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(54) **Ventilation assembly for a ventilating window**

(57) A ventilation assembly (1; 1002) for a ventilating window having a sash, comprising a casing (2; 1002) fixed to the sash, wherein the casing (2; 1002) comprises a ventilation mechanism (3; 1003) arranged in the casing (2; 1002), which comprises a connection member (4a, 4b; 1004a, 1004b) having a first connection point (6a, 6b; 1006a, 1006b) and a second connection point (8a, 8b; 1008a, 1008b), where the second connection point (8a, 8b; 1008a, 1008b) is connected to an actuator slide (5, 1500) for enabling the connection member (4a, 4b; 1004a, 1004b) in the casing (2; 1002) to be displaced between a first position, defining a closed position, and a second position, defining a ventilation position. The displacement is achieved by means of the actuator slide (5; 1500) which is displaceable in guiding means (9; 1009) in the casing (2; 1002) wherein the actuator slide (5; 1500) is connected to operating means (502; 1502) for enabling movement of said actuator slide (5; 1500) between the first position and the second position, defining an open and closed ventilation position, respectively.

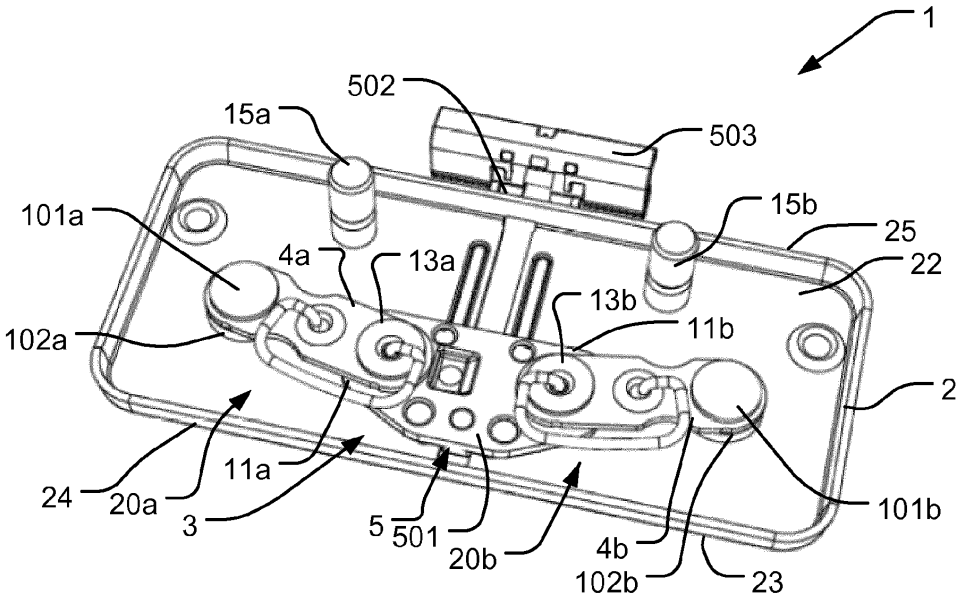

Fig. 2

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Description

Field of the invention

[0001] The present invention relates to a ventilation assembly for a ventilating window having a sash comprising a casing fixed to the sash, where the ventilation mechanism is arranged in the casing to be displaced between a first position, defining a closed position, and a second position, defining a ventilation position of the ventilation assembly.

Background of the invention

[0002] It is known from prior art to provide a window with such ventilation assemblies in order to create a desirable indoor climate in different buildings, e.g. houses, where the ventilation assemblies comprise at least one ventilation position to ensure a flow of air from one side of the window to another side of the window, in this way creating the more desirable indoor climate, where the air flow in the room is optimized.

[0003] An example thereof is an elongated ventilation flap incorporated in a window sash, in which the flap can be opened in various positions to provide an open path for air flow.

[0004] A problem with these types of ventilations flaps are that they are customized to each different type of window and therefore expensive to produce, since no standardization is applicable.

[0005] Improvement of ventilation assemblies has experienced further development as for example disclosed in WO 2012/084083 A1, which discloses a ventilation assembly for a ventilation window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, the lock assembly comprises a casing, a locking arm, a lock mechanism arranged in the casing for enabling the locking arm to be displaceable, via an actuator slide displaceable in a slot in the casing, between a first end position defining an unlocked position, a second end position defining a locked position and a third, intermediate position where the window is slightly open to achieve ventilation.

[0006] This known ventilation assembly, which is incorporated in the window sash in pivotable windows as part of the opening mechanism, has proven to have a good functionality, but it has a limited cost efficiency, due to numerous manufacturing parts, when implemented in windows where only the ventilation functionality is desired.

Disclosure of the invention

[0007] With this background it is an object of the present invention to provide an improved ventilation assembly which is easy to manufacture and cost-effective to produce.

[0008] In a first aspect, this object is met by providing a ventilation assembly for a ventilating window having a sash, comprising a casing fixed to the sash, a ventilation mechanism arranged in the casing comprising a connection member having a first connection point and a second connection point, the second connection point being connected to an actuator slide for enabling the connection member in the casing to be displaced between a first position, defining a closed position, and a second position, defining a ventilation position, by the actuator slide being displaceable in guiding means in the casing wherein the actuator slide is connected to operating means for enabling movement of the actuator slide between the first position and the second position, whereby the connection member at the first connection point is pivotably arranged on a fixation member fixed to the casing and that the connection member can only be displaced between two end positions, constituted by the first and second position, respectively and wherein an oblong hole constitutes the second connection point.

[0009] By this design a ventilation assembly having only a ventilation mechanism is provided, which is cost effective to manufacture due to less manufacturing components of the assembly. The ventilation assembly may be arranged on a window sash from where it is connected through the operating means to a suitable looking flap, thereby creating a favourable looking ventilation assembly of a window frame.

[0010] The interior of the ventilation assembly may comprise guiding means arranged in parallel with two vertical sides of the casing, in order to guide the actuator slide, when operated to be opened by a user.

[0011] Consequently, when the casing comprising the ventilation assembly is positioned on the window sash the operating means, which are connected to a flap in the window, will through the guiding means, being arranged in the aforementioned manner, guide the actuator slide to an open or closed position, where the positioning of the operating means creates an intuitive and easily accessible way, thus creating user-friendly management of the assembly.

[0012] In a further development the actuator slide comprises a plate arranged on the inside of the casing, such that the connection member is attached thereto through the second connection point and thereby being displaceable between the first position and the second position, creating the opening-closing mechanism of the ventilation assembly according to the invention. The plate will enable movement in unison of the connection member and the actuator slide, from the first to the second position and vice versa, whilst additionally providing a basis for both the positioning of the connection member at a second connection point as well as allowing for displacement of the connection member relative to the plate.

[0013] The second connection point being constituted by an oblong hole, arranged to provide the connection member with moveable properties during an activation process from a first to a second position. The specific

choice of providing the second connection point as an oblong hole is an advantage since it provides a directional movement of the connection member. In this way the movement of the connection member may be guided in a longitudinal movement which creates a controlled operation of the connection member. Other alternatives such as forming the second connection point as an enlarged hole allowing the connection member to move in several directions are conceivable as well.

