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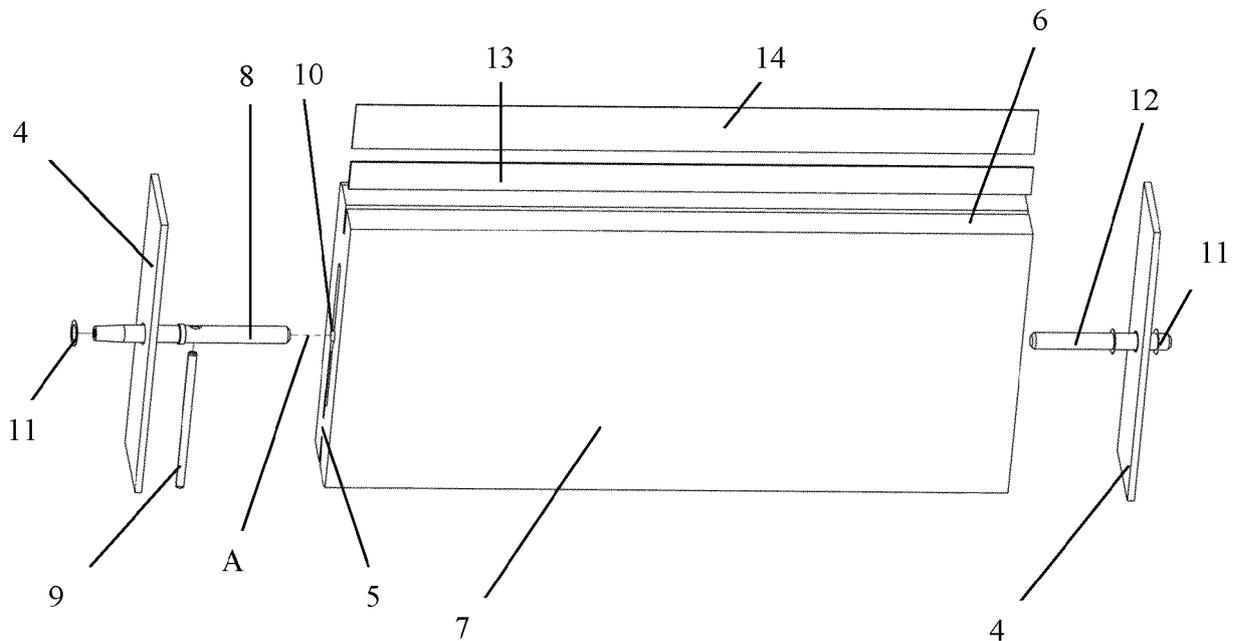
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(54) **VENTILATION ELEMENT COMPRISING ONE OR MORE ROTATABLE DAMPER BLADES**

(57) Ventilation element (1) with one or more rotatable damper blades (3), wherein, for each said damper blade (3), the ventilation element (1) comprises an axle (8) and wherein this axle (8) comprises a passage which extends essentially at right angles to the longitudinal direction of the axle (8), and, for each damper blade (3), the ventilation element (1) comprises a locking means (9) which is form-fitted with the passage and is configured to extend through the passage of the axle (8) in such a

way that the locking means (9) extends on either side of the axle (8), and wherein each damper blade (3) comprises a recess (10), wherein this recess (10) comprises a first part and a second part which extends along the axis of rotation (A) and opens in the first part, and wherein, in use, the locking means (9) extends in the first part of the recess (10) and portions of the axle (8) extend in the first and the second part of the recess (10), respectively.



**Fig. 3**

## Description

**[0001]** The present invention relates to a ventilation element comprising a body which encloses a beam-shaped body passage, and one or more damper blades which are each arranged in the body passage so as to be rotatable about an axis of rotation in order to form a closable air passage opening through the body passage, wherein each damper blade comprises a base part in the form of essentially a hexahedron with 3 pairs of two mutually opposite rectangular outer surfaces, being a first and a second rotation surface, two sealing surfaces and two visible surfaces, respectively, wherein each axis of rotation extends through the respective base part and extends essentially at right angles to the rotation surfaces.

**[0002]** Such a ventilation element serves to allow ventilation through a wall. The wall may be, for example, an external wall, a ceiling or a floor. The ventilation element is installed in a passage of the wall and comprises a body with a body passage through which ventilation is possible. The ventilation elements may be, for example, fire dampers, in which the one or more damper blades/slats are provided to immediately close off the body passage in case of fire. The ventilation elements may also be smoke extraction dampers, wherein the one or more damper blades/slats are configured to ensure suitable smoke extraction in case of fire.

**[0003]** Here, the one or more damper blades are rotatable between an open position, in which the possible ventilation through the body passage is greatest, and a closed position, in which essentially no ventilation through the body passage is possible and the air passage opening is thus closed off.

