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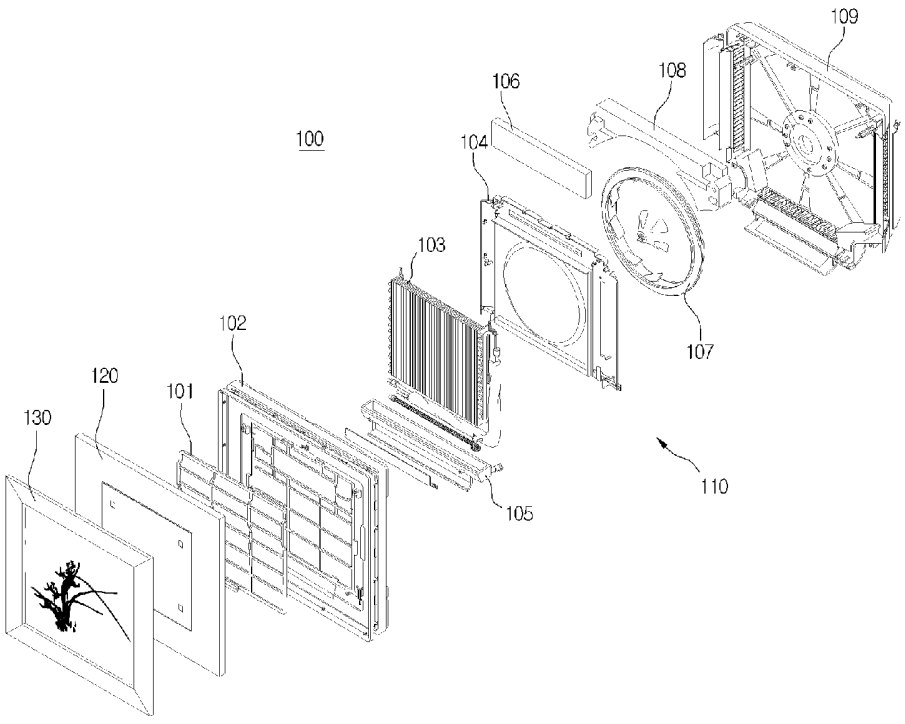
(54) Title: AIR CONDITIONER



(57) Abstract: There is provided an air conditioner. In the air conditioner, a front panel is installed to a front of a main body, a front cover is disposed at a front of the front panel and detachably coupled to the main body, and an art panel is interchangeably inserted in the front cover.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Description

AIR CONDITIONER

Technical Field

[1] The present invention relates to an air conditioner, and more particularly, to an indoor unit of an air conditioner for allowing pictures or photographs displayed by the front thereof to be easily interchanged, thus providing the functional benefits of an air conditioner with an added aesthetic factor of interior decoration.

Background Art

[2] Refrigerants circulating inside air conditioners undergo compression, condensing, expansion, and evaporation stages of a refrigeration cycle. In an air conditioner, refrigerant is first compressed to become high in temperature and pressure, and loses heat to the outside in a condenser, after which it passes through an expansion valve, gradually cooling and depressurizing. The cooled and depressurized refrigerant flows through an evaporator, absorbing heat along the way, and is then recycled to the compressor.

[3] Here, the compression, condensing, and expansion stages occur in an outdoor unit of an air conditioner; and the evaporation stage occurs in an indoor unit by virtue of a blower fan and a heat exchanger.

[4] Air conditioners are grouped into two basic types: single unit air conditioners that consist of a single unit which performs the entire refrigeration cycle, installed in a wall opening such as a window, and split system air conditioners that have a separate indoor and outdoor unit that are respectively installed indoors and outdoors.

[5] Split systems are further divided into wall mounted, permanently-installed, ceiling mounted, and ceiling concealed air conditioners.

[6] Convertible type air conditioners have versatile indoor units, which can be wall mounted, permanently-installed, or even ceiling mounted.

[7] Air conditioner indoor units come in various configurations, depending on the arrangement of their intake and discharge vents. For example, an indoor unit that intakes air from its sides and expels air from its front has discharge louvers disposed at the front to pivot up and down or from side to side for directing air accordingly.

[8] Such prior art air conditioner indoor units have front portions that function only as covers. That is, a front cover installed at the front of an indoor unit functions to prevent components, such as a blower fan, heat exchanger, etc., from being exposed to the outside, as well as preventing electrocution or injury of children who may otherwise stick their hands inside the unit. Accordingly, the front of an indoor unit has a monotonous and stoic feel, and does not harmonize well with an interior.

