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

(11) EP 2 505 930 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.10.2012 Bulletin 2012/40

(51) Int Cl.:
F24F 11/04 *(2006.01)*

(21) Application number: **12161646.0**

(22) Date of filing: **28.03.2012**

(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

(30) Priority: **29.03.2011 BE 201100191**

(71) Applicants:
- **Renson Ventilation NV**
  8790 Waregem (BE)
- **Renson, Paul**
  9771 Nokere (BE)

(72) Inventor: **De Meulenaere, Rino Francky**
8800 Oekene (BE)

(74) Representative: **Hostens, Veerle et al**
KOB NV
Patents
President Kennedypark 31 C
8500 Kortrijk (BE)

(54) Ventilation device

(57) The present invention relates to a ventilation device, comprising a self-regulating valve (2), which is arranged in an air flow duct (1) so as to be tiltable between an open position and a closed position, in which said valve (2) is arranged on one or more supporting bodies (3) in the air flow duct (1) in such a manner that essentially a line contact (A) results between the valve (2) and the one or more supporting bodies (3), in which said ventilation device can be installed in roofs having different angles of inclination while retaining its self-regulating action, due to the fact that the centre of gravity (Z) of the valve (2) is situated next to the line contact (A) at each installation position and due to the fact that, in an installation position which is situated virtually in the middle between the outer installation positions, the centre of gravity (Z) of the valve (2) in the open position is situated in a virtually horizontal plane through the line contact (A) and the distance (X) between the line contact (A) and the centre of gravity (Z) is such that when the pressure difference across the valve (2) decreases, this valve (2) tilts to its open position.

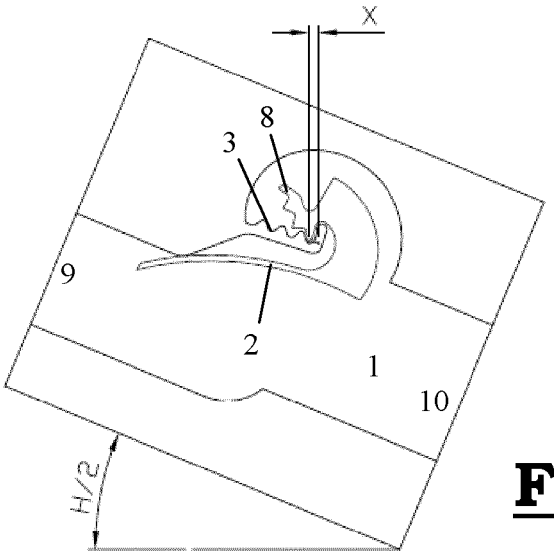

FIG. 5

EP 2 505 930 A1

Description

[0001] The present invention relates to a ventilation device, comprising an air flow duct and comprising a self-regulating valve which is arranged in the air flow duct so as to be tiltable between an open position and a closed position in order to regulate the air flow rate through this air flow duct depending on the pressure difference across the valve, in which said valve is arranged on one or more supporting bodies in the air flow duct in order for it to be positioned in the air flow duct.

[0002] The pressure differences across components of buildings, including ventilation facilities, are subject to constant change due to variations in temperature differences, wind speeds and wind directions, and the way in which the building is used (opening of doors and windows, use of ventilation devices). As a result, the air flow rate of conventional ventilation devices is constantly changing. Certain ventilation devices are provided with an automatic adjustment of the air flow opening (cross section of the passage) which consequently also adjusts the air flow rate depending on the pressure difference across the ventilation grille (the ventilation device). Such grilles are known, inter alia, from NL 1 025 600 C2, EP 0 606 945 A1, NL 1 014 499 C, EP 2 051 020 A1, EP 0 362 913 A1, EP 0503 722 A1, NL 9 102 132 A, etc. and are usually referred to as self-regulating.

[0003] For regulating purposes, such self-regulating ventilation grilles may be provided with a self-regulating valve which automatically changes the cross section of the passage or the air flow opening of a ventilation device when the pressure difference across the ventilation device changes. The present invention relates to such a ventilation device which operates without an actuator or motor (with an autonomous self-regulating valve).

[0004] Above a certain pressure difference across the ventilation device, the self-regulating valve ensures a more or less constant air flow rate at increasing pressure difference. The nominal pressure difference at which the air flow rate has to be kept constant in order to define the ventilation device as self-regulating, differs from country to country due to different standards or legislation; e.g. in the Netherlands from 1 Pa, in Belgium from 2 Pa. In The Netherlands, the Building Decree stipulates that the air flow rate in a self-regulating ventilator should not differ by more than 20% from the nominal flow rate at 1 Pa, and this across a pressure range of 1 to 25 Pa. In Belgium, a similar stipulation applies with respect to the nominal air flow rate at 2 Pa and, furthermore, a distinction is made between classes with a certain degree of adjustment depending on the pressure difference. Except for the difference in nominal air flow rate, the requirements for the most stringent class in Belgium correspond to those of the Netherlands.

[0005] However, the current self-regulating ventilation devices which meet these standards can never be installed at different angles of inclination. There are a number of self-regulating ventilation devices for installing in a pitched roof which meet the standards for a specific pitch of the roof. However, as soon as these are installed in a roof with a pitch which deviates from the pitch for which these ventilation devices are designed, they lose their self-regulating action.

[0006] It is therefore an object of the present invention to provide a ventilation device which can be installed in roofs with different pitches while retaining the self-regulating action which meets the standards specified or legislation for any roof pitch and at least for so-called Belgian class P3.

