



(11) **EP 1 767 877 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.03.2007 Bulletin 2007/13

(51) Int Cl.:
F24F 13/06 (2006.01)

(21) Application number: **06076762.1**

(22) Date of filing: **22.09.2006**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(30) Priority: **23.09.2005 NL 1030021**

(71) Applicant: **Nijburg Investment B.V.**
9611 TG Sappemeer (NL)

(72) Inventor: **Burger, Matthijs Gerard Johan**
1452 AG IJpendam (NL)

(74) Representative: **van Loon, C.J.J. et al**
c/o VEREENIGDE
Johan de Wittlaan 7
2517 JR The Hague (NL)

(54) **Ventilation grate**

(57) The invention relates to a ventilation grate provided with an air collecting housing and a front plate covering the air collecting housing, through which air can be blown from the air collecting housing. The front plate is provided with arcuate openings proceeding from a center outwards. At the rear side of the openings, an adjustable blade is provided in order to selectively guide the airflow in a cross direction with respect to the opening. The blade

is of tiltable design having a bistable, curved shape so that, selectively, one of the longitudinal sides of the blade can be maintained pressed against a longitudinal side of the opening.

In this manner, a simple adjustment of the ventilation grate can be provided, for, at wish, airflows directed inwards or outwards.

EP 1 767 877 A2

Description

[0001] The invention relates to a ventilation grate as described in the preamble of claim 1. The invention relates in particular to a ventilation grate provided with an air collecting housing and a front plate covering the air collecting housing, through which air can be blown from the air collecting housing, while the front plate is provided with arcuate openings extending from a center outwards.

[0002] With such apparatus, known as swirl grates, a spiralling air outflow can be effected. Here, through their curved shape, the openings have a tangential component enabling the realization of a selective airflow moving from the center of the grate outwards, or an airflow directed further towards the center. In the first case, a wider spread of the airflow over the space takes place, in the second case, the airflow is stronger and more focussed.

[0003] Furthermore, the arcuate shape causes a particular diverging action to occur (with air flows directed outwards), in contrast with a converging action, with airflows directed towards the center. With respect to a rectangular shape, it is supposed that this curved shape has a more favourable diverging spreading effect than ordinary, not-curved outflow openings. Such a grate will therefore provide a more favourable spread of the airflow.

[0004] In order to converge or diverge this airflow, with such grates, blades are provided at the rear side of the openings, for guiding the airflow in a selective manner in a cross direction relative to the opening.

[0005] A drawback of the known grates is that the adjustability is limited in that the blades are to be mounted either on one side of the opening or on the other side of the opening. This requires disassembly of the air grate and refitting of the blades, which is labour intensive. Another problem is that for an optimal outflow effect, the blade is to be placed accurately relative to the opening so as not to cause turbulences in the airflow, which may compromise a stable outflow. This requires the blade to be accurately sealed at the edge, while, ideally, the blade is to link up with the edge for an optimal outflow effect. Due to these requirements, it has, up to the present day, appeared virtually impossible to provide an adjustable blade which can move the air flow selectively inwards or outwards, viewed from the center of the grate.

[0006] The object of the invention is to provide a ventilation grate which solves these problems and which can provide the intended selective outflow, in particular for arcuate outflow openings.

[0007] Therefore, a ventilation grate according to claim 1 is provided, in particular a ventilation grate wherein the blade is of tiltable design, and having a bistable, curved shape so that, selectively, one of the longitudinal sides of the blade can be maintained pressed against a longitudinal side of an opening.

[0008] With the ventilation grate according to the invention, the bistable shape commands a good sealing between the blade and the edge of the opening. Here, in both positions, the blade can be designed so as to follow

the shape of the opening so that, each time, an optimal outflow effect is realized.

[0009] Further advantages and features will become clear by means of the following description of the drawings. Herein, it should be understood that the exemplary embodiments serve as illustration, and are not intended to be limitative.

[0010] In the Figures:

Fig. 1 shows a conventional grate with radially oriented outflow openings;

Fig. 2 shows a cross section of the line I-I of Fig. 1; Fig. 3 shows a conventional grate with outflow openings with a tangential component;

Fig. 4 shows a conventional grate with outflow openings with a curved shape in tangential direction;

Fig. 5 shows a cross section of the line I-I of Fig. 4 for a rectangular blade;

Fig. 6 shows an embodiment according to the invention of the adjustable air blade according to the invention;

Fig. 7 shows alternative embodiments of the air blade according to the invention; and

Fig 8 shows an adjustable blade in an alternative elaboration of a ventilation grate according to the invention.

