



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.05.2013 Bulletin 2013/18

(51) Int Cl.:
F24F 13/06 (2006.01) F24F 13/20 (2006.01)

(21) Application number: **12190538.4**

(22) Date of filing: **30.10.2012**

(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
Designated Extension States:
BA ME

(71) Applicant: **Emerson Network Power S.R.L.**
35028 Piove di Sacco (PD) (IT)

(72) Inventor: **Ranzato, Alberto**
35020 Legnaro PD (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Via Meravigli 16
20123 Milano (IT)

(30) Priority: **31.10.2011 IT PD20110344**

(54) **Upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air**

(57) An upper air flow module (10) for industrial climate control machines which are provided with a function for cooling by introducing external air, comprising a box-like framework (15) which has a lower opening (16) for the passage of air toward an underlying cabinet of a climate control machine, two opposite air intakes, a front one (17) and a rear one (18), and an upper air intake

(19); the front air intake (17), the rear air intake (18) and the upper air intake (19) have the same size and are preset so that each one can be provided with one of the three following components:
- two motorized shutters (20, 21) for controlling the flow of air,
- a closing panel (22).

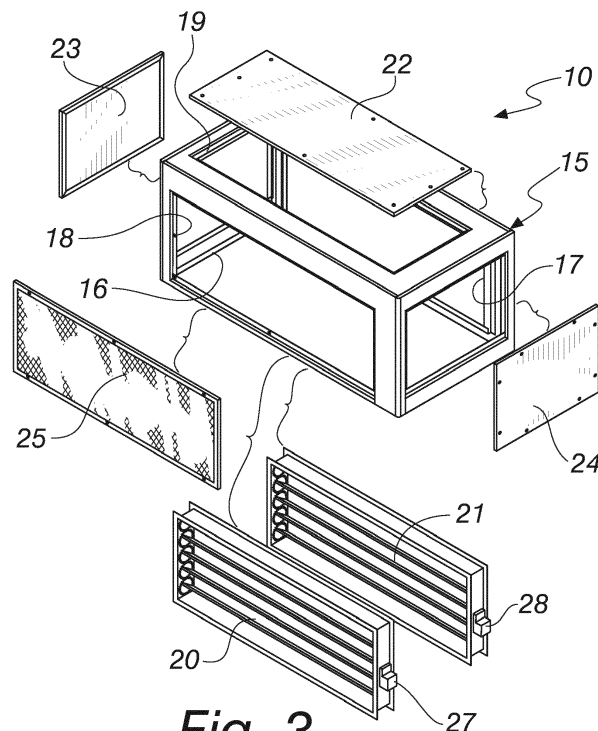


Fig. 3

Description

[0001] The present invention relates to an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air.

[0002] Nowadays a generic industrial climate control machine with a function for cooling by introducing external air, known as a 'free cooling' function, comprises a cabinet inside which there are heat exchange means, proximate to which there are one or more fans adapted to aspirate air

- from a first shutter for the inflow of air that arrives from the internal environment,
- or from a second shutter for the inflow of air that arrives from the outside for what is called a "free cooling" function by introducing external air,
- or from both of the shutters.

[0003] For climate control machines adapted to send treated air below a raised floor, the fans are placed below the heat exchange means, and the heat exchange means extend, and are arranged, diagonally upward from below within the cabinet.

[0004] In such machines the entry of external air can occur from the back or from the upper part of the machine, provided with what is known as a 'plenum space' i.e. a box-like body mounted on top of the cabinet and open toward the inside thereof.

[0005] Similarly, the intake of air from the internal environment can occur from the plenum space or from the front of the cabinet.

[0006] The upper plenum space can have two motorized shutters, one for the inflow of external air and one for the inflow of internal air.

[0007] Nowadays each different climate control machine needs the fine-tuning of a specific, dedicated plenum space, with shutters arranged in a preset and definitive manner according to the design specifications of the machine itself.

[0008] This implies that a same plenum space cannot be used for a different machine or for a different use condition from the one specified in the original design.

[0009] The aim of the present invention is to provide an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air, which is capable of overcoming the above-mentioned limitations of the known art.

[0010] Within this aim, an object of the invention is to provide an upper module that is easily adaptable to a plurality of different types of climate control machines.

