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(54) **INDOOR UNIT**

(57) An indoor unit of an air conditioner is provided with an indoor unit body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface, and a front panel covering a front surface of the indoor unit body. The front panel includes one side part and another side part in a direction perpendicular to a vertical direction of the wall surface and a central part located between

the one side part and the other side part. The one side part and the other side part each have a shape that curves toward the wall surface side from a portion connected to the central part, and a portion beyond the curved portion extends to a location on the wall surface at an acute angle to the wall surface.

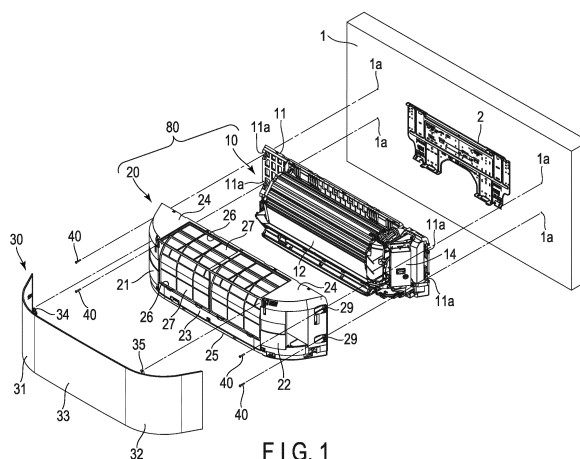


FIG. 1

Description

Technical Field

[0001] The present invention relates generally to a wall-mounted indoor unit of an air conditioner.

Background Art

[0002] An air conditioner comprises an outdoor unit, which houses a compressor, an outdoor heat exchanger, an outdoor fan, etc., and is installed outside the room, and an indoor unit, which houses an indoor heat exchanger, an indoor fan, etc., and is installed inside the room.

[0003] A wall-mounted type (also referred to as a wall-hung type) indoor unit installed on a wall surface in a room comprises a mounting plate attached to the wall surface, a main body that holds various parts such as the indoor heat exchanger and the indoor fan and is attached to the above mounting plate, a front panel covering the front of the main body, and the like.

Citation List

Patent Literature

[0004] Patent Literature 1: JP 6311308 B

Summary of Invention

Technical Problem

[0005] An indoor unit installed on an upper part of a wall surface affects the aesthetic appearance of a room in the same way as furniture such as tables and sofas placed in the room. In addition, since the indoor unit is attached protruding from the wall surface, it may give an intimidating impression to a user. A front panel of an indoor unit of Patent Literature 1 has a curved surface where the center protrudes toward the inside of a room and the left and right sides are curved toward the wall surface, which mitigates such intimidating impression. However, since left and right edges of the front panel are separated from the wall surface, they still have a shape that sharply protrudes from the wall surface, although the protrusion amount (dimension) is smaller than that of a flat-shaped front panel.

[0006] The purpose of the embodiment is to provide an indoor unit of an air conditioner that is aesthetically pleasing and can alleviate a sense of intimidation when in a state of being attached to the upper part of a wall surface.

[0007] An indoor unit of an air conditioner of claim 1 comprises: an indoor unit body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface; and a front panel covering a front surface of the indoor unit body. The front panel includes one side part and another side part in a direction perpendicular to a

vertical direction of the wall surface, and a central part located between the one side part and the other side part. The one side part and the other side part have a shape that curves toward the wall surface side from a portion connected to the central part, respectively, and a portion beyond the curved portion extends to a location on the wall surface at an acute angle to the wall surface.

Brief Description of Drawings

[0008]

FIG. 1: An exploded perspective view of one embodiment.

FIG. 2: A perspective view showing a state in which a main body is attached to a wall surface and a front panel that can be freely attached to and detached from the main body in one embodiment.

FIG. 3: A diagram of a view from the front of the main body in one embodiment.

FIG. 4: A diagram of a view from above in a state where an indoor unit body (main body + sub-body) is attached on the wall surface, and a view from the front and below in a state where an entire indoor unit (main body + sub-body + front panel) is attached on the wall surface, respectively.

FIG. 5: A perspective view which divides and shows a fabric member, a hook-and-loop fastener attached to the fabric member, a front panel, and a hook-and-loop fastener attached to the front panel in one embodiment.

FIG. 6: A diagram showing a back surface of the fabric member and a hook-and-loop fastener sewn to the back surface in one embodiment.

FIG. 7: A diagram showing a state in which one side edge and the other side edge of the fabric member of FIG. 6 are folded toward the back surface side.

FIG. 8: A diagram showing a state in which an upper edge and a lower edge of the fabric member of FIG. 7 are folded toward the back surface side.

FIG. 9: A cross-sectional view of the main body, the front panel, and the fabric member in one embodiment.

FIG. 10: An enlarged view of a key part of FIG. 9.

FIG. 11: A cross-sectional view of the main body and the front panel in one embodiment.

FIG. 12: An enlarged view of a key part of FIG. 11.

Mode for Carrying Out the Invention

[0009] One embodiment of an indoor unit of the present invention will be described below with reference to the accompanying drawings.

[0010] As shown in FIG. 1, a mounting plate 2 made of a high-strength member such as sheet metal is attached to a wall surface 1 in a room by screwing, a main body (also referred to as a rear body) 10 is hung and fastened by positioning the mounting plate 2 approxi-

mately in the center, and, if necessary, a lower part of the main body 10 is fixed to the mounting plate 2 by screwing.

[0011] The main body 10 includes a plate-shaped rear plate 11 made of a molded product of synthetic resin for attachment to the mounting plate 2, and various parts such as an indoor heat exchanger 12, an indoor fan 13 (to be described later), and an electrical component box 14 are attached to predetermined portions of the rear plate 11. The rear plate 11 has a rectangular shape that is long in a direction perpendicular to the vertical direction of the wall surface 1 (right and left directions) and has a predetermined thickness in the direction away from the wall surface 1.

[0012] After the main body 10 is attached to the mounting plate 2, a sub-body (also referred to as a front body or a front cover) 20 made of a molded product of synthetic resin is attached to cover the front side of the main body 10, as shown in FIG. 2. During this attachment, the sub-body 20 can be firmly fixed and held to the rear plate 11 by fitting the outer periphery of the rear plate 11 into the inner periphery of the sub-body 20 and using screws (not shown). An indoor unit body 80 is configured by these main body 10 and sub-body 20.

[0013] As shown enlarged in FIG. 3, the sub-body 20 includes one side part (left side part) 21 and another side part (right side part) 22 in a direction perpendicular to the vertical direction (left-right direction) of the wall surface 1, and also includes a central part 23 located between the one side part 21 and the other side part 22. As shown in FIG. 2, the one side part 21 and the other side part 22 have a shape that curves toward the wall surface 1 side from a portion connected to the central part 23, respectively, and a portion beyond the curved portion extends to a location on the wall surface 1 at an acute angle to the wall surface 1.

[0014] Specifically, as shown in FIG. 4, the one side part 21 includes a side surface 21a that curves with a curvature of radius R1 from a portion connected to the central part 23 to the wall surface 1 side, and a planar side surface 21b that extends from this side surface 21a to a location on the wall surface 1 and has its end edge approach or abut the wall surface 1 at an acute angle Q1. The other side part 22 includes a side surface 22a curving with a curvature of radius R2 from a portion connected to the central part 23 to the wall surface 1 side, and a planar side surface 22b that extends from this side surface 22a to a location on the wall surface 1 and has its end edge approach or abut the wall surface 1 at an acute angle Q2.

[0015] The radius R1 and the radius R2 are set to the same value as each other at approximately 85 degrees or less. The acute angle Q1 and the acute angle Q2 are set to the same value as each other at approximately 53 degrees or less.

[0016] As shown in FIG. 3 and FIG. 4, the sub-body 20 includes an upper surface part 24 extending from the upper edge of each of the one side part 21, the central

part 23, and the other side part 22 to the wall surface 1 and contacting that wall surface 1, and a lower surface part 25 extending from the lower edge of each of the one side part 21, the central part 23, and the other side part 22 to the wall surface 1 and contacting that wall surface 1. The sub-body 20 also has an air inlet 26 from the central part 23 to the upper surface part 24, and detachably holds a mesh filter 27 for dust removal at a location corresponding to the air inlet 26. In addition, the sub-body 20 has an air outlet 28 on the lower surface part 25. The air outlet 28 is closed by a vertical louver 17 of the main body 10, which will be described later, so as to be freely opened and closed as it is attached to the main body 10.

