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(54) **A NOISE REDUCING LOCKING ASSEMBLY FOR A VENTILATING WINDOW**

GERÄUSCHMINDERNDE VERRIEGELUNGSANORDNUNG FÜR EIN LÜFTUNGSFENSTER

ENSEMBLE DE VERROUILLAGE ANTIBRUIT POUR FENETRE D'AERATION

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Description

[0001] The present invention relates to a locking assembly for a ventilating 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, said locking assembly comprising a casing and at least one pawl member, said one pawl member being attached to the casing via a fastening pin, a part of said pawl member projecting through a slot in the casing, said slot having two end sides and said pawl member being arranged such that said part is movable in said slot between a locked position, in which it is adapted to be in locking engagement with a separate stationary locking member, and an unlocked position, in which it is adapted to be released from said locking engagement to allow opening of the window.

[0002] A locking assembly of the abovementioned type is disclosed in DK-C-114 046. An actuator slide protruding through the casing connects an operator member with the locking mechanism, said actuator slide having a first unlocked position, a second locked position and a third intermediate position where the window is slightly open to achieve ventilation. Also protruding through slots in the casing are two pawl members. When closing the window the pawl members come into engagement with the fixed strike plate on the main frame whereby they are forced to the sides and the actuator slide is pressed into its second end position. For the purpose of ventilation, the actuator slide is pulled half way back towards the first position by use of the operator member without the pawl members being displaced.

[0003] The locking assembly described above is made entirely from metal, which entails a good resistance to wear and has a well-proven reliability even after many years of use and exposure to different environmental factors. However, the movement of the pawl members and the actuator slide between their different positions gives rise to noise, particularly in the form of sharp sounds when the moveable parts reach their end positions. Even though users have not indicated these sounds as being a problem and possibly have not even consciously perceived these noises as being a source of irritation, the removal of such noise can be relieving. In other technical fields such as vacuum cleaners and car engines a lot of effort has been put into improving the sound of the engine to make it less irritating and even make it a part of the company brand. However, in the field of roof windows the problem has not previously been recognised. On the contrary, the noise has in many cases been seen as an advantage as it functions as an indication, that the window has been properly closed.

[0004] Having realised that the problem of noise reduction does also apply to the field of locking assemblies for windows, it is the object of the invention to provide a locking assembly, which generates less noise during operation.

[0005] The object is achieved with a locking assembly

of the kind mentioned in the introduction, which further comprises a noise reducing liner positioned to prevent direct contact both between the fastening pin and the casing and between the pawl member and the casing, respectively, said liner lining the end sides of the slot.

[0006] The lack of direct contact between the parts prevents the generation of the characteristic hard or sharp sounds of metal against metal. The liner material may be said to muffle the sound. Using one liner for muffling the sound both between the fastening pin and the casing and between the pawl member and the casing surprisingly provides a cheap, durable and efficient muffling effect. It may also wholly or partly substitute the use of a lubricant.

[0007] The liner decreases the number of separate parts needed for the locking assembly, and the interconnection helps keep the two liner portions in place as they are affected by the rotational movement of the pawl member.

[0008] In a preferred embodiment a locking control mechanism is arranged in said casing to control the movement of the pawl member between said locked and unlocked positions, said locking control mechanism being operable by at least one actuator slide displaceable guide means in the casing from a first end position defining the unlocked position of the pawl member to a second end position defining the locked position of the pawl member and vice versa.

[0009] In another preferred embodiment the slot has the shape of a circular section with the same radius of curvature and the same length as the path of the pawl member, the movement of said pawl member in said slot being a rotation about the fastening pin. This is according to the design of conventional locking assemblies and has among others the advantage, that the attachment of the pawl member via the fastening pin is hidden and protected inside the casing. In such cases it is advantageous that the common liner has the overall shape of an isosceles triangle, where the apex envelopes the fastening pin, the angle between the two legs projecting from the apex corresponding to the angle of the circular section covered by the slot in the casing, where these two legs extend beyond the third side of the triangle, the two extensions lining the end sides of the slot, and where the third side of the triangle is curved with the same radius of curvature as the slot, lining the side surface of the slot facing the apex. To keep the liner secured in relation to the fastening pin, the liner may have one or more retaining members projecting towards the inside of the triangle or a connecting member connecting the two legs projecting from the apex, the area enclosed by the triangle and the retaining or connecting member(s) corresponding in size and shape substantially to the size and cross sectional shape of the fastening pin. Thus, no separate fastening means are necessary. Preferably, the height of the liner in the direction perpendicular to the plane of the triangle decreases from a maximum at the apex to a minimum at or by the third leg.

[0010] In a preferred embodiment at least part of said

liner is provided by means of at least partly overmoulding or encasing said first part with a layer of lining material. Thereby it is possible to manufacture a conventional size part with muffling qualities. Further, the part forms a stronger core, which may be of a heat resistant material such as metal. This makes the lined part and thereby the locking assembly according to the invention fireproof because the heat resistant part is still operational during a fire. Said layer of lining material preferably only covers some of the first part including said first surface of the first part.

[0011] Said lining preferably has a thickness of 0.3 to 1.0 mm, preferably approximately 0.5 mm, which provides for a strong part with muffling qualities and which can be made to be fireproof.

[0012] In an embodiment mutually contacting surfaces are both provided with a liner.

[0013] The liners may be made from any suitable material having a sufficient strength and resistance to wear. It is, however, preferred that the liners be made from a plastic material such as polyethylene (PE), polypropylene (PP), polyether ether ketone (PEEK) or polyoxymethylene (POM), as such materials do not corrode and are relatively cheap. Depending on the number and place of use of the liners there may be two or more types of liners, each liner type being made from a different material depending on the forces acting on them. Similarly, it might be advantageous to use a liner made from a combination of two or more types of material, preferably from two kinds of plastic having different resistances to wear, such as polyoxymethylene (POM) and polypropylene (PP) softened with an ethylene-propylene-diene monomer (EPDM). This may for instance be the case with the common liner described above.

[0014] In a preferred embodiment said liner is in one piece.

[0015] In another preferred embodiment said locking assembly is mounted in said window, the window further including a strike plate comprising said at least one stationary locking member for locking engagement with said locking assembly.

