0043] The height of the lower member 120 may vary according to the external appearance of the indoor unit 1. The lower member 120 may have an appropriate height so that the height of the indoor unit 1 may not be separately adjusted when the indoor unit 1 is mounted on the installation structure 100.

[0044] When the worker adjusts the height by fastening the installation structure 100 to the full-threaded bolt 3, the worker may adjust the height by referring to the position of the edge rib 122. The worker may adjust the height of the installation structure 100 so that the edge rib 122 of the lower member 120 contacts the ceiling surface C. The size and shape of the installation structure 100 may be manufactured according to the size and shape of the indoor unit 1 to be installed. If the indoor unit 1 is mounted on the installation structure 100 after adjusting the height of the edge rib 122 so as to contact the ceiling surface C, the indoor unit 1 is positioned in a desired area. Conventionally, when installing a ceiling-mounted indoor unit, it was necessary to adjust the height of the nut fastened to the full-threaded bolt or use a height adjustment jig to adjust the height again after the indoor unit was connected to all the full-threaded bolts. In the disclosure, it is possible to simplify the indoor unit installation process by adjusting the height when the installation structure 100 is coupled to the full-threaded bolt 3 before mounting the indoor unit 1.

[0045] FIGS. 7A to 7D are views illustrating a process of installing an indoor unit on a ceiling using an installation structure according to an embodiment.

[0046] In FIGS. 7A to 7D, a state in which the full-threaded bolt 3 is fixed to the ceiling wall is shown, but for convenience of description, the ceiling wall is omitted.

[0047] Referring to FIG. 7A, the full-threaded bolt 3 may be installed at a position corresponding to a position where the indoor unit 1 is to be installed. As illustrated, the first full-threaded bolt 3, the second full-threaded bolt 3, the third full-threaded bolt 3, and the fourth full-threaded bolt 3 may be spaced apart from each other and fixed to the ceiling wall. An opening O of the ceiling surface C may be formed under the full-threaded bolt 3 to correspond to the size of the plane of the indoor unit 1. The worker may fix and couple the first full-threaded bolt 3, the second full-threaded bolt 3, the third full-threaded bolt 3, and the fourth full-threaded bolt 3 through the opening O of the ceiling surface C. The number of full-threaded bolts 3 set to install the indoor unit 1 is not limited thereto.

[0048] Referring to FIG. 7B, the installation structure 100 may be installed by being coupled to the full-threaded bolt 3. For example, two installation structures 100 may be installed to support two opposite sides of the body of the indoor unit 1, but are not limited thereto. As illustrated, one installation structure 100 may be fixed by being coupled to two full-threaded bolts 3, but is not limited thereto, and one installation structure 100 may be configured to be coupled to one or three or more full-threaded bolts 3. In the installation process of FIG. 7B, the worker may install the edge rib of the lower member 120 (e.g., the edge rib 122 of FIG. 2) to contact the lower surface of the ceiling surface C. Since the position where the indoor unit 1 is mounted is determined by adjusting the position of the installation structure 100 that allows the edge rib 122 to contact the lower surface of the ceiling surface C, a separate height adjustment process for placing the indoor unit 1 in the correct position may be omitted later, thereby simplifying the installation process.

[0049] When the installation structure 100 of the disclosure is used, the installation of the indoor unit 1 on the ceiling may be performed more conveniently by installing an installation structure that is lighter than the indoor unit 1. Further, while the installation structure 100 is installed, there is no need to hold the indoor unit 1 between the ceiling wall and the ceiling surface C as a separate step, so that a large working space may be secured.

[0050] Referring to FIG. 7C, the ceiling-mounted indoor unit 1 may be installed by simply mounting the indoor unit 1 on the installation structure 100 after installing the installation structure 100. For example, the worker may insert one side portion of the body of the indoor unit 1 into the mounting space 111 of one of the two installation structures 100. The worker may mount the indoor unit 1 on one installation structure 100 with the indoor unit 1 inclined, as shown. Since the indoor unit 1 passes through the opening O in an inclined state and is mounted on one installation structure 100, even if the length of the plane of the indoor unit 1 in the length direction is larger than the length L1 of the long side of

the opening O, the indoor unit 1 may pass through the opening O and be disposed above the ceiling surface C. Here, the length L1 of the long side of the opening O may be a length corresponding to the distance between the vertical surfaces 121 of the lower members 120 of the installation structures 100 installed on two opposite sides. Here, the length in the length direction of the plane of the indoor unit 1 may refer to a length in a direction parallel to the length L1 of the long side of the opening O.

[0051] Referring to FIG. 7D, after one side portion of the body of the indoor unit 1 is inserted, the other side portion, which is the remaining portion, may also be inserted into the installation structure 100 to fix the indoor unit 1 to the ceiling. In this case, since height adjustment of the indoor unit 1 has been simultaneously performed when adjusting the height of the installation structure using the position of the edge rib 122 of the lower member 120, there is no further height adjustment process. Finally, the worker may finish the installation work by fixing the indoor unit 1 supported on the support surface 114 of the installation structure 100 using a fixing member 130 (or a fastening member).

[0052] FIG. 8 is a view illustrating a state in which an indoor unit is installed using a conventional installation structure, as viewed from above. FIG. 9 is a view illustrating a state in which an indoor unit is installed using an installation structure, as viewed from above, according to an embodiment.

[0053] In the case of FIG. 8, the ceiling-mounted indoor unit 1 may be installed by coupling the hanger 810 assembled to the body of the indoor unit 1 to the full-threaded bolt 820 according to the conventional method. In order to install the indoor unit 1 in this way, the worker should fasten the full-threaded bolt 820 and the nut 830 in a state in which the indoor unit 1 is held between the ceiling wall and the ceiling surface. Even after fastening each of the four places, the worker should adjust the nut 830 again to adjust the level of the height of the indoor unit 1 or adjust the height.

[0054] Further, as illustrated in FIG. 8, in order to install the indoor unit 1 in the conventional manner, an opening O' should be formed which has an area of the area the plane M' of the indoor unit 1 plus the portion where the hanger 810 and the full-threaded bolt 820 are coupled. For example, the first length L1' of the opening O' (e.g., the length of the long side of the opening O') required to install the conventional indoor unit 1 becomes larger than the second length L2' (e.g., the length of the long side of the indoor unit 1) parallel to the first length L1' in the area occupied by the plane M' of the indoor unit 1. In this case, in order to install the ceiling-mounted indoor unit 1, an additional space is required to couple the full-threaded bolt 820 and the hanger 810, so that it is needed to form an opening O' longer than the indoor unit 1. Thus, an empty space between the indoor unit 1 and the opening O' may hurt the appearance of the indoor ceiling. Further, if the size of the space where the ceiling-mounted indoor unit 1 is to be installed is limited, installation may be difficult.

[0055] In the case of FIG. 9, when the indoor unit 1 is installed using the installation structure 100 of the disclosure as described in FIGS. 7A to 7D, an additional area other than the area occupied by the plane M of the indoor unit 1 is hardly required. As illustrated, the installation structure 100 may be disposed to overlap a portion of the indoor unit when viewed from above in a state in which the indoor unit 1 is installed.

[0056] According to an example, the first length L1 (e.g., the length of the long side of the opening O) of the opening O may be equal to or shorter than the second length L2 (e.g., the length of the long side of the indoor unit 1) parallel to the first length L1 in the area occupied by the plane M of the indoor unit 1. If the indoor unit 1 is installed using the installation structure 100 according to an embodiment of the disclosure, as illustrated in FIGS. 7A, 7B, 7C, and 7D, installation is completed by passing the indoor unit 1 with it inclined, through the opening O and mounting one side on one installation structure 100 and then mounting the other side on another installation structure 100, so that only the opening having the first length L1 shorter than the second length L2 of the indoor unit 1 is formed to install the indoor unit 1 on the ceiling. In other words, when the installation structure 100 of the disclosure is used, the indoor unit 1 may be installed by utilizing the smaller area of the opening O.