**[0004]** During rotation of the one or more damper blades between the various positions, it is important for the rotation to always run smoothly. In the case of multiple damper blades, it is for example important that the rotation is performed simultaneously. In order to ensure that this rotation runs smoothly, relatively complicated drive means for the damper blades are used nowadays. Thus, there are existing damper blades which comprise, for example, a base part consisting of two leaf parts which abut each other and which are arranged by means of a rotation axle to be rotatable about an axis in order thus to be able to rotate the damper blade between the open and the closed position. In order to render rotation smooth, the leaf parts are connected to each other by means of bolts and nuts, with the bolts extending perpendicularly through both leaf parts, and a transmission is also provided in order to rotate the damper blade in its entirety. The drawbacks here are that the bolts extend perpendicularly through both leaf parts and that these bolts are made of metal, which is obviously disastrous for fire safety. Also in terms of production engineering, it is laborious to fasten damper blades in a rotatable manner in the body in this way.

**[0005]** It is therefore an object to provide a ventilation

element with one or more rotatable damper blades, wherein the rotation of the damper blades can take place in a simpler manner, and wherein the rotation can still take place in a reliable manner.

5 **[0006]** This object is achieved by providing a ventilation element comprising a body which encloses a beam-shaped body passage, and one or more damper blades which are each arranged in the body passage so as to be rotatable about an axis of rotation in order to form a closable air passage opening through the body passage, wherein each damper blade comprises a base part in the form of essentially a hexahedron with 3 pairs of two mutually opposite rectangular outer surfaces, being a first and a second rotation surface, two sealing surfaces and two visible surfaces, respectively, wherein each axis of rotation extends through the respective base part and extends essentially at right angles to the rotation surfaces, wherein, for each said damper blade, the ventilation element comprises an axle which, in use, extends along the respective axis of rotation and wherein this axle comprises a passage which extends essentially at right angles to the longitudinal direction of the axle, and for each damper blade, the ventilation element comprises a locking means which is form-fitting with the passage and is configured to extend through the passage of the axle in such a way that the locking means extends on either side of the axle, and wherein each damper blade comprises a recess which opens in the first rotation surface, wherein this recess comprises a first part which extends along a longitudinal direction which forms an angle with the longitudinal direction of the first rotation surface of between 0° and 30°, opens in the first rotation surface along essentially its entire length, and in which the locking means is fittingly accommodable, and a second part which extends along the axis of rotation, opens in the first part and in which a part of the axle is fittingly accommodable, and wherein, in use, the locking means extends in the first part of the recess and portions of the axle extend in the first and the second part of the recess, respectively.

40 **[0007]** Here, the rotation surfaces extend parallel to each other. The base part has, for example, the shape of a hexahedron with 3 pairs of outer surfaces which are situated parallel to each other. Thus, the base part may be, for example, beam-shaped. Here, the visible surfaces are the surfaces which preferably extend essentially at right angles to the body passage in the closed position and here the sealing surfaces are the surfaces which partly ensure that the body opening is closed off in the closed position at the location of two successive damper blades or at the location of a damper blade and a wall surface of the body. In use, the longitudinal direction of the locking means preferably extends along the passage of the axle, i.e. at right angles to the longitudinal direction of the axle. The longitudinal direction of the first part preferably extends essentially at right angles to the axis of rotation. Thus, the first part may be, for example, beam-shaped. Here, the expression fittingly accommodable is understood to mean that the design of a component has

been matched to another component. Thus, for example, the locking means is accommodable in the first part in a form-fitting and/or clampable way and a part of the axle is for example accommodable in the second part in a form-fitting and/or clampable way. The locking means is preferably accommodable in the passage of the axle in a form-fitting and/or clampable way. Thus, the locking means may be a clamping pin which is configured to be clamped in the passage of the axle and in the first part.

**[0008]** By providing the said axle and the locking means here and by providing the suitable corresponding recess in which the axle and the locking means are accommodable, it is easy here to transmit the rotation of the axle to the damper blade in such a way that the damper blade in its entirety undergoes the same rotation as the axle. The reason for this is that the locking means which extends through the axle and extends in the first part of the recess ensures that the rotation is transmitted reliably to the damper blade. It is thus very easily possible to transmit the rotation of the axle to the damper blade by providing the said recess and the locking means. Here, there is therefore no need for bolts and/or nuts which extend through both visible surfaces. Here, the damper blades can therefore readily prevent fire penetration in the closed position.

**[0009]** If the ventilation element comprises several damper blades, then said axes of rotation extend essentially parallel to each other.