[0014] The connection member could also from the inside of the casing be connected directly to an outer part of the actuator slide, while still maintaining the possibility of being displaced between a first and a second position through use of the operating means, which would be more cost effective due to less manufacturing components.

[0015] Furthermore, in another embodiment, the connection member may be a wire spring, which serves to create a bi-stable mechanism of the opening-closing positioning. A small and strong spring allows for a more compact construction of the ventilation assembly, and since almost all of the spring wire material is bent during movement of the actuator slide, and therefore stores and/or releases energies, the spring is able to handle large forces.

[0016] In order to create a force in the wire spring that serves as a bias towards one of two positions, the ventilation assembly may comprise a wire spring that is arranged such that a continuously changing distance of a spring end-to-end distance, with one end at the first connection point and another end at the second connection point, changes as the wire spring is moved between the first and the second position.

[0017] This continuously change in distance allows for tensioning and energy release of the wire spring, thereby providing a tension spring force, which will ensure positioning of the connection member and actuator slide in either the first or second position, thereby only enabling stable positioning at these aforementioned positions.

[0018] In some embodiments, the wire spring may comprises three portions between the first connection point and the second connection point, a middle portion and two outer portions, which strengthens the force that is built into the spring during movement.

[0019] The middle portion of the wire spring may be directed roughly in parallel with a line connecting the first connection point and the second connection point.

[0020] By providing the wire spring with outer potions that are roughly extending in a direction at a right angle between the imaginary line connecting the two points and/or arranging the middle portion that is directed roughly in parallel with the line connecting the two points, it is possible to construct a small and compact spring that can handle large forces. With the present construction most of the middle section of the wire spring is involved in the bending. Having a small and strong spring allows, in turn, for a more compact construction of the ventilation assembly.

[0021] The strength of the wire spring is furthermore reinforced by the spring having a transition between the middle portion and the outer portion which may be a sharply bent wire.

[0022] In another embodiment, the middle portion may be only slightly curved at any given position of the wire spring.

[0023] By providing a wire spring that is able to handle large forces and is sufficiently secured in a way that takes little place, easy manufacturing and production is possible.

[0024] The middle portion may be curved when no load is applied to the wire spring, and the middle portion may be substantially straight and pre-tensioned when the wire spring is mounted in the ventilation assembly.

[0025] By providing a wire spring that is curved in an un-mounted position, it is possible to create a pre-tension in the wire spring, when it is mounted, and thus creating a tension that must be overcome by the user via the operating means and actuator slide, to change position of the connection member from a first to a second position, and vice versa. This design prevents the ventilation mechanism from independently changing from one position to another without influence from a user.

[0026] However, it is to be understood that the connection member could be of another material and/or geometrical shape, having the same desired mechanical properties as the wire spring.

[0027] In a third embodiment, the connection member may comprise the wire spring.

[0028] A connection member will provide for a solid and easy attachable foundation for the wire spring, and provide stability during movement from position to position. Furthermore, the stability provided by the connection member will make it possible to utilize all of the wire spring pre-tension and thus enable a more smooth and consistent transition from one position to another.

[0029] The connection member can be of any suitable geometrical shape fitting in the casing and may comprise a first, middle and second connection point, for connection with the casing and the wire spring.

[0030] The wire spring may be connected at the middle connection point on the connection member and at the second connection point, such that the distance of the wire spring between the middle connection point and the second connection point changes, when the connection member moves between the first and the second position.

[0031] The change in distance will load and/or unload energy of the wire spring, and thereby provide an affinity of the wire spring to be at either one of the first and second positions. When the wire spring is moved between positions, energy is stored in the wire spring as it reaches a halfway movement between positions, which energy is released when the wire spring is moved to either one of the first and/or second position.

[0032] For the connection member to be displaced between the two positions, the second connection point

may be connected directly to the actuator slide or to a plate arranged at the inside of the casing.

[0033] The connection between the connection member and the plate, will provide for bringing the ends of the wire spring closer to one another during the first half of the movement from the first position to the second position, and vice versa, and thereby enable forces to be created by loading and unloading of the spring, thus providing a mechanism with two stable positions, namely the first and second position.

[0034] The above and/or additional objects, features and advantages of the present invention, will be further elucidated by the following illustrative and non-limiting detailed description of embodiments of the present invention, with reference to the appended drawings.

Brief description of the drawings

[0035]

Fig. 1 is an exploded view of a ventilation assembly according to the invention.

Fig. 2 is a bottom perspective view of a ventilation assembly with the ventilation mechanism in a closed position.

Fig. 3 is a bottom view of a ventilation assembly with the ventilation mechanism in a closed position.

Fig. 4 is a bottom perspective view of a ventilation assembly with the ventilation mechanism in an open position.

Fig. 5 is a bottom view of a ventilation assembly with the ventilation mechanism in an open position.

Fig. 6 is a perspective view of the top of a ventilation assembly with the ventilation mechanism in a closed position.

Fig. 7 is a perspective view of the top of a ventilation assembly with the ventilation mechanism in an open position.

Fig. 8 is a shaded and partly transparent bottom view of a ventilation assembly with the ventilation mechanism in an open position.

Fig. 9 is a shaded and partly transparent bottom view of a ventilation assembly with the ventilation mechanism in a closed position.

Fig. 10 is a bottom view of a second embodiment of a ventilation assembly illustrated in a closed position.

Detailed description of the embodiments

[0036] In Fig. 1 an embodiment of a ventilation assembly 1 for a ventilating window is illustrated, where the window having a sash (not illustrated) comprises the ventilation assembly 1. The ventilation assembly 1 comprises a casing 2 which in a manner known per se is arranged on the sash of the window (not illustrated), wherein a ventilation mechanism 3 is arranged within the casing 2. The casing 2 of the ventilation assembly is symmetrical about an imaginary line along guiding means 9, and several components of the ventilations assembly are thus mirrored on both sides of the casing 2, thus the ventilation assembly 1 will mostly be described through one mirrored part of the assembly.

[0037] The casing 2 is provided with guiding means 9, which are positioned substantially in the centre of a longitudinal axis thereof and arranged in parallel with vertical sides of the casing 2, to receive a plate 501 of an actuator slide 5 at an inside 22 of the casing 2 and to receive operating means 502 of the actuator slide 5 at an outside 23 of the casing 2. The operating means 502 of the actuator slide 5 further comprises an operation connection member 503 to which a flap (not illustrated) is connected for enabling operation of the ventilations assembly 1 by a user.

[0038] The plate 501 of the actuator slide 5 is at longitudinal end portions 11 a, 11 b thereof provided with a receiving part 12a, 12b, which is arranged to connect with a second connection point 8a, 8b of a connection member 4a, 4b, which is pivotably attached to the receiving part 12a, 12b by engagement of engagement means 13a, 13b.

[0039] Following a longitudinal line from the centre of the second connection point 8a, 8b of the connection member 4a, 4b, the connection member 4a, 4b further comprises a first connection point 6a, 6b, which from the top according to Fig. 1 engages with a mounting pin 101 a, 101 b that extends through the first connection point 6a, 6b and further down through an underlying mounting disk 102a, 102b, to be fastened at a pinhole 14a, 14b in the casing 2, such that the connection member 4a, 4b is pivotably arranged on the fixation member 100a, 100b, which is fixed directly to the casing 2.

