(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 460 355 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.03.2019 Bulletin 2019/13

(21) Application number: **18194998.3**

(22) Date of filing: **18.09.2018**

(51) Int Cl.:
F24H 3/04 *(2006.01)* ***F24F 13/20*** *(2006.01)*
F24H 9/02 *(2006.01)* ***F24F 1/02*** *(2019.01)*
F24F 13/02 *(2006.01)*

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **19.09.2017 IT 201700104429**

(71) Applicant: **Priolo, Moreno**
86100 Campobasso CB (IT)

(72) Inventor: **Priolo, Moreno**
86100 Campobasso CB (IT)

(74) Representative: **Papa, Elisabetta et al**
Società Italiana Brevetti S.p.A
Piazza di Pietra, 39
00186 Roma (IT)

(54) **ELECTRIC FAN HEATER**

(57) Electric fan heater (A) for air treatment, suitable for heating civil and industrial environments, comprising
- a first (1) and a second (2) box-shaped body each provided with respective air exhaust ducts (8, 11) and suction ducts (9, 12) of air through corresponding openings,
- a heating unit comprising a centrifugal fan (7) adapted to channel the sucked air through a batch of resistors (18),
- coupling means (24, 6) configured to connect the first (1) and second (2) box-shaped body along a respective perimetral edge,
wherein the coupling means (24, 6) are adapted to allow a reversible overturning of the second box-shaped body (2) between a transport configuration of the fan heater (A) wherein the second box-shaped body (2) rests on the first box-shaped body (1) and an operating configuration wherein the respective air exhaust (11, 8) and suction (12, 9) ducts are in fluid communication with each other through said corresponding openings.

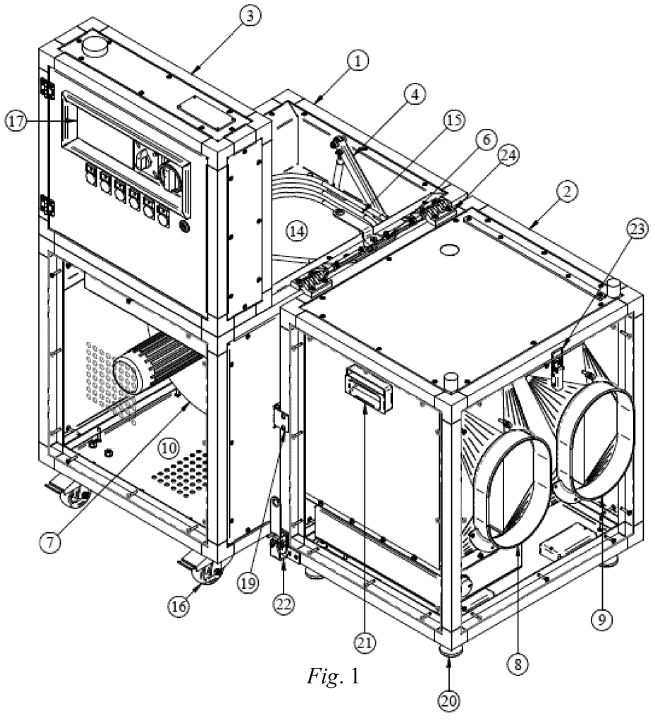

Fig. 1

EP 3 460 355 A1

Description

Technical Field of the Invention

[0001] The present invention refers to the aeraulic field, in particular to implants and systems for air treatment of industrial and civil environments.

[0002] The present invention refers, more in detail, to a model of an electric recirculating air fan heater, designed to air heating of civil and industrial environments in order to disinfest and sanitize.

Background

[0003] Nowadays, the use of heat for disinfesting and sanitizing environments, for which purpose types of electric recirculating air fan heater are present, is well known.

[0004] For example, US6466737 discloses a conditioning system comprising two independently operating separable units, and WO 01/40714 discloses a stove, provided with two rotationally connected units, that allows adjustability for the hot air flow output.

