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EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.06.1998 Bulletin 1998/26

(51) Int. Cl.⁶: F24F 1/00, F24F 13/078,
F24F 13/22

(21) Application number: 97121845.8

(22) Date of filing: 11.12.1997

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 20.12.1996 IT MI962699

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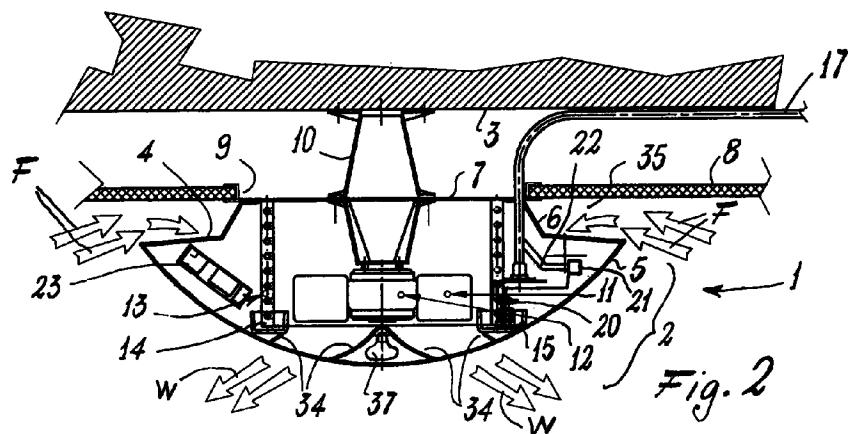
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(54) **Room air conditioning device comprising an evaporator unit and a separate condenser unit, the evaporator unit being provided with a large entry surface for the air to be conditioned**

(57) A room air conditioning device comprises an evaporator unit (1) and a separate condenser unit, the evaporator unit (1) being associated with a wall (3), preferably the ceiling, of a room to be air conditioned, said unit (1) comprising a structure (2) containing an evaporator bank (13) and a motor-driven fan (12). The struc-

ture (2) comprises an annular entry surface (27) for the air to be conditioned, and an annular surface (28) for the exit of the conditioned air into the room. The device is advantageously provided with lighting means (37) and does not necessarily require a false ceiling (8).



Description

This invention relates to a room air conditioning device in accordance with the introduction to the main claim.

Devices of the aforesaid type have been known for some time, comprising an evaporator unit positioned within a room to be air conditioned and connected to a condenser unit positioned external to that room. The evaporator unit is usually associated with a wall of the room and comprises a structure having a plurality of flat surfaces. Such an evaporator unit is generally positioned in proximity to the room ceiling and has that flat surface facing the ceiling provided with an inlet (or suction surface) for the air drawn into said structure by a fan. The inlet air passes over an evaporator bank and is expelled from the structure via a further surface. Expulsion takes place via an outlet (or delivery surface) positioned generally in a plane perpendicular to the room to be air conditioned.

These known arrangements have various drawbacks. Mainly, they do not offer uniform distribution of the treated air within the room as the air delivery surface is located only on one side of the evaporator unit 4.

Other arrangements are known, called cassettes, which can distribute the air through four outlets, but have to be inserted into a false ceiling.

An object of this invention is to provide an improved room air conditioning device comprising an evaporator unit and a separate condenser unit.

A particular object of the invention is to provide a device of the stated type in which the evaporator unit is able to distribute the treated air in an optimum manner throughout the room.

A further object is to provide a device of the stated type in which the evaporator unit is able to support and internally contain lighting means for the room to be air conditioned.

These and further objects are attained by a device in accordance with the accompanying claims.

The invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and on which:

Figure 1 is a front view of the evaporator unit of the device according to the invention;

Figure 2 is a section on the line 2-2 of Figure 1; and Figure 3 is a view from the rear of the evaporator unit of Figure 1.