[0017] Of the upper surface part 24 of the sub-body 20, a portion connected to the side surface 21a of the one side part 21 has a curved shape along the curved shape of the side surface 21a, and a portion connected to the side surface 21b of the one side part 21 has a straight shape along the flat shape of the side surface 21b. Of the upper surface part 24 of the sub-body 20, a portion connected to the side surface 22a of the other side part 22 has a curved shape along the curved shape of the other side part 22, and a portion connected to the side surface 22b of the other side part 22 has a straight shape along the flat shape of the side surface 22b. The upper parts of the one side part 21 and the other side part 22 are each connected to the upper surface part 21 with a gentle slope.

[0018] Similarly, of the lower surface part 25 of the sub-body 20, a portion connected to the side surface 21a of the one side part 21 has a curved shape along the curved shape of the side surface 21a, and a portion connected to the side surface 21b of the one side part 21 has a straight shape along the flat shape of the side surface 21b. Of the lower surface part 25 of the sub-body 20, a portion connected to the side surface 22a of the other side part 22 has a curved shape along the curved shape of the other side part 22, and a portion connected to the side surface 22b of the other side part 22 has a straight shape along the flat shape of the side surface 22b.

[0019] Two insertion holes 29 are formed in the side surface 21b of the one side part 21 and two insertion holes 29 are formed in the side surface 22b of the other side part 22. A fixture, for example, a screw 40, is inserted into each of these insertion holes 29. Each of the screws 40 that are inserted passes through notches 11a formed in four corners of the rear plate 11 in the main body 10 and is screwed into four positions 1a in the upper part of the wall surface 1. By screwing these screws 40, the end edges of the side surface 21b of the one side part 21 and the side surface 23b of the other side part 22 are pressed against the wall surface 1 in a state where the four corners of the rear plate 11 in the main body 10 are sandwiched between them and the wall surface 1, and the main body 10 and the sub-body 20 are fixed to the wall surface 1 in a mutually fastened state. In other words, the indoor unit body 80, which is an assembly of the main body 10 and the sub-body 20, can be fixed to the wall surface 1 in a

state of close contact without lifting from the wall surface 1. The indoor unit main body 80 and a front panel 30, which will be described later, have a long shape in the right and left directions because the ends of both sides of the main body 80 and the front panel 30 are extended to the wall surface 1. In addition, the horizontal width dimension of the mounting plate 2 is made small to reduce the amount of material as much as possible. The actual horizontal dimension of the mounting plate 2 is almost the same as or shorter than the width dimension of the indoor heat exchanger 12 and indoor fan. Therefore, both side parts of the indoor unit main body 80 protrude considerably more to the side than the mounting plate 2. Therefore, both side parts of the indoor unit main body 80 tend to lift up in a direction away from the wall surface 1. In contrast, the screw fixation as described above can prevent the indoor unit main body 80 from lifting up from the wall surface 1. Note that this fixation by the screws 40 can be implemented as necessary depending on the installation conditions.

[0020] Note that, depending on the material of the wall surface 1, in some cases, it may be difficult to screw the screws 40 to the wall surface 1. Even in this case, since the outer periphery of the rear plate 11 and the inner periphery of the sub-body 20 are screwed and engaged, there is no large gap between the end edges of the one side part 21 and the other side part 22 and the wall surface 1. Therefore, additional fixation with the screws 40 is implemented as needed depending on the installation conditions.

[0021] With the attachment of the sub-body 20 to the main body 10, the inner space of the other side part 22 becomes a housing space for the electrical component box 14 described above. The side surface 22a of the other side part 22 has an opening 22c for exposing a lid of the electrical component box 14. Through this opening 22c, the lid of the electrical component box 14 can be opened and closed. The electrical component box 14 is attached at an inclined state with respect to the thickness direction of the main body 10, in accordance with the curved shape of the side surface 22a of the other side part 22.

[0022] Note that, as shown in FIG. 3, a lower part 21ax of the side surface 21a and a lower part 21bx of the side surface 21b in the one side part 21, a lower part 23x of the central part 23, and a lower part 22ax of the side surface 22a and a lower part 22bx of the side surface 22b in the other side part 22 become attachment areas for a band-shaped elastic member 70 described below. Note that only the lower part 23x of the central part 23 may be used as the attachment area of the band-shaped elastic member 70.

[0023] As shown in FIG. 3, fastening holes 71 are formed in the lower part 21ax of the side surface 21a, the lower part 23x of the central part 23, and the lower part 22ax of the side surface 22a, respectively, at a position above the area to which the elastic member 70 is attached. When the front panel 30 is attached to the sub-

body 20, fastening claws 35 shown in FIG. 10 below, which are formed on the back surface side of the front panel 30, enter these fastening holes 71 and are gently held in place.

[0024] After the attachment of the sub-body 20 to the main body 10, a white, milky-white, or cream-colored front panel (also referred to as a decorative panel or grille panel) 30 made of synthetic resin integrally molded to cover the front side of the sub-body 20 is attached. Thus, the indoor unit of the air conditioner is configured by the main body 10, the sub-body 20, and the front panel 30. The front panel 30 includes a one side part 31, a central part 33, and another side part 32 of almost the same shape as the one side part 21, the central part 23, and the other side part 22 of the sub-body 20, and is detachably attached to the sub-body 20 by a pair of ribs 34 and 35 attached to the upper edge of the front panel 30.

[0025] The drawing shown in the uppermost part of FIG. 4 is a view from above in a state where the indoor unit body (main body 20 + sub-body 30) 80 is attached on the wall surface 1. The drawing shown in the middle part of FIG. 4 is a view from the front in a state where an entire indoor unit (main body 20 + sub-body 30 + front panel 30) is attached on the wall surface 1. The drawing shown in the bottom part of FIG. 4 is a view from below in a state where the entire indoor unit is attached on the wall surface 1.

[0026] In the front panel 30, the one side part 31 includes a same curved side surface 31a as the side surface 21a of the one side part 21 in the sub-body 20 and a same planar side surface 31b as the side surface 21b of the one side part 21 in the sub-body 20. In other words, the one side part 31 includes the side surface 31a that curves with a curvature of radius R1 from a portion connected to the central part 33 to the wall surface 1 side, and the planar side surface 31b that extends from this side surface 31 to the location on the wall surface 1 and has its end edge approach or abut the wall surface 1 at the acute angle Q1. The central part 33 has the same flat shape as the central part 23 in the sub-body 20. The other side part 32 includes a same curved side surface 32a as the side surface 22a of the other side part 22 in the sub-body 20 and a same planar side surface 32b as the side surface 22b of the other side part 22 in the sub-body 20. In other words, the other side part 32 includes the side surface 32a that curves with a curvature of radius R2 from a portion connected to the central part 33 to the wall surface 1 side, and the planar side surface 32b that extends from this side surface 32a to the location on the wall surface 1 and has its end edge approach or abut the wall surface 1 at the acute angle Q2.

[0027] Note that, although the central part 33 is in a flat shape, it may also be a gently curved surface with a large curvature in the left and right directions. Note that, for the connection portions of the side surface 31a and the side surface 31b and of the side surface 31b and the central part 33, and for the connection portions of the side surface 32a and the side surface 32b and of side

surface 32b and the central part 33, lines along the vertical direction are drawn on the drawing to indicate that they are connection portions, but these multiple surface connection portions actually have an almost smooth curved surface shape. Therefore, changes in the curvature and surface shape of the surfaces of each connection portion are hardly noticeable, and no clear lines appear on each of the connection portions in terms of appearance.

[0028] The ribs 34 and 35 for attaching the front panel 30 to the sub-body 20 have fastening projections 34a and 35a at their distal ends as shown in FIG. 3. Upon attachment to the sub-body 20, the ribs 34 and 35 are inserted into a slit 41 formed at the upper part of the one side part 21 and a slit 42 formed at the upper part of the other side part 22 of the sub-body 20 while being pushed and expanded in opposite directions from each other by artificial operation, as shown by bold arrows. After this insertion, when the pushing and expanding operation on the ribs 34 and 35 is released, the ribs 34 and 35 return to their original state due to the elasticity of the synthetic resin itself. Accordingly, the projections 34a and 35a of the ribs 34 and 35 engage with the fastening members inside the slits 41 and 42, and the upper edge of the front panel 30 is rotatably fastened to the upper part of the sub-body 20. In this fastened state, the front panel 30 is pushed down toward the central part 23 of the sub-body 20, and each of the fastening claws 35 described below on the lower back surface side of the front panel 30 is inserted into each of the fastening holes 71 of the sub-body 20 to engage each hook 72 described below, thereby completing attachment of the front panel 30 to the sub-body 20. In a state where the attachment of the front panel 30 to the sub-body 20 is completed, the left and right ends of the front panel 30, i.e., the left and right end parts of the side surfaces 31b and 32b, will come in contact with the wall surface or extend to the wall surface 1 to a position where there is only a very small gap.

[0029] On the other hand, the front panel 30 can be easily detached from the sub-body 20 by performing the opposite operation to that for attachment since the engagement between the fastening claw 35 and the hook 72 is a loose engagement held by the elasticity of the fastening claw 35 and the hook 72, which are made of synthetic resin.