[0040] The connection member 4a, 4b further comprises a middle connection point 19a, 19b arranged substantially in the middle of the connection member 4a, 4b, where a wire spring 20a, 20b is arranged to be positioned in the connection member 4a, 4b through the engagement means 13a, 13b engaging at the second connection point 8a, 8b and through the middle connection point 19a, 19b.

[0041] The second connection point 8a, 8b has the shape of an oblong hole 401 a, 401 b, best illustrated in Fig. 8 and Fig. 9, extending in a longitudinally line of the connection member 4a, 4b, and in which the engagement means 13a, 13b is movable. The specific choice of providing the second connection point 8a, 8b as an oblong hole 401 a, 401 b is an advantage since it provides a directional movement of the engagement means 13a, 13b. That is the engagement means 13a, 13b may in this way be guided in a longitudinal movement which creates a controlled operation thereof, such that the wire spring 20a, 20b is compressed in a controlled longitudinal direction.

[0042] By this arrangement the ventilation assembly can by movement of the actuator slide 5, through movement of the operating means 502, enable the connection member 4a, 4b to be displaced between a first position,

defining a closed position, and a second position, defining a ventilation position, where the wire spring 20a, 20b serves to provide a stable closed and open position of the actuator slide 5, which positions are illustrated in Figs. 2 through 5, along with the corresponding opening-closing action of the ventilation assembly 1.

[0043] Referring to Fig. 2 and Fig. 3 the closed position of the ventilation assembly 1 is obtained by the operating means 502 of the actuator slide 5 on the outside 23 of the casing 2 being positioned closets to the upper longitudinal horizontal side 25 of the casing, whereby the plate 501 of the actuator slide 5 is positioned closets to the lower longitudinal horizontal side 24 of the inside 22 of the casing 2. In this positioning of the ventilation assembly 1 the actuator slide 5 blocks an inflow of air through the ventilation assembly 1.

[0044] Coming from a closed position of the ventilation assembly 1 to an open position is best illustrated in Fig. 2 and Fig. 4, where an opening of the ventilation assembly 1 is achieved by moving the operating means 502 of the actuator slide 5 outwards away from the casing 2, thereby moving the plate 501 of the actuator slide 5 along the guiding means 9 upwards towards a set of downwardly projecting fastening pins 15a, 15b, arranged on the inside 22 of the casing 2 at pinholes 16a, 16b for mounting the casing 2 on a sash (not illustrated), in this way creating a ventilation opening in the ventilation assembly 1 allowing inflow of air.

[0045] Returning from the open position of the ventilation assembly 1 to a closed position thereof, is achieved by moving the operating means 502 of the actuator slide 5 towards the upper horizontal side 25 of the casing 2, such that the actuator plate 501 moves in the same direction towards the lower horizontal side 24 of the casing 2, thereby closing the ventilation opening in the ventilation assembly 1, causing blocking of air inflow.

[0046] During the displacement of the actuator slide 5, when switching between the closed and open position, a force is created in the wire spring 20a, 20b, due to a continuously change in the wire spring end-to-end distance between end portions of the wire spring 20a, 20b arranged at the middle connection point 19a, 19b and the second connection point 8a, 8b, respectively. As the connection member 4a, 4b, through the movement of the actuator slide 5 is moved between the first position and the second position, a simultaneous movement of the engagement means 13a, 13b in the oblong holes 401 a, 401 b of the second connection point 8a, 8b arises, moving the engagement means 13a, 13b form a first position to a second position, thereby creating a bi-stable mechanism in the wire spring 20a, 20b, that has an urge to move to either the closed position or to the open position, creating the two stable open and closed positions of the actuator slide 5. The movement of the engagement means 13a, 13b from a first position to a second position is controlled by the oblong holes 401 a, 401 b, which is provided to create a directional movement in a longitudinal direction. In this way a stable and smooth movement of the engagement means 13a, 13b is achieved, and the bi-stable force build up in the wire spring 20a, 20b may be continuous, without any sudden unwanted shift in directional movement of the engagement means 13a, 13b, that could cause an unwanted torque in the wire spring 20a, 20b.

[0047] In an alternative embodiment the movement of the spring 20a, 20b could be achieved by having the oblong holes 401 a, 401 b arranged directly in the actuator slide 5, so that the receiving part 12a, 12b of the engagement means 13a, 13b can freely move during the activation process.

[0048] The wire spring 20a, 20b may comprise three portions between the middle connection point 19a, 19b and the second connection point 8a, 8b; a middle portion 201 a, 201 b and two outer portions 202a, 202b, 203a, 203b, where the middle portion 201 a, 201 b can be directed roughly in parallel with a line connecting the middle connection point 19a, 19b and the second connection point 8a, 8b.

[0049] Furthermore, the transition between the middle portion 201 a, 201 b and the two outer portions 202a, 202b, 203a, 203b of the wire spring 20a, 20b may comprise a sharply bent wire.

[0050] At any given position the middle portion 201 a, 201 b of the wire spring 20a, 20b may be only slightly curved, and when no load is applied to the wire spring 20a, 20b the middle portion 201 a, 201 b might be only slightly curved or when experiencing maximal tension it may even be substantially straight.

[0051] The wire spring 20a, 20b may be preloaded when mounted to the ventilation assembly 1.

[0052] In a second embodiment illustrated in Fig. 10 the ventilation assembly 1001 may comprise a connection member 1004a, 1004b being the wire spring, which is connected directly to the first 1006a, 1006b and second connection point 1008a, 1008b, without having a connecting member, as the one previously described, which may provide the ventilation assembly 1001 with the same properties, while having less manufacturing components.

[0053] In such an embodiment the connection member 1004a, 1004b, constituted e.g. by the wire spring may be connected to the actuator slide 1500 in the same manner as previously described, while at a first connection point 1006a, 1006b it may be connected directly on a fixation member 1010a, 1010b having the same properties as the previously described first connection point 6a, 6b.

[0054] The opening-closing positions of the actuator slide 1500 is in this embodiment achieved by the ends of the guiding means 1009, wherein the actuator slide 1500 is guided, has the function of a stopping mechanism for each of the two positions, while the connection member 1004a, 1004b can be constituted by a wire spring 20a, 20b as previously described, and provides the ventilation mechanism with two stable opening-closing positions.

[0055] In this embodiment the second connection

member could as previously described comprise oblong holes 1401 a, 1401 b arranged directly in the actuator slide 1500, and to where the engagement means 1013a, 1013b engage, in this way creating movable properties of the engagement means, creating a spring force in the spring during the activation process, which causes a bi-stable mechanism in the connection member 1004a, 1004b, constituted by e.g. the wire spring.

[0056] Applying for all possible embodiments the wire spring 20a, 20b may be connected to the first connection point 6a, 6b and the second connection 8a, 8b at any distance from each other depending on the properties of the wire spring 20a, 20b. That is, in one embodiment the wire spring may be connected to a fixation member 10a, 10b placed at e.g. the location of the middle connection point 19a, 19b or any other suitable location in the casing.

[0057] The actuator slide 5 may according to any embodiment be of any other form possible to maintain the properties of the ventilation assembly 1 as described. The plate 501 of the actuator slide 5 may have other shapes, e.g. rectangular, round, oval, triangular and other geometrical shapes suitable for this purpose.

