



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
06.02.2013 Bulletin 2013/06

(51) Int Cl.:
F24F 13/20 (2006.01)

(21) Application number: **11761979.1**

(86) International application number:
PCT/CN2011/072177

(22) Date of filing: **25.03.2011**

(87) International publication number:
WO 2011/120405 (06.10.2011 Gazette 2011/40)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **02.04.2010 CN 201010142896**

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(54) **INDOOR UNIT OF AIR CONDITIONER**

(57) An indoor unit of an air conditioner includes a panel body (2) surrounding the side part and the top part of the air conditioner, a back shell surrounding the back part of the air conditioner, and a front panel (1) arranged at the front side and jointed closely with the panel body (2). The back shell, the panel body (2) and the front panel (1) define an inner chamber of the air conditioner, in which a heat exchanger, a control element and a fan assembly are arranged. The side face of the indoor unit of the air conditioner has a U-shaped structure. The front, back and bottom surfaces of the lower part of the indoor unit of the air conditioner are formed by more than one curved surfaces.

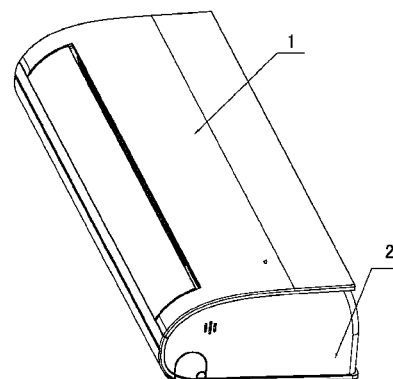


Fig. 2

Description

FIELD OF THE INVENTION

5 **[0001]** The present application relates to an indoor unit of an air conditioner, and particularly, to an indoor unit of an air conditioner having a distinct personalized effect.

BACKGROUND OF THE INVENTION

10 **[0002]** Generally, the air conditioner is an apparatus which utilizes an air cooler, a heater or an air purifier to cool, warm or purify a room, such that an internal environment of the room is more favorable. The air conditioner is provided with a ventilating device, an air cooling and heating device and an air purifier. The ventilating device circulate the air in the room, that is, absorbs air from the room, performs heat exchanging or purifies the air, and then discharges the air into the room. Improvements have been continually made to the air conditioner in the prior art. Generally, an indoor unit of the air conditioner includes: a rear shell enclosing side portions and a rear portion of the air conditioner, and a panel body arranged in front of the rear shell and closely connected to the rear shell. The rear shell and the panel body define an inner chamber of the air conditioner in which a heat exchanger, a control element and a fan component are provided. The panel body is usually fixedly connected to the rear shell via screws or in a snap-fit connecting manner. Since air conditioner market becomes increasingly mature, consumers require more and more on the air conditioner. Thus, manufacturers do their bests to improve the panel of the air conditioner. Accordingly, panels with color plates, decorative pictures or double-layer structures are developed. However, indoor units with such structures have disadvantages. For example, since the overall contour and the structure of the air conditioner are not changed at all, the lower portion of the indoor unit of the air conditioner is still of a cuboid or polyhedron structure with arris, the above improving solutions have no evidently effects on the improvements of aesthetics of the air conditioner.

SUMMARY OF THE INVENTION

30 **[0003]** An object of the present application is to provide an indoor unit of an air conditioner having a simple structure, being compatible with the overall environment indoors, and improving the decorative style of the appearance of the indoor unit of the air conditioner.

[0004] In order to achieve the above object, it is provided according to present application the following technical solutions.

35 **[0005]** An indoor unit of an air conditioner including: a panel body enclosing side portions and a top portion of the air conditioner and being configured for installing a front panel, a rear shell enclosing a rear portion of the air conditioner, and the front panel arranged in the front of the air conditioner and closely connected to the panel body. The rear shell, the panel body and the front panel define an inner chamber of the air conditioner in which a heat exchanger, a control element and a fan component are provided. Side surfaces of the indoor unit of the air conditioner are of a "U" shape structure, and front, rear and bottom surfaces of a lower portion of the indoor unit of the air conditioner are formed by more than one curved surface.

40 **[0006]** To sum up, the present application has advantageous effects, for example:

[0007] In the indoor unit of the air conditioner according to the present application, since the side surfaces of the indoor unit of the air conditioner are of a "U" shape structure, and the front, rear surfaces of the lower portion of the indoor unit of the air conditioner are formed by more than one curved surface, the overall contour of the indoor unit of the air conditioner has a unique visual effect, and the indoor unit of the air conditioner according to the present application becomes a novel air conditioner with a distinct personalized feature. Thus, the present application plays an important role in improving the aesthetics of the air conditioner.