**[0010]** The body may comprise, for example, four adjoining wall surfaces which together enclose the body passage, wherein these wall surfaces comprise a first and a second pair of two wall surfaces which extend essentially parallel opposite each other and a distance apart in order to form said beam-shaped body passage. Here, the one or more axes of rotation then preferably extend essentially at right angles to the wall surfaces of a said pair of wall surfaces.

**[0011]** Preferably, the second part extends centrally with respect to the first part, viewed along the longitudinal direction of the first part, and the locking means extends essentially along the same length on either side of the axle. In this way, the locking means is readily able to transmit the rotation of the axle to the entire base part and the damper blade can thus rotate reliably.

**[0012]** In a preferred embodiment, the first part of the recess extends essentially along the longitudinal direction of the first rotation surface. Still more preferably, the length of the first part is between 0.3 and 0.7 times the length of the rotation surface, most preferably between 0.4 and 0.6 times the length of the rotation surface. In this way, the locking means influences a sufficiently long portion of the base part without compromising the strength and the sealing properties of the base part. Preferably, the first part extends centrally with respect to the first rotation surface, viewed along the longitudinal direction of the first rotation surface.

**[0013]** The base part is preferably made as a single part. As a result thereof, the base part is strong and also

readily able to prevent fire penetration in case of fire. Here, said recess is therefore enclosed by one component.

**[0014]** Preferably, the base part is made of a fire-resistant and heat-insulating material. Thus, this material may comprise plaster, calcium silicate and/or concrete. This base part may be, for example, a plasterboard or a calcium silicate board. It is very simple to provide such panels with the necessary recesses. Thus, these recesses may be cut. Preferably, the respective rotation axle extends centrally through the base part. This benefits the strength and the smooth rotation of the damper blades.

**[0015]** In a highly preferred embodiment, the locking means is a clamping pin. A clamping pin can readily be securely clamped in a form-fitting first part of the recess. A clamping pin can also readily be securely clamped in the passage of the axle, as a result of which the clamping pin will always assume the same position with respect to the axle. By means of a clamping pin, it is therefore very simple to transmit the rotation of the axle to the base part and thus to the damper blade in a reliable manner. This clamping pin is made, for example, of spring steel. The diameter of the clamping pin is, for example, essentially half the diameter of the axle.

**[0016]** In a preferred embodiment, for each said damper blade, the ventilation element comprises a cover plate to cover the first rotation surface, wherein this cover plate comprises a passage through which the axle is provided to extend. Here, this cover plate may be made of a fire-resistant material which is readily able to ensure a good sealing between the body and the damper blade. In this way, leaks are prevented in the closed position of the one or more damper blades. Preferably, the second rotation surface is also provided with such a cover plate.

**[0017]** Furthermore preferably, the cover plate is connected to the respective first rotation surface by means of glue. This ensures that the cover plate does not become detached from the first rotation surface.

**[0018]** Also furthermore preferably, the cover plate is made of high-temperature fibres. This makes the cover plate readily able to provide a reliable seal, as a result of which the air passage opening is reliably sealable. The reason for this is that by using fibres a reliable and flexible seal can be provided and by using high-temperature fibres a reliable seal can be ensured for a certain period of time in case of fire because such high-temperature fibres are readily able to withstand heat. These high-temperature fibres are for example glass fibres or ceramic fibres. These fibres may be felted or woven.

**[0019]** Also furthermore preferably, the ventilation element comprises a support ring which is configured, in use, to extend around the axle in the passage of the cover plate. In this way, the axle is prevented from locally compressing the cover plate, for example the fibres, during the rotation of the one or more damper blades and also in said positions of the one or more damper blades. This support ring may be made of, for example, steel or another metal (alloy).

**[0020]** In a preferred embodiment, for each damper blade, the ventilation element comprises a second axle which in use, extends along the respective axis of rotation, and wherein each damper blade comprises a second recess which opens in the second rotation surface, wherein at least a portion of this second recess is formed with the second axle and this second axle is configured to extend partly in this second recess. By means of this second axle which extends in the second recess, the reliable rotation of each damper blade is additionally ensured. This second recess may or may not be of a similar design to the first recess. This depends on whether use is also made of a said locking means at the location of the second rotation surface. If the length of the damper blade allows this, it is not necessary to also provide a locking means at the location of the second rotation surface, since the first-mentioned locking means then suffices to make the entire damper blade rotate reliably. However, with relatively long damper blades, it may be desirable to also provide such a locking means at the location of the second rotation surface in order to ensure that the entire damper blade will always perform the desired rotation and therefore does not bend. The second rotation surface is for example also coated with a cover plate, wherein this cover plate then comprises a passage for the second axle. Here, it is then also possible to use an abovementioned support ring.