[0005] However, the known types devices exhibit some disadvantages and are perfectible in terms of versatility of use, transportability and overall dimensions.

Summary of the Invention

[0006] The technical problem placed and solved by the present invention is therefore to overcome the above-mentioned drawbacks, and this is achieved by a device as defined in claim 1.

[0007] Aim of the present invention is to allow environmental disinfestation and sanitation activities that mainly develop vertically (for example silos), by introducing hot air generated by an electric fan heater whose shape can be mutated in order to facilitate both the transport and the use of the whole hot air generator.

[0008] In general terms, the electric fan heater of the present invention is preferably provided with hinges and releasing and locking means which allow to vary shape and size of the electric fan heater, switching from a transport configuration to a use one and vice versa.

[0009] Advantageously, the electric fan heater according to the present invention comprises a medium pressure centrifugal fan which intakes air from the environment to be treated, canalizes it into a duct where, after passing through a set of electrical resistors, is heated and released into the vertical structures, allowing the heating of the entire volume in which it is placed.

[0010] Other advantages, features and operation modes of the present invention will be made apparent from the following detailed description of some embodiments thereof, given by way of example and not for limitative purposes.

Brief description of the Figures

[0011] Reference will be made to the figures of the annexed drawings, wherein:

- Figure 1 is a preferred embodiment of the fan heater according to the present invention in an operating configuration;
- Figure 2 is the fan heater of Figure 1 shown in a transport configuration;
- Figure 3 is a preferred embodiment of the fast releasing means of the box-shaped bodies of the fan heater according to the present invention.

Detailed description of preferred embodiments

[0012] The present invention will be described hereinafter by referring to the above-mentioned figures.

[0013] With the initial reference to Figures 1, 2 and 3, an electric fan heater A according to the present invention will hereinafter be described in its functional components.

[0014] The electric fan heater A is an assembly - or device - comprising a first and a second box-shaped body, respectively denoted by the reference 1 and 2, which, in the illustrated example, are connected to each other by means of hinges 24 and a fast releasing means 6.

[0015] In the illustrated embodiment, the box-shaped body 1 comprises:

- a lower compartment 10 containing a centrifugal fan 7,
- exhaust ducts 11 and suction ducts 12 of the air through corresponding exhaust and suction openings;
- safety contacts 13;
- an upper compartment 14 preferably configurated to house auxiliary and/or supplying means, for example to collect the electrical supply cable 15 and other possible accessories;
- an electrical panel 3 (or control unit);
- a fixed support 29 of the fast releasing means 6.

[0016] As figures show, inside the upper compartment 1 there are preferably lifting and opening equipment for the opening 4 useful to facilitate lifting the box-shaped body 2, when the electric fan heater A, from a transport configuration (Figure 2), requires to be placed in an operating configuration (Figure 1). A fixed support 29 of the fast releasing means 6 is anchored to the perimetral edge of the box-shaped body 1, as illustrated in figure 1; in the

fixed support 29, hinges 24 preferably mounted on the perimetral edge of the box-shaped body 2 are preferably inserted, again with reference to Figure 1.

[0017] In general terms, therefore, the device in accordance with the present invention comprises coupling means 24, 6 configured to connect the first and second box-shaped bodies 1, 2 along a respective perimetral edge.

[0018] Preferably, at the base of the box-shaped body 1 there are the wheels 16 for handling the electric fan heater A; said wheels 16 can also be replaced by fixed elements, without thereby not being considered in the scope of the present invention.

[0019] The electric panel 3 preferably contains all control and safety devices of the electric fan heater A. Referring to the showed example, an electronic control unit 17 to control the entire electric fan heater system A is present in the frontal part of the electric panel 3.

[0020] In the described embodiment, the box-shaped body 2 comprises:

- a batch of resistors 18;
- exhaust ducts 8 and suction ducts 9 for hot air through corresponding exhaust and suction openings;
- a cam 19 to trigger the safety contacts 13 placed on the box-shaped body 1;
- the hinges 24.

