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(54) **Cross flow induction ceiling convector**

(57) The present invention concerns a ceiling convector (1) which is used as an internal unit of an air conditioning system and is suitable for delivering cooled or heated air. More in particular, the ceiling convector of the present invention uses the cross flow induction principle wherein at least two primary air flows (13) are directed towards each other or cross each other as a result of which an increased secondary air flow (15) is created by induction which is conducted from the room along an heat exchanger (9) and is mixed with the primary air flows.

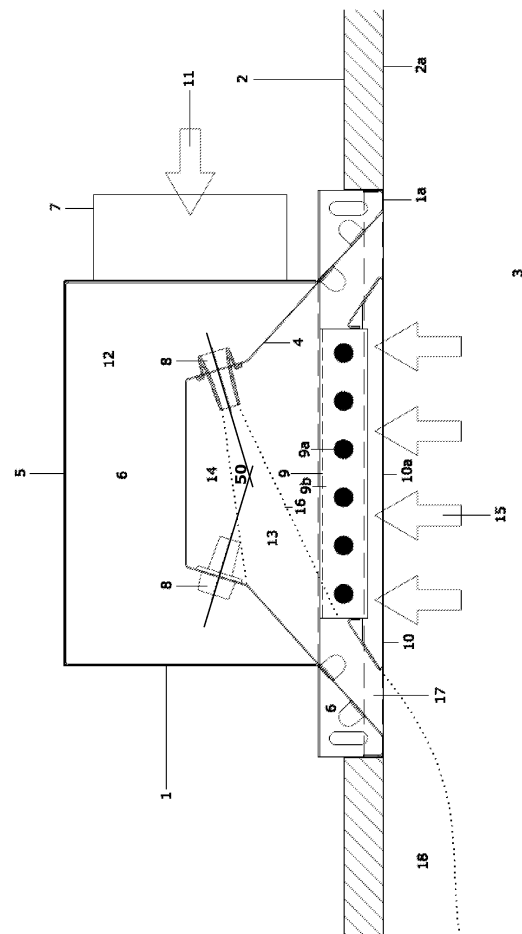


Figure 1

Description

Technical field

[0001] The present invention concerns a ceiling convector for delivering cooled or heated air. More in particular, the ceiling convector uses a cross flow principle as a result of which the efficiency and the cooling and heating capacity of the ceiling convector is enhanced.

Background of the invention

[0002] According to the prior art, a large number of systems are known which are suitable for regulating the air in a room. Such climate regulation or air conditioning is regulated by a device which is able to maintain the temperature and humidity of the air in the room at a comfortable level. The air may also be purified by applying a filter system.

[0003] The principle of climate regulation generally involves an air flow transported through a heat exchanger. This heat exchanger is used to cool down or warm up the air flow. By directing the air flow transported through the heat exchanger into the room, the temperature and humidity of the air in the room can be accurately regulated.

[0004] An air conditioner generally consists of two units. A separate external unit located outside ensures that the coolant in the heat exchanger is cooled down. The internal unit in the room ensures cooling or heating the air in the room. With other devices consisting only of one single internal unit, the warm and humid air is transported to the outdoors.

[0005] The present invention concerns a ceiling convector, which can be used as internal unit of an air conditioning system. A ceiling convector is mounted in or at a ceiling of a room and may deliver either cooled or heated air. A ceiling convector usually comprises a housing in which a heat exchanger is mounted for the treatment (cooling or heating) of said air, an outflow opening, as well as driving means for generating a flow of air via the heat exchanger to the outflow opening.

[0006] The air in the room under the ceiling is sucked in via the heat exchanger, and subsequently delivered in a cooled or heated state. The direction of the air flowing out of the outflow opening can be adapted such that, when cooling the room, the outflowing air sweeps along the ceiling and, as a result of the Coanda-effect, also continues to follow the ceiling over a longer distance. While when heating, the outflowing air may be directed downward.

[0007] However, the problem which occurs mostly with traditional air conditioning systems is that they consume a lot of energy while their capacity is not fully exploited. Hence, the efficiency of the traditional air conditioning systems is too low. On the one hand, modifications to the external unit may increase the efficiency, but on the other hand, the internal unit may also be modified as

such.

[0008] The present invention concerns a ceiling convector as described above, characterized by an improved efficiency and an increased capacity. For this, the ceiling convector of the present invention uses a cross flow of the primary air flows. By allowing the primary air flows to cross each other, the induced air flow which flows through the heat exchanger increases. Because of this, the heat exchanger is exploited more efficiently and the capacity of the ceiling convector is increased.