[0030] As described above, the indoor unit is configured by the main body 10, the sub-body 20, and the front panel 30.

[0031] Since one side part 31 and the other side part 32 of the front panel 30 have a shape that curves from a portion connecting the central part 33 to the wall surface 1 side, and a portion beyond the curved portion is configured to extend to the wall surface 1 at an acute angle to the wall surface 1, the indoor unit appears to be integrated with the wall surface 1 to form an almost flush surface with the wall surface 1 while expanding smoothly from the wall surface 1. In addition, even when the interior lighting shines on the indoor unit, the shadow of the in-

door unit is hardly cast on the wall surface 1. These points lead to an improvement in the aesthetics of the indoor unit and can significantly alleviate the sense of intimidation caused by the indoor unit attached on the upper part of the wall surface to the user.

[0032] Furthermore, in a state where the indoor unit is installed on the wall surface, the front panel 30 covers the entire front of the indoor unit main body 80, that is, the sub-main body 20, in the indoor direction. Therefore, compared to the conventional case where only the front of the indoor unit main body is covered by the front panel 30 and both side surfaces of the main body 80 are exposed to the room, since both right and left side surfaces of the indoor unit main body 80 are entirely covered by the front panel 30, both side surfaces of the indoor unit main body 80 will not become dirty with dust, etc. Instead, dust, etc., will adhere to the front surface of the front panel 30; however, since the front panel 30 is configured by a smooth surface up to the wall surface, it can be easily cleaned and easily removed in case of heavy soiling, and can be washed with tap water, etc., after removal, which is hygienic.

[Regarding fabric member]

[0033] The front panel 30 can be used as it is, but if necessary, a decorative fabric (cloth) member 50 shown in FIG. 5 can be attached. This fabric member 50 has a rectangular shape of approximately the same size as the front panel 30 and covers the surface of the front panel 30 by attaching it to the front panel 30, and can be prepared in various colors and patterns to further improve the aesthetics of the indoor unit. Accordingly, by selecting the fabric member 50, it is possible to make it assimilate with the wall surface by matching the color to make it inconspicuous, or conversely, to make it conspicuous.

[0034] When attaching the fabric member 50, four band-shaped hook-and-loop fasteners (first hook-and-loop fasteners) 61 are attached to the peripheral edge of the back surface of the fabric member 50 by sewing threads, for example, and four hook-and-loop fasteners (second hook-and-loop fasteners) 62 are also attached to the peripheral edge of the back surface side of the front panel 30 by double-sided tape, for example.

[0035] In other words, as shown in FIG. 6, the band-shaped hook-and-loop fastener 61 is sewn to a one side edge 51, another side edge 52, an upper edge 53, and a lower edge 54 of the back surface of the fabric member 50, respectively. Next, as shown in FIG. 7, the one side edge 51 and the other side edge 52 of the fabric member 50 are folded from the front side to the back side, followed by folding the upper edge 53 and the lower edge 54 of the fabric member 50 from the front side to the back side as shown in FIG. 8. Overlapping portions 55 and 56 of both ends of a folded piece of the upper edge 53 and the one side edge 51 and the other side edge 52 are sewn together, and overlapping portions 57 and 58 of both ends of a folded piece of the lower edge 54 and the one side

edge 51 and the other side edge 52 are sewn together by a thread.

[0036] By this folding and sewing together, bag-like portions are formed respectively on the four sides of the back surface of the fabric member 50 for attaching to the front panel 30, and the hook-and-loop fastener 61 residing inside the bag-like portions becomes a state facing the back surface of the fabric member 50.

[0037] The hook-and-loop fastener 61 is, for example, a loop type made by arranging a number of loop-shaped fibers, the hook-and-loop fastener 62 is, for example, a hook type made by arranging a number of hook-shaped fibers, and the two can be engaged by pressing them together and disengaged by pulling them apart.

[0038] In the case of attaching the fabric member 50 to the front panel 30, the peripheral edge of the front panel 30 is placed in the bag-like portion of the fabric member 50, and, by pressing the folded piece of the peripheral edge of the fabric member 50 against the peripheral edge of the front panel 30, the hook-and-loop fastener 61 on the fabric member 50 side engages the hook-and-loop fastener 62 on the front panel 30 side. This engagement enables the fabric member 50 to be firmly attached to the front panel 30. It is suitable to use a fabric with low elasticity for the fabric member 50. High elasticity makes attachment to the front panel 30 more difficult. However, a fabric with low elasticity can cause the fabric to twist or ripple easily when assembled. However, the front panel 30 of the present embodiment has a curved surface portion with a large R, a gentle inclination to the wall surface 1, and a convex surface on which surface the fabric member 50 is to be attached. Furthermore, since the front panel 30 is an integrally molded product of synthetic resin, and the material itself is elastically deformed and has the ability to restore its original shape, twist or ripple may be hard to occur after the fabric member 50 is attached, enabling neat and easy attachment.

[0039] A state in which the front panel 30 on which the fabric member 50 is attached is attached to the sub-body 20 is shown cross-sectional in FIG. 9 together with the configuration inside the main body 10, and the engaged state of the hook-and-loop fasteners 61 and 62 in FIG. 9 is shown enlarged in FIG. 10. FIG. 9 and FIG. 10 are both longitudinal cross sections of the indoor unit at approximately the center portion.

[0040] The main body 10 is configured by arranging the indoor heat exchanger 12 formed in a three-folded U-shape over the front and back surfaces, arranging the indoor fan 13 inside the indoor heat exchanger 12, and arranging a horizontal louver 16 and the vertical louver 17 successively in an air path leading from the indoor fan 13 to the air outlet 28.

[0041] The elastic member 70 made of a band-shaped sponge or the like that is elastically deformable by pressing and can be substantially airtight is attached to the lower part 21ax, lower part 21bx, lower part 23x, lower part 22ax, and lower part 22bx of the sub-body 20.

[0042] The lower parts 21ax, 23x, and 22ax to which

the elastic member 70 is attached have the fastening holes 71 as shown in FIG. 3, and when the front panel 30 is attached to the sub-body 20, a plurality of protruding fastening claws 35 formed on the back side of the front panel 30 enter these fastening holes 71. Each of the entered fastening claws 35 pushes up each of the hooks 72 located at a position corresponding to each of the fastening holes 71 while resisting the elastic bias force of each of the hooks 72, and engages each of the hooks 72 in a state where the elastic restoring force of each of the pushed up hooks 72 is received. This engagement completes the attachment of the front panel 30 to the sub-body 20.

[0043] When the front panel 30 to which the fabric member 50 is attached is attached to the sub-body 20, at least the outer circumference of the folded piece of the bag-like portion of the fabric member 50 abuts the elastic member 70, and the abutment blocks airflow into the sub-body 20. For example, as shown by arrows in FIG. 10, even if air blown out from the air outlet 28 or surrounding air tries to flow into the lower part of the sub-body 20, defects caused by the air flowing into the sub-body 20 and the main body 10 can be prevented. This can avoid unnecessary condensation in the sub-body 20 and main body 10.

[0044] A state in which the front panel 30 on which the fabric member 50 is not attached is attached to the sub-body 20 is shown cross-sectional in FIG. 11 together with the configuration inside the main body 10, and the contact state of the hook-and-loop fastener 62 and the elastic member 70 in FIG. 11 is shown enlarged in FIG. 12.

[0045] In this case, the peripheral edge of the back surface of the front panel 30 and the hook-and-loop fastener 62 abut the elastic member 70, and the abutment blocks air flow into the sub-body 20. For example, as shown by arrows in FIG. 12, even if air blown out from the air outlet 28 and surrounding air flows into the lower part of the sub-body 20, defects caused by the air flowing into the sub-body 20 and the main body 10 can be prevented. As can be seen by comparing FIG. 10 and FIG. 12, in the case of FIG. 10 where the fabric member 50 is attached, the elastic member 70 is compressed and thinner by the thickness of the fabric member 50 compared to FIG. 12. By using such a compressible elastic member 70, air flow into the sub-body 20 can be blocked in both cases where the fabric member 50 is and is not attached to the front panel 30.

[0046] In addition, in the case where the fabric member 50 is attached to the front panel 30, dust and the like adhere to the fabric member 50 instead of the front panel 30. As mentioned above, since the fabric member 50 can be easily attached and detached, it is possible to remove the fabric member 50 from the front panel 30 and wash or clean only the fabric member 50 in a case where it is heavily soiled, which is hygienic.

[Modification]

[0047] In the above embodiment, the radius R1, which is the curvature of the curve of the side surface 21a on the one side part 21, and the radius R2, which is the curvature of the curve of the side surface 22a on the other side part 22, are set to the same value as each other, but they may be set to different values from each other depending on the shape of the interior space and the arranged location of the indoor unit.

