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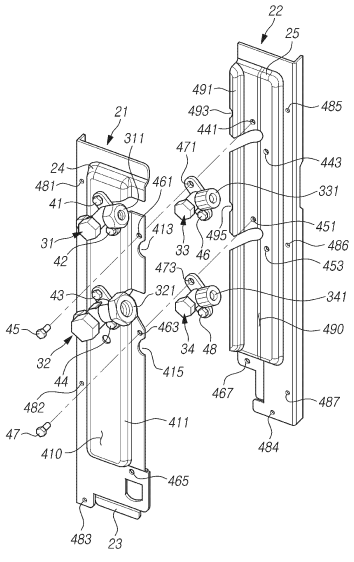
(54) **CEILING-TYPE AIR CONDITIONER**

(57) Various embodiments disclosed herein relate to a bracket structure for fastening pipes in an outdoor unit of an air conditioner. To this end, the outdoor unit of the air conditioner may include: a bracket configured by fastening a right-side part of an upper plate and a left-side part of a lower plate so that the surfaces thereof partially overlap, wherein one or a plurality of first service valves are mounted on the right-side part of the upper plate and one or a plurality of second service valves are mounted on the left-side part of the lower plate; and a housing configured so that the bracket is fastened to the lower end of one surface.

FIG.5



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Description

[Technical Field]

[0001] The disclosure relates to a bracket structure for fastening pipes in an outdoor unit of an air conditioner.

[Background Art]

[0002] An air conditioner may include components, such as a compressor, a condenser, an expansion valve, an evaporator, or a blower fan. The air conditioner may provide air conditioning indoors or in a specific place by controlling the temperature, humidity, air flow, or cleanliness of the air using a cooling cycle.

[0003] The air conditioner may be structurally divided into a separate type in which the compressor is placed outdoors, and an integrated type in which the compressor is integrated. The separate-type air conditioner may connect an indoor unit including an indoor heat exchanger to an outdoor unit including an outdoor heat exchanger and a compressor using a refrigerant pipe. The integrated-type air conditioner may install an indoor heat exchanger, an outdoor heat exchanger, or a compressor in one housing.

[0004] The air conditioner may include an outdoor unit to discharge air polluted or heated from the indoor unit to the outside. The outdoor unit may include a fan, a compressor, or various pipes for discharging air to the outside.

[0005] The outdoor unit of the air conditioner may require brackets which are separate structures for connecting the external piping with the internal piping. The bracket is a separate component and must be able to be mounted on the housing of the outdoor unit. In this case, for the brackets on which the service valves to connect the external piping and the internal piping in the outdoor unit, piping work may be hard due to the surrounding components. Thus, a need exists for a method for reducing interference by other structures.

[Disclosure]

[Technical Solution]

[0006] Embodiments of the disclosure is to provide a bracket structure capable of reducing interference by an adjacent service valve or plate during the work of fastening a pipe to a service valve in an outdoor unit of an air conditioner.

[0007] Embodiments of the disclosure is to provide a bracket structure for blocking foreign objects from entering from the outside to the inside when mounted on an outdoor unit of an air conditioner.

[0008] Embodiments the disclosure is to provide a fastening structure for coupling service valves and plates to constitute a bracket to be mounted on an outdoor unit of an air conditioner.

[0009] The technical objects of the disclosure are not limited to the foregoing, and other technical objects may be derived by one of ordinary skill in the art from example embodiments of the disclosure.

[0010] According to various example embodiments of the disclosure, an outdoor unit of an air conditioner may comprise a bracket configured as a right side portion of an upper plate where one or more first service valves are mounted and a left side portion of a lower plate where one or more second service valves are mounted are fastened to overlap each other in a partial area and a housing configured to allow the bracket to be fastened at a lower portion of one surface thereof.

[0011] According to various example embodiments of the disclosure, there is proposed a bracket structure installed on an outdoor unit of an air conditioner, which may secure a working space for fastening a pipe to the bracket and block foreign objects from entering from the outside to the inside.

[0012] 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.

[Description of Drawings]

[0013] The above and other aspects, features and advantages of certain embodiments of the present disclosure will be more apparent from the following detailed description, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view illustrating an outdoor unit provided in an air conditioner according to various embodiments;

FIG. 2a and 2b are views illustrating an example of mounting a bracket on the outdoor unit of FIG. 1;

FIG. 3 is a perspective view illustrating a bracket provided on an outdoor unit of an air conditioner according to various embodiments;

FIG. 4 is an exploded perspective view illustrating plates constituting the bracket of FIG. 3;

FIG. 5 is an exploded perspective view illustrating the bracket of FIG. 3;

FIG. 6 is a view illustrating an example of fastening pipes in a bracket provided on an outdoor unit of an air conditioner according to various embodiments;

FIG. 7a and 7b are a view illustrating an example effective work radius when pipes are fastened in a bracket provided on an outdoor unit of an air conditioner having a general structure;

FIG. 8a and 8b are a view illustrating an example effective work radius when pipes are fastened in a

bracket provided on an outdoor unit of an air conditioner having a structure according to various embodiments; and

FIGS. 9a and 9b are views illustrating an example of coupling two plates to provide a bracket according to various embodiments.

[Mode for Invention]

[0014] Embodiments of the present disclosure are now described in greater detail with reference to the accompanying drawings. 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 numerals may be used to refer to the same or similar elements throughout the disclosure and the drawings. Further, for clarity and brevity, no description may be made of well-known functions and configurations in the drawings and relevant descriptions.

[0015] As used in the disclosure, 'upper side,' 'upper direction,' 'lower side,' and 'lower direction' denote upper and lower directions of the air conditioner according to an embodiment of the present disclosure, shown in FIG. 1. In other words, the side where the inlet of the air conditioner in FIG. 1 is provided is referred to as a lower side, and the side there above is referred to as an upper side.

[0016] An air conditioner according to an embodiment of the disclosure is an air conditioner that lacks blades for air-conditioning the discharged air. However, without limitations to one embodiment of the present disclosure, the present disclosure may also be applicable to air conditioner including blades.

[0017] Further, an air conditioner according to an embodiment of the disclosure is an air conditioner that includes a heat exchanger provided in an annular shape. However, without limitations to one embodiment of the present disclosure, the present disclosure may also be applicable to air conditioners including a heat exchanger provided in a rectangular shape or in other various shapes.

[0018] Hereinafter, various embodiments of the disclosure are described with reference to the accompanying drawings.

[0019] FIG. 1 is a perspective view illustrating an outdoor unit 1 provided in an air conditioner according to various embodiments. FIG. 2A and 2B are views illustrating an example of mounting a bracket 20 on the outdoor unit 1 of FIG. 1.

[0020] Referring to FIGS. 1 and 2, an outdoor unit 1 of an air conditioner according to an embodiment may include a housing 10 having a bracket 20 mounted on one surface 10a thereof by fastening members 11 and 13. The one surface 10a of the housing 10 on which the bracket 20 is mounted may be, e.g., either the right or left side surface with respect to the front surface in a state in which the outdoor unit 1 is installed. An opening 30 for mounting the bracket 20 may be provided in the one surface 10a of the housing 10. Components constituting the outdoor unit 1, such as a compressor, a gas pipe, or a liquid pipe, may be disposed in the inner space of the housing 10.

[0021] According to an embodiment, the bracket 20 may be a structure for connecting an external pipe to an internal pipe. The bracket 20 may include an outer structure (e.g., service valves) for fastening with the external pipe on an outer surface thereof, and an inner structure (not shown) for fastening with the internal pipe (e.g., a gas pipe and/or a liquid pipe) on an inner surface thereof. The outer structure may be a plurality of service valves. The plurality of service valves may include, e.g., one or more first service valves and one or more second service valves that may be classified according to uses. The one or a plurality of first service valves may be low-pressure service valves, and the one or a plurality of second service valves may be high-pressure service valves. The inner structure may be a protruding member having a pipe shape at a lower end portion of the service valve, which is the outer structure. The protruding member may be fitted into, e.g., an internal pipe such as a gas pipe and/or a liquid pipe, or may be coupled by welding.

