(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 February 2007 (01.02.2007)

PCT

(10) International Publication Number
WO 2007/012156 A1

(51) International Patent Classification:
F25D 23/12 (2006.01) *B60S 1/54* (2006.01)
F25D 19/00 (2006.01) *B60H 1/02* (2006.01)
F25B 39/02 (2006.01)

(21) International Application Number:
PCT/BR2005/000147

(22) International Filing Date: 29 July 2005 (29.07.2005)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: SIDE PANEL ARRANGEMENT FOR AN EVAPORATOR UNIT

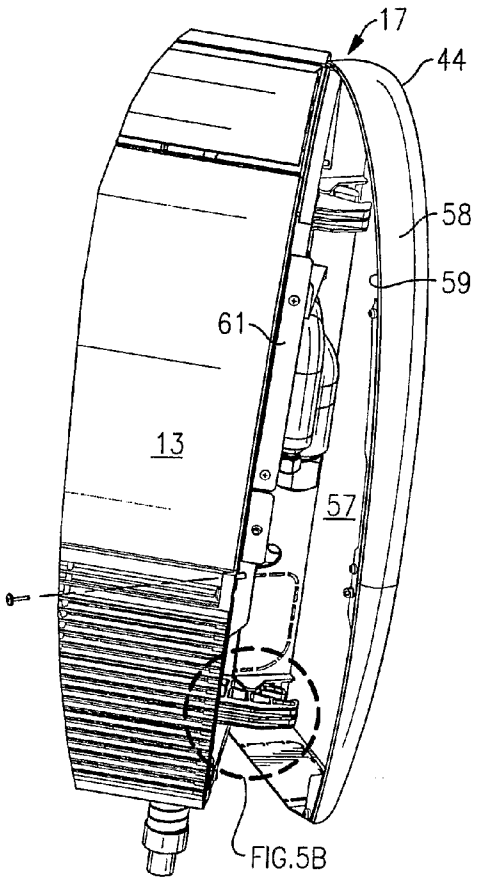

FIG.5B

(57) Abstract: An air conditioning evaporator unit having a main body with front and rear sides, a top and bottom, all forming a housing with partially open ends, includes a pair of end covers which are attached to the body by snap-in brackets located near the rear of the unit. Female brackets attached to the body include opposed fingers that define a slot that leads to a pocket, and the cover brackets each include a post that can be snapped in through the slot and into the pocket of the body bracket. A single fastener located at the front of the unit interconnects the body to the cover.

WO 2007/012156 A1

Published:
— *with international search report*

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"SIDE PANEL ARRANGEMENT FOR AN EVAPORATOR UNIT"

Technical Field

This invention relates generally to evaporator units for air conditioning systems and, more particularly, to the construction and mounting of side panel structures for closing the ends thereof.

Background Art

In many commercial air conditioning, heating and ventilating systems, conditioned air is discharged into an internal space through an air distribution or conditioning unit. For example, one general type of air conditioning system, often referred to as a split system, includes separate indoor and outdoor units. The outdoor unit includes a compressor, a heat exchanger and a fan. The indoor unit includes a heat exchanger and a fan. In operation, the indoor fan draws air into the indoor or evaporator unit, through an inlet thereof, and forces the air over the indoor heat exchanger and then out of the indoor unit, through an outlet opening therein.

The outdoor fan draws outdoor air into the outdoor unit, and circulates it over the outdoor heat exchanger and then back out to ambient. At the same time, a compressor causes a refrigeration fluid to circulate through and between the indoor/outdoor heat exchangers. At the indoor heat exchanger, the refrigerant absorbs heat from the air passing over that heat exchanger to cool the air. At the same time, at the outdoor heat exchanger, the air passing over the heat exchanger absorbs heat from the refrigerant passing therethrough.

Split type air conditioning units of this type are typically manufactured in a wide range of cooling capacities. Accordingly, the size of the indoor unit can range from a small compact relatively narrow unit up to a wide unit, of substantially the same height as the compact unit.

In manufacturing such units, particularly as the units become larger, the fabrication of certain components, such as those comprising the front cover portion of the unit, become onerous and cumbersome in size. Such large size results in components which are difficult to manufacture and difficult to handle, both during manufacture and assembly of the units.

Typically, the larger the unit the more components are required and the more fasteners are required in order to assemble all of the components. It is considered extremely desirable to minimize the number of components and fasteners required in the fabrication process.