[0007] The object of the present invention is achieved by providing a ventilation device, comprising an air flow duct and comprising a self-regulating valve which is arranged in the air flow duct so as to be tiltable between an open position and a closed position in order to regulate the air flow rate through this air flow duct depending on the pressure difference across the valve, in which this valve is arranged on one or more supporting bodies in the air flow duct in order for it to be positioned in the air flow duct in such a manner that essentially a line contact results between the valve and the one or more supporting bodies, in which the ventilation device can be installed in an installation position between a first outer installation position and a second outer installation position, in which the main direction of the flow of the air in the air flow duct is at an angle of inclination with respect to the main direction of the flow of the air in the air flow duct in the first outer installation position, in which the centre of gravity of the valve is situated next to said line contact at each installation position, viewed in the main direction of the flow of the air in the air flow duct, and in which, in an installation position which is situated virtually in the middle between the first outer installation position and the second outer installation position, the centre of gravity of the valve in the open position of the valve is situated in a virtually horizontal plane through the line contact and the distance between the line contact and the centre of gravity is such that when the pressure difference across the valve decreases, this valve tilts to its open position.

[0008] During tilting of the valve between its open position and its closed position, this valve effectively rolls over the one or more supporting bodies. As a result of this rolling, an increasing resistance to angular rotation of the valve is produced on account of the changing pressure difference across the valve. This results in a good self-regulating ability of the valve.

[0009] Due to the specific construction of the valve, based on the positioning of the centre of gravity of this valve with respect to the line contact between this valve and the one or more supporting bodies, the self-regulating function of the valve can be retained for different installation positions at different angles of inclination of the ventilation body. Depending on the desired class of controllability, the range of installation positions will be greater or smaller (the angle of inclination between the first outer installation position and the second outer installation position is then greater or smaller).

[0010] In a specific embodiment of a ventilation device according to the present invention, the line contact assumes different positions when tilting the valve between the open position and the closed position.

[0011] More specifically, at the location of the one or more supporting bodies, the valve comprises several ribs which extend essentially in the longitudinal direction of the valve and one or more cavities which are delimited at least partly by the ribs.

[0012] Preferably, the one or more supporting bodies in such embodiments comprise several cavities, corresponding to the ribs of the valve and one or more ribs which delimit the cavities at least partly, corresponding to the one or more cavities of the valve.

[0013] Due to the ribs of the valve and the one or more supporting bodies, and the corresponding cavities, the tendency of the valve to slide across the one or more supporting bodies is reduced. Even if said valve would like to slide across the valve, for example on account of a sudden change in pressure, then this valve can automatically return to its correct position due to these ribs and cavities and on account of the force of gravity.

[0014] The ribs of the valve and/or of the one or more supporting bodies preferably determine the various positions of the line contact.

[0015] In a more preferred embodiment of a ventilation device according to the present invention, the valve comprises one or more hook elements, with the ribs and the one or more cavities of the valve being provided in said one or more hook elements. These hook elements may, more specifically, be provided locally. Preferably, the one or more supporting bodies are also essentially hook-shaped.

[0016] The one or more hook elements of the valve then preferably hook over the one or more essentially hook-shaped supporting bodies to arrange the valve on the one or more supporting bodies. These hook shapes provide additional security in order to ensure that the valve can always return to its correct position on the one or more supporting bodies. These hook shapes may partly prevent that, for example when a sudden gust of wind passes through the air flow duct, the valve will be lifted off the one or more supporting bodies on account of this gust of wind.

[0017] In a particular embodiment of a ventilation device according to the present invention, the valve is designed as one or more injection mouldings.

[0018] More particularly, the valve may be designed as different valve parts which are coupled together and adjoin one another in the longitudinal direction.

[0019] By designing the valve as an injection moulding, it is possible to produce hook elements with ribs and cavities in a simpler manner than with the conventional techniques of producing valves for ventilation devices. However, when such a valve is designed as an injection moulding, its length is more limited than the standard lengths for valves in similar ventilation devices. In order to be able nevertheless to fit a valve which is produced by injection-moulding across the entire standard length of ventilation devices, it is now possible to make such a valve from various valve parts which are coupled to one another so that they adjoin one another in the longitudinal direction.

[0020] In order to be able to couple these valve parts to one another in a simple manner, these valve parts, on the sides by means of which they adjoin one another, may be provided with a pin or a hole which corresponds to the pin, respectively, so that the valve parts can be coupled together by inserting the pin into the corresponding hole.

[0021] A particular ventilation device according to the present invention can be installed, in its first outer installation position, in a roof having a roof pitch of virtually 30°. A further particular ventilation device according to the present invention can be installed, in its second outer installation position, in a roof having a roof pitch of virtually 60°.

[0022] The present invention will now be explained in more detail with reference to the following detailed description of some preferred ventilation devices according to the present invention. The sole aim of this description is to present illustrative examples and to indicate further advantages and particulars of these ventilation devices 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.