[0022] According to an embodiment, the bracket 20 may be mounted on the housing by fastening structures 11 and 13 formed as screws and screw holes at a lower end portion (e.g., the bottom surface 10b of the housing 10) of the housing 10 (a -> b). The bottom surface 10b of the housing 10 may have a rib provided by vertically bending an end (e.g., a line segment) of the bottom surface 10b to facilitate mounting of the bracket 20. To fasten the bracket 20, a plurality of screw holes penetrating two opposite surfaces of the rib may be formed.

[0023] According to an embodiment, a fitting gap may be provided in a portion of the lower end portion 10b of the housing on which the bracket 20 is to be mounted. A fitting plate may be provided at a lower end of the bracket 20 at a position facing the fitting gap provided in the housing 10. When the bracket 20 is mounted on the housing 10, the fitting plate provided in the bracket 20 may be fittingly fastened to the fitting gap provided in the housing 10. However, the structure in which the bracket 20 is mounted on the housing 10 is not limited to the illustrated structure, and may be implemented by various applications.

[0024] FIG. 3 is a perspective view illustrating a bracket (the bracket 20 of FIG. 1) provided on an outdoor unit (e.g., the outdoor unit 1 of FIG. 1) of an air conditioner according to various embodiments. FIG. 4 is an exploded perspective view illustrating plates constituting the bracket 20 of FIG. 3. FIG. 5 is an exploded perspective view illustrating the bracket 20 of FIG. 3.

[0025] Referring to FIGS. 3, 4, and 5, the bracket 20 according to an embodiment may include a first plate 21, a second plate 22, a plurality of service valves 31, 32, 33, and 34, or a plurality of fastening components 41, 42, 43, 44, 45, 46, 47, and 48. The first plate 21 may be an upper plate, and the second plate 22 may be a lower plate, but without limitations thereto, the first plate 21 may

be a lower plate, and the second plate 22 may be an upper plate. Among the plurality of service valves 31, 32, 33, and 34, the service valves 31 and 32 to be mounted on the first plate 21 may be low-pressure service valves, and the service valves 33 and 34 to be mounted on the second plate 22 may be high-pressure service valves. The low-pressure service valves 31 and 32 may be relatively larger than the high-pressure service valves 33 and 34.

[0026] According to an embodiment, the first plate 21 may include one or more fitting portions (e.g., the first fitting portion 420 and the second fitting portion 430 of FIG. 4), fastening holes 421, 423, 431, and 433 for fastening the first and second upper service valves 31 and 32, fastening holes 461, 463, and 465 for fastening with the second plate 22, fastening holes 481, 482, and 483 for fastening with the housing (e.g., the housing 20 of FIG. 1) or a component in the housing 20, or a rib 23 to be fitted into a lower portion of the housing 20.

[0027] The first fitting portion 420 and/or the second fitting portion 430 may be provided in a left direction that is inward from the end of the right side portion of the first plate 21. It may be preferable that the first fitting portion 420 and the second fitting portion 430 maintain a sufficient separation distance to facilitate pipe fastening. The fastening holes 421 and 423 for fastening with the first upper service valve 31 may be provided near the end of the first fitting portion 420. The fastening holes 431 and 433 for fastening with the second upper service valve 32 may be provided near the end of the second fitting portion 430.

[0028] The first plate 21 may be provided with an upper guide member 24 having a protruding upper surface 410 so that a central portion thereof is formed to be substantially higher than a surrounding portion thereof. The upper guide member 24 may serve as an assembly guide when coupled to the second plate 22. The right protruding corner among the four protruding corners provided in the upper guide member 24 may be used as, e.g., an upper guide stop jaw 411 configured to allow a lower guide stop jaw 491 provided in the second plate 22 to be engaged and stuck thereto when coupled with the second plate 22.

[0029] According to an embodiment, the second plate 22 may include one or more fitting portions (e.g., the third fitting portion 440 and the fourth fitting portion 450 of FIG. 4), fastening holes 441, 443, 451, and 453 for fastening the first and second lower service valves 33 and 34, fastening holes 467 for fastening with the first plate 21, or fastening holes 484, 485, 486, and 487 for fastening with the housing 20 or a component in the housing 20.

[0030] The third fitting portion 440 and/or the fourth fitting portion 450 may be provided in a right direction that is inward from an end of a left portion of the second plate 22. It may be preferable that the third fitting portion 440 and the fourth fitting portion 450 maintain a sufficient separation distance to facilitate pipe fastening. The fastening holes 441 and 443 for fastening with the first lower service valve 33 may be provided near the end of the third fitting portion 440. The fastening holes 451 and 453 for fastening with the second lower service valve 34 may be provided near the end of the fourth fitting portion 450.

[0031] The second plate 22 may be provided with a lower guide member 25 including a lower guide stop jaw 491 that protrudes from the lower surface 490 so that the whole or part of the left side end portion is aligned and fixed to an upper guide stop jaw 411 of the upper guide member 24 provided in the first plate 21 if coupled with the first plate 21. The lower guide member 25 may serve as an assembly guide when coupled to the first plate 21. For example, the lower guide stop jaw 491 provided in the lower guide member 25 may be configured to be engaged and stuck to the upper guide stop jaw 411 provided in the first plate 21 when coupled with the first plate 21.

[0032] According to an embodiment, the first upper service valve 31 and/or the second upper service valve 32 may be mounted on the first plate 21. A lower end portion of the first upper service valve 31 may be fitted into the first fitting portion 420 provided in the first plate 21, and a lower end portion of the second upper service valve 32 may be fitted into the second fitting portion 430 provided in the first plate 21.

[0033] A lower end portion of the first upper service valve 31 may be fitted into the first fitting portion 420 provided in the first plate 21 and be then fastened with the first plate 21 by the fastening members 41 and 42. One 41 of the fastening members 41 and 42 may be fastened through the fastening hole provided in the first upper service valve 31 and the fastening hole 421 provided in the first plate 21, and the other 42 may be fastened through the other fastening hole provided in the first upper service valve 31 and the fastening hole 423 provided in the first plate. When fitted into the first fitting portion 420 provided in the first plate 21, an upper end portion of the first upper service valve 31 may be exposed above the upper surface 410 provided in the first plate 21.

[0034] A lower end portion of the second upper service valve 32 may be fitted into the second fitting portion 430 provided in the first plate 21 and be then fastened with the first plate 21 by the fastening members 43 and 44. One 43 of the fastening members 43 and 44 may be fastened through the fastening hole provided in the second upper service valve 32 and the fastening hole 431 provided in the first plate, and the other 44 may be fastened through the other fastening hole provided in the first upper service valve 31 and the fastening hole 433 provided in the first plate. When fitted into the second fitting portion 430 provided in the first plate 21, an upper end portion of the second upper service valve 32 may be exposed above the upper surface 410 provided in the first plate 21.

[0035] According to an embodiment, the first lower service valve 33 and/or the second lower service valve 34 may be mounted on the second plate 22. A lower end portion of the first lower service valve 33 may be fitted into the third fitting portion 440 provided in the second plate 22, and a lower end portion of the second lower

service valve 34 may be fitted into the fourth fitting portion 450 provided in the second plate 22.

[0036] A lower end portion of the first lower service valve 33 may be fitted into the third fitting portion 440 provided in the second plate 22 and be then fastened with the second plate 22 by the fastening member 46. The fastening member 46 may be fastened through a fastening hole provided in the first lower service valve 33 and a fastening hole 443 provided in the second plate 22. The other fastening hole 471 provided in the first lower service valve 33 may be open until the other fastening hole 471 is fastened to the first plate 21. When fitted into the third fitting portion 440 provided in the second plate 22, the upper end portion of the first lower service valve 33 may be exposed above the lower surface 490 provided in the second plate 22.

