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(71) Applicant: **LG ELECTRONICS INC.**
Seoul (KR)

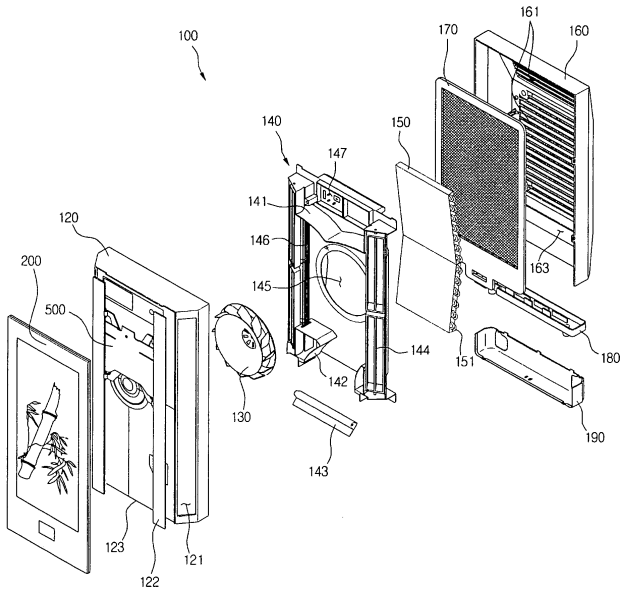
(72) Inventors:
- **Kim, Ji Hoon**
  Jinhae-si
  Gyeongsangnam-do (KR)
- **Yoo, Joong Gil**
  Changwon-si,
  Kyungsangnam-do
  641-711 (KR)
- **Yoo, Ki Jung,**
  Hanshin Hue-plus Apt. 108-1704
  Seoul (KR)

(74) Representative: **Palmer, Jonathan R.**
Boult Wade Tennant,
Verulam Gardens,
70 Gray's Inn Road
London WC1X 8BT (GB)

(54) Air conditioner

(57) There is provided an air conditioner. The air conditioner includes a front frame (120), a base (160), a blower fan (130), and a panel assembly (200). The front frame (120) includes a discharge port (121,12) formed on at least one side thereof. The base (160) is coupled at a rear of the front frame (120) and forms at least one intake port (161) for suctioning indoor air. The blower fan (130) is installed between the front frame (120) and the base (160) for suctioning the indoor air through a rear thereof and discharging the indoor air through a front thereof. The panel assembly (200) is installed at a front of the front frame for allowing an interchanging of a picture, photograph, etc.

Fig.3



EP 1 703 223 A1

Description

Field of the Invention

[0001] 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 at the front thereof to be easily interchanged, thus providing the functional benefits of an air conditioner with an added aesthetic factor for interior decoration.

Description of the Related Art

[0002] 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.

[0003] 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.

[0004] 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.

[0005] Such air conditioner indoor units according to the related art 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.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention is directed to an air conditioner that addresses one or more problems due to limitations and disadvantages of the related art.

[0007] It would be desirable 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.

[0008] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0009] Accordingly, the invention provides an air conditioner that includes: a front frame including a discharge port formed on at least one side thereof; a base coupled at a rear of the front frame and forming at least one intake port for suctioning indoor air; a blower fan installed between the front frame and the base for suctioning the indoor air through a rear thereof and discharging the indoor air through a front thereof; and a panel assembly installed at a front of the front frame for allowing an interchanging of an image.

[0010] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

Fig. 1 is a frontal perspective view of an indoor unit of an air conditioner according to the present invention;
Fig. 2 is rear perspective view of the indoor unit in Fig. 1;
Fig. 3 is an exploded perspective view showing the interior structure of the indoor unit in Fig. 1;
Fig. 4 is a perspective view of a panel assembly according to the first embodiment of the present invention;
Fig. 5 is a perspective view of a panel assembly according to the second embodiment of the present invention;

Fig. 6 is a perspective view of a panel assembly according to the third embodiment of the present invention;
Fig. 7 is a perspective view of a panel assembly according to the fourth embodiment of the present invention;
Fig. 8 is a perspective view showing an indoor unit of an air conditioner with a panel assembly according to the fifth embodiment of the present invention; and
Fig. 9 is a perspective view showing an indoor unit of an air conditioner with a panel assembly according to the sixth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0013] Fig. 1 is a frontal perspective view of an indoor unit of an air conditioner according to the present invention, Fig. 2 is rear perspective view of the indoor unit in Fig. 1, and Fig. 3 is an exploded perspective view showing the interior structure of the indoor unit in Fig. 1.

[0014] Referring to Figs. 1 through 3, the indoor unit 100 of the air conditioner according to the present invention includes a front frame 120, a panel assembly 200 mounted at the front of the front frame 120 and holding a picture or a photograph within, and a base 160 coupled to the rear of the front frame 120, for protecting components within.

[0015] In further detail, the front frame 120 has a side discharge port 121 formed at its side and a lower discharge port 123 formed at its bottom. A louver 122 is installed between the front frame 120 and the panel assembly 200 to open and close the side discharge port 121.

[0016] Also, the indoor unit 100 includes a blower fan 130 installed at the rear of the front frame 120 to suction indoor air, a motor (not shown) installed at the rear of the front frame 120 and connected to the blower fan 130 to rotate the blower fan 130, and a guide plate 140 for guiding air suctioned by the blower fan 130 towards the discharge ports. Specifically, the guide plate 140 has an upper air guide 141 for guiding indoor air suctioned by the blower fan 130 to the side discharge port 121, a lower air guide 142 for guiding the air to the lower discharge port 123, and an air directing vane 144 for controlling the direction of air discharged from the side discharge port 121. An air guide hole 145 is formed at the central portion of the guide plate 140 for guiding the air suctioned by the blower fan 130. An electrical component portion 147, such as a printed circuit board (PCB) is formed at the top of the guide plate 140 to house electrical components. A discharge vane 143 is installed at the lower discharge port 123 to control the direction in which air is discharged from the lower discharge port 123.