[0023] In this detailed description, reference numerals are used to refer to the attached drawings, in which

- ***Fig. 1a*** diagrammatically shows a first ventilation grille according to the present invention in the first outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;
- ***Fig. 1b*** shows a detail from Fig. 1a at the location where the valve is mounted on the supporting body;
- ***Fig. 2a*** diagrammatically shows the first ventilation grille according to the present invention from Fig. 1a, in an installation position which is situated virtually in the middle between the first outer installation position and the second outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;
- ***Fig. 2b*** shows a detail from Fig. 2a at the location where the valve is mounted on the supporting body;
- ***Fig. 3a*** diagrammatically shows the first ventilation grille according to the present invention from Fig. 1a in the second outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;
- ***Fig. 3b*** shows a detail from Fig. 3 a at the location where the valve is mounted on the supporting body;
- ***Fig. 4*** diagrammatically shows a second ventilation grille according to the present invention in the first

outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;

- ***Fig. 5*** diagrammatically shows the second ventilation grille according to the present invention from Fig. 4, in an installation position which is virtually in the middle between the first outer installation position and the second outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;
- ***Fig. 6*** diagrammatically shows the second ventilation grille according to the present invention from Fig. 4 in the second outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its open position;
- ***Fig. 7a*** diagrammatically shows the second ventilation grille according to the present invention from Fig. 4 in the first outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in a position close to its open position;
- ***Fig. 7b*** shows a detail from Fig. 7a at the location where the valve is mounted on the supporting body;
- ***Fig. 8*** diagrammatically shows the second ventilation grille according to the present invention from Fig. 7a in the first outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in a position between its open position and its closed position;
- ***Fig. 9a*** diagrammatically shows the second ventilation grille according to the present invention from Fig. 7a in the first outer installation position, in a cross section of a part of the air flow duct at the location of the self-regulating valve which is in its closed position;
- ***Fig. 9b*** shows a detail from Fig. 9a at the location where the valve is mounted on the supporting body;
- ***Fig. 10*** shows a side view of a valve part of the self-regulating valve from the second ventilation grille according to the present invention from Fig. 4a;
- ***Fig. 11*** shows a perspective view of the valve part from Fig. 10 with its hook elements directed to the rear;
- ***Fig. 12*** shows a perspective view of the valve part from Fig. 10 with its hook elements directed to the front;
- ***Fig. 13*** shows a perspective view of a detail of two valve parts of the self-regulating valve from the second ventilation grille according to the present invention from Fig. 4a at the location of their coupling and in a position in which they are coupled together;
- ***Fig. 14*** shows a perspective view of a detail of the two valve parts from Fig. 13 at the location of their coupling and in a position in which they are uncoupled from one another.

[0024] Ventilation grilles according to the present invention are designed to be installed in a pitched roof for supplying air from the environment to spaces under this roof.

[0025] To this end, the illustrated ventilation grilles in each case comprise an air flow duct (1). A self-regulating valve (2) is arranged in this air flow duct (1) for regulating the air flow rate between an inlet (9) and an outlet (10) of this air flow duct (1) depending on the pressure difference across the valve (2).

[0026] The air flow duct (1) comprises a supporting body (3) on which the valve (2) is arranged by means of hook elements (8) in such a manner that essentially a line contact (A) results between the valve (2) and the supporting body (3). In this way, the valve (2) is tiltable in the air flow duct (1) between an open position, in which the air flow duct (1) is open virtually completely and a closed position, in which the air flow duct (1) is closed virtually completely by means of this valve (2). When the pressure difference across the valve (2) increases, the latter moves towards its closed position, whereas this valve (2) tilts to its open position when the pressure difference across the valve (2) decreases.

[0027] The ventilation grilles according to the present invention can be installed in an installation position between a first outer installation position and a second outer installation position. In Fig. 1a, the first illustrated embodiment of a ventilation grille according to the present invention is shown in its first outer installation position, whereas this embodiment is shown in its second outer installation position in Fig. 3a. Analogously, the second illustrated embodiment of a ventilation grille according to the present invention is shown in its first outer installation position in Fig. 4, whereas this embodiment is shown in its second outer installation position in Fig. 6. In each case, the ventilation grille is in the second outer installation position at a maximum angle of inclination (H) with respect to the first outer installation position. In Figs. 2a and 5, respectively, the first and the second embodiment are shown in an installation position which is virtually in the middle between the first outer installation position and the second outer installation position. In this central installation position, the ventilation grille is in each case virtually below half the maximum angle of inclination (H/2) with respect to the first outer installation position, whereas the ventilation grille is below half the maximum angle of inclination (H/2) with respect to the central installation position in the second outer installation position.

[0028] In order to ensure the self-regulating action of the self-regulating valve (2) in every installation position between the first outer installation position and the second installation position, the valve (2) is designed in such a way that the centre of gravity (Z) of this valve (2) is situated next to said line contact (A) in each installation position. This is clearly illustrated in Figs. 1b, 2b and 3b for the first embodiment and clearly illustrated in Figs. 4 to 9b for the second embodiment, in which case it can

be seen in each case that the distance (X, X', Xmin, Xmax) between the projection of the centre of gravity (Z) of the valve (2) on a horizontal plane through the line contact (A) and the line contact (A) in each case differs from 0.

[0029] The distance (X) between the line contact (A) and the centre of gravity (Z) of the valve (2) in the central installation position is furthermore in each case chosen such that when the pressure difference across the valve (2) decreases, this valve (2) will tilt to its open position.