[0011] Another object of the invention is to provide an upper module which can be installed in the configuration for use at the last moment before mounting on the climate control machine with which it is intended to be used.

[0012] Another object of the invention is to provide an upper module the portions of which are easily removable

and mountable on site with conventional tools.

[0013] Another object of the invention is to provide an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air, which can be produced using known systems and technologies.

[0014] This aim and these and other objects which will become more evident hereinafter are achieved by an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air, said climate control machines comprising a cabinet which contains internally heat exchange means, and fans below said cabinet which are adapted to propel air into the space below a raised floor, said upper module being **characterized in that** it comprises a boxlike framework which has a lower opening for the passage of air toward an underlying cabinet, two opposite lateral air intakes and an upper air intake, said lateral air intakes and said upper air intake having the same size and being preset so that each one can be provided with one of the three following components:

- two motorized shutters for controlling the flow of air,
- a closing panel.

[0015] Further characteristics and advantages of the invention will become more apparent from the description of a preferred, but not exclusive, embodiment of the upper module according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a perspective view of a climate control machine provided with an upper module according to the invention;

Figure 2 is a perspective view of the upper module according to the invention;

Figure 3 is an exploded perspective view of the upper module according to the invention;

Figure 4 shows a detail of construction of the module according to the invention;

Figures 5 to 7 each schematically show a different type of assemblage of the module according to the invention.

[0016] With reference to the figures, an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air, according to the invention, is generally designated with the reference numeral 10.

[0017] A generic climate control machine is designated with 11 and comprises a cabinet 12 which contains internally heat exchange means, not shown for the sake of simplicity and understood to be conventional, and fans 13 below the cabinet 12, shown in dotted lines in Figure 1, which are adapted to propel air into the space below a raised floor 14.

[0018] The upper module 10 according to the invention

comprises a boxlike framework 15 which has a lower opening 16, clearly visible in Figure 3, for the flow of air toward the underlying cabinet 12.

[0019] The boxlike framework 15 also has two opposite openings, a front one and a rear one, 17 and 18, and an upper opening 19, such three openings 17, 18 and 19 being adapted for the intake of air.

[0020] The lateral air intakes 17 and 18 and the upper air intake 19 have the same size and are each adapted to be provided with one of the three following components:

- two motorized shutters 20 and 21 for controlling the flow of air,
- a closing panel 22.

[0021] The upper module 10 is completed by two lateral closing panels 23 and 24, which can be removed for inspection, and by a grille-like panel 25 which is to be arranged outside the shutter 20 or 21 and is preselected for aspirating internal air.

[0022] The fixing of the closing panels 22, 23 and 24 and of the shutters 20 and 21, as well as of the grille-like panel 25 occurs by way of screws, or other similar removable coupling elements, which are easily handled with conventional tools.

[0023] Figure 4 shows an example of using a screw 26 to fix the shutter 20 to the framework 15.

[0024] The shutters 20 and 21 are each managed by way of a self-contained servo-controlled motor 27 and 28 respectively, shown in Figure 3.

[0025] Each of Figures 5 to 7 shows a different exemplary configuration of the numerous possible configurations of the upper module 10.

[0026] For clarity, a front side F and a rear side P of the climate control machine 11 are distinguished.

[0027] In Figure 5 the module 10 is arranged to aspirate internal air AI from the front side F, where the shutter 21 is also provided with the grille-like panel 25, while the external air AE is passed from the second shutter 20 arranged on the rear side of the module 10.

[0028] In Figure 6, the shutter 20 for external air AE is arranged at the upper intake 19.

[0029] In Figure 7 it is the shutter 21 for internal air AI that is positioned at the upper intake 19.

[0030] The other possible configurations are not shown for the sake of simplicity, but are understood to be covered by the scope of the invention.

[0031] In practice it has been found that the invention fully achieves the intended aim and objects.

[0032] In particular, with the invention an upper module is provided which is easily adaptable to a plurality of different types of climate control machines.

[0033] What is more, with the invention an upper module is provided which can be installed in the configuration for use at the last moment before mounting on the climate control machine with which it is intended to be used.