[0021] As displayed in the illustrated example, at the bottom of the box-shaped body 2 the fixed elements 20 for the placement on the ground are present. On the external part of the same box-shaped body 2 the handles 21 and the locking means 22 and 23 are present, which said locking means 22, denoted with reference 22, blocks the second box-shaped body 2 to the first box-shaped body 1 when electric fan heater A is in operating configuration as showed in figure 1; the locking means 23 blocks, instead, the second box-shaped body 2 with the first box-shaped body 1 when electric fan heater A is in transport configuration as showed in figure 2.

[0022] On the front part of the second box-shaped body 2 open the exhaust ducts 8 and suction ducts 9, wherein indeed the duct 8 is for the exhaust of hot air from the fan heater, the duct 9 is for the intake of hot air. Each of said ducts 8, 9 connects the flexible pipes having the function of exhausting (duct 8) and sucking (duct 9) hot air into the environment to be treated. In the illustrated embodiment, said exhaust duct 8 and suction duct 9 of the second box-shaped body 2 open on opposite sides of the latter with respective suction and exhaust openings.

[0023] Preferably, on the perimetral edge of the box-shaped body 2 the hinges 24 are fixed as showed in figure 1; the hinges 24 fit in the fixed support 29 of the releasing means 6. In the illustrated example, the hinges 24 are anchored to the fixed support 29 through the pins 28 of the releasing means 6, so as to constrain the first and the second box-shaped bodies 1, 2 each other.

[0024] In more detail, the fast releasing means 6 of the preferred embodiment from figure 3 comprises the fixed support 29, the pins 28, levers 27, the driving element 26 and the key 25. The key 25 fits in the driving element 26 which is coupled to the fixed support 29 though the screw 30. At the ends of the driving element 26 the levers 27 are hooked, which levers 27 are coupled to respective opposite ends of the pins 28.

[0025] During use, when the driving element 26 is rotated with the aid of the key 25 coupled with the latter, the levers 27 retract extracting the pins 28 from the hinges 24 and from the fixed support 29, thus placing the fast releasing means 6 in the release mode; in this way, the second box-shaped body 2 is released from the first box-shaped body 1, thus allowing their detachment. In case of driving element 26 is aligned with the levers 27, the pins 28 are inserted in the hinges 24 and in the fixed support 29; the fast releasing means 6 is thereby in a hooking position and the first and the second box-shaped bodies 1, 2 of the electric fan heater A are bounded together.

[0026] The hinges 24 and the fast releasing means 6 allows the second box-shaped body 2 to be rotated of 180° with respect to the first box-shaped body 1, thus positioning the electric fan heater A from the transport configuration (figure 2) to the operating configuration (figure 1) and vice versa.

[0027] It will therefore be appreciated that the configuration of the coupling means 24, 6 is such as to allow a reversible overturning of the second box-shaped body 2 from a transport configuration of the fan heater A wherein the second box-shaped body 2 rests on the first box-shaped body 1, to an operating configuration wherein their respective air exhaust ducts 11, 8 and suction ducts 12, 9 are in fluid communication through said corresponding openings.

[0028] Preferably, the lifting box-shaped body 2 is favoured by lifting means 4 used for opening, which said means 4 is placed inside the upper compartment of the first box-shaped body 1.

[0029] In the transport configuration (Figure 2) the second box-shaped body 2 is secured to the first box-shaped body 1 using the locking means 23.

[0030] In the operating configuration (figure 1), the second box-shaped body 2 is secured to the first box-shaped body 1 through the locking means 22; in this configuration, the cam 19 presses the safety contacts 13 present on the first box-shaped body 1, thus allowing the electric fan heater A to operate in total safety. The exhaust ducts 11, 8 and suction ducts 12, 9 on both the box-shaped body 1,2, matching each other through the exhaust and suction openings, allow the passage of air from the first box-shaped body 1 to the second box-shaped body 2, air which is thus heated passing through the batch of

resistors 18 housed, as shown in the illustrated example, preferably in the second box-shaped body 2.

