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(54) **AIR IMPELLER FOR VENTILATION DUCTS**

(57) The invention relates to an air impeller for ventilation ducts, formed by a centrifugal fan having a volute (1) provided with side openings (2) for air inflow and a mouth (3) for air outflow in a perpendicular direction, lines (4) being connected to the side openings (2), which merge into a common port (5) for direct connection to a section (6) of a ventilation duct.

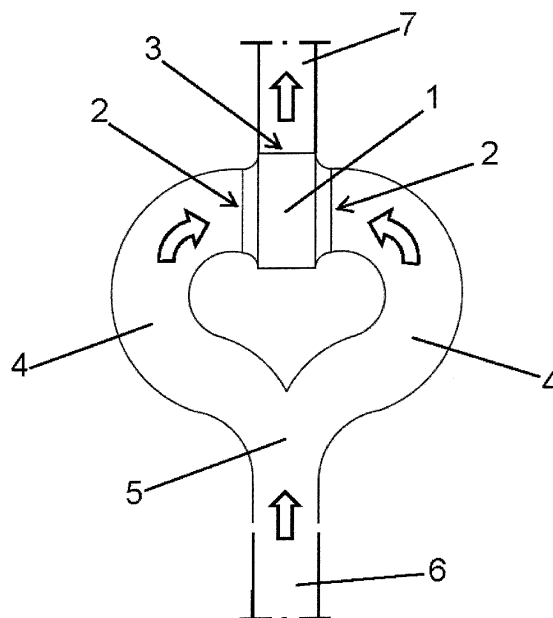


Fig. 3

Description

Field of the Art

[0001] The present invention relates to ventilation installations for buildings, homes, commercial premises, etc., proposing an air impeller for ventilation ducts whereby operating conditions which allow obtaining the maximum efficiency of the corresponding installations are achieved.

State of the Art

[0002] Ventilation installations in buildings, homes, commercial premises and any venue in which air renewal is required for providing healthy and comfortable ambient conditions are designed with air circulation ducts between the places or spaces to be ventilated and outlets for discharging air to the outside.

[0003] For establishing a suitably efficient air circulation in said installations, impeller units are arranged in the air circulation ducts which establish by means of fans an air circulation speed for obtaining a suitable ventilation efficiency, the fans normally used in that function being of the centrifugal type drawing in air through the sides of a volute and expelling it through an outlet perpendicular to the sides.

[0004] For the inline intercalation in the air ducts of application, the air impeller units conventionally used comprise a chamber provided with respective opposing ports, one for air inflow and another for air outflow, for coupling to the duct of application, incorporating a centrifugal fan in the inside of the chamber.

[0005] In those air impeller units the fan can be arranged with its air outlet going into the air outlet of the chamber, receiving through the sides the air entering and expanding in the chamber; the fan can also be arranged with a side opening going into the air inlet in the chamber, the air outlet of the fan in this case being separated from the air outlet of the chamber, so the air leaving the fan expands in the chamber before reaching its outlet.

[0006] In said impeller units the expansion of air inside the chamber where the fan is located and the fact that the air must circulate inside the chamber such that it is oriented to enter the fan or reach the outlet of the chamber, according to the particular embodiment, mean that increased drive must be applied in order to achieve the necessary air speed, obtaining efficiencies of the effective use of the fan power between 35% and 37%.

Object of the Invention

[0007] The present invention proposes an air impeller for ventilation ducts, with features substantially improving the conditions for driving air and consequently the operating efficiency of the ventilation.

[0008] This air impeller comprises a centrifugal fan, formed by a volute to which, there are connected on the

sides, lines which merge into a common port oriented in the direction opposite the air outlet of the centrifugal fan.

[0009] An air impeller is thereby obtained, which impeller can be coupled to an air arrival line of a ventilation duct through the common port of the lines connected to the sides, and to an air discharge mouth or line by means of the air outlet port of the fan.

[0010] The air circulating through the ventilation duct thereby directly enters the fan of the impeller from the air arrival line and also leaves directly from the fan to the discharge line mouth or line, without passing through any expansion chamber, such that air retention with a speed loss as occurs in the chamber of conventional air impellers is prevented, therefore obtaining more effective use of the fan action for driving the air circulation, achieving an operating efficiency of up to 52% of the fan power, clearly greater than that of conventional air impellers.