**[0021]** The ventilation element is for example a smoke extraction damper or a fire damper which forms part of a ventilation system. By means of such ventilation elements, it is readily possible to provide the desired ventilation while providing the desired smoke extraction or desired seal in case of a possible fire.

**[0022]** Preferably, the ventilation element comprises a drive mechanism for rotating said one or more axles about the respective axes of rotation.

**[0023]** Furthermore, the damper blades may be provided with sealing rubber and/or intumescent material in order to ensure a reliable seal during normal use and in case of fire. Thus, the sealing surfaces may comprise, for example, indentations in which sealing rubber and/or intumescent material is provided.

**[0024]** The present invention will now be described in more detail by means of the following detailed description of a preferred embodiment of a ventilation element according to the present invention. The sole aim of this description is to give illustrative examples and to indicate further advantages and features 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.

**[0025]** In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- **Fig. 1** shows a perspective view of a ventilation element according to the invention, wherein this ventilation element comprises several damper blades and these damper blades are in an open position in

order to make ventilation possible;

- **Fig. 2** is an illustration of the ventilation element shown in Fig. 1, wherein a part of the ventilation element is not visible so that the drive mechanism for rotation of the damper blades is visible;
- **Fig. 3** shows a cut-away perspective of a damper blade, the axles, the clamping pin and the support rings of the ventilation element illustrated in Fig. 1;
- **Fig. 4** shows a perspective view of the components illustrated in Fig. 3 in a connected state, wherein a portion is shown in cross section.

**[0026]** The fire-resistant ventilation element (1) according to the invention which is shown in the figures is a smoke extraction damper (1). This ventilation element (1) forms part of a ventilation system and is used to make ventilation through a wall possible. Furthermore, this ventilation element (1) will make it possible to ensure suitable smoke extraction in case of fire. This ventilation element (1) comprises a body (2) which encloses a beam-shaped body passage. This body passage is formed by 4 successive wall surfaces which are each arranged in pairs and in parallel, being the rotation wall surfaces and the sealing wall surfaces. The sealing wall surfaces are each provided with a recess which serves as a stop for the damper blades (3) (see below) and are shown horizontally in Figs. 1 and 3. The rotation wall surfaces are the wall surfaces which extend vertically in Figs. 1 and 2. In this body passage, 4 damper blades (3) are arranged so as to be able to rotate, each about an axis of rotation (A) in order to be able to provide a closable air passage opening in the body passage. These 4 damper blades (3) are arranged so as to be able to simultaneously rotate between two limit positions, namely an open position in which the possible ventilation through the body passage is at a maximum and a closed position in which the damper blades (3) close off the body passage and thus ventilation through the body passage is essentially prevented completely. The axes of rotation (A) extend parallel to each other and each extend essentially at right angles to the rotation wall surfaces.

**[0027]** Each damper blade (3) comprises a beam-shaped base part with 3 pairs of mutually parallel rectangular outer surfaces, being respectively a first and a second rotation surface (5), two sealing surfaces (6) and two visible surfaces (7), wherein each axis of rotation (A) extends through the respective base part (4) and extends essentially at right angles to the rotation surfaces (5). These base parts are made from calcium silicate boards or from plasterboards and are thus made as a single part. For each said damper blade (3), the ventilation element (1) comprises a set of a first axle (8), a clamping pin (9) and a support ring (11) and a set of a second axle (12) and an associated support ring (11). For each said set, the base part (4) comprises the appropriate recesses (10). Thus, the base part (4) comprises a first recess (10) which opens in the first rotation surface (5) and a second recess which opens in the second rotation surface (not

visible in the figures). The first axle (8) comprises a passage which extends at right angles to its longitudinal direction and in which the clamping pin (9) is provided to extend in such a way that the clamping pin (9) extends on either side of the passage along the same length on either side.

**[0028]** The first recess (10) comprises a first part which extends along the longitudinal direction (B) of the first rotation surface (5), opens into the first rotation surface (5) along essentially its entire length, and in which the clamping pin (9) is accommodable in a form-fitting way, and a second part which extends along the axis of rotation (A), opens in the first part which extends centrally with respect to the first part and in which a part of the first axle (8) is accommodable in a form-fitting way. This first recess (10) therefore has a T-shaped cross section. In use, the clamping pin (9) extends in the first part of the first recess (10) and a first portion of the first axle (8) extends in the first and the second part of the first recess (10) and a second portion extends beyond the base part. The second recess extends along the axis of rotation (A) and the second axle (12) is accommodable in this second recess in a form-fitting way so that a first portion of the second axle (12) extends in the second recess and a second portion of the second axle (12) extends beyond the base part.