[0011] Presently, with reference to Fig. 1, the operation of a grate 1 with radial, generally rectangular openings 2 in a front plate 3 will be discussed. Such a grate 1 has a symmetrical structure, while an outflow direction from opening 2 has no special effect, as appears from the arrows P in Fig. 1. Here, Fig. 2 shows the cross section of the line I-I of Fig. 1. Here, the continuous lines and the broken lines indicate the opposite outflow directions that can be provided by reversing a blade 4.

[0012] In contrast with Fig. 1, Fig. 3 shows a configuration of openings of a grate 5, in which a longitudinal axis of openings 6 has a tangential component. With such a configuration, the symmetry is breached and the outflow direction is relevant to the effect on the airflow. In particular, if the outflow is directed in the direction of the continuous arrow (P), an airflow directed further outward occurs, having, consequently, a greater outflow range. If the outflow is directed in the direction of the interrupted arrow (Q), the outflow is limited to a smaller outflow range and the outflow may be somewhat stronger. Through variations of airflows directed inward and outward, the relative proportions of the space ventilated by the grate 6 can be taken into account.

[0013] Further, Fig. 4 shows a grate 7 with a configuration of openings in which the openings 8 have a curved design. When blowing in the direction P, this curved shape causes a diverging effect and, when blowing in the direction Q, a converging effect is realized. Additionally, it has appeared that this swirl structure is a visually attractive form that finds a ready market. With respect to the rectangular shape, the curved shape of the configu-

ration shown in Fig. 4 poses a problem because in order for the blades 4 to link up with the edge, the connection of the blades 4 must be optimal. For a rectangular shape, this is relatively simple and the blade can easily be configured such that the edge links up with the opening edge 9 of a grate opening 8. However, with a curved shape, this is relatively difficult. Due to the complex geometry it is not easy to have the edges link up with the opening.

[0014] This can be solved by utilizing a rectangular blade 4 as shown in Fig. 5, which is positioned behind the grate opening in substantially longitudinal direction of the curved opening. This can, however, not be done properly when the curvature of the opening is too substantial. Furthermore, due to a varying "dead space" 10 between blade 4 and front plate 3, the outflow profile will be adversely influenced, it is then, in particular, more difficult to have the air flow out along the grate plate 3 due to turbulence problems.

[0015] Fig. 6 shows the solution to the above posed problems, in particular in a first embodiment, a flexible blade 11 of, for instance, a flexible plastic connected to a rigid but flexible central axis 12 of, for instance, spring steel, which is held in hinge points 13. Alternatively, the flexible blade 11 can be formed of a thin plate (not represented) while the central axis is absent. The blade can then be curvedly confined between two hinge points 13. Due to the geometry, the blade 11 will be curved, so that, viewed in the direction of arrow R, it is hollow. Additionally, due to the resilient action of the flexible blade 11 and/or the central axis 12, the blade will be pressed against the edge 9 of the opening 8. Through accurate positioning, it can then be designed to follow the shape with respect to the edge of the opening 9.

[0016] Through tilting of the blade 11 relative to the hinge points 13, the blade 11 is pressed from a convex to a hollow shape, so that the blade swings to the opposite side. At the other side, the former upper side of the blade contacts the opening edge 9 and closes it off due to the spring tension in the flexible blade 11 and/or central axis 12. Therefore, the flexible blade 11 is provided with a bistable shape, so that, selectively, one of the longitudinal sides of the blade 11 can be maintained pressed against an opening edge 9 of the opening.

[0017] Fig. 7 shows two variants of the blade in not-curved position, in which a first version 14 is shown with generally parallel designed curved blade sides, and a second version 15 with blade sides designed to be generally diverging.