With reference to said figures, the device of the invention comprises an evaporator unit 1 positioned within a room to be air conditioned (or in which a certain temperature is to be maintained at a controlled humidity) and connected to a known condenser unit (not shown) positioned outside the room. The unit 1 comprises a structure 2, which is substantially hemispherical in the example, associated with a ceiling 3 of said

room such as to be at least partly external to the ceiling and visible within the room. The structure 2 comprises a wall 4 facing the ceiling 3 and, in the example, a curved wall 5 rigid with the wall 4. From the first surface 4 there extends an inclined annular wall 6 associated with a flat wall 7 lying parallel to the ceiling 3. This latter wall can be either in contact with the ceiling or be positioned in correspondence with a false ceiling 8 (as in Figure 2) provided with an aperture 9 through which a support element 10 for the structure 2 is positioned and is fixed to the ceiling 3 in any known manner.

The structure 2 contains a fan associated with its own motor 12 connected to the said element 10. The fan 11 and the motor 12 are positioned coaxially with a cylindrical evaporator bank 13, at one end of which there is provided an annular tray 15 for collecting the condensed water which forms on the bank 13. This latter is connected to the condenser unit via usual pipes 17 which, in Figure 2, are positioned between the ceiling 3 and the false ceiling 8. If this latter is not provided, the pipes 17 are inserted into a suitable channel (not shown) associated with the ceiling 3.

Within the tray 15 there is a usual float 20 connected to a usual pumping member 21 from which there extends a conduit 22 positioned parallel to said pipes 17, it being also associated with the ceiling 3 and connected to the condenser unit.

The pumping unit 21 draws water from the tray 15 when the water level within it exceeds a determined fixed value. The operation of the evaporator unit (to maintain a temperature and humidity fixed by the user) is controlled by a control unit 23 which measures the temperature and humidity of the room in which the unit 1 is positioned, by means of known sensors (not shown) connected to said unit.

On the wall 4 there is provided an annular surface 27 (provided with usual filters, not shown) for air entry into the structure 2 of the evaporator unit 1, on the wall 5 there being provided an annular surface 28 for the exit of air (treated by the unit 1) into the room. More specifically, the annular surface 27 can either comprise a single port for air entry into the structure 2 of the unit 1 or, as in the figures, comprise a plurality of ports 30 arranged annularly. The ports 30 can be of variable number and may occupy only a part of the surface 27.

Likewise, the air exit surface 28 comprises one or more ports 33 (as in the figures) through which the air treated in the unit 1 passes into the room in which this latter is located. Within the unit structure 2 there are positioned a plurality of fixed walls 34 arranged to direct the air moved by the fan 11 towards the ports 33. Usual deflectors (not shown) are provided in correspondence with these latter. In a like manner, the wall 6 defines, together with the ceiling 3 or false ceiling 8, an annular guide corridor 35 for the air drawn into the structure 11 by the fan positioned within this structure. The wall 6 acts as a conveyor for conveying the air into the structure.

Additionally, in the wall 5 there is provided a recess 36 between the walls 34, to house an electric lamp 37 connected to an electricity supply in known manner (for example via the electrical line which powers the motor 12). In this manner the unit 1 can also be used as a light fitting and be positioned on a ceiling or false ceiling of the air conditioned room to also light it.

During use, the air drawn by the fan 11 penetrates into the structure 2 through the corridor 35 and the ports 30 (arrows F of Figure 2), ie through the top of the structure. This air passes through the evaporator bank 13 to become dehumidified and cooled, and is expelled from the structure 2 through the ports 33 (arrows W of Figure 2), ie from the bottom of the structure. Because of the form of the air entry (or suction) surface 27 and the air exit surface 28, air distribution within the room is substantially uniform in all directions. Moreover the device 1 can be associated either with the ceiling 3 or with a false ceiling 8. However the device does not necessarily require the false ceiling for its fixing to the ceiling itself.

One embodiment of the invention has been described. Others are however possible. For example the structure 2 can be cylindrical with the surface 27 provided in its lateral wall, and the surface 28 provided for example in a flat surface parallel to that which faces the wall to which the evaporator unit is fixed. Additionally, if the structure 2 is fixed to a false ceiling, external air can be drawn through the false ceiling to penetrate into the structure 2 through the wall 7, which in this case is provided with air entry ports.