[0058] The operation connection member 503 of the operating means 502 may also be of any suitable geometrical shape fitting into the flap of the window, to which it may be operated from by a potential user.

[0059] The ventilation assembly may be mounted on any window to which a ventilation mechanism is necessary and found suitable.

[0060] The invention should not be regarded as been delimited to the embodiments shown and described in the above, but various modifications and combinations may be carried out without departing from the scope of the appended claims.

Claims

1. A ventilation assembly (1; 1001) for a ventilating window having a sash, comprising a casing (2; 1002) fixed to said sash, a ventilation mechanism (3; 1003) arranged in said casing (2; 1002) comprising a connection member (4a, 4b; 1004a, 1004b) having a first connection point (6a, 6b; 1006a, 1006b) and a second connection point (8a, 8b; 1008a, 1008b), said second connection point (8a, 8b; 1008a, 1008b) being connected to an actuator slide (5, 1500) for enabling said connection member in said casing (2; 1002) to be displaced between a first position, defining a closed position, and a second position, defining a ventilation position, by said actuator slide (5; 1500) being displaceable in guiding means (9; 1009) in said casing (2; 1002) wherein said actuator slide (5; 1500) is connected to operating means (502; 1502) for enabling movement of said actuator slide (5; 1500) between said first position and said second position,

characterized in that said connection member (4a, 4b; 1004a, 1004b) at said first connection point (6a, 6b; 1006a, 1006b) is pivotably arranged on a fixation member (10a, 10b; 1010a, 1010b) fixed to said casing (2; 1002) and that said connection member (4a, 4b; 1004a, 1004b) can only be displaced between two end positions constituted by said first and second position, respectively, and wherein an oblong hole (401 a, 401 b; 1401 a, 1401 b) constitutes said second connection point (8a, 8b; 1008a, 1008b).

2. A ventilation assembly (1; 1001) according to any of the preceding claims, wherein said guiding means (9; 1009) is arranged in parallel with two vertical sides of said casing (2; 1002).

3. A ventilation assembly (1; 1001) according to any of the preceding claims wherein said actuator slide (5; 1500) comprises a plate (501; 1501) arranged on the inside (22; 1022) of said casing (2; 1002) and being displaceable between said first position and said second position.

4. A ventilation assembly (1; 1001) according to claim 3, wherein said connection member (4a, 4b; 1004a, 1004b) is arranged on said plate (501; 1501) at said second connection point (8a, 8b; 1008a, 1008b).

5. A ventilation assembly (1; 1001) according to any one of the preceding claims, wherein said connection member (4a, 4b; 1004a, 1004b) is a wire spring (20a, 20b).

6. A ventilation assembly (1; 1001) according to claim 5, wherein a spring end-to-end distance, with one end at said first connection point (6a, 6b) and another end at said second connection point (8a, 8b), changes continuously as said wire spring (20a, 20b) is moved between said first position and said second position.

7. A ventilation assembly (1) according to any one of claims 5 to 6, wherein said wire spring (20a, 20b) comprises three portions between said first connection point (6a, 6b) and said second connection point (8a, 8b; 1008a, 1008b), a middle portion (201 a, 201 b) and two outer portions (202a, 202b, 203a, 203b).

8. A ventilation assembly (1) according to any one of claims 5 to 7, wherein said middle portion (201 a, 201 b) is directed roughly in parallel with a line connecting said first connection point (6a, 6b) and said second connection point (8a, 8b).

9. A ventilation assembly (1) according to any one of

claims 5 to 8, wherein the transition between said middle portion (201 a, 201 b) and said outer portions (202a, 202b, 203a, 203b) comprises a sharply bent wire.

10. A ventilation assembly (1) according to any one of claims 5 to 9, wherein said middle portion (201 a, 201 b) is only slightly curved at any given position of said wire spring (20a, 20b).

11. A ventilation assembly (1) according to any one of claims 5 to 10, wherein said middle portion (201 a, 201 b) is curved when no load is applied to said wire spring (20a, 20b), and said middle portion (201 a, 201 b) is substantially straight and pre-tensioned when said wire spring (20a, 20b) is mounted in said ventilation assembly (1).

12. A ventilation assembly (1) according to claims 1 to 4, wherein said connection member (4a, 4b; 1004a, 1004b) comprises said wire spring (20a, 20b).

13. A ventilation assembly (1) according to claim 12, wherein said connection member (4a, 4b; 1004a, 1004b) comprises a first connection point (6a, 6b), a middle connection point (19a, 19b) and a second connection point (8a, 8b).

14. A ventilation assembly (1) according to any of claims 12 to 13, wherein said wire spring (20a, 20b) is connected at said middle connection point (19a, 19b) on said connection member (4a, 4b; 1004a, 1004b) and at said second connection point (8a, 8b), such that the distance between said wire springs (20a, 20b) end portions changes, when said connection member (4a, 4b; 1004a, 1004b) moves between said first position and said second position.

15. A ventilation assembly (1) according to any of claims 12 to 14, wherein said second connection point (8a, 8b) is connected to said actuator slide (5).

16. A ventilation assembly (1) according to claim 12 to 15, wherein said connection member (4a, 4b) is arranged on said plate (501) at said second connection point (8a, 8b).