[0016] The invention will now be described in detail with reference to the accompanying drawing, in which

Fig. 1 is a sectional view of the upper part of a ventilating window, where a locking assembly according to the invention is in its closed position,

Fig. 2 is a sectional view corresponding to the one in Fig. 1, but where the locking assembly is in its open position,

Fig. 3 is a plane view of a part of the locking assembly shown in Fig. 1 seen from above,

Fig. 4 is a plane view of the strike plate shown in Fig. 1 seen from below,

Fig. 5 is a plane view of a part of the locking assembly shown in Figs. 1 and 3 seen from below,

Fig. 6 is a perspective view of a liner for the actuator slide,

Fig. 7 is a perspective view of a pawl liner,

Fig. 8 is a perspective view of a hinge for connecting the operator member to the sash,

Fig. 9 is a plane view seen from the side of the hinge shown in Fig. 8,

Fig. 10 is a perspective view of an overmoulded or encased operator hinge,

Fig. 11 is a cross-section along the line XI-XI of the operator hinge according to Fig. 10, and

[0017] Fig. 12 is a cross-section along the line XII-XII of the operator hinge according to Fig. 10.

[0018] In Figs 1 and 2 an embodiment of a locking assembly according to the invention is shown in a ventilation window. An operator member 1 is located on the inside of the window in connection with the top sash member 2. When pulling on the operator member 1 to open the window, as indicated by the arrow A, an actuator slide 3 that protrudes through a slot (not shown) in the casing 4 of the locking assembly is moved towards the inside of the window (to the right in Figs. 1 and 2), the operator member 1 and actuator slide 3 being connected via an operator arm 5 via an operator hinge 1a. Simultaneously, pawl members 6 (only one is visible in Figs 1 and 2) are being shifted to the positions shown in Fig. 3 from positions at the other ends of slots 41 in the casing 4, the pawl members being connected to the actuator slide 3 via a locking control mechanism (not shown) consisting of a system of link joint arms inside the casing 4 as will be explained later. The pawl members are thereby brought out of engagement with the stationary locking members 71 (only one is visible in Figs 1 and 2) projecting from a strike plate 7, which may be seen more clearly in Fig. 4, said strike plate being fixed to the top frame member 8.

[0019] The slots 41,42 in the casing through which the pawl members 6 and actuator slide 3 protrude serve as guide means.

[0020] The operator member 1 is connected to the top sash member 2 by means of a hinge 9. The resulting pivot movement of the operator members (indicated by the arrow A) necessitates pivot connections both between the operator member 1 and the operator arm 5 and between the operator arm 5 and the actuator slide 3.

[0021] When closing the window, the pawl members 6 come into engagement with the stationary locking members 71 of the strike plate 7 and are thereby forced to the sides, moving along the slot 41 to the position opposite the one shown in Fig. 3. The movement of the pawl members are transmitted to the actuator slide 3 via the locking control mechanism 43,44,45, and the actuator slide is pulled back from the position shown in Fig. 2 to the position shown in Fig. 1. The pattern of movement of the pawl members in relation to the strike plate is indicated with the arrows B in Fig. 4. The pawl members are now located behind the stationary locking members 71 of the strike plate 7 thereby locking the window.

[0022] To achieve ventilation with only a limited loss

of heat a window with a locking assembly as the one shown in the drawing may be opened slightly by placing the actuator slide 3 in an intermediate position (not shown). The pawl members 6 are not affected by the moving of the actuator slide 3 between its locked position and its ventilating position. As may be seen from Fig. 5, the actuator slide 3 and pawl members 6 are interconnected via the locking control mechanism, which consists of a system of spring-loaded arms 43, which force the actuator slide to move stepwise between three predetermined positions as described above, while the pawl members move between only two positions. Other configurations of the arms 43 and springs 44,45, and other means of interconnection may be devised, but the embodiment shown has proven its worth over decades of use. Similarly it is to be understood that a locking assembly functioning with only two positions of the actuator slide, i.e. with no ventilating position is also within the scope of the invention.

[0023] The movement of the pawl members 6 and actuator slide 3 in relation to the casing 4 as well as the contact between the pawl members and the stationary locking members 71 of the strike plate 7 inevitably gives rise to friction, and both the actuator slide and the pawl members may further hit against the end edges of the slots 41,42 in the casing. This gives rise to several kinds of sound, not only impact sounds and frictional sounds, but possibly also resonance in different parts of the locking assembly, particularly the casing.

[0024] At present the different parts of practically all commercially available locking assemblies are made from metal, as such materials possess both the necessary strength and wearability and have in general proven well suited for the purpose. This choice of material, however, increases the problem of sound generation. Especially the generation of resonance may be a problem.

[0025] To moderate the generation of sound during operation of the locking assembly it is, according to the invention, provided with one or more liners, which cushion the contact between the different parts of the locking assembly thereby cushioning the sound. Other liners than the ones provided by the invention may be provided, as it will be apparent from the following.

[0026] Fig. 6 shows a slide liner 31, which prevents the actuator slide 3 from coming into direct contact with the casing 4, the spring-loaded arms 43 and the operator arm 5. The slide liner has a base 311, which abuts against the spring-loaded arms as may be seen in Fig. 5, a projecting edge 312, which serves as a contact surface with the casing, a pair of projections 313 protruding through the slot 42 in the casing as may be seen in Fig. 3, and a connecting piece 314 projecting into the actuator slide and preventing contact with the operator arm 5 as may also be seen in Fig. 3. To make room for the liner 31, the slot 42 may be made slightly wider than in the traditional locking assembly so that the effective width of the slot is approximately the same.

[0027] Fig. 7 shows a pawl liner 61 in accordance with

the invention intended to isolate the pawl members from the casing, said pawl liner providing muffling of both the pawl member and the fastening pin. The pawl liner may be said to have the overall shape of a triangle, where the apex 62 is rounded and the opposite leg 63 curved. As may be seen in Figs. 3 and 5, the liner 61 is arranged with its apex at the fastening point 64 of the pawl member 6, and with the curved leg 63 projecting into the slot 41 in the casing. The apex thus lines the pivot connection between the pawl member and the casing and the curved leg lines the slot against the part 6' of the pawl member projecting there through.