Disclosure of Invention

Technical Problem

[9] An object of the present invention is to provide an air conditioner indoor unit with a structure that allows easy installation and removal of pictures or photographs to and from its blank front cover, so that the unit fulfills its air conditioning duties, as well as complements the decor of an interior space.

Technical Solution

[10] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, an air conditioner according to the present invention includes: a main body; a front panel installed at the front of the main body; a cover disposed at the front of the front panel, and detachably coupled to the main body; and an art panel interchangeably inserted in the cover.

[11] According to another aspect of the present invention, there is provided an air conditioner including: a main body; a back cover disposed at the front of the main body; a window made of transparent material disposed in front of the back cover; an art panel interposed between the back cover and the window; and a side frame forming an enclosure for the edges of the back cover, window, and art panel.

[12] According to a further aspect of the present invention, there is provided an air conditioner including: a main body; a panel moveably attached to the front of the main body; and a cover for interchangeably holding pictures or photographs and detachably mounted on the front of the panel.

Advantageous Effects

[13] The air conditioner according to the present invention adds a supplementary function to the unit's air conditioning duties, allowing easy interchangeable display of art or family portraits on the front of the indoor unit, thus functioning as a decoration piece that complements other elements in an interior.

Brief Description of the Drawings

[14] Fig. 1 is a perspective view of an indoor unit of an air conditioner according to the present invention;

[15] Fig. 2 is an exploded view of the indoor unit in Fig. 1;

[16] Fig. 3 is a disassembled view of the front cover of the indoor unit of an air conditioner according to the present invention;

[17] Fig. 4 is a perspective view of an indoor unit of an air conditioner showing an air intake structure according to one embodiment of the present invention;

[18] Fig. 5 is a perspective view of an indoor unit of an air conditioner showing an air intake structure according to another embodiment of the present invention;

[19] Fig. 6 is an exploded perspective view of the front cover of the indoor unit of an air

conditioner according to the present invention;

[20] Fig. 7 is an enlarged perspective view showing the assembly of the front cover frame edges of the air conditioner indoor unit according to the present invention; and

[21] Fig. 8 is a perspective view showing the assembly of the front cover frame edges of the air conditioner indoor unit according to another embodiment of the present invention.

Best Mode for Carrying Out the Invention

[22] Hereinafter, preferred embodiments of an air conditioner according to the present invention will be described in detail with reference to the accompanying drawings. While the present invention has been described and illustrated herein with reference to the preferred embodiments thereof, it will be apparent to those skilled in the art that various modifications and variations can be made therein without departing from the spirit and scope of the invention. Thus, it is intended that the present invention covers the modifications and variations of this invention that come within the scope of the appended claims and their equivalents.

[23] Fig. 1 is a perspective view of an indoor unit of an air conditioner according to the present invention, and Fig. 2 is an exploded view of the thereof.

[24] Referring to Figs. 1 and 2, the indoor unit 100 of the air conditioner according to the present invention includes a main body 110 forming the exterior of the unit, a front panel 120 disposed at the front of the main body 110 to pivot a predetermined angle by means of a hinge, and a front cover 130 detachably coupled to the front of the front panel 120 for having a picture or photograph inserted therein.

[25] An intake opening 150 (refer to Fig. 4) for suctioning indoor air is formed when the front panel 120 pivots on a hinge to open at a predetermined angle on one side. The indoor air that enters the intake opening 150 is discharged from the discharge vent 151 formed on a side of the main body 110.

[26] The main body 110 further includes a filter 101 for filtering impurities from the indoor air, a front frame 102 disposed behind the filter 101 for installing the filter thereon and protecting the components therein, a base 109 coupled to the front frame 102, and a blower fan 107 installed between the front frame 102 and the base 109 for drawing indoor air into the unit.

[27] Additionally, the main body 110 includes a heat exchanger 103 installed in front of the blower pan 107 for lowering the temperature of indoor air drawn into the unit, a drain fan 105 disposed below the heat exchanger 103 for collecting moisture that condenses on and drips from the heat exchanger 103, an air guide 104 installed behind the heat exchanger 103 for directing the flow of indoor air drawn into the unit, an electronics housing 106 disposed above the air guide 104 for housing electronic

components, and a guide duct 108 for causing indoor air drawn into the unit by the blower fan 107 to be discharged from the unit.

[28] An explanation of the operation and function of the indoor unit 100 of an air conditioner according to the present invention will now be set forth.

[29] First, when electrical current is applied to the indoor unit 100, the front panel 120 disposed at the front of the main body 110 pivots to open at a predetermined angle, creating an intake opening 150.