A common approach for indoor units of a split type air conditioning system is to provide an elongate body with a covering arrangement which wraps over the top, front and bottom of the body, and then providing separate end panels to cover the ends thereof. Since it is important that these end covers are very securely fastened to the body, this attachment process generally involves considerable time and effort, as well as a number of fasteners.

Disclosure of the Invention

An evaporator unit for an air conditioning system includes a main body having a back panel and a front section defining an air inlet and an air

outlet. The body defines an air flow path through the unit extending from the inlet to the outlet. An evaporator coil is supported in the body and within the air flow path. The unit includes an evaporator fan for causing air to flow along the air flowpath and through the evaporator coil where the air is cooled and water is removed therefrom, resulting in condensation.

A pair of mounting brackets are mounted on a rear edge of the body end opening, and a pair of mating hinge brackets are mounted on the rear edge of the end panels, with the hinge brackets being easily engageable with the mounting brackets to hingeably mount the end panel to the body. A pair of fasteners then interconnects the front edge of the body and opening to the front edge of the end panel. The mounting brackets and hinge brackets are integrally formed as part of the body and end panel, respectively. The mounting bracket is of a female configuration and the hinge bracket is of a male configuration, and the two are interconnected by way of a snap-in arrangement.

In the drawings as hereinafter described, a preferred embodiment is depicted; however, various other modifications and alternate constructions can be made thereto without departing from the true spirit and scope of the invention.

Brief Description of the Drawings

Fig. 1 is a perspective view of an evaporator unit in accordance with the present invention.

Fig. 2 is an exploded view thereof.

Fig. 3 is a partial perspective end view showing the right side

thereof with the end cover removed.

Fig. 4 is a partial perspective view showing a left side thereof with the end cover removed.

Fig. 5A is a partial perspective view thereof with the side panel installed but in an open position.

Fig. 5B is an expanded view of the Fig. 5A embodiment.

Fig. 5C is an enlarged view of a portion of the Fig. 5A embodiment.

Detailed Description of the Invention

An evaporator unit embodying the present invention is shown at 11 as being installed with its rear side 12 against a lower portion of the wall, near the floor. Such a system may, as well, be installed with its rear side 12 against the ceiling of a room. For purposes of description, however, the unit 11 will be described as having a front side 13, top 14, a left end 16 and a right end 17, and a bottom 18.

Referring to Fig. 2, the evaporator unit is shown in an exploded view to include all the various components prior to assembly. The sequence and manner of assembly will now be described.

A back panel 21 forms the primary structural component and a portion of the housing of the evaporator unit. An upper closure assembly 22 is secured to the back panel 21 by first engaging an upper edge thereof over an upper edge of the back panel 21 and then securing the two components together with fasteners 23. The left and right internal side assemblies, 24 and 26 are attached to the back panel 21 by fasteners. The fan assembly 27 is then secured

to the lower portion of the back panel 21 by fasteners 28.

The next step in the assembly process is to install the evaporator coil 29 into the housing by placing its ends in the respective left and right internal side assemblies 24 and 26. The evaporator coil 29 is then secured in its installed position by a single screw at each end thereof which passes through the internal side assembly and into a tube sheet at the end of the evaporator coil 29. The evaporator coil 29 is so disposed within the evaporator compartment, which is partially defined by the pack panel 21 and the left and right internal side assemblies 24 and 26. However, it is still necessary to close the ends of the evaporator compartment to prevent the flow of air therethrough. This is accomplished by way of left and right closure elements 31 and 32 which are simply placed in position without fasteners and then are held in place by engagement with the drain pan 33 which further defines the evaporator compartment. The drain pan 33 is secured in place by a fastener in each end to secure the respective left and right internal side assemblies 24 and 26 to the drain pan 33. A drain hose 34 is attached to a drainage element of the drain pan 33. A front panel 36 is then placed over the drain pan 33 and secured in place by fasteners attaching it to both the left and right internal side assemblies 24 and 26 and also to the fan deck portion of the back panel 21.

Returning to the side of the unit, a control box 37 is installed by snap fit into the left internal side assembly 24 and a stepping motor 38 is also secured to the side assembly 24.

The blower compartment, which is partially formed by the lower

portion of the back panel 21 and by the fan assembly 27, has an air intake opening therein. This intake opening is partially closed by way of a grill 39 into which a plurality of filter elements 41 are placed.

