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(54) **INDOOR EQUIPMENT OF AIR CONDITIONING EQUIPMENT**

(57) It is an object of the present invention to provide an indoor unit of an air conditioner where the depth of the indoor unit can be made to appear thin. An indoor unit (1) of an air conditioner is disposed with a body (2) and a cover member (9). The body (2) includes a front top surface (53) and a rear step portion (51). The rear step portion (51) is formed so as to be lower than the front top surface (53). The rear step portion (51) is capable of being embedded in a wall. The cover member (9) is disposed adjoining the front top surface (53). The cover member (9) has a width (L2) that is shorter than a length (L1) of the rear step portion (51). The cover member (9) covers part of the rear step portion (51).

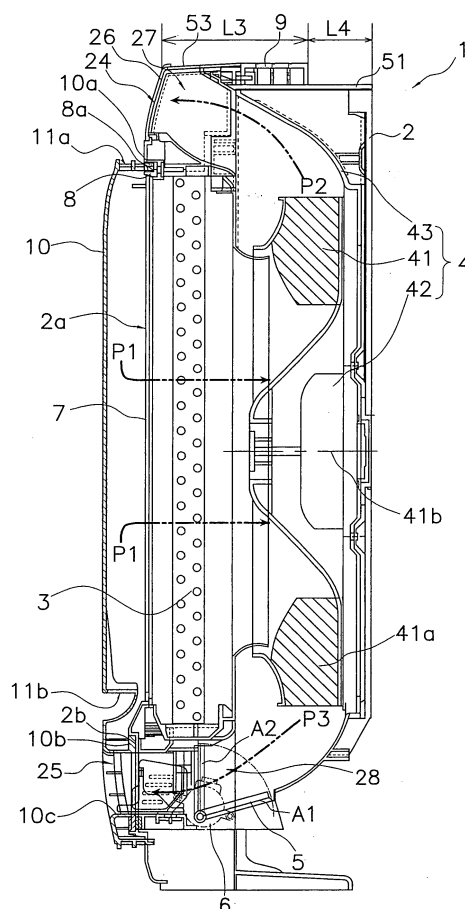


FIG. 4

Description

TECHNICAL FIELD

[0001] The present invention relates to an indoor unit of an air conditioner.

BACKGROUND ART

[0002] Among conventional floor model indoor units of air conditioners, there is an indoor unit that is capable of being embedded and installed in a wall such as described in Patent Document 1. This indoor unit includes, in its body casing, a rear embedded portion that is embedded in a wall. When the indoor unit is not embedded in a wall, the embedded portion is covered by a cover. The cover is a U-shaped member to cover the top surface and both side surfaces of the embedded portion. The cover has a width that is the same as the depth of the embedded portion, and the cover is capable of covering and hiding the entire embedded portion.

<Patent Document 1>
JP-A No. 10-300186

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0003] However, in the indoor unit described in Patent Document 1, in a state where the embedded portion is covered by the cover, the depth of the indoor unit appears long when the portion where the top surface on the front side of the body and the top surface of the cover are joined together is seen somewhat diagonally above or somewhat diagonally sideways from the front, and it is difficult to make the exterior of the indoor unit appear beautiful.

[0004] It is an object of the present invention to provide an indoor unit of an air conditioner where the depth of the indoor unit can be made to appear thin.

MEANS FOR SOLVING THE PROBLEM

[0005] An indoor unit of an air conditioner of a first invention comprises a body and a cover member. The body includes a front top surface and a rear step portion. The rear step portion is formed so as to be lower than the front top surface. The rear step portion is capable of being embedded in a wall. The cover member is disposed adjoining the front top surface. The cover member has a width that is shorter than a length of the rear step portion. The cover member covers part of the rear step portion.

[0006] Here, the cover member is disposed adjoining the front top surface, has a width that is shorter than a length of the rear step portion, and covers part of the rear step portion, so it is possible to make the depth of the indoor unit appear short because of the cover member

that has a width that is shorter than the rear step portion.

[0007] An indoor unit of an air conditioner of a second invention comprises the indoor unit of an air conditioner of claim 1, wherein a front depth dimension is greater than a rear depth dimension. The front depth dimension is a combined dimension of the front top surface of the body and the cover member. The rear depth dimension is a depth dimension of a remainder of the rear step portion exposed to the outside in a state where the cover member is attached to the rear step portion.

[0008] Here, the combined front depth dimension of the front top surface of the body and the cover member is greater than the rear depth dimension that is the depth dimension of the remainder of the rear step portion exposed to the outside in a state where the cover member is attached to the rear step portion. Consequently, the front top surface of the body and the cover member can be made conspicuous and, as a result, it is possible to make the depth of the indoor unit appear short.

[0009] An indoor unit of an air conditioner of a third invention comprises the indoor unit of an air conditioner of the first invention, wherein the width of the cover member is $7/8$ to $3/8$ the length of the rear step portion.

[0010] Here, the width of the cover member is $7/8$ to $3/8$ the length of the rear step portion, so the front top surface of the body and the cover member can more effectively be made conspicuous and, as a result, it is possible to improve the visual effect of making the depth of the indoor unit appear short.