[30] At the same time that the front panel 120 moves to create an intake opening 150, the blower fan 107 inside the main body 110 begins spinning. The spinning blower fan 107 draws indoor air through the intake opening 150 into the unit. The drawn air sheds its impurities as it passes through the filter 101, and proceeds through the heat exchanger 103 to exchange heat with refrigerant therein. When the air passes through the heat exchanger 103, its temperature drops, and it is then directed via the air guide 104 towards the blower fan 107. The air is then guided by the guide duct 108 disposed above the blower fan 107 so that it is finally discharged through the discharge vent 151 back to the indoor space.

[31] As explained above, the front panel 120 disposed on the front of the main body 110 and the front cover 130 disposed at the front of the front panel 120 are detachably coupled to one another.

[32] Fig. 3 is a disassembled view of the front cover of the indoor unit of an air conditioner according to the present invention, and Fig. 4 is a perspective view of an indoor unit of an air conditioner showing an air intake structure according to one embodiment of the present invention.

[33] Referring to Figs. 3 and 4, the indoor unit 100 of the air conditioner according to the present invention includes a front cover 130 detachably coupled to the main body 110, and a front panel 120 having the front cover 130 attached to its front and being attached on the main body 110 to pivot a predetermined angle. At least one mounting hook 134 is formed at the rear of the front cover 130 for attaching the same to the front panel 120. Conversely, an eyelet 141 is formed on the front of the front panel 120 for coupling with the mounting hook 134. Here, the mounting hook 134 may take the form of a hook, and the eyelet 141 may be a hole of a predetermined size for accommodating the insertion of the mounting hook 134 therein. However, the mounting device is not necessarily limited to the mounting hook and eyelet embodiment of the present invention, and can include magnets or other detachably mountable devices.

[34] The pivoting direction of the front panel 120 is also not necessarily limited to the previously-described embodiment, and thus the pivot axis can be disposed at any one of the top, bottom, right, and left edges of the indoor unit. The pivot axis may be designated as the bottom edge, so that when the front panel 120 is activated to pivot

forward therefrom forming an intake opening, the image installed at the front of the unit can still be viewed.

[35] As shown in Fig. 4, when the indoor unit operates, the front panel 120 has one of its edges designated as a pivot axis, while the other end swings forward at a pre-determined angle, thereby forming an intake opening 150 between the front panel 120 and the front cover 130. In order to allow the front panel 120 to swing forward from the main body 110, a rack 170 is formed to extend a predetermined distance from the rear of the front panel 120, the rack 170 having gear teeth on a side thereof. Here, in order to smoothly open the front panel 120, the rack 170 has the same curvature as an arc formed by the front panel 120 swinging open. The main body 110 contains a rotating pinion 171 that has teeth meshing with those of the rack 170, and a step motor 172 rotating the pinion 171 in a forward and reverse direction. When an electrical current is applied to the indoor unit 100, the step motor 172 rotates the pinion 171. The rack 170 meshed with the pinion 171 moves to pivot the front panel 120.

[36] Fig. 5 is a perspective view of an indoor unit of an air conditioner showing an air intake structure according to another embodiment of the present invention.

[37] Referring to Fig. 5, the indoor unit 100 of the air conditioner according to the present invention includes a main body 110, a front panel 120 installed at the front of the main body, and a sub panel 140 of a predetermined size formed inside the front panel 120, and capable of forward and backward translation movement.

[38] To elaborate, in order to allow the sub panel 140 to translate forward and backward with respect to the front panel 120, a rack 180 having gear teeth on one side thereof extends a predetermined distance from the back of the sub panel 140. Installed inside the main body 110 are a rotating pinion 181 meshing with the teeth of the rack 180, and a step motor 182 rotating the pinion 181 in a forward and reverse direction. Here, in order to allow forward and backward translation of the sub panel 140, the rack 180 may be straightly formed. Also, in order to allow uniform forward and backward translation of the sub panel 140, a rack is formed on each of the four corners at the rear of the sub panel 140.

[39] In addition to the above embodiment where the sub panel 140 is capable of translation, the sub panel 140 can be formed as one with the front panel 120, or the front panel 120 can be made capable of forward and backward translation.

[40] Fig. 6 is an exploded perspective view of the front cover of the indoor unit of an air conditioner according to the present invention, and Fig. 7 is an enlarged perspective view showing the assembly of the front cover frame edges of the air conditioner indoor unit according to the present invention.

