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(54) **Louvre**

(57) The present invention relates to a louvre (1), comprising at least two substantially horizontal, spaced-apart blades (2) which are arranged parallel to one another and which delimit an air flow duct (3) for air to flow through from an inlet opening (4) to an outlet opening (5), in which each blade (2) comprises an upwardly directed part (2a) adjacent to the inlet opening (4) and comprises a substantially flat or downwardly directed part (2b) adjacent to the outlet opening (5), and in which the watertightness is increased still further, substantially without affecting the ventilation capacity, by providing the air flow duct (3) with a sudden depression (D) between the upwardly directed part (2a) and the substantially flat or downwardly directed part (2b).

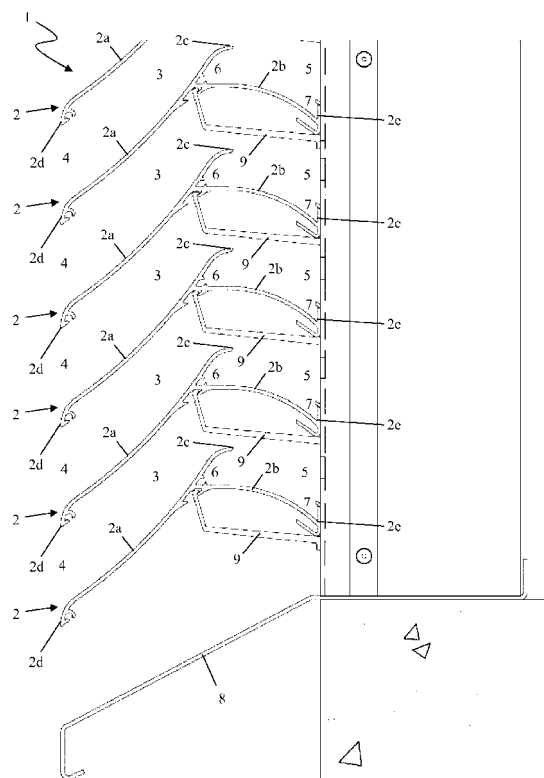


FIG. 1

Description

[0001] The present invention relates to a louvre, comprising at least two substantially horizontal, spaced-apart blades which are arranged parallel to one another and which delimit an air flow duct for air to flow through from an inlet opening to an outlet opening, in which each blade comprises an upwardly directed part adjacent to the inlet opening and comprises a substantially flat or downwardly directed part between this upwardly directed part and the outlet opening.

[0002] Such louvres are, for example, known as wall ventilators or as window ventilators or louvre walls.

[0003] A significant problem associated with louvres which are placed between a technical installation and the open air as a partition or as grille at the end of ventilation tubes of a ventilation device, etc. is the fact that, on the one hand, they are provided as protection against the environment and therefore also have to be watertight, but, on the other hand, they have to provide sufficient ventilation of this technical installation or air flow through the ventilation tubes and therefore have to guarantee a sufficiently large ventilation capacity.

[0004] As is the case with the blades according to the preamble of the first claim, it is already known to provide the blades of such a louvre with an upwardly directed part adjacent to the inlet opening as a barrier against rain which impinges on the louvre and with a downwardly directed part between this upwardly directed part and the outlet opening in order to drain off rain which the upwardly directed part has not been able to block but which has impinged on the downwardly directed part on account of the force of gravity, via said downwardly directed part into, for example, a channel at the end of the blade. Optionally, a second upwardly directed part is then provided between said downwardly directed part and the outlet opening as without this forced change in direction, it has been found to be very difficult to block drops which are entrained by the inflowing air. It is therefore important that the upwardly directed parts provide a sufficiently high barrier over which the water has to be forced. In this way, it is possible to guarantee both a high ventilation capacity and a high watertightness.

[0005] This known solution is particularly suitable to block water from inflowing air (wind), but in many cases not sufficient to block water from air flowing through (ventilation) to a sufficient degree.

[0006] It is an object of the present invention to increase the watertightness of such a louvre still further, in which water from air flowing through (ventilation) is also blocked to a sufficient degree, substantially without reducing the ventilation capacity.