[0057] FIG. 10 is a view illustrating a state in which an installation structure is fixed to a ceiling according to an embodiment.

[0058] FIG. 10 is a view illustrating a state in which an installation structure 1000 is coupled to a full-threaded bolt 3 for convenience of description. The installation structure 1000 illustrated in FIG. 10 may be substantially the same as the installation structure 1000 described with reference to FIGS. 1 to 7D.

[0059] Referring to FIG. 10, the installation structure 1000 may include a hanger member 1010 or a lower member 1020. The indoor unit 1 may be installed on the ceiling in a manner to mount the indoor unit 1 on the hanger member 1010 after the installation structure 1000 is coupled to the full-threaded bolt 3 and installed on the ceiling. If the installation structure 1000 is coupled to the full-threaded bolt 3, the lower member 1020 may contact the surroundings of the opening O of the ceiling surface C.

[0060] According to an embodiment, the hanger member 1010 may be installed to be fixed to a ceiling wall (e.g., the ceiling wall W of FIG. 4). The hanger member 1010 may be formed of, e.g., a fire-resistant material. The hanger member 1010 may include, e.g., a steel or stainless material, but is not limited thereto. Therefore, the installation structure 1000 may be maintained in its shape without being burned or melted by fire, preventing indoor unit 1 from falling even if a fire occurs.

[0061] According to an embodiment, the hanger member 1010 may include an upper portion 1010a, a first side portion 1010b, and a second side portion 1010c. The

hanger member 1010 may have a shape with an open lower side. According to an embodiment, the hanger member 1010 may provide a mounting space 1011 in which a portion of the indoor unit 1 is mounted. The mounting space 1011 may be defined by the upper portion 1010a, the first side portion 1010b, and the second side portion 1010c.

[0062] According to an example, the hanger member 1010 may include a through portion (not shown) configured to allow the full-threaded bolt 3 fixed to the ceiling wall W to pass there through. The through portion may be positioned, e.g., in the upper portion 1010a of the hanger member 1010. According to an example, the hanger member 1010 may include an insertion portion 1012 provided to be open to allow the full-threaded bolt 3 to be inserted into the through portion when the installation structure 1000 is installed.

[0063] According to an embodiment, the hanger member 1010 may be configured to mount the indoor unit 1. The hanger member 1010 may include a support surface 1014 for mounting or supporting the indoor unit 1. The support surface 1014 may be positioned on each of the first side portion 1010b and the second side portion 1010c. The support surface 1014 may be positioned under the hanger member 1010 and may extend toward the inside of the hanger member 1010. Here, the inside may refer to a direction toward the mounting space 1011. The support surface 1014 may extend in, e.g., a horizontal direction. The support surface 1014 may extend, e.g., in a direction perpendicular to the first side portion 1010b or the second side portion 1010c. The first support surface 1014 formed on the first side portion 1010b and the second support surface 1014 formed on the second side portion 1010c may be positioned at substantially the same height.

[0064] According to an embodiment, the support surface 1014 may include an opening 1014a. According to an embodiment, the installation structure 1000 may include a fixing member 1030 (or a fastening member). The fixing member 1030 may pass through the opening 1014a of the support surface 1014. If the indoor unit 1 is mounted on the support surface 1014, the fixing member 1030 may pass through the opening 1014a of the support surface 1014 to be fastened to the indoor unit 1. As the fixing member 1030 is fastened to the indoor unit 1, the indoor unit 1 may be fixedly coupled to the installation structure 1000. Therefore, it is possible to prevent the indoor unit 1 from moving with respect to the installation structure 1000 due to vibration generated while the indoor unit 1 is operating.

[0065] According to an example, the lower member 1020 may be coupled to a lower portion of the hanger member 1010. The lower member 1020 may be coupled to the hanger member 1010 by, e.g., a fixing member 1030 (or a fastening member). According to an example, the lower member 1020 may be manufactured by an injection method. The lower member 1020 may be formed of, e.g., a plastic material, but is not limited thereto.

[0066] According to an embodiment, the lower member 1020 may include a vertical surface 1021 and an edge rib 1022. The edge rib 1022 may horizontally extend outward from the vertical surface 1021. The edge rib 1022 may extend from at least a portion of a lower end of the vertical surface 1021, but is not limited thereto, may extend from another portion of the vertical surface 1021. The edge rib 1022 may be a portion in contact with the ceiling surface C when the installation structure 1000 is coupled to the full-threaded bolt 3. For example, the installation structure 1000 may be installed so that the edge rib 1022 faces the ceiling surface C.

[0067] According to an example, the lower member 1020 may be formed to contact the edge of the opening O of the ceiling surface C for positioning the indoor unit 1. For example, the vertical surface 1021 of the lower member 1020 may be formed to contact the edge of the opening O of the ceiling surface C. The lower member 1020 may have, e.g., the same shape as the opening O of the ceiling surface C. For example, the lower member 1020 may have a rectangular cross-sectional shape corresponding to the opening O of the ceiling surface C as illustrated. For example, the vertical surface 1021 of the lower member 1020 may have the same shape as the opening O of the ceiling surface C.

[0068] According to an embodiment, a plurality of hanger members 1010 may be coupled to the lower member 1020. For example, as shown, two hanger members 1010 may be coupled on two opposite sides of the lower member 1020 formed to surround the edge of the opening O of the ceiling surface C. The number of hanger members 1010 coupled to the lower member 1020 is not limited thereto, and three or more hanger members 1010 may be coupled to the lower member 1020.

[0069] According to an example, the edge rib 1022 may be configured to be visible when viewed from below the ceiling surface C. The edge rib 1022 may contact the lower surface of the ceiling surface C, for example. The edge rib 1022 may support the ceiling surface C. The shape of the edge rib 1022 is not limited to the foregoing, and may be configured to be invisible when viewed from below the ceiling surface C. In this case, the edge rib 1022 may contact the upper surface of the ceiling surface C.

[0070] FIG. 11 is a view illustrating a state in which an installation structure is fixed to a ceiling according to an embodiment.

[0071] FIG. 11 is a view illustrating a state in which an installation structure 1100 is coupled to a full-threaded bolt 3 for convenience of description.

[0072] Referring to FIG. 11, the installation structure 1100 may include a hanger member 1110 or a lower member 1120. The indoor unit 1 may be installed on the ceiling in a manner to mount the indoor unit 1 on the hanger member 1110 after the installation structure 1100 is coupled to the full-threaded bolt 3 and installed on the ceiling. If the installation structure 1100 is coupled to

the full-threaded bolt 3, the lower member 1120 may contact the surroundings of the opening O of the ceiling surface C. Each installation structure 1100 may be disposed by being coupled to one full-threaded bolt 3, for example.

[0073] According to an example, as many installation structures 1100 as the number of full-threaded bolts fixed to the ceiling wall (e.g., the ceiling wall W of FIG. 4) may be provided. For example, four installation structures 1100 may be provided as illustrated. Each installation structure 1100 may be positioned at a corner portion of the opening O of the ceiling surface C.

[0074] According to an embodiment, the hanger member 1110 may be installed to be fixed to the ceiling wall W. The hanger member 1110 may be formed of, e.g., a fire-resistant material. The hanger member 1110 may include, e.g., a steel or stainless material, but is not limited thereto. Therefore, the installation structure 1100 may be maintained in its shape without being burned or melted by fire, preventing indoor unit 1 from falling even if a fire occurs.

[0075] According to an embodiment, the hanger member 1110 may include an upper surface 1110a, a first side surface 1110b, and a second side surface 1110c perpendicular to the first side surface 1110b. The upper surface 1110a may be, e.g., a portion coupled to the full-threaded bolt 3. The first side surface 1110b and the second side surface 1110c may extend to be perpendicular from the upper surface 1110a to be coupled to the lower member 1120.