[0017] The indoor unit 100 further includes a heat exchanger 150 installed at the back of the guide plate 140 to exchange heat with the suctioned air, a filter 170 installed behind the heat exchanger 150 to filter impurities from the suctioned air, and a base 160 having the filter 170 inserted at the front thereof and an intake port 161 at central and/or peripheral portions thereof for suctioning air. The heat exchanger 150 has a refrigerant tubing 151 that is bent a plurality of times for refrigerant to flow through, and cooling fins arranged along the outer surface of the refrigerant tubing 151. A filter insertion slot 163 is formed at the lower edge portion of the base 160 for inserting the filter 170 into. A drain pan 180 is installed below the heat exchanger 150 to receive water that condenses on and drips down from the surface of the heat exchanger 150, and a tubing cover 190 installed below the drain pan 180.

[0018] The operation of the above-structured indoor unit of an air conditioner according to the present invention will now be described. First, when power is turned on in the indoor unit 100, the drive motor operates to turn the blower fan 130. Simultaneously, the louver 122 and the discharge vane 143 operate to open the side discharge port 121 and the lower discharge port 123. The air directing vane 144 pivots back and forth in a clockwise and a counter-clockwise direction at a predetermined angle. The rotating blower fan 130 suctions indoor air through the intake port 161. The indoor air suctioned through the intake port 161 passes through the filter 170 and is removed of impurities, and passes through the heat exchanger 150, whereupon its temperature drops. The air that passes through the heat exchanger 150 passes through the guide plate 140, and is discharged back into the indoor space through the side discharge port 121 and the lower discharge port 123 of the front frame 120 by being guided by the upper air guide 141 and the lower air guide 142. Here, the air that is discharged through the side discharge port 121 and the lower discharge port 123 is evenly distributed inside the indoor space by means of the oscillating air directing vane 144 and the discharge vane 143.

[0019] Additionally, a picture, photograph, etc. is interchangeably installed on the panel assembly 200 formed at the front of the front frame 120, so that the indoor unit not only performs air conditioning duties, but also decorates the interior.

[0020] A description of the panel assembly 200 will now be provided in further detail, with reference to the diagrams.

[0021] Fig. 4 is a perspective view of a panel assembly according to the first embodiment of the present invention.

[0022] Referring to Fig. 4, the panel assembly 200 according to the present invention includes a front panel 210 received at the front of a front frame 120 (refer to Fig. 3), an art panel 230 detachably mounted at the front portion of the front panel 210 and having a picture or photograph attached thereon, and a front cover 220 for preventing impurities from settling on the art panel 230 and protecting the art panel 230 from damage caused by collisions with external objects.

[0023] In further detail, an art panel receptacle 211 is formed at the front of the front panel 210 for mounting the art panel 230 in. Depending on the model, a display 212 may be formed below the art panel receptacle 211 to display the operational status of the indoor unit 100.

[0024] The front cover 220 is pivotably mounted to the front panel 210 by means of a hinge 240. A magnet 221 is installed on an inner edge of the front cover 220. Accordingly, when the front cover 220 is closed, the magnetic force of the magnet 221 prevents the front cover 220 from easily detaching from the front panel 210. Here, according to its mounted location on the hinge 240, the front cover 220 may pivot on the left, right, top or bottom. Also, instead of the hinge 240, the front cover 220 may have a plurality of magnets 221 formed on its rear surface, so that the front cover 220 can be completely detached from the front panel 210. Accordingly, the magnetic force of the magnets 221 causes the front cover 220 to couple with the front panel 210. Here, the size and number of magnets may be altered to provide a suitable cohering force between the front cover 220 and the front panel 210. That is, by adjusting the cohering force to a suitable level, a user is able to easily detach the front cover 220, while the front cover 220 is prevented from autonomously detaching from the front panel 210 and falling to the floor.

[0025] Additionally, the front panel 210 may be detachably coupled or permanently fixed to the front frame 120. In order to allow the art panel 230 to be viewed from the outside, the front cover 220 may be formed of a transparent material.

[0026] Fig. 5 is a perspective view of a panel assembly according to the second embodiment of the present invention.

[0027] Referring to Fig. 5, the panel assembly 200 according to the present invention is characterized by the front cover 220 being coupled to the front panel 210 by hooks.

[0028] Specifically, the front cover 220 has a hinge 240 on one edge thereof for pivotably coupling it to the front panel 210, and at least one hook 222 formed at the opposite edge. The front panel 210 has a hook receptacle 213 formed thereon for receiving the hook 222 inserted therein. Conversely, the hook 222 may be formed on the front panel 210, and the hook receptacle 213 may be formed on the front cover 220.

[0029] In the above structure, in order to replace an art panel 230 mounted in the front panel 210, a user pulls the front cover forward 220 so that the hook 222 is released from the hook receptacle 213. After the art panel 230 is replaced, the front cover 220 is pivoted on the hinge 240 so that the hook 222 inserts back into the hook receptacle 213.

[0030] Fig. 6 is a perspective view of a panel assembly according to the third embodiment of the present invention.

[0031] Referring to Fig. 6, the panel assembly 200 according to the present invention is characterized by the front cover 220 being completely detachable from the front panel 210.

[0032] In further detail, a hook is used instead of a hinge 240 for coupling the front cover 220 to the front panel 210.

[0033] That is, a plurality of hooks 222 are formed on the rear surface of the front cover 220, and a corresponding number of hook receptacles 213 for receiving the hooks 222 to be inserted therein are formed on the front of the front panel 210. Of course, the locations of the hooks 222 and hook receptacles 213 may be interchanged. In other words, the hooks 222 may be formed on the front panel 210, and the hook receptacles 213 may be formed on the front cover 220.

[0034] In the above structure, a user presses the front cover 220 against the front of the front panel 210 so that the hooks 222 formed on the back of the front cover 220 insert into the hook receptacles 213. In order to remove the front cover 220 from the front panel 210, the front cover 220 is pulled in an opposite forward direction.