[0007] This object of the invention is achieved by providing a louvre, comprising at least two substantially horizontal, spaced-apart blades which are arranged parallel to one another and which delimit an air flow duct for air to flow through from an inlet opening to an outlet opening, in which each blade comprises an upwardly directed part

adjacent to the inlet opening and comprises a substantially flat or downwardly directed part between this upwardly directed part and the outlet opening, and in which the air flow duct is provided with a sudden depression between the upwardly directed part and the substantially flat or downwardly directed part.

[0008] Such a sudden depression has a particularly advantageous effect on the air flow, in which case a large part of the water in the air which flows through and which is not blocked by the upwardly directed part of the blade and still remains in the centre of the air flow duct, also precipitates onto the bottom blade which delimits the air flow duct. As a result of this sudden widening, the air velocity between the blades is lowered as much as possible in order to give drops the opportunity to fall onto the blades. This sudden widening has to be provided downstream of the upwardly directed part, and therefore in fact after a curve, in order to be able to achieve the intended effect. If this sudden widening were to be provided in the upwardly directed part, the water could be blown behind the widening by the inflowing wind, as a result of which the widening would lose its effect.

[0009] Said sudden depression is preferably substantially formed by a dip in the top surface of the blade which delimits the air flow duct at the bottom.

[0010] Downstream of the sudden depression, preferably as few obstacles as possible are provided in the air flow duct in order to affect the air flow as little as possible downstream of this sudden widening and in order not to limit the ventilation capacity unnecessarily. In practice, a reinforcement element and/or a channel, etc. will be provided at the end of the blade, at the location of the outlet opening. However, the top surface of each blade preferably has a substantially flowing shape between the sudden depression and the outlet opening.

[0011] Preferably, as few obstacles in the air flow duct as possible are also provided upstream of the sudden depression in order to allow for the largest possible ventilation capacity. In practice, a reinforcement element will, for example, usually be provided at the end of the blade, at the location of the inlet opening. However, the top surface of each blade preferably has a substantially flowing shape between the inlet opening and the sudden depression.

[0012] Preferably, the height of the air flow duct for the remainder stays substantially constant between the sudden depression and the outlet opening, essentially up to the outlet opening. As has already been mentioned, fastening elements, a channel, etc. are often provided at this outlet opening in practice which will locally limit the height of the air flow duct at the location of the outlet opening. However, the height of the air flow duct between the sudden depression and the outlet opening is preferably kept as constant as possible.

[0013] The sudden depression of a particular embodiment of a louvre according to the invention is situated, viewed in the direction of air through-flow, beyond the halfway point of the depth of the blades. Still more pref-

erably, the blades in this case have an upwardly directed part which occupies at least half the depth of the blades in order to ensure a sufficiently large barrier against impinging rain.

[0014] Preferably, the top side of each blade of a louvre according to the present invention is provided with a pocket with an access opening which is turned towards the outlet opening. In this case, such a pocket extends along the length of the blade.

[0015] Such a pocket has another particularly advantageous increasing effect on the air flow, in which case a large portion of the rain which still remains centrally in the air flow duct beyond the sudden widening of the blade, is precipitated on the bottom blade which delimits the air flow duct.

[0016] Such a pocket is preferably arranged between the upwardly directed part and the substantially flat or downwardly directed part and, still more preferred, forms a transition between the upwardly directed part and the substantially flat or downwardly directed part.

[0017] In a specific preferred embodiment of a louvre according to the present invention, the substantially flat or downwardly directed part substantially adjoins the outlet opening.

[0018] In a particularly preferred embodiment of a louvre according to the invention, the sudden depression is between substantially 1/3 and substantially 1/2 of the average height of the air flow duct at the location of the flat or downwardly directed part.

[0019] The end of each blade at the location of the outlet opening of a louvre according to the present invention is preferably situated in a higher position than the end of said blade at the location of the inlet opening. Furthermore, the height of the upwardly directed part is preferably greater than the average height of the air flow duct at the location of said upwardly directed part. In turn, the height of the substantially flat or downwardly directed part is preferably smaller than the average height of the air flow duct at the location of said flat or downwardly directed part.