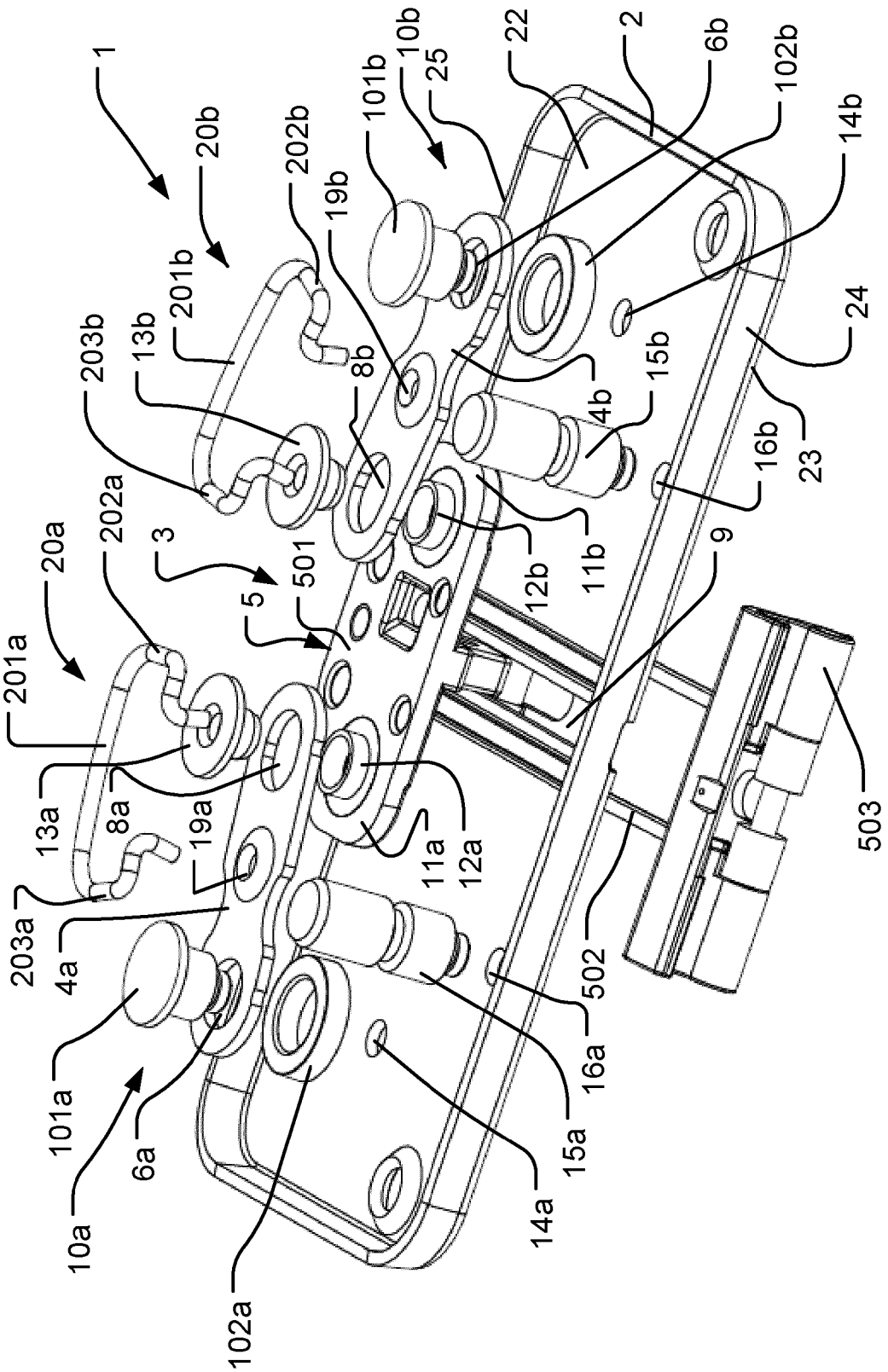
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Fig. 1

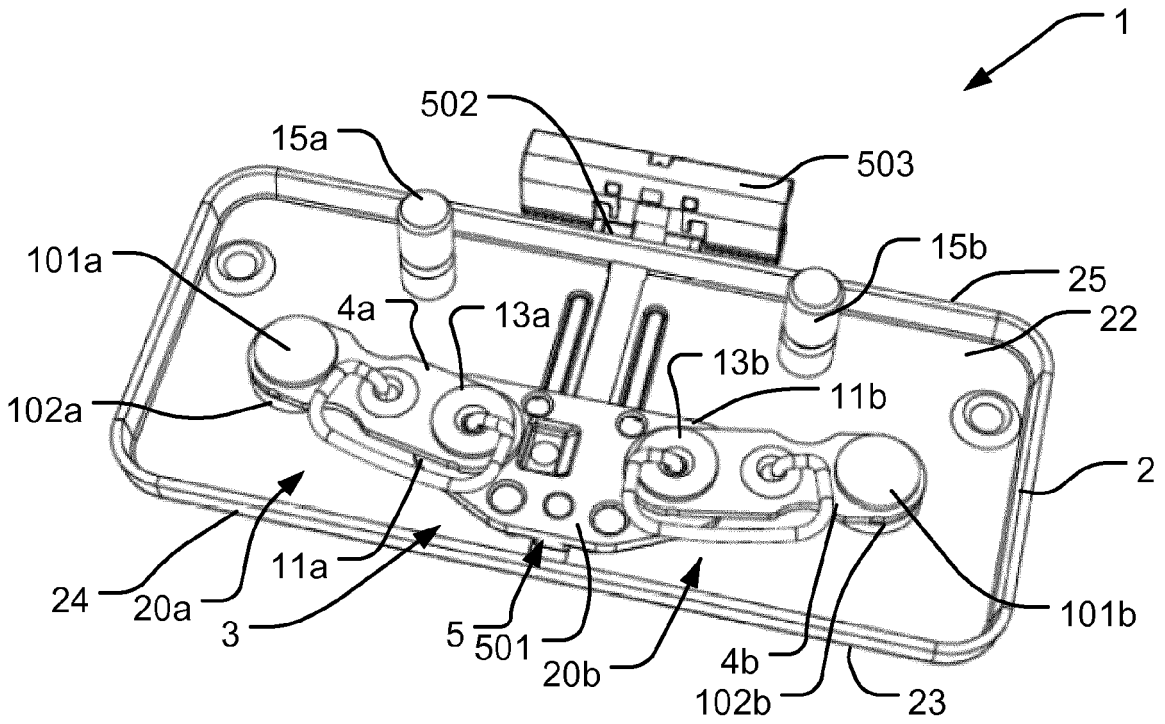
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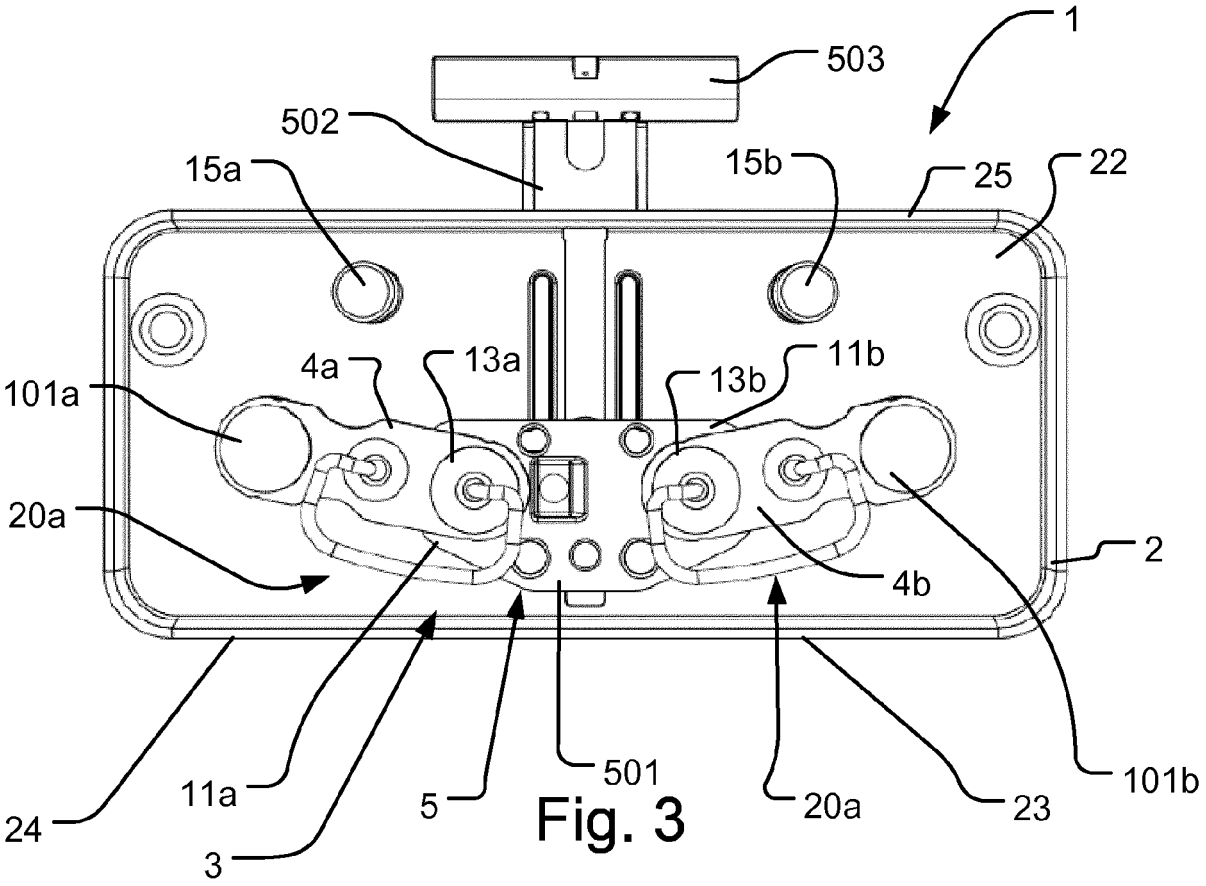
Fig. 2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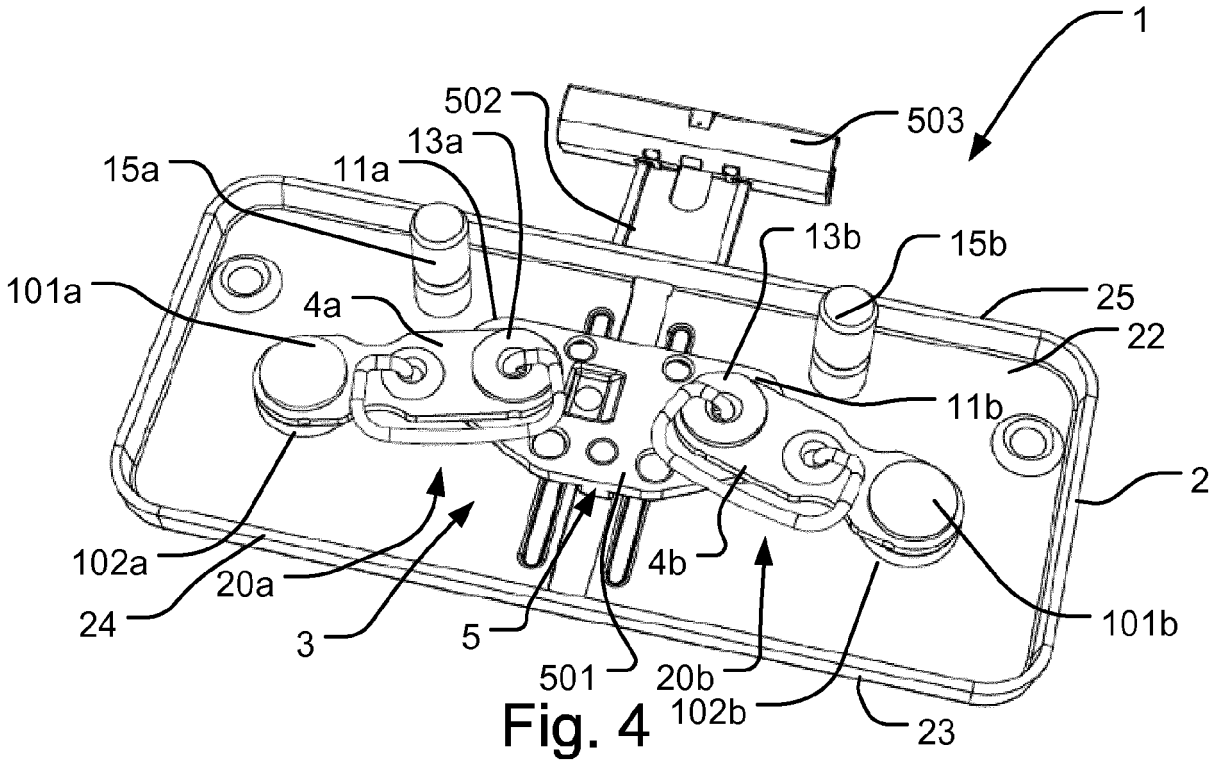
5
501
20a
23
101b