[0034] Moreover, with the invention an upper module

is provided the portions of which, i.e. shutters and panels, are easily removable and mountable on site with conventional tools.

[0035] In addition, with the invention an upper air flow module for industrial climate control machines which are provided with a function for cooling by introducing external air is provided which can be produced using known systems and technologies.

[0036] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0037] In practice the materials employed, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

[0038] The disclosures in Italian Patent Application No. PD2011A000344 from which this application claims priority are incorporated herein by reference.

[0039] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. An upper air flow module (10) for industrial climate control machines which are provided with a function for cooling by introducing external air, said climate control machines (11) comprising a cabinet (12) which contains internally heat exchange means, and fans (13) below said cabinet which are adapted to propel air into the space below a raised floor (14), said upper module (10) being **characterized in that** it comprises a boxlike framework (15) which has a lower opening (16) for the passage of air toward an underlying cabinet, two opposite air intakes, a front one (17) and a rear one (18), and an upper air intake (19), said front air intake (17), said rear air intake (18) and said upper air intake (19) having the same size and being preset so that each one can be provided with one component of the three following components:

- two motorized shutters (20, 21) for controlling the flow of air,
- a closing panel (22).

2. The upper module according to claim 1, **characterized in that** it comprises two lateral closing panels (23, 24), which can be removed for inspection, and a grille-like panel (25) to be arranged outside the shutter (20, 21) that is preselected for aspirating in-

ternal air.

3. The upper module according to one or more of the preceding claims, **characterized in that** the fixing of the closing panels (22, 23, 24), of the shutters (20, 21) and of the grille-like panel (25) occurs by using screws or other similar removable coupling elements that can be handled easily with tools of the known type.

10

15

20

25

30

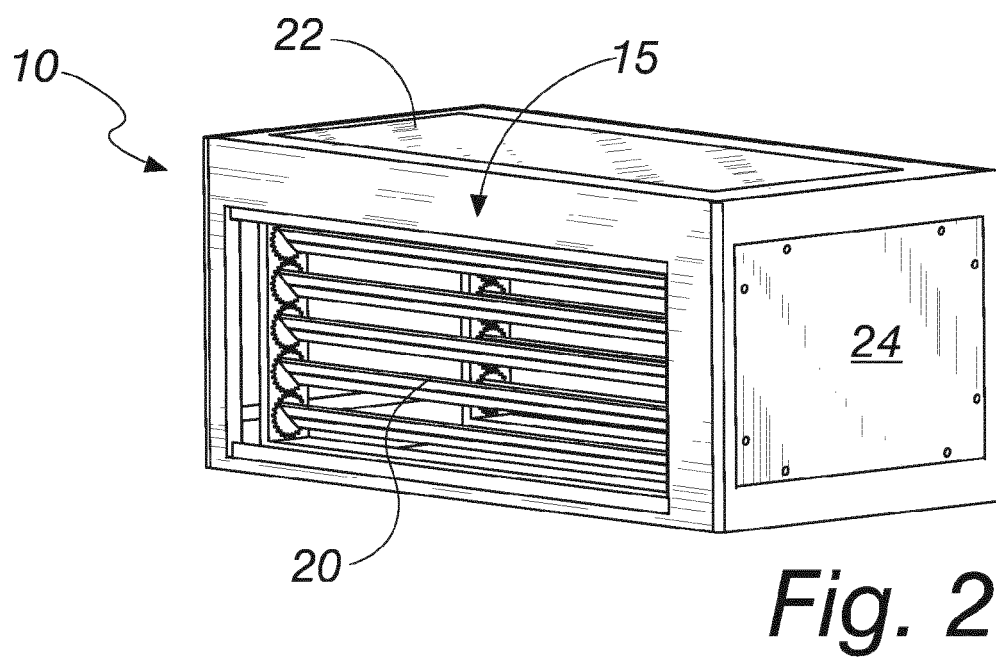
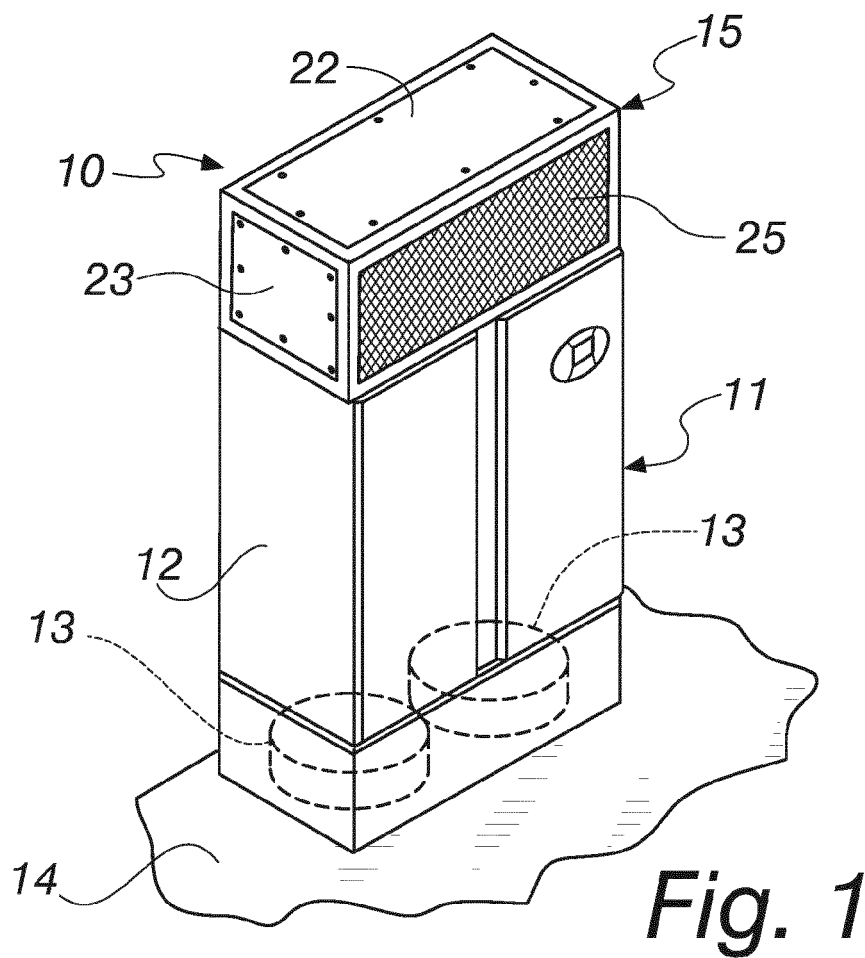
35