[0020] The present invention will now be described in more detail by means of the following detailed description of some preferred embodiments of louvres according to the present invention. The aim of this description is solely to give illustrative examples and to indicate further advantages and features of these louvres, and can therefore by no means be interpreted as a limitation of the area of application of the invention or of the patent rights defined in the claims.

[0021] In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- **Fig. 1** shows a preferred embodiment of a louvre according to the present invention in cross section;
- **Fig. 2** shows two blades in the louvre from Fig. 1 separately in cross section;
- **Fig. 3** shows a simulation of the air flow through an existing louvre with the same parameters as the lou-

vre from Fig. 1, but without sudden widening;

- **Fig. 4** shows a simulation of the air flow through the louvre from Fig. 1.

[0022] The embodiment of a louvre (1) according to the invention as illustrated in Fig. 1 comprises several horizontal, spaced-apart blades (2) which are arranged parallel to one another. In this case, every two successive blades (2) in each case delimit an air flow duct (3) for air to flow through from an inlet opening (4) to an outlet opening (5). As is already known, the blades (2) are in each case click-fitted onto holders (9) of the louvre (1). The louvre (1) furthermore comprises frame profiles (8) in order to be able to fit it in an opening in a wall. In this way, the louvre (1) is, for example, configured as a wall ventilator. Alternatively, a louvre (1) according to the invention may, for example, also be configured as a window ventilator or as a blade wall.

[0023] Adjacent to the inlet opening (4), the blades (2) comprise an upwardly directed part (2a). Adjacent to the outlet opening (5), the blades (2) comprise a downwardly directed part (2b). Between the upwardly directed part (2a) and the downwardly directed part (2b), the top side of each blade (2) comprises a pocket (6) with an access opening which faces the outlet opening (5). This pocket (6) creates a sudden depression (D) between the top (2c) of the blade at the highest spot of the upwardly directed part (2a) and the adjoining downwardly directed part (2b) of the blade (2). The downwardly directed part (2b) does not adjoin the top (2c) of the blade (2), but adjoins the upwardly directed part (2a) with a bend substantially along a distance of the sudden depression (D) just below said top (2c). On the bottom side, the blade (2) retains a substantially smooth surface. Only the connecting points by means of which the blade (2) is click-fitted onto a holder (9) of the louvre (1) interrupt the smooth surface underneath the blade (2). On the top side, the blade (2) has a substantially flowing shape, both in the upwardly directed part (2a) and in the downwardly directed part (2b). The sudden depression (D) creates an abrupt disturbance in the flowing shape of the top side of the blade (2). Furthermore, the end (2e) of the blade at the outlet opening (5) is provided with a channel (7) which forms the last limited disturbance of the flowing shape of the top side of the blade (2).

[0024] In this way, the blades (2) of this embodiment are substantially configured in the form of an inverted V shape. In other embodiments, the blades (2) could be provided with a second upwardly directed part downstream of the downwardly directed part (2b) and upstream of the outlet opening (5).

[0025] As can clearly be seen in Fig. 2, the upwardly directed part (2a) of the blades (2) extends across more than half the depth of the blades (2) and the height (H3) of this upwardly directed part (2a) is greater than the average height (H1) of the air flow duct (3) at the location of said upwardly directed part (2a) in order to form a sufficiently high barrier together with this upwardly directed

part (2a) for drops in the inflowing air. In this upwardly directed part (2a), the height (H1) of the air flow duct (3) gradually decreases between the inlet opening (4) and the top (2c) of the blades (2), as a result of which the air velocity between the blades (2) will increase slightly. The sudden depression (D) and the pocket (6) result in a sudden local deceleration in the air velocity, so that drops from the air flowing through can drop onto the downwardly directed part (2b) of the blades (2) beyond the top (2c) of the blades (2). The height (H2) of the air flow duct (3) between the sudden depression (D) and the outlet opening (5) is then substantially constant again in order not to unnecessarily disturb the air velocity further and not to limit the ventilation capacity unnecessarily. To this end, the height (H4) of the downwardly directed part (2b) is limited and is smaller than the average height (H2) of the air flow duct (3) at the location of said flat or downwardly directed part (2b). This height (H4) is chosen to be sufficiently large to enable water which lands on this downwardly directed part (2b) to quickly drain away to the channel (7) so that it can be drained off the louvre (1) via this channel (7) in a known manner. The downwardly directed part (2b) furthermore extends across less than half the depth of the blades (2), so that the end (2e) of each blade (2) at the location of the outlet opening (5) is in a higher position than the end (2d) of this blade (2) at the location of the inlet opening (4).

