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

(57) A casing 1 which is formed into a horizontally long rectangular shape and whose undersurface is opened is arranged under a ceiling of a room to be air conditioned. A heat exchanger 9, a fan 8 and the like are contained in the inside of the casing 1. A decorative panel 2 is engaged into an undersurface opening portion 1a of the casing and exposed to the inside of the room to be air conditioned. An outlet port 15 is opened into a horizontally long rectangular shape, over the roughly full length in the longitudinal direction of the decorative panel

2. A reinforcing connection member 20 is positioned roughly at the center portion in the longitudinal direction of the outlet port and arranged between both the side portions along the longitudinal direction of the outlet port and attached to the decorative panel. A hole portion 100g is arranged in the reinforcing connection member. A fixing screw 23 is inserted from the decorative panel into the hole portion of the reinforcing connection member, and attaches and fixes the decorative panel to the casing together with the reinforcing connection member.

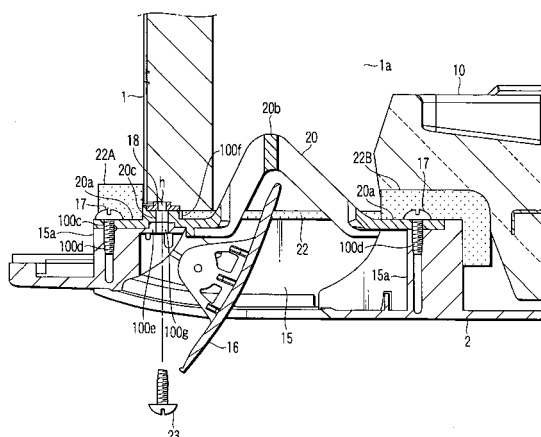


FIG. 3

Description

Technical Field

[0001] The present invention relates to a ceiling-embedded air conditioner which is equipped with a decorative panel formed into a horizontally long rectangular shape, and acquires a reinforcing structure to an outlet port arranged over the roughly full length in the longitudinal direction of this decorative panel.

Background Art

[0002] In the case of air conditioning of a wide area such as retail premises as indoor equipment of an air conditioner, ceiling-embedded air conditioners which can discharge heat-exchanged air evenly over a wider range from a ceiling surface than wall-mounted air conditioners attached to a wall, and which provide less feeling of pressure to occupants, are used widely.

[0003] This kind of air conditioner is disclosed in Japanese Patent No. 2902857 (Pat. Document 1) and Jpn. Pat. Appln. KOKAI Publication No. 7-151376 (Pat. Document 2) and the like. Specifically, an air conditioner main body (hereinafter referred to as casing) is attached under the ceiling proper of a room to be air conditioned, and a heat exchanger, a fan and the like are contained in the inside thereof. The undersurface opening portion of the casing is of a horizontally long rectangular shape, and a decorative panel is inserted thereinto to be exposed to the inside of the room to be air conditioned. In the decorative panel, an intake port that takes in and guide indoor air to the casing, and an outlet port that discharges and directs heat-exchanged air to the room.

[0004] In the above Pat. Document 1, indoor equipment of an air conditioner having an outlet port along the longitudinal direction at one side of the decorative panel, and referred to as a one-direction ceiling cassette type is disclosed. Further, in the above Pat. Document 2, indoor equipment of an air conditioner having outlet ports along the longitudinal direction respectively at both sides of the decorative panel, and referred to as a two-direction ceiling cassette type is disclosed.

Disclosure of Invention

[0005] With regard to the outlet port, in either structure, it is preferred that the outlet port itself is as long as possible in terms of the characteristics of discharged air current. Therefore, the full length of the outlet ports in the respective Pat. Documents is formed to have roughly the same length as the longitudinal direction of the decorative panel.

[0006] In particular, in the Pat. Document 2, at the position corresponding to the long outlet port, an outlet route regulated by a supporting plate and the main body long side wall is formed along the longitudinal direction of the main body. Heat-exchanged air having passed through

a heat exchanger is guided to this outlet route, and then discharged to the room inside via the outlet port arranged in the decorative panel.

[0007] In addition, since the outlet route is long, reinforcement is required. Thus, in the Pat. Document 2, a reinforcing metal fitting is arranged between the supporting plate and the long side wall, roughly at the center in the longitudinal direction. On the other hand, no reinforcing structure is adopted to the outlet port at the decorative panel side having the same opening shape as the outlet route.

[0008] It is same in the Pat. Document 1 that there is no reinforcing structure to the outlet port in the decorative panel. That is, it is understood that, since the decorative panel does not support any heavy part and is not subject to heavy weight, and further, attached and fixed to the casing, the outlet port is not reinforced in particular.

[0009] The casing is attached under the ceiling proper and not exposed in the room inside, and accordingly, it is merely formed of a metal thin plate by sheet metal processing, which does not require beautiful decoration. On the other hand, the decorative panel is exposed in the room inside and thus requires an attractive appearance. Therefore, the decorative panel is structured of an attractive synthetic resin material, and is formed as thin as possible in order to make it lightweight.

[0010] Thus, the rigidity of the decorative panel is restrained to necessity minimum, and consideration to the rigidity around the long outlet port is hardly taken. Accordingly, there has been a fear that force works on the center portion, which may be broken due to lack of strength.

[0011] The present invention has been made in consideration of the above circumstance, and accordingly, an object of the present invention is to provide a ceiling-embedded air conditioner in which the rigidity of the portion around the outlet port arranged in the decorative panel is increased, and reliability is improved without a fear of breakage.

Brief Description of Drawings

[0012]

FIG. 1 is a perspective view showing a disassembled ceiling-embedded air conditioner according to one embodiment of the present invention.

FIG. 2 is a cross-sectional view showing the ceiling-embedded air conditioner.

FIG. 3 is a cross-sectional view showing an outlet port, a reinforcing connection member and the peripheral portion thereof in the ceiling-embedded air conditioner.

FIG. 4 is a perspective view for explaining the attachment of part of the rear surface of the decorative panel, and an elastic member in the ceiling-embedded air conditioner.

FIG. 5 is a cross-sectional view showing an outlet

port and a louver in the ceiling-embedded air conditioner.

FIG. 6A is a perspective view showing an entire louver in the ceiling-embedded air conditioner and a driving shaft portion of the louver.

FIG. 6B is a perspective view showing a driving shaft portion of the louver in the ceiling-embedded air conditioner.