**[0029]** Each damper blade (3) comprises two cover plates (4) for covering the two rotation surfaces (5), respectively. These cover plates (4) are made of high-temperature fibres. The cover plates (4) are glued onto the respective two rotation surfaces (5) and each comprise a passage through which the respective axles (8, 12) can extend. The support rings (11) are arranged in the respective passages to support the axles (8, 12) and thus prevent damage to the cover plates (4). Each of these axles (8, 12) also extends beyond its cover plate (4), so that the drive mechanism can engage with the first axles (8) and the second axles (12) can extend in indentations in the body (2).

**[0030]** Each base part also comprises two indentations which respectively open into the sealing surfaces (6). In the one indentation, intumescent material (13) is fitted and in the other indentation both intumescent material (13) and a sealing rubber (14) are fitted. This sealing rubber (14) extends beyond the base part. These sealing rubbers (14) thus help to provide a good seal between successive damper blades (3) and between a damper blade (3) and a respective sealing wall. The intumescent material (13) prevents fire penetration for a certain period.

## Claims

1. Ventilation element (1) comprising a body (2) which encloses a beam-shaped body passage, and one or more damper blades (3) which are each arranged in the body passage so as to be rotatable about an axis

of rotation (A) in order to form a closable air passage opening through the body passage, wherein each damper blade (3) comprises a base part in the form of essentially a hexahedron with 3 pairs of two mutually opposite rectangular outer surfaces, being a first and second rotation surface (5), two sealing surfaces (6) and two visible surfaces (7), respectively, wherein each axis of