Summary of the invention

[0009] The present invention concerns a ceiling convector used as an internal unit of an air conditioning system. The ceiling convector is mounted in or at a ceiling of a room and may deliver either cooled or heated air and comprises a housing in which a heat exchanger is mounted for treating said air, an outflow opening as well as driving means for generating the flow of air through the outflow opening.

[0010] The inventors have found that - when the primary air flows are crossed - an improved flow through the heat exchanger is created. Whereas traditional ceiling convectors use parallel or opposite directed primary air flows to suck in the secondary cooled air, the inventors have found that directing towards each other and crossing the air flows offers a number of advantages with respect to the ceiling convectors known in the prior art.

[0011] The air flows which are expelled by the ceiling convector, have an air suction effect that is known as the induction principle. This way a secondary air flow is sucked in from the room by the induction in the ceiling convector. When said secondary air enters the ceiling convector, the secondary air flow is transported along a heat exchanger and is either cooled down or heated up, depending on the intended function of the ceiling convector. Subsequently, the cooled or heated secondary air is mixed in the induction area with primary air flows upon which the cooled or heated air is reintroduced into the room.

[0012] Since the outflowing air flows in a traditional ceiling convector are directed in opposite directions, only a limited induction effect is created, therefore in some cases it is necessary to provide for extra driving means for sucking in the secondary air from the room through the heat exchanger. Surprisingly, the inventors have found that when the primary air flows are directed towards each other or are crossed, an improved induction effect arises which makes the use of extra driving means superfluous and which ensures a more efficient use of the heat exchanger.

[0013] It appears that with an equal amount of primary air flow, a larger amount of secondary air is sucked in and that the total amount of air blown into the room produces a larger net amount. As a result, more secondary air is transported over the heat exchanger, and a higher cooling and heating capacity is achieved. Because of

this, for the cooling or heating of the same room a smaller cross flow induction ceiling convector will be required, in comparison with a traditional ceiling convector.

[0014] Hence, the present invention provides a ceiling convector for delivering cooled or heated air, **characterized in that** the ceiling convector makes use of the cross flow induction principle.

[0015] With the cross flow induction principle is meant that the ceiling convector has at least two primary air flows directed towards each other or which cross each other, as a result of which an increased secondary air flow is created by induction, which is transported from the room along a heat exchanger and is mixed with the primary air flows. The mixed air flow is subsequently transported into the room.

[0016] More specifically, the ceiling convector is characterized by the fact that the primary air flows cross each other at an angle (50) ranging between 10° and 170°, preferably ranging between 120° and 170°, preferably ranging between 135° and 160° and in particular preferably ranging between 140° and 150°. Most preferably, the angle (50) at which the primary air flows cross each other is 135°, 136°, 137°, 138°, 139°, 140°, 141°, 142°, 143°, 144°, 145°, 146°, 147°, 148°, 149°, 150°, 151°, 152°, 153°, 154°, 155°, 156°, 157°, 158°, 159° or 160°.

[0017] The present invention further provides a ceiling convector for delivering cooled or heated air, comprising:

- (a) an heat exchanger for treating said air related to the cooling or heating thereof,
- (b) at least two outflow openings, and,
- (c) at least two opposite orifices for generating an airflow air towards the outflow openings (17),

characterised in that at least two opposite orifices are directed towards each other.

[0018] More in particular, the present invention provides a ceiling convector (1) for delivering cooled or heated air, comprising:

- (a) an heat exchanger (9) for treating said air related to the cooling or heating thereof,
- (b) at least two outflow openings (17),
- (c) at least two opposite orifices directed towards each other (8) for generating an air flow towards the outflow opening (17),

characterised in that the primary air flows (13) generated by the opposite orifices (8), directed towards each other, cross each other in the mixing chamber (14).

[0019] The different elements of the ceiling convector may be comprised in a housing which may be mounted in or at a ceiling of a room.

[0020] The ceiling convector provides at least, but is

not limited to, two outflow openings. In a particular embodiment, the ceiling convector of the present invention provides 2, 3, 4, 6, 8, 10 or more outflow openings. In particular, the ceiling convector provides two or four outflow openings.