[41] Referring to Figs. 6 and 7, the front cover 130 according to the present invention includes an art panel 160, a cover plate, and a frame edge 133. The art panel 160 holds

a picture or photograph. The cover plate includes a back plate 132 having a front surface on which the art panel 160 is mounted and a window 131 made of transparent material for covering the front of the art panel 160 so that dust and other foreign substances do not adhere to the art panel 160. The frame edge 133 holds the back plate 132, the art panel 160, and the window 131 together so that they do not separate.

[42] In further detail, the frame edge 133 is installed on each of the four edges of the front cover 130, and is connected by means of connectors disposed on the end portions thereof. In order to mount the art panel 160, the front of the back plate 132 may have a mounting surface recessed a predetermined depth. The edges of the back plate 132 and the window 131 can be received in a groove recessed a predetermined depth in the frame edge 133, to assemble the components. The frame edge 133 that is assembled at the top, bottom, and on both sides, has a connector on either end thereof that allows detachable assembly.

[43] In still further detail, a connecting member 136 is disposed on one or both ends of the frame edge 133. A connecting hole 135 is formed for inserting the connecting member 136 therein, so that an end of one frame edge 133 can be coupled with an end of another frame edge 133. Four frame edges 133 can be connected to form one frame by means of the connecting members 136 and the opposing connecting holes 135. Here, the connecting member 136 may be formed as a hooked member so that it can be effectively coupled to and removed from the connecting hole 135. However, the connector disposed on each end of the frame edge 133 does not necessarily have to be formed as a hook, and can be formed of a magnetic material to allow two frame edges to be coupled magnetically. Also, a separate corner piece can be inserted over the perpendicularly connecting junction of two frame edges 133 to couple the two pieces together. That is to say, the present invention encompasses a variety of methods that can be used to couple the frame edges 133 together.

[44] In addition, a groove for inserting the window 131, art panel 160, and the back plate 132 therein is recessed a predetermined depth and formed along the inside of the frame edge 133 from one end to the other end thereof.

[45] Fig. 8 is a perspective view showing the assembly of the front cover frame edges of the air conditioner indoor unit according to another embodiment of the present invention.

[46] Referring to Fig. 8, the front cover 130 of the indoor unit 100 of the air conditioner according to the present invention allows only one of the four frame edges 133 of the frame to be disassembled.

[47] Specifically, only one of the four frame edges 133 is removed, allowing the window 131, art panel 160, and the back plate 132 to be inserted in the opening created by the removed frame edge 133. After the components 131, 160, and 132 have been inserted,

the removed frame edge 133 is reassembled to the frame. With the exception of the bottom edge of the front cover 130, the removable frame edge 133 may be the top edge or the right or left-side edge. Should the bottom frame edge 133 be made to be removable, there is the possibility of a user suffering injury from the bottom frame edge 133 falling due to gravity. This is because structural components of the front cover 130 may detach or dislodge from the front cover 130.

Industrial Applicability

[48] According to the present invention, since an artwork or a picture can be displayed on the front portion of the indoor unit, the interior atmosphere can be improved. Therefore, the present invention can be applied to various air conditioners.

Claims

[1] An air conditioner comprising:
a main body;
a front panel installed to a front of the main body;
a front cover disposed at a front of the front panel, and detachably coupled to the main body; and
an art panel interchangeably inserted in the front cover.

[2] The air conditioner according to claim 1, wherein the front cover is detachably coupled to the front panel.

[3] The air conditioner according to claim 1, wherein the front panel is attached to pivot at a predetermined angle from the main body.

[4] The air conditioner according to claim 1, wherein the front cover is coupled to the front panel to pivot therewith at a predetermined angle.

[5] The air conditioner according to claim 1, further comprising:
a rack attached to a rear of the front panel for allowing the front panel to pivot at a predetermined angle;
a rotating pinion meshed with teeth on the rack; and
a driving motor imparting rotational force to the pinion.

[6] The air conditioner according to claim 5, wherein the rack is formed with a pre-determined curvature.

[7] The air conditioner according to claim 1, wherein the front panel includes a sub panel moveably installed therein, and the front cover is attached to a front of the sub panel.

[8] The air conditioner according to claim 7, further comprising:
a rack formed at a rear of the sub panel for allowing a forward and backward translation of the sub panel;
a rotating pinion meshed with teeth on the rack; and
a driving motor for imparting rotating force to the pinion.

[9] The air conditioner according to claim 7, wherein the front cover is capable of forward and backward translation together with the sub panel.

[10] The air conditioner according to claim 1, wherein the front cover includes a cover plate enclosing a front and a rear of the art panel and a frame edge installed at an edge of the cover plate.