[0037] A lower end portion of the second lower service valve 34 may be fitted into the fourth fitting portion 450 provided in the second plate 22 and be then fastened with the second plate 22 by the fastening member 48. The fastening member 48 may be fastened through a fastening hole provided in the second lower service valve 34 and a fastening hole 453 provided in the second plate 22. The other fastening hole 473 provided in the second lower service valve 34 may be open until the other fastening hole 473 is fastened to the first plate 21. When fitted into the fourth fitting portion 450 provided in the second plate 22, an upper end portion of the second lower service valve 34 may be exposed above the lower surface 490 provided in the second plate 22.

[0038] According to an embodiment, the upper surface 410 provided in the first plate 21 may be provided at a relatively higher position than the lower surface 490 provided in the second plate 22. Accordingly, the positions where the first and second upper service valves 31 and 32 exposed above the upper surface 410 provided in the first plate 21 are disposed may be higher than the positions where the first and second lower service valves 31 and 32 exposed above the lower surface 490 provided in the second plate 22 are disposed. For example, the height difference between the upper surface 410 provided in the first plate 21 and the lower surface 490 provided in the second plate 22 may be about 5 mm.

[0039] According to an embodiment, the right side portion of the first plate 21 may be fastened to the left side portion of the second plate 22 to overlap in a partial area. For example, the bracket 20 may be configured so that the left side portion of the second plate 22 overlaps and is fastened under the right side portion of the first plate 21. The upper surface 410 of the first plate 21, on which the first and second upper service valves 31 and 32 are to be mounted, may be disposed to be relatively higher than the upper surface 490 of the second plate 22, on which the first and second lower service valves 33 and 34 are to be mounted. The upper surface 490 of the second plate 22 may correspond to a lower surface of the bracket 20 in which the first plate 21 and the second plate 22 are coupled. The fastening holes 461, 463, and 465 provided in the right side portion of the first plate 21 may be aligned to the fastening holes 441, 451, and 467, respectively, provided in the left side portion of the second plate 22 at a lower end thereof and be fastened by the fastening components 45 and 47.

[0040] The fastening hole 471 provided in the first lower service valve 33 and in the open state may be penetrated together with the fastening hole 461 provided in the first plate 21 and the fastening hole 441 provided in the second plate 22 by the fastening component 45 to be triple-fastened. The fastening hole 473 provided in the second lower service valve 34 and in the open state may be penetrated together with the fastening hole 463 provided in the first plate 21 and the fastening hole 451 provided in the second plate 22 by the fastening component 47 to be triple-fastened.

[0041] When the first plate 21 and the second plate 22 are coupled to each other, the first fitting portion 420 and the second fitting portion 430 provided in the first plate 21 may be blocked by the upper left surface of the second plate 22. When the first plate 21 and the second plate 22 are coupled to each other, the third fitting portion 440 and the fourth fitting portion 450 provided in the second plate 22 may be blocked by the lower right surface of the first plate 21.

[0042] According to an embodiment, fixing recesses 413 and 415 may be provided in the right edge (e.g., near the bottoms of the fastening holes 461 and 463) of the first plate 21. The fixing recesses 413 and 415 may be fitted into the lower ends of the fastening members (e.g., the fastening members 46 and 48 of FIG. 3) fastening the service valves (e.g., the first high-pressure service valve 33 and the second high-pressure service valve 34 of FIG. 3) disposed on the second plate 22 when coupled with the second plate 22. The fixing recesses 413 and 415 may be provided at the positions that may face the fastening members 46 and 48 included in the service valves 33 and 34 disposed on the second plate 22 around the right edge of the first plate 21 after being fastened, for example.

[0043] According to an embodiment, fixing recesses 493 and 495 may be provided in the left edge (e.g., between the third fitting portion 440 and the fourth fitting portion 450) of the second plate 22. The fixing recesses 493 and 495 may be fitted into the lower ends of the fastening members (e.g., the fastening members 42 and 44 of FIG. 3) fastening the service valves (e.g., the first low-pressure service valve 31 and the second low-pressure service valve 32 of FIG. 3) disposed on the first plate 21 when coupled with the first plate 21. The fixing recesses 493 and 495 may be provided at the positions that may face the fastening members 42 and 44 included in the service valves 31 and 32 disposed on the first plate 21 around the left edge of the second plate 22 after being fastened, for example.

[0044] According to an embodiment, the bracket 20 may be mounted on the housing 20. The first plate 21 constituting the bracket 20 may be fastened to compo-

nents provided inside the outdoor unit 1 or the housing 20 of the outdoor unit 1 using the plurality of fastening holes 481, 482, and 483. The second plate 22 constituting the bracket 20 may be fastened to components provided inside the outdoor unit 1 or the housing 20 of the outdoor unit 1 using the plurality of fastening holes 484, 485, 486, and 487.

[0045] FIG. 6 is a view illustrating an example of fastening pipes in a bracket (the bracket 20 of FIG. 1) provided on an outdoor unit (e.g., the outdoor unit 1 of FIG. 1) of an air conditioner according to various embodiments. FIG. 7A and 7B are a view illustrating an example of an effective work radius when fastening pipes in a general bracket 20 provided in an outdoor unit 1 of an air conditioner. FIG. 8A and 8B are a view illustrating an example of an effective work radius when fastening pipes in a proposed bracket 20 provided in an outdoor unit 1 of an air conditioner.

[0046] Referring to FIGS. 6, 7A, 7B, 8A and 8B, the bracket 20 according to an embodiment may be configured by overlapping and fastening a left side portion of a second plate (e.g., the lower plate 22 of FIG. 3) under a right side portion of a first plate (e.g., the upper plate 21 of FIG. 3). A first service valve (e.g., the first low-pressure service valve 31 and the second low-pressure service valve 32 of FIG. 3) may be mounted on the first plate 21. A second service valve (e.g., the first high-pressure service valve 33 and the second high-pressure service valve 34 of FIG. 3) may be mounted on the second plate 22.

[0047] According to an embodiment, the first service valves 31 and 32 may be provided with fasteners 311 and 321 to fasten an external pipe. The fasteners 311 and 321 may have a structure such as a nut that may be tightened or loosened by a spanner 60. The fasteners 311 and 321 may be fixing nuts but, without limitations thereto, may be implemented as a structure according to various other applications. The fasteners 311 and 321 may be provided to face in, e.g., a right direction in which the second plate 22 is fastened, at upper end portions of the first service valve 31 and 32. As another example, the fasteners 311 and 321 may be provided to face in a left direction opposite to the direction in which the second plate 22 is fastened, at upper end portions of the first service valves 31 and 32. The directions in which the fasteners 311 and 321 face may be modified in consideration of the degree of interference caused by other components (e.g., adjacent service valves or the bottom surfaces of the plates) during the pipe fastening work.

[0048] According to an embodiment, the second service valves 33 and 34 may be provided with fasteners 331 and 341 to fasten an external pipe. The fasteners 331 and 341 may have a structure such as a nut that may be tightened or loosened by a spanner 60. The fasteners 331 and 341 may be fixing nuts but, without limitations thereto, may be implemented as a structure according to various other applications. For example, the fasteners 331 and 341 may be provided to face in a right direction opposite to the direction in which the first plate 21 is fastened, at upper end portions of the second service valves 33 and 34. As another example, the fasteners 331 and 341 may be provided to face in a left direction in which the first plate 21 is fastened, at upper end portions of the second service valves 33 and 34. The directions in which the fasteners 321 and 331 face may be modified in consideration of the degree of interference caused by other components (e.g., adjacent service valves or the bottom surfaces of the plates) during the pipe fastening work.

[0049] According to an embodiment, the first service valves 31 and 32 and the second service valves 33 and 34 may be mounted on the first plate 21 or the second plate 22 in a zigzag shape so as not to be aligned on the horizontal axis of the bracket 20. The first service valves 31 and 32 mounted on the first plate 21 may be disposed a predetermined distance above the second service valves 33 and 34 mounted on the second plate 22, away from the horizontal axis, for example. The second service valves 33 and 34 mounted on the second plate 22 may be disposed a predetermined distance below the first service valves 31 and 32 mounted on the first plate 21, away from the horizontal axis, for example. Accordingly, the separation distance between the first service valves 31 and 32 or between the second service valves 33 and 34 may be 30 mm or more. The first service valves 31 and 32 or the second service valves 33 and 34 may be disposed to be inclined at a predetermined angle with respect to the vertical axis. For example, the angle at which the first service valves 31 and 32 or the second service valves 33 and 34 are inclined with respect to the vertical axis may be determined to be between 0 degrees and 90 degrees, but preferably 30 degrees or more.