[0030] In the illustrated embodiments, the supporting body (3) is in each case provided at the top side of the air flow duct (1) and the valve (2) arranged thereon can be tilted counterclockwise from its open position to its closed position. The inlet (9) of the air flow duct (1) is situated on the left and the outlet (10) on the right. In this case, the centre of gravity (Z) is then situated to the right of the line contact (A). If the valve (2) were to be designed such that it could tilt clockwise from its open position to its closed position, the centre of gravity (Z) would have to be situated to the left of the line contact (A). Alternatively, the supporting body (3) could also be installed, for example on the bottom side of the air flow duct (1). If a valve (2) which is arranged thereon could be tilted clockwise from its open position to its closed position, the centre of gravity (Z) would be situated to the left of the line contact (A). If a valve (2) which is arranged thereon could be tilted counterclockwise from its open position to its closed position, the centre of gravity (Z) would be situated to the right of the line contact (A). If the inlet (9) of the air flow duct (1) is situated on the right and the outlet (10) on the left, everything can simply be mirrored.

[0031] In each of the illustrated embodiments, the supporting body (3) is designed to be essentially hook-shaped and the valve (2) is also essentially hook-shaped, with the valve (2) being hooked over the hook-shaped supporting body (3). In this way, the risk of the valve (2) becoming completely detached from the supporting body (3) is limited significantly as, when the latter is, for example, unhooked temporarily on account of, for example, a sudden change in pressure across the valve (2), the hook shape ensures that the valve (2) will automatically engage on the supporting body (3) back in the correct position on account of the force of gravity.

[0032] In the second embodiment in Figs. 4 to 14, the valve (2) is to this end provided with hook elements (8) which are shorter than the length of the valve (2). At the location of the supporting body (3), each of these hook elements (8) is provided with four ribs (4) which extend essentially in the longitudinal direction of the valve (2) and delimit three cavities. The supporting body (3) is provided with four cavities which correspond to the ribs (4) of the valve (2) and with three ribs (5) which correspond to the cavities of the valve (2). When the valve (2) tilts, it is alternately supported by one of its ribs (4) in a cavity of the supporting body (3) or by one of the ribs (5) of the supporting body (3) in one of its cavities. In each case, a line contact (A) is produced in this manner, in which case this line contact (A) is determined by the ribs (4, 5) of the valve (2) and the supporting body (3). In this way, the line contact (A) assumes different positions when the valve (2) tilts between its open position and its closed position, as is illustrated in Figs. 7b and 9b.

[0033] Due to the ribs (4) of the valve (2) and the ribs (5) of the supporting body (3) and the corresponding cavities, the tendency of the valve (2) to slide across the supporting body during its tilting or rolling movement is reduced. Even if the valve (2) would like to slide, for example on account of a sudden change in pressure across the valve (2), this valve (2) can automatically return to its correct position due to these ribs (4, 5) and cavities and on account of the force of gravity.

[0034] As is illustrated in Figs. 10 to 14, the self-regulating valve (2) of the second embodiment is composed of several valve parts (2a, 2b), which are coupled to one another in such a manner that they adjoin one another in the longitudinal direction. By designing the valve (2) as an injection moulding, it is easier to produce local hook elements (8) with ribs (4) and cavities than when using conventional techniques for producing valves (2) for ventilation grilles. However, when such a valve (2) is designed as an injection moulding, its length is more limited than the standard lengths for valves (2) in similar ventilation devices. In order to be able nevertheless to fit a valve (2) which is produced by injection-moulding across the entire standard length of ventilation devices, it is now possible to make such a valve (2) from various valve parts (2a, 2b) which are coupled to one another so that they adjoin one another in the longitudinal direction. In order to be able to couple these valve parts (2a, 2b) to one another, they are, on the sides by means of which they adjoin one another, provided with a pin (6) or a hole (7) which corresponds to the pin (6), respectively, so that the valve parts (2a, 2b) can be coupled together by inserting the pin (6) into the corresponding hole (7).

[0035] The shape of the valve (2) from the first embodiment is simpler and may be produced, for example, by extrusion in a conventional manner.

[0036] The illustrated valves (2) are in each case of rigid design. In alternative embodiments, these valves (2) could, for example, also be at least partly made of soft material in order to prevent banging, for example. Valves (2) could also, viewed in cross section, consist of several parts and could, for example, be made from heavier and lighter parts in order to achieve a satisfactory positioning of the centre of gravity (Z).

Claims

1. Ventilation device, comprising an air flow duct (1) and comprising a self-regulating valve (2), which is arranged in the air flow duct (1) so as to be tiltable between an open position and a closed position in order to regulate the air flow rate through this air flow duct (1) depending on the pressure difference across

the valve (2), in which said valve (2) is arranged on one or more supporting bodies (3) in the air flow duct (1) in order for it to be positioned in the air flow duct (1) in such a manner that essentially a line contact (A) results between the valve (2) and the one or more supporting bodies (3), **characterized in that** the ventilation device can be installed in an installation position between a first outer installation position and a second outer installation position, in which the main direction of the flow of the air in the air flow duct (1) is at an angle of inclination (H) with respect to the main direction of the flow of the air in the air flow duct (1) in the first outer installation position, **in that** the centre of gravity (Z) of the valve (2) at each installation position is situated next to said line contact (A), viewed in the main direction of the flow of the air in the air flow duct (1), and **in that**, in an installation position which is situated virtually in the middle between the first outer installation position and the second outer installation position, the centre of gravity (Z) of the valve (2) in the open position of the valve (2) is situated in a virtually horizontal plane through the line contact (A) and the distance (X) between the line contact (A) and the centre of gravity (Z) is such that when the pressure difference across the valve (2) decreases, this valve (2) tilts to its open position.

2. Ventilation device according to Claim 1, **characterized in that** the line contact (A) assumes different positions when tilting the valve (2) between the open position and the closed position.