[11] An air conditioner comprising:
a main body;
a back cover disposed at a front of the main body;
a window made of transparent material disposed at a front of the back cover;

an art panel interposed between the back cover and the window; and
a frame edge for inserting edges of the back cover, window, and art panel therein.

[12] The air conditioner according to claim 11, further comprising a front panel installed at the front of the main body and detachably coupled to the front of the back cover.

[13] The air conditioner according to claim 12, wherein the front panel pivots at a pre-determined angle or translates forward and backward.

[14] The air conditioner according to claim 12, wherein the back cover includes a fastener formed on a rear thereof, the front panel includes a fastener receptacle formed on a front thereof for coupling with the fastener, and the fastener is formed to detachably couple with the fastener receptacle.

[15] The air conditioner according to claim 14, wherein the fastener is a catch, hook, or magnet.

[16] The air conditioner according to claim 14, wherein the fastener receptacle is a hole of a predetermined size or a magnet.

[17] The air conditioner according to claim 11, further comprising:
a front panel fixed to the front of the main body; and
a sub panel coupled inside the front panel to be capable of forward and backward translation, and having a front surface on which the back cover is detachably mounted.

[18] The air conditioner according to claim 17, wherein the back cover includes a fastener formed on a rear thereof, and the sub panel includes a fastener receptacle formed on the front thereof.

[19] The air conditioner according to claim 18, wherein the fastener is a catch, hook, or magnet, and the fastener receptacle is a hole of a predetermined size or a magnet.

[20] The air conditioner according to claim 11, wherein the frame edge is formed by a plurality of pieces, of which at least one is detachable.

[21] The air conditioner according to claim 11, wherein the frame edge has a groove of a predetermined depth formed along an inside thereof, for inserting edges of the back cover and/or the art panel and/or the window therein.

[22] The air conditioner according to claim 11, wherein the frame edge is formed in one unit by coupling individual pieces thereof by means of connectors formed on one end and/or both ends of each individual piece.

[23] The air conditioner according to claim 22, wherein the connector is a hooked member or a magnet.

[24] The air conditioner according to claim 22, wherein the connector is a corner

piece covering outer surfaces of two frame edge pieces at a junction thereof to couple the two frame edge pieces.

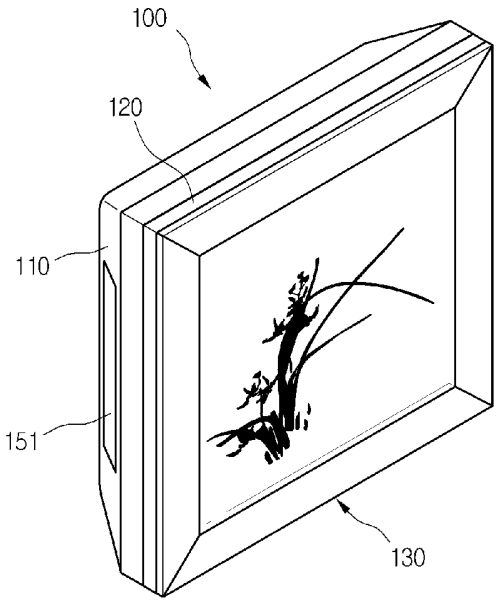
[25] An air conditioner comprising:

a main body;

a panel movably installed at a front of the main body; and

a front cover detachably coupled to a front of the panel and having a picture or photograph interchangeably inserted therein.

