



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 424 614 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **90113928.7**

(51) Int. Cl.⁵: **F24F 5/00, F24F 1/02**

(22) Date of filing: **20.07.90**

The title of the invention has been amended
(Guidelines for Examination in the EPO, A-III,
7.3).

(30) Priority: **25.09.89 IT 2181289**

(43) Date of publication of application:
02.05.91 Bulletin 91/18

(54) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **DELCHI/CARRIER S.P.A.**
Via R. Sanzio, 9
I-20058 Villasanta (Milan)(IT)

(72) Inventor: **Colombo, Guglielmo**
Via Roma, 54
I-22064 Casatenovo, Como(IT)

(74) Representative: **Checcacci, Giorgio et al**
Jacobacci, Casetta & Perani Via Visconti di
Modrone, 7
I-20122 Milano(IT)

(54) **Airconditioning unit.**

(57) This air conditioning unit (1) comprises a case (2), a heat exchanger (11) housed within the case (2), a compressor (9) mounted beside the heat exchanger (11) within the case (2) and enclosed in a compartment (18) separated from the air flow, air intake ports (7) formed on two contiguous sides (3,4) of the case (2), and air discharge ports (8) formed on an opposite side (6) of the case (2) from one (4) of the sides formed with air intake ports (7).

The heat exchanger (11) is essentially U-shaped, it having three sides (12,13,14) of which two (12,13) lie adjacent to respective sides (3,4) of the case (2) at the air intake ports (7), and the third (14) is facing a chamber (16) open to the air intake ports (7).

By this invention, the advantage of a three-sided (12, 13, 14) heat exchanger (11) is obtained even where one of the case sides (3, 4, 5 and 6) is made inaccessible by the presence of the compressor (9).

EP 0 424 614 A1

This invention relates to an air conditioning unit incorporating a heat exchanger and a compressor enclosed in a separated compartment from the air flow.

Of air-conditioning sets, those made up of separate units have met with widespread acceptance and comprise an outdoor unit with a heat exchanger which serves as a condenser (or evaporator when arranged for heat pump operation), and an indoor unit having a heat exchanger which serves as an evaporator (or condenser for heat pump operation). One of the two units also accommodates a compressor; both units are usually equipped with fan means for forcing the air flow through the heat exchangers.

A basic requirement of these air conditioning units is that the highest capacity for heat exchange be combined with minimal space requirements.

One of the approaches adopted to that aim is that of maximizing the size of the heat exchanger. Thus, two- or three-sided heat exchangers have been used wherein each side lies adjacent to a respective side of the outer case at air intake ports thereof.

The technical problem that underlies this invention is to maximize heat exchange in an air conditioning unit which comprises a compressor beside the heat exchanger, enclosed within a separated compartment from the air flow.

This problem is solved, according to the invention, by an air conditioning unit comprising a case, a heat exchanger housed within the case, a compressor mounted beside the heat exchanger within the case, air intake ports formed on two adjacent sides of the case, air discharge ports formed on a case side lying opposite from one of the sides formed with air intake ports, characterized in that said heat exchanger is essentially U-shaped and has three sides of which two are adjacent to respective sides of the case at said air intake ports, the third side facing a chamber which is open to said air intake ports.

By this invention, it becomes possible to provide the advantage of a three-sided heat exchanger even if one of the case sides is made inaccessible by the presence of the compressor.

Further features and advantages of an air conditioning unit according to the invention will be more clearly appreciated from the following detailed description of a preferred embodiment thereof, given with reference to the accompanying drawing, the one figure whereof shows it in cross section.

In the drawing figure, generally shown at 1 is an air conditioning unit which comprises an outer case 2 of substantially parallelepipedic shape having four sides 3, 4, 5 and 6. The sides 3 and 4 are formed with air intake ports 7 to the case 2, and

the side 6 is formed with air discharge ports 8 from the case 2.

Housed within the case 2 are a compressor 9 adjacent to side 5, at least one fan 10 adjacent to side 6 at the ports 8, and a heat exchanger 11.

The heat exchanger 11 is essentially U-shaped, it having three sides of which two contiguous sides, 12 and 13, lie adjacent to the sides, respectively 3 and 4, of the case 2 at the air intake ports 7; the third side, 14, of the heat exchanger 11 faces the compressor 9.

Provided within the case 2 is also a partition 15 between the compressor 9 and the side 14 of the heat exchanger 11, which extends between the side 4 and the side 6 of the container 2; there are thus defined both a chamber 16 between the partition 15, the side 14 of the heat exchanger 11, and a portion 17 of the side 4 of the container 2, and a compartment 18 wherein the compressor 9 is enclosed and held separate from the air flow.

In operation, air admitted into the case 2 via the air intake ports 7 is flown through the heat exchanger 11; specifically, the side 12 is swept by air incoming directly through the ports 7 in the side 3 of the case 2, the side 13 is swept by air incoming directly through the ports 7 in the side 4 of the container 2, and the side 14 is swept by air from the chamber 16 whereinto it has been admitted through the ports 7 in the portion 17 of the side 4 of the container 2. All the air, after flowing through the heat exchanger 11, will exit from the ports 8 in the side 6.

To further enhance the rate of heat exchange, the heat exchanger 11 may be provided with an additional tier 19 at one of its sides, preferably its major side 13.