Best Mode for Carrying Out the Invention

[0013] An embodiment according to the present invention will be described with reference to the attached drawings hereinafter.

[0014] FIG. 1 is a perspective view showing a disassembled ceiling-embedded air conditioner according to one embodiment of the present invention, and FIG. 2 is a cross sectional view showing the ceiling-embedded air conditioner.

[0015] The ceiling-embedded air conditioner is equipped with an air conditioner main body (hereinafter referred to as a casing) 1 which is inserted into an attachment opening portion arranged in the false ceiling of a room to be air conditioned, and which is suspended and fixed via a suspending bolt or the like under the ceiling proper (not illustrated).

[0016] In the casing 1, the entire undersurface is opened, and a decorative panel 2 is attached to this opening portion 1a. The decorative panel 2 is exposed to the room inside while being attached to the casing 1, and is in the height position to meet the false ceiling. In addition, the decorative panel 2 blocks the clearance between the attachment opening portion arranged in the false ceiling and the side surface portion of the casing 1.

[0017] The casing 1 is formed into a horizontally long rectangular box shape in which the longitudinal direction thereof is longer than the width direction orthogonal to the longitudinal direction. The external appearance of all the surfaces except the undersurface opening portion 1a is formed of a metal thin plate by metal plate processing, and a heat insulation material is assembled in the inside thereof to make a heat insulation structure.

[0018] To both side surface portions 1b of the casing 1, a pair of attachment metal fittings 3 is attached respectively with an interval. In the respective attachment metal fittings 3, the top end portion is made to be a suspending metal fitting 3A that protrudes from the casing side surface portion 1b in the horizontal direction. The suspending metal fitting 3A is notched from the protrusion end edge toward the side surface portion 1b, and this notched portion is engaged with a suspending bolt (not illustrated) suspended under the ceiling proper.

[0019] Further, the attachment metal fitting 3 integrally has a fixing metal portion 3B formed to be bent along the undersurface end portion of the casing 1 which forms the undersurface opening portion 1a. Into this fixing metal portion 3B, screw holes are made for attachment of the decorative panel 2 to the casing 1, and for attachment of

a drain pan 10 to be described later herein.

[0020] At the side surface portion 1b at one side (the right side surface in the figure) of the casing 1, in the vicinity of the attachment metal fitting 3, two coolant connection pipes 4 and a cable pipe 5 end portion are protruded. The coolant connection pipes 4 are communicated with a heat exchanger 10 described later and arranged in the casing 1, and to these coolant connection pipes 4, coolant delivery pipes (not illustrated) extending from an outdoor equipment are connected. To the cable pipe 5, a delivery cable (not illustrated) that electrically connects the indoor equipment and the outdoor equipment and a power source portion is inserted.

[0021] At roughly half the length position in the width direction in the casing 1, a partition plate 6 is arranged in the longitudinal direction of the casing. Accordingly, the inside of the casing 1 is divided, by the partition plate 6, into two chambers 7A, 7B in the width direction. One chamber divided by the partition plate 6 is called an air supply chamber 7A, and a fan 8 is arranged herein. The other chamber divided by the partition plate 6 is called a heat exchange chamber 7B, and there are arranged a heat exchanger 9 and a drain pan 10, which is at the lower portion of this heat exchanger.

[0022] The fan 8 has a fan motor FM at the center thereof, and this fan motor is a biaxial motor in which rotating shafts 100n protrude from both the left and right sides. To the respective rotating shafts 100n, fans (so-called multiblade fans) F that take in air from the axial direction and discharge air to the circumferential direction in the rotation are connected. Further, the respective fans F are covered with a fan casing 8a.

[0023] An opening portion 100m for taking in and guiding air is arranged at each of both the side portions in the axial direction of the fan casing 8a.

[0024] At the side end portion of the partition plate 6 of the fan casing 8a, an outlet port body K is protruded, and is attached and fixed to the partition plate 6. A through hole 6a is made in the partition plate 6, and the outlet port body K of the fan casing 8a is connected to this hole. Accordingly, the through hole 6a sends and guides the air discharged from the outlet port body K of the fan casing 8a with the drive of the fan 8 to the heat exchange chamber 7B side.

[0025] On the other hand, the heat exchanger 9 arranged in the heat exchange chamber 7B is arranged above the drain pan 10 of a tray shape to be described later, and is arranged in a state that the vertical direction is inclined diagonally. Since the vertical direction dimension of the casing 1 is made as short as possible to obtain a thin casing, the vertical direction dimension of the heat exchanger 9 cannot be set to a sufficient length.

[0026] On the other hand, it is necessary to secure the heat exchange area of the heat exchanger 9 as much as possible, and thereby improve the heat exchange efficiency. Accordingly, the heat exchanger 9 is inclined diagonally in the vertical direction, and the vertical direction dimension is restrained while a sufficient heat exchange

area can be secured.

[0027] When such a heat exchanger 9 is viewed from the top, the planar area of the drain pan 10 is formed to be larger than the planar area of the heat exchanger 9. Therefore, in the case where cooling operation to be described later is carried out, the drain pan 10 can reliably catch condensation (drain water) generated in the heat exchanger 9 along with the operation.

[0028] On the other hand, the decorative panel 2 is structured of a molded product of synthetic resin material, for example PS (polystyrene) material, in order to improve weight reduction and beautiful appearance. This decorative panel 2 is attached to the undersurface opening portion 1a of the casing 1, and therefore, it is of a horizontally long rectangular shape where the longitudinal direction is longer than the width direction to meet the shape of the undersurface opening portion.

[0029] In one side portion in the width direction of the decorative panel 2, an intake port 12 is opened, and an intake grill 13 is engaged thereinto. The intake grill 13 is separately arranged to the decorative panel 2, but it may be formed integrally with the decorative panel 2. In addition, the intake grill 13 is covered with a filter 14 detachably attached to the rear surface of the decorative panel 2.

[0030] In a state in which the decorative panel 2 is attached to the undersurface opening portion 1a of the casing 1, the intake grill 13 faces the air supply chamber 7A. The longitudinal direction of the intake grill 13 is arranged over the roughly full length in the longitudinal direction of the decorative panel 2, and accordingly, it roughly meets the longitudinal direction of the undersurface opening portion 1a of the casing.