[0026] Figs. 3 and 4 clearly show that said effects on the air flow through the louvre (1) are actually being achieved. In these figures, a simulation compares the air flow through an existing louvre (Fig. 3) with the same parameters as the illustrated louvre (1) according to the invention with the air flow through this louvre (1) according to the invention (Fig. 4). The arrows in the figures in each case indicate the air velocity and the direction of the air flow at specific spots across the louvre (1). One such simulation is a so-called CFD simulation (i.e. Computational Fluid Dynamics). When comparing Figs. 3 and 4, it can clearly be seen that, due to the sudden depression (D) and the pocket (6), the air flow is indeed influenced in such a way that drops in the air flowing through can fall onto the downwardly directed part to a considerable extent without the ventilation capacity being excessively limited compared to the ventilation capacity of the existing louvre (1).

Claims

1. Louvre (1), comprising at least two substantially horizontal, spaced-apart blades (2) which are arranged parallel to one another and which delimit an air flow duct (3) for air to flow through from an inlet opening (4) to an outlet opening (5), in which each blade (2) comprises an upwardly directed part (2a) adjacent to the inlet opening (4) and comprises a substantially flat or downwardly directed part (2b) adjacent to the outlet opening (5), **characterized in that** the air flow

duct (3) is provided with a sudden depression (D) between the upwardly directed part (2a) and the substantially flat or downwardly directed part (2b).

2. Louvre (1) according to Claim 1, **characterized in that** the sudden depression (D) is substantially formed by a dip in the top surface of the blade (2) which delimits the air flow duct (3) at the bottom.
3. Louvre (1) according to one of the preceding claims, **characterized in that** the top surface of each blade (2) has a substantially flowing shape between the sudden depression (D) and the outlet opening (5).
4. Louvre (1) according to one of the preceding claims, **characterized in that** the top surface of each blade (2) has a substantially flowing shape between the inlet opening (2a) and the sudden depression (D).
5. Louvre (1) according to one of the preceding claims, **characterized in that** the height (H2) of the air flow duct (3) stays substantially constant between the sudden depression (D) and the outlet opening (5), essentially up to the outlet opening (5).
6. Louvre (1) according to one of the preceding claims, **characterized in that** the sudden depression (D) is situated, viewed in the direction of air through-flow, beyond the halfway point of the depth of the blades (2).
7. Louvre (1) according to one of the preceding claims, **characterized in that** the top side of each blade (8) is provided with a pocket (6) with an access opening which is turned towards the outlet opening (5).
8. Louvre (1) according to Claim 7, **characterized in that** the pocket (6) is arranged between the upwardly directed part (2a) and the substantially flat or downwardly directed part (2b).
9. Louvre (1) according to Claim 8, **characterized in that** the pocket (6) forms a transition between the upwardly directed part (2a) and the substantially flat or downwardly directed part (2b).
10. Louvre (1) according to one of the preceding claims, **characterized in that** the substantially flat or downwardly directed part (2b) substantially adjoins the outlet opening (5).
11. Louvre (1) according to one of the preceding claims, **characterized in that** the sudden depression (D) is between substantially 1/3 and substantially 1/2 of the average height (H2) of the air flow duct (3) at the location of the flat or downwardly directed part (2b).
12. Louvre (1) according to one of the preceding claims,

characterized in that the end (2e) of each blade (2) at the location of the outlet opening (5) is situated in a higher position than the end (2d) of said blade (2) at the location of the inlet opening (4).

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13. Louvre (1) according to one of the preceding claims, **characterized in that** the height (H3) of the upwardly directed part (2a) is greater than the average height (H1) of the air flow duct (3) at the location of said upwardly directed part (2a).