[0076] According to an example, the hanger member 1110 may include a through portion (not shown) configured to allow the full-threaded bolt 3 fixed to the ceiling wall W to pass therethrough. The through portion may be positioned, e.g., on the upper surface 1110a of the hanger member 1110. According to an example, the hanger member 1110 may include an insertion portion 1112 provided to be open to allow the full-threaded bolt 3 to be inserted into the through portion when the installation structure 1100 is installed. The insertion portion 1112 may be formed to extend along a portion of the upper surface 1110a and the first side surface 1110b, for example. In other words, the first side surface 1110b may be formed to be partially open. Due to the open shape, when the full-threaded bolt 3 is inserted laterally into the hanger member 1110, it may be inserted more conveniently.

[0077] According to an embodiment, the hanger member 1110 may be configured to mount the indoor unit 1. The hanger member 1110 may include a support surface 1114 for mounting or supporting the indoor unit 1. The support surface 1114 may be formed to extend from the second side surface 1110c. The support surface 1114 may be positioned under the hanger member 1110 and may extend toward the inside of the hanger member 1110. Here, the inside may refer to a direction toward the indoor unit (e.g., the indoor unit 1 of FIG. 1). The support surface 1114 may extend in, e.g., a horizontal direction. The support surface 1114 may extend in a direction perpendicular to the second side surface 1110c, for example.

[0078] According to an embodiment, the support surface 1114 may include an opening 1114a. According to an embodiment, the installation structure 1100 may include a fixing member 1130 (or a fastening member). The fixing member 1130 may pass through the opening 1114a of the support surface 1114. If the indoor unit 1 is mounted on the support surface 1114, the fixing member 1130 may pass through the opening 1114a of the support surface 1114 to be fastened to the indoor unit 1. As the fixing member 1130 is fastened to the indoor unit 1, the indoor unit 1 may be fixedly coupled to the installation structure 1100. Therefore, it is possible to prevent the indoor unit 1 from moving with respect to the installation structure 1100 due to vibration generated while the indoor unit 1 is operating.

[0079] According to an example, the lower member 1120 may be coupled to a lower portion of the hanger member 1110. The lower member 1120 may be coupled to the hanger member 1110 by, e.g., a fixing member 1130 (or a fastening member). According to an example, the lower member 1120 may be manufactured by an injection method. The lower member 1120 may be formed of, e.g., a plastic material, but is not limited thereto.

[0080] According to an embodiment, the lower member 1120 may include a vertical surface 1121 and an edge rib 1122. The edge rib 1122 may horizontally extend outward from the vertical surface 1121. The edge rib 1122 may extend from at least a portion of a lower end of the vertical surface 1121, but is not limited thereto, may extend from another portion of the vertical surface 1121. The edge rib 1122 may be a portion in contact with the ceiling surface C when the installation structure 1100 is coupled to the full-threaded bolt 3. For example, the installation structure 1100 may be installed so that the edge rib 1122 faces the ceiling surface C.

[0081] According to an example, the lower member 1120 may be formed to contact the edge of the opening O of the ceiling surface C for positioning the indoor unit 1. For example, the vertical surface 1121 of the lower member 1120 may be formed to contact the edge of the opening O of the ceiling surface C. The lower member 1120 may have, e.g., the same shape as the opening O of the ceiling surface C. For example, the lower member 1120 may have a rectangular cross-sectional shape corresponding to the opening O of the ceiling surface C as illustrated. For example, the vertical surface 1121 of the lower member 1120 may have the same shape as the opening O of the ceiling surface C.

[0082] According to an embodiment, a plurality of hanger members 1110 may be coupled to the lower member 1120. For example, as shown, two hanger members 1110 may be coupled on two opposite sides of the lower member 1120 formed to surround the edge of the opening O of the ceiling surface C. The number of hanger members 1110 coupled to the lower member 1120 is not limited thereto, and three or more hanger members 1110

may be coupled to the lower member 1120.

[0083] According to an example, the edge rib 1122 may be configured to be visible when viewed from below the ceiling surface C. The edge rib 1122 may contact the lower surface of the ceiling surface C, for example. The edge rib 1122 may support the ceiling surface C. The shape of the edge rib 1122 is not limited to the foregoing, and may be configured to be invisible when viewed from below the ceiling surface C. In this case, the edge rib 1122 may contact the upper surface of the ceiling surface C.

[0084] Any embodiment of the disclosure may be used in combination with any other embodiment of the disclosure.

[0085] The terms as used herein are provided merely to describe some embodiments thereof, but are not intended to limit the disclosure. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C," may include all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, the term 'and/or' should be understood as encompassing any and all possible combinations by one or more of the enumerated items. As used herein, the terms "include," "have," and "comprise" are used merely to designate the presence of the feature, component, part, or a combination thereof described herein, but use of the term does not exclude the likelihood of presence or adding one or more other features, components, parts, or combinations thereof. As used herein, the terms "first" and "second" may modify various components regardless of importance and/or order and are used to distinguish a component from another without limiting the components.

[0086] As used herein, the terms "configured to" may be interchangeably used with the terms "suitable for," "having the capacity to," "designed to," "adapted to," "made to," or "capable of" depending on circumstances. The term "configured to" does not essentially mean "specifically designed in hardware to." Rather, the term "configured to" may mean that a device can perform an operation together with another device or parts. For example, a 'device configured (or set) to perform A, B, and C' may be a dedicated device to perform the corresponding operation or may mean a general-purpose device capable of various operations including the corresponding operation.

[0087] Meanwhile, the terms "upper side", "lower side", and "front and rear directions" used in the disclosure are defined with respect to the drawings, and the shape and position of each component are not limited by these terms.

[0088] In the disclosure, the above-described description has been made mainly of specific embodiments, but the disclosure is not limited to such specific embodiments, but should rather be appreciated as covering all various modifications, equivalents, and/or substitutes of various embodiments.

Claims

1. An installation structure for an indoor unit, comprising:

   a hanger member (110, 1010, 1110) installed to be fixed to a ceiling wall (W) and configured to mount the indoor unit (1); and
   a lower member (120, 1020, 1120) coupled to a lower portion of the hanger member (110, 1010, 1110) and comprising an edge rib (122, 1022, 1122) extending horizontally outwardly from at least a portion of a lower end to contact a ceiling surface (C).

2. The installation structure of claim 1, wherein the edge rib (122, 1022, 1122) is configured to be visible when viewed from below the ceiling surface (C).

3. The installation structure of claim 1, wherein the hanger member (110, 1010, 1110) comprises a support surface (114, 1014, 1114) configured to be bent horizontally inward to support the indoor unit (1) at a lower portion thereof.

4. The installation structure of claim 3, wherein the support surface (114, 1014, 1114) comprises an opening (1141, 1014a, 1114a).

5. The installation structure of claim 4, comprising a fixing member provided to, if the indoor unit (1) is mounted on the support surface (114, 1014, 1114), pass through the opening (1141, 1014a, 1114a) to fix the indoor unit (1) on the support surface (114, 1014, 1114).

6. The installation structure of claim 3, wherein the hanger member (110, 1010, 1110) includes:

   a first bend portion (115) bent downward to be perpendicular to the support surface (114, 1014, 1114); and
   a second bend portion (116) bent to be parallel to the support surface (114, 1014, 1114), under the first bend portion (115).

7. The installation structure of claim 6, wherein the lower member (120, 1020, 1120) is configured to be partially inserted into a space defined by the support surface (114, 1014, 1114), the first bend portion (115), and the second bend portion (116).

8. The installation structure of claim 1, wherein the installation structure is disposed to overlap a portion

of the indoor unit (1) when viewed from above in a state in which the indoor unit (1) is installed.

9. The installation structure of claim 1, wherein the lower member (120, 1020, 1120) is formed to contact at least a portion of an edge of an opening (O) of the ceiling surface (C) in which the indoor unit (1) to be positioned.