[0021] The ceiling convector provides at least, but is not limited to, two opposite orifices. In a particular embodiment, the ceiling convector of the present invention provides 2, 3, 4, 5, 6, 8, 10 or more orifices of which at least 2 opposite orifices are directed towards each other.

[0022] With opposite orifices is meant that at least two orifices are mounted opposite each other such that they may be directed towards each other.

[0023] Also, the driving means for generating the air flow through the orifices may be configured in a large number of ways, such as with ventilators and the like.

[0024] In a specific embodiment, the ceiling convector is characterized by two opposite orifices directed towards each and two outflow openings.

[0025] By directing towards each other the opposite orifices it is meant that the air flows which are transported through the opposite orifices, flow towards each other and entirely, partially or not at all mix with each other. In a particular embodiment, the ceiling convector according to the present invention provides an overlap of the air flows generated by the opposite orifices, between 0% and 100% at the location where the air flows cross each other, and preferably between 0% and 50%, and more preferably between 0% and 20% at the location where the air flows cross each other. Preferably, there is no overlap between air flows crossing each other.

[0026] By directing the orifices towards each other, the air flows from said orifices are going to cross each other in an opposite direction. This provides for extra turbulence in the area where the air flows cross each other, which further ensures a better and faster mixing of the primary air flows with the secondary air flows. By this additional effect, the induction effect increases, which provides in itself for an increased capacity of the ceiling convector.

[0027] According to a more detailed embodiment, the ceiling convector is **characterized in that** the orifices are grouped in at least, but not limited to, two opposite rows of orifices directed towards each other. Each row comprises at least, but is not limited to, one orifice, preferably two orifices, and most preferably four orifices. A row may comprise 1, 2, 3, 4, 5, 6 and more orifices.

[0028] In a specifically preferred embodiment, the ceiling convector comprises two opposite rows of orifices directed towards each other, wherein the two rows run parallel with each other. In a further embodiment, the ceiling convector comprises three rows of orifices directed towards each other, wherein the three rows form a triangle. In a still further embodiment, the ceiling convector comprises four rows of orifices directed towards each other, wherein the four rows form a square.

[0029] In a more detailed embodiment, the ceiling convector is **characterized in that** the centre lines of the

opposite orifices form an angle (50) between 10° and 170°, preferably ranging between 120° and 170°, preferably ranging between 135° and 160° and in particular preferably ranging between 140° and 150°. Most preferably, the angle (50) at which the primary air flows cross each other preferably is 135°, 136°, 137°, 138°, 139°, 140°, 141°, 142°, 143°, 144°, 145°, 146°, 147°, 148°, 149°, 150°, 151°, 152°, 153°, 154°, 155°, 156°, 157°, 158°, 159° or 160°.

[0030] In a more detailed embodiment, the ceiling convector is **characterized in that** the opposite orifices are positioned crossed with respect to each other.

[0031] With a crossed positioning of the opposite orifices is meant that the opposite orifices are not positioned directly opposite each other, but that the position of the opposite orifices is staggered. Because of this, the air flows which are directed through the opposite orifices, will flows towards each other and will cross each other in an opposite direction. When the opposite orifices are staggered with respect to each other, the air flows will not touch each other, or only partially and consequently not or only partially mix with each other. Crossing ensures that extra turbulence is generated which ensures a faster mixing such that the secondary air flow is better mixed with the primary air flows.

[0032] Typical for the present invention is that the crossing air flows cover the whole surface of the heat exchanger. This provides an even flow of secondary air over the complete width of the heat exchanger. This increases the effectiveness and hence, also the capacity of the ceiling convector. With existing convectors, the air jets generally do not cover the middle of the heat exchanger as a result of the decentralised positioning of the orifices pointing outwards or downwards. Hence, the middle area of the heat exchanger is hardly used.

[0033] In still a more detailed embodiment, the ceiling convector is **characterized in that** at least two opposite orifices extend into a mixing chamber which provide the primary air flow, and wherein the mixing chamber is connected with the outflow side of the heat exchanger which provides the secondary air flow, wherein the mixed air flow leaves the mixing chamber through the outflow opening.

[0034] In still a more detailed embodiment, the ceiling convector is **characterized in that** each orifice is positioned opposite an outflow opening.

[0035] In a more detailed embodiment, the ceiling convector is **characterized in that** the ceiling convector comprises controlling means for regulating the position of the regulator based on the temperature of the outflowing air.