40

45

50

55



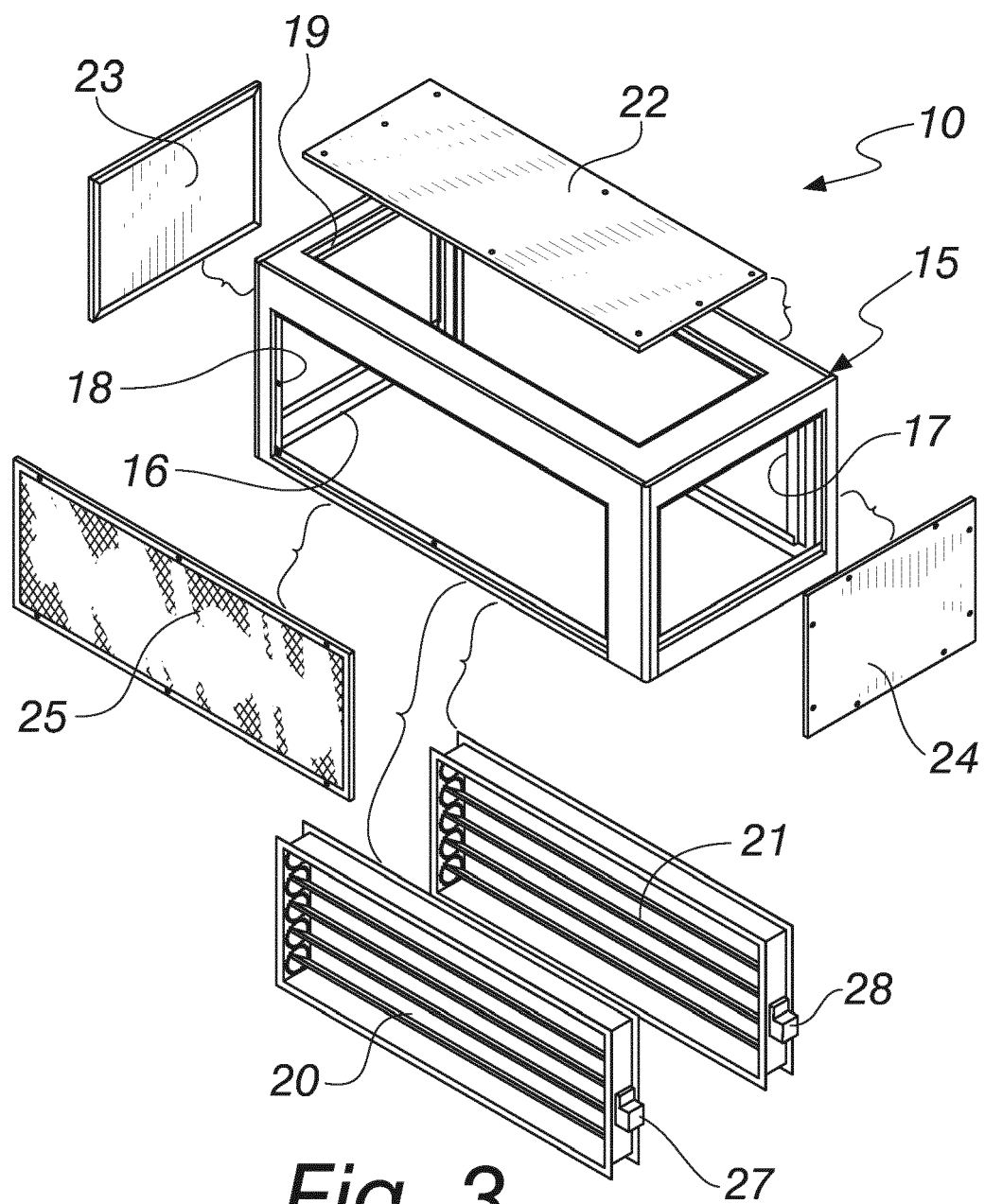
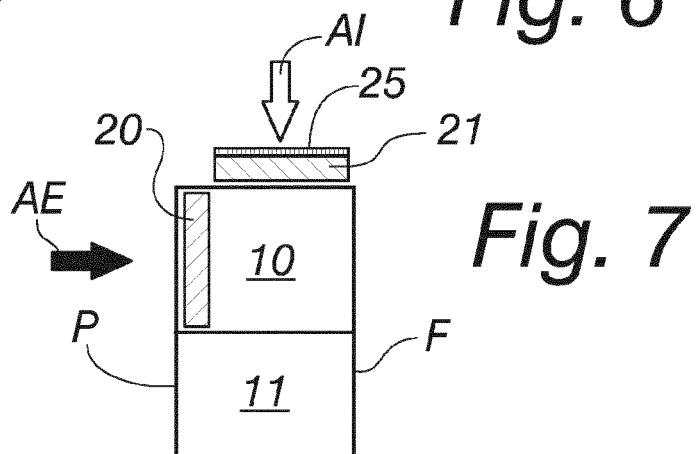
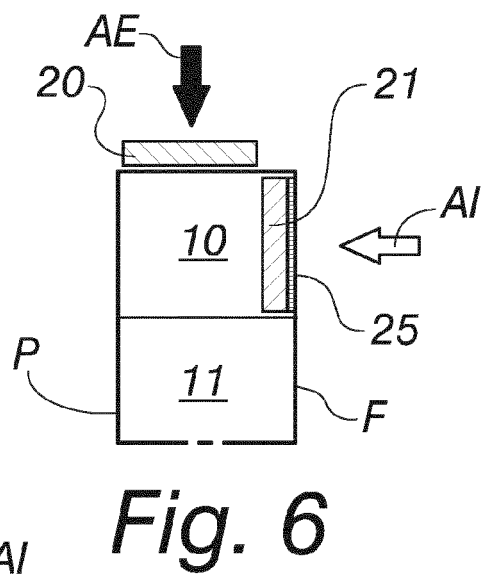
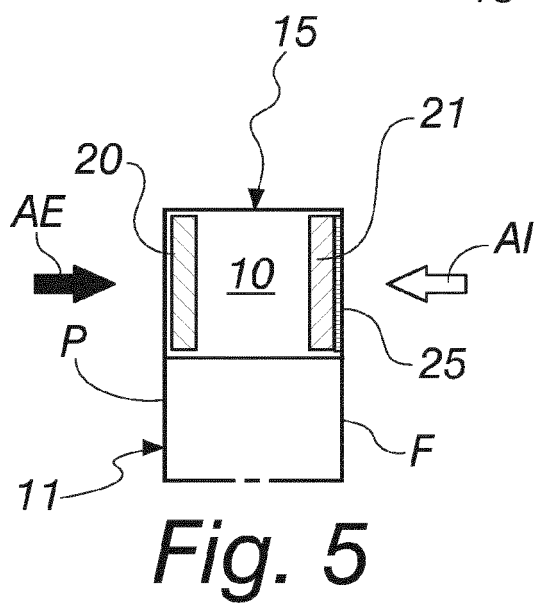
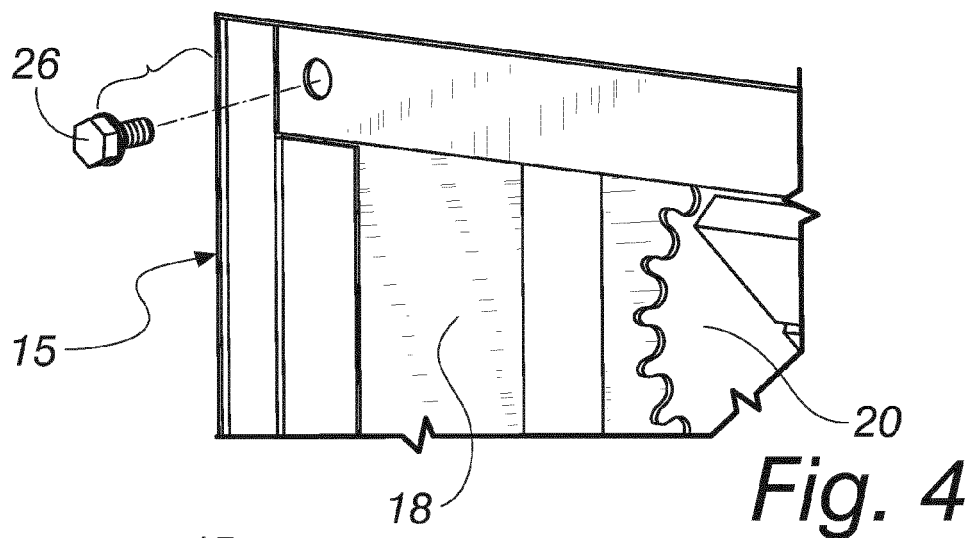


Fig. 3





EUROPEAN SEARCH REPORT

Application Number
EP 12 19 0538

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2006/129891 A2 (LG ELECTRONICS INC [KR]; BYUN JAE-BYUNG [KR]; KANG WANSEOK [KR]; NOH W) 7 December 2006 (2006-12-07) * abstract; figures 1,5,7 * -----	1-3	INV. F24F13/06 F24F13/20
A	GB 780 844 A (LEONARD JOHN FOWLER; WEATHERFOIL HEATING SYSTEMS LT) 7 August 1957 (1957-08-07) * abstract * -----	1-3	
A	US 2008/194195 A1 (DUKE CARL H [US]) 14 August 2008 (2008-08-14) * abstract * -----	1-3	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 February 2013	Examiner Valenza, Davide
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			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 19 0538

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-02-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006129891 A2	07-12-2006	AT 432450 T	15-06-2009
		CN 101189478 A	28-05-2008
		EP 1886070 A2	13-02-2008
		ES 2327140 T3	26-10-2009
		KR 20070119724 A	20-12-2007
		WO 2006129891 A2	07-12-2006

GB 780844 A	07-08-1957	NONE	

US 2008194195 A1	14-08-2008	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT PD20110344 A [0038]