rotation (A) extends through the respective base part (4) and extends essentially at right angles to the rotation surfaces (5), **characterized in that**, for each said damper blade (3), the ventilation element (1) comprises an axle (8) which, in use, extends along the respective axis of rotation (A) and wherein this axle (8) comprises a passage which extends essentially at right angles to the longitudinal direction of the axle (8), and for each damper blade (3), the ventilation element (1) comprises a locking means (9) which is form-fitting with the passage and is configured to extend through the passage of the axle (8) in such a way that the locking means (9) extends on either side of the axle (8), and wherein each damper blade (3) comprises a recess (10) which opens in the first rotation surface (5), wherein this recess (10) comprises a first part which extends along a longitudinal direction which forms an angle with the longitudinal direction (B) of the first rotation surface (5) of between 0° and 30°, opens in the first rotation surface (5) along essentially its entire length, and in which the locking means (9) is fittingly accommodable, and a second part which extends along the axis of rotation (A), opens in the first part and in which a part of the axle (8) is fittingly accommodable, and wherein, in use, the locking means (9) extends in the first part of the recess (10) and portions of the axle (8) extend in the first and the second part of the recess (10), respectively.

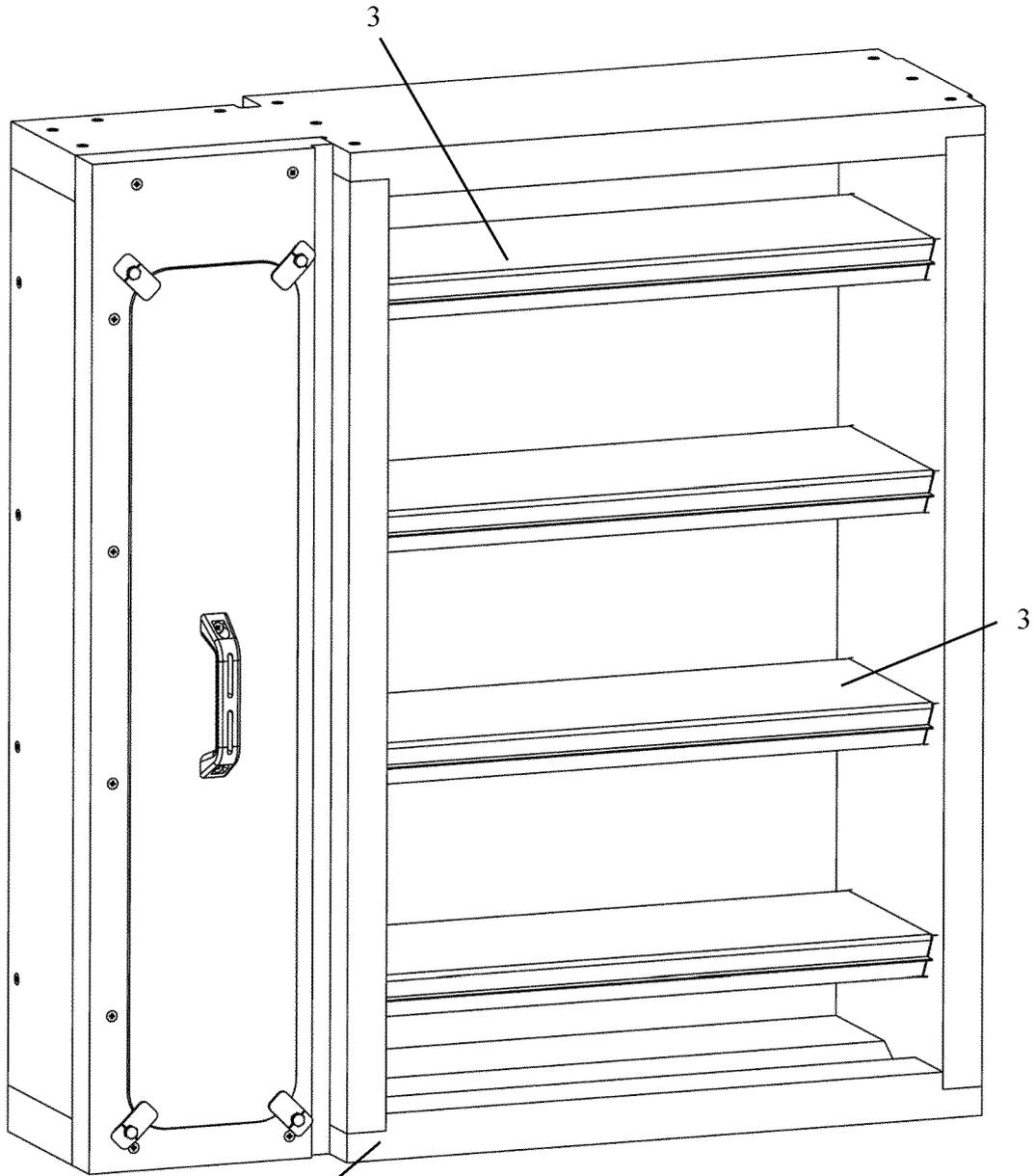
2. Ventilation element (1) according to Claim 1, **characterized in that** the second part extends centrally with respect to the first part, viewed along the longitudinal direction of the first part, and wherein the locking means (9) extends essentially along the same length on either side of the axle (8).