[0028] In the embodiment shown, the apex 62 is provided with a semicircular connecting piece 66, which together with the apex forms a circular member surrounding the connection between the pawl member 6 and the casing 4 all way round. The connecting piece may, however be left out or replaced with a retaining member (not shown) projecting from the side of the triangle to prevent the liner 61 from getting dislocated without surrounding the connection entirely.

[0029] The pawl liner 61 is further provided with a pair of projecting corner pieces 65, which may be said to be extensions of the two legs meeting at the apex 62. As for the curved leg 63, the corner pieces has an increased height seen in the direction perpendicularly to the plane of the triangle, which allows them to project through the slot 41. The corner pieces thus function as a liner for the end edges i.e. the end sides of the slot, preventing the pawl member from hitting against the casing when being moved between its two positions as may be seen in Figs. 3 and 5.

[0030] The height of the pawl liner 61 in the direction perpendicular to the plane of the triangle is shown to decrease from a maximum at the apex 62 to a minimum at or by the third leg 63. At present, this design is considered to be the one providing the best manageability during assembly of the locking assembly, but other designs may be preferable in consideration of other factors.

[0031] Figs. 8 and 9 show the hinge 9 connecting the operator member 1 to the top sash member 2. Traditionally, this hinge consisted of two hinge parts 91 and 92, which were connected to the operator member and the top sash member, respectively, and which were interconnected by means of a pivot 93 projecting through bend back edges 94,95 of the two hinge parts. In the embodiment shown the pivot 93 has now been provided with a plastic coating 96 preventing direct contact between the pivot and the hinge parts 91,92.

[0032] To minimise efforts and expenses it might be considered to make the pivot 93,94 or possibly even the entire hinge 9 entirely from plastic. Again, this should, however, be done with care as some kinds of plastic would quickly deteriorate in the event of fire, making it impossible to open the window.

[0033] Even though not shown in the drawing, the hinge 9 may further be provided with liners preventing direct contact between the bend back edges 94,95 of the

two hinge parts 91, 92 at the points marked by 97 in Fig. 8.

[0034] Finally the strike plate 7, which is shown in Fig. 4, is preferably made entirely from plastic, preferably moulded in one piece. Regardless of the material chosen it may, however, also be provided with liners (not shown) on the stationary locking members 71, these liners serving to deaden sound and/or as wearing parts. The drawbacks of using only plastic mentioned above in relation to i.a. the hinge 9 do not apply to the strike plate, as a melted strike plate would only make it easier to open the window.

[0035] The pawl liner 61 is preferably made from a plastic material, which is resistant to impact loads. An example of such a material is Hytrel®, which is polypropylene softened by the addition of an ethylene-propylene-diene-monomer. The same applies to any all-plastic parts of the locking assembly affected by impact loads.

[0036] Other liners and parts of the locking assembly, which are not subject to impact loads, such as the slide liner 31 and the strike plate 7, should instead be made from a material, which is more resistant to frictional loads caused by the movement of the actuator slide 3 and pawl members 6 in relation to the casing 4 and strike plate 7. An example of such a material is polyoxymethylene, known as POM.

[0037] Noise reduction may further be improved by an appropriate configuration of the strike plate 7. Traditionally the strike plate has been provided with a raised edge or projection at the point marked with 72 in Fig. 4, the purpose of the edge being to force the pawl member to the side when closing the window and to keep it there. It has, however, surprisingly been discovered that, in particular when making the strike plate from plastic, the raised edge is unnecessary for the functioning of the locking assembly, and that a locking assembly with a strike plate as the one shown in Fig. 4 gives rise to less noise. It is therefore preferred that the shape of the inner side of the stationary locking members of the strike plate of the locking assembly describes a smooth, continuously advancing curve.

[0038] The liner or part of it may in another embodiment of the locking assembly according to the invention be provided by means of overmoulding or encasing a part with a layer of lining material, e.g. a plastic material such as poly ether ether ketone (PEEK).

[0039] Figs 10-12 show different views of an operator hinge 1a, which in has been overmoulded or encased with a layer 1b of lining material. The operator hinge 1a itself is made from metal. The layer 1b of lining material is best seen in Figs 11 and 12 and covers some of the operator hinge 1a including the surface facing operator arm 5. The layer 1b of lining material thus leaves the operator hinge 1a and thereby the locking assembly according to the invention fireproof because the heat resistant metallic operator hinge 1a will still be operational even when exposed to high temperatures.

[0040] In the embodiment shown the layer of lining material has a thickness of approximately 0.5 mm. The ma-

terial thickness of the operator hinge without the layer of lining material is approximately 2.5 mm. In the specific embodiment shown a locking assembly of reduced noise generation is thus provided while at the same time ensuring fireproof characteristics. In different embodiments of the locking assembly the thicknesses of the layer and the core may assume other absolute and relative values to suit any other distribution of forces or other fire safety demands.

[0041] Linings of other parts of the locking assembly according to the invention may also be provided in the form of overmoulding or encasing the respective parts. As examples this holds true for the operator arm 5, hinge 9, pawl member 6, actuator slide 3 and casing 4.

[0042] In addition to the liners described above, other liners may be provided, such other linings also being made by overmoulding or encasing the respective part or in any other appropriate way. Such liners may be made from any appropriate material as long as they meet the object of making the operation of the locking assembly generate less or more agreeable sound.

[0043] In the above, only one of each pair of mutually contacting surfaces is provided with a liner. It is, however, to be understood that a double lining protecting both surfaces may be preferable, for example to achieve an effect corresponding to a lubrication of the two surfaces.

[0044] It is further to be understood, that in addition to the embodiments described above, the object of the invention may be achieved in several other ways within the scope of the invention as defined by the appended claims. For example the number of separate liners may be increased, and liners may further be employed in different places or have a different shape, some parts of the locking assembly may be made entirely from a plastic material etc. Similarly, the overall construction of the locking assembly may be varied by e.g. using only one pawl member.

Claims

1. A locking assembly for a ventilating 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, said locking assembly comprising
a casing (4) and at least one pawl member (6),
said one pawl member (6) being attached to the casing (4) via a fastening pin (64), a part (6') of said pawl member (6) projecting through a slot (41) in the casing, said slot having two end sides,
said pawl member (6) being arranged such that said part (6') is movable in said slot (41) between a locked position, in which it is adapted to be in locking engagement with a separate stationary locking member (71), and an unlocked position, in which it is adapted to be released from said locking engagement to allow opening of the window,

characterized in that

the locking assembly further comprises a noise reducing liner (61) positioned to prevent direct contact both between the fastening pin (64) and the casing (4) and between the pawl member (6,6') and the casing (4), respectively, said liner lining the end sides of the slot (41).