[0035] In order to allow the front cover 220 to be removed from the front panel 210, a magnet may be used in this embodiment instead of the hook assembly. That is, a plurality of magnets may be installed on the rear surface of the front cover 220 and/or the front surface of the front panel 210, so that the front cover 220 attaches to the front panel 210 by means of magnetic force.

[0036] Fig. 7 is a perspective view of a panel assembly according to the fourth embodiment of the present invention.

[0037] Referring to Fig. 7, the panel assembly 200 according to the present invention includes a cavity formed inside the front panel 210 for inserting the art panel 230 into, where the art panel 230 is inserted into the front panel 210 through a top or a side thereof.

[0038] In further detail, the front panel 210 is formed of a transparent material that allows its interior to be seen from the outside. A cavity having a three-dimensional size corresponding to that of the art panel 230 is formed within the front panel 210. An insertion slot 214 is formed at the top or at a side of the front panel 210 to insert the art panel 230 through.

[0039] The above structure allows the art panel 230 to be freely interchanged, and also reduces the manufacturing cost of the panel assembly.

[0040] Fig. 8 is a perspective view showing an indoor unit of an air conditioner with a panel assembly according to the fifth embodiment of the present invention.

[0041] Referring to Fig. 8, the panel assembly 200 according to the present invention includes a front panel 210 mounted on the front of the front frame 120, a pivoting axis 250 provided on a portion of the front of the front panel 210, a front cover 220 coupled at the front of the front panel 210 by means of the pivoting axis 250 so that it can rotate in a clockwise or a counter-clockwise direction with respect to the front panel 210, and an art panel 230 mounted to the front portion of the front panel 210 and protected by the front cover 220. Also, as in the previous embodiments, a picture or photograph is attached to the front of the art panel 230.

[0042] A latch hook 215 is formed on the front of the front panel 210 at a location opposite to the pivoting axis 250 to

prevent the front cover 220 from moving. Also, a latch receiver 223 is formed on the back of the front cover 220 in order to insert the latch hook 215 therein and prevent the front cover 220 from moving. Again, it is obvious that the latch hook 215 may be formed on the front cover 220, and the latch receiver 223 may be formed on the front panel 210.

[0043] In the above structure, in order to change the art panel 230, a user rotates the front panel 220 in a predetermined angle so that the latch hook 215 is removed from the latch receiver 223. Then, after changing the art panel 230, the front cover 220 is rotated in the opposite direction to resume its original position so that the latch hook 215 inserts back into the latch receiver 223.

[0044] Fig. 9 is a perspective view showing an indoor unit of an air conditioner with a panel assembly according to the sixth embodiment of the present invention.

[0045] Referring to Fig. 9, the indoor unit 100 of an air conditioner according to the present invention is characterized in that the front panel 210 attached to the front of the front frame 120 is a liquid crystal display (LCD), a plasma display panel (PDP), or an organic light emitting diode (OLED).

[0046] Specifically, a digital data transfer portion is formed at one end of the front panel 210, and a cable 310, being a transferring part for transferring digital data, is connected to the digital data transfer portion. A display device 216 is formed on the front of the front panel 210 to display images derived from digital signals. Images from digital signals transferred through the cable 310 are displayed on the display device 216. Thus, a user does not need to directly install a picture or photograph, but can save a large quantity of pictures, photographs, or other digital imagery as digital files and selectively display these images on the display device 216. In other words, the front panel 210 can function as the panel assembly 200.

[0047] For example, after saving preferred pictures, photographs or moving images as files on a computer, a user can display them on the display device 216 through the cable 310. By thus providing the display device 216, there is no need to manually change pictures or photographs, and the front of the air conditioner 100 may function as a monitor as well.

[0048] The indoor unit of the air conditioner according to the present invention performs not only the functions of an indoor unit according to the related art, but also allows the display of easily interchangeable images such as art prints and family portraits at the front thereof, to become a piece of furniture complimenting the interior of a room.

[0049] By allowing the interchangeable display of photographs, pictures, etc. at the front thereof, the above structure of the air conditioner indoor unit can augment the interior decoration of a room, and thus has a high industrial applicability.

[0050] 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.

Claims

1. An air conditioner for suctioning indoor air to exchange heat with refrigerant circulating inside a heat exchanger and discharging the indoor air in a cold or a hot state back to an indoor space, the air conditioner comprising:

   a front frame including a discharge port formed on at least one side thereof;
   a base coupled at a rear of the front frame and forming at least one intake port for suctioning indoor air;
   a blower fan installed between the front frame and the base for suctioning the indoor air through a rear thereof and discharging the indoor air through a front thereof; and
   a panel assembly installed at a front of the front frame for allowing an interchanging of an image.

2. The air conditioner according to claim 1, wherein the panel assembly includes:

   a front panel attached to a front of the front frame;
   an art panel mounted at a front of the front panel and having the image attached thereto; and
   a front cover made of a transparent material mounted at a front of the art panel and coupled to the front panel.

3. The air conditioner according to claim 2, wherein the front cover is pivotably coupled to the front panel.

4. The air conditioner according to claim 2, wherein the panel assembly further includes a hinge for allowing the front cover to pivot from an edge of the front panel at a predetermined angle to the front panel.

5. The air conditioner according to claim 2, wherein the panel assembly further includes a pivoting axis for rotatably mounting the front cover thereto and allowing the front cover to rotate in a clockwise or a counter-clockwise direction with respect to the front panel.

6. The air conditioner according to claim 5, wherein the panel assembly further includes:

a latch hook formed at a location opposite to the pivoting axis on the front panel, for preventing a movement of the front cover with respect to the front panel; and
a latch receiver formed on the front cover for receiving the latch hook therein.

7. The air conditioner according to claim 2, wherein the panel assembly further includes at least one magnet attached to at least one of a rear of the front cover and the front of the front panel, the magnet for cohering the front cover to the front panel.