[0036] With the ceiling convector according to the invention, a regulator is installed which provides the normal Coanda-effect when cooling. The regulator is then inactive. However, when heating, the regulator is adjusted such that a downwards directed flow is obtained. This downwards directed flow breaks up the Coanda-effect, and ensures that the relatively warm air leaving the ceiling

convector, is directed downwards. As a result, when heating, the air is transported directly to the workplaces, such that a better temperature distribution is obtained.

[0037] Of course, when using such a regulator, it is also possible to obtain an intermediate position, such that warm air with a relatively low temperature is directed into a transitional area between the ceiling and a steeply downwards directed area. In that respect, preferably controlling means are provided for regulating the position of the regulator based on the temperature of the outflowing air. Said controlling means may be configured in all kinds of ways, for example with a temperature sensor in combination with an electric regulator drive.

[0038] In a preferred embodiment, two parallel outflow openings are provided, each with their own regulator, as well as two rows of orifices, each one positioned opposite a respective outflow opening, the heat exchanger being positioned between the outflow openings.

[0039] In a more detailed embodiment, the ceiling convector is **characterized in that** the heat exchanger has a supply side which is in connection with the room.

[0040] In a further embodiment, the ceiling convector is **characterized in that** the ceiling convector comprises a housing which is mounted in or at a ceiling of a room.

[0041] In a more detailed embodiment, the ceiling convector is **characterized in that** the primary air flows in the ceiling convector cross each other at an angle (50) ranging between 10° and 170°, preferably ranging between 120° and 170°, preferably ranging between 135° and 160° and in particular preferably ranging between 140° and 150°. Most preferably, the angle (50) at which the primary air flows cross each other is preferably 135°, 136°, 137°, 138°, 139°, 140°, 141°, 142°, 143°, 144°, 145°, 146°, 147°, 148°, 149°, 150°, 151°, 152°, 153°, 154°, 155°, 156°, 157°, 158°, 159° or 160°.

[0042] The present invention also provides a method for providing a room with a ceiling convector according to the present invention, **characterized in that** the secondary air flow from the room towards the ceiling convector has at least doubled compared to a ceiling convector wherein the primary air flows are not directed towards each other.

[0043] Compared to a traditional ceiling convector wherein the primary air flows are not directed towards each other or do not cross each other, with the ceiling convector of the present invention an increased capacity is obtained. The increase of the capacity amounts 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50% or more.

[0044] Next, the invention will be illustrated in more detail by means of an embodiment shown in the Figures.

Short description of the Figures

[0045]

Figure 1 shows a cross section of the ceiling convector as mounted on a ceiling.

Figure 2 shows a ceiling convector wherein the air flows cross.

Detailed description of the invention

[0046] The ceiling convector (1) shown in Figure 1 and Figure 2 is incorporated in the ceiling (2). The ceiling convector (1) is mounted in the ceiling (2) in a well-known manner. Preferably, the ceiling convector (1) is mounted in such a way that the lower boundary (1a) of the ceiling convector (1) lies in the same plane as the lower boundary (2a) of the ceiling (2). Such a way of mounting is known per se, and is here not shown further in detail. The ceiling delimits a room (3) the air of which is treated by the ceiling convector (1). The ceiling convector (1) may also be supported by the lowered ceiling (2) or may be suspended independently from the above positioned ceiling or a bridge construction, not further shown.

[0047] The ceiling convector (1) comprises a profiled separation plate (4) with cap (5) mounted thereon, both defined on the head sides by a head plate (6). In the cap (5) at least one ventilation air inflow opening is provided with an air connection (7) connected on the outside. In this embodiment, said air connection (7) is positioned at the side, however it may also be positioned at the top of the cap (5).

[0048] The separation plate (4) is also provided with openings in which aerodynamically formed air inflow orifices (8) are placed. In another embodiment, the openings with orifices (8) may be replaced by profiled openings, integrated in the separation plate (4), which have the same inflow function as the orifices (8).

[0049] The positioning of the orifices (8) in the separation plate (4) is most particular in that the left and right row of orifices are directed towards each other, in contrast to the existing systems wherein they are directed away from each other or are at least minimum parallel to each other. Additionally, the positioning in the longitudinal direction of the separation plate (4) is such that the orifices (8) in the left row are staggered with respect to those in the right row. By this special positioning the so-called cross flow induction principle is obtained.