[0048] In the above embodiment, the acute angle Q1, which is the angle at which the side surface 21b in the one side part 21 contacts the wall surface 1, and the acute angle Q2, which is the angle at which the side surface 22b in the other side part 22 contacts the wall surface 1, are set to the same value as each other, but they may be set to different values from each other depending on the shape of the interior space and the arranged location of the indoor unit. However, in such a modification, the appearance of the indoor unit becomes asymmetrical in shape.

[0049] In the above embodiment, the hook-and-loop fastener 61 attached to the fabric member 50 is a loop type, and the hook-and-loop fastener 62 attached to the front panel 30 is a hook type, but the shapes of the hook-and-loop fasteners may be reversed. In the case of being reversed, when the front panel 30 to which the fabric member 50 is not attached is attached to the sub-body 20, the loop-type hook-and-loop fastener attached to the front panel 30 will be in contact with the elastic member 70, and the abutment to the elastic member 70 will be weakened, thereby improving the durability of the elastic member 70.

[0050] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

Reference Signs List

[0051] 1...wall surface, 2...mounting plate, 10...main body, 11...rear plate, 12... indoor heat exchanger, 13... indoor fan, 20... sub-body, 21...one side part, 22...other side part, 23...center part, 24...upper surface part, 25...lower surface part, 26...air inlet, 27...filter, 30...front panel, 31...one side part, 32...other side part, 33...central part, 40...screw (fixture), 50...fabric member, 61...hook-and-loop fastener (first hook-and-loop fastener), 62...hook-and-loop fastener (second hook-and-loop fastener), 70...elastic member, 80...indoor unit body

Claims

1. An indoor unit of an air conditioner comprising:

5 an indoor unit body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface; and
a front panel covering a front surface of the indoor unit body, wherein
10 the front panel includes a one side part and another side part in a direction perpendicular to a vertical direction of the wall surface, and also includes a central part located between the one side part and the other side part, and
15 the one side part and the other side part each have a shape that curves toward the wall surface side from a portion connected to the central part, and a portion beyond the curved portion extends to a location on the wall surface at an acute angle to the wall surface.

2. The indoor unit of an air conditioner of claim 1, wherein the front panel can be attached to and detached from the indoor unit body.

3. The indoor unit of an air conditioner of claim 2, wherein the indoor unit body comprises:

30 a main body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface; and
a sub-body having an air inlet and an air outlet and attached to the main body in a state that covers the front side of the main body, wherein
35 the sub-body includes a one side part and another side part in a direction perpendicular to a vertical direction of the wall surface, and a central part located between the one side part and the other side part, and
40 the one side part and the other side part of the sub-body each have a shape curved toward the wall surface side from a portion connecting with the central part of the sub-body, and a portion beyond the curved portion extends to a location on the wall surface at an acute angle to the wall surface.

4. The indoor unit of an air conditioner of claim 2 or claim 3, further comprising:

50 a fabric member having a rectangular shape of approximately the same size as the front panel and covering a surface of the front panel when attached to the front panel.

5. The indoor unit of an air conditioner of claim 1, wherein the indoor unit body comprises:

- a main body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface; and
 a sub-body having an air inlet and an air outlet and attached to the main body in a state that covers a front side of the main body, wherein the sub-body includes a one side part and another side part in a direction perpendicular to a vertical direction of the wall surface, and a central part located between the one side part and the other side part,
 the one side part of the sub-body includes a side surface curving with a curvature of radius R1 from a portion of the sub-body connected to the central part toward the wall surface side, and a side surface extending from this side surface to a location on the wall surface at an acute angle Q1 to the wall surface, and
 the other side part of the sub-body includes a side surface curving with a curvature of radius R2 from a portion of the sub-body connected to the central part toward the wall surface side, and a side surface extending from this side surface to a location on the wall surface at an acute angle Q2 to the wall surface.
6. The indoor unit of an air conditioner of claim 5, wherein
 the radius R1 and the radius R2 are approximately 85 degrees or less, and
 the acute angle Q1 and the acute angle Q2 are approximately 53 degrees or less.
7. The indoor unit of an air conditioner of claim 3, wherein
 the sub-body comprises:
 an upper surface part extending from an upper edge of each of the one side part, the central part, and the other side part to the wall surface side and in contact with the wall surface, and on which the air inlet is formed;
 a lower surface part extending from a lower edge of each of the one side part, the central part, and the other side part to the wall surface side and in contact with the wall surface, and on which the air outlet is formed; and
 one or more fixtures inserted into the one side part and the other side part to fix an end edge of each of the one side part and the other side part to the wall surface, and
 holds a filter for removing dust at a location corresponding to the air inlet in the central part and the upper surface part of the sub-body.
8. The indoor unit of an air conditioner of claim 4, wherein the fabric member comprises a bag-like portion formed by folding a peripheral edge from a front side to a back side for attachment to the front panel.
9. The indoor unit of an air conditioner of claim 8, further comprising:
 a first hook-and-loop fastener attached inside a folded piece of the bag-like portion of the fabric member in a state facing a back surface of the fabric member; and
 a second hook-and-loop fastener attached to a peripheral edge of a back surface of the front panel and engaged with the first hook-and-loop fastener when the peripheral edge of the front panel is placed in the bag-like portion of the fabric member.
10. The indoor unit of an air conditioner of claim 9, further comprising:
 an elastic member attached to a lower part of each of the first side part, the central part, and the other side part of the sub-body, and, when the front panel is attached to the sub-body, contacts at least an outer circumference of a folded piece of the bag-like portion of the fabric member of the fabric member in a case where the fabric member is attached to the front panel, thereby blocking air flow into the sub-body, and contacts a peripheral edge of a back surface of the front panel and the second hook-and-loop fastener in a case where the fabric member is not attached to the front panel, thereby blocking air flow into the sub-body.
11. An indoor unit of an air conditioner comprising:
 an indoor unit body holding an indoor heat exchanger and an indoor fan and mounted on a wall surface; and
 a front panel that covers a front surface of the indoor unit body and extends to a location on the wall surface with both side surfaces thereof at an acute angle to the wall surface, and can be attached to and detached from the indoor unit body.
12. The indoor unit of an air conditioner of claim 11, wherein a front surface of the front panel is formed of a plurality of surfaces, and connection portions of these surfaces have an almost smooth curved surface shape.
13. The indoor unit of an air conditioner of claim 11, further comprising a mounting plate attached to the wall surface.
14. The indoor unit of an air conditioner of claim 3, further comprising:
 a plurality of screws which are screwed from the one

side part and the other side part of the sub-body through a plurality of portions of the main body to the wall surface, and fix the main body and the sub-body to the wall surface in a mutually fastened state by the screwing.

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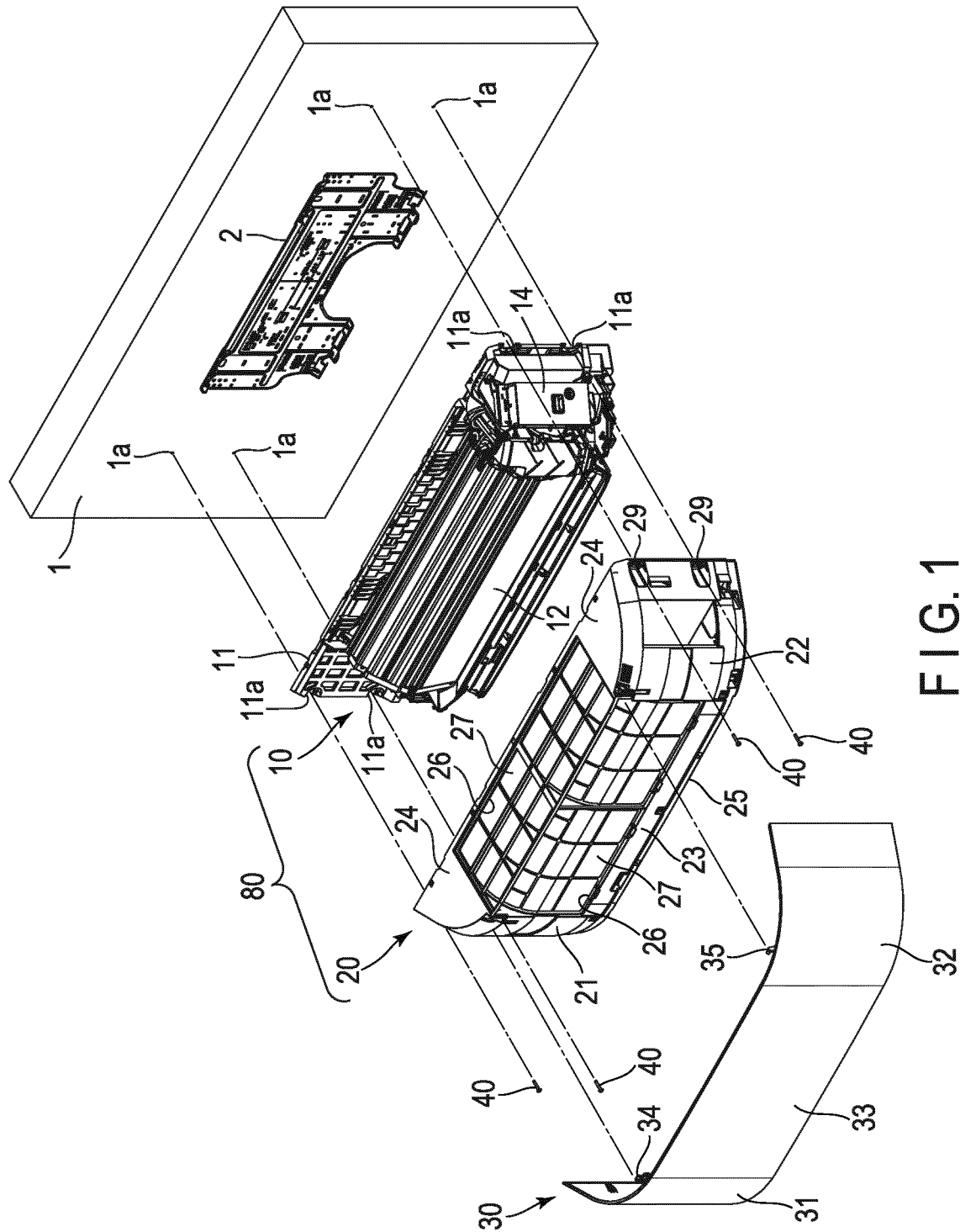