[0031] One side edge in the width direction of the intake grill 13 is formed at the position near one side edge of the decorative panel 2, and the other side edge thereof is set at the position opposing the lower end portion of the partition plate 6. Accordingly, the intake grill 13 is formed to have roughly the same shape area as the entire surface of the air supply chamber 7A.

[0032] Further, an outlet port 15 is opened along the other side edge in the width direction of the decorative panel 2, and a louver 16 is rotatably attached to this outlet port 15. At one side portion of the outlet port 15, a drive source 16M is attached, which is connected with the louver 16 via a connection mechanism not illustrated. Accordingly, when the drive source 16M drives, the louver 16 is rotated and controlled, and thus the outlet angle from the outlet port 15 is adjustable.

[0033] Meanwhile, in a state in which the decorative panel 2 is attached to the undersurface opening portion 1a of the casing 1, this outlet port 15 opposes the heat exchange chamber 7B. The outlet port 15 is opened along the side edge along the longitudinal direction of the decorative panel 2, in parallel with the partition plate 6 via a specified interval, and over the roughly full length in the longitudinal direction of the decorative panel 2. The outlet port 15 is of a horizontally long shape whose width

direction is extremely shorter than the longitudinal direction.

[0034] A reinforcing connection member 20 to be described later is arranged at roughly the center portion in the longitudinal direction of this outlet port 15.

[0035] FIG. 3 is a cross sectional view showing the structure of the reinforcing connection member 20 to be attached to the outlet port 15, and the attachment portion with the reinforcing connection member 20 for explaining the attachment structure, and FIG. 4 is a partial perspective view of the decorative panel 2 for explaining the structure around the outlet port 15 to which the reinforcing connection member 20 is attached.

[0036] This reinforcing connection member 20 is made of an oil resistant synthetic resin material (ABS material or the like), and arranged between both side portions along the longitudinal direction of the outlet port 15. Both root portions 20a of the reinforcing connection member 20 are attached via attachment screws 17 to the decorative panel 2, and a center portion 20b thereof is formed to be bent upward in a roughly triangular shape.

[0037] As described above, the louver 16 rotatably supported at the outlet port 15 is variable from the state to completely close the outlet port 15, to the state to nearly fully open it. In particular, when the outlet port 15 is fully or almost fully opened as shown in FIG. 3, one side portion of the louver 16 follows a trajectory of going into the depth of the outlet port 15, specifically, into the casing 1. Therefore, the center portion 20b of the reinforcing connection member 20 is formed so as to avoid the rotation trajectory of the louver 16.

[0038] The both root portions 20a of the reinforcing connection member 20 are extended in the horizontal direction, and an attachment hole 100c is arranged to the side edge portions. These both root portions 20a are put on a protruded portion 15a integrally protruded upward along the circumference of the outlet port 15, and the attachment hole 100c of the reinforcing connection member 20 is communicated with a screw hole 100d arranged in the protruded portion 15a. Then, the attachment screw 17 is screwed into the screw hole 100d via the attachment hole 100c of the reinforcing connection member 20, thereby the reinforcing connection member 20 is attached and fixed to the decorative panel 2.

[0039] Further, at one side (louver 16 attachment side) of the root portion 20a extended in the horizontal direction of the reinforcing connection member 20, and in the portion in the vicinity of the attachment hole 100c through which the attachment screw 17 is inserted, a boss portion 20c protruding upward from the root portion 20a is arranged integrally. Meanwhile, the top surface of this boss portion 20c protrudes with a specified height from the top surface of the root portion 20a, and the undersurface of the boss portion is formed into a shape recessed from the undersurface of the root portion.

[0040] On the other hand, the upper surface portion of the protruded portion 15a is protruded, and the undersurface convex portion of the boss portion 20c is engaged

with this protrusion 100e. Accordingly, positioning of the reinforcing connection member 20 to the protruded portion 15a can be made easily.

[0041] Hole portions 100g which are communicated with each other are arranged in the reinforcing connection member boss portion 20c and the decorative panel protruded portion 15a. A nut portion 18 having a screw hole 100h is arranged at a portion of the casing 1 facing these hole portions 100g. When the decorative panel 2 is attached and fixed to the casing 1, particularly in the reinforcing connection member 20, a fixing screw 23 serving as a fixing tool is screwed into the screw hole 100h of the nut portion 18 attached to the casing 1 via the hole portions 100g of the boss portion 20c and the protruded portion 15a.

[0042] In the state in which the reinforcing connection member 20 is attached to the decorative panel 2 in this manner, particularly as shown in FIG. 4, an elastic member 22 is attached to the reinforcing connection member 20 along the circumferential portion of the outlet port 15.

[0043] That is, the elastic member 22 has cushioning property of, for example, a sponge material. In the figure, the state is shown in which the elastic member 22 is already attached over one side portion in the width direction of the outlet port 15 and one side portion of the decorative panel 2, and separately prepared two elastic members 22A, 22B are to be attached to the longitudinal direction of the outlet port 15.

[0044] In particular, in the elastic member 22A to be attached to the side portion of the root portion 20a side where the boss portion 20c of the reinforcing connection member 20 is formed, a hole portion 100f having roughly the same diameter as the diameter of the boss portion 20c is arranged. Accordingly, when the elastic member 22A is attached to the protruded portion 15a, the reinforcing connection member boss portion 20c is engaged into the hole portion 100f of the elastic member. The thickness of this elastic member 22A is formed to be larger than the height dimension of the boss portion 20c, and when the elastic member 22A is attached to the protruded portion 15a, the boss portion 20c gets into the inside of the hole portion 100f.

[0045] In this state, the decorative panel 2 is put to the undersurface opening portion 1a of the casing 1, the attachment screw is screwed via the decorative panel 2 into the screw hole of the fixing metal portion 3B formed in the attachment metal fitting 3, and the decorative panel 2 is attached and fixed to the casing 1. In the reinforcing connection member 20 as well, as described above, the fixing screw 23 is screwed into the screw hole 100h of the nut portion 18 attached to the casing 1 via the decorative panel protruded portion 100e and the hole portion 100g arranged in the boss portion 20c.

[0046] In particular, the elastic member 22, which exists between the protruded portion 15a forming the outlet port 15 of the decorative panel 2 and the peripheral portion of the undersurface opening portion 1a of the casing 1, is pinched and fixed between the decorative panel 2

and the casing 1, and the wall thickness of the elastic member 22 is compressed to a fraction of the original thickness.