[0031] Therefore, it will be appreciated that the present invention advantageously provides:

- an electric fan heater A comprising a first and a second box-shaped body 1, 2, where the second box-shaped body 2 showed in figure 1 can be rotated of 180° with respect to the first box-shaped body 1 also showed in figure 1 by means of the hinges 24 and the fast releasing means 6 that constrain the two box-shaped body 1, 2 each other, enabling said rotation so as to allow the positioning of the device from the transport configuration showed in figure 2 to the operating configuration showed in figure 1 and vice versa;

- an electric fan heater A where the fast releasing means 6 showed in figure 3 enables to disengage the second box-shaped body 2 from the first box-shaped body 1. In particular, the decoupling is achieved preferably through the rotation of the key 25 fitted in the driving element 26 which, by the effect of the rotation, brings back the levers 27, which in turn are linked to the pins 28 that are in this way extracted from the inside of the hinges 24, decoupling the two box-shaped body 1, 2 of the electric fan heater A;

- an electric fan heater A intended for disinfestation and sanitation activities of civil and industrial environments that mainly develop vertically (for example silos).

[0032] The present invention has been so far described with reference to its preferred embodiments. It is to be understood that each of the technical solutions implemented in the preferred embodiments, described here by way of example, may advantageously be combined differently to give rise to other embodiments which belong to the same inventive core and all however falling within the protection scope of the claims set forth below.

Claims

1. An electric fan heater (A) for air treatment, suitable for heating civil and industrial environments, comprising

   - a first (1) and a second (2) box-shaped body each provided with respective exhaust ducts (11, 8) and suction ducts (12, 9) of air through corresponding openings,
   - a heating unit comprising a centrifugal fan (7) adapted to channel the sucked air through a batch of resistors (18),
   - coupling means (24, 6) configured for connecting the first (1) and the second (2) box-shaped body along a respective perimetral edge,

   wherein the coupling means (24, 6) are adapted to allow a reversible overturning of the second box-shaped body (2) between a transport configuration of the fan heater (A) wherein the second box-shaped body (2) rests on the first box-shaped body (1) and an operating configuration wherein the respective exhaust (11, 8) and suction (12, 9) ducts are in fluid communication with each other through said corresponding openings.

2. The electric fan heater (A) according to claim 1, wherein the coupling means comprises releasing means (6) provided with pins (28) configured to cooperate with corresponding hinges (24) fixed on said respective perimetral edge, said pins (28) being movable in such a way that, in a disengaged position of said operating configuration, the first (1) and the second (2) box-shaped body are released from each other.

3. The electric fan heater (A) according to claims 1 or 2 further provided with actuating means comprising a cam (19) fixed to the second box-shaped body (2) shaped so as to press, in said operating configuration, corresponding safety contacts (13) provided on the first box-shaped body (1) and connected to the heating unit.

4. The electric fan heater (A) according to any one of the previous claims, wherein the first box-shaped body (1) comprises a lower compartment (10) and an upper compartment (14), wherein said centrifugal fan (7) is housed in the lower compartment (10) and wherein the upper compartment (14) is configured to house auxiliary and/or supplying means.

5. The electric fan heater (A) according to claim 4, wherein the upper compartment (14) comprises lifting means (4) of the second box-shaped body (2).

6. Electric fan heater (A) according to any one of the previous claims, wherein said batch of resistors (18) is housed in the second box-shaped body (2).

7. The electric fan heater (A) according to any one of the preceding claims, further comprising locking means (22, 23) of the second box-shaped body (2) to the first box-shaped body (1) in each of said operating and transport configuration.

8. The electric fan heater (A) according to any one of the previous claims, wherein the first box-shaped body (1) further comprises a control unit (3) of the heating unit.

9. The electric fan heater (A) according to any one of the previous claims, wherein the first box-shaped body (1) comprises means for moving the fan heater (A), in particular wheels (16).

10. Use of an electric fan heater (A) according to any one of the previous claims for disinfesting and/or sanitizing civil and/or industrial environments.