[0050] In the plane of the lower boundary of the ceiling convector (1) is located a centrally positioned bottom panel (10) provided with one or more perforations (10a) with such an flow rate that sufficient air from the room (3) may enter the ceiling convector (1). On both sides of the bottom panel (10) is located a gap-like air inflow opening (17). It is defined on the outside by the separation plate (4). The bottom panel (10) borders the heat exchanger (9) which forms a battery which is constructed from water-carrying pipes (9a) with perpendicular placed fins thereon (9b). The water-carrying pipes (9a) are connected to a tubing system, not further shown.

[0051] The action of the ceiling convector (1) is characterized in that by means of a commonly known transport system for conditioned ventilation air, not further shown, air (11) with a certain pressure is transported into

the inflow plenum (12) by means of the air connection (7). The inflow plenum (12) is defined by the separation plate (4), cap (5), and head plates (6). As a result of the existing pressure in the inflow plenum (12) air is transported via the orifices (8) into the underlying mixing and induction area (14) in the form of primary air flows (13). Since the total surface of the air flow-orifice is very small, the initial speed of the primary air flows (13) will be relatively high. The air pressure in a free air flow is always lower than in the surrounding nearly static air. The higher the air speed in the flow, the lower the pressure. As a result, the air present in the mixing zone (14) will be sucked in by the primary air flows (13) where it will mix gradually with the air present therein. This is called the induction principle. Hence, a secondary air flow (15) is generated which is sucked into the mixing zone (14) via the perforations (10a) of the bottom panel (10) and through the heat exchanger (9). Furthermore, the secondary air flow (15) is cooled or heated by the heat exchanger (9), flushed with cold or warm water, respectively.

[0052] The cold or warm air mixture induced by the primary air flows (13) is blown into the room (3) via the gap-like air inflow openings (17). The inflow angle is chosen such that the inflow air (18) is given the opportunity to stick to the ceiling (2) present, the so-called "Coanda-effect". Hence, the room (3) is treated evenly without an undesirable cold zone occurring. In this manner, by gradual mixing of the inflow air (18) with the room air, the room (3) below is suitably cooled or heated and provided with fresh air.

[0053] Figure 2 pertains to a detailed view of a ceiling convector (1) wherein the heat exchanger (9) and bottom panel (10) have been omitted by way of illustration of the cross flow induction principle.

[0054] The special positioning of the two rows of orifices (8) opposite each other results in that the length of the air flow (13) over which can be induced in the induction area (14) is much larger than what is common with traditional convectors with equal external dimensions. This is the consequence of the position of the orifice (8) with regard to the gap-like air inflow opening (17). Because of this, at an equal amount of added ventilation air (11), a larger amount of secondary air (15) will be sucked in such that the total amount of air blown into the room (3), provides a higher net amount. Therefore, more secondary air (15) is transported over the heat exchanger (9) and this yields a higher cooling or heating capacity.

[0055] By the staggered positions between the opposite rows of orifices, the crossing jets (13) do not, or only partially touch each other. However, the crossing jets (13) cause extra vorticities or turbulence in the area located between the air jets mutually and in the boundary layer (16) of these air jets (13). These vorticities provide a faster mixing of the secondary air flow (15) with the primary air flows (13). Because of this, induction and capacity increase further.

[0056] Furthermore, the crossing air jets (13) always

cover the whole surface of the heat exchanger (9), which results in a very even inflow of secondary air (15) over the entire width of the heat exchanger (9). This increases the effectiveness and as a result, also the capacity. With traditional ceiling convectors, the air jets generally do not cover the middle of the heat exchanger as a consequence of the decentralised positioning of the orifices opening outwards or downstairs. Hence, the middle portion of the heat exchanger is hardly used.

[0057] By the large increase of the capacity of the ceiling convector (1) in comparison with a traditional ceiling convector as a consequence of the cross flow induction, the ceiling convector of the present invention may be provided with a smaller and simpler heat exchanger with a smaller heat exchange fin surface and less tubing. As a consequence, the ceiling convector will be smaller and more economical.

Claims

1. Ceiling convector (1) for delivering cooled or heated air, comprising :

- a. a heat exchanger (9) for treating said air related to the cooling or heating thereof,
- b. at least two outflow openings (17),
- c. at least two opposite orifices directed towards each other (8) for generating an air flow towards the outflow opening (17),

characterised in that the primary air flows (13) generated by the opposite orifices (8), directed towards each other, cross each other in the mixing chamber (14).