8. The air conditioner according to claim 2, wherein the panel assembly further includes:

at least one hook formed on a rear of the front cover; and
at least one hook receptacle formed on the front of the front panel for the hook to be inserted therein.

9. The air conditioner according to claim 2, wherein the front cover is detachably mounted to the front panel through a hook or a magnet.

10. The air conditioner according to claim 1, wherein the panel assembly is detachably coupled to the front frame.

11. The air conditioner according to claim 1, wherein the panel assembly includes:

an art panel having a picture or photograph attached thereto; and
a front panel having a cavity for receiving the art panel therein, and an insertion slot formed at a top or a side thereof for inserting the art panel through.

12. The air conditioner according to claim 1, wherein the panel assembly is formed with one of a liquid crystal device, hereinafter referred to as LCD, plasma display panel, hereinafter referred to as PDP, and organic light emitting diode, hereinafter referred to a OLED.

13. The air conditioner according to claim 12, wherein the panel assembly includes:

a display device for displaying a digital image on a front thereof; and
a data transferring part formed on an edge thereof for transferring digital data.

14. An air conditioner for suctioning indoor air to exchange heat with refrigerant circulating inside a heat exchanger and discharging the indoor air in a cold or a hot state back to an indoor space, the air conditioner comprising:

a front frame forming at least one discharge port on a periphery thereof;
a base coupled at a rear of the front frame and forming at least one intake port for suctioning indoor air;
a blower fan installed between the front frame and the base for suctioning the indoor air through a rear thereof and discharging the indoor air through a front thereof;
a heat exchanger disposed at a front of the base for exchanging heat between the suctioned indoor air and refrigerant; and
a panel assembly including a front panel made of a transparent material and installed on a front of the front frame, and an art panel inserted inside the front panel.

15. An air conditioner for suctioning indoor air to exchange heat with refrigerant circulating inside a heat exchanger and discharging the indoor air in a cold or a hot state back to an indoor space, the air conditioner comprising:

a front frame forming at least one discharge port on a periphery thereof;
a base coupled at a rear of the front frame and forming at least one intake port for suctioning indoor air;
a blower fan installed between the front frame and the base for suctioning the indoor air through a rear thereof and discharging the indoor air through a front thereof;
a heat exchanger disposed at a front of the base for exchanging heat between the suctioned indoor air and refrigerant; and
a panel assembly installed at a front of the front frame, wherein the panel assembly is formed with one of an LCD, PDP, and OLED, and the panel assembly includes a data transferring part formed on a side thereof for transferring digital data.