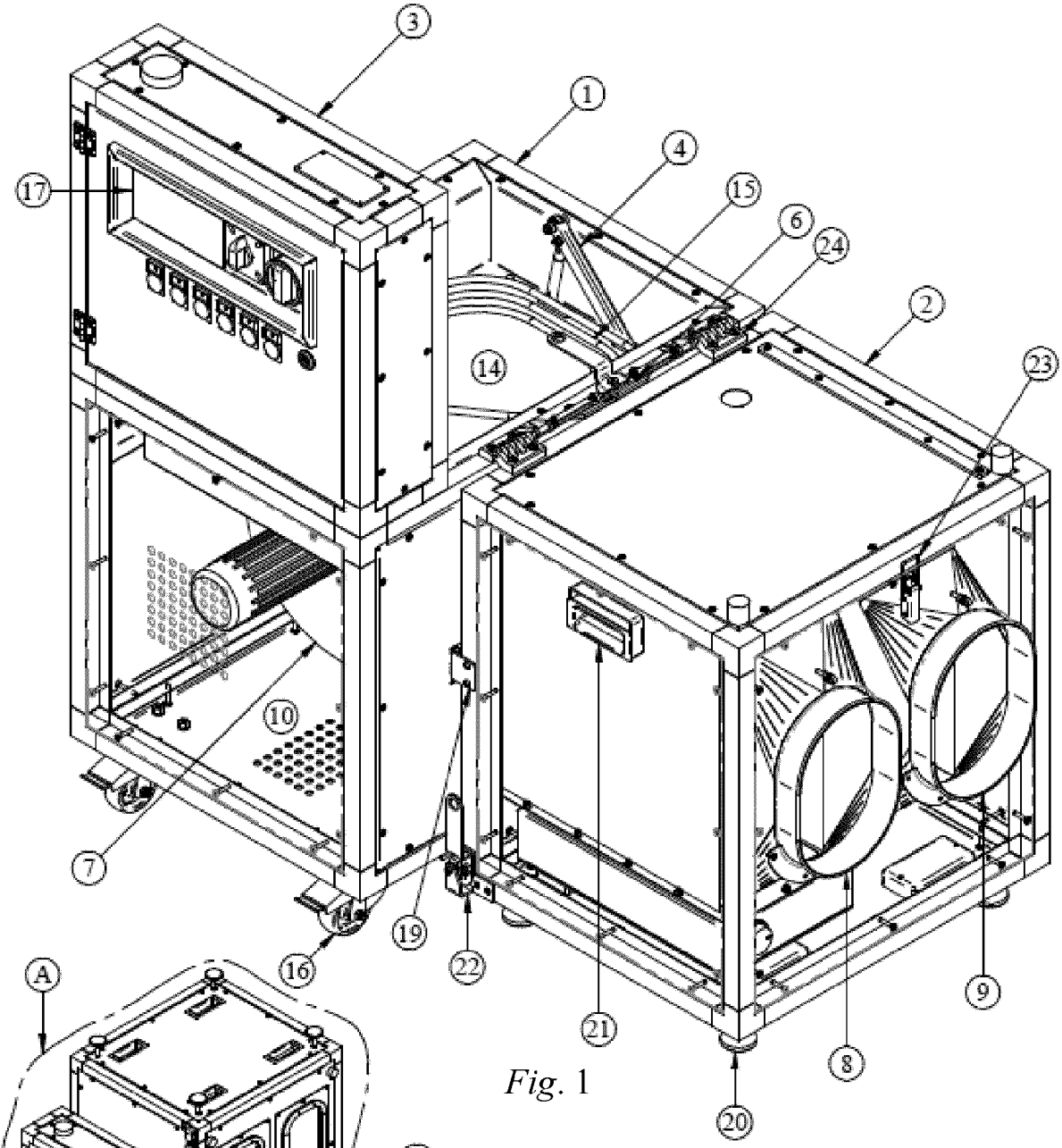

Fig. 1

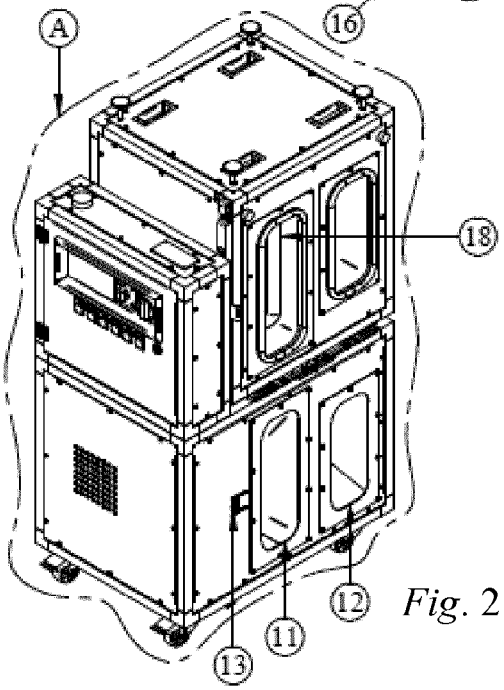

Fig. 2

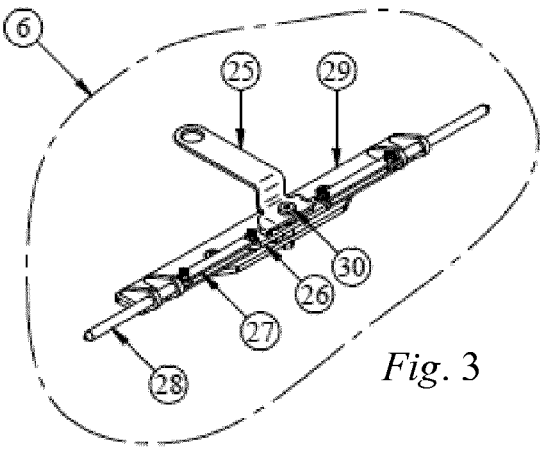

Fig. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 19 4998

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	US 6 466 737 B1 (BIRDSELL WALTER G [US] ET AL) 15 October 2002 (2002-10-15) * columns 2-5; figures 1-4,7,8 *	1-10	INV. F24H3/04 F24F13/20 F24H9/02
A	WO 01/40714 A1 (HOLMES GROUP INC [US]) 7 June 2001 (2001-06-07) * page 4; figures 1-3,8,9 *	1-10	F24F1/02 F24F13/02
A	DE 20 2004 004695 U1 (HESS AXEL [DE]) 3 June 2004 (2004-06-03) * abstract; figures *	1-10	
A	CN 106 949 559 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO LTD; MIDEA GROUP CO LTD) 14 July 2017 (2017-07-14) * abstract; figure 2 *	1-10	
A	EP 2 228 130 A1 (LUDWIG JOACHIM [DE]) 15 September 2010 (2010-09-15) * abstract; figure 2 *	1-10	
A	US 6 130 991 A (CHAPMAN LILIAN E [US]) 10 October 2000 (2000-10-10) * columns 1,2; figures *	1-10	TECHNICAL FIELDS SEARCHED (IPC) F24H F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 February 2019	von Mittelstaedt, A

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 19 4998

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.

08-02-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6466737 B1	15-10-2002	NONE	
WO 0140714 A1	07-06-2001	CA 2360344 A1	07-06-2001
		EP 1157242 A1	28-11-2001
		US 2001031137 A1	18-10-2001
		WO 0140714 A1	07-06-2001
DE 202004004695 U1	03-06-2004	NONE	
CN 106949559 A	14-07-2017	NONE	
EP 2228130 A1	15-09-2010	DE 102009025264 A1	02-09-2010
		EP 2228130 A1	15-09-2010
US 6130991 A	10-10-2000	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

- US 6466737 B **[0004]**
- WO 0140714 A **[0004]**