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14. Louvre (1) according to one of the preceding claims, **characterized in that** the height (H4) of the substantially flat or downwardly directed part (2b) is smaller than the average height (H2) of the air flow duct (3) at the location of said flat or downwardly directed part (2b).

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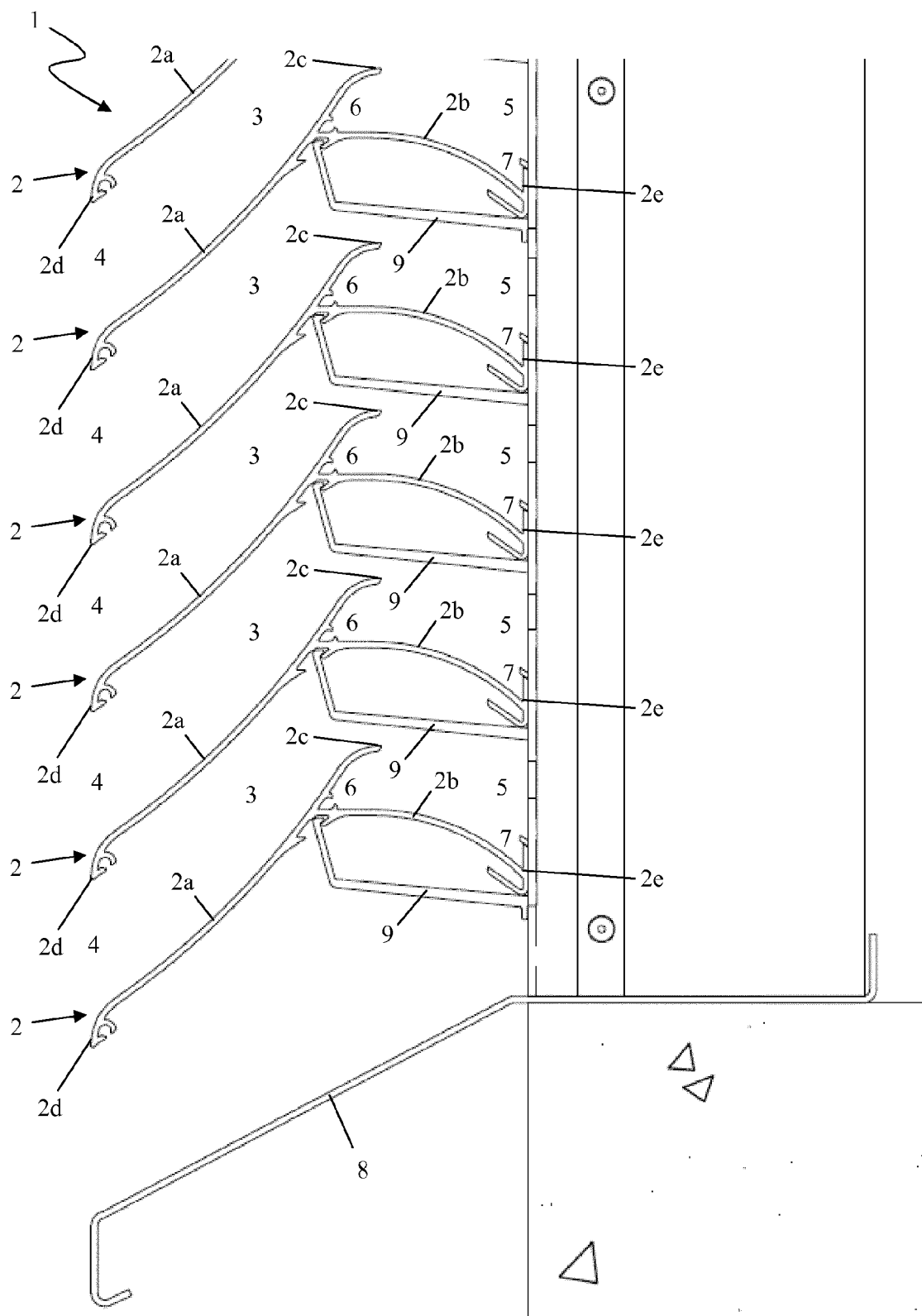