10. The installation structure of claim 1, wherein the hanger member (110, 1010, 1110) includes a through portion (112) configured to allow a full-threaded bolt (3) fixed to the ceiling wall (W) to pass therethrough.

11. The installation structure of claim 10, comprising:

a lower nut provided to be fastened to the full-threaded bolt (3) to be positioned under the through portion (112) to adjust a height of the hanger member (110, 1010, 1110); and
an upper nut provided to be fastened to the full-threaded bolt (3) to be positioned above the through portion (112) to fix a movement of the hanger member (110, 1010, 1110).

12. The installation structure of claim 1, wherein the hanger member (110, 1010, 1110) includes a steel or stainless steel material.

13. The installation structure of claim 1, wherein the lower member (120, 1020, 1120) includes a plastic material.

14. The installation structure of claim 1, wherein the lower member (1020) has the same shape as an opening (O) of the ceiling surface (C) for the indoor unit (1) to be positioned, and
wherein a plurality of hanger members (1010) are coupled to the lower member (1020).

15. The installation structure of claim 1, a plurality of installation structures are disposed in each corner of an opening (O) of the ceiling surface (C) where the indoor unit (1) is positioned.

FIG. 1

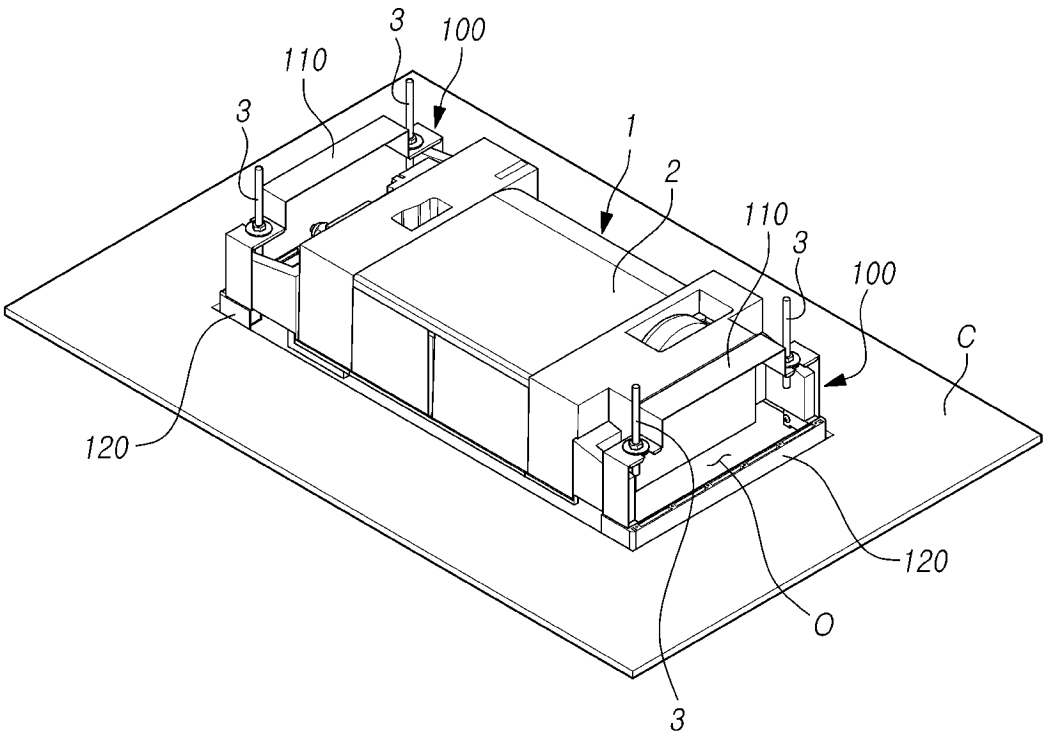
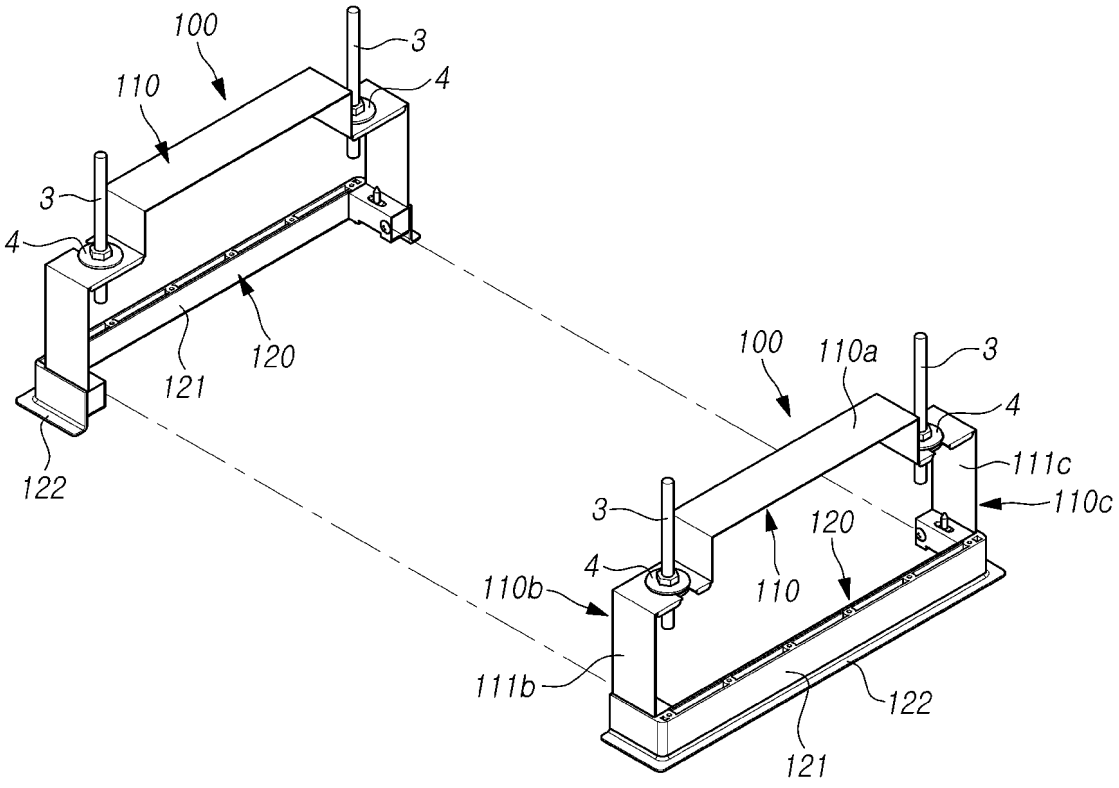