These embodiments are also to be considered as falling within the scope of this invention.

Claims

1. A room air conditioning device comprising an evaporator unit (1) and a separate condenser unit, the evaporator unit (1) being associated with a wall (3), preferably the ceiling, of a room to be air conditioned, said unit (1) comprising a structure (2) containing an evaporator bank (13) and a motor-driven fan (12), characterised in that the structure (2) is at least partly external to said wall (3) and comprises an annular entry surface (27) for the air to be conditioned, and an annular surface (28) for the exit of the conditioned air into the room, said surfaces (27, 28) being arranged such that the air flow within the room is from the top downwards.
2. A device as claimed in claim 1, characterised in that the annular air entry surface (27) comprises one or more ports associated with the structure (2) of the evaporator unit (1).
3. A device as claimed in claim 1, characterised in that the annular air exit surface (28) comprises one or more ports (33) associated with the structure (2) of the evaporator unit.

4. A device as claimed in claim 1, characterised by comprising means (6) for conveying the air towards the annular surface (28) through which air enters the structure (2) of the evaporator unit.
5. A device as claimed in claim 4, characterised in that the conveying means are an annular wall (6) of the evaporator unit structure (2) associated with a wall (4) of the evaporator unit in which the air entry surface (27) is provided, said wall (6) spacing the structure (2) of the unit (1) from that wall (3, 8) of the room to be air conditioned to which the structure (2) is fixed and towards which the air entry surface (27) faces, between this latter and said wall (3, 8) there being defined a corridor (35) through which the room air is drawn by the motor-driven fan (12) into the evaporator unit (1).
6. A device as claimed in claim 1, characterised by comprising, in correspondence with the exit ports (33), deflector means (34) arranged to direct the conditioned air into the room.
7. A device as claimed in claim 1, characterised in that a seat (36) for a lighting member (37) is provided in that wall (5) of the structure (2) of the evaporator unit (1) in which the air exit surface (28) is present.
8. A device as claimed in claim 1, characterised in that the evaporator bank (13) is cylindrical.
9. A device as claimed in claim 8, characterised by comprising means (15) for collecting the condensed water formed on the evaporator bank (13).
10. A device as claimed in claim 9, characterised by comprising means (21) for removing the condensed water from the collection means (15).