[0018] Finally, Fig. 8 A shows a top side and bottom side 16, 17, respectively (with an orientation in attached condition) of an adjustable blade 18 in an alternative embodiment of a ventilation grate according to the invention. For the sake of comprehensibility, in the Figures, only a few elements are designated with reference numerals. Fig. 8B shows this blade 18 in alternative coupled conditions I and II in the front plate 3 of the grate (not further shown), while it is shown how the blade 18 is arranged in the opening 8 of the grate, in order to selectively guide

the air flow in cross directions P and Q relative to the opening normal.

[0019] Along the longitudinal sides of the blade 18, an upstanding attachment structure 19 is provided, having coupling elements 20, 21. A part of the coupling elements 20 is provided at a low position 22 situated virtually in the plane of the blade 18. Another part of the coupling elements 21 is provided at a high position 23, remote from the plane of the blade. As is represented in Fig. 8B, the blade 18 can be selectively coupled to the low coupling elements 20, along one of the longitudinal sides of the blade, or to the high coupling elements 21, along the opposite longitudinal side, respectively, along a longitudinal side 9 of an opening 8. Advantageously, the high coupling elements 20 or the low coupling elements 21, respectively, are provided on opposite surface sides of the blade. As a result, the blade can project somewhat outside the front plate 3 so that a more favourable airflow is obtained as the outflow air does not impact against the flat edge of the blade. Although different types of coupling elements can be provided, in one elaboration, at least one part of the coupling elements 20, 21 is hook-shaped. The low coupling elements, together with the surface of the blade, form a hook which can be clamped around the opening edge 9 of the opening 8. The invention is not limited to the embodiments given in the examples but can contain variations and modifications thereon which fall in the range of the claims as defined in the following.

Claims

1. A ventilation grate provided with:

- an air collecting housing
- a front plate covering the air collecting housing, through which air can be blown from the air collecting housing;
- which front plate is provided with arcuate openings proceeding from a center outwards;
- a blade provided in or behind these openings for selectively guiding an air flow in a cross direction with respect to the opening;
- which blade is of adjustable design, having a bistable, curved shape so that, in a selective manner, one of the longitudinal sides of the blade can be maintained pressed against a longitudinal side of an opening.

2. A ventilation grate according to claim 1, **characterized in that** the blade cooperates with a flexible curved axis which is of tiltable design with respect to hinge points arranged at the end face of the blade.

3. A ventilation grate according to claim 1, **characterized in that** the blade is formed from a flexible metal plate which is confined under tension between hinge points arranged at the end face of the blade.

4. A ventilation grate according to claim 1, **characterized in that** the blade has a flexible sealing edge.
5. A ventilation grate according to claim 1, **characterized in that** the blade has an arcuate shape with a curvature that follows the edges of the arcuate opening. 5
6. A ventilation grate according to claim 1, **characterized in that** along the longitudinal sides of the blade, an upstanding attachment structure is provided having coupling elements at a low position situated virtually in the plane of the blade and at a high position remote from the plane of the blade such that the blade can be selectively coupled along one of the longitudinal sides to the low coupling elements, or along the opposite longitudinal side, to the high coupling elements, respectively, along a longitudinal side of an opening. 10 15 20
7. A ventilation grate according to claim 6, **characterized in that** the high and low coupling elements, respectively, are provided on opposite surface sides of the blade. 25
8. A ventilation grate according to claim 6 or 7, **characterized in that** the coupling elements are hook-shaped such that they are clamped against the opposite sides of the opening 30