Fig.1

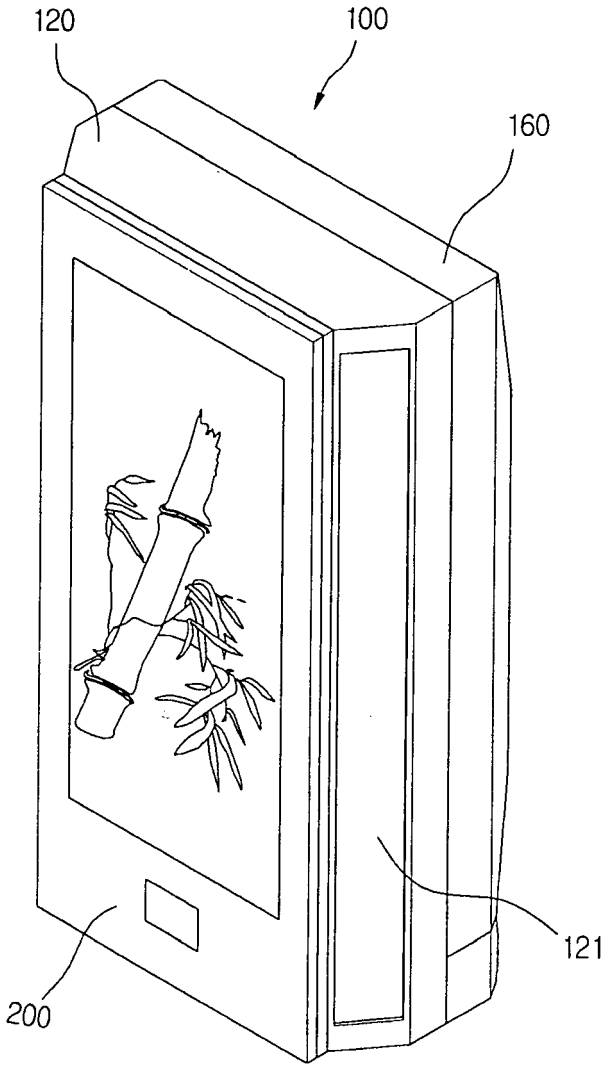


Fig.2

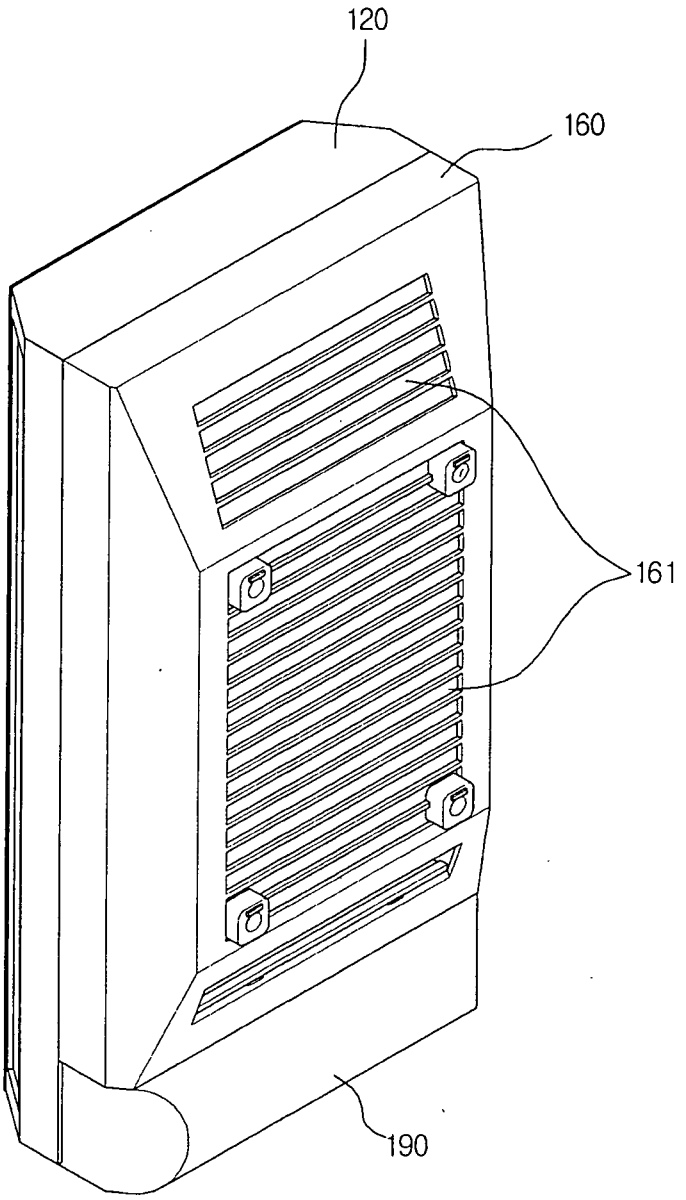


Fig.3

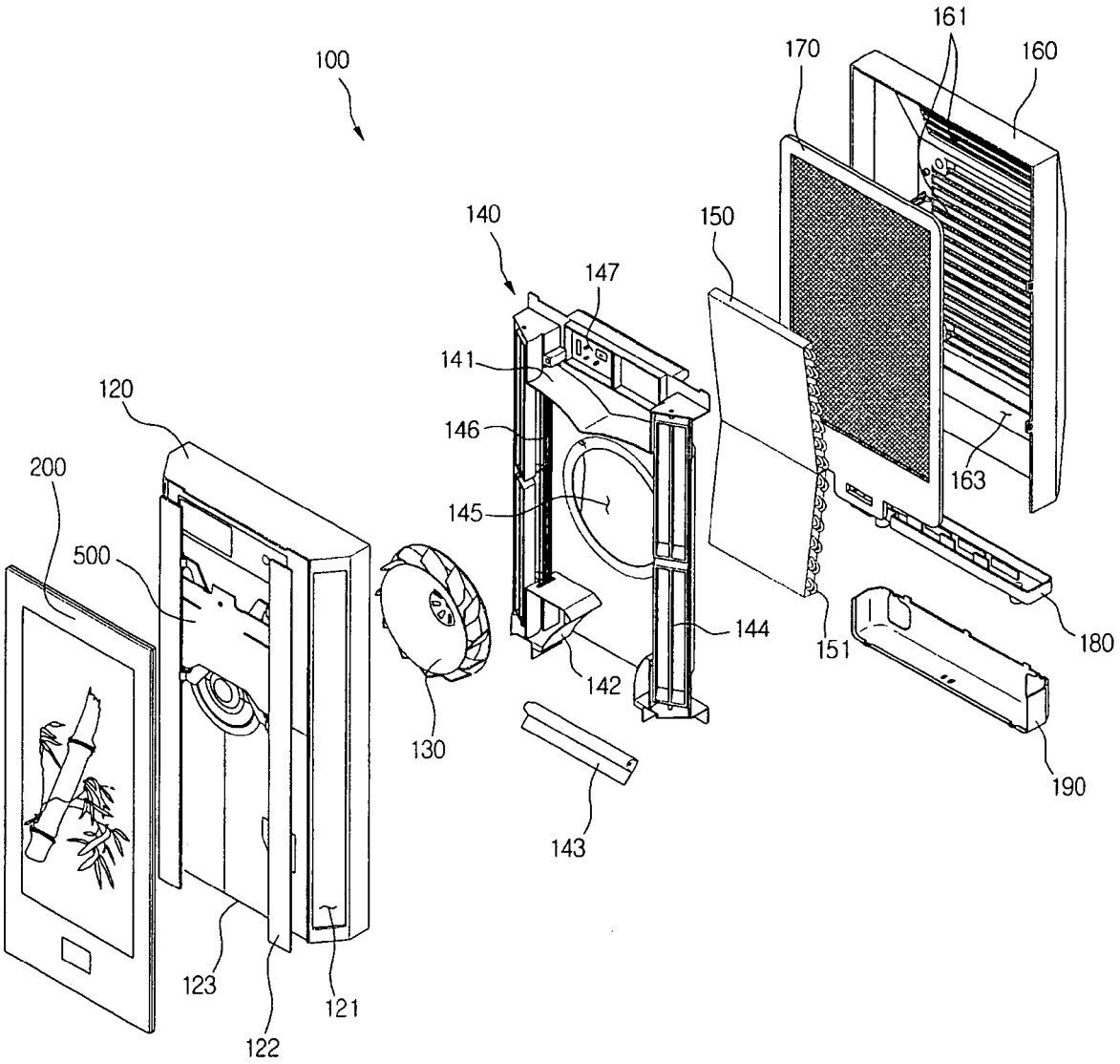

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Fig.4

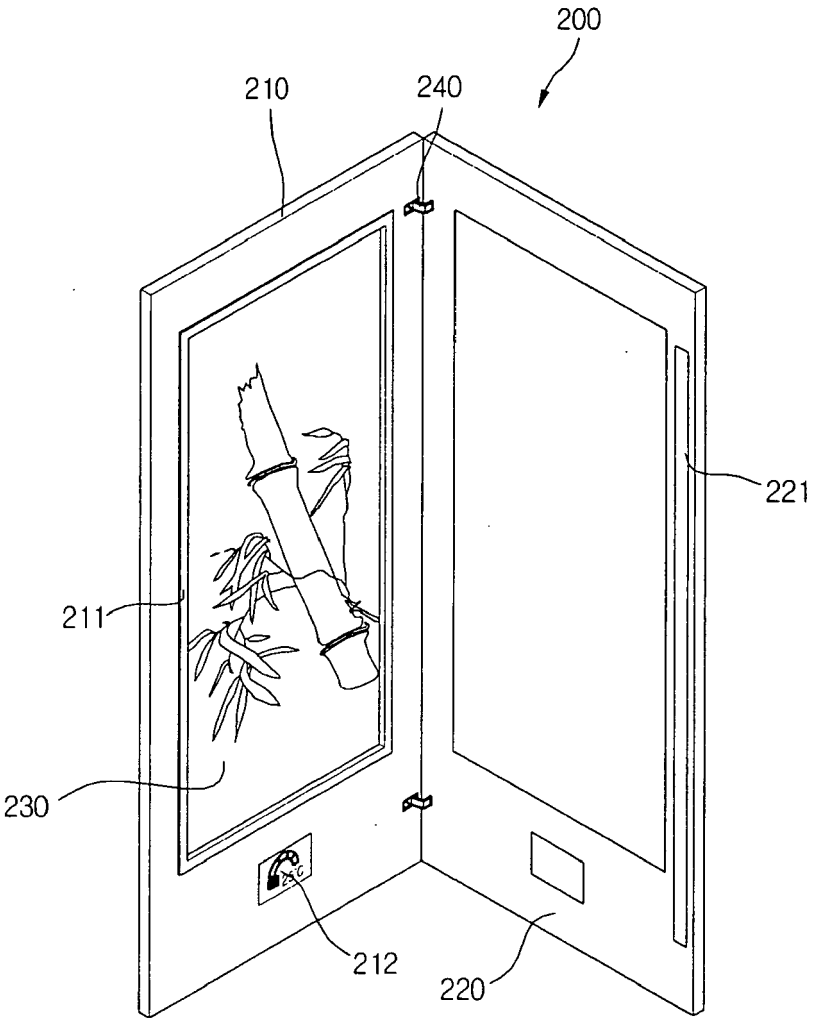


Fig.5

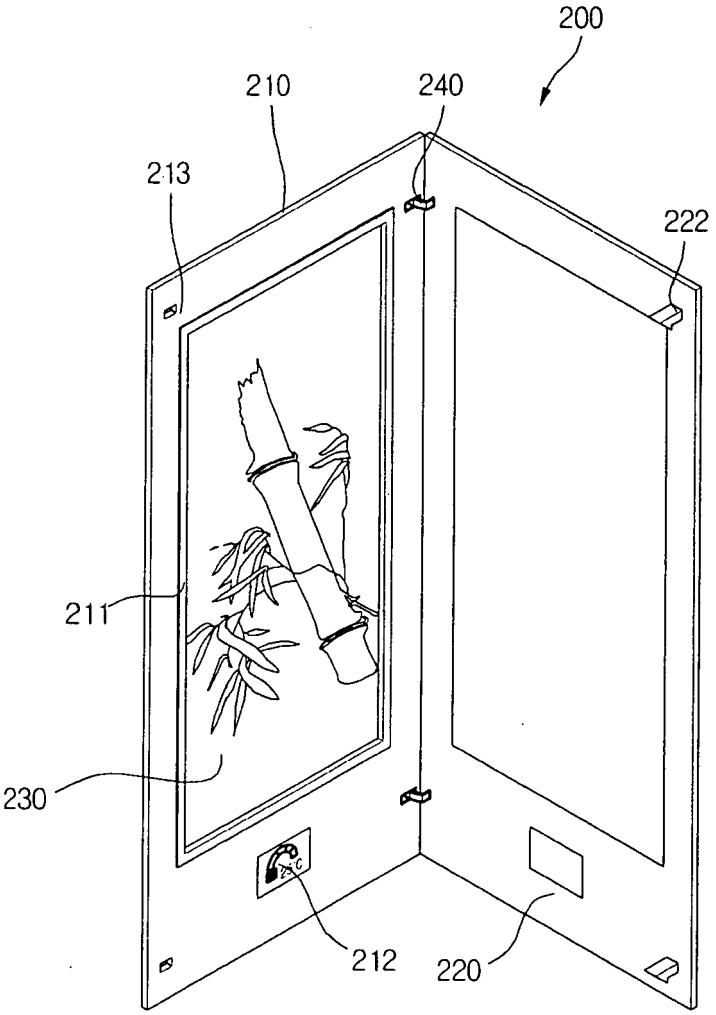


Fig.6

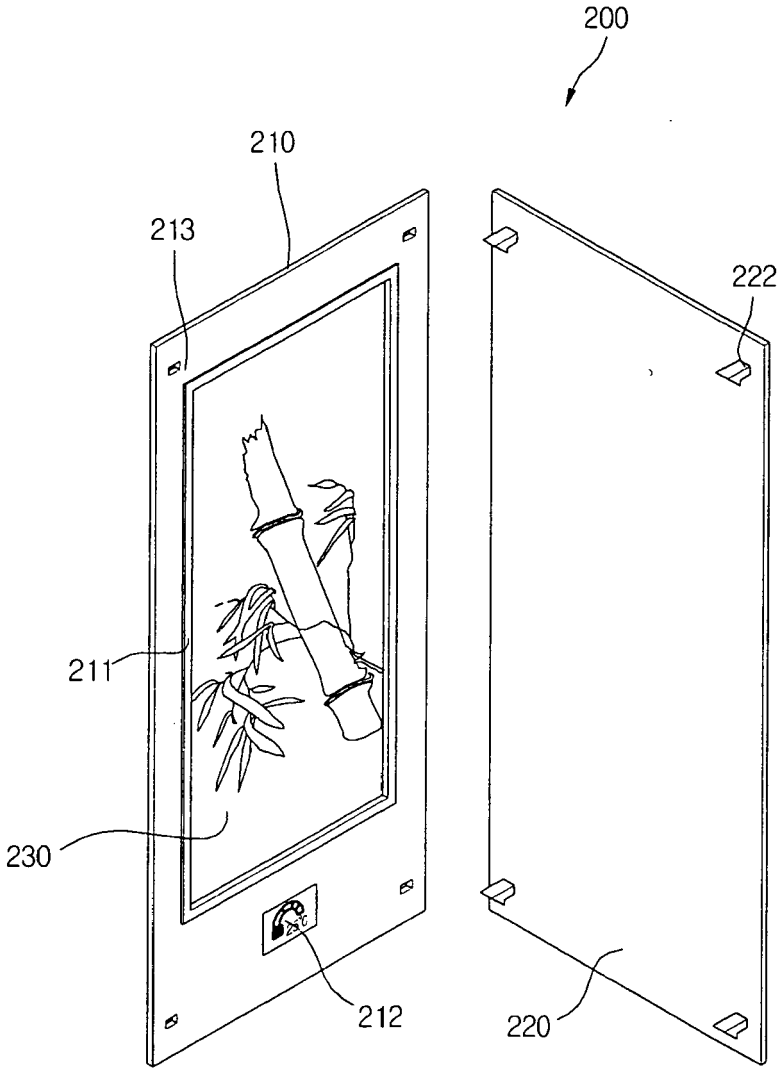