[Fig. 1]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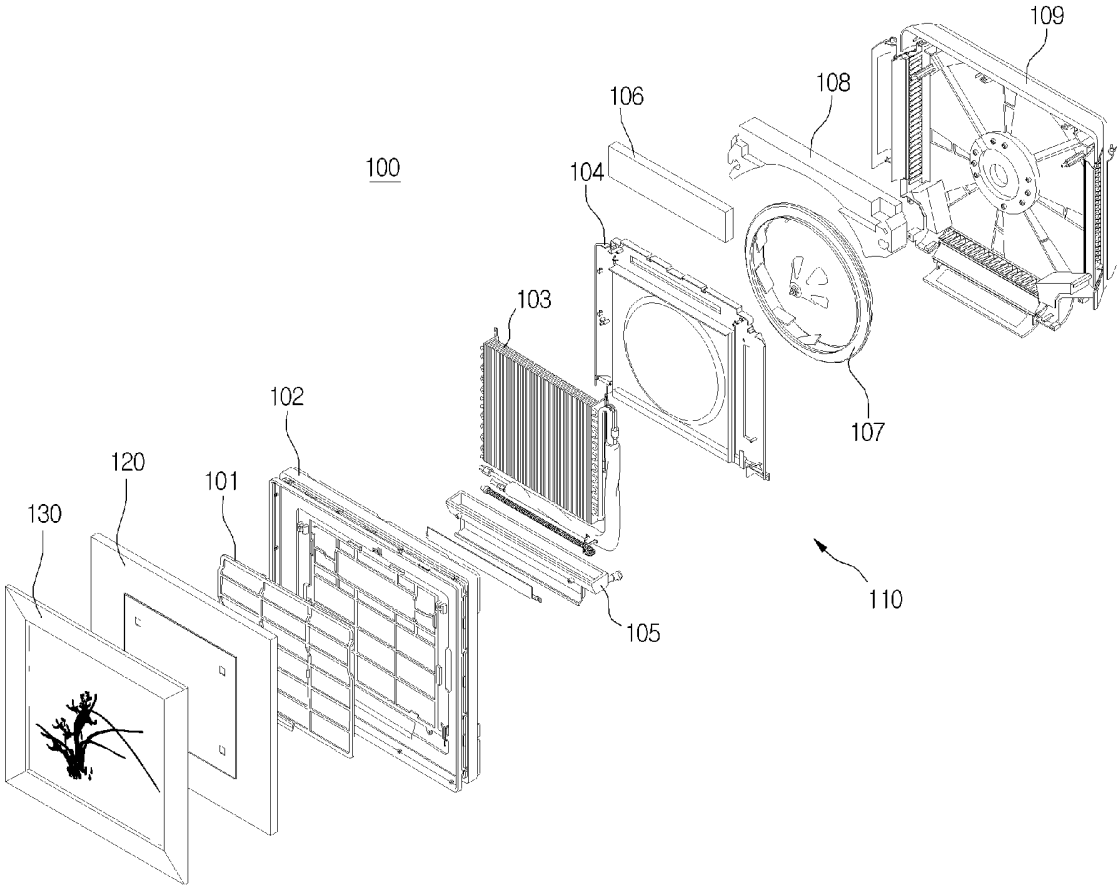
[Fig. 2]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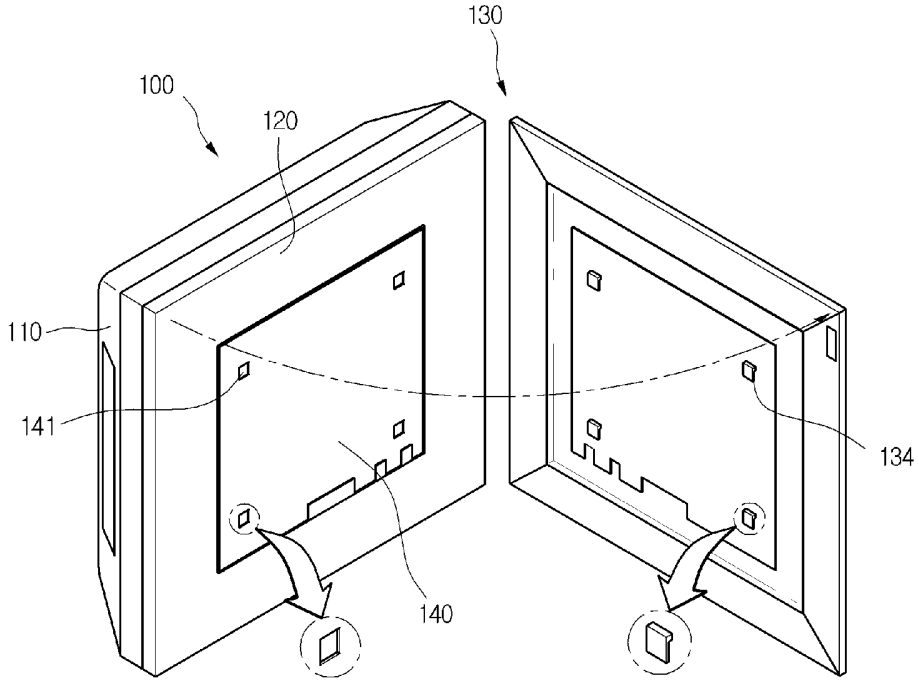
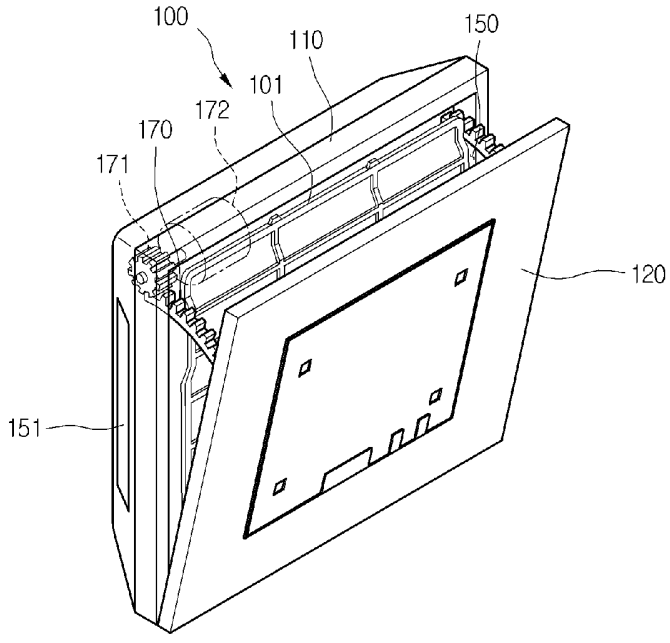
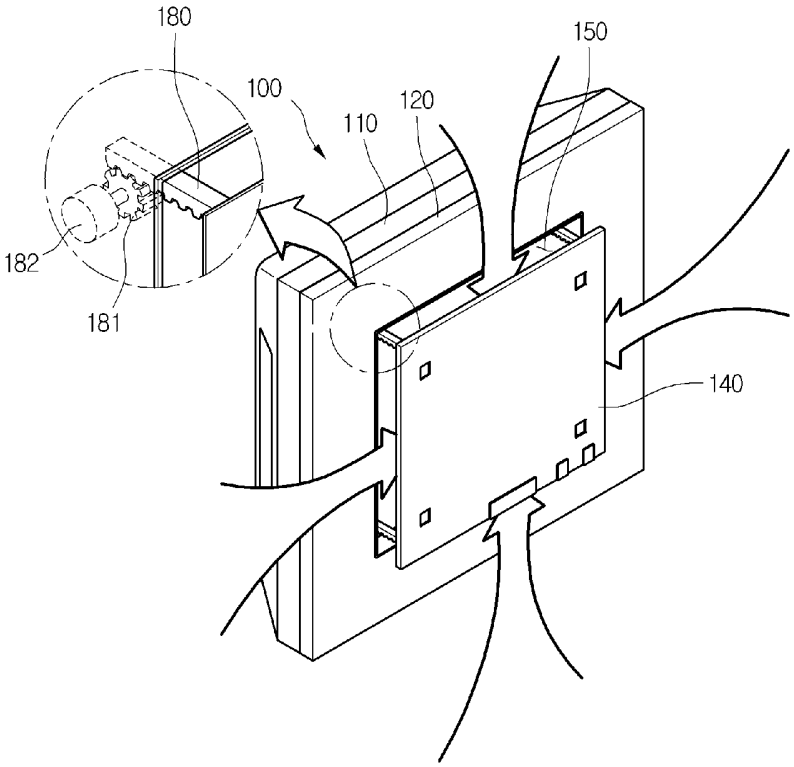
[Fig. 3]