3. Ventilation element (1) according to Claim 1 or 2, **characterized in that** the longitudinal direction of the first part of the recess (10) extends essentially along the longitudinal direction (B) of the first rotation surface (5).

4. Ventilation element (1) according to Claim 3, **characterized in that** the length of the first part is between 0.3 and 0.7 times the length of the rotation surface (5).

5. Ventilation element (1) according to any of the preceding claims, **characterized in that** the base part is made as a single part.

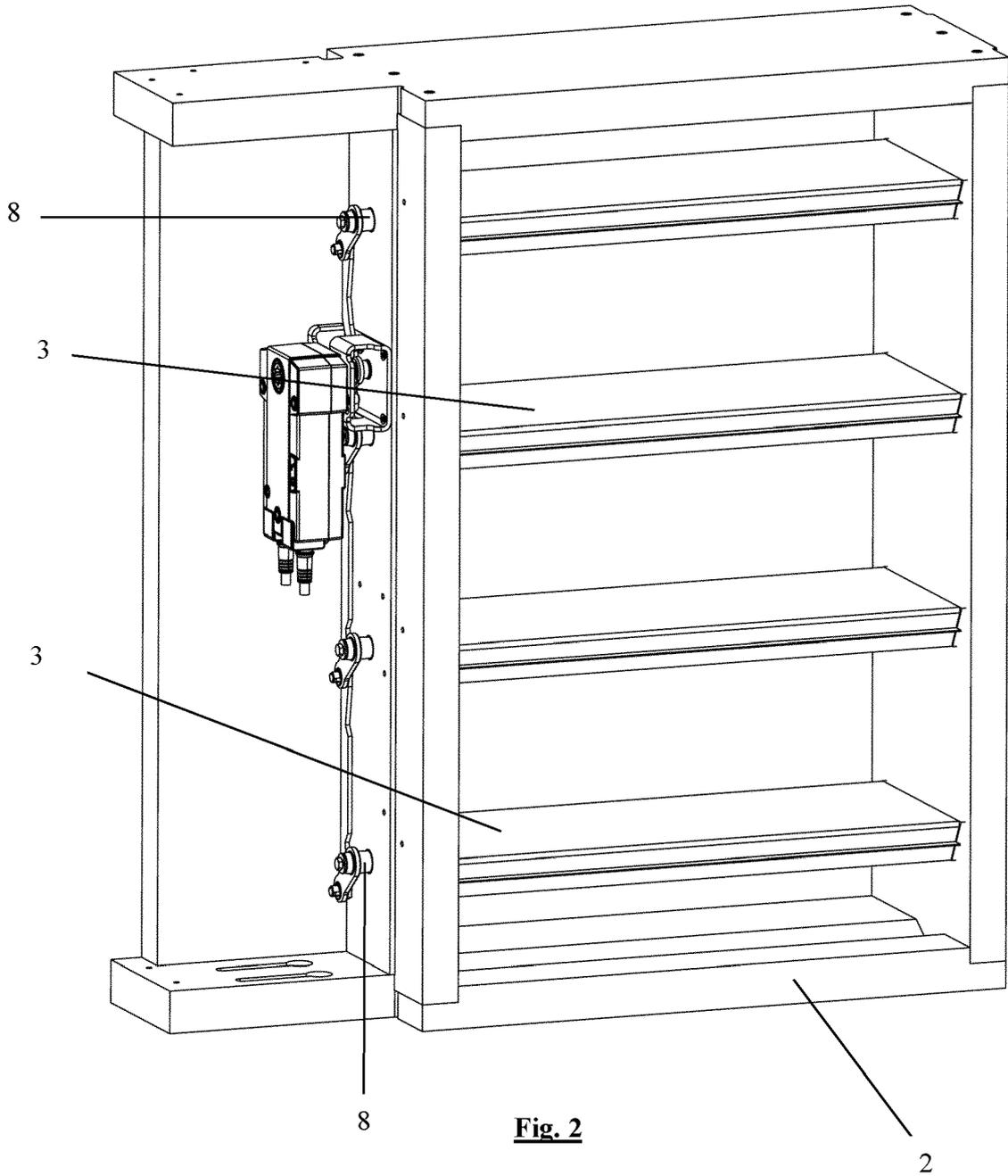
6. Ventilation element (1) according to any of the preceding claims, **characterized in that** the base part is made of a fire-resistant and heat-insulating material. 5
7. Ventilation element (1) according to any of the preceding claims, **characterized in that** the respective axis of rotation (A) extends centrally through the base part. 10
8. Ventilation element (1) according to any of the preceding claims, **characterized in that** the locking means (9) is a clamping pin. 15
9. Ventilation element (1) according to any of the preceding claims, **characterized in that**, for each said damper blade (3), the ventilation element (1) comprises a cover plate (4) to cover the first rotation surface (5), wherein this cover plate (4) comprises a passage through which the axle (8) is provided to extend. 20
10. Ventilation element (1) according to claim 9, **characterized in that** the cover plate (4) is connected to the respective first rotation surface (5) by means of glue. 25
11. Ventilation element (1) according to Claim 9 or 10, **characterized in that** the cover plate (4) is made of high-temperature fibres. 30
12. Ventilation element (1) according to one of Claims 9 to 11, **characterized in that** the ventilation element (1) comprises a support ring (11) which is configured, in use, to extend around the axle (8) in the passage of the cover plate (4). 35
13. Ventilation element (1) according to any of the preceding claims, **characterized in that**, for each damper blade (3), the ventilation element (1) comprises a second axle (12) which, in use, extends along the respective axis of rotation (A), and wherein each damper blade (3) comprises a second recess which opens in the second rotation surface, wherein at least a portion of this second recess is form-fitted with the second axle (12) and this second axle (12) is configured to extend partly in this second recess. 40 45
14. Ventilation element (1) according to any of the preceding claims, **characterized in that** the ventilation element (1) is a smoke extraction damper or a fire damper which forms part of a ventilation system. 50
15. Ventilation element (1) according to any of the preceding claims, **characterized in that** the ventilation element (1) comprises a drive mechanism for rotating the said one or more axles (8) about the respective axes of rotation (A). 55