Fig.7

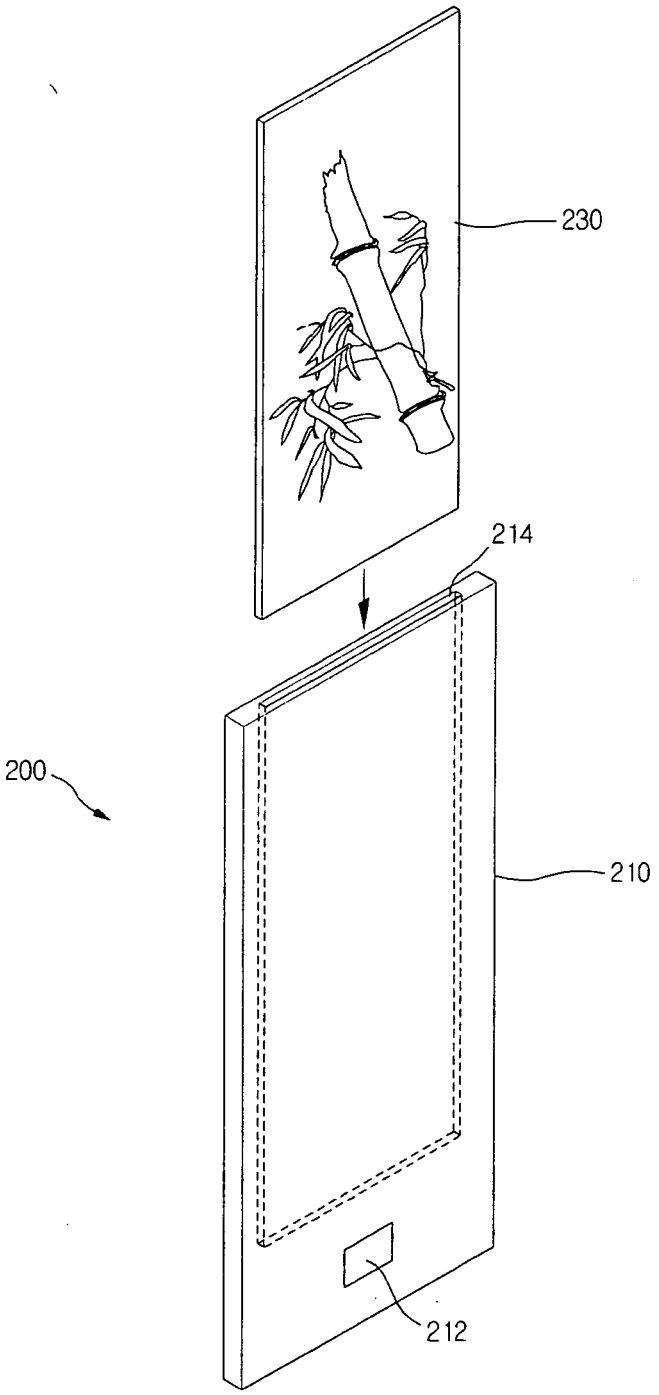


Fig.8

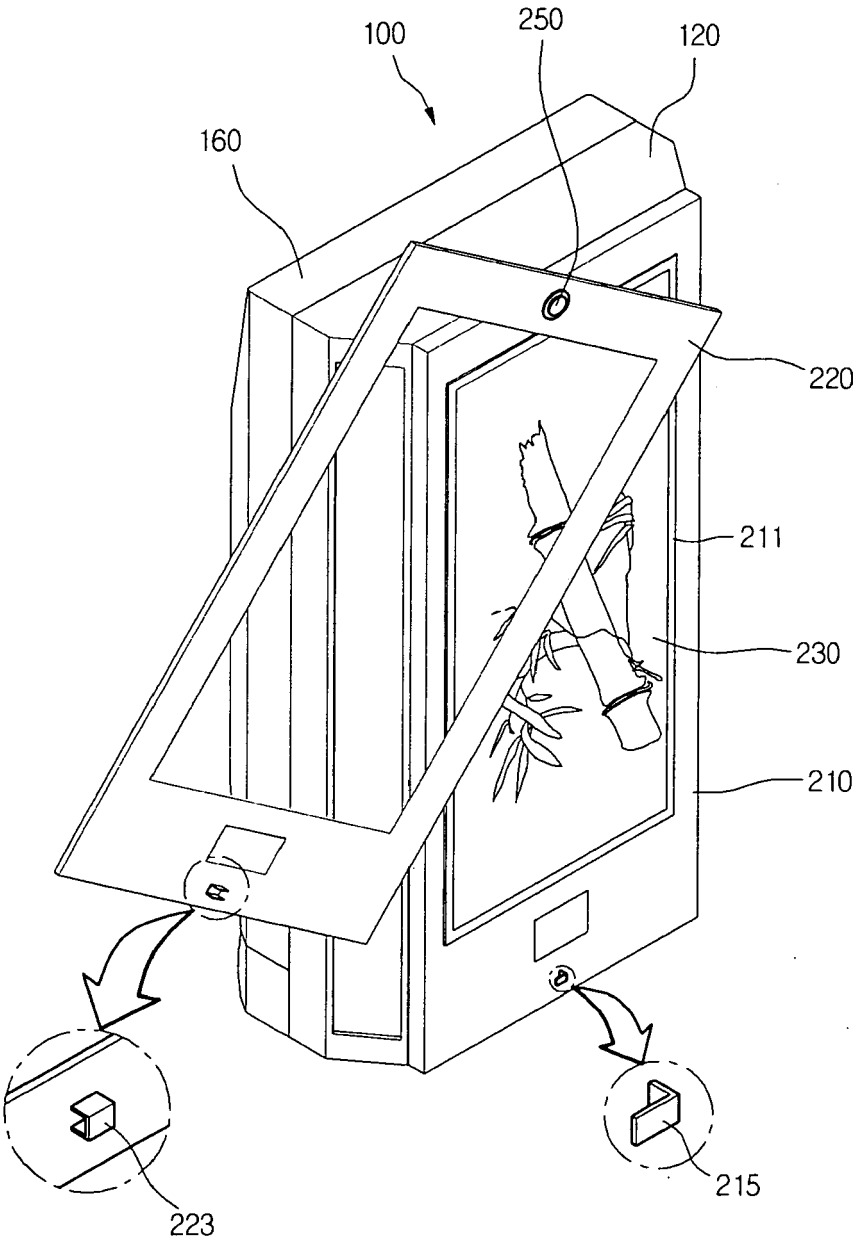
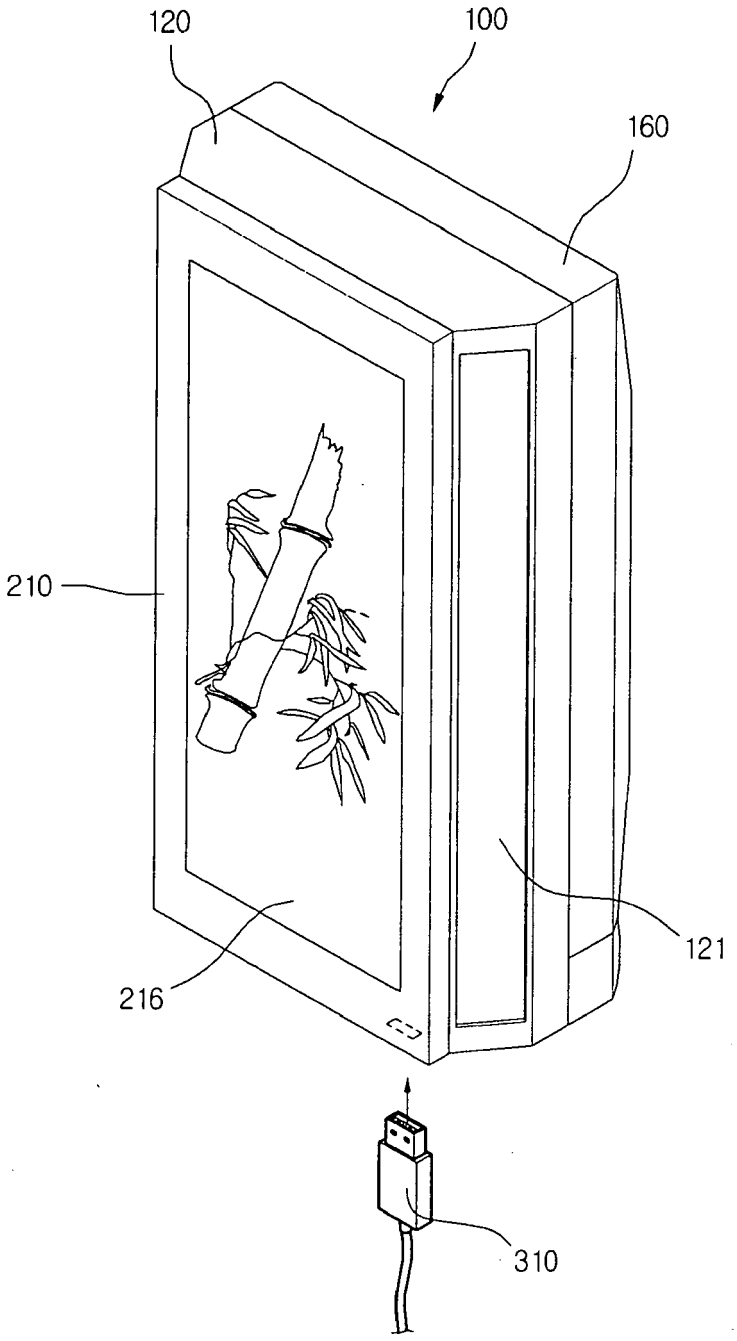


Fig.9



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 25 0498

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 271 065 A (LG ELECTRONICS INC) 2 January 2003 (2003-01-02) * paragraphs [0054] - [0072]; figures 5A,5B *	1,2, 10-15	INV. F24F13/20 F24F1/00
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P,X	EP 1 533 577 A (LG ELECTRONICS INC) 25 May 2005 (2005-05-25) * paragraphs [0061] - [0113]; figures 6-15 *	1,14,15	
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 493 (M-1191), 13 December 1991 (1991-12-13) & JP 03 213921 A (MITSUBISHI ELECTRIC CORP), 19 September 1991 (1991-09-19) * abstract *	1,14,15	TECHNICAL FIELDS SEARCHED (IPC) F24F
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 May 2006	Lienhard, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 25 0498

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-05-2006

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