[0050] According to an embodiment, the first upper surface 410 (e.g., the upper surface 410 of FIG. 4) to which the first service valves 31 and 32 are to be fastened on the first plate 21 and the second upper surface 490 (e.g., the lower surface 490 of FIG. 4) to which the second service valves 33 and 34 are to be fastened on the second plate 22 may be designed to have a step 730. For example, the step 730 may be made by the coupling of the upper guide stop jaw 411 and the lower guide stop jaw 491 in FIG. 4. The first service valves 31 and 32 mounted on the first plate 21 may be positioned relatively higher than the second service valves 33 and 34 mounted on the second plate 22. For example, the height of the bottom (e.g., the first upper surface 410) to which the first service valves 31 and 32 are fastened in the first plate 21 may be relatively higher than the height of the bottom (e.g., the second upper surface 490) to which the second service valves 33 and 34 are fastened in the second plate 22.

[0051] According to an embodiment, the first service valves 31 and 32 mounted on the first plate 21 and the second service valves 33 and 34 mounted on the second plate 22 may not be disposed on the vertical axis. For example, the second service valves 33 and 34 may be disposed to be spaced apart from the first service valves

31 and 32 by a predetermined distance in the right direction. The second service valves 33 and 34 may be disposed away in the lower right direction of the first service valves 31 and 32. The structure in which the second service valves 33 and 34 are disposed in the lower right direction of the first service valves 31 and 32 may be identified with reference to the positions where the upper plate 21 and the lower plate 22 are disposed in FIG. 3.

[0052] As described above, the second effective distance $\ell 2$ in the proposed bracket structure (e.g., the structure illustrated in FIG. 3) (see FIG. 8A) in which the first service valves 31 and 32 and the second service valves 33 and 34 are arranged in a zig-zag manner while having the step 730 may be relatively longer than the first effective distance $\ell 1$ in the general bracket structure (see FIG. 7A) in which the service valves (e.g., the first service valves 31 and 32 and the second service valves 33 and 34) are arranged in a row on the vertical axis of the plane 750 without a step. The genera bracket structure may be, e.g., a structure in which a plurality of service valves are linearly arranged on the vertical axis on the upper surface 750 of one plate.

[0053] Accordingly, the spanner operable range (e.g., the effective work radius) in the proposed bracket structure in which service valves are arranged in a zig-zag manner on two plates with a step 730 may be relatively broader than the spanner operable range (e.g., the effective work radius) in the general bracket structure in which service valves are arranged in a row on the vertical axis without a step. This is why in the proposed bracket structure, the pipe fastening work may be continued until the second upper surface 490 of the second plate 22 provided to be positioned relatively lower than the first upper surface 410 of the first service valves 31 and 31 acts as interference with the rotation of the spanner 60. When the spanner operable range is broad, it may be understood as similarly meaning, e.g., that the rotation angle of the spanner 60 is large during the pipe fastening work.

[0054] For example, the first effective distance $\ell 1$ may be defined as a straight distance from the position where the service valve 32 is disposed to the position a1 (e.g., a position 710 or 720 where interference occurs in FIG. 7A or 7B) where the spanner 60 turns to the left to contact the upper surface of the plate without a step during the pipe fastening work on the service valve 32 in the general bracket structure (e.g., the structure illustrated in FIG. 7A) where service valves are arranged in a row on the vertical axis. For example, the first effective distance $\ell 1$ may be the distance between the fixing nut (e.g., the center) which is the fastening member 321 provided in the service valve 32 mounted on the first plate 21 and the position a1 of the upper surface which is the higher bottom provided in the plate which the spanner 60 is supposed to contact when turning to the left.

[0055] The second effective distance f2 may be defined as a straight distance from the position where the service valve 32 is disposed to the position a2 (e.g., a position 730 or 740 where interference occurs in FIG. 8A or 8B) where the spanner 60 turns left to contact the second upper surface 490 of the second plate 22, lower is at a lower position due to the provided step 730 during the pipe fastening work on the service valve 32 in the proposed bracket structure (e.g., the structure illustrated in FIG. 8A) where service valves are arranged in a zig-zag manner with the step 730. For example, the second effective distance f2 may be the distance between the fixing nut (e.g., the center) which is the fastening member 321 provided in the service valve 32 mounted on the first plate 21 and the position a2 of the second upper surface 490 which is the lower bottom provided in the second plate 22 which is spanner 60 is supposed to contact when turning to the left.

[0056] According to an embodiment, one surface of the first plate 21 where the first service valves 31 and 32 are mounted and one surface of the second plate 22 where the second service valves 33 and 34 are mounted may have a certain difference in height. For example, the upper surface of the first plate 21 on which the first service valves 31 and 32 are to be mounted may be positioned relatively higher than the upper surface of the second plate 22 on which the second service valves 33 and 34 are to be mounted. The height difference may provide a first protrusion (e.g., the upper guide member 24 of FIG. 3) on the first plate 21 so that the substantially central portion is formed to be relatively higher than the surroundings and a second protrusion (e.g., the lower guide member 25 of FIG. 3) on the second plate 22 so that the whole or part of the left end portion is aligned and fixed to the protrusion provided in the first plate 21 when coupled with the first plate 21. The first protrusion 24 and/or the second protrusion 25 may serve as an assembly guide when the first plate 21 and the second plate 22 are coupled to each other.

[0057] In general, in a structure (e.g., the structure illustrated in FIG. 7A) where service valves are arranged on the bracket 20 in a row on the vertical axis, the rotatable angle (spanner operable range) of the spanner 60 may be about 70 degrees (see FIG. 7B) when tightening or loosening the fixing nut, which is the fastening member 321 provided in any service valve, using the spanner 60. For example, when the spanner 60 is operated in the vertical direction for work, the rotatable angle of the spanner 60 may be a vertical clearance. This is caused by interference 710 and 720 due to a service valve adjacent to the fastening member 321 and/or interference 710 and 720 due to the bottom of the bracket (e.g., the bracket 20 of FIG. 1).

[0058] According to an embodiment, in a structure (e.g., the structure illustrated in FIG. 8A) where service valves are arranged on the bracket 20 on the vertical axis in a zig-zag manner, rather than in a row, the rotatable angle of the spanner 60 may be increased up to about 125 degrees when tightening or loosening the fixing nut, which is the fastening member 321 provided in any service valve, using the spanner 60. For example, when the

spanner 60 is operated in the vertical direction for work, the rotatable angle of the spanner 60 may be a vertical clearance. This is caused by interference due to a service valve adjacent to the fastening member 321 and/or interference 730 and 740 due to the bottom (e.g., the upper surface 490 of the second plate 22) of the second plate 22 constituting the bracket 20.

[0059] FIGS. 9A and 9B are views illustrating an example of assembling one bracket (e.g., the bracket 20 of FIG. 1) by coupling two plates (e.g., the upper plate 21 and the lower plate 22) to mount the bracket (e.g., the bracket 20 of FIG. 1) on an outdoor unit (e.g., the outdoor unit 1 of FIG. 1) of an air conditioner according to various embodiments.

[0060] Referring to FIGS. 9A and 9B, a first plate 21 according to an embodiment may be provided with a first fitting portion (e.g., the first fitting portion 420 of FIG. 4) and a second fitting portion (e.g., the second fitting portion 430 of FIG. 4), and a second plate 22 may be provided with a third fitting portion (e.g., the third fitting portion 440 of FIG. 4) and a fourth fitting portion (e.g., the fourth fitting portion 450 of FIG. 4).