2. A locking assembly according to claim 1, **characterized in that** a locking control mechanism (43,44,45) is arranged in said casing to control the movement of the pawl member (6) between said locked and unlocked positions, said locking control mechanism (43,44,45) being operable by at least one actuator slide (3) displaceable guide means (42) in the casing (4) from a first end position defining the unlocked position of the pawl member (6) to a second end position defining the locked position of the pawl member (6) and vice versa.
3. A locking assembly according to claim 1 or 2, **characterized in that** the slot (41) has the shape of a circular section with the same radius of curvature and the same length as the path of the pawl member (6), and that the movement of said pawl member (6) in said slot (41) is a rotation about the fastening pin.
4. A locking assembly according to any previous claim, **characterized in that** the liner (61) has the overall shape of an isosceles triangle, the apex (62) enveloping the fastening pin (64), the angle between the two legs projecting from the apex corresponding to the angle of the circular section covered by the slot (41) in the casing, these two legs extending beyond the third side (63) of the triangle, the two extensions (65) lining the end sides of the slot, and the third side (63) of the triangle being curved with the same radius of curvature as the slot (4), lining the side surface of the slot (41) facing the apex (62).
5. A locking assembly according to claim 4, **characterized in that** the liner (61) has one or more retaining members projecting towards the inside of the triangle or a connecting member (66) connecting the two legs projecting from the apex (62) in such a manner that the liner may be secured to the fastening pin (64), the area enclosed by the triangle and the retaining or connecting member(s) corresponding in size and shape to the size and cross sectional shape of the fastening pin.
6. A locking assembly according to claim 4 or 5, **characterized in that** the height of the liner (61) in the direction perpendicular to the plane of the triangle decreases from a maximum at the apex (62) to a minimum at or by the third leg (63).
7. A locking assembly according to claim 1, **character-**

ized in that at least part of said liner (61) is provided by means of at least partly overmoulding or encasing with a layer of lining material.

8. A locking assembly according to claim 2 or 3, **characterized in that** said liner (61) has a thickness of 0.3 to 1.0 mm, preferably approximately 0.5 mm.
9. A locking assembly according to any of the preceding claims, **characterized in that** mutually contacting surfaces are both provided with a liner.
10. A locking assembly according to any of the preceding claims, **characterized in that** said liner (61) is made from a plastic material such as polyethylene (PE), polypropylene (PP), poly ether ether ketone (PEEK) or polyoxymethylene (POM).
11. A locking assembly according to any of the preceding claims, **characterized in that** said liner is made from a combination of two types of material, preferably from two kinds of plastic having different resistance to wear, such as poly-oxy-methylene (POM) and poly-propylene (PP) softened with an ethylene-propylene-diene-monomer (EPDM).
12. A locking assembly according to any of the preceding claims, **characterized in that** said liner is in one piece.
13. A locking, assembly according to any of the preceding claims, **characterized in that** said locking assembly is mounted in said window, the window further including a strike plate (7) comprising said at least one stationary locking member (71) for locking engagement with said locking assembly.
14. A locking assembly according to claim 1, **characterized by** a strike plate (7) with at least one stationary locking member (71) secured, in use to a main frame member (8) opposite one of said pair of sash members (2), a locking control mechanism (43,44,45) arranged in said casing to control the movement of the pawl member (6) between said locking and unlocked positions, said locking control mechanism (43,44,45) being operable by an operator member (1) accessible from the inside of the window via at least one actuator slide (3) displaceable in second guide means (42) in the casing (4) from a first end position defining the unlocked position of the pawl member (6) to a second end position defining the locking position of the pawl member (6) and vice versa, the operator member (1) being connected with the actuator slide (3) to occupy two distinct positions corresponding to the end positions of the actuator slide (3),

the casing (4) being secured, in use to said one sash member opposite the strike plate,
 the at least one pawl member (6) being arranged in said casing to be movable between a locking position and an unlocked position, the pawl member moving along first guide means (41) in the casing, where the locking assembly comprising a first part (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71), which is moveable in relation to a second part (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) of the locking assembly with a first surface of the first part (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) facing a second surface of the second part (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71), where at least the first surface is provided with a liner (31, 61, 7, 71, 96, 1b) preventing direct contact between the first and second surfaces,
 the slot (41) in the casing, through which a part (6') of the pawl member projects, constitutes the first guide means, and that the casing constitutes a first part and the fastening pin (64) and the pawl member (6, 6') a second part, the contacting surfaces of the first and second part being provided with one or more liners (61) preventing direct contact between the casing and the fastening pin and pawl member, the liner used between the fastening pin (64) and the casing (4) and the liner used between the pawl member (6, 6') and the casing (4) being formed as one common liner (61),
 the first guide means (41) through which the pawl member (6, 6') projects being formed as a slot in the casing (4), said slot having the shape of a circular section with the same radius of curvature and the same length as the path of the pawl member, and the common liner (61) having the overall shape of an isosceles triangle,
 where the apex (62) envelopes the fastening pin (64), the angle between the two legs projecting from the apex corresponding to the angle of the circular section covered by the slot (41) in the casing, where these two legs extend beyond the third side (63) of the triangle, the two extensions (65) lining the end sides of the slot, and
 where the third side (63) of the triangle is curved with the same radius of curvature as the slot (41), lining the side surface of the slot facing the apex (62).