FIG. 1

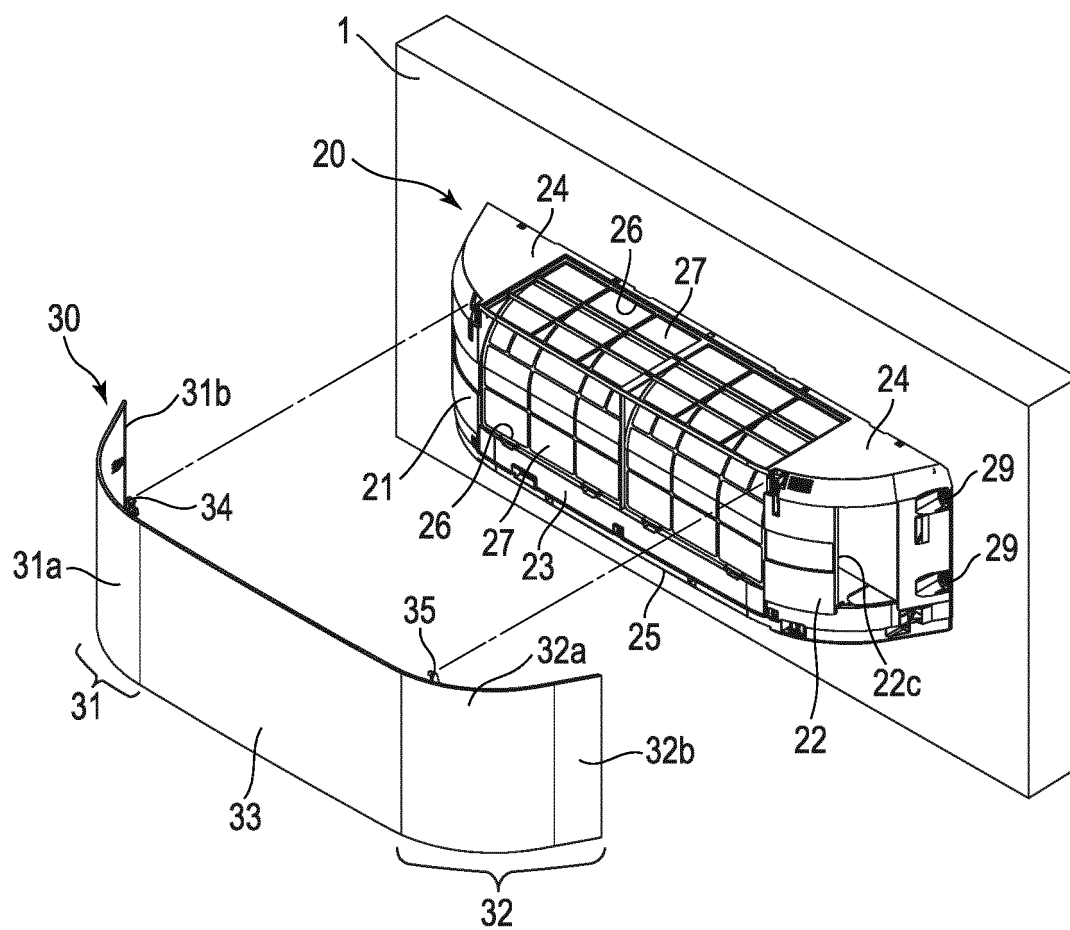


FIG. 2

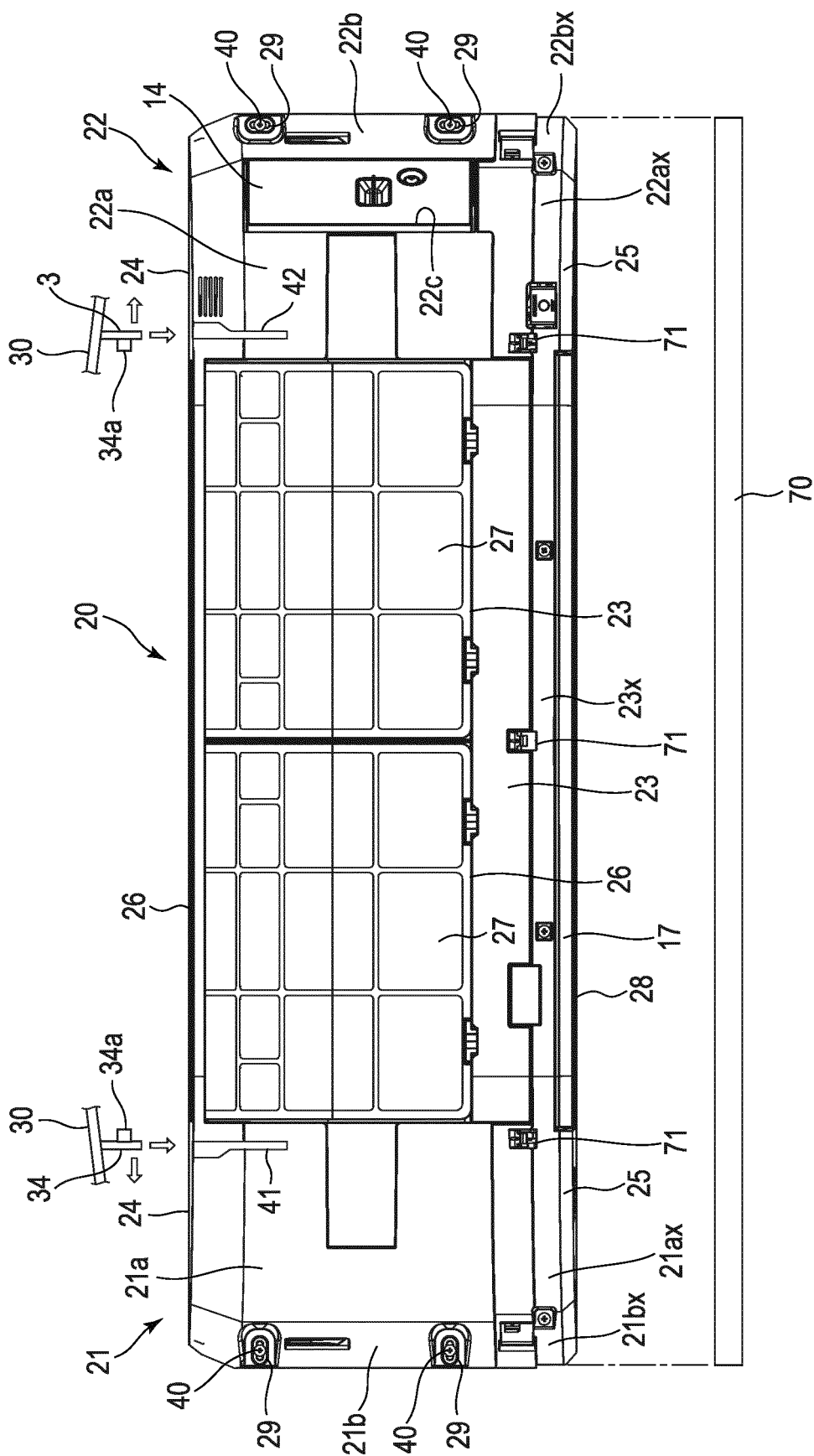


FIG. 3

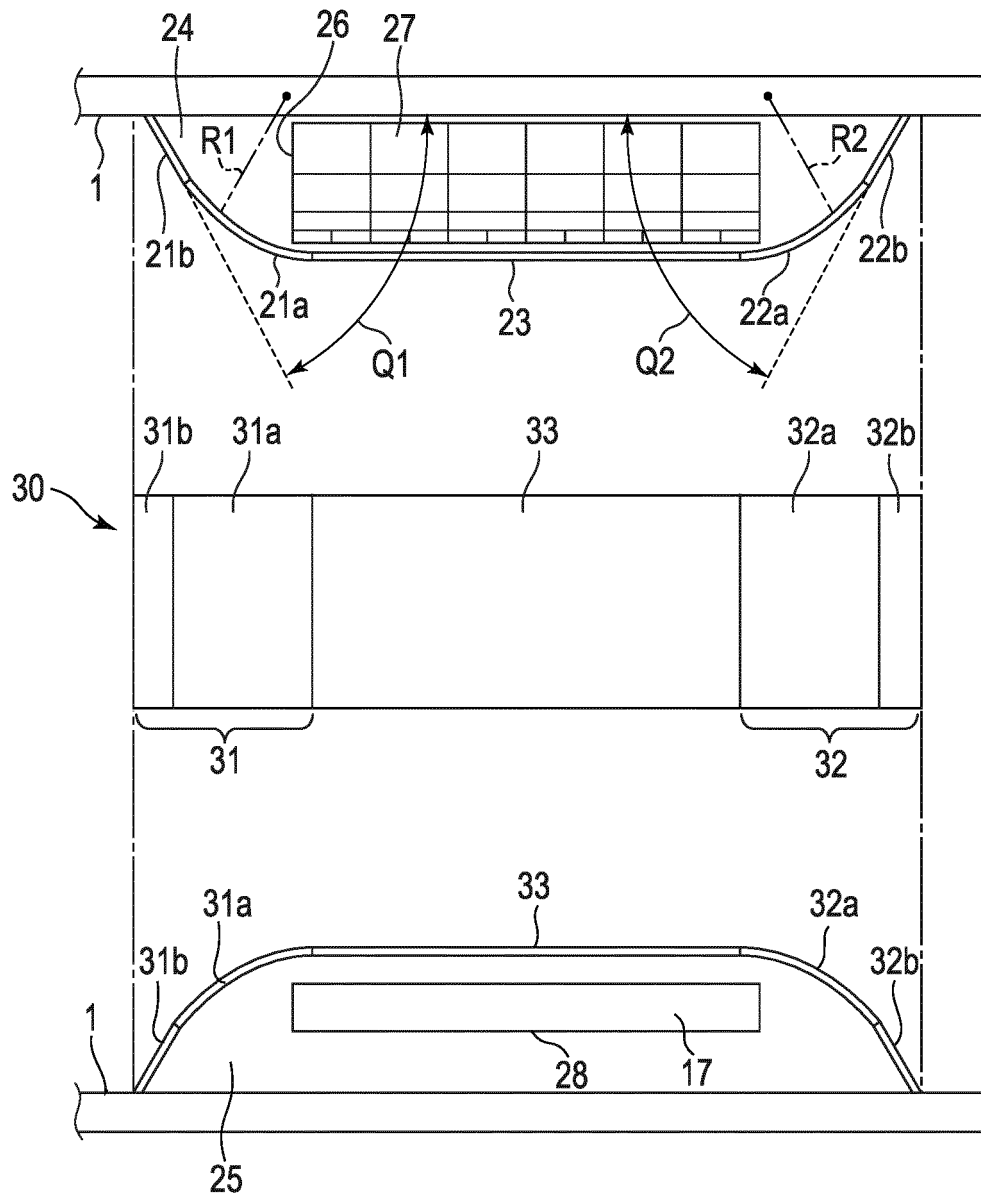