The next step is to connect the stepping motor 38 to a horizontal louver mechanism on the upper closure assembly 22 and the horizontal louver 42 is secured at its ends to the left and right internal side assemblies 24 and 26 and, in its intermediate portion, to the upper closure assembly 22. The left and right end covers, 43 and 44, are then secured to the respective left and right internal side assemblies 24 and 26 respectively, to complete the assembly process.

Referring now to Fig. 3, the evaporator unit is shown with its right end 17 being exposed, i.e., with its right end cover being removed to show an internal side assembly 45 with some of the internal components including a refrigerant connection tube 46 which provides fluid communication to the tubes within an internal heat exchanger, and a condensate drainage tube 47 that provides for drainage of condensate from a condensate pan when the unit is installed in an under-ceiling position. Located adjacent the rear side 12 are a pair of spaced main body brackets 48 and 49, near the top 14 and bottom 18 of the unit, respectively. These brackets are provided for securing the right end cover in a manner to be described hereinafter.

Similarly, the left end 16 of the unit is shown in Fig. 4 with its cover being removed to expose an internal side assembly 50 with various components such as the evaporator coil 51 and an electronic control module 52.

Again, main body brackets 53 and 54 are provided adjacent the rear side 12, near the top 14 and bottom 18, respectively.

The right end is again shown at 17 in Fig. 5A, but with the right end cover 44 being mounted to the main body brackets 48 and 49 as shown. In the position shown, the right end cover 44 has been attached to the main body brackets 48 and 49 but the right end cover 44 has not yet been rotated forwardly to the closed position.

The right end cover 44 comprises a rather flat end wall 57 and a side wall 58 extending substantially normally therefrom on all sides of the end wall 57. When in the closed position the edge 59 of the side wall 58 is engaged with the edge 61 of the body and is secured in that position by a single fastener.

Referring to Figs 5B and 5C, the details of the securing brackets are shown in greater detail. The main body bracket 49 includes a female connector 62 which is comprised of a pair of spaced tongues 63 and 64 forming a slot 66 therebetween the tongue 64 which is dispersed near the front side 13 of the unit is slightly longer than the tongue 63 as shown, and the slot 66 extends toward the body and terminates in a pocket 67 which extends substantially normally thereto.

In the sidewall 58 of the right end cover 44 is an end cover bracket 68 which includes opposing walls 69 and 71 extending substantially normally from the side wall 58 and having a post 72 interconnected therebetween. In operation, the post 72 acts as the male connector and is passed through the slot

66 and into the pocket 67 of the main body bracket 49. In Fig. 5B, the two brackets are shown just prior to their being interconnected, and in Fig. 5C, they are shown with the post 72 having been installed in the pocket 67. The identical structure is provided in the upper portion of the unit wherein an end cover bracket is interconnected to the main body bracket 48.

It will therefore be seen that the left and right end covers 43 and 44 may be very easily and quickly installed on or removed from the unit with only a single fastener then being used to secure each of the covers in place after they have been rotated to the closed position.

CLAIMS

1. An evaporator unit for an air conditioning system, comprising:

a main body having various components contained therein and having at least one open end which allows access to at least some of the components, said at least one open end having a rear edge and a front edge;

a pair of mounting brackets attached to and extending outwardly from near said rear edge; and

a cover having a shape which generally conforms to the shape of said at least one main body open end, said cover having front and rear edges and a pair of cover brackets attached and extending outwardly from near said rear edge, said cover brackets being supportably attached to said mounting brackets; and

attachment means for attaching said front edge of said side panel to a front edge of said main body.

2. An evaporator unit as set forth in claim 1 wherein said mounting brackets and said cover brackets are integrally formed with said main body and said cover, respectively.

3. An evaporator unit as set forth in claim 1 wherein said mounting brackets are formed in a female configuration and said cover brackets are formed in a male configuration, with the cover brackets being interconnected to said mounting brackets by way of a male-female connection.

4. An evaporator unit as set forth in claim 3 wherein said cover brackets are hingeably connected to said mounting brackets.

5. An evaporator unit as set forth in claim 1 wherein said cover brackets are interconnected with said mounting brackets by way of a snap fit.