[0047] However, herein the boss portion 20c is protruded upward integrally with the root portion 20a of the reinforcing connection member 20. Thus, even if the elastic member 22A is compressed between the casing 1 and the decorative panel 2, the compression to below the height of the boss portion 20c is regulated by the boss portion. That is, the elastic member 22A maintains the indispensable thickness, and thereby the sealing property is secured.

[0048] FIG. 5 is a cross sectional view showing the louver 16 supported at the outlet port 15, FIG. 6A is a perspective view showing the louver 16 single body, and FIG. 6B is a perspective view showing one end portion of the louver 16.

[0049] In particular as shown in FIG. 6A, the louver 16 is supported by four shafts 25A to 25D, to the outlet port 15. Herein, the three shafts 25A to 25C except the shaft 25D arranged at the right side end portion in the figure are merely inserted into holes of supporting portion (not illustrated) arranged at one side portion and center portion of the outlet port 15, and the shaft 25D at the right side end portion is a drive shaft connected to the drive source 16M.

[0050] That is, the three shafts 25A to 25C are just supporting shafts and thus the diameter thereof may be thin. However, the drive shaft 25D is to transmit driving force and is subject to force, and therefore, it is necessary to secure a certain degree of strength, and the diameter thereof is larger than those of the other three shafts. For the reason to be described later, only the drive shaft 25D is formed into a shaft with a knurling slot, unlike the other three shafts 25A to 25C.

[0051] In the ceiling-embedded air conditioner structured as above, when the fan 8 is driven, indoor air is drawn, via the intake grill 13 forming the intake port 12 and the filter 14, into the air supply chamber 7A in the casing 1. The indoor air is guided, via the fan casing 8a constituting the fan 8 and the through hole 6a arranged in the partition plate 6 to the heat exchange chamber 7B, and heat-exchanged with the heat exchanger 9.

[0052] The heat-exchanged air after the heat exchange with the heat exchanger 9 is guided to the outlet port 15 and discharged via the louver 16 to the room, and makes heat exchange of the room. Particularly at a cooling operation, condensation forms and drips along with the heat exchange operation of the heat exchanger 9. The condensate is received and collected by the drain pan 10, and finally discharged to the outside.

[0053] In the air conditioning operation of either cooling operation or heating operation, heat-exchanged air is discharged from one outlet port 15 arranged in the decorative panel 2, that is, one-directional discharge is carried out. However, by the posture control of the outlet port 15 with respect to the louver 16, heat-exchanged air can be discharged and directed evenly to a wider range inside

the room, and efficient air conditioning can be obtained.

[0054] Further, the outlet port 15 is arranged along one side edge in the width direction of the decorative panel 2, and is opened over the roughly full length in the longitudinal direction of the decorative panel 2. Accordingly, air discharge is carried out to a further wider range inside the room, and though it is of one-direction discharge, discharge characteristics are preferable.

[0055] The outlet port 15 itself is arranged in the decorative panel 2 having a low strength, and is opened over the roughly full length in the longitudinal direction of the decorative panel. Therefore, the peripheral portion forming the outlet port 15 has a low strength. However, herein the reinforcing connection member 20 is attached to the decorative panel 2 via the attachment screw 17 in the state positioned at roughly the center in the longitudinal direction of the outlet port 15, and arranged between both the side portions along the longitudinal direction of the outlet port 15.

[0056] Further, the fixing screw 23 attaches and fixes the reinforcing connection member 20 to the casing 1 together with the decorative panel 2. Accordingly, even if the decorative panel 2 is made of a synthetic resin material of low strength in order to maintain a beautiful appearance, and the outlet port 15 is formed into a horizontally long shape along the longitudinal direction, the shortage in strength around the outlet port 15 is compensated for and there is no fear of breakage.

[0057] Furthermore, the elastic member 22 for sealing is interposed between the peripheral portion of the undersurface opening portion 1a of the casing 1 and the peripheral portion of the decorative panel 2. Since the boss portion 20c for securing the thickness of the elastic member 22 is protruded in the reinforcing connection member 20, the necessary minimum thickness especially in the elastic member 22A is guaranteed, thereby securing a sealing property.

[0058] Since the decorative panel 2 is structured of a molded product of a polystyrene (PS) material, weight thereof can be reduced in comparison with a metal plate. Further, a good molding property provides a high freedom degree of molded shapes, and it is easily modeled into a shape for improving beautiful appearances. In addition, a recycling property is also preferable.

[0059] The reinforcing connection member 20 is structured of a molded product of an oil resistant synthetic resin material (ABS material or the like). Accordingly, there is no occurrence of so-called solvent crack due to attachment of oil and chemical, and it is possible to increase the strength. Further, since the reinforcing connection member 20 is made of a synthetic resin material, the thermal conductivity thereof is low, and thus there is no occurrence of condensation unlike in a metal material.

[0060] As explained previously, the louver 16 is supported by the four shafts 25A to 25D, to the outlet port 15. Herein, the three shafts 25A to 25C except the shaft 25D arranged at the right side end portion in the figure are merely inserted into holes of supporting portion (not

illustrated) arranged at one side portion and center portion of the outlet port 15, and the shaft 25D at the right side end portion is a drive shaft connected to the drive source 16M. That is, while the three shafts 25A to 25C are just supporting shafts and the diameter thereof may be thin, the drive shaft 25D is to transmit driving force and is subject to force. Therefore, it is necessary to secure a certain degree of strength in the drive shaft 25D, and the diameter thereof is larger than those of the other shafts.

[0061] As a result, while cold air is discharged in cooling operation, ice may form in the downstream portion of the drive shaft 25D. Therefore, only the drive shaft 25D is formed into a shaft with knurling slot, unlike the other three shafts 25A to 25C, for preventing condensation, and even if condensation occurs, it is hard for condensate to drip. That is, the drive shaft 25D can decrease condensation and drops of condensate. Meanwhile, the other shafts 25A to 25C have a thin diameter, and are originally not subject to condensation. Therefore, they may be formed into a smooth cylindrical shape.

[0062] Note that the present invention is of course not limited to the above embodiment, but may be embodied by appropriately modifying the structural components without departing from the spirit of the invention.

Industrial Applicability

[0063] According to the present invention, there is obtained an effect that the rigidity of the portion around the outlet port arranged in the decorative panel is increased, and reliability is improved without a fear of breakage.