Fig. 3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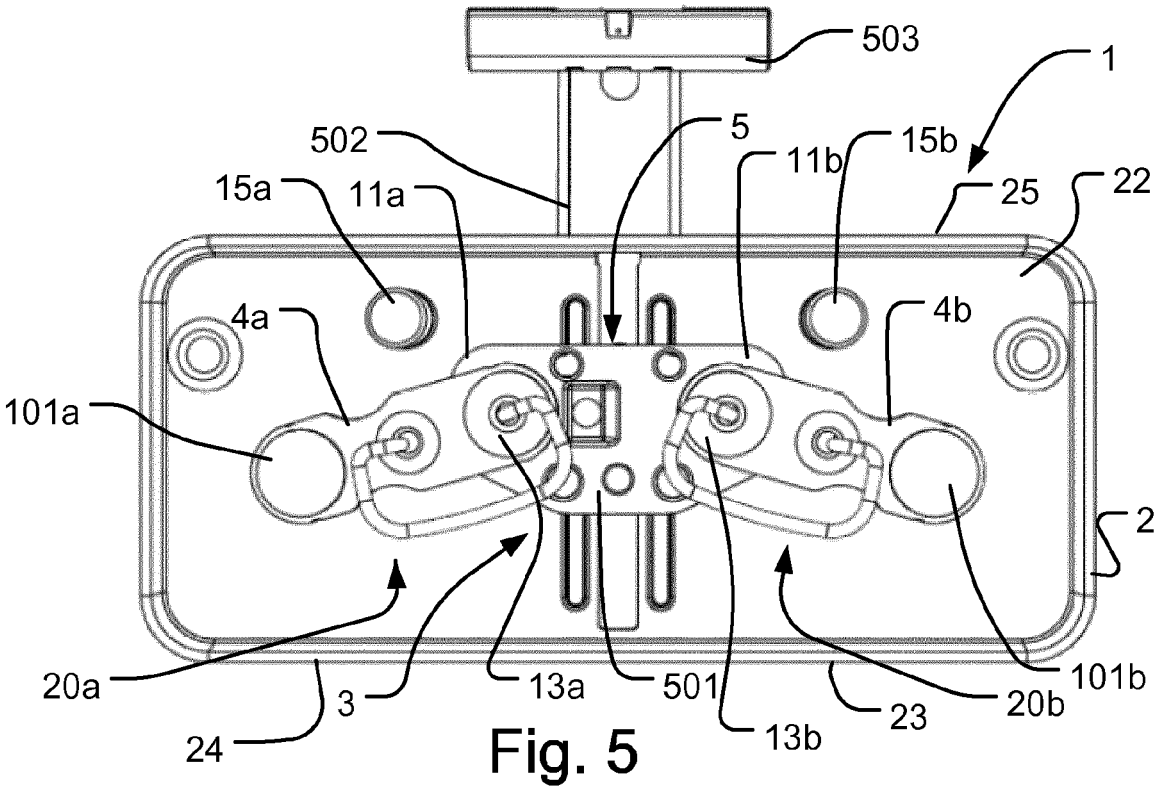
3
5
101b
501
20b
102b
23