6. An evaporator unit as set forth in claim 5 wherein said mounting brackets each comprise a pair of fingers which define an entry slot between their opposing open ends and an enlarged pocket near their rear ends thereof, and further wherein said cover brackets each have a mating member which snaps through the entry slot and into said pocket.

7. An evaporator unit as set forth in claim 1 wherein said attachment means comprises a single fastener.

8. An evaporator unit as set forth in claim 7 wherein of said fastener passes first through a portion of said body and then into said side panel.

9. An evaporator unit as set forth in claim 1 wherein said body includes an internal side assembly which partially closes said body open end.

10. An evaporator unit for an air conditioning system of the type having a main body with front and rear sides, a top, and bottom, all forming a housing for containing components therein, said housing having partially open ends for allowing access to a portion of the components, comprising:

a pair of end covers with each being attachable to one of said open

ends, said end covers each having an end wall and a side wall extending thereround and being sized such that they correspond to the size and shape of said open end;

at least one body bracket attached to and extending from the main body;

at least one cover bracket attached to and extending from said end cover;

wherein said body brackets and said cover bracket are interconnected by a male/female connection to removably mount said cover to said body.

11. An evaporator unit as set forth in claim 10 wherein said body bracket is formed in a female configuration and said cover bracket is formed in a male configuration.

12. An evaporator unit as set forth in claim 10 wherein said body brackets and said cover brackets are integrally formed with said main body and said cover, respectively.

13. An evaporator unit as set forth in claim 10 wherein said cover brackets are hingeably connected to said body brackets.

14. An evaporator unit as set forth in claim 10 wherein said cover brackets are interconnected with said body brackets by way of a snap fit.

15. An evaporator unit as set forth in claim 11 wherein said body

brackets each comprise a pair of fingers which define an entry slot between their opposing open ends and an enlarged pocket near the rear ends thereof, and further wherein said cover brackets each have a mating member which snaps through the entry slot and into said pocket.

16. An evaporator unit as set forth in claim 10 wherein said body brackets and said cover brackets are located near the rear wall of the unit and further wherein there is included an attachment means for securing said cover to said body at a location near the front side of the unit.

17. An evaporator unit as set forth in claim 16 wherein said attachment means comprises a fastener which passes first through a portion of said body and then into said side panel.