[0061] According to an embodiment, a lower end portion of a first upper service valve 31 may be fitted into the first fitting portion 420 provided in the first plate 21 and be then fastened with the first plate 21 by fastening members 41 and 42. A lower end portion of a second upper service valve 32 may be fitted into the second fitting portion 430 provided in the first plate 21 and be then fastened with the first plate 21 by fastening members 43 and 44.

[0062] According to an embodiment, the first plate 21 where the first upper service valve 31 and the second upper service valve 32 are mounted may be fastened to the housing 20 of the outdoor unit 1 or components 80 provided inside the outdoor unit 1 using a plurality of fastening holes 481, 482, and 483.

[0063] According to an embodiment, a lower end portion of the first lower service valve 33 may be fitted into the third fitting portion 440 provided in the second plate 22 and be then fastened to only one side of the second plate 22 through one of the two fastening holes provided in the first lower service valve 33 by the fastening member 46. A lower end portion of the second lower service valve 34 may be fitted into the fourth fitting portion 450 provided in the second plate 22 and be then fastened to only one side of the second plate 22 through one of the two fastening holes provided in the second lower service valve 34 by the fastening members 48. The other one 471 of the two fastening holes provided in the first lower service valve 33 and the other one 473 of the two fastening holes provided in the second lower service valve 34 may remain empty.

[0064] As described above, in the first plate 21, the first upper service valve 31 and the second upper service valve 32 may first be mounted, and the first plate 21 may be fastened with the housing 20 of the outdoor unit 1 or the component 80 provided inside the outdoor unit 1 with the first upper service valve 31 and the second upper service valve 32 mounted. In this case, the second plate 22 is in a state in which one side of the first lower service valve 33 and one side of the second lower service valve 34 are fastened, and the other side of the first lower service valve 33 and the other side of the second lower service valve 34 are open (see FIG. 9B).

[0065] According to an embodiment, the left side portion of the second plate 22 may overlap under the right side portion of the first plate 21 fastened with the component 80 provided inside the outdoor unit 1 or the housing 20 of the outdoor unit 1, and they may be fastened by the fastening components 45 and 47 in the overlapping portion. For example, the first fastening member 45 may achieve triple fastening through the fastening hole (e.g., the fastening hole 461 of FIG. 4) provided in the right portion of the first plate 21, the fastening hole 471 provided in the first lower service valve 33, and the fastening hole (e.g., the fastening hole 441 of FIG. 4) provided in the left side portion of the second plate 22. The second fastening member 47 may achieve triple fastening through the fastening hole (e.g., the fastening hole 463 of FIG. 4) provided in the right portion of the first plate 21, the fastening hole 473 provided in the first lower service valve 33, and the fastening hole (e.g., the fastening hole 451 of FIG. 4) provided in the left side portion of the second plate 22.

[0066] According to an embodiment, if the bracket 20 is completed as the second plate 22 is fastened to the first plate 21, it may be fastened to the housing 20 of the outdoor unit 1 or the components 80 provided inside the outdoor unit 1 using the fastening holes 484, 485, 486, and 487 provided in the right side portion and lower right end portion of the bracket 20.

[0067] As described above, it may be easy to perform welding by disassembling only the first plate 21 or second plate 22 or piping and each service valve mounted on the first and second plates 21 and 22 from the bracket 20 seated in the outdoor unit (e.g., the outdoor unit 10 of FIG. 1).

[0068] 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, com-

ponents, 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.

[0069] 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 refer, for example, to a device able to 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 refer, for example, to a general-purpose device capable of various operations including the corresponding operation.

[0070] 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.

[0071] While the disclosure has been illustrated and described with reference to various example embodiments, it will be understood that the various example embodiments are intended to be illustrative, not limiting. It will be further understood by those skilled in the art that various changes in form and detail may be made without departing from the true spirit and full scope of the disclosure, including the appended claims and their equivalents. It will also be understood that any of the embodiment(s) described herein may be used in conjunction with any other embodiment(s) described herein.

Claims

1. An outdoor unit of an air conditioner, comprising:

   a bracket comprising a right side portion of an upper plate where one or more first service valves are mounted and a left side portion of a lower plate where one or more second service valves are mounted, wherein the upper and lower plates are configured to be fastened to overlap each other in a partial area; and
   a housing configured to allow the bracket to be fastened at a lower portion of one surface thereof.

2. The outdoor unit of claim 1, wherein an upper surface of the upper plate where the first service valve is configured to be mounted is disposed relatively higher than an upper surface of the lower plate where the second service valve is configured to be mounted, and
   wherein the first service valve mounted on the upper plate is disposed to deviate from the second service valve mounted on the lower plate on a horizontal axis.

3. The outdoor unit of claim 1, wherein the first service valve is configured to be fitted and coupled to an upper fitting gap provided in one side end portion in a direction toward the lower plate when fastened at the upper plate,

   wherein the second service valve is configured to be fitted and coupled to a lower fitting gap provided in one side end portion in a direction toward the upper plate when fastened at the lower plate, and
   wherein the bracket is configured so that the one side end portion provided in the lower plate is configured to be fastened to overlap a lower side of the one side end portion provided in the upper plate.

4. The outdoor unit of claim 1, wherein the bracket is configured to be triple-fastened by a first fastening hole provided in the right portion of the upper plate, a second fastening hole provided in the one or more second service valves, and a third fastening hole provided in the left portion of the lower plate, and
   wherein another second fastening hole provided in the second service valve is aligned to a fastening hole provided near an end of a fitting portion provided in the lower plate and fastened by a fastening component.

5. The outdoor unit of claim 1, wherein the one or more first service valves are low-pressure service valves, and the one or more second service valves are high-pressure service valves,

   wherein a first fitting portion is provided where a lower end portion of the lower-pressure service valve is configured to be fitted in a left direction which is inward from an end of the right portion of the upper plate, and
   wherein a second fitting portion is provided where a lower end portion of the higher-pressure service valve is configured to be fitted in a right direction inward from an end of the left portion of the lower plate.

6. The outdoor unit of claim 5, wherein based on the upper plate and the lower plate are coupled, the first fitting portion is disposed on the upper plate to be blocked by the left portion of the lower plate.

7. The outdoor unit of claim 5, wherein based on the upper plate and the lower plate are coupled, the second fitting portion is disposed on the lower plate to be blocked by the right portion of the upper plate.

8. The outdoor unit of claim 5, wherein fastening holes provided in the lower-pressure service valve are aligned by fastening holes provided near an end of the first fitting portion and fastened by a fastening component.

9. The outdoor unit of claim 1, wherein a plurality of fastening holes provided in a left portion of the upper plate and a plurality of fastening holes provided in a right portion of the lower plate are aligned by a plurality of fastening holes provided in the housing and configured to be fastened by a fastening component, and
wherein a fastening hole provided in the right portion of the upper plate is aligned by a fastening hole provided in the left portion of the lower plate, at a lower end, and configured to be fastened by a fastening component.

10. The outdoor unit of claim 1, wherein a fastener configured to fasten pipes is provided at an upper end portion of the first service valve to face in a right direction where the lower plate is to be fastened, and
wherein a fastener configured to fasten pipes is provided at an upper end portion of the second service valve to face in a left direction where the upper plate is to be fastened.

11. The outdoor unit of claim 1, wherein a fastener configured to fasten pipes is provided at an upper end portion of the first service valve to face in a left direction which is opposite to a direction in which the lower plate is fastened, and
wherein a fastener configured to fasten pipes is provided at an upper end portion of the second service valve to face in a right direction opposite to a direction in which the upper plate is fastened.

12. The outdoor unit of claim 1, wherein a fastening rib is provided at a lower end portion of at least one of the upper plate or the lower plate and configured to be fitted into a lower end portion of the housing.

13. The outdoor unit of claim 1, wherein the upper plate is provided with a first protrusion so that a substantially central portion is formed to be relatively higher than a surrounding,

wherein the lower plate includes a second protrusion so that a whole or part of a left side end portion is aligned with fixed to a protrusion provided on the upper plate by coupling with the upper plate, and
wherein the upper plate and the lower plate includes a configured serving as an assembly guide by coupling.