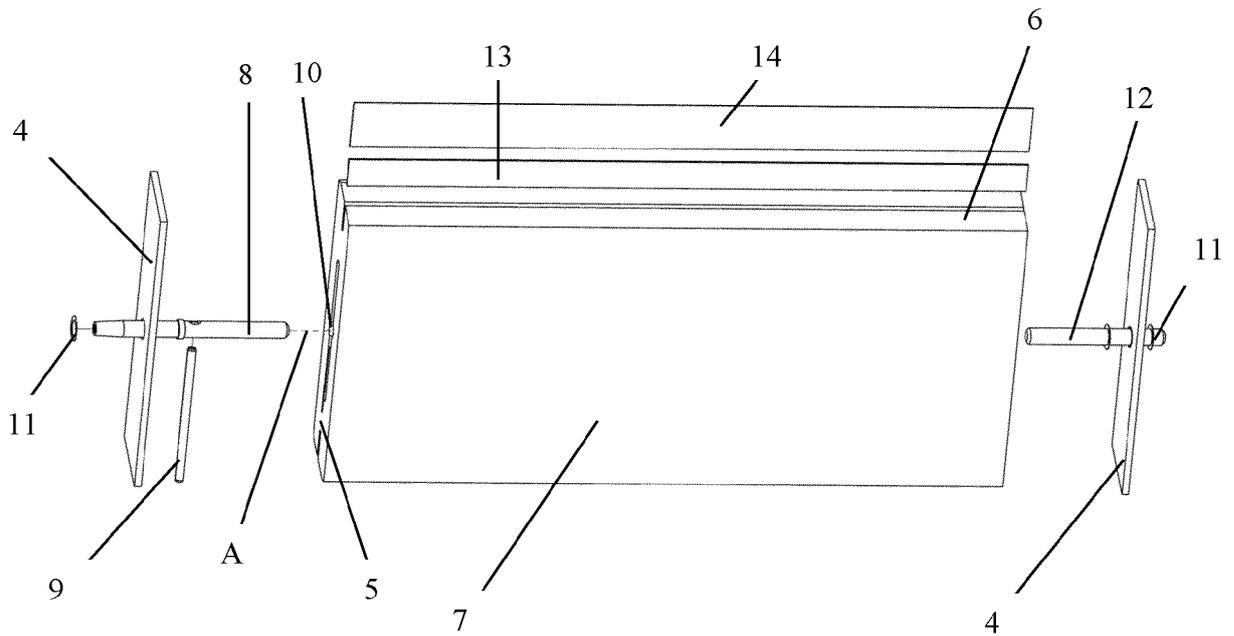


**Fig. 1**

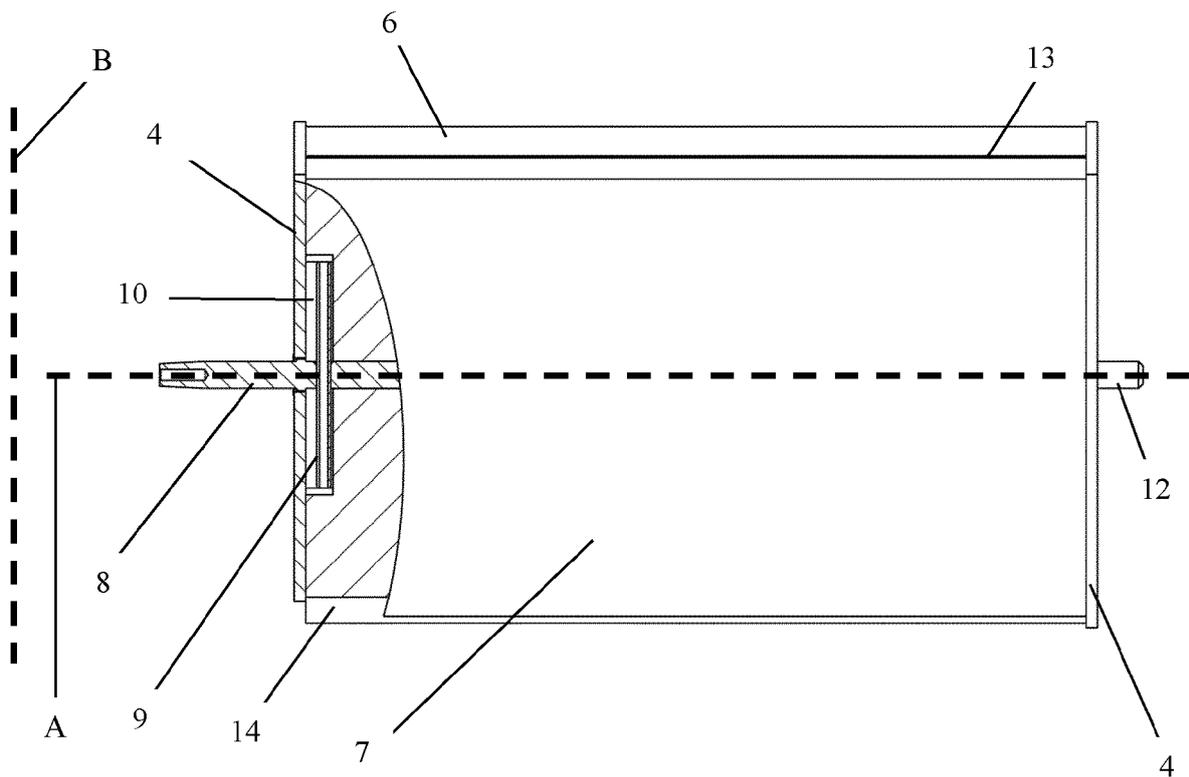
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**Fig. 3**



**Fig. 4**



EUROPEAN SEARCH REPORT

Application Number  
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 September 2021	Examiner Mattias Grenbäck
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ANNEX TO THE EUROPEAN SEARCH REPORT  
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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.

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