2. Ceiling convector according to claim 1, **characterised in that** the orifices are grouped in at least two opposite rows of orifices directed towards each other.

3. Ceiling convector according to claims 1 or 2, **characterised in that** the centre lines of the opposite orifices (8) form an angle (50) between 10° and 170°.

4. Ceiling convector according to any one of the preceding claims, **characterised in that** the opposite orifices (8) are placed crossed with respect to each other.

5. Ceiling convector according to any one of the preceding claims, **characterized in that** at least two opposite orifices (8) extend into a mixing chamber (14) which provide the primary air flow, and wherein the mixing chamber (14) is connected with the outflow side of the heat exchanger (9) which provides the secondary air flow, wherein the mixed air flow leaves the mixing chamber (14) through the outflow

opening (17).

6. Ceiling convector according to any one of the preceding claims, **characterized in that** each orifice (8) is located opposite an outflow opening (17).

7. Ceiling convector according to any one of the preceding claims, **characterized in that** the ceiling convector comprises controlling means for regulating the position of the regulator based on the temperature of the outflowing air.

8. Ceiling convector according to any one of the preceding claims, **characterized in that** the heat exchanger (9) has a supply side which is connected with the room (3).

9. Ceiling convector according to any one of the preceding claims, **characterized in that** the ceiling convector comprises a housing (12) which is mounted in or at a ceiling (2) of a room (3).

10. Ceiling convector according to any one of the preceding claims, **characterized in that** the primary air flows in the ceiling convector cross each other at an angle (50) ranging between 10° and 170°.

11. Method for providing a room with a ceiling convector according to any one of the preceding claims, **characterized in that** the secondary flow of air (15) from the room (3) to the ceiling convector has at least doubled.