[0011] An indoor unit of an air conditioner of a fourth invention comprises the indoor unit of an air conditioner of the first invention, wherein the cover member is colored in a color that is the same color as that of the front top surface and is lighter than that of the rear step portion. Here, the cover member is colored in a color that is the same color as that of the front top surface and is lighter than that of the rear step portion. Consequently, it is possible to make the cover member and the front top surface conspicuous by a color that is lighter than that of the rear step portion. As a result, it is possible to improve the visual effect of making the depth of the indoor unit appear short.

EFFECTS OF THE INVENTION

[0012] According to the first invention, it is possible to make the depth of the indoor unit appear short because of the cover member that has a width that is shorter than the rear step portion.

[0013] According to the second invention, the front top surface of the body and the cover member can be made conspicuous. As a result, it is possible to make the depth of the indoor unit appear short.

[0014] According to the third invention, the front top surface of the body and the cover member can more effectively be made conspicuous. As a result, it is possible to improve the visual effect of making the depth of the indoor unit appear short.

[0015] According to the fourth invention, it is possible to make the cover member and the front top surface conspicuous by a color that is lighter than that of the rear step portion. As a result, it is possible to improve the visual effect of making the depth of the indoor unit appear short.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a front view of an indoor unit of an air conditioner according to an embodiment of the present invention.

FIG. 2 is a side view of the indoor unit of FIG. 1.

FIG. 3 is a perspective view of the indoor unit of FIG. 1 in a state where a cover member is removed.

FIG. 4 is a longitudinal sectional view of the indoor unit of FIG. 1.

FIG. 5 is an enlarged cross-sectional view of the vicinity of the cover member in the indoor unit of FIG. 4.

FIGS. 6 are side views showing use states of the indoor unit of FIG. 1, with (a) being a side view in regard to a state where the indoor unit is embedded in a wall, (b) being a side view in regard to a state where the cover member is attached to the indoor unit, and (c) being a side view in regard to a state where a cover member is attached in a conventional indoor unit for comparison with (b).

DESCRIPTION OF THE REFERENCE SYMBOLS

[0017]

- 1 Indoor Unit
- 2 Body
- 3 Indoor Heat Exchanger
- 4 Fan
- 5 Shutter
- 6 Step Motor
- 7 Filter
- 8 Front Grille
- 9 Cover Member
- 10 Front Panel
- 24 Upper Blowout Opening
- 25 Lower Blowout Opening
- 27 Upper Space Portion
- 28 Lower Space Portion
- 51 Rear Step Portion
- 53 Front Top Surface

BEST MODE FOR CARRYING OUT THE INVENTION

[0018] Below, an indoor unit of an air conditioner pertaining to an embodiment of the present invention will be described with reference to the drawings.

[0019] An indoor unit 1 of an air conditioner shown in FIG. 1 to FIG. 5 is a floor model indoor unit and is disposed

with a body 2, an indoor heat exchanger 3, a fan 4, a shutter 5, a step motor 6, a filter 7, a front grille 8, a cover member 9 and a front panel 10. The front panel 10, which is disposed on the front of the body 2, has a flat shape.

[0020] The indoor heat exchanger 3, the fan 4, the shutter 5, the step motor 6, the filter 7 and the front grille 8 are housed in the body 2.

[0021] The indoor unit 1 is used in a state where it is installed on a floor of a living room. The indoor unit 1 is capable not only of being installed such that the body 2 is brought into contact with the surface of a wall of a living room but, as shown in FIG. 3 and FIG. 5, also of being installed in a state where a rear step portion 51 of the body 2 is embedded in a wall of a living room by removing the later-described cover member 9.

<Configuration of Body 2>

[0022] As shown in FIG. 4 and FIG. 5, the body 2 comprises a hollow casing that is made of a synthetic resin.

[0023] In the body 2, as shown in FIG. 5, the rear step portion 51 that is capable of being embedded in a wall is formed so as to be lower than a front top surface 53. The height of the cover member 9 that covers the rear step portion 51 is set to be the same as the height of the front top surface 53.

[0024] As shown in FIG. 4, the filter 7, the indoor heat exchanger 3 and the fan 4 are disposed in order inside the body 2 from a front opening 2a formed in the front toward the rear.

[0025] The front grille 8 is attached to the peripheral edge of the front opening 2a in the body 2. The filter 7 is fitted inside the front grille 8.

[0026] The flat front panel 10 is disposed in front of the front opening 2a in the body 2 in a state where the front panel 10 is spaced from the front opening 2a.

[0027] The front panel 10 includes, in the four directions of top, bottom, left and right, an upper suction opening 11a, a lower suction opening 11b, a first side suction opening 11c and a second side suction opening 11d. Specifically, the front panel 10 is disposed frontwardly away from the body 2, so the upper suction opening 11a, the first side suction opening 11c and the second side suction opening 11d (see FIG. 1) of three places are formed in the three directions of the top side and both the left and right sides of the front panel 10. Further, the slit-shaped lower suction opening 11b is formed in the lower portion of the front panel 10 in a position that is slightly above a lower blowout opening 25. Thus, the suction openings 11a, 11b, 11c and 11d are respectively disposed in the four directions of top, bottom, left and right of the front panel 10.