BRIEF DESCRIPTION OF THE DRAWINGS

50 **[0008]** Fig. 1 is a side structural schematic view of an indoor unit of an air conditioner according to the present application;

[0009] Fig. 2 is a perspective structural schematic view of an indoor unit of an air conditioner according to the present application;

[0010] Fig. 3 is a schematic view of a skirt structure of an indoor unit of an air conditioner according to the present application;

55 **[0011]** Fig. 4 is a structural schematic view of a panel body of an indoor unit of an air conditioner according to the present application;

[0012] Fig. 5 is a schematic view of a front panel of an indoor unit of an air conditioner according to the present application in an installed state;

[0013] Fig. 6 is a structural schematic view of a rear boss of an indoor unit of an air conditioner according to the present application;

[0014] Fig. 7 is a structural schematic view of an indoor unit of an air conditioner according to the present application after being cut in half; and

5 [0015] Fig. 8 is a structural schematic view of the indoor unit of the air conditioner shown in Fig. 7, with the front panel being removed.

[0016] Reference numerals:

	1. front panel	2. panel body	10. front panel skirt structure
10	20. panel body skirt structure	11. first combining surface	12. second combining surface
	13. third combining surface	21. fourth combining surface	22. fifth combining surface
	23. sixth combining surface	24. seventh combining surface	25. convex surface
	26. rib	27. rear boss	28. side plate
15	29. rear frame	291. opening	221. notch

DETAILED DESCRIPTION

[0017] The present application provides an indoor unit of an air conditioner. As shown in Figs. 1 and 2, the indoor unit of the air conditioner includes: a panel body 2 enclosing side portions and a top portion of the air conditioner and being configured for installing a front panel 1, a rear shell enclosing a rear portion of the air conditioner, and the front panel 1 arranged in the front of the air conditioner and closely connected to the panel body 2. The rear shell, the panel body 2 and the front panel 1 define an inner chamber of the air conditioner in which a heat exchanger, a control element, and a fan component are provided. Side surfaces of the indoor unit of the air conditioner are of a "U" shape structure, and front, rear and bottom surfaces of a lower portion of the indoor unit of the air conditioner are formed by more than one curved surfaces.

[0018] The front panel 1 includes, from top to bottom in sequence, a first combining surface 11, a second combining surface 12 and a third combining surface 13. A sectional profile line of the first combining surface 11 is of a straight line or an arc line with a curvature approaching to zero. A sectional profile line of the second combining surface 12 is of a curved line with a curvature gradually increased from upper to lower, and the maximum curvature is less than or equal to 0.025. A sectional profile line of the third combining surface 13 is of a curved line with a curvature gradually decreased from upper to lower, and the minimum curvature is larger than 0.0005.

[0019] The rear shell is mounted at a rear portion of the panel body 2. A lower portion of a front portion of the panel body 2 is closely connected to a bottom portion of the front panel 1.

35 [0020] An assembly of the panel body 2 and the rear shell includes, from front to rear in sequence, a fourth combining surface 21, a fifth combining surface 22, a sixth combining surface 23 and a seventh combining surface 24.

[0021] Sectional profile lines of the fourth combining surface 21, the fifth combining surface 22, the sixth combining surface 23 and the seventh combining surface 24 have different curvatures, respectively, such that a bottom of the air conditioner has an arc transition structure.

40 [0022] As shown in Fig. 3, the front panel 1 covers the front portion of the panel body 2, and a width of the front panel 1 is larger than a width of the front portion of the panel body 2, thereby forming a front panel skirt structure 10 at at least one side of a bonding portion of the front panel 1 and the panel body 2. As shown in Figs. 3 and 6, the panel body 2 includes: a rear frame 29 at a rear portion of the panel body 2, and a left side plate 28 and a right side plate 28. At least one side of the rear frame 29 extends beyond corresponding side plate 28 at the same side, thereby forming a panel body skirt structure 20. The front panel skirt structure 10 and the panel body skirt structure 20 are connected to form a "U" shape side decorative edge of the indoor unit of the air conditioner.

[0023] Preferably, each of a left side and a right side of the bonding portion of the front panel 1 and the panel body 2 is formed with the front panel skirt structure 10, and each of a left side and a right side of the panel body 2 is formed with the panel body skirt structure 20, such that each of a left side and a right side of the indoor unit has a decorative edge.

50 [0024] Top portions of the front panel 1 and the rear frame 29 are higher than a top surface of the rear shell.