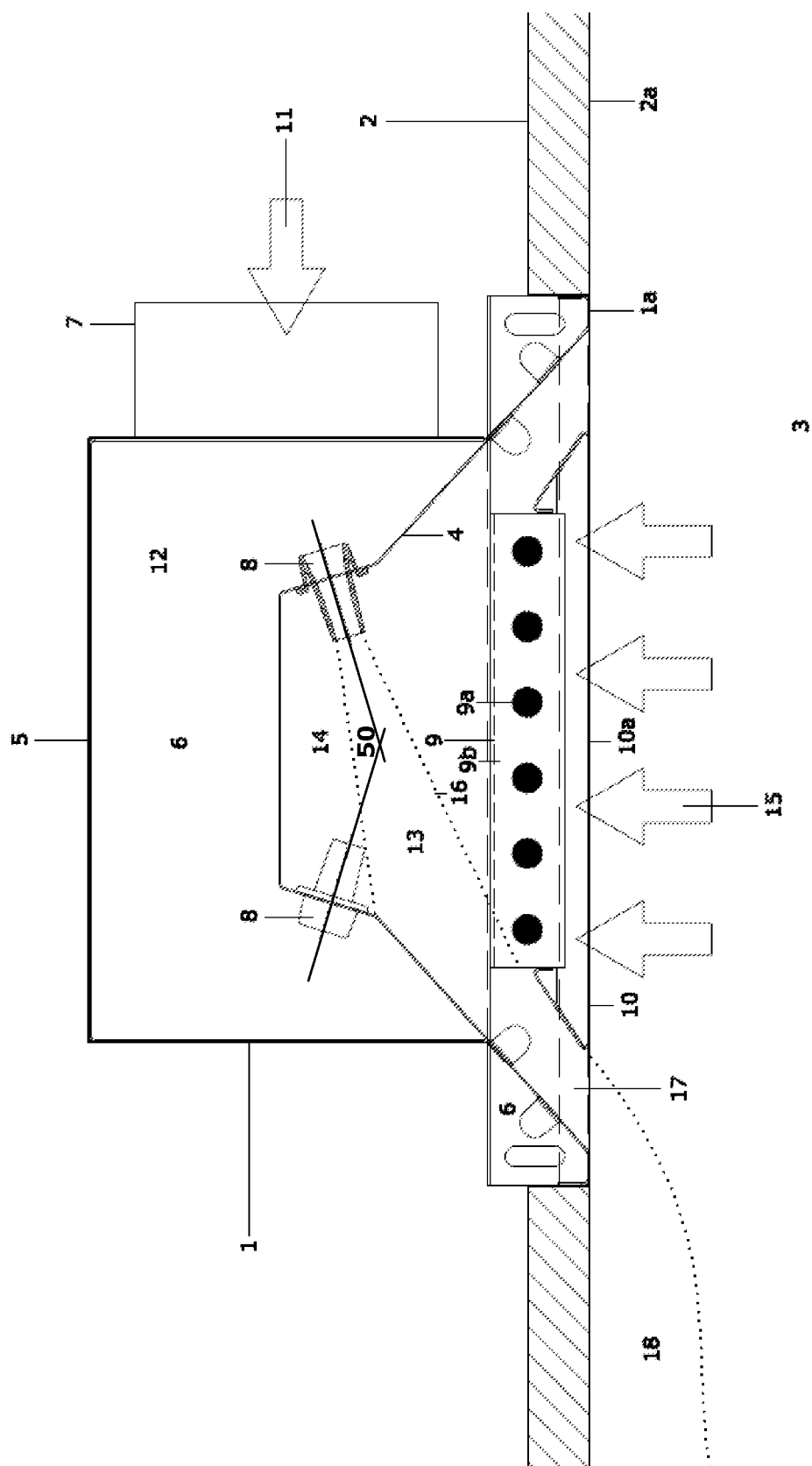


Figure 1

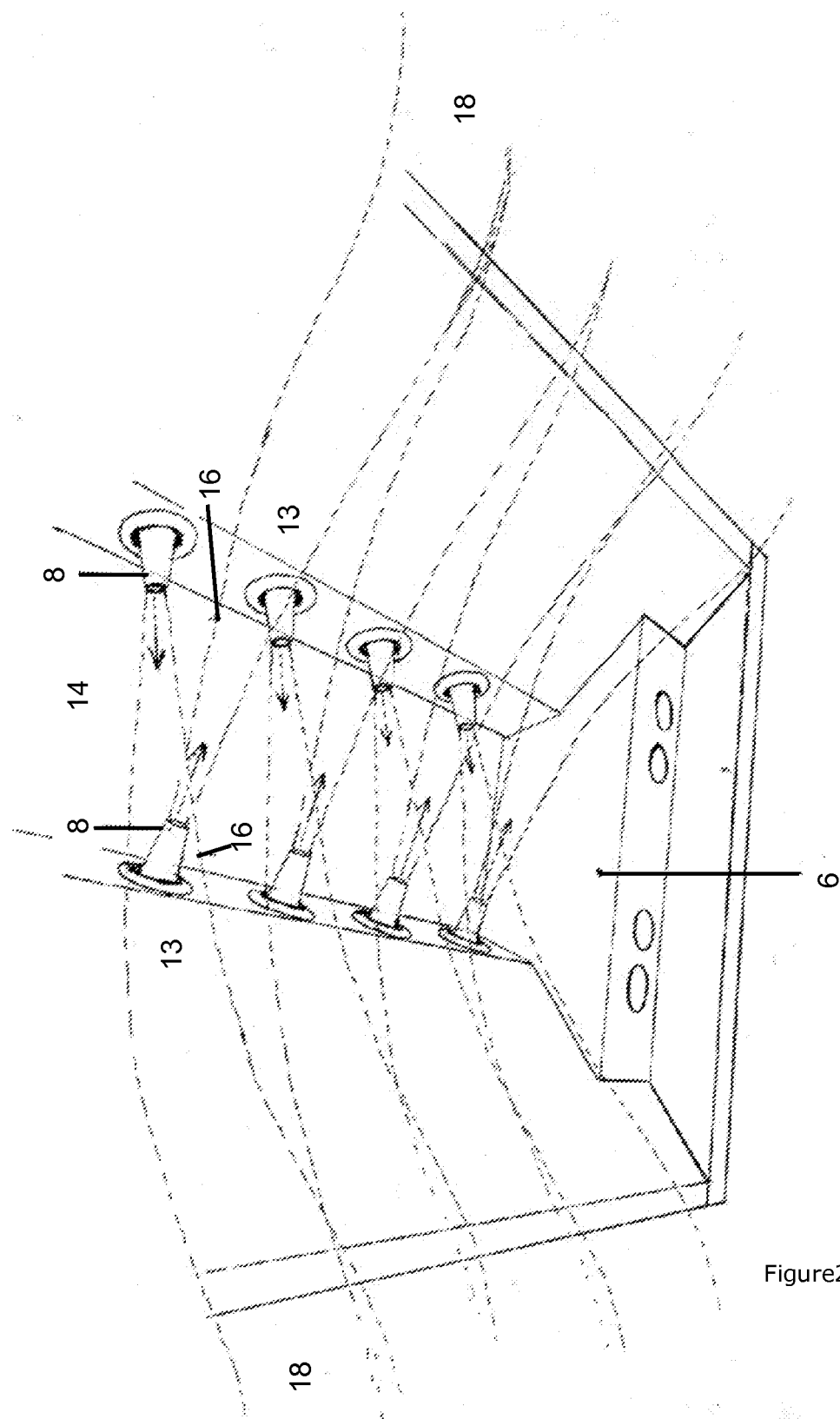


Figure2



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 1084

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 07 091685 A (MATSUSHITA SEIKO KK) 4 April 1995 (1995-04-04)	1-3,5-6, 8-9,11	INV. F24F1/01
A	* the whole document *	4,7,10	ADD. F24F13/26
A	US 2002/070010 A1 (HAKKINEN MARKO [FI] ET AL HAEKKINEN MARKO [FI] ET AL) 13 June 2002 (2002-06-13) * figure 1B *	1	
A	NL 7 600 455 A (SIEMENS AG) 27 July 1976 (1976-07-27) * page 6, line 10 - line 35; claim 7; figure 4 *	1	
A	WO 2005/075897 A (LINDAB AB [SE]; HULTMARK GOERAN [SE]) 18 August 2005 (2005-08-18) * the whole document *	1	
A	US 5 014 609 A (WECK FRANZ [DE]) 14 May 1991 (1991-05-14) * the whole document *	1	
A	EP 0 834 705 A (LUCHTTECHNISCH ADVIESBUREAU EV [NL]) 8 April 1998 (1998-04-08) * figure 5 *	11	TECHNICAL FIELDS SEARCHED (IPC) F24F
A	DE 198 26 566 A1 (LTG HOLDING GMBH [DE]) 23 December 1999 (1999-12-23)	1	
A	JP 52 095861 A (NISSHIN KOGYO KK) 11 August 1977 (1977-08-11)	1	
A	US 2 962 953 A (ASHLEY CARLYLE M ET AL) 6 December 1960 (1960-12-06)	1	
A	DE 43 03 307 A1 (SCHMIDT CHRISTEL [DE]) 11 August 1994 (1994-08-11)	1	
	-/-		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 January 2010	Examiner de Graaf, Jan Douwe
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			

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EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 1084