[0028] Fitting projections 10a and 10b are respectively formed on the upper portion and the lower portion of the front panel 10. The fitting projections 10a and 10b are respectively fitted into a fitting recess 8a in the front grille 8 and a fitting hole 2b in the vicinity of the front lower end of the body 2, whereby the front panel 10 is fixed in a

state where the front panel 10 is spaced from the front opening 2a in the body 2.

[0029] A suction passage P1, an upper blowout passage P2 and a lower blowout passage P3 are formed in the body 2.

[0030] The suction passage P1 is a passage that passes through the front opening 2a through any of the upper suction opening 11a, the lower suction opening 11b, the first side suction opening 11c or the second side suction opening 11d of the four directions of the front panel 10, enters the body 2, and passes in order through the filter 7, the indoor heat exchanger 3 and the fan 4.

[0031] The upper blowout passage P2 is a passage that leads from the fan 4 through an upper space portion 27 toward an upper blowout opening 24. The upper blowout opening 24 is formed above the front opening 2a in the body 2. A movable plate 26 that is capable of opening and closing is disposed in the upper blowout opening 24.

[0032] The lower blowout passage P3 is a passage that leads from the fan 4 through a lower space portion 28 toward a lower blowout opening 25. The lower blowout opening 25 is formed below the front opening 2a in the body 2. The shutter 5 that is capable of opening and closing is disposed in the lower space portion 28. Moreover, a stopper that abuts against the shutter 5 in a closed state is formed inside the lower space portion 28. Further, plural slits 10c that extend in a horizontal direction are formed in the portion of the front panel 10 in front of the lower blowout opening 25.

<Configuration of Fan 4>

[0033] The fan 4 is a turbo fan, which is one type of centrifugal fan that blows out air in a centrifugal direction, and, as shown in FIG. 4, is disposed with a fan rotor 41, a motor 42 and a fan casing 43. The fan rotor 41 includes plural blades 41a (portions hatched with diagonal lines in FIG. 4) that are disposed so as to spiral away from a center 41b.

[0034] The fan casing 43 is a casing that houses the fan rotor 41 and the motor 42. The upper portion of the fan casing 43 is communicated with the upper space portion 27 of the body 2. The lower portion of the fan casing 43 is communicated with the lower space portion 28 of the body 2.

[0035] The air flows that are created by the fan 4 and blown out in the centrifugal direction branch up and down from the fan casing 43, respectively pass through the upper blowout passage P2 and the lower blowout passage P3, and thereafter are discharged to the outside of the body 2 respectively from the upper blowout opening 24 and the lower blowout opening 25.

<Configuration of Cover Member 9>

[0036] As shown in FIG. 3 to FIG. 5, the cover member 9 is a member that covers part of the rear step portion 51 of the body 2 and is formed in a U shape so that it

covers the top surface and both side surfaces of the rear step portion 51. The cover member 9 is fixed to the body 2 by screws 52.

[0037] Further, as shown in FIG. 5, the cover member 9 includes plural cover elements 55, 56, 57 and 58 that are capable of being split apart. The cover elements 55, 56, 57 and 58 are arranged along a direction D in which the rear step portion 51 is embedded in a wall. The cover member 9 is manufactured by a synthetic resin such that the cover elements 55, 56, 57 and 58 become integrated.

[0038] As shown in FIG. 5, the cover member 9 is disposed adjoining the rear side of the front top surface 53 of the body 2. The cover member 9 has a width L2 that is shorter than a length L1 of the rear step portion 51. Consequently, when the indoor unit 1 is seen somewhat diagonally above or somewhat diagonally sideways from the front, the cover member 9 of the short width L2 is more conspicuous than a remaining portion 51a, which is exposed to the outside, of the rear step portion 51 that is exposed from the cover member 9, so it is possible to make the depth of the indoor unit 1 appear short.

[0039] Further, as shown in FIG. 4, a combined front depth dimension L3 of the front top surface 53 of the body 2 and the cover member 9 is greater than a rear depth dimension L4 that is a depth dimension of a remainder of the rear step portion 51 exposed to the outside in a state where the cover member 9 is attached to the rear step portion 51. Consequently, the combined depth dimension L3 of the front top surface 53 of the body 2 and the cover member 9 is made greater than the rear depth dimension L4 that is the depth dimension of the remainder of the rear step portion 51 exposed to the outside in a state where the cover member 9 is attached to the rear step portion 51, and the front top surface 53 of the body 2 and the cover member 9 are made conspicuous, whereby the depth of the indoor unit 1 can be made to appear short.

[0040] As long as the width L2 of the cover member 9 is 7/8 to 3/8 the length L1 of the rear step portion 51, it is possible to more effectively make the front top surface 53 of the body 2 and the cover member 9 conspicuous, and the depth of the indoor unit 1 can be made to appear short.

[0041] Further, although it also depends on the thickness of the cover member 9, when the width L2 of the cover member 9 is about 7/8 to 6/8 the length L1 of the rear step portion 51, the remaining portion 51a, which is exposed to the outside, of the rear step portion 51 that is exposed from the cover member 9 is hidden by a rear edge 9a of the cover member 9 when the indoor unit 1 is seen somewhat diagonally above from the front, so just the front top surface 53 of the body 2 and the cover member 9 become able to be seen, so the depth of the indoor unit 1 can be made to appear short.