Fig. 4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501
13b
23
20b
101b
24

Fig. 5

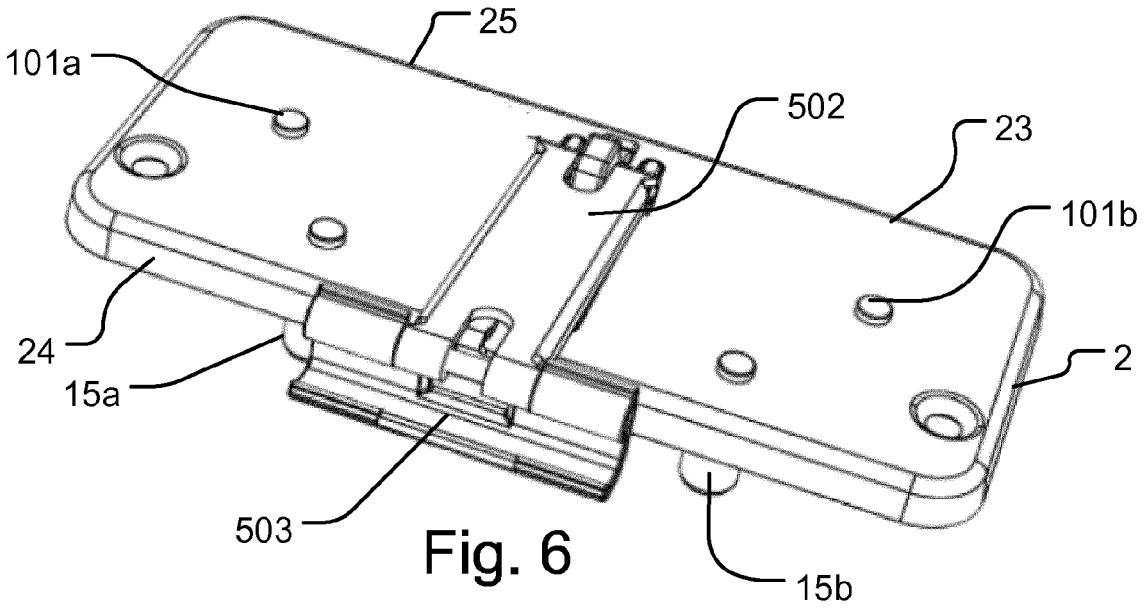
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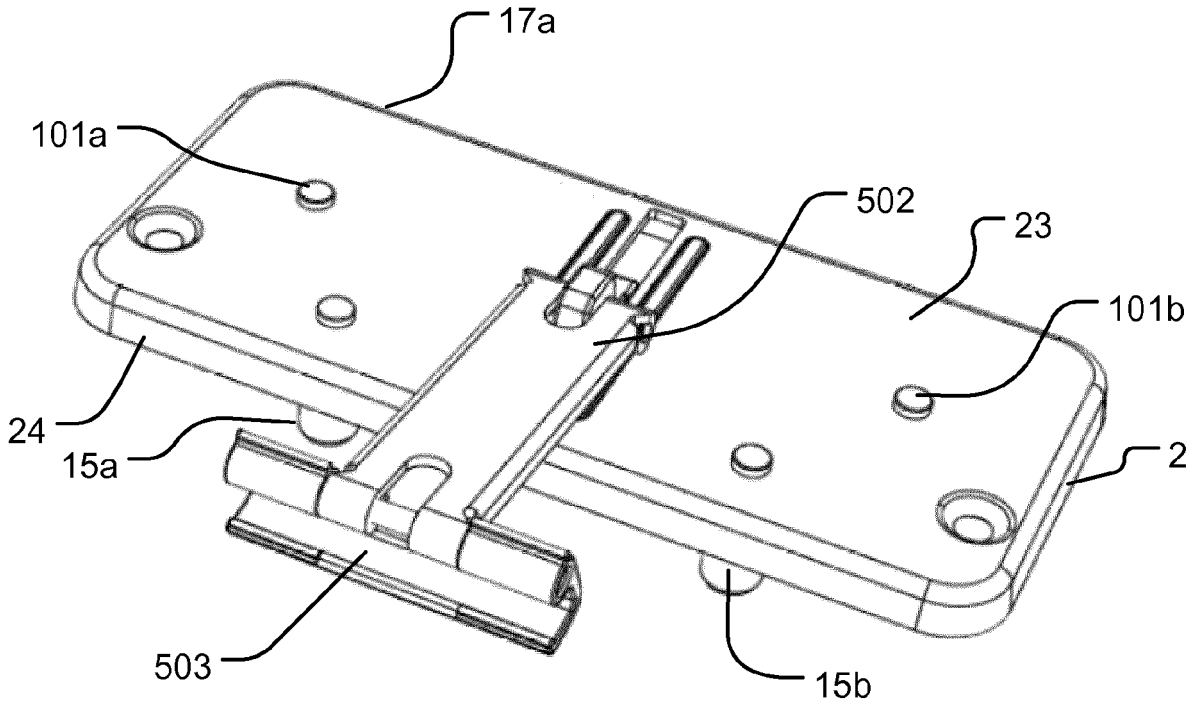
Fig. 6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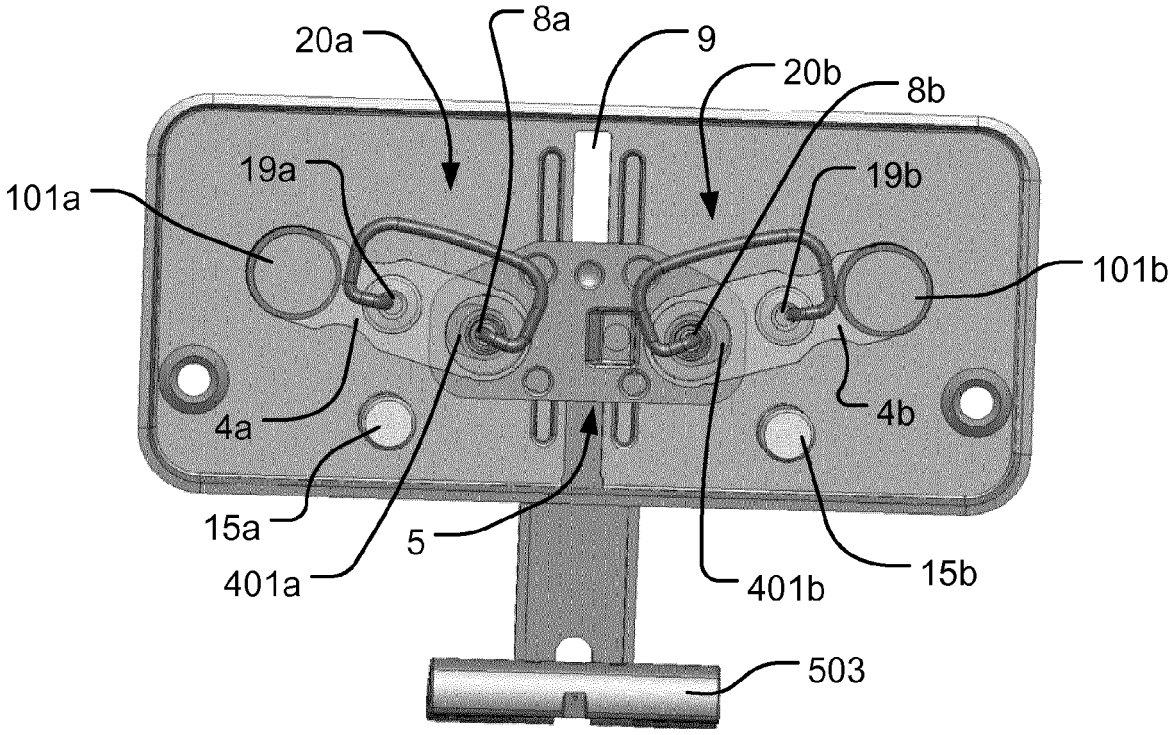
503
15b