Patentansprüche

1. Verriegelungsanordnung für ein Lüftungsfenster mit einem Fensterflügel, der angeordnet ist, um bezüglich eines Hauptrahmens durch eine Schwenkbewegung um eine Schwenkachse, die parallel zu einem Paar von gegenüberliegenden Fensterflügelementen liegt, geöffnet werden zu können, wobei die Verriegelungsanordnung aufweist:

ein Gehäuse (4) und mindestens ein Zapfenelement (6),

wobei das eine Zapfenelement (6) durch einen Befestigungsstift (64) an dem Gehäuse (4) angebracht ist, wobei ein Teil (6') des Zapfenelements (6) durch einen Schlitz (41) im Gehäuse hervorsteht, wobei der Schlitz zwei Endseiten hat,
 wobei das Zapfenelement (6) so angeordnet ist, dass der Teil (6') in dem Schlitz (41) beweglich ist zwischen einer verriegelnden Position, in der er vorgesehen ist, in verriegelndem Eingriff mit einem separaten stationären Schließelement (71) zu sein, und einer nicht-verriegelnden Position, in der er vorgesehen ist, aus dem verriegelnden Eingriff gelöst zu sein, so dass das Fenster geöffnet werden kann,

dadurch gekennzeichnet, dass

die Verriegelungsanordnung weiterhin eine geräuschmindernde Verkleidung (61) aufweist, die so angeordnet ist, dass ein direkter Kontakt zwischen dem Befestigungsstift (64) und dem Gehäuse (4) beziehungsweise zwischen dem Zapfenelement (6, 6') und dem Gehäuse (4) verhindert wird, wobei die Verkleidung die Endseiten des Schlitzes (41) auskleidet.

2. Verriegelungsanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Verriegelungssteuerungsmechanismus (43, 44, 45) in dem Gehäuse angeordnet ist, um die Bewegung des Zapfenelements (6) zwischen der verriegelnden Position und der nicht-verriegelnden Position zu steuern, wobei der Verriegelungssteuerungsmechanismus (43, 44, 45) durch mindestens einen in einer Führung (42) im Gehäuse (4) von einer ersten Endposition, die die nicht-verriegelnde Position des Zapfenelements (6) definiert, zu einer zweiten Endposition, die die verriegelnde Position des Zapfenelements (6) definiert, und umgekehrt verschiebbaren Betätigungsschieber (3) betätigbar ist.
3. Verriegelungsanordnung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Schlitz (41) die Form eines Kreisabschnitts mit demselben Krümmungsradius und derselben Länge wie der Weg des Zapfenelements (6) hat, und dass die Bewegung des Zapfenelements (6) in dem Schlitz (41) eine Drehung um den Befestigungsstift ist.

4. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verkleidung (61) die allgemeine Form eines gleichschenkligen Dreiecks hat, wobei der Scheitelbereich (62) den Befestigungsstift (64) umgibt, wobei der Winkel zwischen den zwei Schenkeln, die sich vom Scheitelbereich erstrecken, dem Winkel des Kreisabschnitts entspricht, der durch den Schlitz (41) im Gehäuse abgedeckt ist, wobei diese beiden Schenkel über die dritte Seite (63) des Drei-

ecks hervorstehen, wobei die beiden Verlängerungen (65) die Endseiten des Schlitzes auskleiden, und wobei die dritte Seite (63) des Dreiecks mit demselben Krümmungsradius gekrümmt ist wie der Schlitz (41) und diejenige Seitenoberfläche des Schlitzes (41) auskleidet, die zum Scheitelbereich (62) weist.

5. Verriegelungsanordnung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Verkleidung (61) einen oder mehrere Halteelemente hat, die zu der Innenseite des Dreiecks hervorstehen, oder ein Verbindungselement (66), das die beiden Schenkel, die von dem Scheitelbereich (62) hervorstehen, auf solche Weise miteinander verbindet, dass die Verkleidung am Befestigungsstift (64) befestigt werden kann, wobei die Fläche, die von dem Dreieck eingeschlossen wird, und das(die) Halte- oder Verbindungselement(e) in Größe und Form der Größe und Querschnittsform des Befestigungsstifts entspricht (entsprechen). 10
6. Verriegelungsanordnung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** sich die Höhe der Verkleidung (61) in der Richtung senkrecht zur Ebene des Dreiecks von einem Maximum am Scheitelbereich (62) zu einem Minimum an oder bei dem dritten Schenkel (63) verringert. 25
7. Verriegelungsanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** mindestens ein Teil der Verkleidung (61) durch mindestens teilweises Überformen oder Umhüllen mit einer Schicht aus Verkleidungsmaterial vorgesehen ist. 30
8. Verriegelungsanordnung nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die Verkleidung (61) eine Dicke von 0,3 bis 1,0 mm, vorzugsweise etwa 0,5 mm, hat. 35
9. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** aneinander anliegende Kontaktflächen beide eine Verkleidung haben. 40
10. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verkleidung (61) aus einem Kunststoffmaterial wie Polyethylen (PE), Polypropylen (PP), Polyetheretherketon (PEEK) oder Polyoxymethylen (POM) hergestellt ist. 45
11. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verkleidung (61) aus einer Kombination von zwei Typen von Material hergestellt ist, vorzugsweise aus zwei Kunststoffarten, die eine unterschiedliche Verschleißfestigkeit haben, wie Polyoxymethylen (POM) und Polypropylen (PP) weich-

gemacht mit einem Ethylen-Propylen-Dienemonomer (EPDM).

12. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verkleidung einstückig ist. 5
13. Verriegelungsanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verriegelungsanordnung in dem Fenster angebracht ist, wobei das Fenster weiterhin ein Schließblech (7) aufweist, das mindestens ein stationäres Schließelement (71) für einen verriegelnden Eingriff mit der Verriegelungsanordnung aufweist. 10
14. Verriegelungsanordnung nach Anspruch 1, **gekennzeichnet durch** ein Schließblech (7) mit mindestens einem stationären Schließelement (71), das während der Benutzung an einem Hauptrahmenelement (8) gegenüber einem des Paares der Fensterflügelelemente (2) befestigt ist, 15
einen Verriegelungssteuerungsmechanismus (43, 44, 45), der in dem Gehäuse angebracht ist, um die Bewegung des Zapfenelements (6) zwischen der verriegelnden und der nicht-verriegelnden Position zu steuern, 20
wobei der Verriegelungssteuerungsmechanismus (43, 44, 45) **durch** ein Betätigungselement (1) betätigt werden kann, das von der Innenseite des Fensters **durch** mindestens einen in einer zweiten Führung (42) im Gehäuse (4) zwischen einer ersten Endposition, die die nicht-verriegelnde Position des Zapfenelements (6) definiert, und einer zweiten Endposition, die die verriegelnde Position des Zapfenelements definiert, und umgekehrt verschiebbaren Betätigungsschieber (3) zugänglich ist, 25
wobei das Betätigungselement (1) mit dem Betätigungsschieber (3) verbunden ist, um zwei getrennte Positionen einzunehmen, die den Endpositionen des Betätigungsschiebers (3) entsprechen, wobei das Gehäuse (4) während der Benutzung an dem Fensterflügelelement gegenüber dem Schließblech befestigt ist, 30
wobei das mindestens eine Zapfenelement (6) so in dem Gehäuse angeordnet ist, dass es zwischen einer verriegelnden Position und einer nicht-verriegelnden Position bewegbar ist, wobei das Zapfenelement sich entlang einer ersten Führung (41) im Gehäuse bewegt, wobei die Verriegelungsanordnung einen ersten Teil (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) aufweist, der in Relation zum zweiten Teil (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) der Verriegelungsanordnung beweglich ist, wobei eine erste Oberfläche des ersten Teils (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) zu einer zweiten Oberfläche des zweiten Teils (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) weist, wobei minde-