35

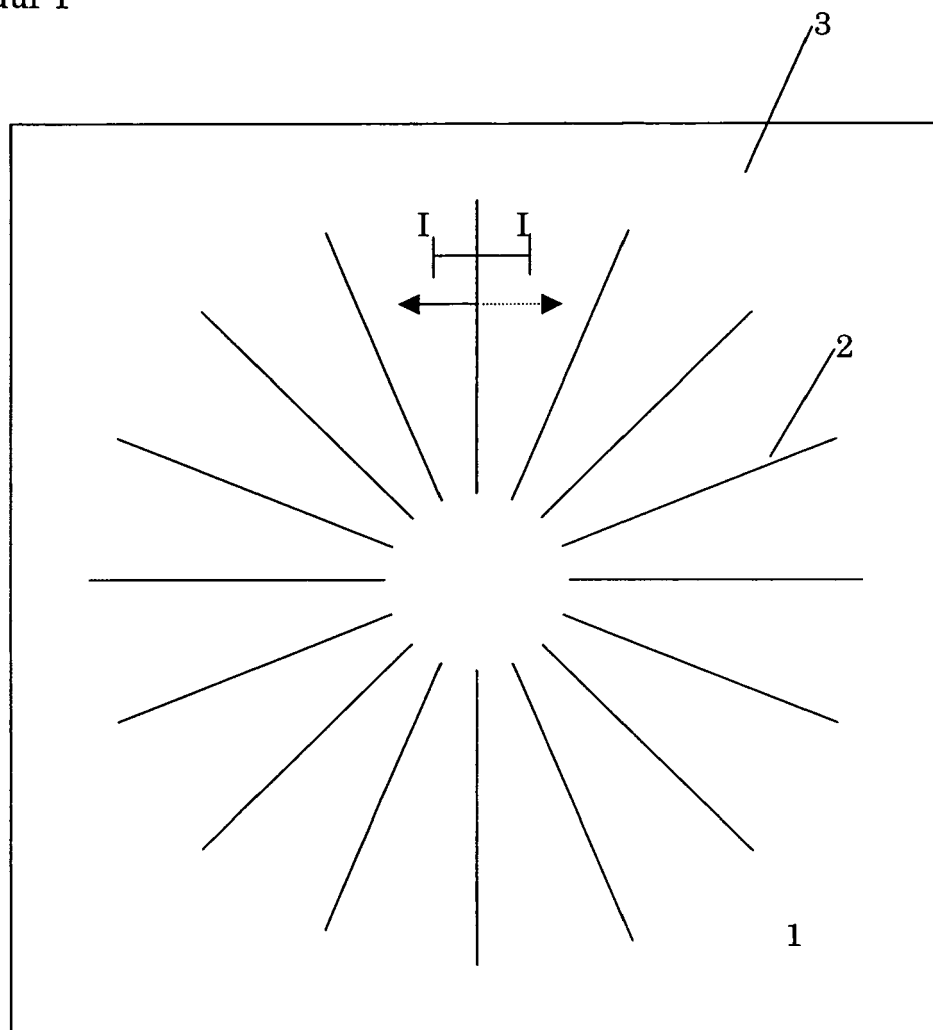
40

45

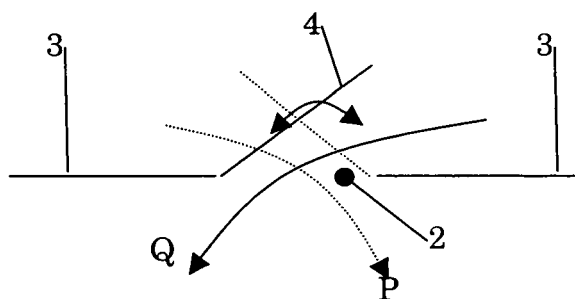
50

55