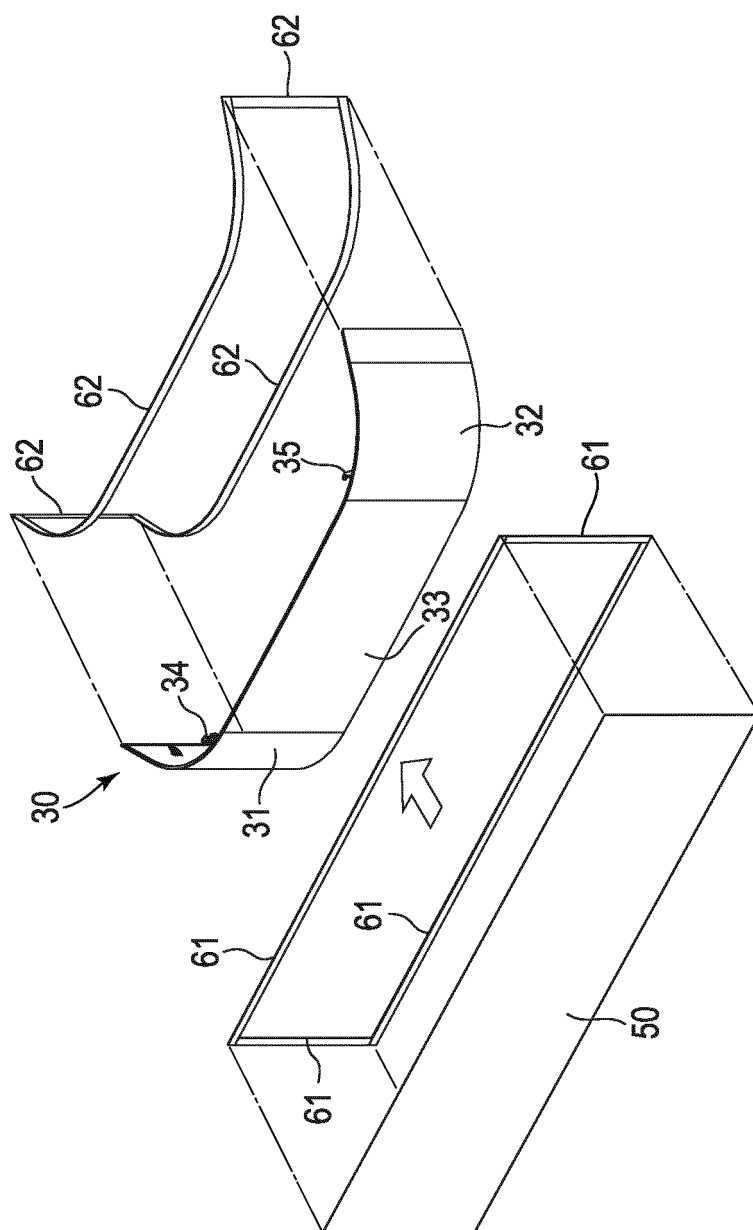


FIG. 4



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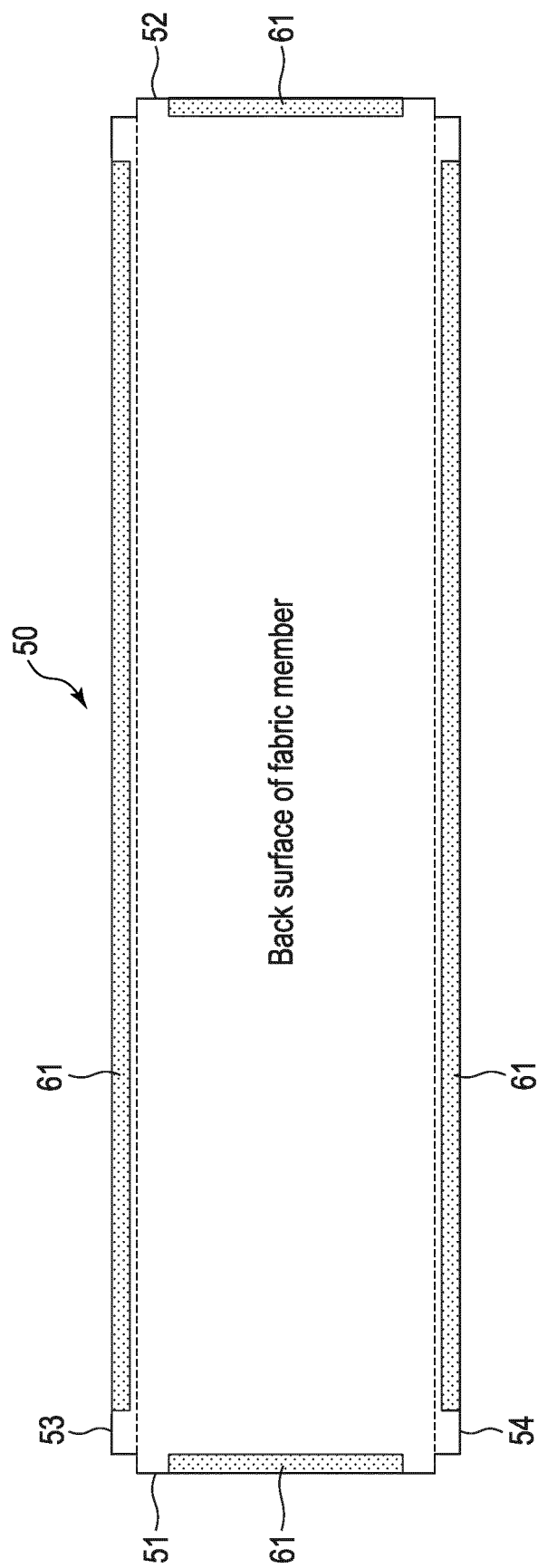