[0025] Widths L2 of the front panel skirt structure 10 and the panel body skirt structure 20 are ranged from 2 millimeter (mm) to 8mm, and preferably are 4mm. A thickness H1 of the front panel skirt structure 10 and a thickness H2 of the panel body skirt structure 20 are ranged from 3mm to 10mm, and preferably are 8mm.

55 [0026] As shown in Figs. 4 and 5, the lower portion of the front portion of the panel body 2 is provided with a convex surface 25. The bottom portion of the front panel 1 is arranged on the convex surface 25, and the front panel 1 is fixedly connected to the panel body 2 via a fastening mechanism.

[0027] The fastening mechanism is a connecting mechanism including a bayonet and a groove cooperated with the bayonet.

[0028] Preferably, a width of the convex surface 25 is equal to a thickness of the front panel 1.

[0029] As shown in Fig. 6, a back portion of the panel body 2 is formed with an opening 291 for installing the rear shell, and is provided with a rear boss 27 at a lower edge of the opening 291. After the air conditioner is mounted, the rear boss 27 abuts against a wall surface, to form an installing space for a drain pipe and a refrigerant connecting pipe between the rear shell and the wall surface.

[0030] The rear boss 27 is arranged in a transverse direction, and has upward bending portions at left and right ends thereof. A size of the rear boss 27 in a horizontal direction is less than that of the rear frame 29.

[0031] As shown in Figs. 7 and 8, a notch 221 is provided at one side of the panel body to form an air-intake passage between the notch and the front panel skirt structure 10, so as to increase air intake amount of the air conditioner, thereby increasing performance of the product. Preferably, each of the right side and the left side of the panel body is provided with a notch 221 so as to form a three-side air intake structure, in which a top air intake opening serves as a major air intake passage and auxiliary air intake passages are formed at the left and right sides, thereby increasing the air amount and thus the performance of the product.

[0032] The above embodiments are not intended to limit the present application. Various improvements and variations made by the person skilled in the art, without departing from the scope of the present application, are deemed to fall into the protection scope of the present application. For example, radiuses, curvatures, number, and so on, of the combining surfaces of the front panel 1 and the panel body 2 may be varied.

Claims

1. An indoor unit of an air conditioner comprising: a panel body (2) enclosing side portions and a top portion of the air conditioner and being configured for installing a front panel (1), a rear shell enclosing a rear portion of the air conditioner, and the front panel (1) arranged in the front of the air conditioner and closely connected to the panel body (2), wherein the rear shell, the panel body (2) and the front panel (1) define an inner chamber of the air conditioner in which a heat exchanger, a control element and a fan component are provided,
characterized in that,
side surfaces of the indoor unit of the air conditioner as of a "U" shape structure, and front, rear and bottom surfaces of a lower portion of the indoor unit of the air conditioner are formed by more than one curved surface.
2. The indoor unit of the air conditioner according to claim 1, wherein the front panel (1) comprises, from top to bottom in sequence, a first combining surface (11), a second combining surface (12) and a third combining surface (13), wherein a sectional profile line of the first combining surface (11) is of a straight line or an arc line with a curvature approaching to zero; a sectional profile line of the second combining surface (12) is of a curved line with a curvature gradually increased from upper to lower, the maximum curvature being less than or equal to 0.025; and a sectional profile line of the third combining surface (13) is of a curved line with a curvature gradually decreased from upper to lower, the minimum curvature being larger than 0.0005.
3. The indoor unit of the air conditioner according to claim 1 or 2, wherein the rear shell is mounted at a rear portion of the panel body (2), and a lower portion of a front portion of the panel body (2) is closely connected to a bottom portion of the front panel (1).
4. The indoor unit of the air conditioner according to claim 3, wherein an assembly of the panel body (2) and the rear shell comprises, from front to rear in sequence, a fourth combining surface (21), a fifth combining surface (22), a sixth combining surface (23) and a seventh combining surface (24).
5. The indoor unit of the air conditioner according to claim 1 or 2, wherein the rear shell is mounted at a rear portion of the panel body (2), and an assembly of the panel body (2) and the rear shell comprises, from front to rear in sequence, a fourth combining surface (21), a fifth combining surface (22), a sixth combining surface (23) and a seventh combining surface (24).
6. The indoor unit of the air conditioner according to claim 1 or 2, wherein the front panel (1) covers the front portion of the panel body (2), and a width of the front panel (1) is larger than a width of the front portion of the panel body (2), thereby forming a front panel skirt structure (10) at at least one side of a bonding portion of the front panel (1) and the panel body (2).
7. The indoor unit of the air conditioner according to claim 1 or 2, wherein the panel body (2) comprises: a rear frame (29) at a rear portion of the panel body (2), and a left side plate (28) and a right side plate (28), wherein at least one

side of the rear frame (29) extends beyond corresponding side plate (28), thereby forming a panel body skirt structure (20).