3. Ventilation device according to one of the preceding claims, **characterized in that** the valve (2), at the location of the one or more supporting bodies (3), comprises several ribs (4) which extend essentially in the longitudinal direction of the valve (2) and one or more cavities which are delimited at least partly by the ribs (4).

4. Ventilation device according to Claim 3, **characterized in that** the one or more supporting bodies comprise several cavities, corresponding to the ribs (4) of the valve (2) and one or more ribs (5) which delimit the cavities at least partly, corresponding to the one or more cavities of the valve (2).

5. Ventilation device according to Claims 2 and 3 or 4, **characterized in that** the ribs (4, 5) of the valve and/or of the one or more supporting bodies determine the various positions of the line contact (A).

6. Ventilation device according to one of the preceding claims, **characterized in that** the valve (2) comprises one or more hook elements (8), with the ribs (4) and the one or more cavities of the valve (2) being provided in said one or more hook elements (8).

7. Ventilation device according to Claim 6, **characterized in that** the hook elements (8) are constructed locally.

8. Ventilation device according to one of the preceding claims, **characterized in that** the one or more supporting bodies (3) are essentially hook-shaped.

9. Ventilation device according to Claims 6 or 7 and 8, **characterized in that** the one or more hook elements (8) of the valve (2) hook over the one or more essentially hook-shaped supporting bodies (3) to arrange the valve (2) on the one or more supporting bodies (3).

10. Ventilation device according to one of the preceding claims, **characterized in that** the valve (2) is designed as one or more injection mouldings.

11. Ventilation device according to one of the preceding claims, **characterized in that** the valve (2) is designed as different valve parts (2a, 2b) which are coupled together and adjoin one another in the longitudinal direction.

12. Ventilation device according to Claim 11, **characterized in that** the valve parts (2a, 2b), on the sides by means of which they adjoin one another, are provided with a pin (6) or a hole (7) which corresponds to the pin (6), respectively, so that the valve parts (2a, 2b) can be coupled together by inserting the pin (6) into the corresponding hole (7).

13. Ventilation device according to one of the preceding claims, **characterized in that** the ventilation device, in its first outer installation position, can be installed in a roof having a roof pitch of virtually 30°.

14. Ventilation device according to one of the preceding claims, **characterized in that** the ventilation device, in its second outer installation position, can be installed in a roof having a roof pitch of virtually 60°.