14. The outdoor unit of claim 1, wherein the upper plate includes at least one fixing recess at a right edge into which a fastening member fastening one or more second service valves mounted on the lower plate are configured to be fitted.

15. The outdoor unit of claim 1, wherein the lower plate includes at least one fixing recess at a left edge into which a fastening member fastening one or more first service valves mounted on the upper plate are configured to be fitted.

FIG. 1

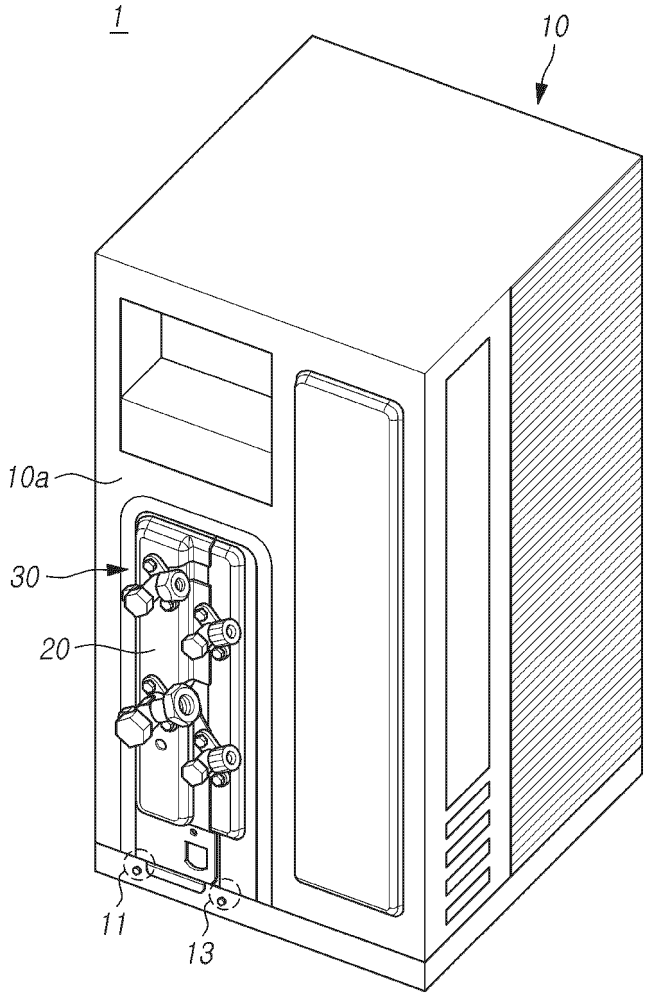

FIG.2A

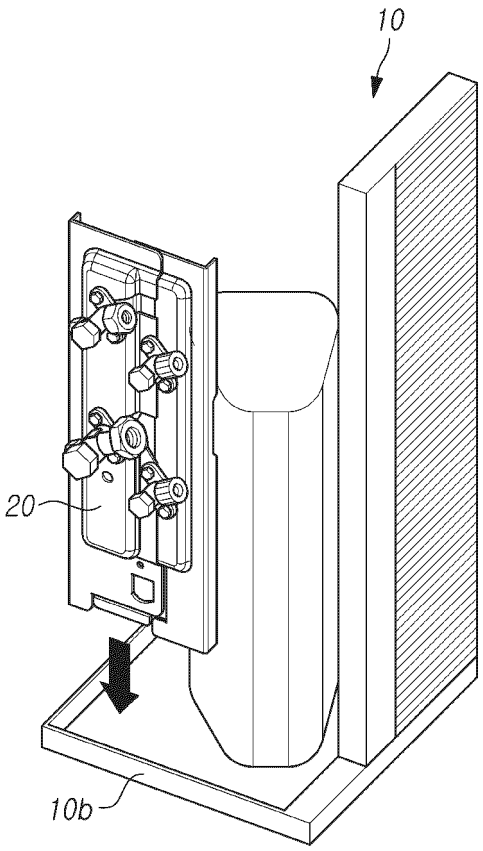

FIG.2B

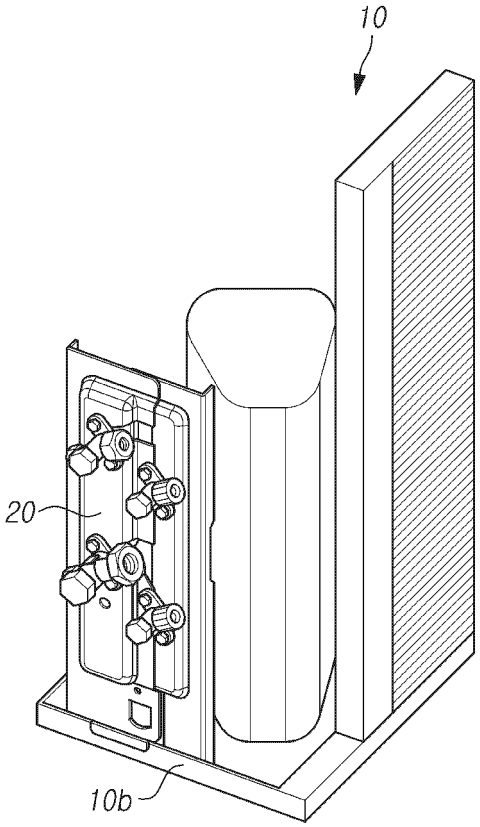

FIG.3

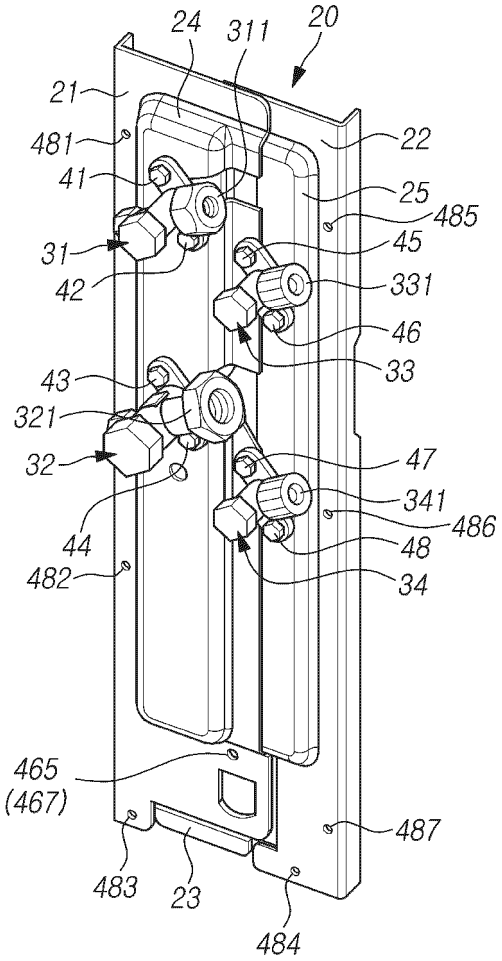
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FIG.4

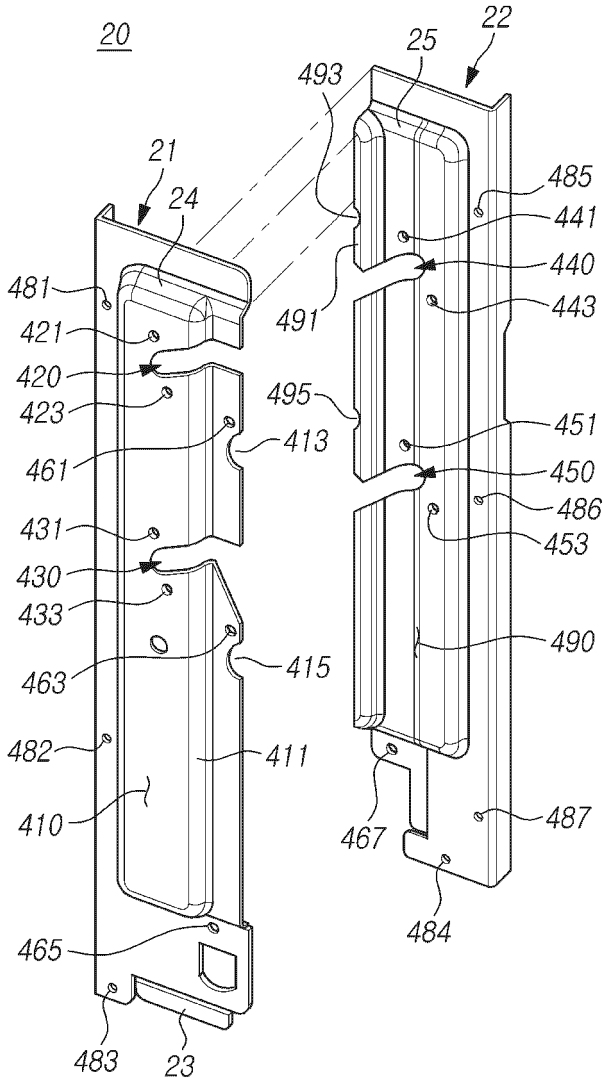
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FIG.5