FIG.2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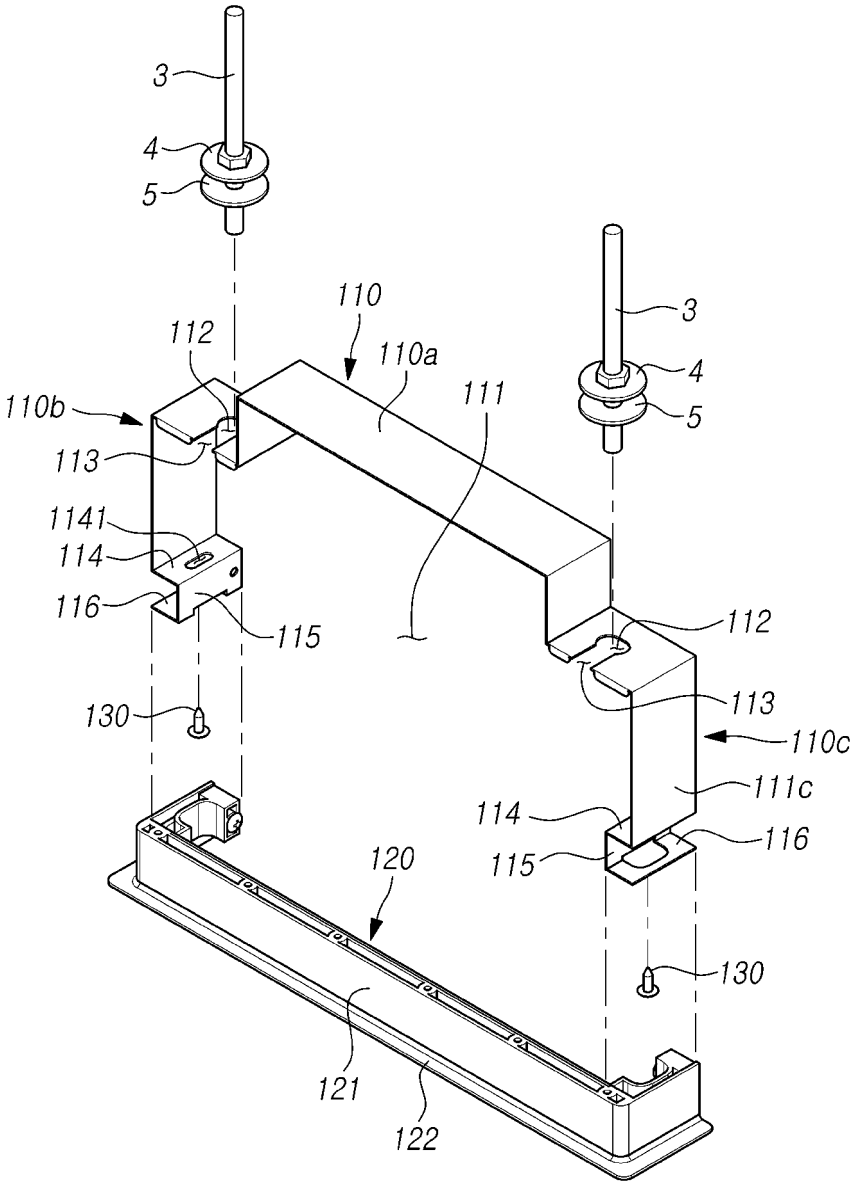
122
121

FIG.3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110b
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130
121
122

FIG.4

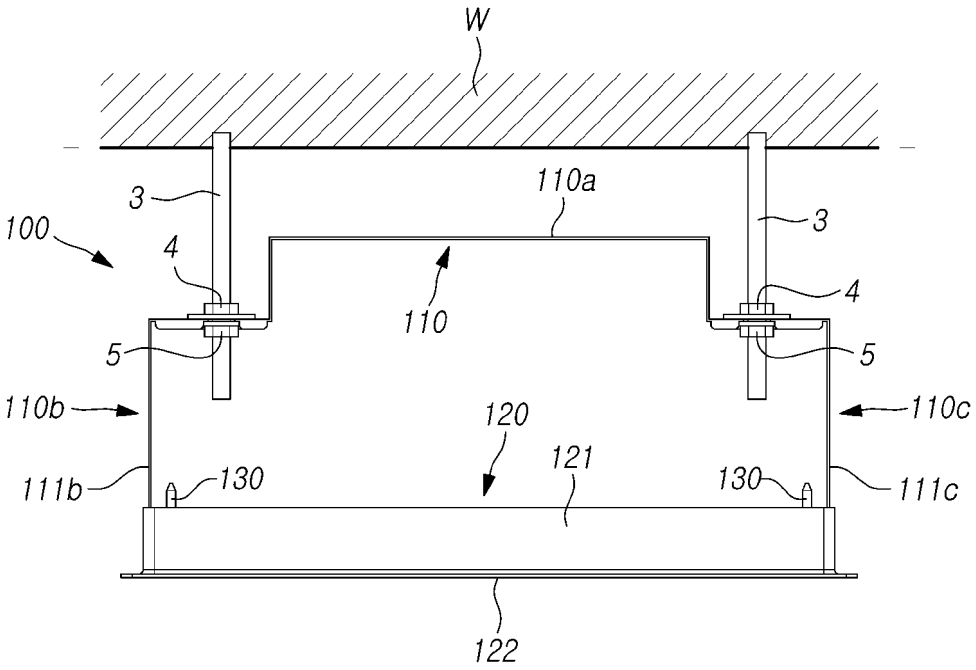
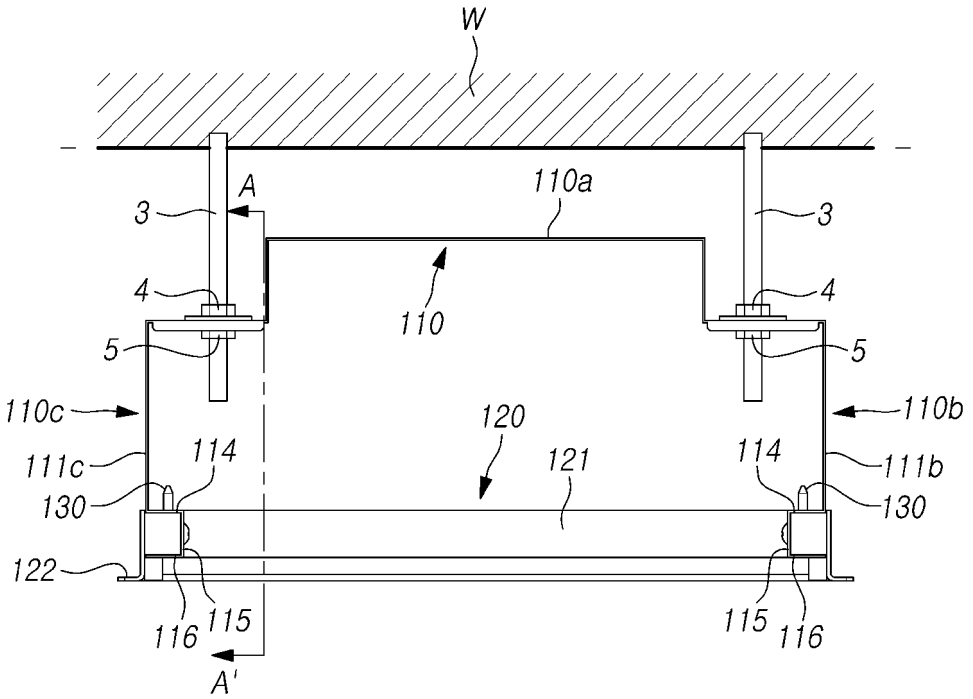


FIG.5


W
A
3
3
110a
4
4
110
5
5
110c
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114
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115
115
116
A'