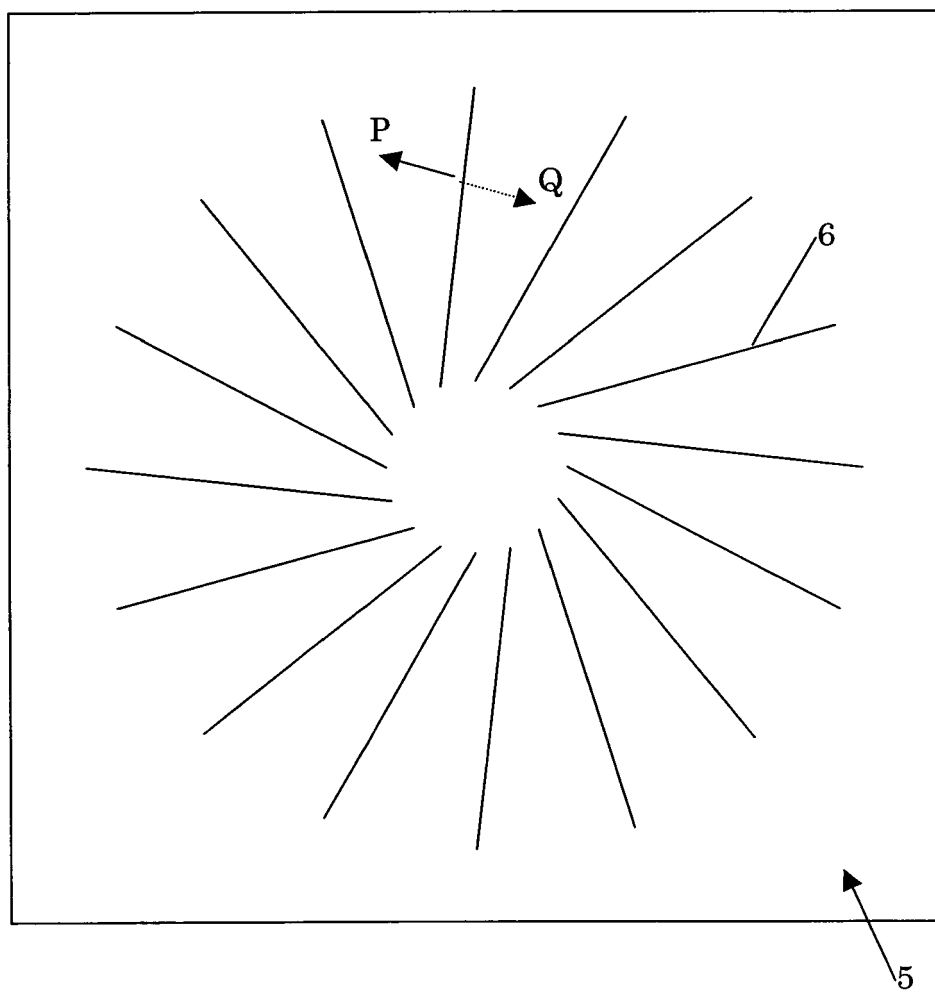
Figuur 1



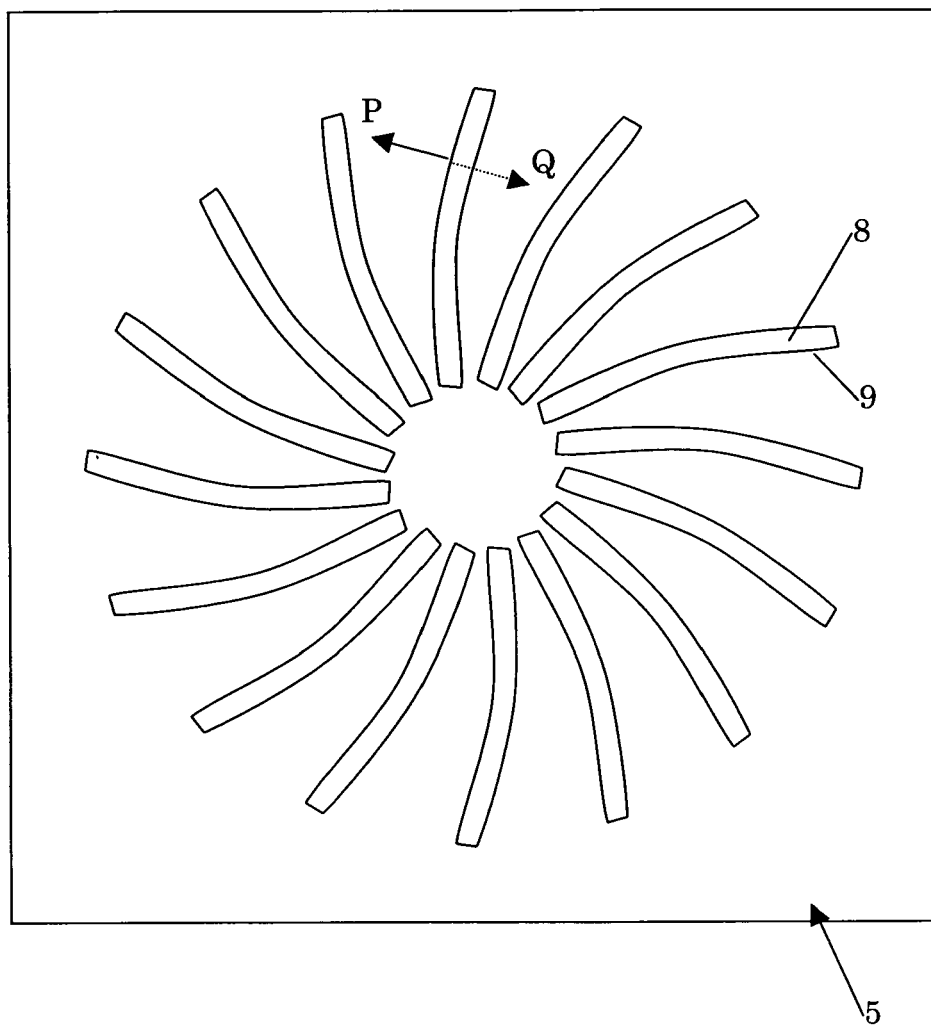