stens die erste Oberfläche eine Verkleidung (31, 61, 7, 71, 96, 1b) aufweist, die einen direkten Kontakt zwischen der ersten und der zweiten Oberfläche verhindert,

wobei der Schlitz (41) in dem Gehäuse, **durch** den ein Teil (6') des Zapfenelements hervorsticht, die erste Führung bildet, und dass das Gehäuse einen ersten Teil bildet und der Befestigungsstift (64) und das Zapfenelement (6, 6') einen zweiten Teil bilden, wobei die Kontaktoberflächen des ersten und zweiten Teils, die eine oder mehrere Verkleidungen (61) haben, einen direkten Kontakt zwischen dem Gehäuse und dem Befestigungsstift und dem Zapfenelement verhindern,

wobei die Verkleidung, die zwischen dem Befestigungsstift (64) und dem Gehäuse (4) benutzt wird, und die Verkleidung, die zwischen dem Zapfenelement (6, 6') und dem Gehäuse (4) benutzt wird, als gemeinsame Verkleidung (61) geformt ist,

wobei die erste Führung (41), **durch** die das Zapfenelement (6, 6') hervorsticht, als ein Schlitz in dem Gehäuse (4) geformt ist, wobei der Schlitz die Form eines Kreisabschnitts mit demselben Krümmungsradius und derselben Länge wie der Weg des Zapfenelements hat, und

wobei die gemeinsame Verkleidung (61) die allgemeine Form eines gleichschenkligen Dreiecks hat, wobei der Scheitelpunkt (62) den Befestigungsstift (64) umgibt, wobei der Winkel zwischen den zwei Schenkeln, die sich vom Scheitelpunkt erstrecken, dem Winkel des Kreisabschnitts entspricht, der **durch** den Schlitz (41) im Gehäuse abgedeckt ist, wobei diese beiden Schenkel über die dritte Seite (63) des Dreiecks herausragen, wobei die Verlängerungen (65) die Endseiten des Schlitzes auskleiden und

wobei die dritte Seite (63) des Dreiecks mit demselben Krümmungsradius wie der Schlitz (41) gekrümmt ist, wobei die Seitenoberfläche des Schlitzes ausgekleidet ist, die zum Scheitelpunkt (62) weist.

Revendications

1. Ensemble de verrouillage destiné à une fenêtre d'aération comportant un ouvrant agencé en vue de pouvoir s'ouvrir par rapport à un cadre principal par un mouvement de pivotement autour d'un axe pivot parallèle à une paire d'éléments de ouvrant opposés, ledit ensemble de verrouillage comportant un boîtier (4) et au moins un élément de loquet (6), ledit élément de loquet (6) étant fixé au boîtier (4) par l'intermédiaire d'une broche de fixation (64), une partie (6') dudit élément de loquet (6) s'avancant à travers une fente (41) dans le boîtier, ladite fente ayant deux côtés d'extrémité, ledit élément de loquet (6) étant disposé de telle sorte que ladite partie (6') puisse se déplacer dans ladite

fente (41) entre une position verrouillée, dans laquelle elle est adaptée pour être en engagement de verrouillage avec un élément de verrouillage fixe séparé (71), et une position déverrouillée, dans laquelle elle est adaptée pour être libérée dudit engagement de verrouillage afin de permettre l'ouverture de la fenêtre, **caractérisé en ce que**

l'ensemble de verrouillage comprend, de plus, une pièce d'écartement pour réduction de bruit (61) positionnée en vue d'éviter le contact direct à la fois entre la broche de fixation (64) et le boîtier (4) et entre l'élément de loquet (6, 6') et le boîtier (4), respectivement, ladite pièce d'écartement recouvrant les côtés d'extrémité de la fente (41).

2. Ensemble de verrouillage selon la revendication 1, **caractérisé en ce qu'un** mécanisme de commande de verrouillage (43, 44, 45) est disposé dans ledit boîtier afin de commander le déplacement dudit élément de loquet (6) entre lesdites positions verrouillée et déverrouillée, ledit mécanisme de commande de verrouillage (43, 44, 45) pouvant être actionné par au moins un moyen de guidage (3) pouvant être déplacé dans une glissière d'actionnement (42) dans le boîtier (4) d'une première position d'extrémité définissant la position déverrouillée de l'élément de loquet (6) à une seconde position d'extrémité définissant la position verrouillée de l'élément de loquet (6) et vice-versa.
3. Ensemble de verrouillage selon la revendication 1 ou 2, **caractérisé en ce que** la fente (41) présente la configuration d'une section circulaire dotée du même rayon de courbure et de la même longueur que le parcours de l'élément de loquet (6), et **en ce que** le déplacement dudit élément de loquet (6) dans ladite fente (41) est une rotation autour de la broche de fixation.
4. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la pièce d'écartement (61) présente la configuration globale d'un triangle isocèle, le sommet (62) enveloppant la broche de fixation (64), l'angle formé entre les deux branches s'avancant à partir du sommet correspondant à l'angle de la section circulaire couverte par la fente (41) dans le boîtier, ces deux branches s'étendant au-delà du troisième côté (63) du triangle, les deux prolongements (65) recouvrant les côtés d'extrémité de la fente, et le troisième côté (63) du triangle étant courbe avec le même rayon de courbure que la fente (41), recouvrant la surface latérale de la fente (41) opposée au sommet (62).
5. Ensemble de verrouillage selon la revendication 4, **caractérisé en ce que** la pièce d'écartement (61) possède un ou plusieurs éléments de retenue s'avancant vers l'intérieur du triangle ou un élément

de raccordement (66) raccordant les deux branches s'avancant à partir du sommet (62) d'une manière telle que la pièce d'écartement puisse être fixée à la broche de fixation (64), la surface enfermée par le triangle et l'élément (les éléments) de retenue ou de