FIG.6

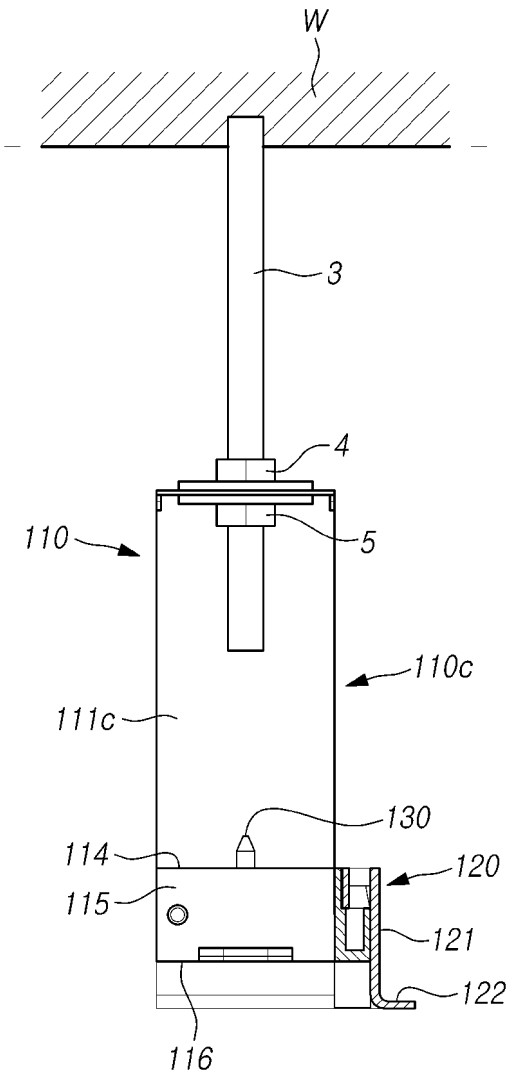


FIG. 7A

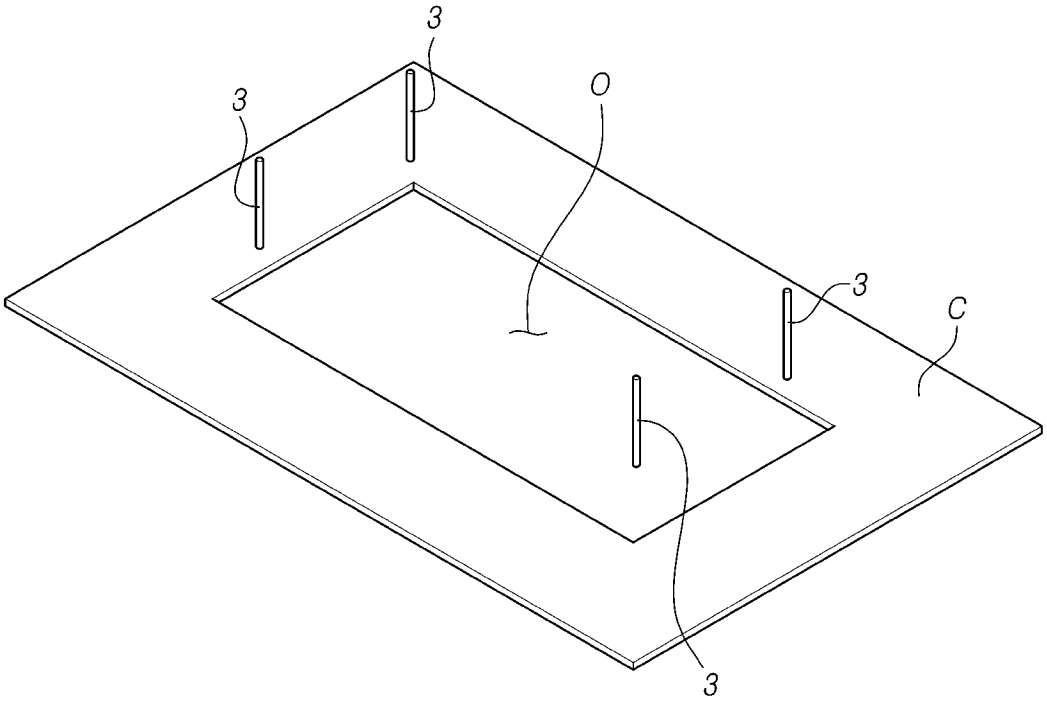
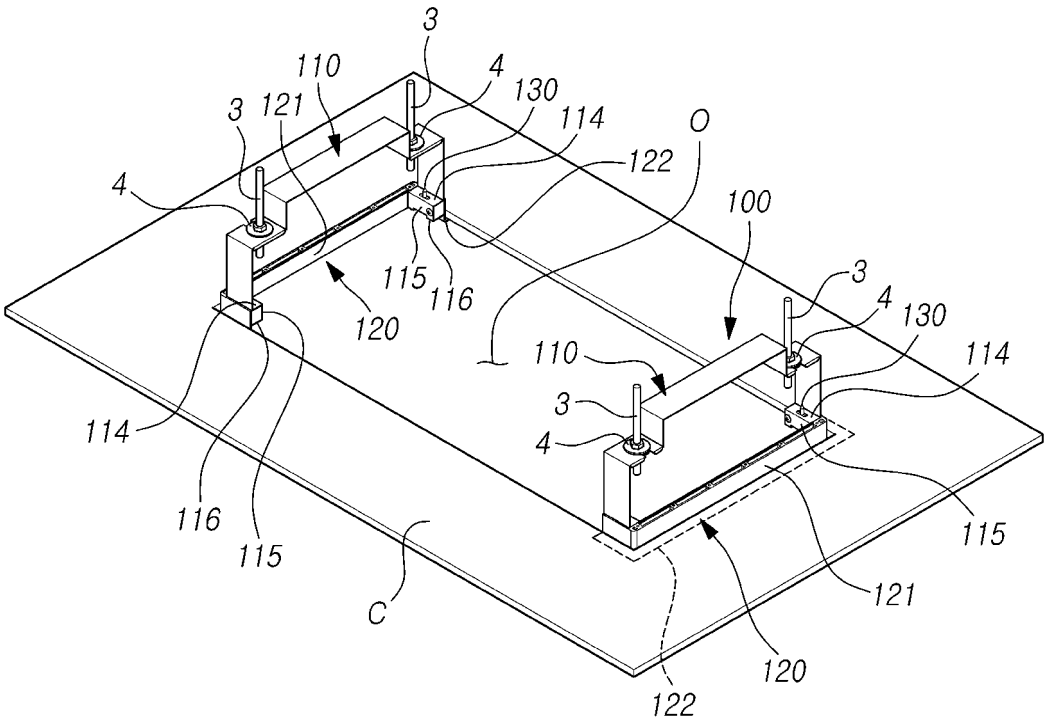


FIG. 7B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110
4
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3
121
114
O
122
4
100
115
116
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4
130
120
110
114
3
4
114
116
115
115
C
121
120
122