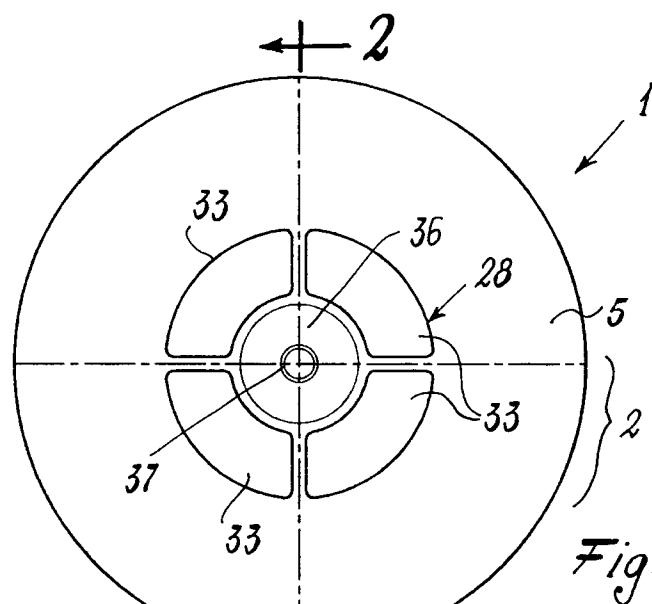


Fig. 1

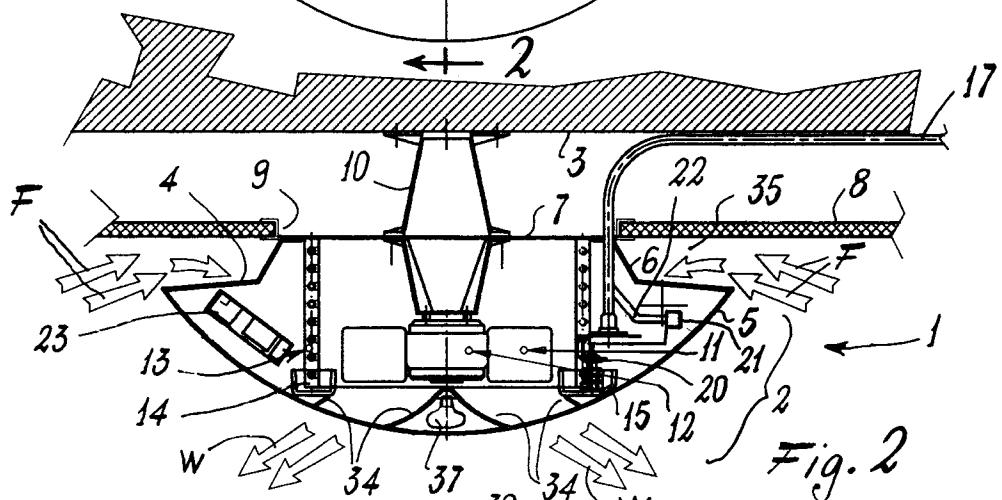


Fig. 2

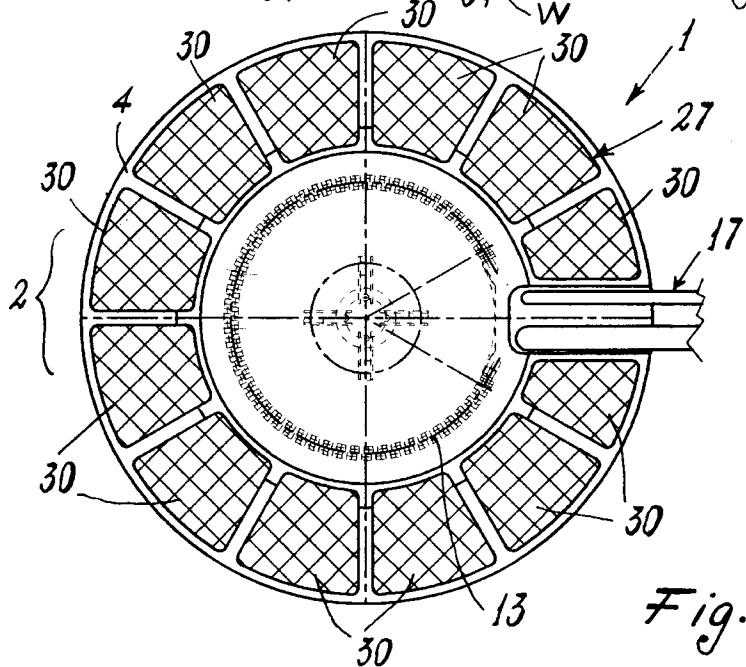


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
Y	DE 19512275 A (GEA-HAPPEL KLIMATECHNIK GMBH) 19 September 1996 (19.09.96), the whole document. --	1-10	F 24 F 1/00 F 24 F 13/078 F 24 F 13/22						
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Y	EP 0503458 A2 (SCHAKO METALLWARENFABRIK FERDINAND SCHAD KG) 16 September 1992 (16.09.92), the whole document. --	7							
Y	EP 0442028 A1 (DELCHI/CARRIER S.P.A.) 21 August 1991 (21.08.91), the whole document. --	9, 10							
A	Patent Abstracts of Japan, Vol.10, No. 273 (M-518), 17 September 1986; & JP 61-96339 A (SANYO ELECTRIC CO LTD), 15 May 1986, abstract, fig. ----	1-10	F 24 F						
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>VIENNA</td> <td>17-04-1998</td> <td>LOSENICKY</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	VIENNA	17-04-1998	LOSENICKY
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CATEGORY OF CITED DOCUMENTS		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							
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