[0011] The coupling of the air arrival lines to the fan, with the side inlets of the fan, can also be established by means of joints that can be oriented or fixed in different angular positions, which allows arranging the air impeller during assembly with its air outlet selectively oriented according to the relative position in which the air arrival line of the duct of application and the air discharge line or outlet are located, thereby facilitating an installation without bends which cause air speed losses.

[0012] The air impeller object of the invention therefore has very beneficial features for its intended function, acquiring own identity and a preferred character with respect to conventional air impellers for the same application.

Description of the Drawings

[0013]

Figure 1 shows a diagram of a conventional air impeller with the fan coupled to the air outlet of the chamber of the impeller.

Figure 2 shows a diagram of a conventional air impeller with the fan coupled to the air inlet of the chamber of the impeller.

Figure 3 is a front view of a diagram of an air impeller according to the invention, without expansion chamber, with the air arrival line coupled to the two sides of the fan of the impeller.

Figure 3A is a side view of a diagram of the air impeller of the preceding figure with the air inlet and outlet aligned in opposite directions.

Figure 3B is a side view of a diagram of the same impeller mentioned above with the air inlet and outlet oriented at 90° with respect to one another.

Figure 4 is a diagram of an air impeller according to the invention, without expansion chamber, with the air arrival line coupled to only one side of the fan of the impeller.

Detailed Description of the Invention

[0014] The object of the invention relates to an air impeller intended for being incorporated in ventilation installations, for the purpose of circulating air at a specific speed in the installations of application for effective ventilation.

[0015] The proposed air impeller comprises a centrifugal fan provided with a volute (1) having side openings (2) for air inflow and a mouth (3) for air outflow in a direction perpendicular to the side openings (2) for air inflow.

[0016] Lines (4) merging into a common air receiving port (5) are connected to the side openings (2) for air inflow.

[0017] The air impeller can thereby be arranged intercalated between an air arrival line (6) and an air discharge line (7), in an air circulation duct of a ventilation installation, with the air receiving port (5) in connection with the air arrival line (6) and with the mouth (3) for air outflow in connection with the air discharge line (7).

[0018] The air circulating through the duct of application thereby directly enters the centrifugal fan by means of the side openings (2), through the lines (4), and also directly leaves the centrifugal fan to the discharge line (7) through the outlet mouth (3), therefore no air expansion whatsoever occurs outside the centrifugal fan, nor does the air have to travel such that it is oriented for entering or leaving the centrifugal fan, after passing through it, for discharge.

[0019] Therefore, the air is not slowed down by retention which reduces its speed as it passes through the centrifugal fan, allowing improved use of the air driving power and consequently a higher efficiency of the centrifugal fan in said function; eliminating the drawback that conventional air impellers have in this sense, which impellers having a centrifugal fan (8) housed inside a chamber (9) provided with an air inlet (10) and an air outlet (11), wherein the centrifugal fan (8) can be arranged with its air outlet connected to the air outlet (11) of the chamber (9), such as in the diagram of Figure 1, or the centrifugal fan (8) can be arranged with an air inlet side opening connected to the air inlet (10) of the chamber (9), such as in the diagram of Figure 2, the air having to follow, in both cases, an expansion route through the inside of the chamber (9), which gives rise to loss in circulation speed.

[0020] By adapting the arrangement of the lines (4) which are connected to the side openings (2) for air inflow, the air impeller can furthermore be arranged in connection between an air arrival line (6) of a ventilation duct and an air discharge line (7), being arranged in line or at an angle with respect to one another, as depicted in Figures 3A and 3B, which can be achieved by means of joints that can be oriented or fixed in different angular positions, between the mentioned lines (4) and said side openings (2) for air inflow into the centrifugal fan, maintaining the feature of the air directly entering the centrifugal fan from the duct of application and the air directly

leaving the centrifugal fan to the evacuation line (7), without any expansion chamber causing the air to slow down as it passes through the impeller.

[0021] As observed in Figure 4, the centrifugal fan can also be connected to an air arrival line (6) of a ventilation duct, by means of a single line (4) connected to a side opening (2) of the volute (1) of the centrifugal fan, likewise maintaining with this arrangement the feature of the air directly entering the centrifugal fan from the air arrival line (6) and the air directly leaving the centrifugal fan to the discharge line (7) or outlet.