[0042] The cover member 9 is colored in a color that is the same color as that of the front top surface 53 of the body 2 and is lighter than that of the rear step portion 51. For example, the rear step portion 51 of the body 2

is colored in a dark color such as black or gray, and on the other hand, the cover member 9 and the front top surface 53 of the body 2 are colored in a light color such as white or ivory that are colors that are lighter than that of the rear step portion 51. By making the cover member 9 and the front top surface 53 conspicuous by a color that is lighter than that of the rear step portion 51, it is possible to improve the visual effect of making the depth of the indoor unit 1 appear short.

[0043] Further, in the cover member 9 of the present embodiment, by splitting apart one or several of the plural cover elements 55, 56, 57 and 58 of the cover member 9, the width of the cover member 9 is adjustable in a step-like manner to correspond to the embedded amount in which the rear step portion 51 of the body 2 is embedded in a wall.

[0044] Further, the cover member 9 includes, in the outer peripheral surface of the cover member 9, grooves 50 that extend in a circumferential direction of the body 2. The grooves 50 are formed in the vicinities of the boundaries between the plural cover elements 55, 56, 57 and 58. Thus, in the cover member 9, it is possible to split apart one or several of the plural cover elements 55, 56, 57 and 58 of the cover member 9 along the grooves 50.

[0045] The grooves 50 are molded at the same time when the cover member 9 is manufactured by a synthetic resin, or the grooves 50 are formed by cutting the cover member 9 after the cover member 9 has been molded.

[0046] Moreover, the cover member 9 includes ribs 59 as self-supporting portions that extend along the circumferential direction of the body 2. The ribs 59 are respectively formed on the cover elements 55, 56, 57 and 58. Because of these ribs 59, it is possible to improve the strength of the cover member 9.

[0047] The ribs 59 are disposed so as to be offset from the grooves 50 in the front-rear direction of the rear step portion 51 of the body 2, so cracks arising from the grooves 50 and the ribs 59 do not interfere with each other when the cover elements 55, 56, 57 and 58 are split apart along the grooves 50. Moreover, the ribs 59 reinforce each of the cover elements 55, 56, 57 and 58 in positions nearest the grooves 50, so it is possible to decrease deformation of the cover elements 55, 56, 57 and 58 when the cover elements 55, 56, 57 and 58 are split apart. Thus, it becomes possible to easily split apart the cover elements 55, 56, 57 and 58 along the grooves 50.

<Description in Regard to Use States of Indoor Unit 1>

[0048] As shown in FIG. 6(a), when the indoor unit 1 is installed on an indoor floor in a state where the indoor unit 1 is embedded in a wall W, the indoor unit 1 is used in a state where the rear step portion 51 of the body 2 is embedded in the wall W and the front top surface 53 and front side surfaces 54 are exposed to the outside. In this instance, just the front top surface 53 and the front side

surfaces 54 can be seen by people in the living room, so the depth of the indoor unit 1 appears short.

[0049] On the other hand, as shown in FIG. 6(b), when the indoor unit 1 is installed on a floor without being embedded in the wall W, the indoor unit 1 is used in a state where the cover member 9 is attached to the rear step portion 51. In this instance, when people in the living room see the indoor unit 1 somewhat diagonally above or somewhat diagonally sideways from the front, the cover member 9 of the short width is more conspicuous than the rear step portion 51, and the depth of the indoor unit 1 appears, in terms of its appearance, to be just the combined depth of the front top surface 53 (or the front side surfaces 54) and the cover member 9. Consequently, it is possible to make the depth of the indoor unit 1 appear short.

[0050] In particular, by making the cover member 9 and the front top surface 53 conspicuous by a color that is lighter than that of the rear step portion 51, it becomes relatively difficult for the rear step portion 51 that is colored by a dark color to be conspicuous, and it is possible to improve the visual effect of making the depth of the indoor unit 1 appear short.

[0051] Moreover, because at least one groove 50 is formed in the outer side of the cover member 9, it is possible to provide the visual effect that the depth of the entire indoor unit 1 appears thin.

[0052] Here, as a comparative example, as shown in FIG. 6(c), an instance will be considered where a conventional floor model indoor unit 101 is installed on a floor without being embedded in the wall W. In this instance, the indoor unit 101 is used in a state where a cover member 109 is attached so as to cover the entire rear step portion. When people in the living room see the indoor unit 101 in this state somewhat diagonally above or somewhat diagonally sideways from the front, the depth of the indoor unit 101 appears extremely long because the width of the cover member 109 is thick.

<Characteristics>

[0053]

(1)

In the indoor unit 1 of the embodiment, the cover member 9 is disposed adjoining the front top surface 53, has the width L2 that is shorter than the length L1 of the rear step portion 51 of the body 2, and covers part of the rear step portion 51. Consequently, when the indoor unit 1 is seen somewhat diagonally above or somewhat diagonally sideways from the front, the cover member 9 of the short width L2 is more conspicuous than the remaining portion 51a, which is exposed to the outside, of the rear step portion 51 that is exposed from the cover member 9, so it is possible to make the depth of the indoor unit 1 appear short.