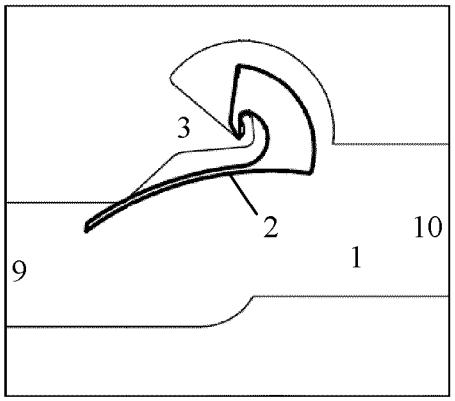

FIG. 1a

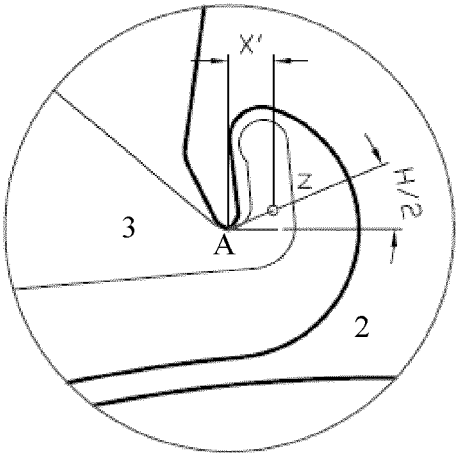

FIG. 1b

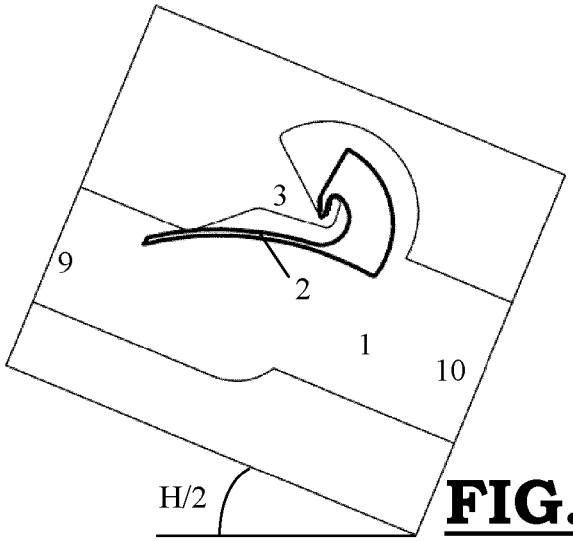

FIG. 2a

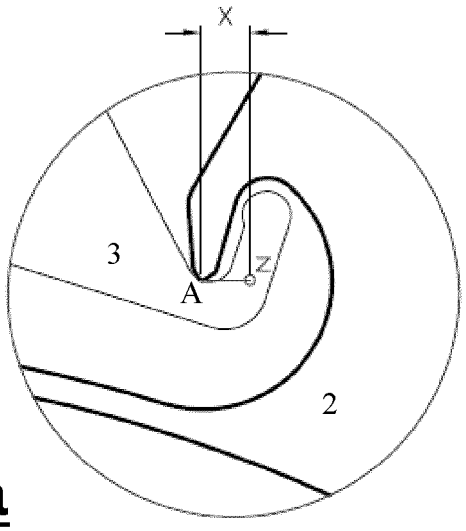

FIG. 2b

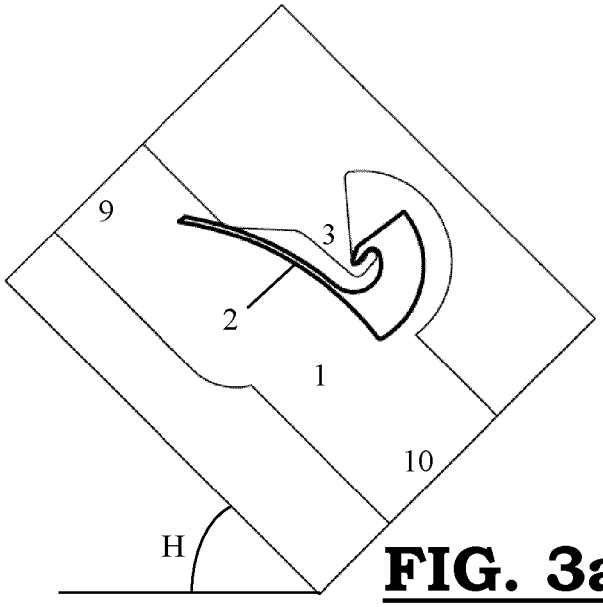

FIG. 3a

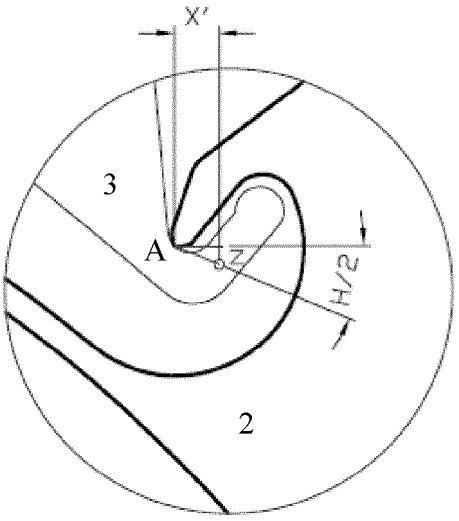

FIG. 3b

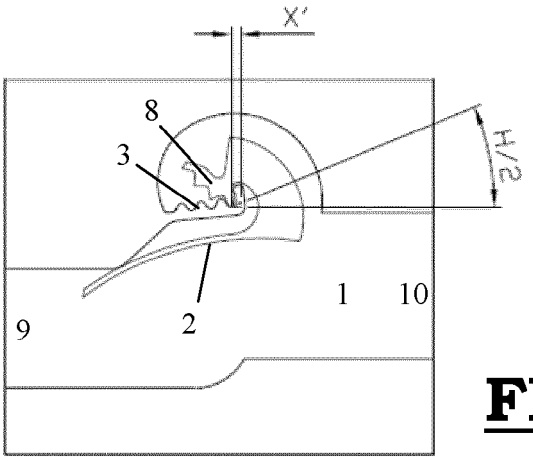

FIG. 4

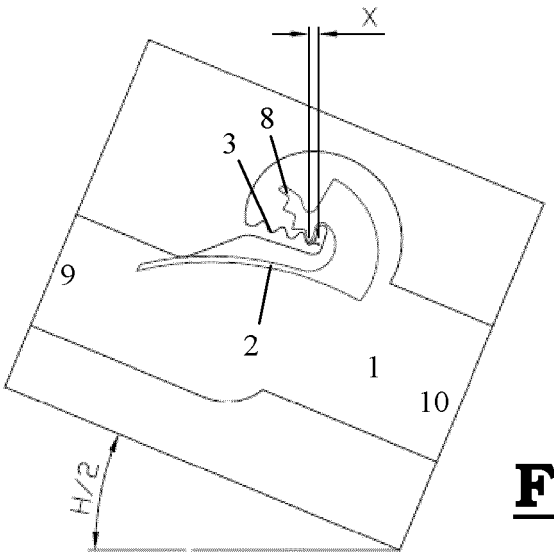

FIG. 5

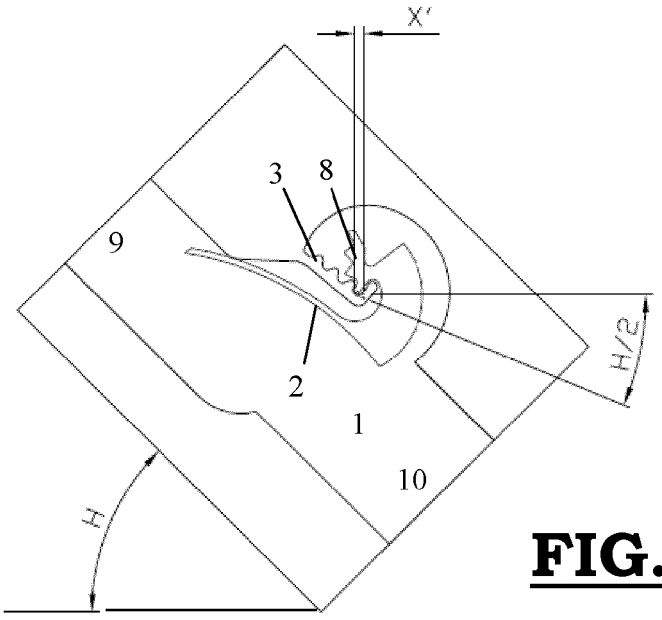

FIG. 6

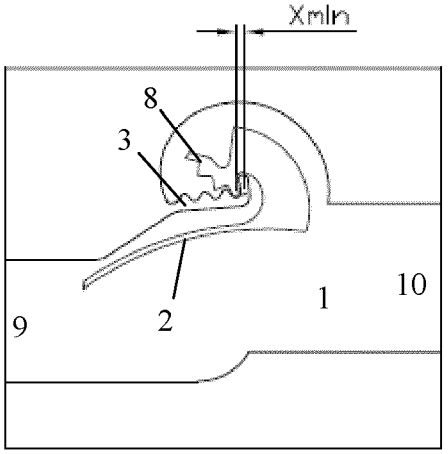

FIG. 7a

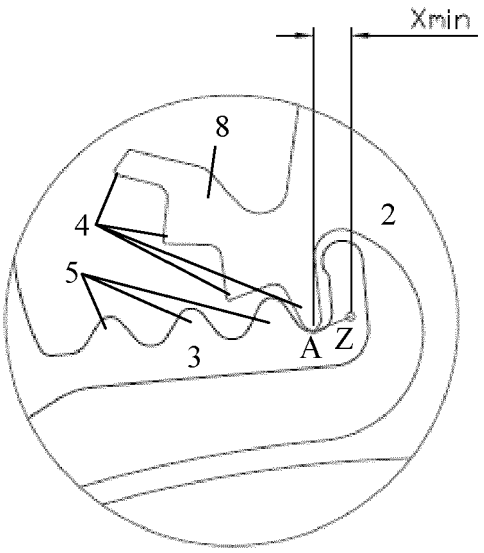

FIG. 7b

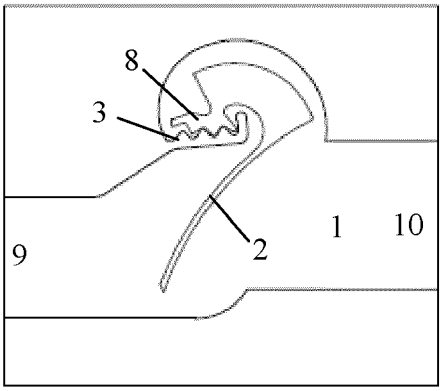

FIG. 8

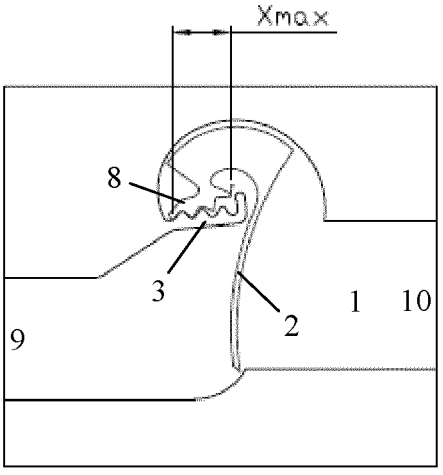

FIG. 9a

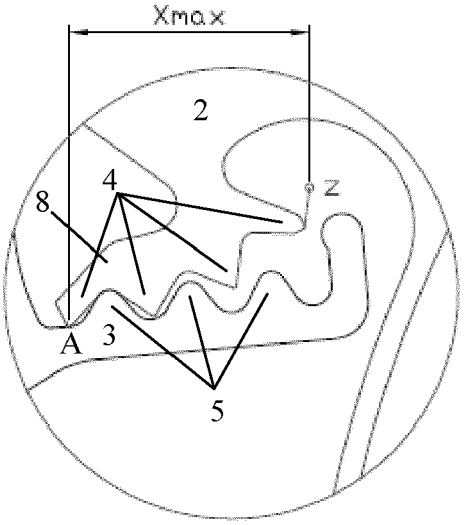

FIG. 9b

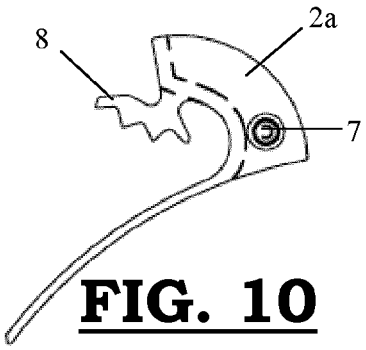

FIG. 10