FIG. 7C

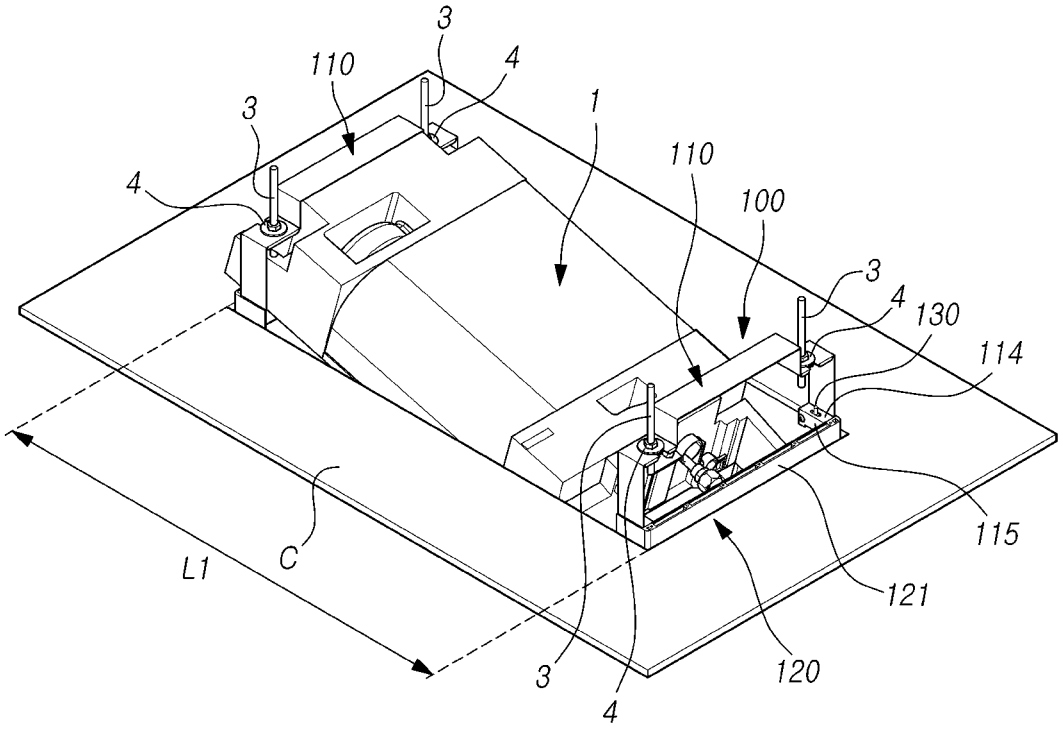


FIG. 7D

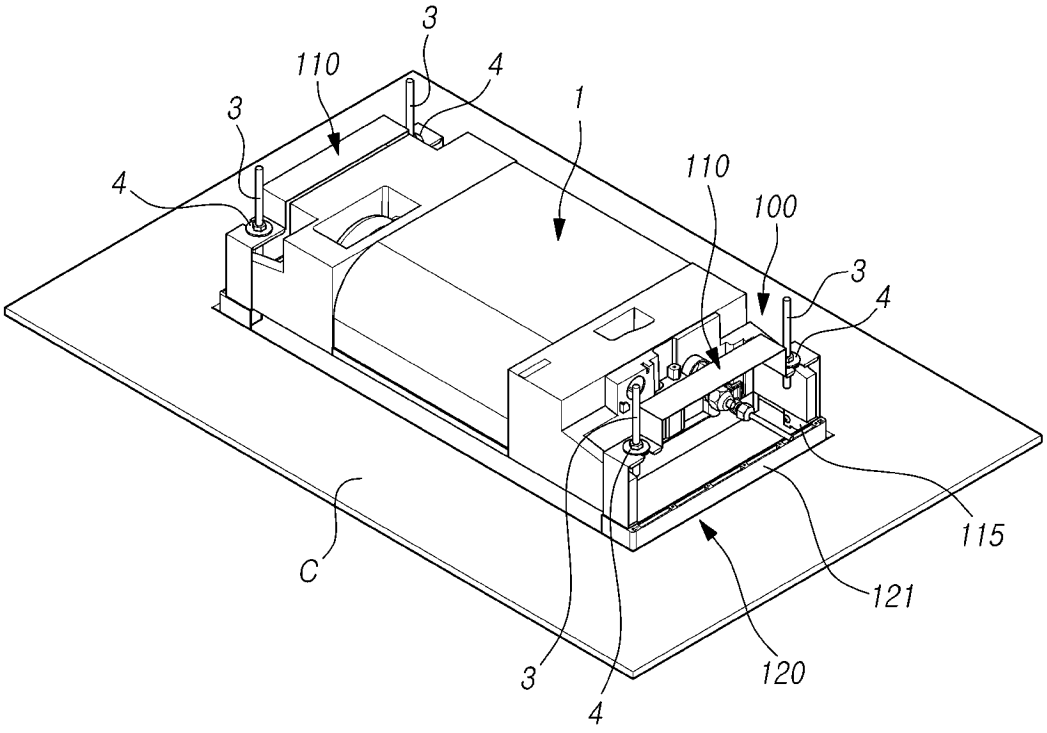


FIG.8

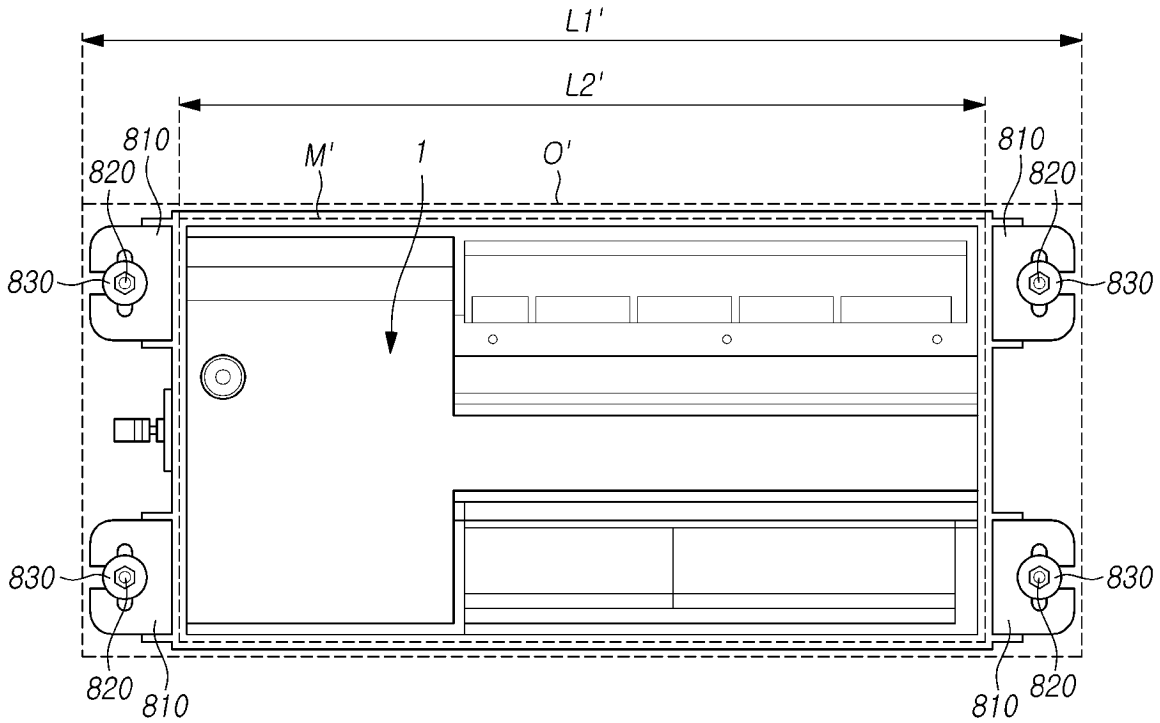


FIG.9

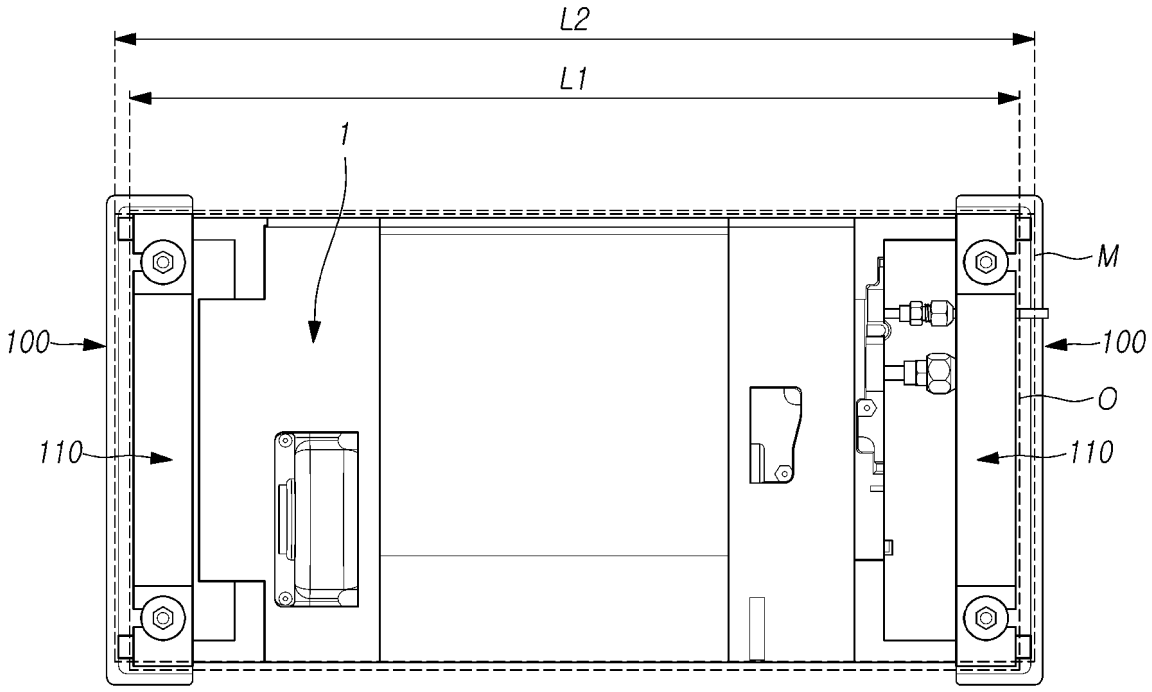
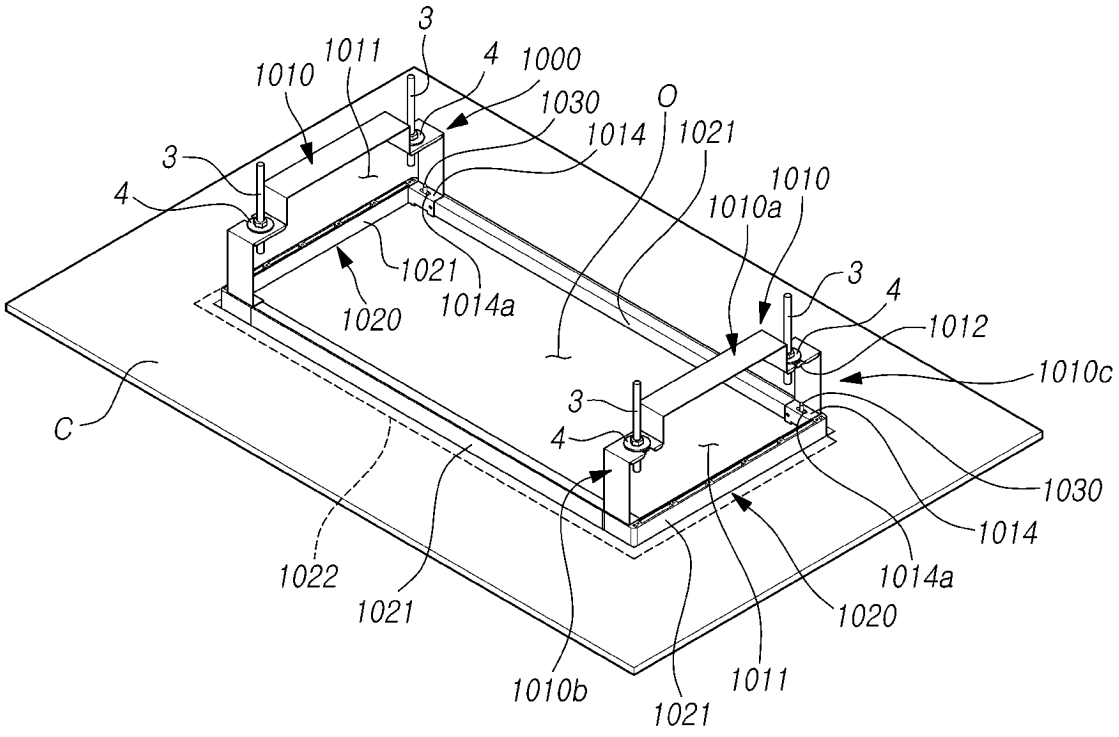


FIG. 10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4
1000
1010
1030
O
1014
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3
1010
4
1010a
1021
3
4
1020
1014a
1012
1010c
C
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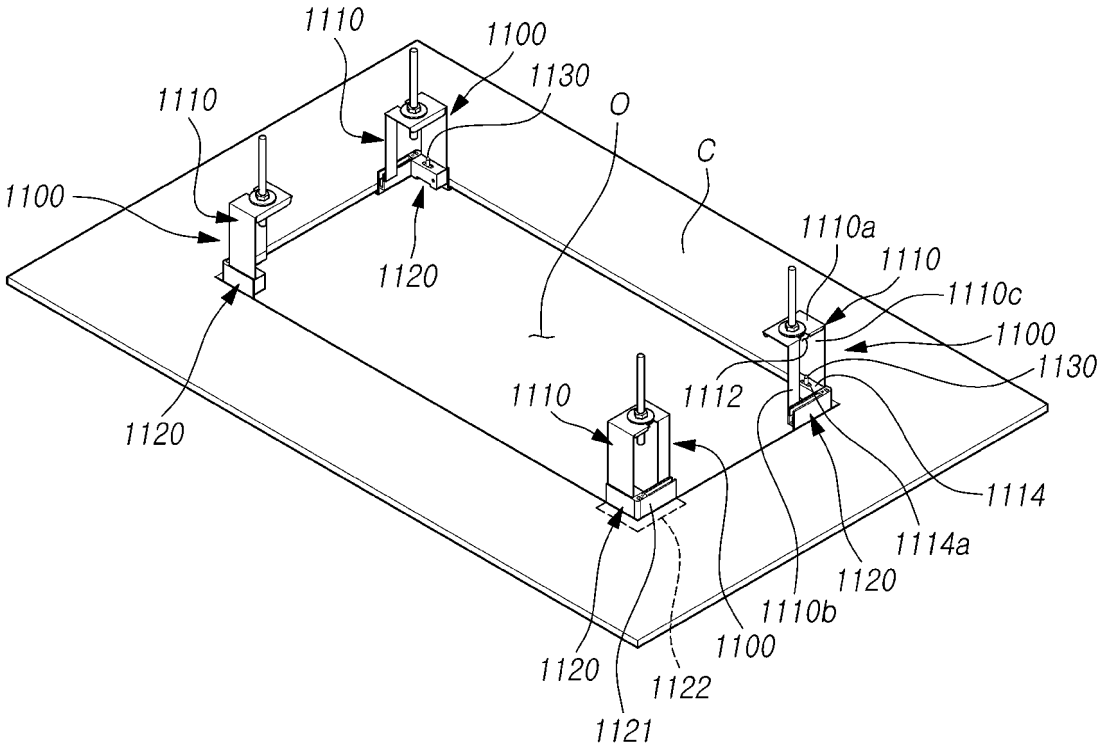
4
1030
1014
1022
1014a
1021
1020
1010b
1011
1021

FIG. 11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1114a
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1110b
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1120
1122
1121

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2023/014901

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/0047(2019.01)i; **F24F 13/32**(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F 1/0047(2019.01); F16M 13/00(2006.01); F24F 1/00(2011.01); F24F 13/32(2006.01); F24F 3/16(2006.01); F24F 5/00(2006.01); F24H 1/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 설치 