FIG. 6

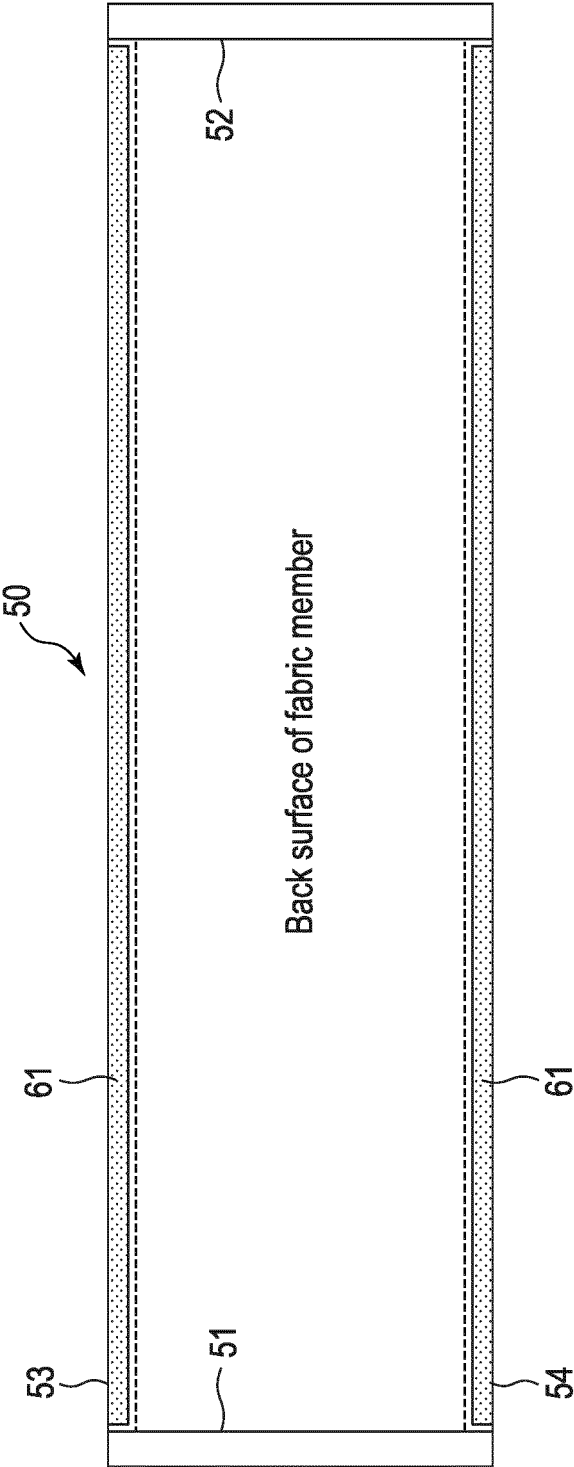


FIG. 7

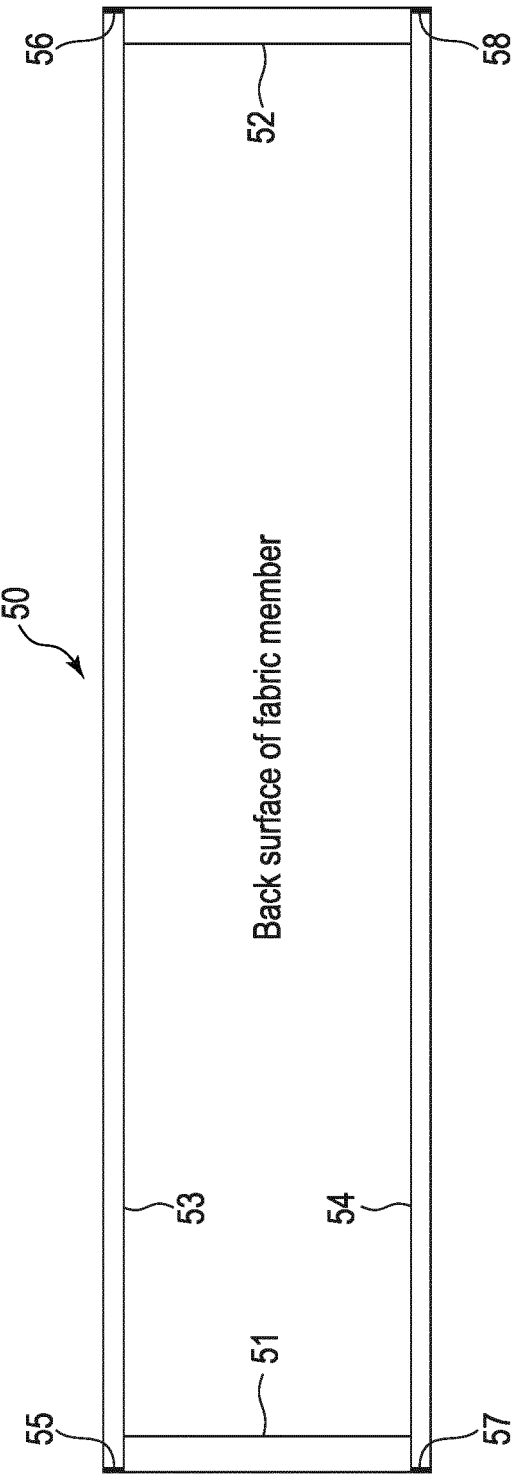


FIG. 8

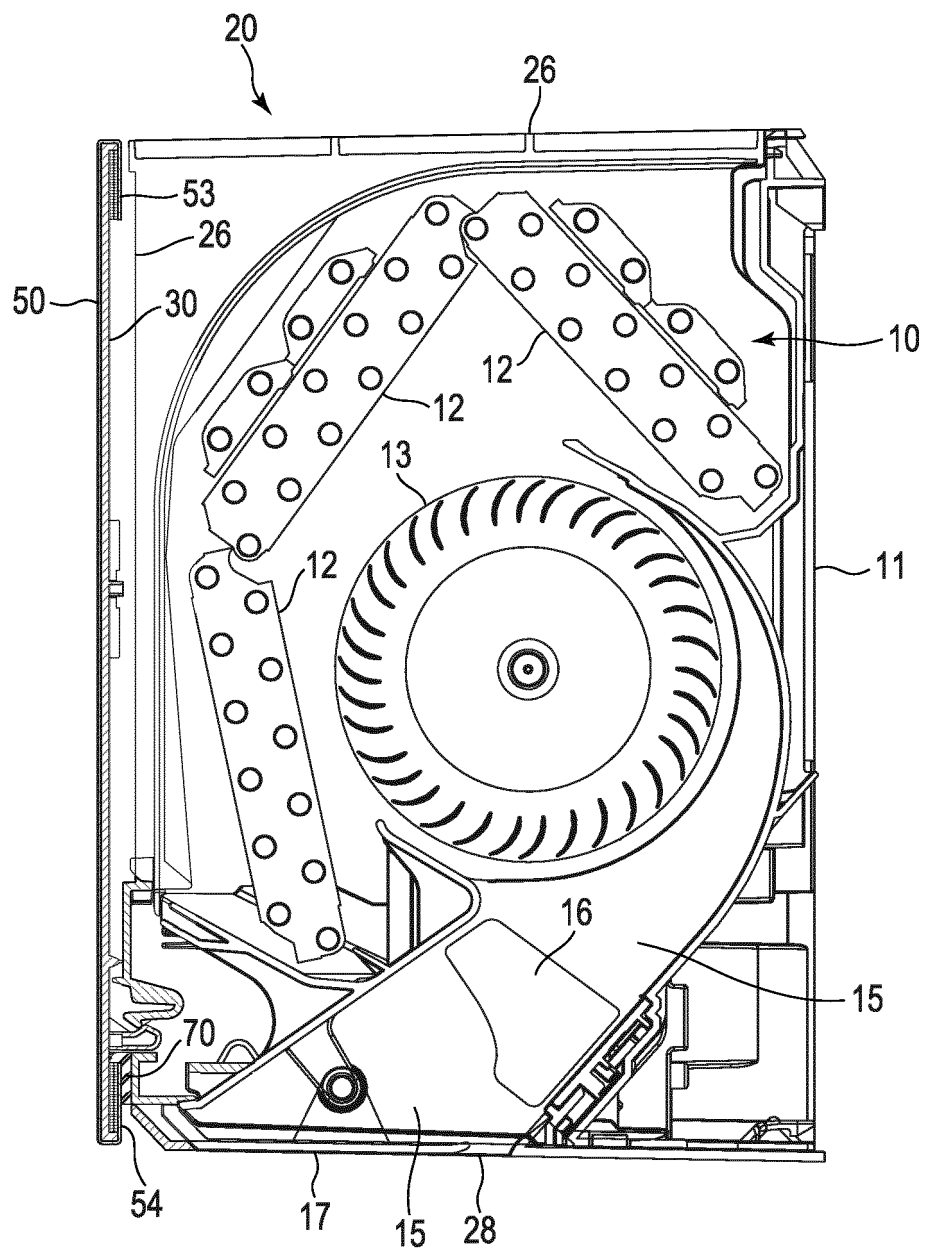


FIG. 9

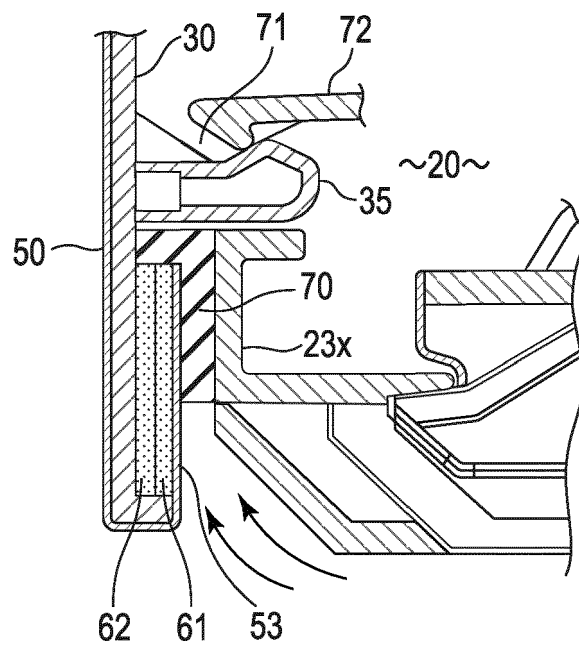


FIG. 10

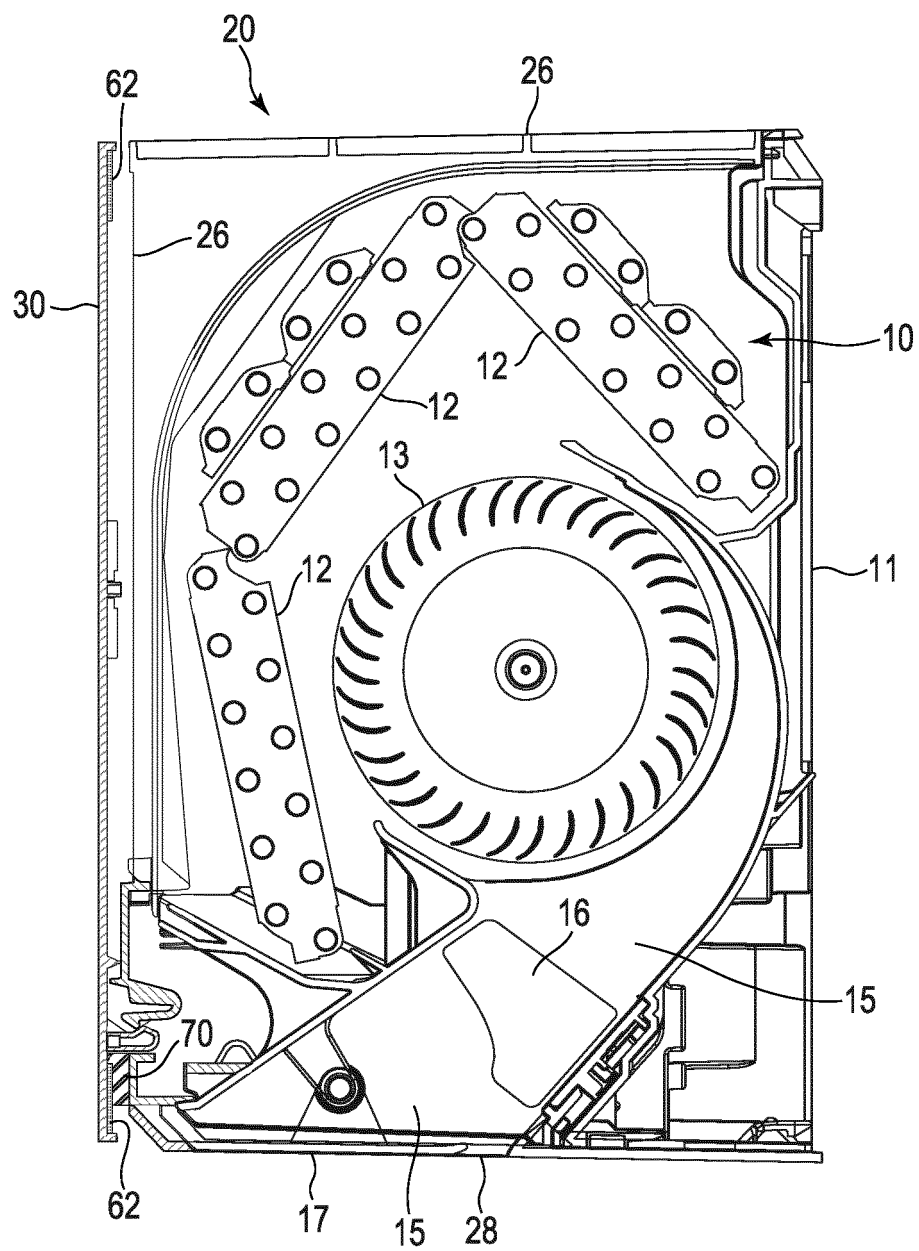


FIG. 11

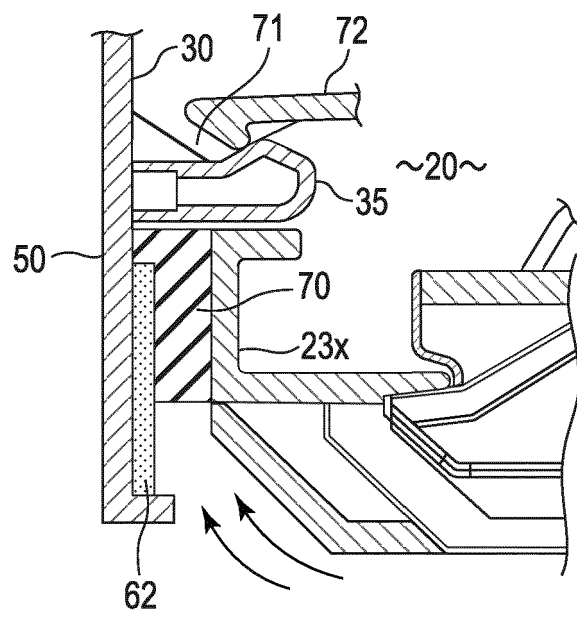


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/040271

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. F24F13/20 (2006.01) i

FI: F24F1/0007 401B

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)

Int. Cl. F24F13/20

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 7-63368 A (HITACHI, LTD.) 07 March 1995 (1995-03-07), paragraphs [0014]-[0030]	1-8, 14
Y	JP 2003-148761 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 21 May 2003 (2003-05-21), paragraphs [0001]-[0035]	1-8, 11-14
Y	JP 3059885 U (FUNAI ELECTRIC CO., LTD.) 13 July 1999 (1999-07-13), paragraph [0035]	2-4, 7-8, 11-14
Y A	JP 3214328 U (TODA, Rikiya) 11 January 2018 (2018-01-11), paragraphs [0029]-[0046]	4, 8 9-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search
09.12.2020Date of mailing of the international search report
12.01.2021Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/JP2020/040271

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 7-63368 A	07.03.1995	(Family: none)	
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JP 3059885 U	13.07.1999	(Family: none)	
JP 3214328 U	11.01.2018	(Family: none)	

REFERENCES CITED IN THE DESCRIPTION

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