8. The indoor unit of the air conditioner according to claim 1 or 2, wherein the front panel (1) covers the front portion of the panel body (2), and a width of the front panel (1) is larger than a width of the front portion of the panel body (2), thereby forming a front panel skirt structure (10) at at least one side of a bonding portion of the front panel (1) and the panel body (2); the panel body (2) comprises: a rear frame (29) at a rear portion of the panel body (2), and a left side plate (28) and a right side plate (28), and at least one side of the rear frame (29) extends beyond corresponding side plate (28), thereby forming a panel body skirt structure (20); and the front panel skirt structure (10) and the panel body skirt structure (20) are connected to form a "U" shape side decorative edge of the indoor unit of the air conditioner.
9. The indoor unit of the air conditioner according to claim 8, wherein the front panel skirt structure (10) is formed at each of a left side and a right side of the bonding portion of the front panel 1 and the panel body (2), and the panel body skirt structure (20) is formed at each of a left side and a right side of the panel body (2), such that each of a left side and a right side of the indoor unit has a decorative edge.
10. The indoor unit of the air conditioner according to claim 9, wherein top portions of the front panel (1) and the rear frame (29) are higher than top surfaces of the rear shell and the left and right side plates.
11. The indoor unit of the air conditioner according to claim 6, wherein the front panel skirt structure (10) has a width ranged from 2mm to 8mm, and a thickness ranged from 3mm to 10mm.
12. The indoor unit of the air conditioner according to claim 7, wherein the panel body skirt structure (20) has a width ranged from 2mm to 8mm, and a thickness ranged from 3 mm to 10mm.
13. The indoor unit of the air conditioner according to claim 8, wherein each of the front panel skirt structure (10) and the panel body skirt structure (20) has a width ranged from 2mm to 8mm, and a thickness ranged from 3mm to 10mm.
14. The indoor unit of the air conditioner according to claim 1, 2 or 4, wherein the lower portion of the front portion of the panel body 2 is provided with a convex surface (25) on which the bottom portion of the front panel (1) is arranged, and the front panel (1) is fixedly connected to the panel body (2) via a fastening mechanism.
15. The indoor unit of the air conditioner according to claim 14, wherein the fastening mechanism is a connecting mechanism comprising a bayonet and a groove cooperated with the bayonet.
16. The indoor unit of the air conditioner according to claim 14, wherein a width of the convex surface (25) is equal to a thickness of the front panel (1).
17. The indoor unit of the air conditioner according to claim 1, 2 or 4, wherein a back portion of the panel body (2) is formed with an opening (291) for installing the rear shell, and is provided with a rear boss (27) at a lower edge of the opening (291).
18. The indoor unit of the air conditioner according to claim 17, wherein a size of the rear boss (27) in a horizontal direction is less than that of the rear frame (29).
19. The indoor unit of the air conditioner according to claim 17, wherein the rear boss (27) is arranged in a transverse direction, and has upward bending portions at a left side and a right end thereof.
20. The indoor unit of the air conditioner according to claim 6, wherein a notch (221) is provided at one side of the panel body to form an air-intake passage between the notch and the front panel skirt structure (10).
21. The indoor unit of the air conditioner according to claim 4, wherein sectional profile lines of the fourth combining surface (21), the fifth combining surface (22), the sixth combining surface (23) and the seventh combining surface (24) have different curvatures, respectively, such that a bottom of the air conditioner has an arc transition structure.
22. The indoor unit of the air conditioner according to claim 5, wherein sectional profile lines of the fourth combining surface (21), the fifth combining surface (22), the sixth combining surface (23) and the seventh combining surface

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(24) have different curvatures, respectively, such that a bottom of the air conditioner has an arc transition structure.