Claims

1. An air impeller for ventilation ducts comprising a centrifugal fan having a volute (1) provided with side openings (2) for air inflow and a mouth (3) for air outflow in a direction perpendicular to the side openings (2) for air inflow, **characterized in that** the side openings (2) for air inflow are connected to lines (4) which merge into a port (5) for direct connection to an air arrival section (6) of a ventilation duct.
2. The air impeller for ventilation ducts according to claim 1, **characterized in that** the lines (4) are connected to the side openings (2) of the centrifugal fan by means of joints that can be oriented.
3. The air impeller for ventilation ducts according to claims 1 and 2, **characterized in that** the centrifugal fan can be arranged attached to a single line (4) connected to a side opening (2) of the volute (1), for connection to an air arrival section (6) of a ventilation duct.

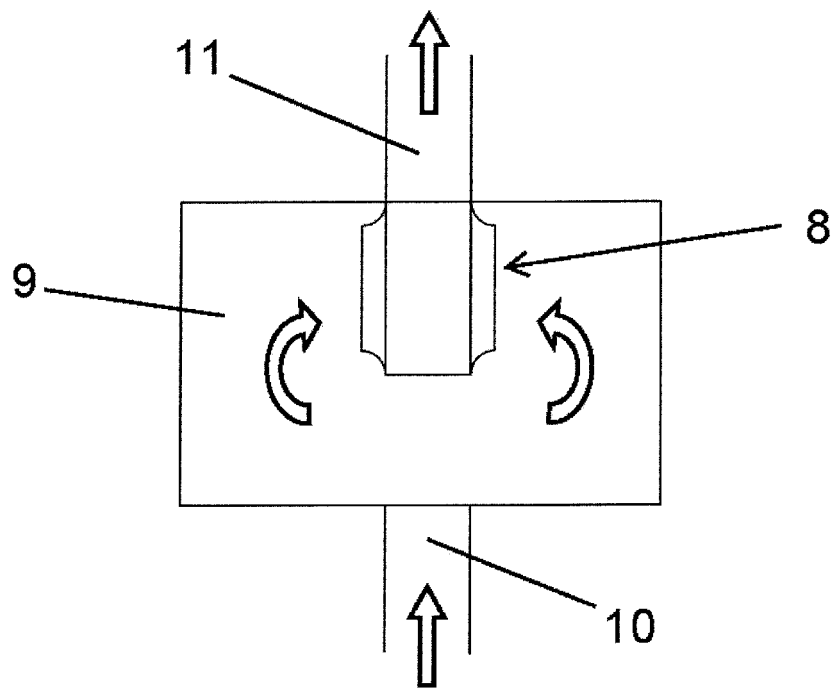


Fig. 1

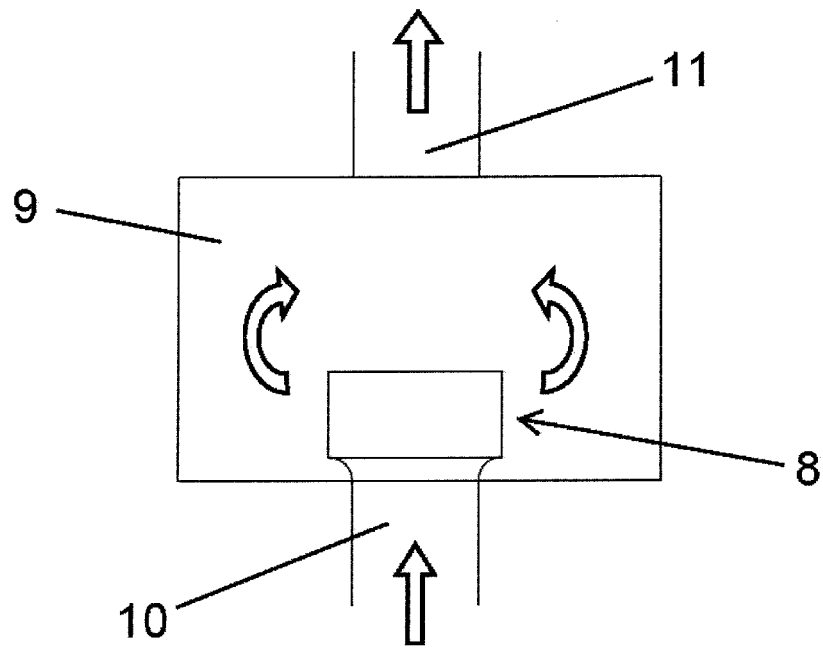


Fig. 2

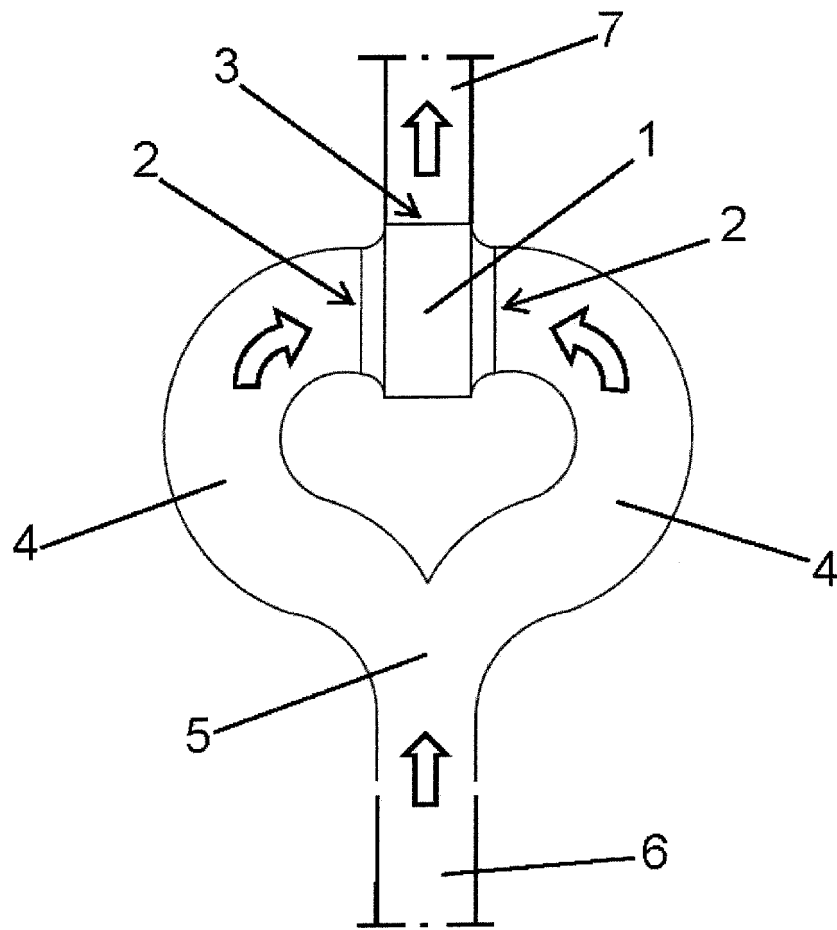


Fig. 3

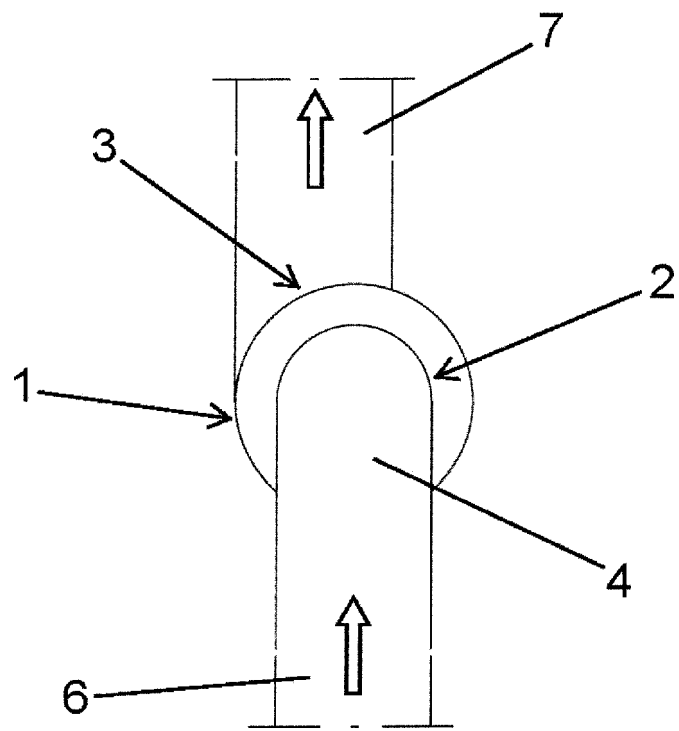


Fig. 3A

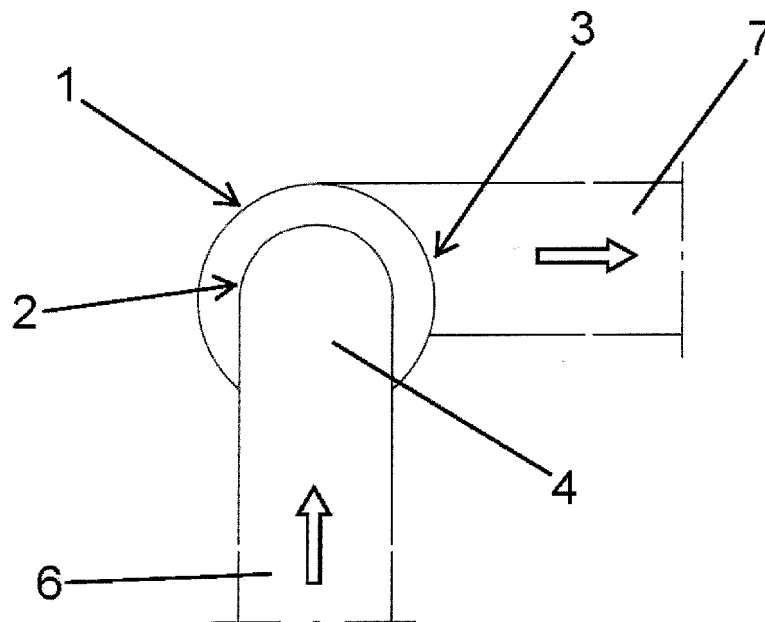


Fig. 3B

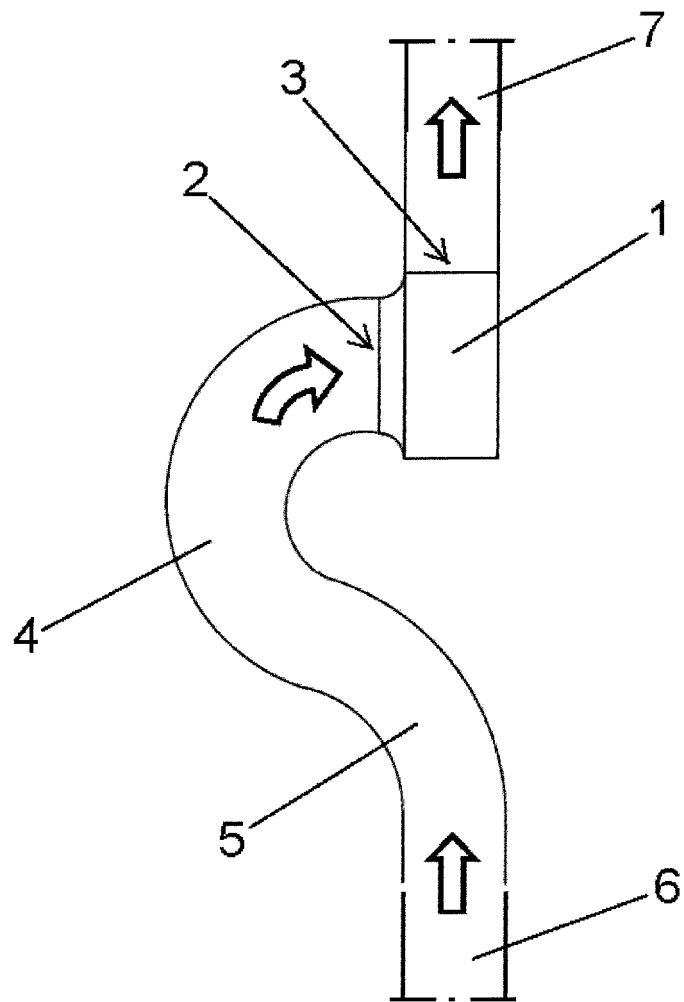


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070790

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F04D, F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 2357365 A2 (BRINK CLIMATE SYSTEMS B V) 17/08/2011, the whole document and especially: claim 1, figure 22, figures 1 - 4.	1-3
Y	US 2344456 A (JOHN CASSIE) 14/03/1944, column 1, lines 43 - 48; column 2, lines 3 - 14; column 2, lines 15 - 38; figures 1 - 2.	1-3

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document but published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"O" document referring to an oral disclosure use, exhibition, or other means.	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
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Date of mailing of the international search report
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Name and mailing address of the ISA/

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Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2014/070790

Information on patent family members

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
EP2357365 A2	17.08.2011	US2011217182 A1	08.09.2011
US2344456 A	14.03.1944	NONE	

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INTERNATIONAL SEARCH REPORT

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CLASSIFICATION OF SUBJECT MATTER

F04D17/16 (2006.01)

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F04D29/52 (2006.01)

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F24F13/02 (2006.01)

F24F7/08 (2006.01)

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