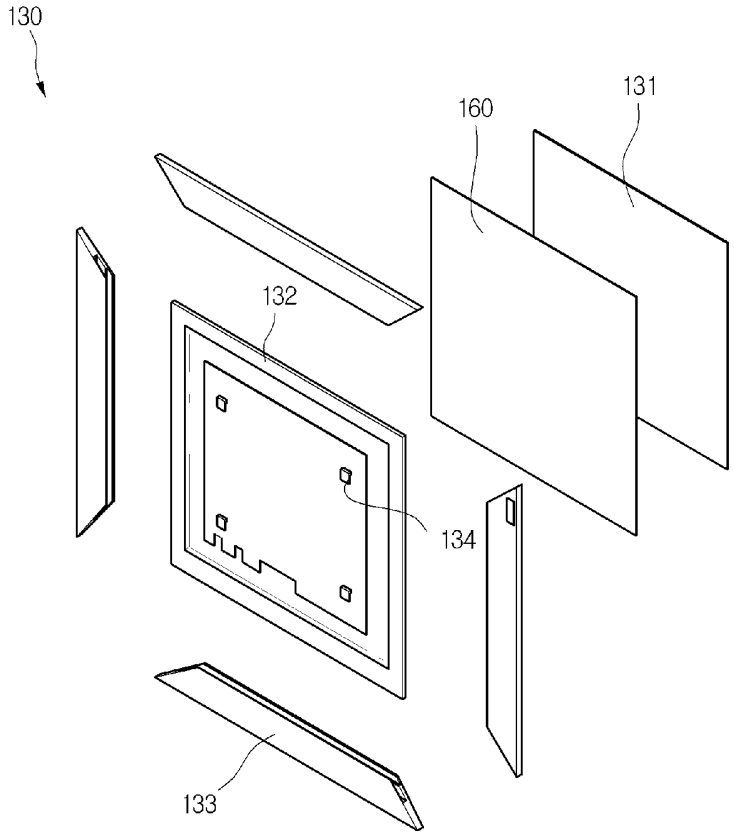
[Fig. 4]