Figuur 2



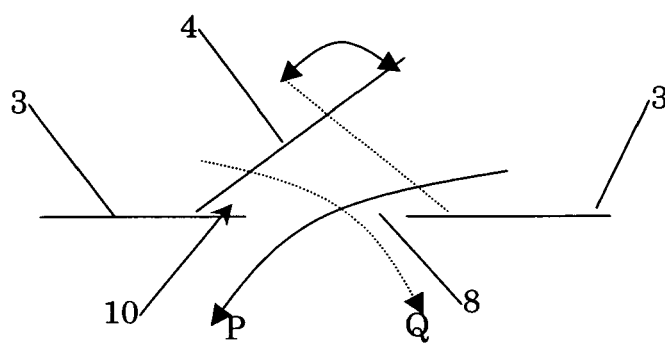
Figuur 3



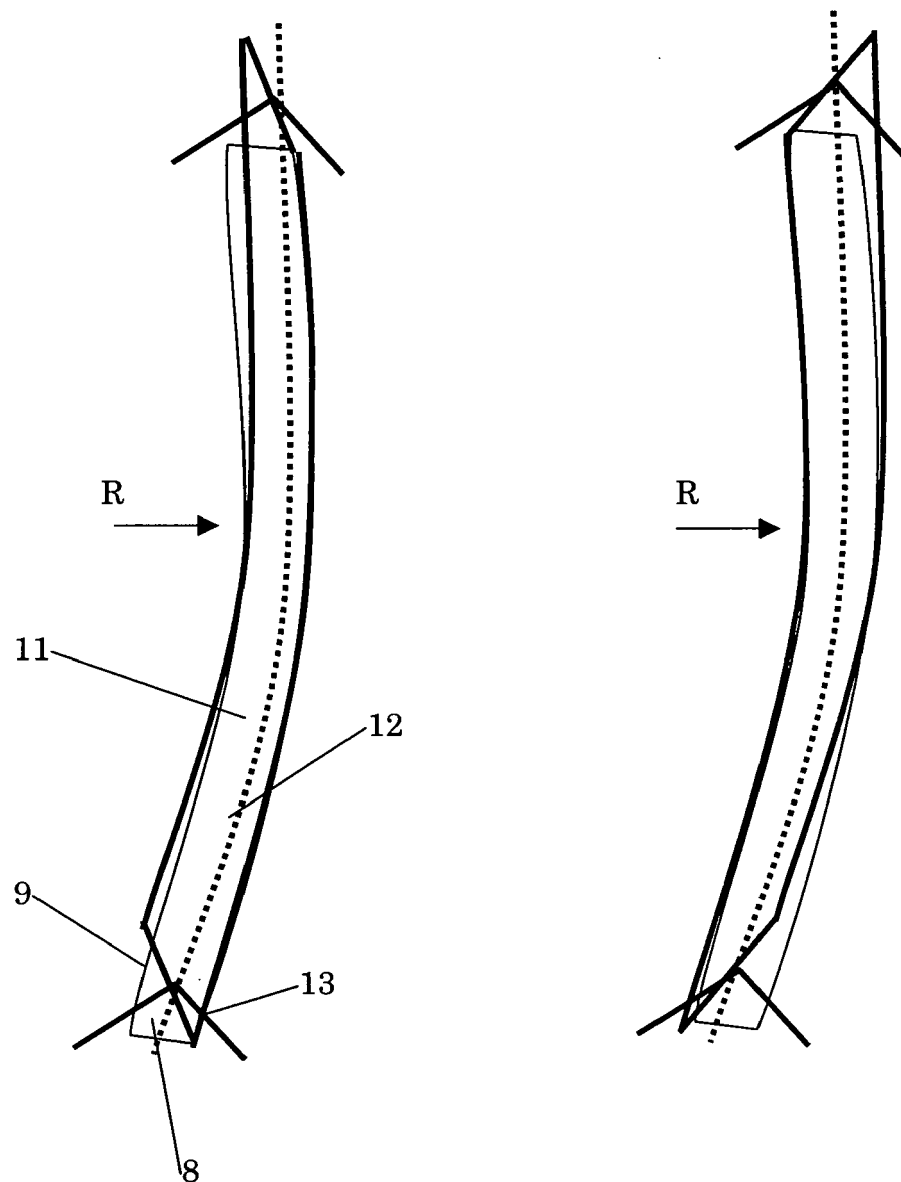