구조(install structure), 실내기(indoor unit), 천장(ceiling), 행거(hanger), 리브(rib), 절곡(bending)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 10-019309 A (NEMII KOGYO K.K. et al.) 23 January 1998 (1998-01-23) See paragraphs [0002] and [0004]; and figures 1 and 4.	1-2,8-15
A		3-7
Y	KR 10-0360423 B1 (LG ELECTRONICS INC.) 08 November 2002 (2002-11-08) See paragraph [0016]; and figure 3.	1-2,8-15
A	KR 10-2021-0084069 A (DAERYUK CONSTRUCTION CO., LTD.) 07 July 2021 (2021-07-07) See paragraphs [0031]-[0033]; and figure 1.	1-15
A	KR 10-2005-0039975 A (LG ELECTRONICS INC.) 03 May 2005 (2005-05-03) See claim 1; and figure 1.	1-15
A	JP 2005-282956 A (SANYO ELECTRIC CO., LTD.) 13 October 2005 (2005-10-13) See paragraphs [0017]-[0018]; and figure 2.	1-15

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 January 2024	**18 January 2024**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2023/014901

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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KR 10-2005-0039975 A	03 May 2005	None	
JP 2005-282956 A	13 October 2005	JP 4297819 B2	15 July 2009

Form PCT/ISA/210 (patent family annex) (July 2022)