Claims

1. An air conditioning unit (1) comprising a case (2), a heat exchanger (11) housed within the case (2), a compressor (9) mounted beside the heat exchanger (11) within the case (2) and enclosed in a compartment (18) separated from the air flow, air intake ports (7) formed on two contiguous sides (3,4) of the case (2), air discharge ports (8) formed on a case (2) side (6) lying opposite from one (4) of the sides formed with air intake ports (7), characterized in that said heat exchanger (11) is essentially U-shaped and has three sides (12,13,14) of which two (12,13) are adjacent to respective sides (3,4) of the case (2) at said air intake ports (7), the third side (14) facing a chamber (16) which is open to said air intake ports (7).

2. An air conditioning unit (1) according to Claim 1, characterized in that it comprises a partition (15) between the third side (14) of the heat exchanger

(11) and the compressor (9), extending from the case (2) side (6) formed with the air discharge ports (8) to the opposite side (4) of the case (2), said partition (15) defining both said chamber (16) in cooperation with the third side (14) of the heat exchanger (11) and the compartment (18) wherein the compressor (9) is contained separate from the air flow.

3. An air conditioning unit (1) according to Claim 2, characterized in that said heat exchanger (11) is provided with an additional tier (19) at one (13) of its sides.

5

10

15

20

25

30

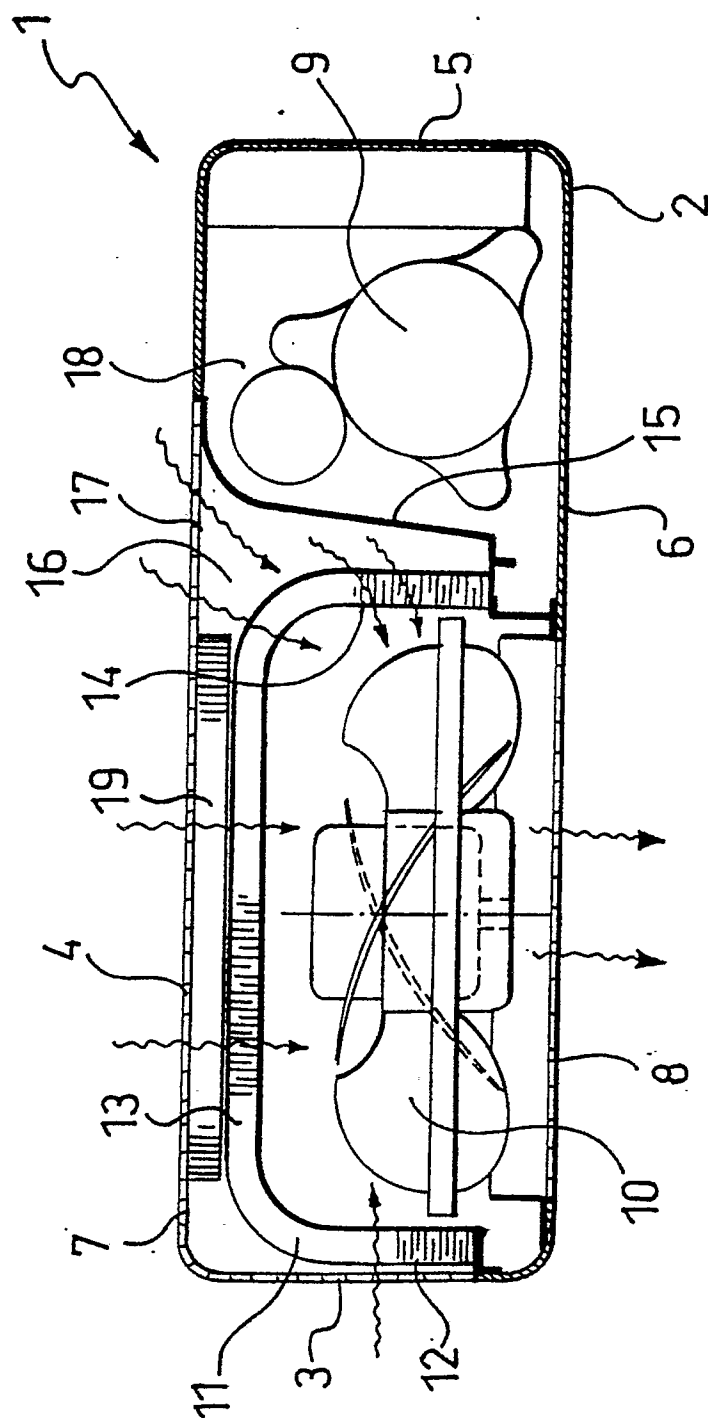
35

40

45

50

55





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90113928.7
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	<u>GB - A - 2 199 936</u> (MATSUSHITA) * Abstract; fig. 1,2; claims 1-5 *	1	F 24 F 5/00 F 24 F 1/02
Y	<u>FR - A1 - 2 544 470</u> (HIROSS) * Abstract; fig. 2-4; claims *	1	
A	--	2	
Y	<u>DD - A1 - 271 561</u> (VEB-MANSFELD) * Abstract; fig. 2; claim 1 *	1	
A	<u>US - A - 3 756 039</u> (RIELLO) * Fig. 2,6; abstract; claims *	1-3	
A	<u>AT - B - 312 876</u> (RIELLO) * Fig. 1; claim *	1-3	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	<u>FR - A3 - 2 601 757</u> (DELCHI) * Abstract; claims; fig. 1-3 *	1	F 24 F F 28 F
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 14-12-1990	Examiner LANG
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			