Claims

1. A ceiling-embedded air conditioner characterized by comprising:

- an air conditioner main body which is arranged under a ceiling of a room to be air conditioned, and whose undersurface formed into a rectangular shape is opened, and in which a heat exchanger, a fan and the like are contained;
- a decorative panel which is attached to the undersurface portion of the air conditioner main body, and is exposed to the inside of the room to be air conditioned;
- an outlet port which is opened into a horizontally long rectangular shape, over the roughly full length in the longitudinal direction of the decorative panel;
- a reinforcing connection member which is positioned roughly at the center portion in the longitudinal direction of the outlet port, arranged between both the side portions along the longitudinal direction of the outlet port, and attached to the decorative panel;

- a hole portion which is arranged in the reinforcing connection member; and
a fixing tool which is inserted from the decorative panel into the hole portion of the reinforcing connection member, and attaches and fixes the decorative panel to the air conditioner main body together with the reinforcing connection member. 5
2. The ceiling-embedded air conditioner according to claim 1, **characterized in that** 10
an elastic member for sealing is arranged between the peripheral portion of the undersurface opening of the air conditioner main body and the peripheral portion of the decorative panel, and 15
a boss portion to secure a thickness of the elastic member is protruded around the hole portion of the reinforcing connection member.
3. The ceiling-embedded air conditioner according to claim 1 or 2, **characterized in that** 20
the decorative panel is made of a polystyrene material, and the reinforcing connection member is made of an oil resistant synthetic resin material. 25

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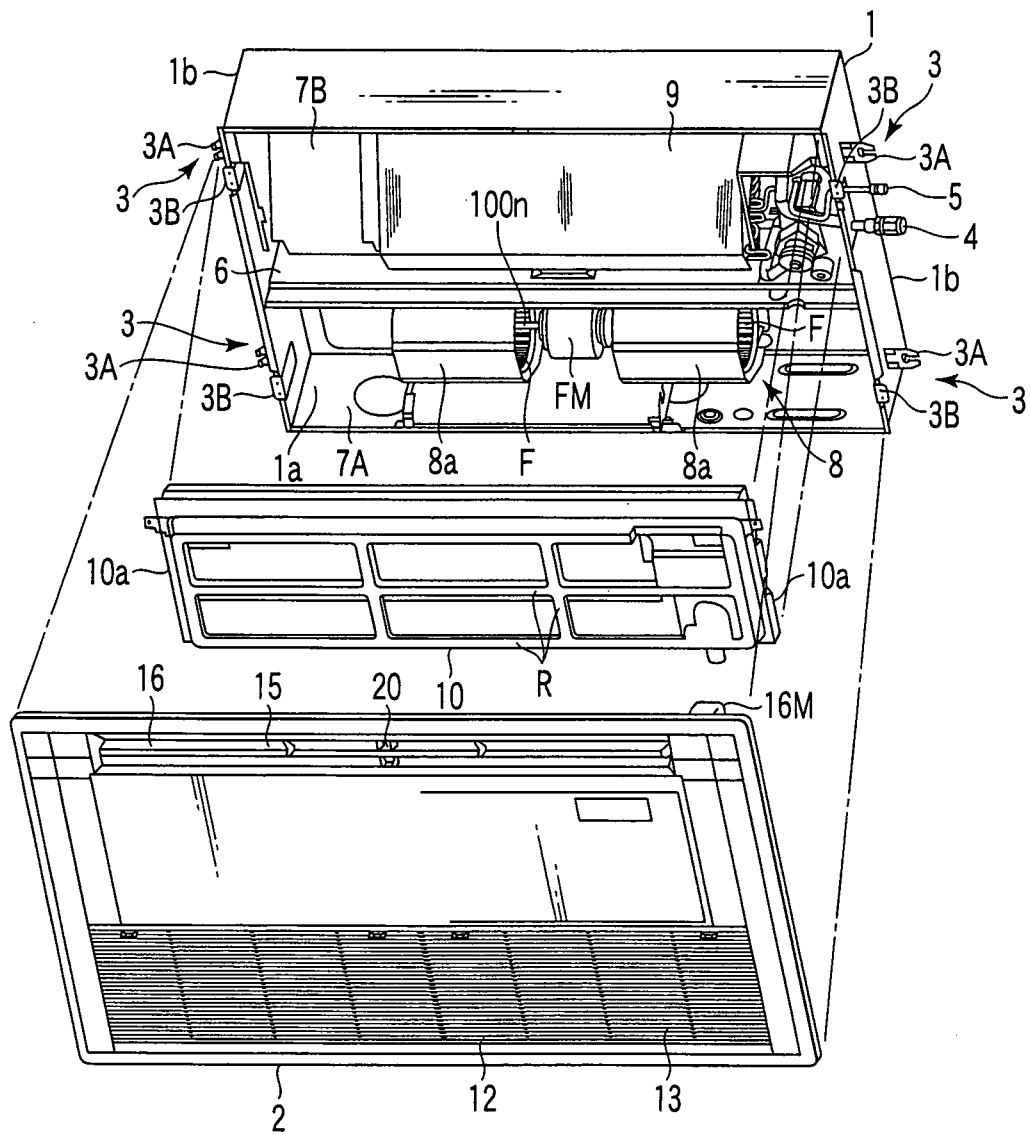