- 5 6. Ensemble de verrouillage selon la revendication 4 ou 5, **caractérisé en ce que** la hauteur de la pièce d'écartement (61) dans la direction perpendiculaire au plan du triangle diminue d'une valeur maximale au niveau du sommet (62) à une valeur minimale au niveau de, ou près de, la troisième branche (63). 10
- 15 7. Ensemble de verrouillage selon la revendication 1, **caractérisé en ce que** au moins une partie de ladite pièce d'écartement (61) est fournie au moyen d'un surmoulage ou d'un emboîtement au moins partiel avec une couche de matériau de revêtement. 20
- 25 8. Ensemble de verrouillage selon la revendication 2 ou 3, **caractérisé en ce que** ladite pièce d'écartement (61) présente une épaisseur de 0,3 à 1,0 mm, de préférence de 0,5 mm environ. 25
- 30 9. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** des surfaces mutuellement en contact sont toutes deux prévues avec une pièce d'écartement. 30
- 35 10. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite pièce d'écartement (61) est constituée d'un matériau plastique tel que du polyéthylène (PE), du polypropylène (PP), du poly éther éther cétone (PEEK) ou du polyoxyméthylène (POM). 35
- 40 11. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite pièce d'écartement est constituée d'une combinaison de deux types de matériau, de préférence de deux types de matériau plastique présentant une résistance à l'usure différente, tels que le poly-oxy-méthylène (POM) et le polypropylène (PP) adouci avec un monomère d'éthylène-propylène-diène (EPDM). 40
- 45 12. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite pièce d'écartement est réalisée en une seule pièce. 50
- 55 13. Ensemble de verrouillage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit ensemble de verrouillage est monté dans ladite fenêtre, la fenêtre comportant de plus, une pla-

que de gâche (7) comportant ledit au moins un élément de verrouillage fixe (71) permettant de verrouiller l'engagement avec ledit ensemble de verrouillage.

14. Ensemble de verrouillage selon la revendication 1 caractérisé par

une plaque de gâche (7) pourvue d'au moins un élément de verrouillage fixe (71) fixée, en fonctionnement, à un élément de cadre principal (8) opposé à l'un des éléments de ladite paire d'éléments de ouvrant (2),
un mécanisme de commande de verrouillage (43, 44, 45) agencé dans ledit boîtier afin de commander le déplacement de l'élément de loquet (6) entre les dites positions de verrouillage et de déverrouillage, ledit mécanisme de commande de verrouillage (43, 44, 45) pouvant être actionné par un élément opérateur (1) accessible à partir de l'intérieur de la fenêtre par l'intermédiaire d'au moins une glissière d'actionnement (3) pouvant se déplacer dans les seconds moyens de guidage (42) dans le boîtier (4) à partir d'une première position d'extrémité définissant la position déverrouillée de l'élément de loquet (6) vers une seconde position d'extrémité définissant la position de verrouillage de l'élément de loquet (6), et vice versa,
l'élément opérateur (1) étant connecté à la glissière d'actionnement (3) pour occuper deux positions distinctes correspondant aux positions d'extrémité de la glissière d'actionnement (3),
le boîtier (4) étant fixé, en fonctionnement, au dit élément de ouvrant opposé à la plaque de gâche, le, au moins un, élément de loquet (6) étant agencé dans ledit boîtier afin de se déplacer entre une position de verrouillage et une position déverrouillée, l'élément de loquet se déplaçant le long des premiers moyens de guidage (41) dans le boîtier, dans lequel l'ensemble de verrouillage comprenant une première partie (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71), laquelle peut se déplacer par rapport à une seconde partie (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) de l'ensemble de verrouillage avec une première surface de la première partie (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71) opposée à une seconde surface de la seconde partie (1, 1a, 3, 4, 41, 42, 5, 6, 6', 7, 71), où au moins la première surface est dotée d'une pièce d'écartement (31, 61, 7, 71, 96, 1b) empêchant un contact direct entre les première et seconde surfaces,
la fente (41) dans le boîtier, à travers laquelle une partie (6') de l'élément de loquet s'avance, constitue le premier moyen de guidage, et en ce que le boîtier constitue une première partie et la broche de fixation (64) et l'élément de loquet (6, 6') une seconde partie, les surfaces de contact de la première et de la seconde partie étant dotées d'un ou de plusieurs pièces d'écartement (61) empêchant un contact direct entre le boîtier et la broche de fixation et l'élément

de loquet,

la pièce d'écartement utilisée entre la broche de fixation (64) et le boîtier (4) et la pièce d'écartement utilisée entre l'élément de loquet (6, 6') et le boîtier (4) étant formées sous la forme d'une pièce d'écartement commune (61),

les premiers moyens de guidage (41) à travers lesquels l'élément de loquet (6, 6') s'avance étant formés sous la forme d'une fente dans le boîtier (4), ladite fente présentant la configuration d'une section circulaire ayant le même rayon de courbure et la même longueur que le parcours de l'élément de loquet, et

la pièce d'écartement commune (61) présentant la même configuration globale qu'un triangle isocèle, où le sommet (62) enveloppe la broche de fixation (64), l'angle formé entre les deux branches s'avancant à partir du sommet correspondant à l'angle de la section circulaire couverte par la fente (41) dans le boîtier,

où ces deux branches s'étendent au-delà du troisième côté (63) du triangle, les deux extensions (65) recouvrant les côtés d'extrémité de la fente, et où le troisième côté (63) du triangle est courbe avec le même rayon de courbure que la fente (41), recouvrant la surface latérale de la fente opposée au sommet (62).