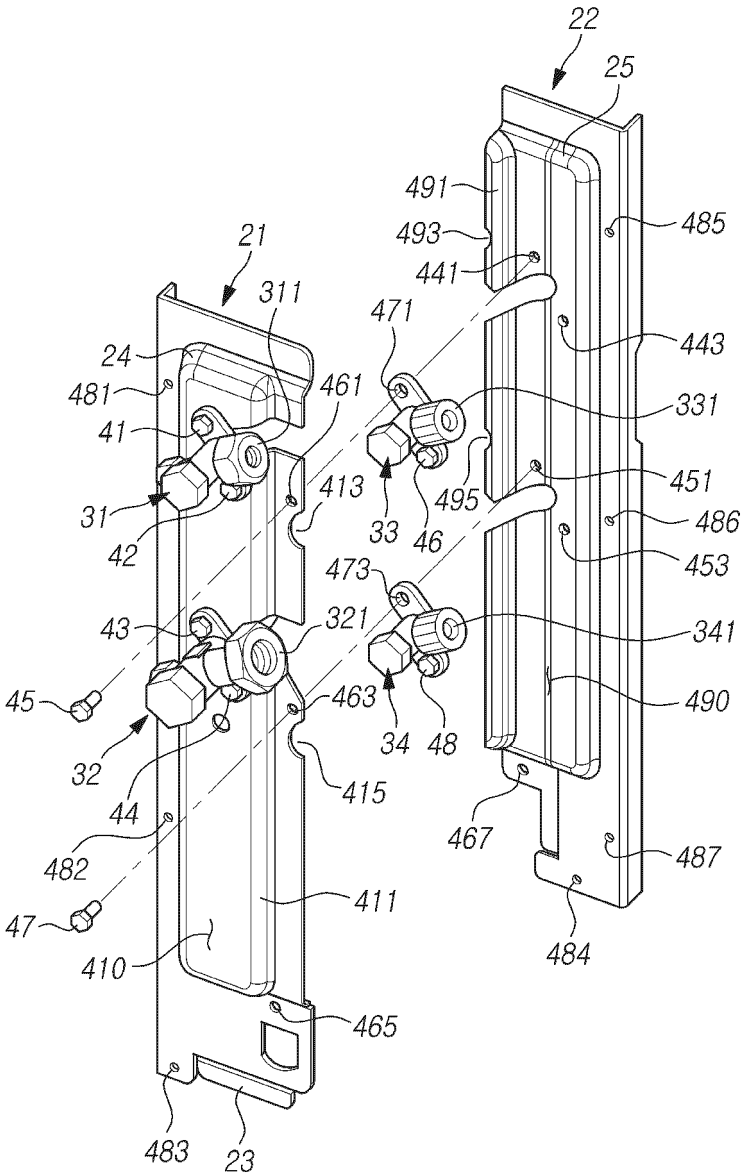
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FIG.6