Fig. 7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9
20b
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101b
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15b
503

Fig. 8

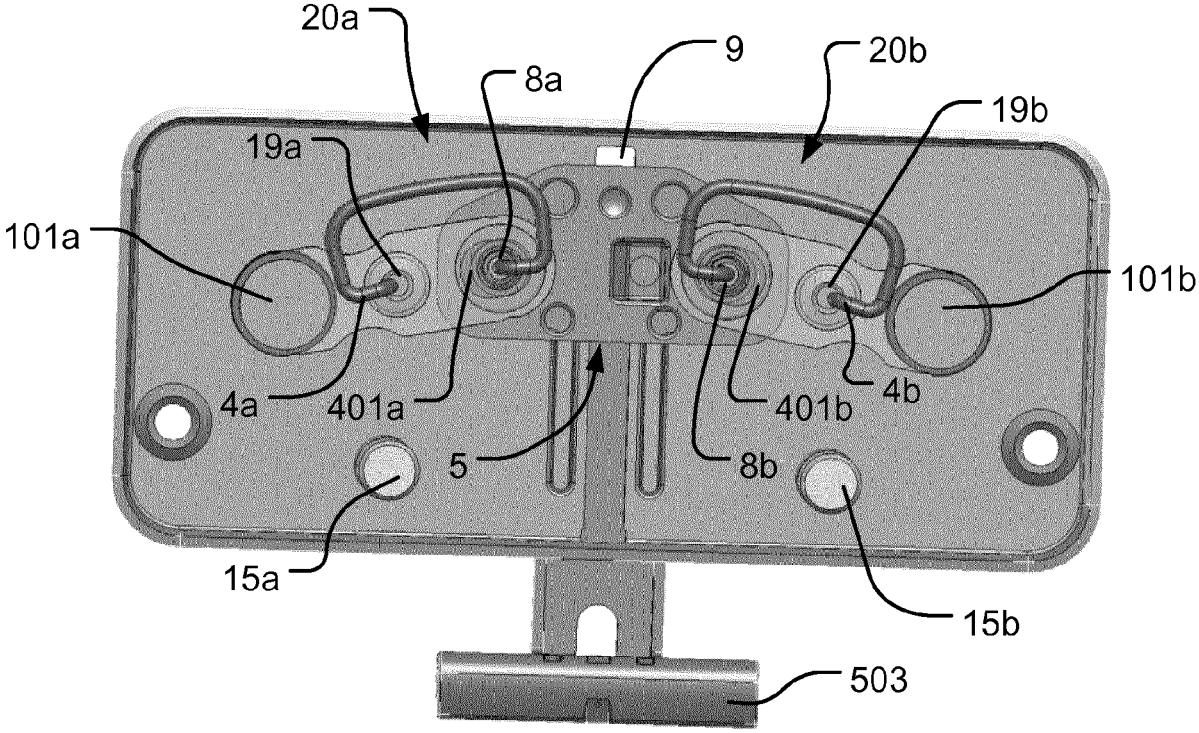
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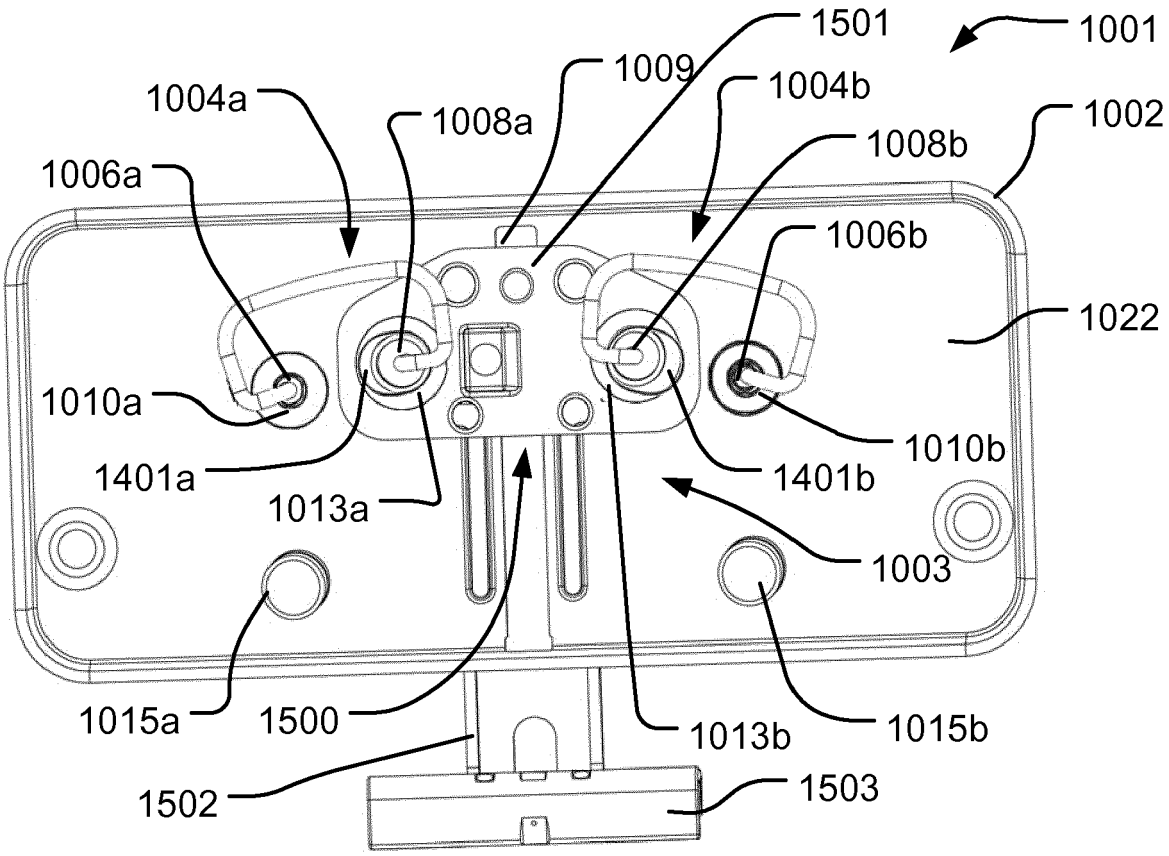
Fig. 9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1003
1015a
1500
1013b
1015b
1502
1503

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 3324

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 August 2014	Merz, Wolfgang

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18-08-2014

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