(2)

In the indoor unit 1 of the embodiment, the combined front depth dimension L3 of the front top surface 53 of the body 2 and the cover member 9 is greater than the rear depth dimension L4 that is the depth dimension of the remainder of the rear step portion 51 exposed to the outside in a state where the cover member 9 is attached to the rear step portion 51. Consequently, the front top surface 53 of the body 2 and the cover member 9 can be made conspicuous and, as a result, it is possible to make the depth of the indoor unit 1 appear short.

(3)

In the indoor unit 1 of the embodiment, the width L2 of the cover member 9 is 7/8 to 3/8 the length L1 of the rear step portion 51. Consequently, the front top surface 53 of the body 2 and the cover member 9 can more effectively be made conspicuous and, as a result, it is possible to improve the visual effect of making the depth of the indoor unit 1 appear short.

(4)

In the indoor unit 1 of the embodiment, the cover member 9 is colored in a color that is the same color as that of the front top surface 53 and is lighter than that of the rear step portion 51. Consequently, it is possible to make the cover member 9 and the front top surface 53 conspicuous by a color that is lighter than that of the rear step portion 51. As a result, it is possible to improve the visual effect of making the depth of the indoor unit 1 appear short.

(5)

In the indoor unit 1 of the embodiment, at least one groove 50 is formed in the outer side of the cover member 9, so it is possible to provide the visual effect that the depth of the entire indoor unit 1 appears thin.

<Modifications>

[0054]

(A)

In the embodiment, a method of installing the indoor unit 1 by removing the cover member 9 and embedding the rear step portion 51 of the body 2 in a wall of a room has been described, but the present invention is not limited to this. As a modification, in the case of a thin wall, it is also possible to install the indoor unit 1 by embedding part of the rear step portion 51 in a state where the cover member 9 is attached to the rear step portion 51.

(B)

In the embodiment, the grooves 50 are formed in the outer side of the cover member 9, but the present invention is not limited to this, and the grooves 50 may also be formed in the inner side of the cover member 9 or in both the inner and outer sides of the cover member 9. In this instance also, it is possible to easily split apart the cover member 9.

INDUSTRIAL APPLICABILITY

[0055] The present invention is capable of being applied to an indoor unit of an air conditioner that is capable of being embedded in a wall.

Claims

1. A floor model indoor unit (1) of an air conditioner, the indoor unit comprising:

a body (2) that includes a front top surface (53) and a rear step portion (51) that is formed so as to be lower than the front top surface (53) and is capable of being embedded in a wall; and a cover member (9) that is disposed adjoining the front top surface (53), has a width (L2) that is shorter than a length (L1) of the rear step portion (51), and covers part of the rear step portion (51).

2. The indoor unit (1) of claim 1, wherein a combined front depth dimension (L3) of the front top surface (53) of the body (2) and the cover member (9) is greater than a rear depth dimension (L4) that is a depth dimension of a remainder of the rear step portion (51) exposed to the outside in a state where the cover member (9) is attached to the rear step portion (51).

3. The indoor unit (1) of claim 1, wherein the width (L2) of the cover member (9) is 7/8 to 3/8 the length (L1) of the rear step portion (51).

4. The indoor unit (1) of claim 1, wherein the cover member (9) is colored in a color that is the same color as that of the front top surface (53) and is lighter than that of the rear step portion (51).

FIG. 1

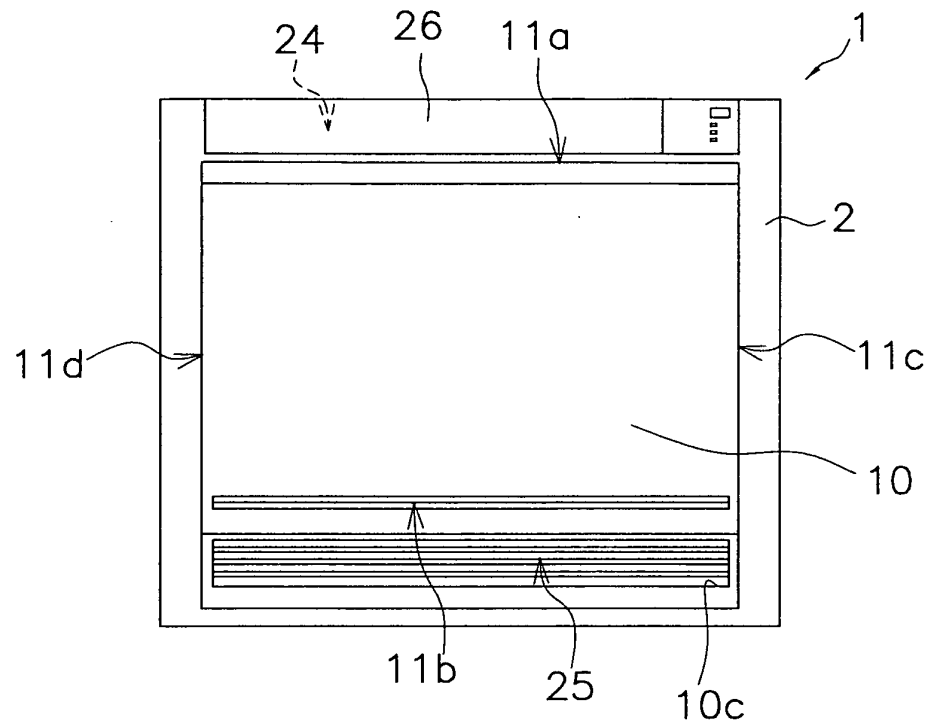
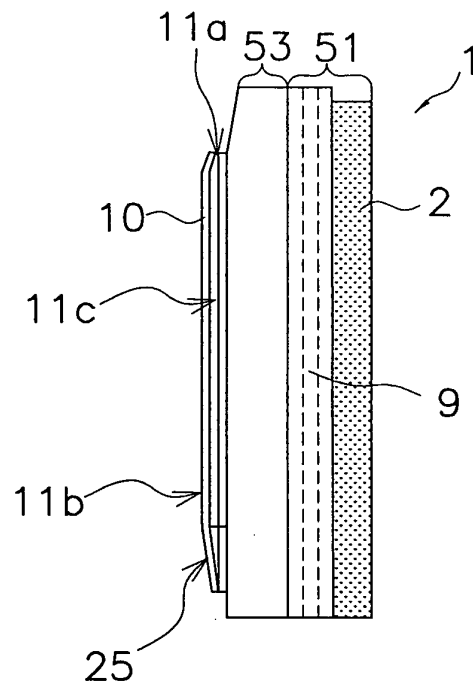