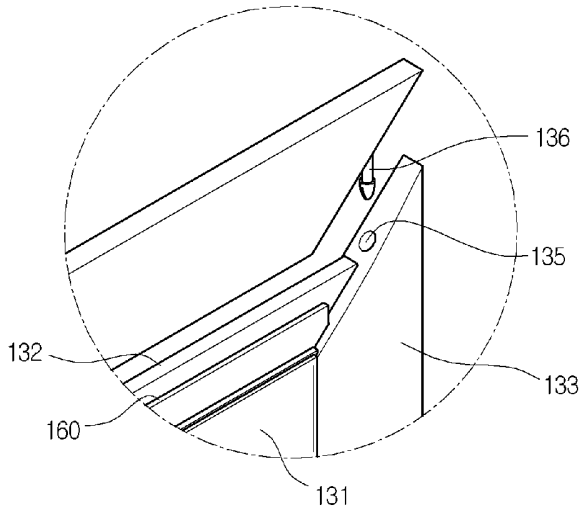
[Fig. 5]



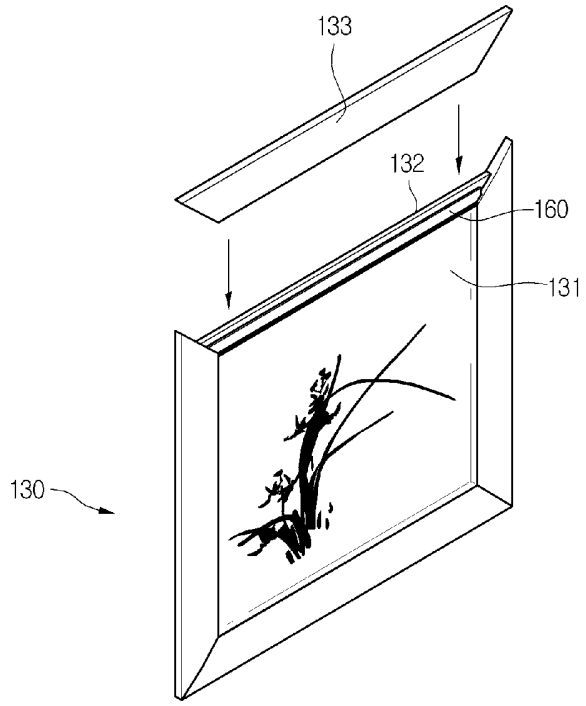
[Fig. 6]



[Fig. 7]



[Fig. 8]



PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
05FLWR012PC3		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/KR2005/004555	**26 DECEMBER 2005 (26.12.2005)**	26 JANUARY 2005 (26.01.2005)

Applicant

LG ELECTRONICS INC.

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      ☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 2
      ☐ as suggested by the applicant.
      ☒ because the applicant failed to suggest a figure.
      ☐ because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/004555

A. CLASSIFICATION OF SUBJECT MATTER

F24F 13/00(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)

IPC8 F24F 13/00

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

Korean Patents and applications for inventions since 1975
Korean Utility models and applications for Utility models since 1975
Japanese Utility models and application for Utility models since 1975

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

WPI, KIPRIS, PAJ,USPTO, "INDOOR UNIT, PANEL, FRAME'

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 2005-24798 A (LG ELECTRIC CORP.) 11 MARCH, 2005	1 - 25
A	KR 2002-33880 A (MANDO CORP.) 08 MAY, 2002	1,2
A	JP 03213921 A (MITSUBISHI ELECTRIC CORP) 19 SEP. 1991	1

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

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Date of the actual completion of the international search	Date of mailing of the international search report
31 MARCH 2006 (31.03.2006)	**31 MARCH 2006 (31.03.2006)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2005/004555

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 2005-24798	11 MARCH, 2005	NONE	
KR 2002-33880	08 MAY, 2002	NONE	
JP 03213921	19 SEP. 1991	NONE	