FIG. 1

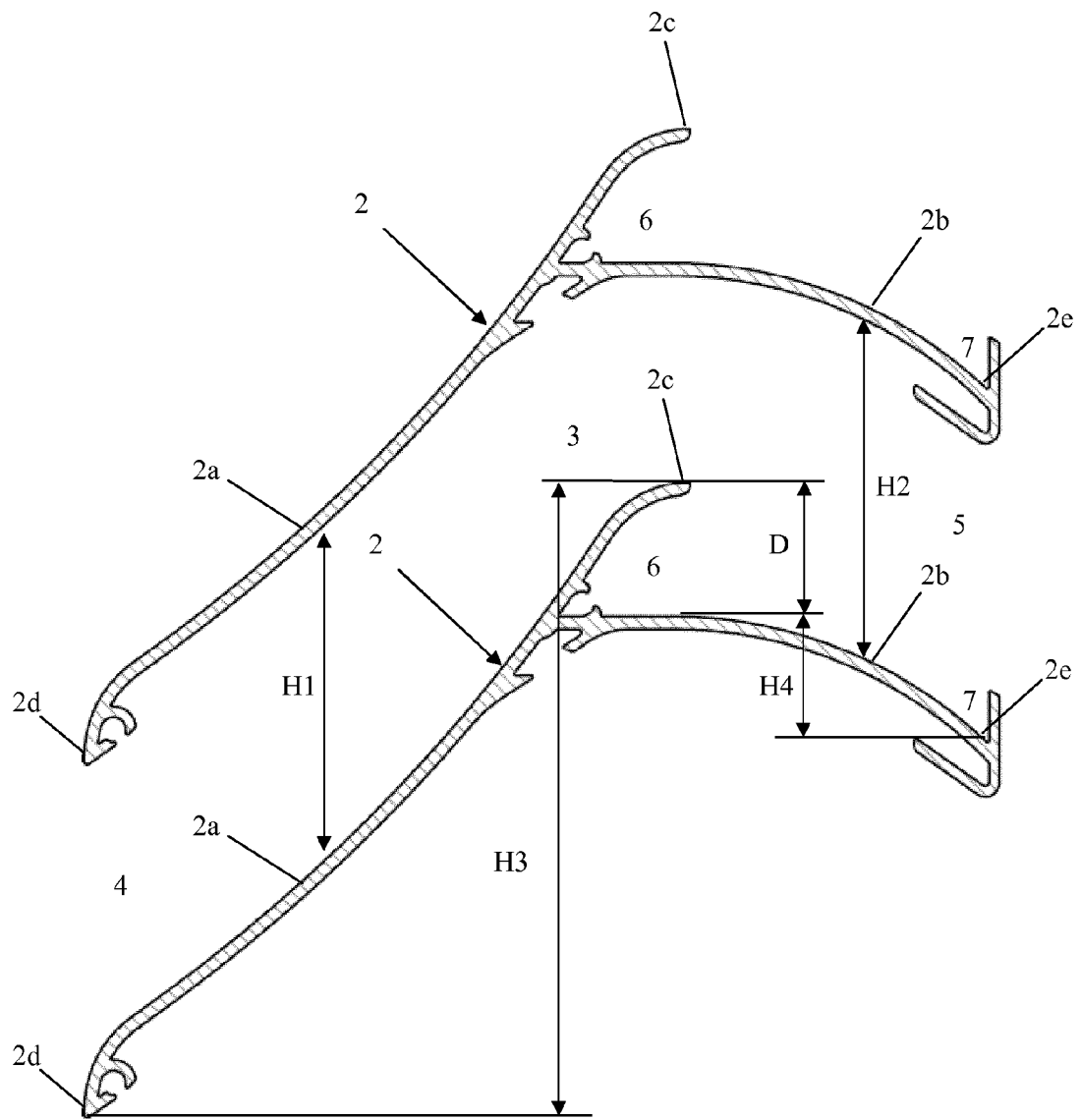


FIG. 2

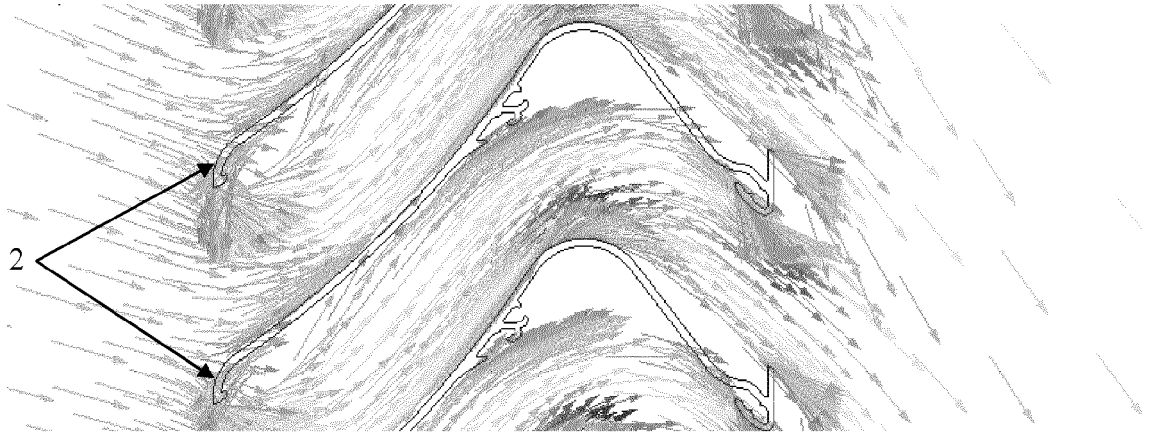


FIG. 3

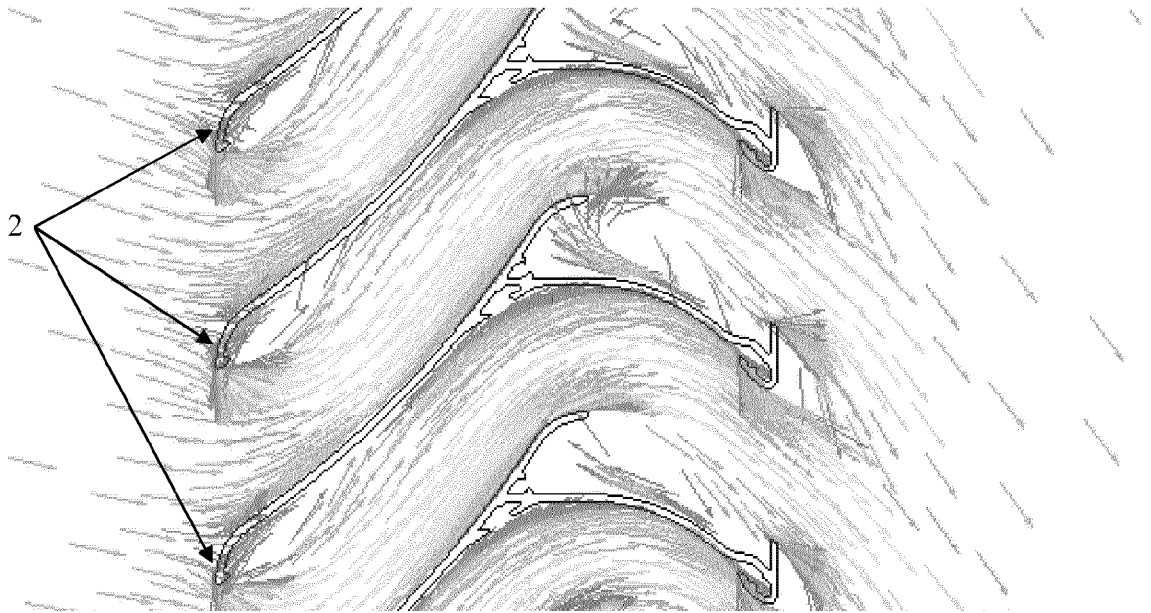


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 12 18 0075

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	WO 2009/044847 A1 (ROBIN HOOD CO LTD [JP]; TOKUI TERUO [JP]) 9 April 2009 (2009-04-09) * abstract; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) F24F E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 September 2012	Examiner Mattias Grenbäck
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 18 0075

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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07-09-2012

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