Figuur 4



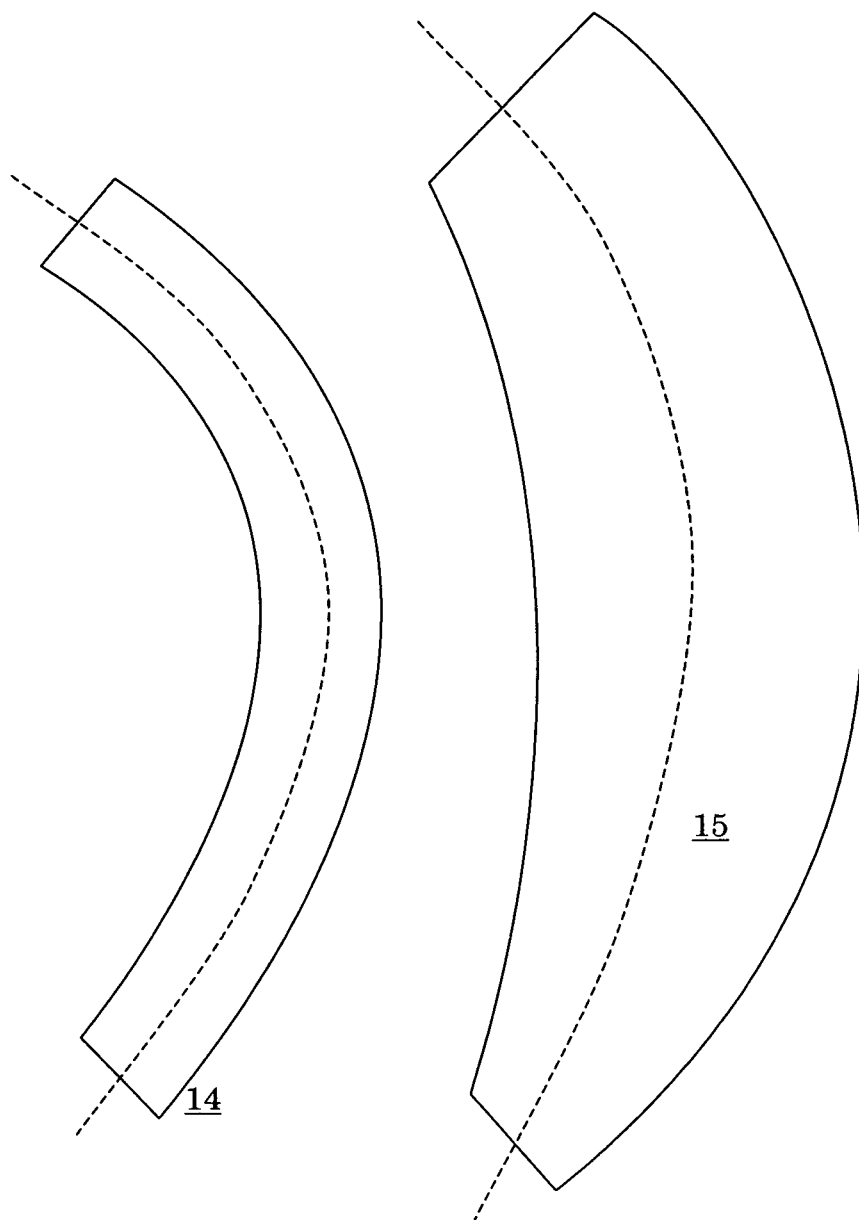
Figuur 5



Figuur 6



Figuur 7



Figuur 8