FIG. 2



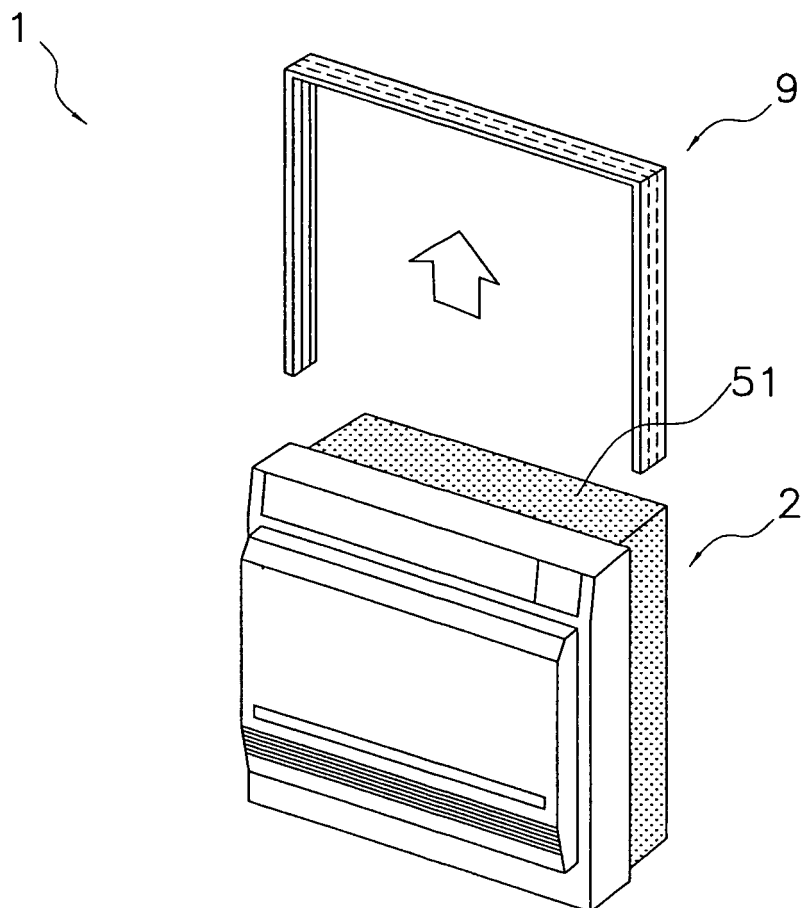


FIG. 3

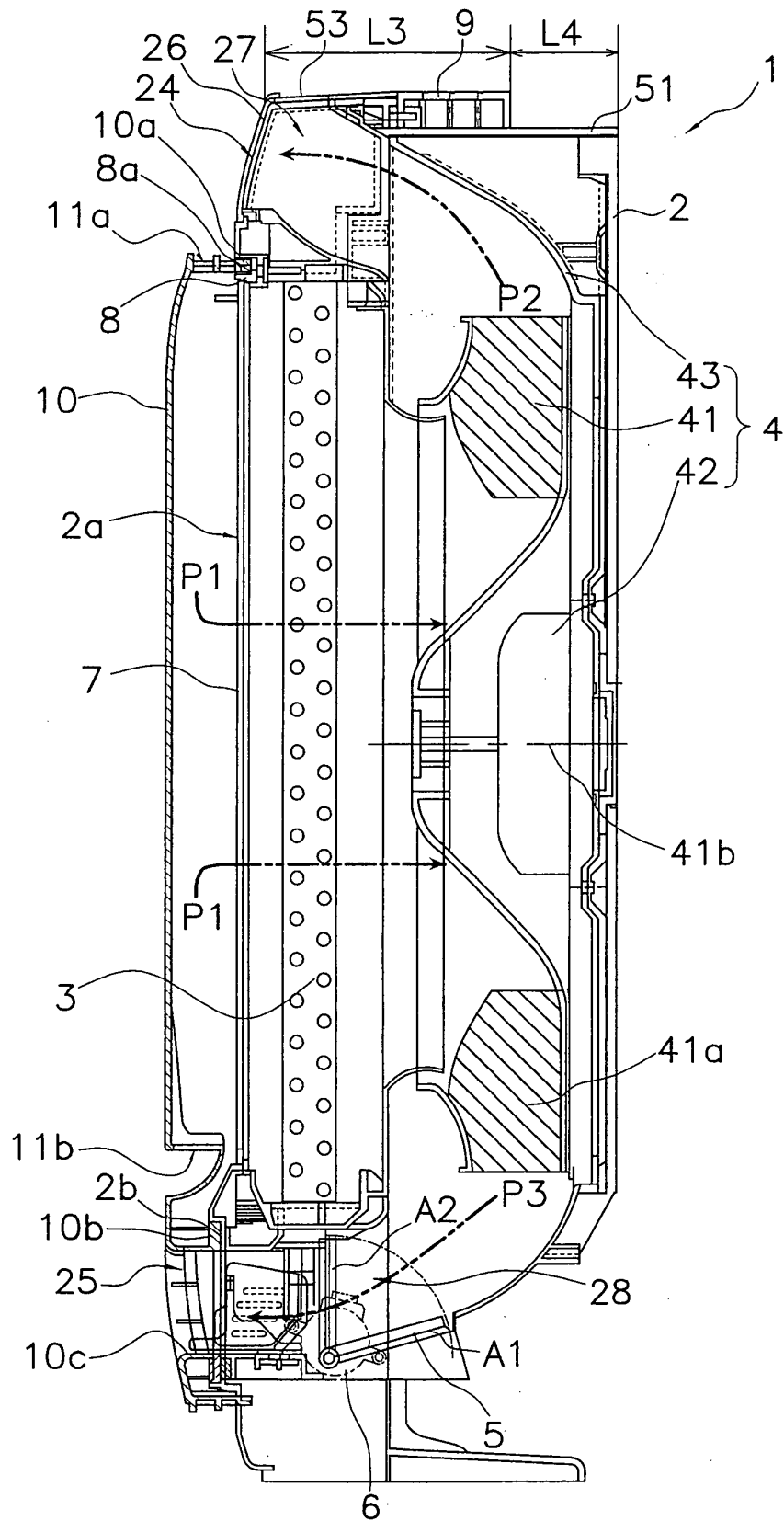


FIG. 4

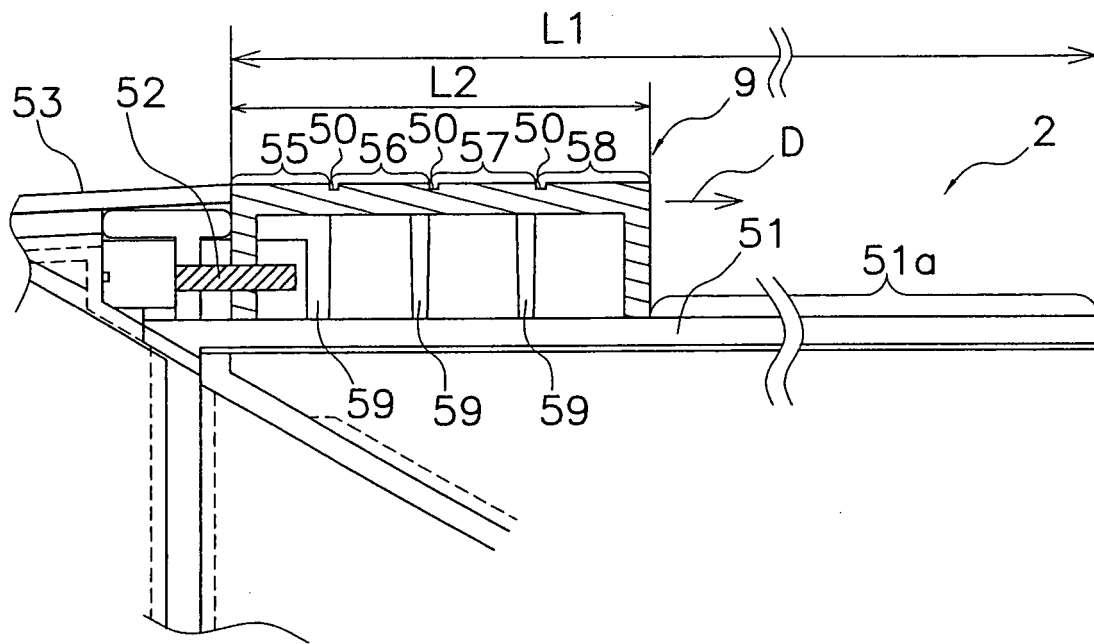


FIG. 5

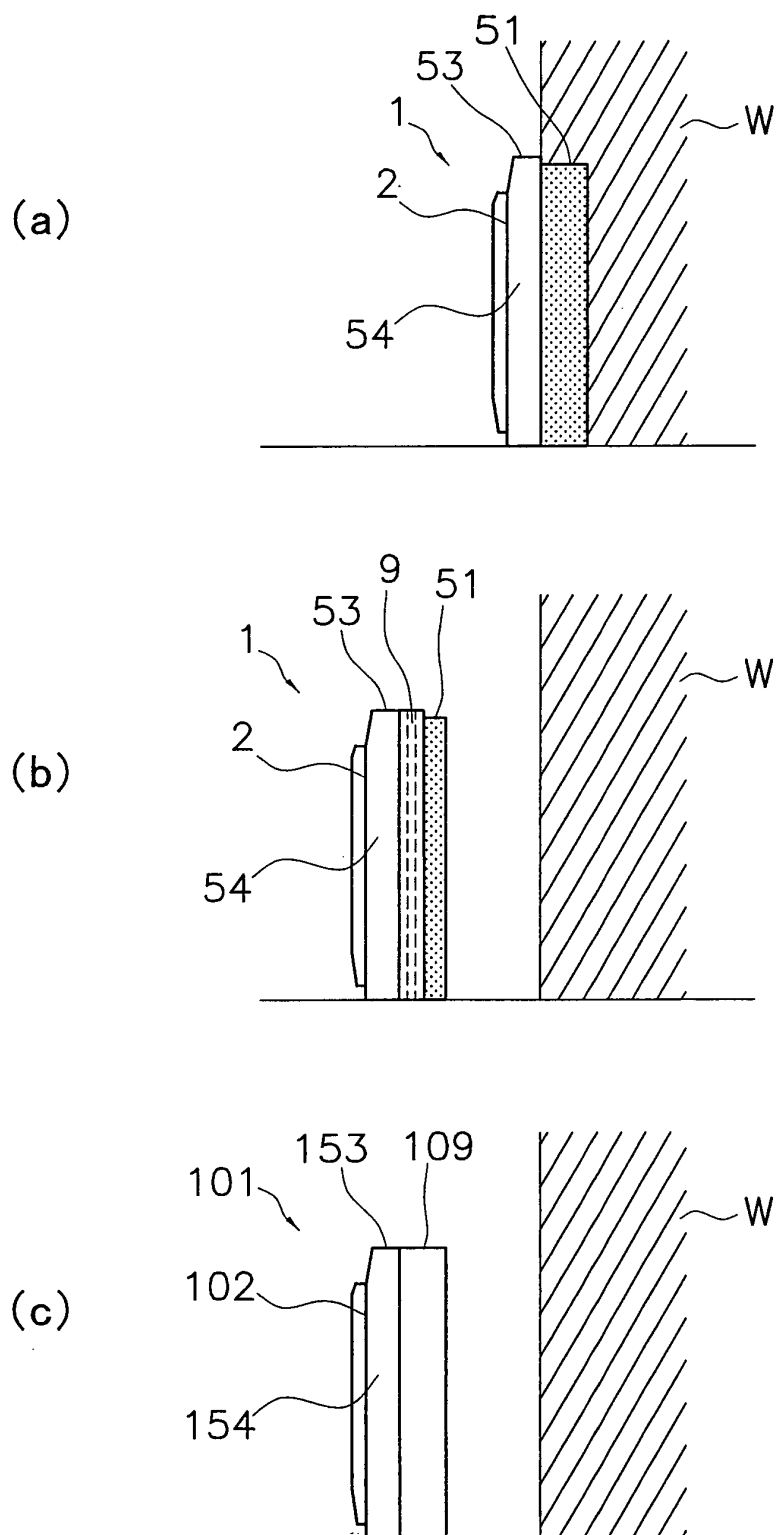


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/325745

A. CLASSIFICATION OF SUBJECT MATTER F24F1/00 (2006.01) i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) F24F1/00		
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 1996-2007 Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007		
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 10-300186 A (Daikin Industries, Ltd.), 13 November, 1998 (13.11.98), Par. Nos. [0018], [0019]; Fig. 1 (Family: none)	1-4
Y	JP 2000-266401 A (Mitsubishi Electric Corp.), 29 September, 2000 (29.09.00), Par. Nos. [0015], [0016]; Figs. 1 to 4 (Family: none)	1-4
☒ 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 "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 08 March, 2007 (08.03.07)		Date of mailing of the international search report 20 March, 2007 (20.03.07)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/325745

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 86516/1984 (Laid-open No. 3331/1986) (Sanyo Electric Co., Ltd.), 10 January, 1986 (10.01.86), Claims; Figs. 2, 3 (Family: none)	1-4
A	JP 10-205880 A (Matsushita Electric Industrial Co., Ltd.), 04 August, 1998 (04.08.98), Claims; Fig. 1 (Family: none)	3
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 24629/1985 (Laid-open No. 141660/1986) (Rinnai Corp.), 02 September, 1986 (02.09.86), Page 3, line 7 to page 4, line 14; Fig. 1 (Family: none)	1-4

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 10300186 A [0002]