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	FR 1 283 789 A (DELL ORTO CHIEREGATTI SPA) 2 February 1962 (1962-02-02) -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 January 2010	Examiner de Graaf, Jan Douwe
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 09 17 1084

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
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12-01-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 7091685	A	04-04-1995	NONE	
US 2002070010	A1	13-06-2002	DE 10159900 A1	14-08-2002
			FI 20002677 A	08-06-2002
			FR 2817951 A1	14-06-2002
			GB 2371853 A	07-08-2002
			NL 1019512 C2	11-06-2002
			SE 523334 C2	13-04-2004
			SE 0104003 A	08-06-2002
NL 7600455	A	27-07-1976	BE 837806 A1	14-05-1976
			CH 589825 A5	15-07-1977
			DE 2502538 A1	26-08-1976
			FR 2298769 A1	20-08-1976
			GB 1503441 A	08-03-1978
			SE 7600640 A	24-07-1976
			US 4222316 A	16-09-1980
WO 2005075897	A	18-08-2005	EP 1714090 A1	25-10-2006
			SE 527956 C2	18-07-2006
			SE 0400300 A	11-08-2005
US 5014609	A	14-05-1991	DD 297227 A5	02-01-1992
			DE 8910063 U1	19-10-1989
			EP 0414021 A2	27-02-1991
EP 0834705	A	08-04-1998	NL 1004187 C2	06-04-1998
DE 19826566	A1	23-12-1999	NONE	
JP 52095861	A	11-08-1977	NONE	
US 2962953	A	06-12-1960	BE 553797 A	
			CH 353515 A	15-04-1961
			DE 1126107 B	22-03-1962
			ES 229498 A1	01-10-1956
			FR 1165475 A	27-10-1958
			GB 809903 A	04-03-1959
DE 4303307	A1	11-08-1994	NONE	
FR 1283789	A	02-02-1962	NONE	

EPO FORM P0459

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