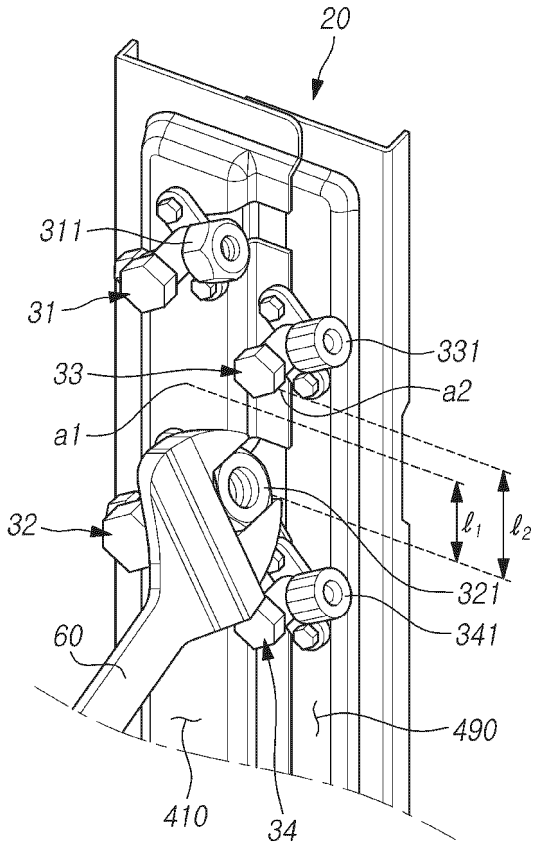

FIG. 7A

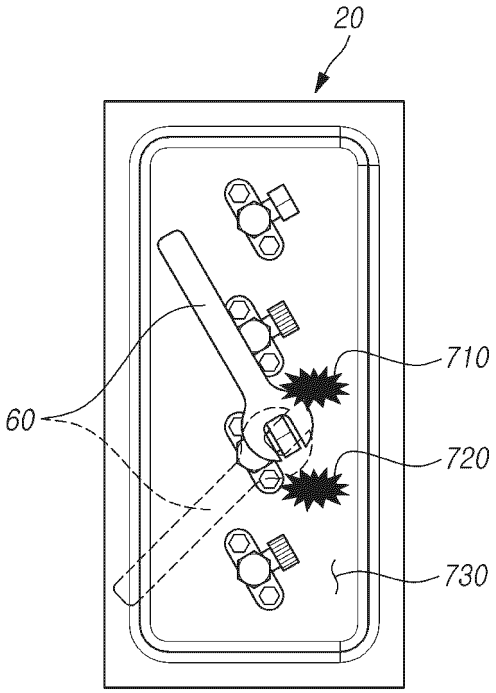

FIG. 7B

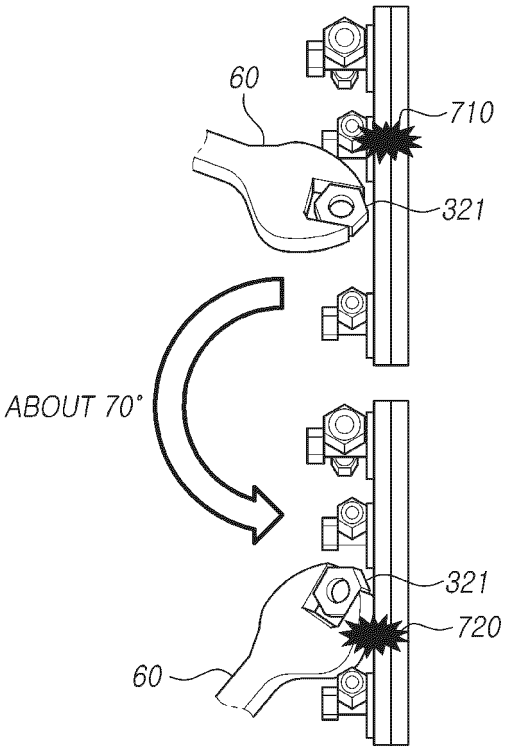

FIG. 8A

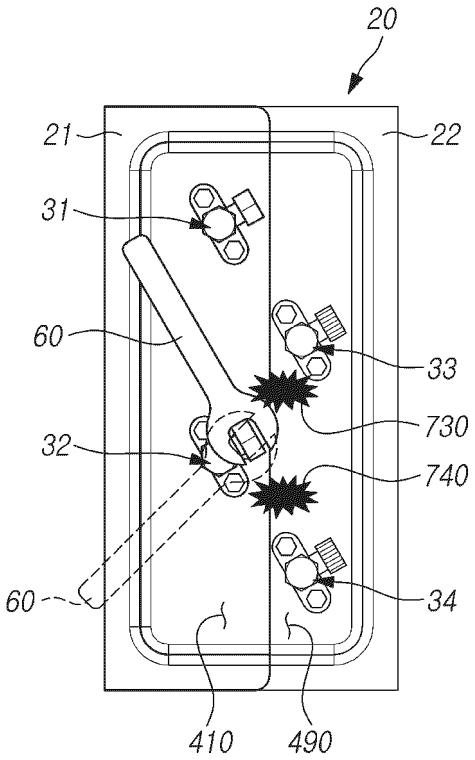

FIG.8B

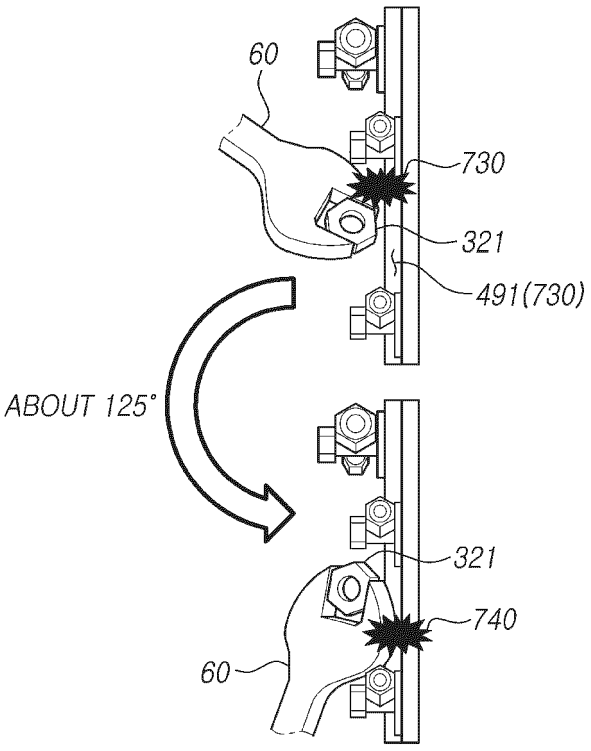

FIG.9A

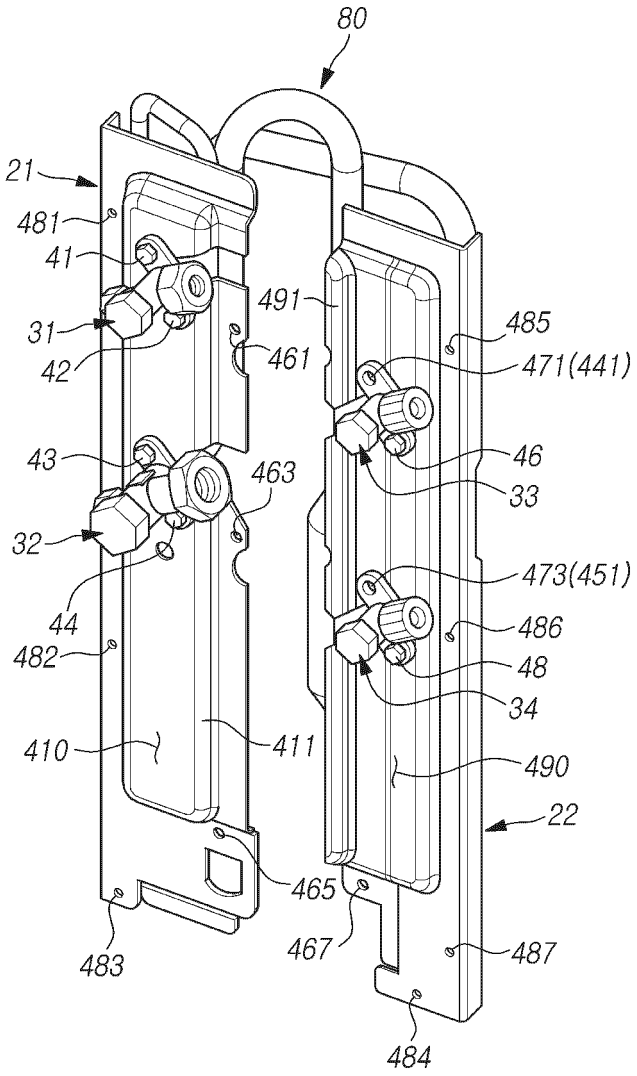
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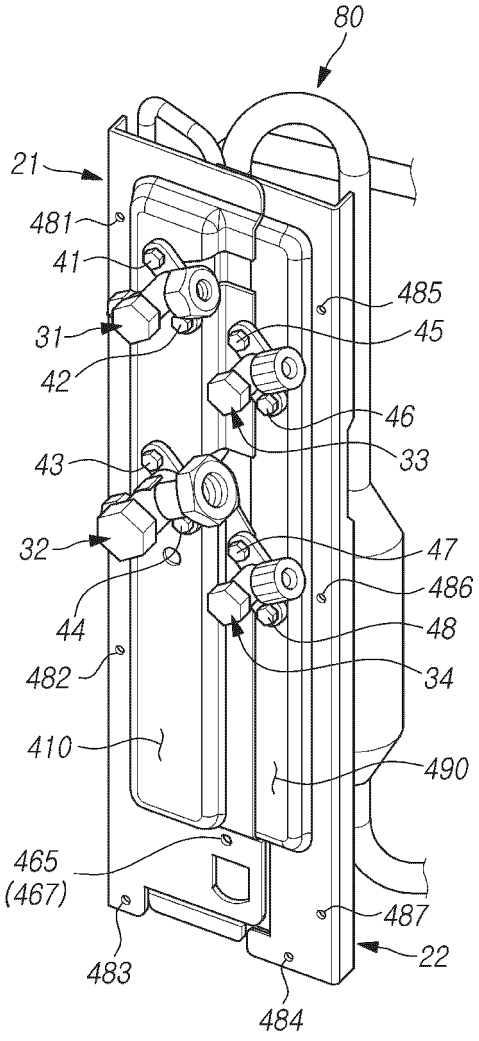
FIG.9B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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/019122

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/26(2011.01)i; **F24F 1/56**(2011.01)i; **F25B 41/20**(2021.01)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 1/26(2011.01); F24F 1/06(2011.01); F24F 13/20(2006.01); F24F 5/00(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: 공기조화기(air conditioner), 브라켓(bracket), 상부(top), 하부(lower), 플레이트(plate), 겹침(overlap), 서비스 밸브(service valve), 끼움(insert), 홀(hole), 체결부재(fastening member)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2002-0052820 A (LG ELECTRONICS INC.) 04 July 2002 (2002-07-04) See paragraphs [0024]-[0027] and [0034]-[0037] and figures 1 and 3.	1,3-13
A		2,14,15
Y	JP 62-014238 U (SANYO ELECTRIC CO.) 28 January 1987. See page 3, line 11 - page 5, line 15, claim 1 and figures 1-2.	1,3-13
A	KR 10-0744771 B1 (SAMSUNG ELECTRONICS CO., LTD.) 01 August 2007 (2007-08-01) See paragraphs [0018]-[0031] and figures 2-3.	1-15
A	JP 07-151358 A (TOSHIBA CORP. et al.) 13 June 1995 (1995-06-13) See paragraphs [0016]-[0023] and figures 1-2.	1-15
A	US 2005-0172656 A1 (JUNG et al.) 11 August 2005 (2005-08-11) See paragraph [0032] 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
13 March 2023	**13 March 2023**

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

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/019122

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