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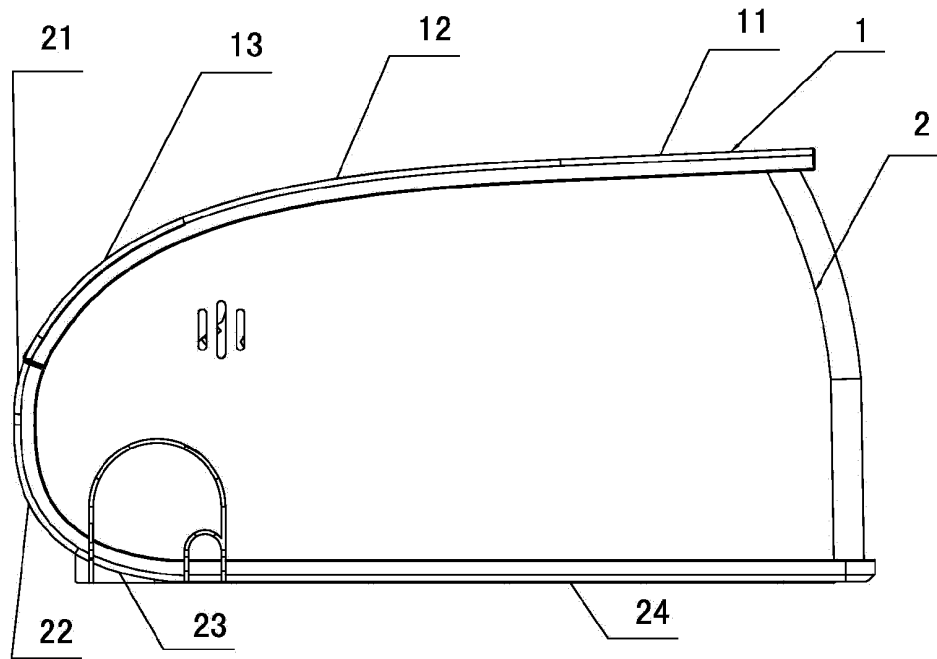