FIG.1

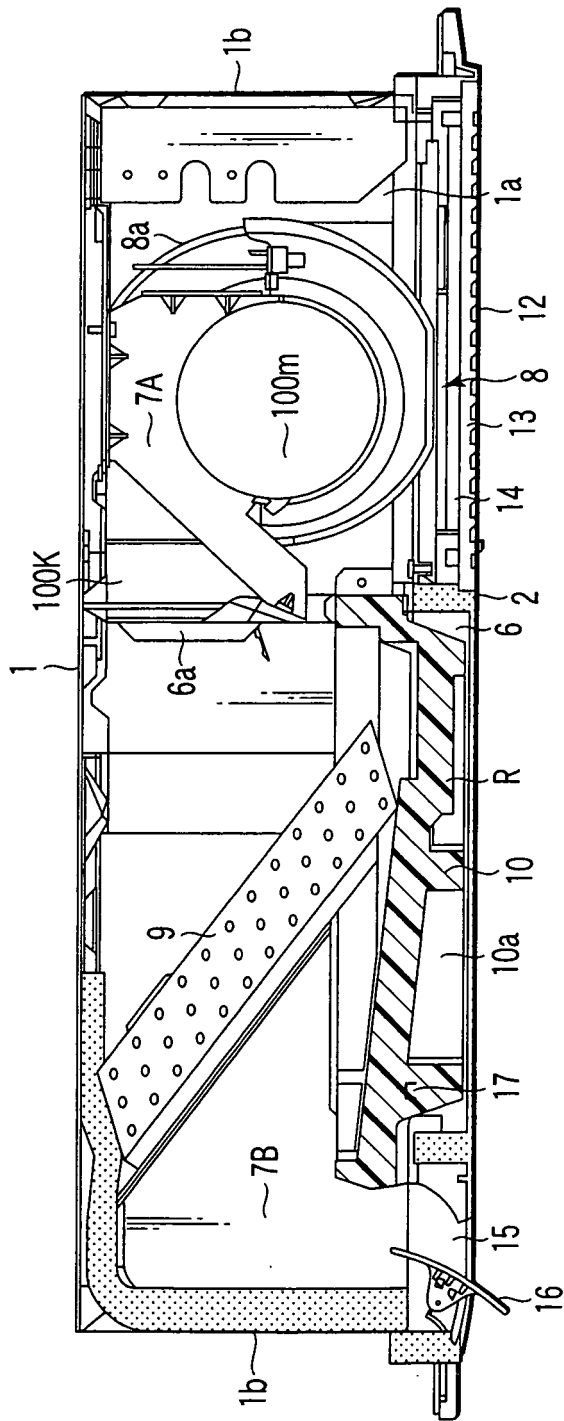


FIG. 2

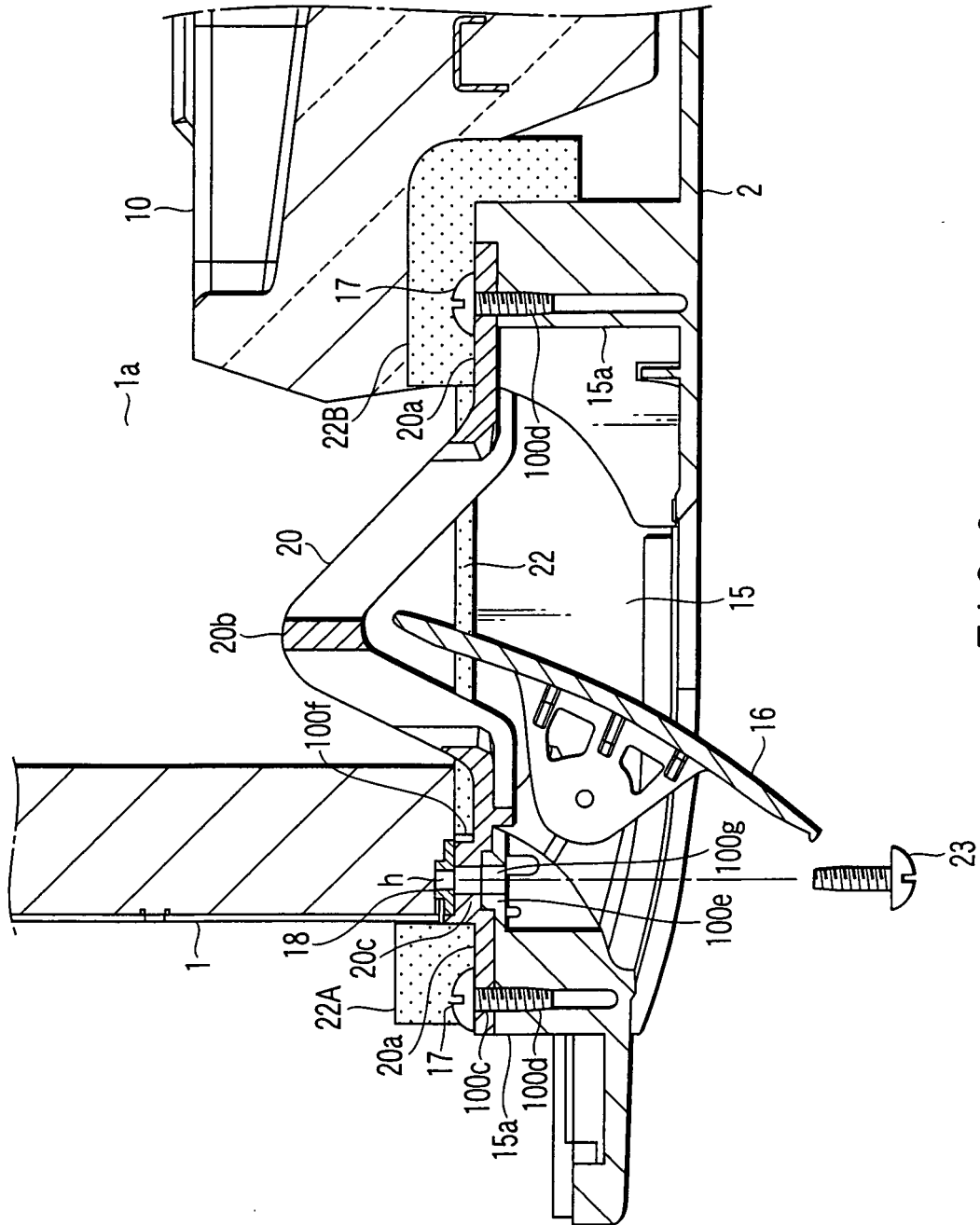


FIG. 3

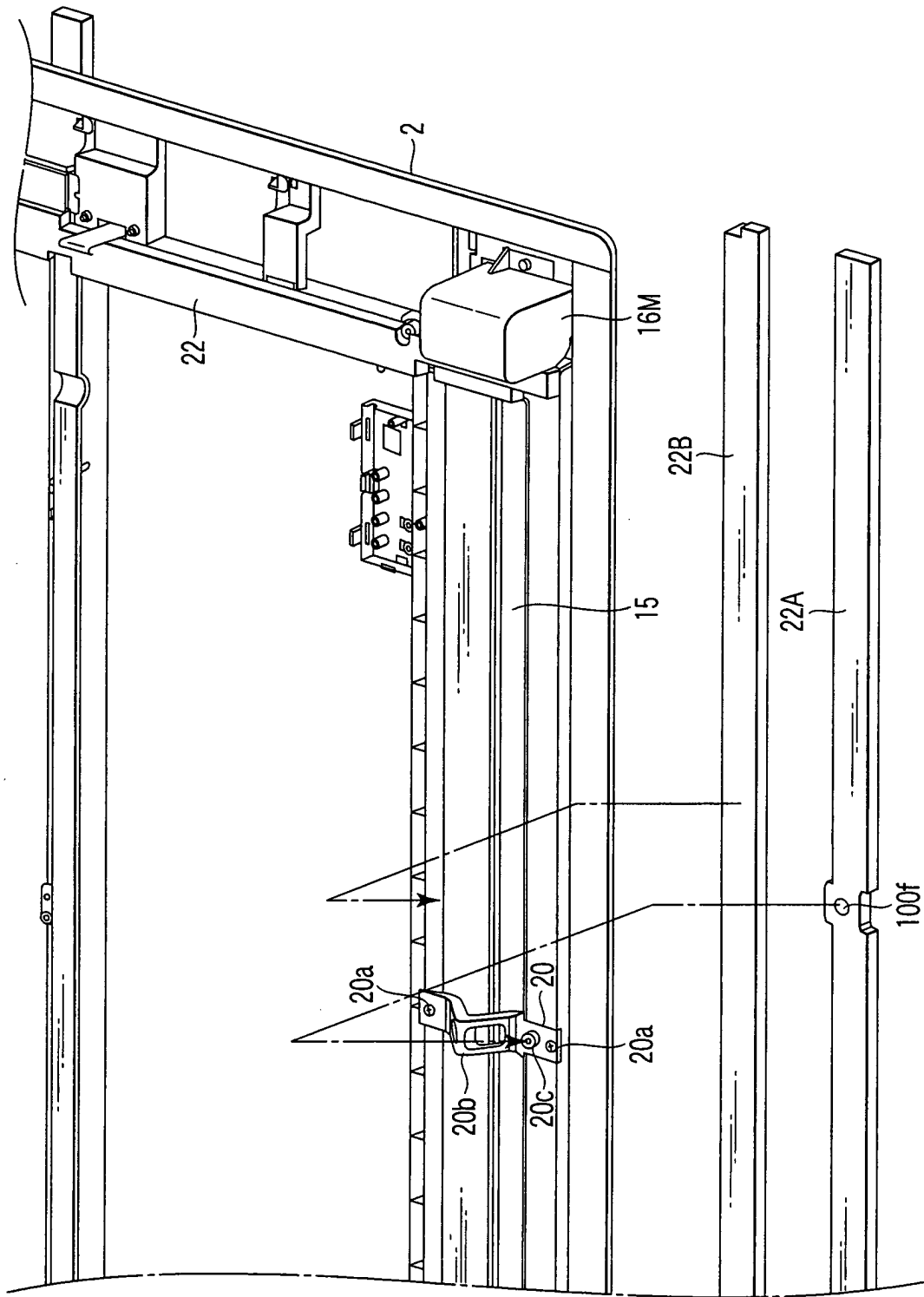


FIG. 4

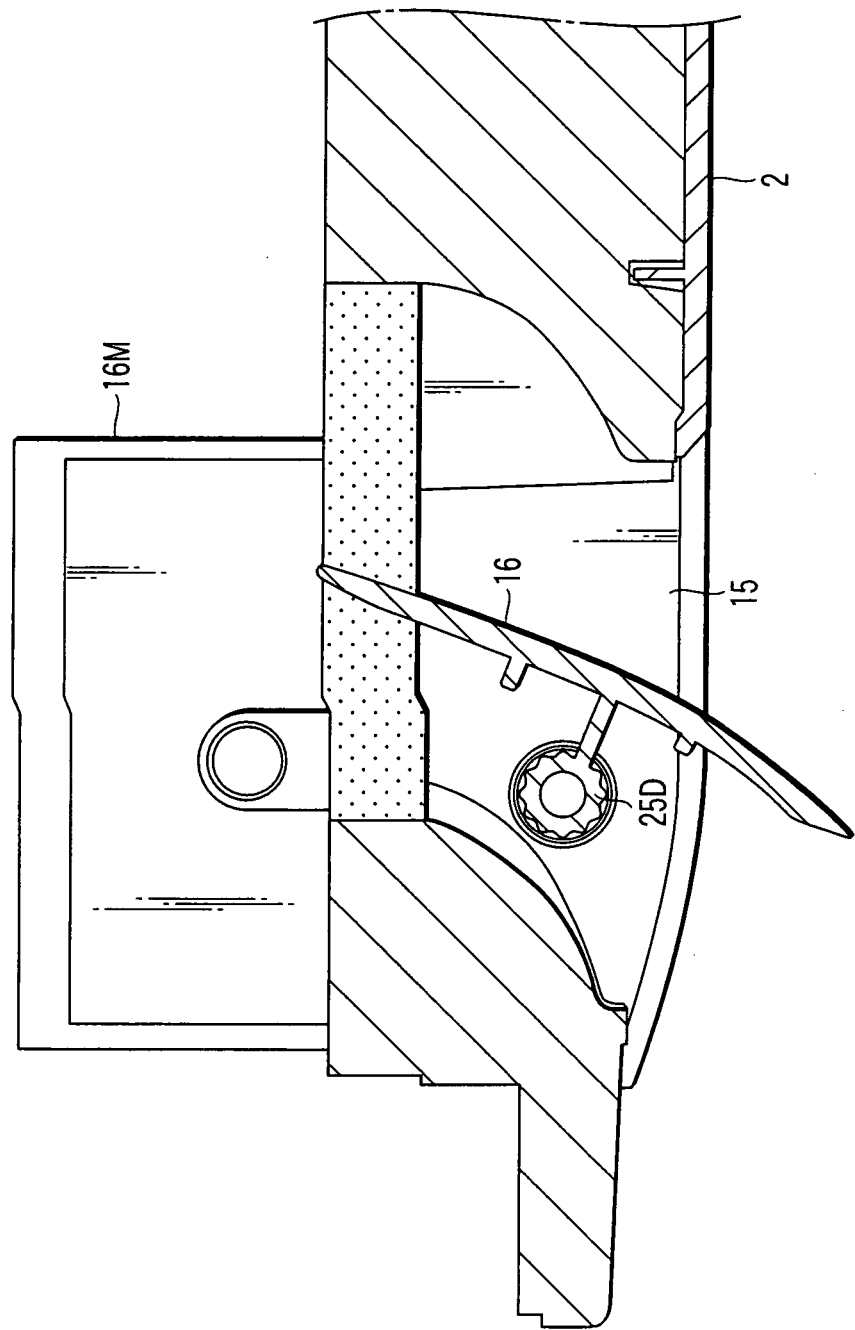


FIG.5

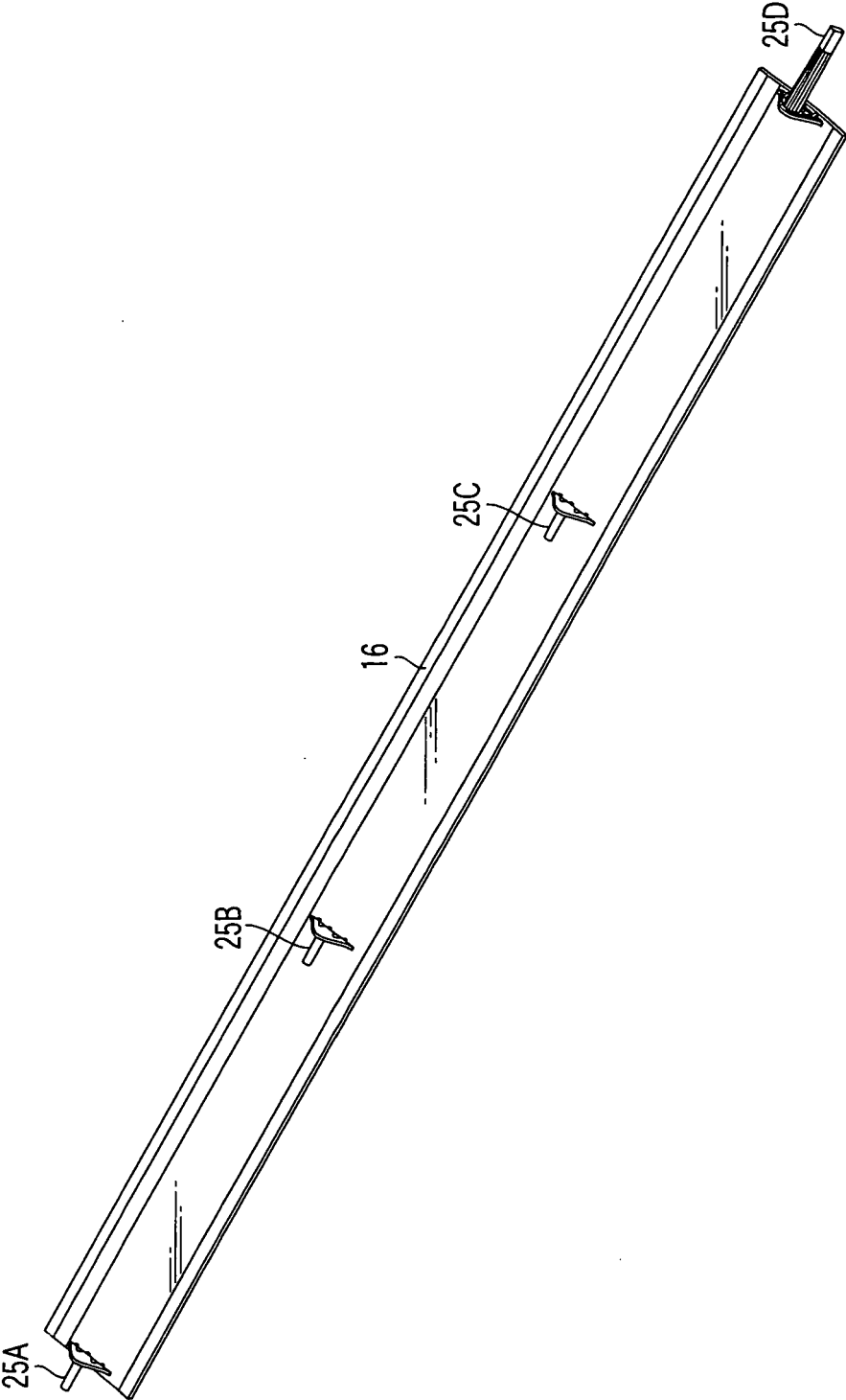


FIG. 6A

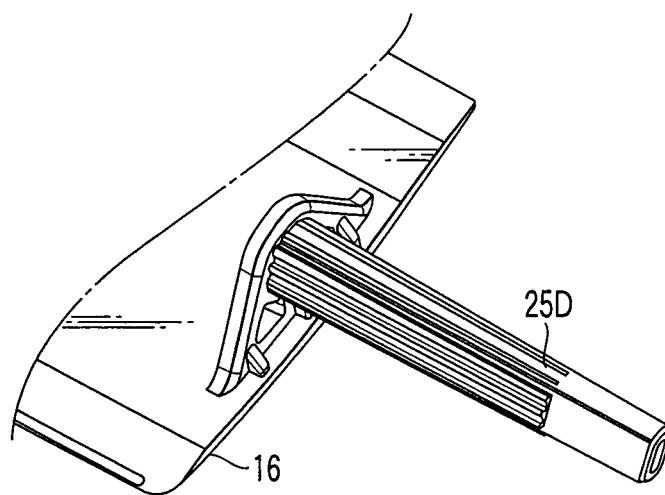


FIG. 6B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/017702

A. CLASSIFICATION OF SUBJECT MATTER

F24F1/00 (2006.01)

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)

F24F1/00 (2006.01)

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2005
Kokai Jitsuyo Shinan Koho	1971-2005	Toroku Jitsuyo Shinan Koho	1994-2005

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.
X	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 44867/1990 (Laid-open No. 4622/1992) (Mitsubishi Electric Corp.), 16 January, 1992 (16.01.92), Claims; page 4, line 8 to page 5, line 15; Figs. 1 to 3 (Family: none)	1-3
A	JP 2902857 B2 (Sanyo Electric Co., Ltd.), 19 March, 1999 (19.03.99), Claims; Figs. 1 to 9 (Family: none)	1-3

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

* Special categories of cited documents:

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Date of the actual completion of the international search

21 November, 2005 (21.11.05)

Date of mailing of the international search report

29 November, 2005 (29.11.05)

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 7-151376 A (Sanyo Electric Co., Ltd.), 13 June, 1995 (13.06.95), Claims; Figs. 1 to 5 (Family: none)	1-3

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2902857 B [0003]
- JP 7151376 A [0003]