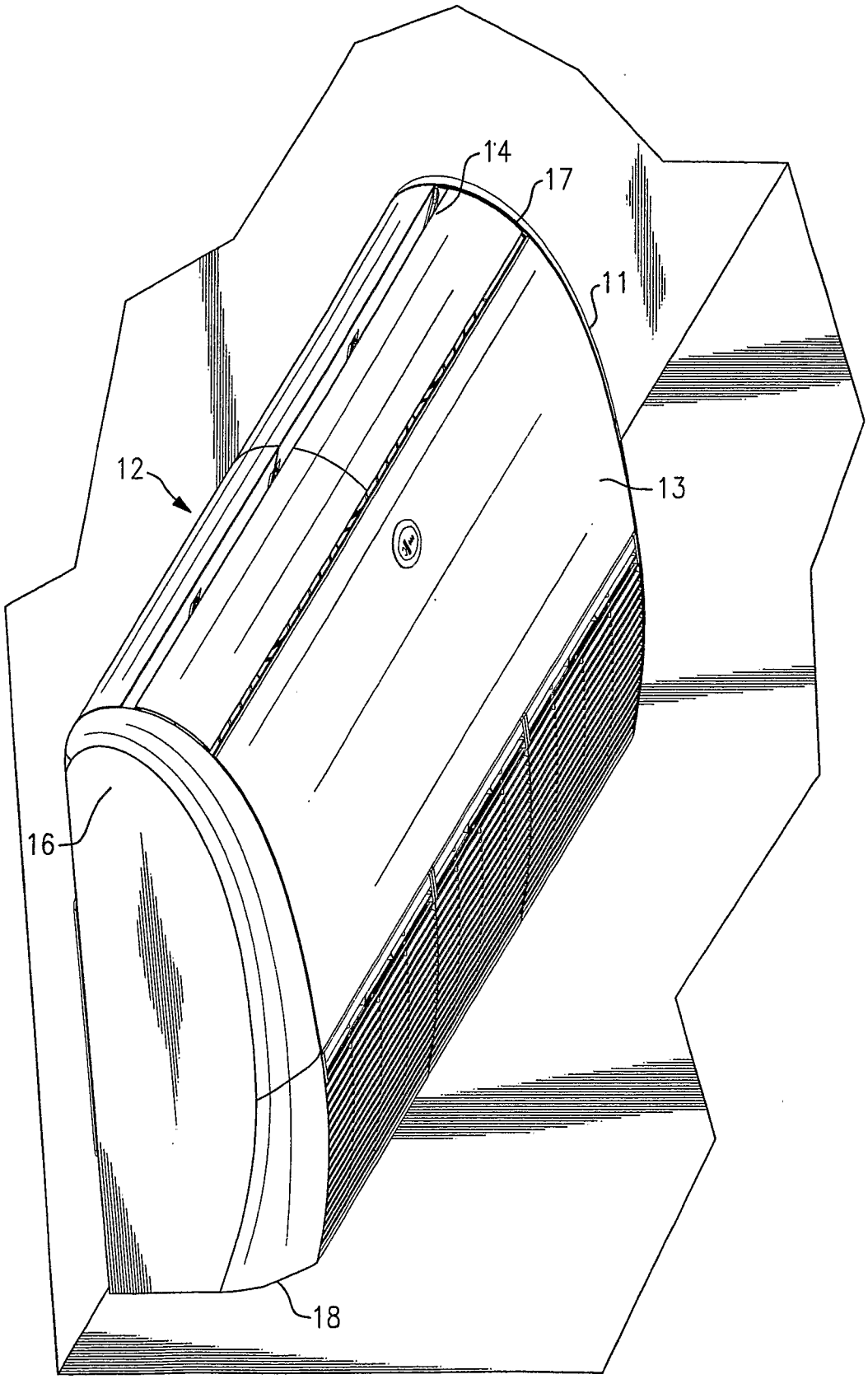

FIG.1

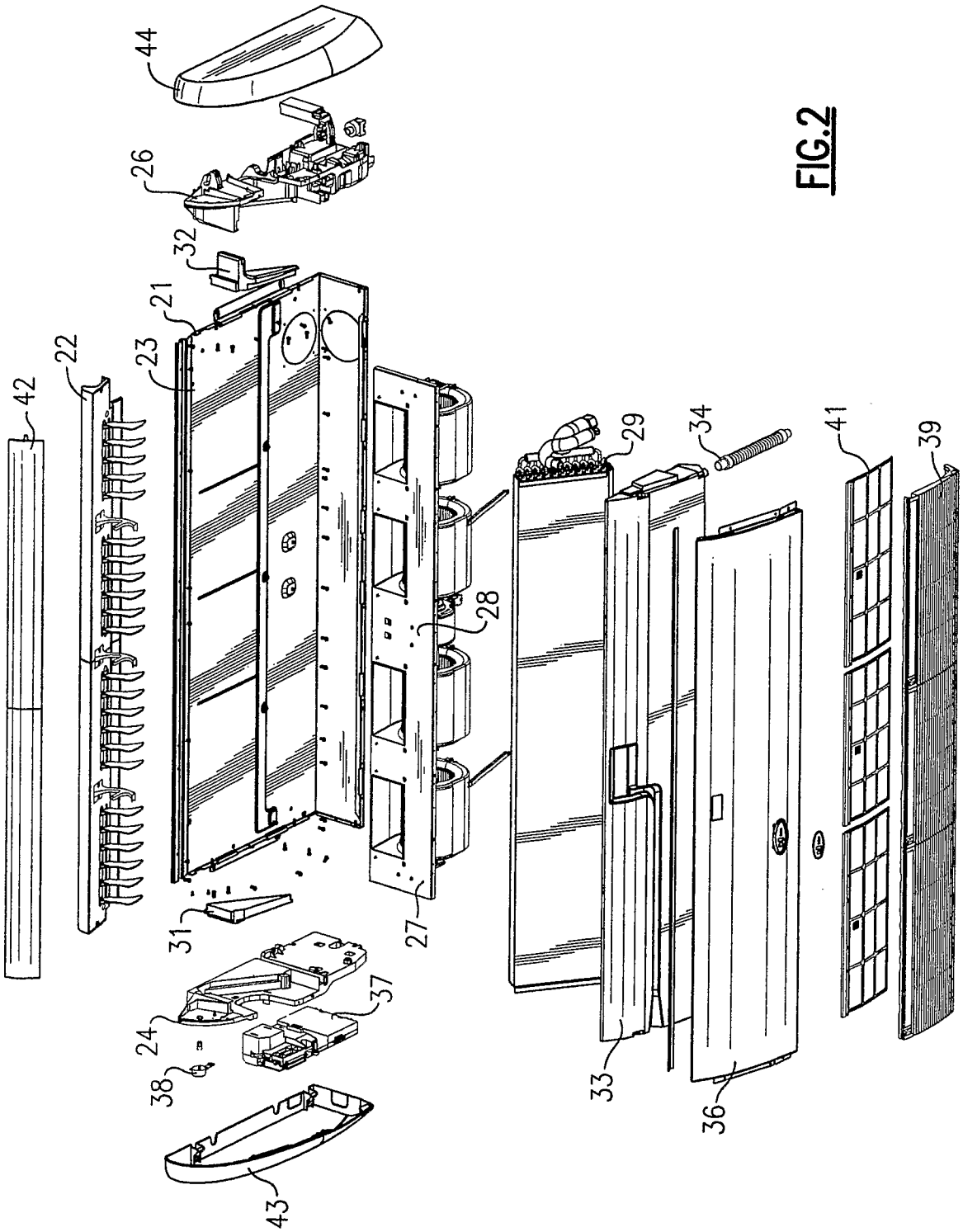

FIG.2

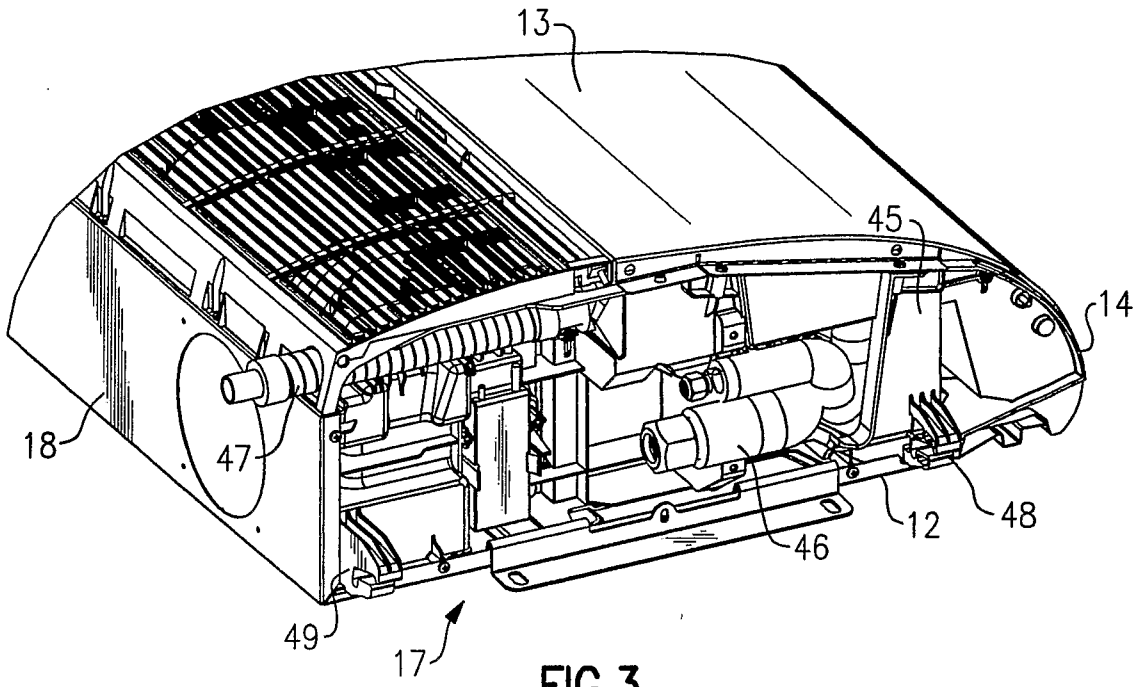

FIG.3

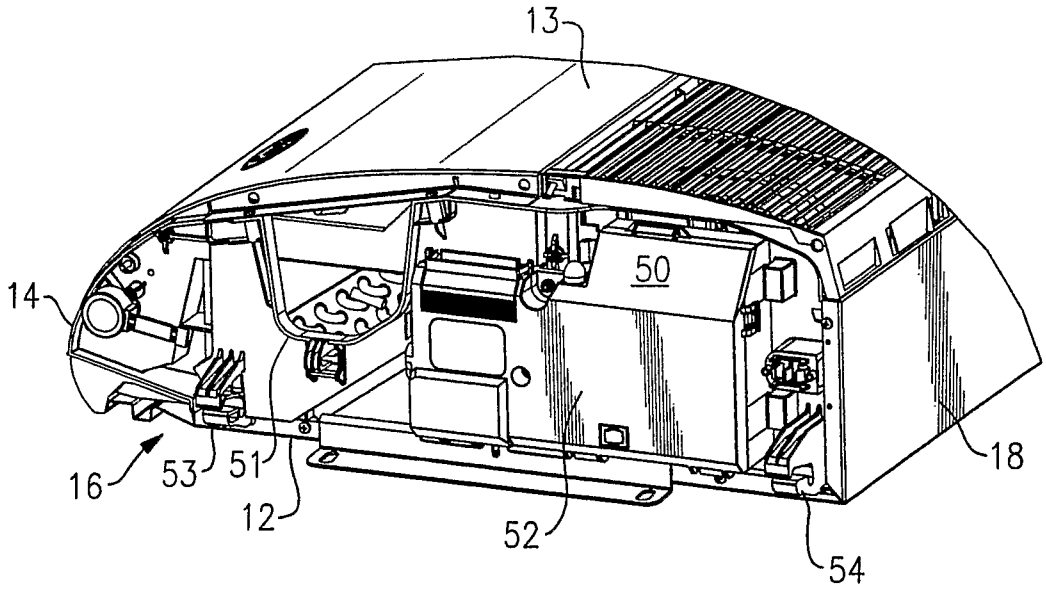

FIG.4

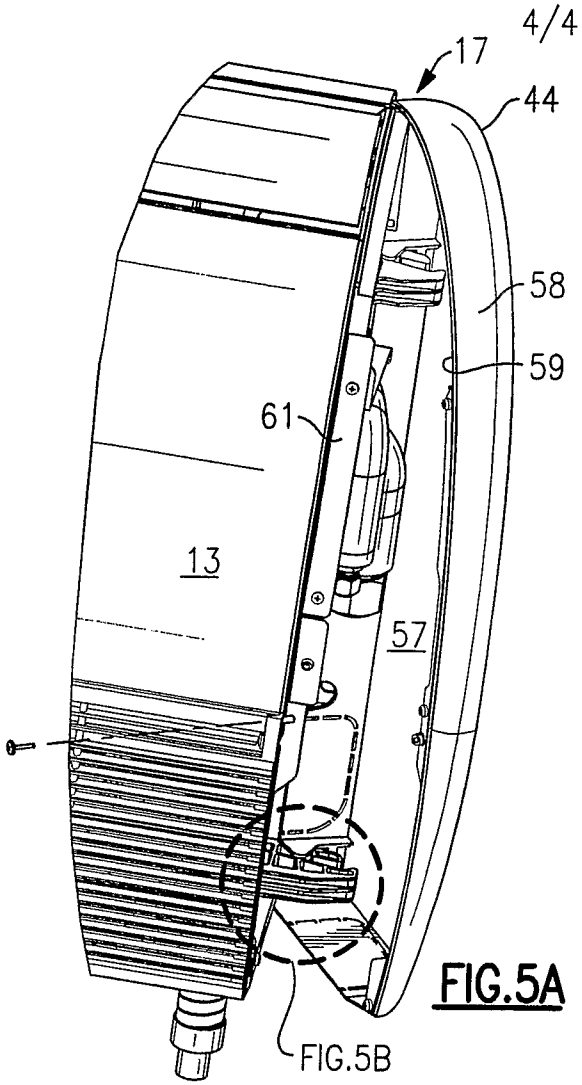

FIG.5A

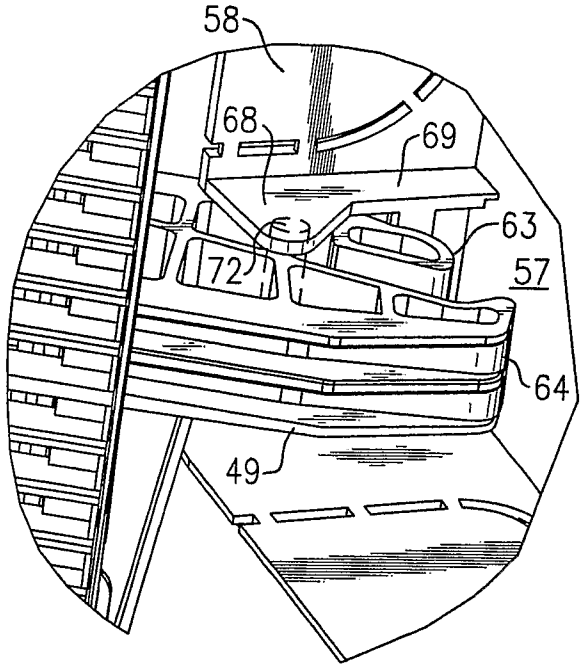

FIG.5C

FIG.5B

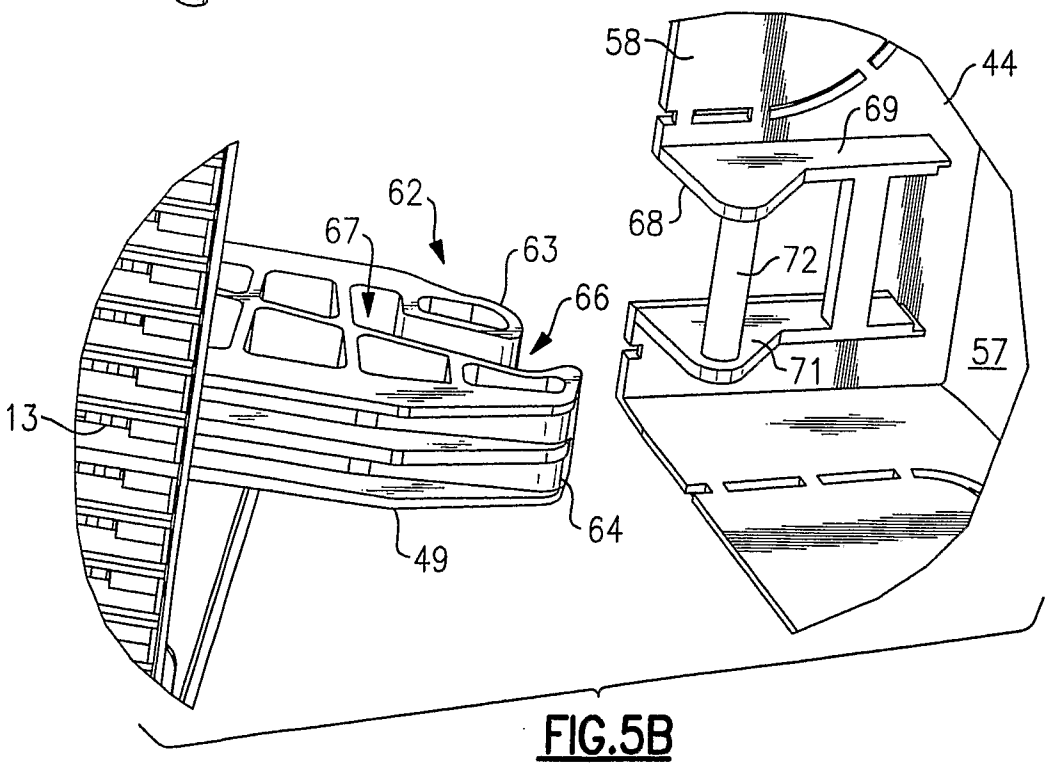

FIG.5B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR05/00147

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8): **F25D 23/12, 19/00; F25B 39/02;B60S 1/54; B60H 1/02**

USPC: 62/262,297,298,515,516,517,518;454/121,160,161
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)
U.S. : 62/262,297,298,515,516,517,518;454/121,160,161

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)
Search electronically by using search engine EAST.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,330,807 B1 (CORREA et al) 18 December 2001, see the entire document.	1-17
A	US 3,905,789 A (CARPENTER) 16 September 1975, see the entire document.	1-17
A	US 6,318,104 B1 (MORAES et al) 20 November 2001, see the entire document.	1-17
A	US 6,324,859 B1 (TESCHE et al) 04 December 2001, see the entire document.	1-17
A	US 5,761,037 A (ANDERSON et al) 02 June 1998, see the entire document.	1-17

☐ 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
13 March 2006 (13.03.2006)	31 MAR 2006
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Form PCT/ISA/210 (second sheet) (April 2005)