Fig. 1

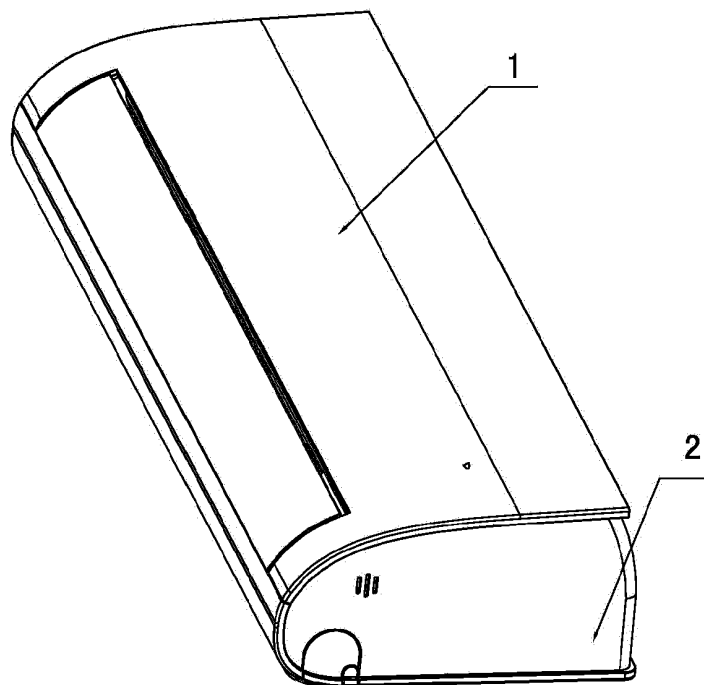


Fig. 2

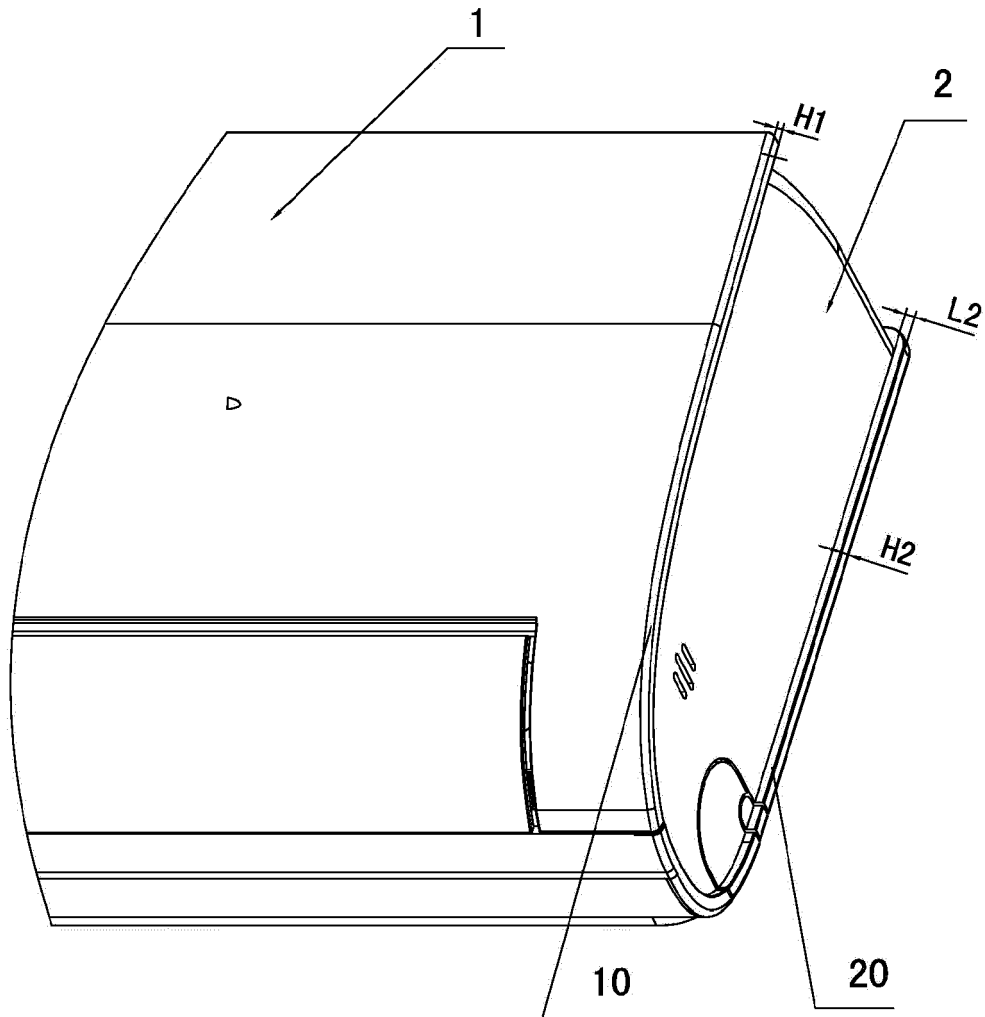


Fig. 3

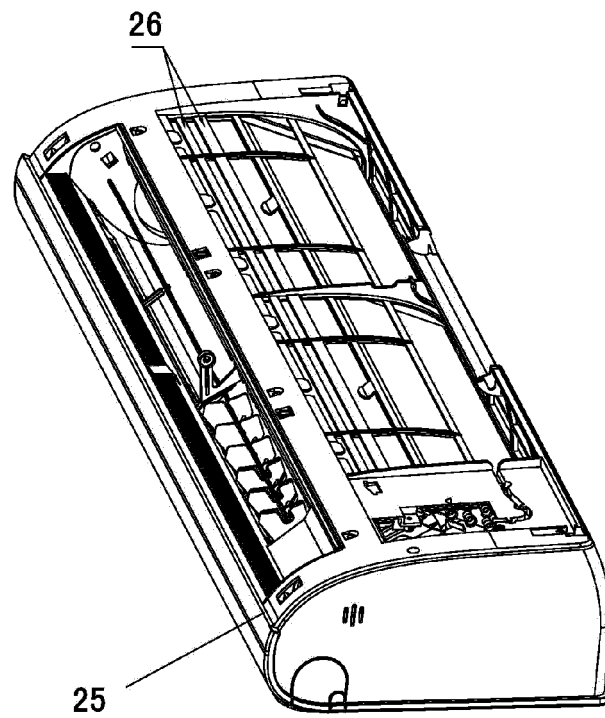


Fig. 4

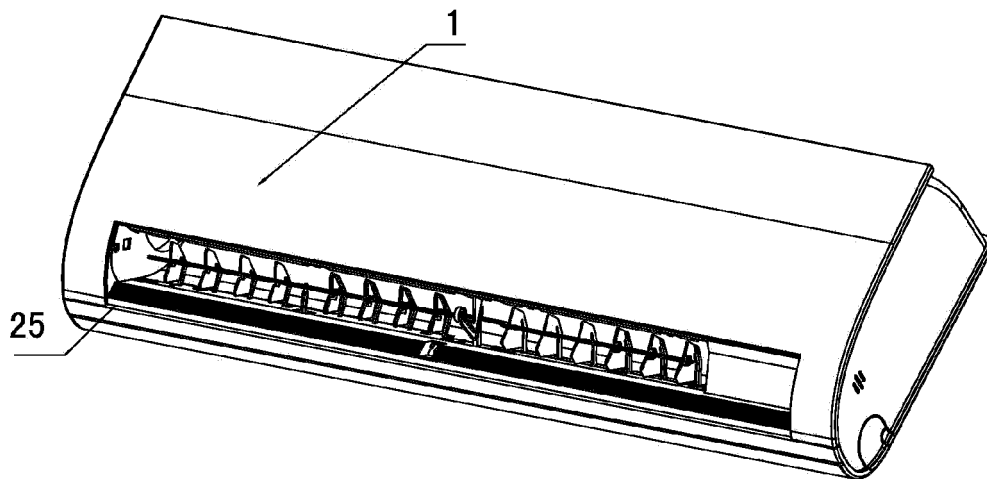


Fig. 5

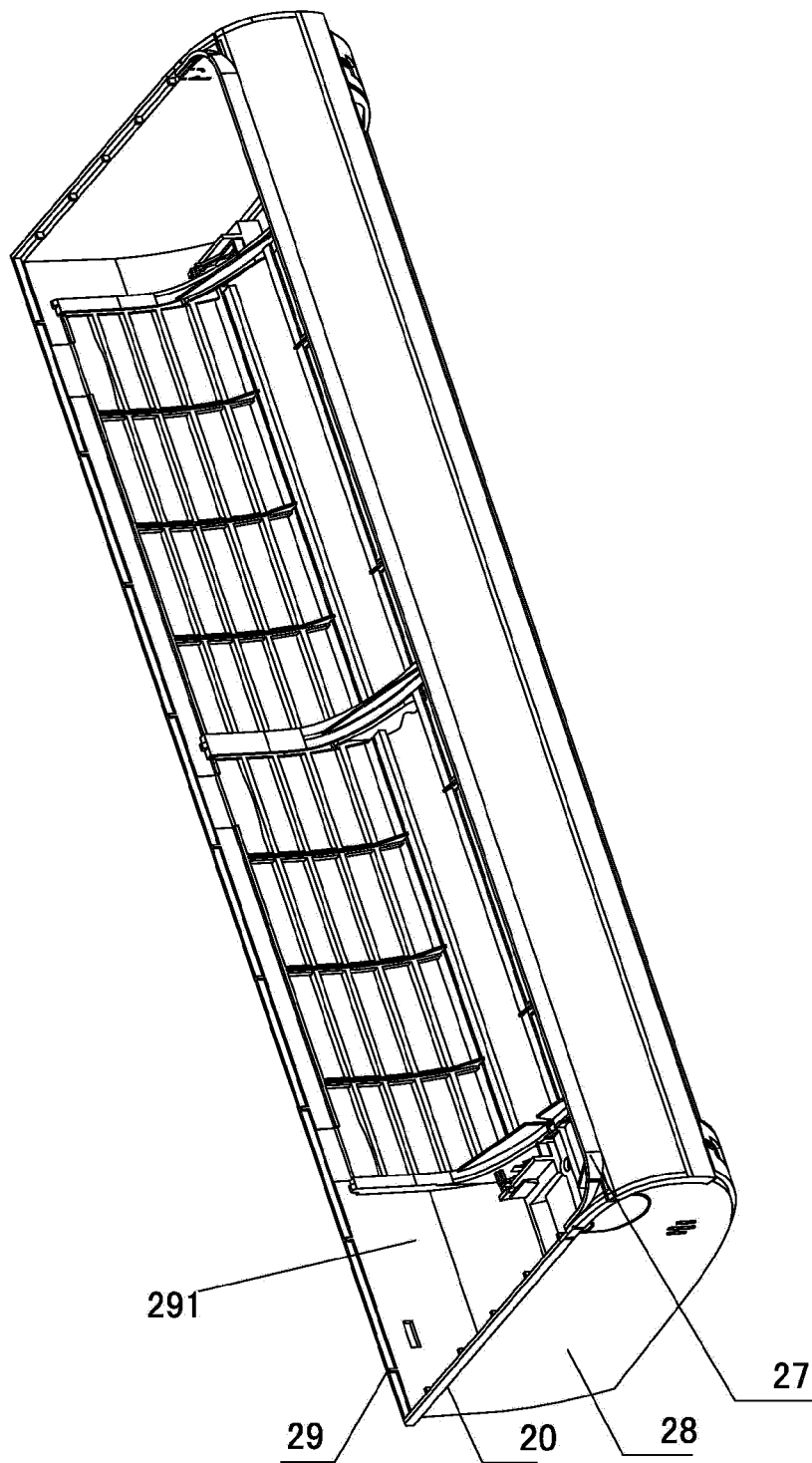


Fig. 6

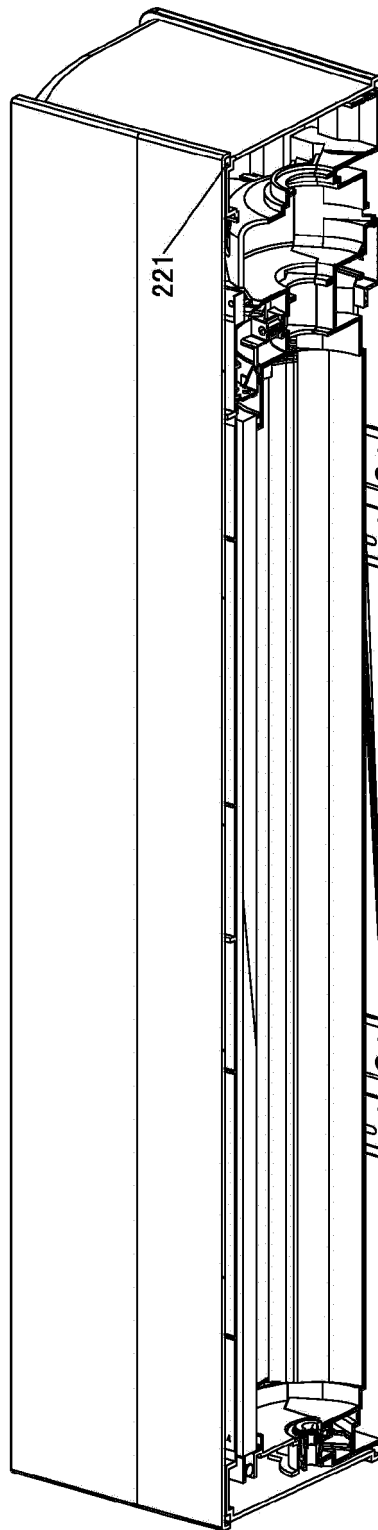


Fig. 7

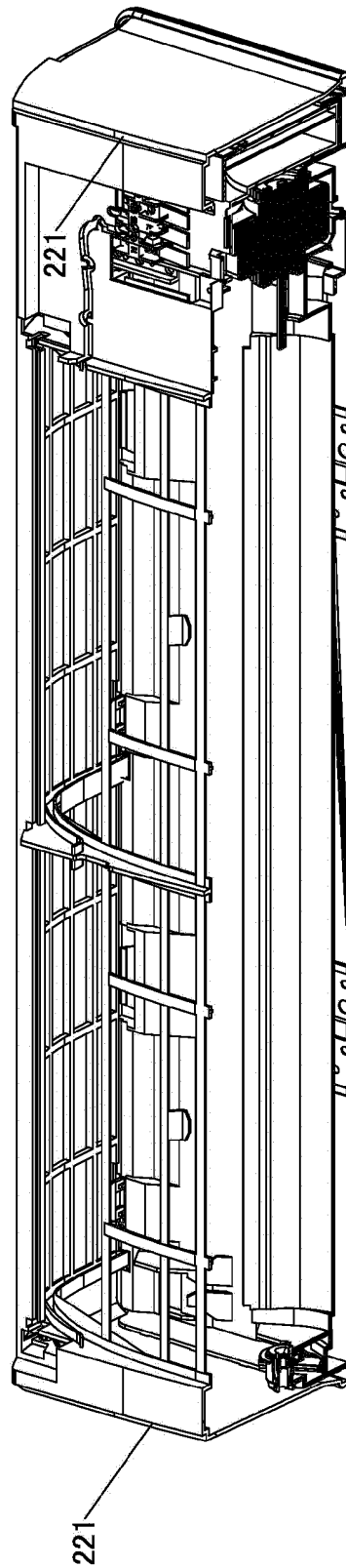


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2011/072177

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/20(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)

IPC: F24F

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

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

WPI; EPODOC; CNPAT; CNKI

air w condition+, indoor, wall, panel?, plat???, U 1w (shape+ or type+), curv+, bent+, bend+, arc+, case, casing, shell, housing, combin+, joint+, brim+, edge+, rim+, side+, decorat+, trim+, garnish+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	CO LTD) 28 Nov. 2007(28.11.2007) Desc. page 3 line 10 to page 4 line 14, Figs. 1-3,5	2
A	Whole document	6-13,17-20
Y	CN 1403748 A (TOSHIBA CARRIER CORP) 19 Mar. 2003(19.03.2003)	2
	Desc. page 3 line 29 to page 4 line 4, Fig. 1	
A	Whole document	1,3-22

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

* Special categories of cited documents:

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Date of the actual completion of the international search

20 May 2011(20.05.2011)

Date of mailing of the international search report

30 Jun. 2011 (30.06.2011)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2011/072177

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Information on patent family members

International application No.

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