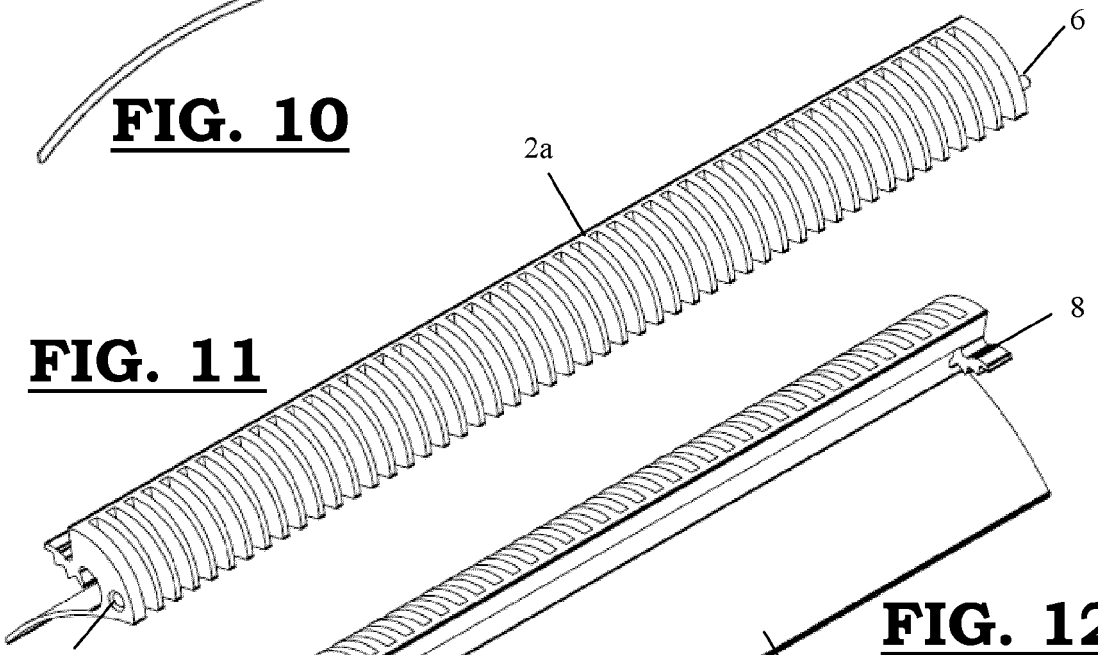

FIG. 11

FIG. 12

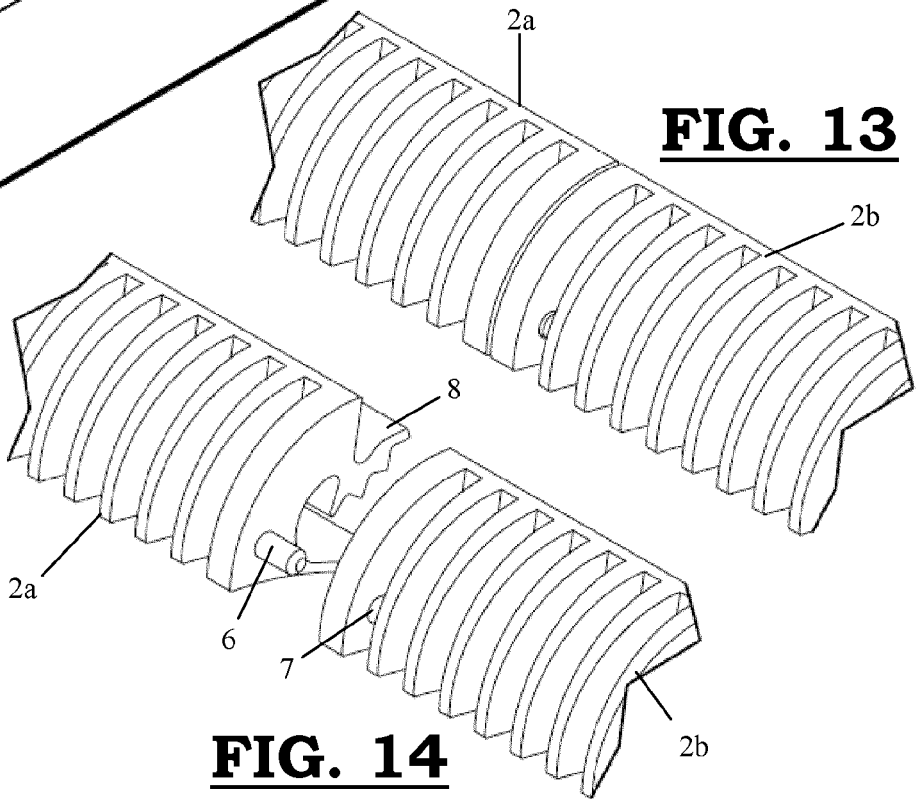

FIG. 13

FIG. 14

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 16 1646

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	NL 1 026 034 C2 (VKR HOLDING AS [DK]) 25 October 2005 (2005-10-25) * page 8, line 37 - page 9, line 35; figure 3 *	1-14	INV. F24F11/04
A,D	NL 1 014 499 C2 (REMI EMIEL VAN PARYS [BE]) 10 October 2000 (2000-10-10) * page 3, line 20 - page 10, line 10; figures 1-5 *	1	
A	FR 2 105 313 A5 (OGNY JEAN D) 28 April 1972 (1972-04-28) * the whole document *	1-14	
A,D	EP 1 568 947 A1 (RENSON VENTILATION NV [BE]; RENSON PAUL [BE]) 31 August 2005 (2005-08-31) * abstract; figures *	1	

TECHNICAL FIELDS SEARCHED (IPC)
F24F
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 May 2012	González-Granda, C

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 16 1646

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.

29-05-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL 1026034 C2	25-10-2005	NONE	
NL 1014499 C2	10-10-2000	BE 1012588 A3	05-12-2000
		NL 1014499 C2	10-10-2000
FR 2105313 A5	28-04-1972	NONE	
EP 1568947 A1	31-08-2005	AT 362083 T	15-06-2007
		DE 602005001059 T2	17-01-2008
		EP 1568947 A1	31-08-2005
		ES 2287861 T3	16-12-2007
		NL 1025600 C2	30-08-2005

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

- NL 1025600 C2 **[0002]**
- EP 0606945 A1 **[0002]**
- NL 1014499 C **[0002]**
- EP 2051020 A1 **[0002]**
- EP 0362913 A1 **[0002]**
- EP 0503722 A1 **[0002]**
- NL 9102132 A **[0002]**