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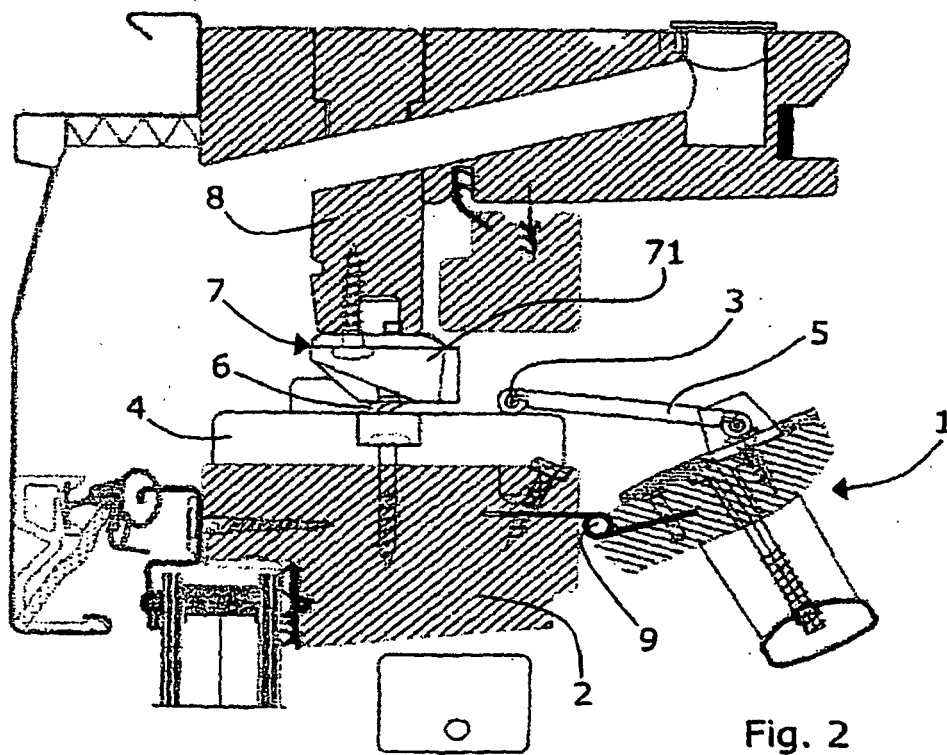
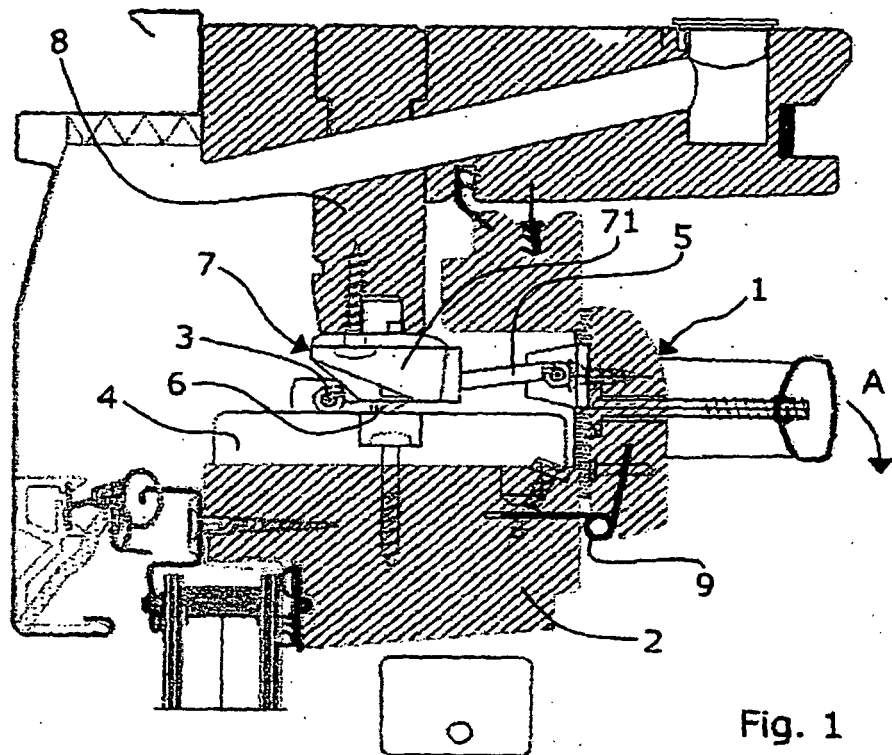
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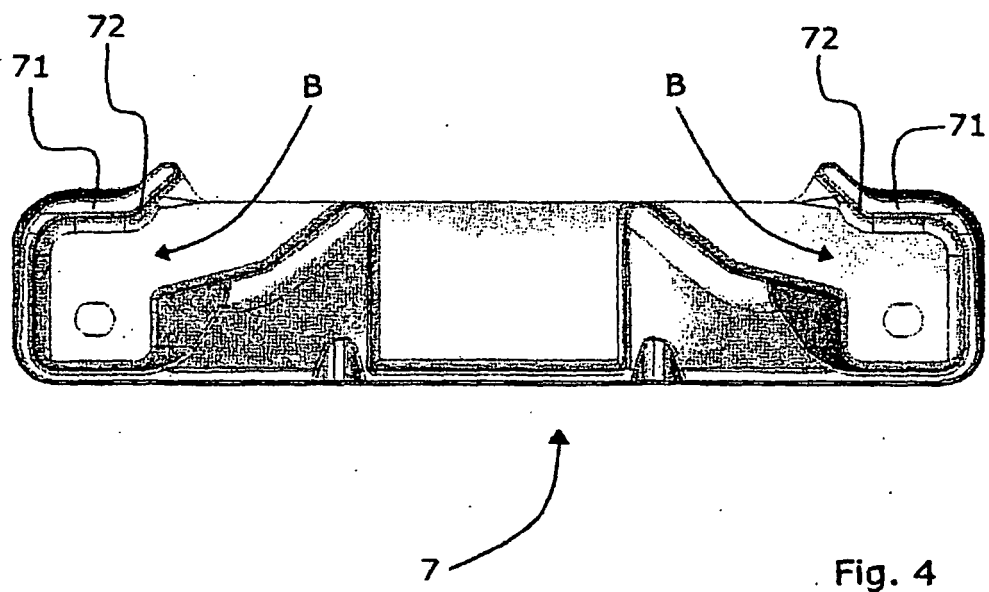
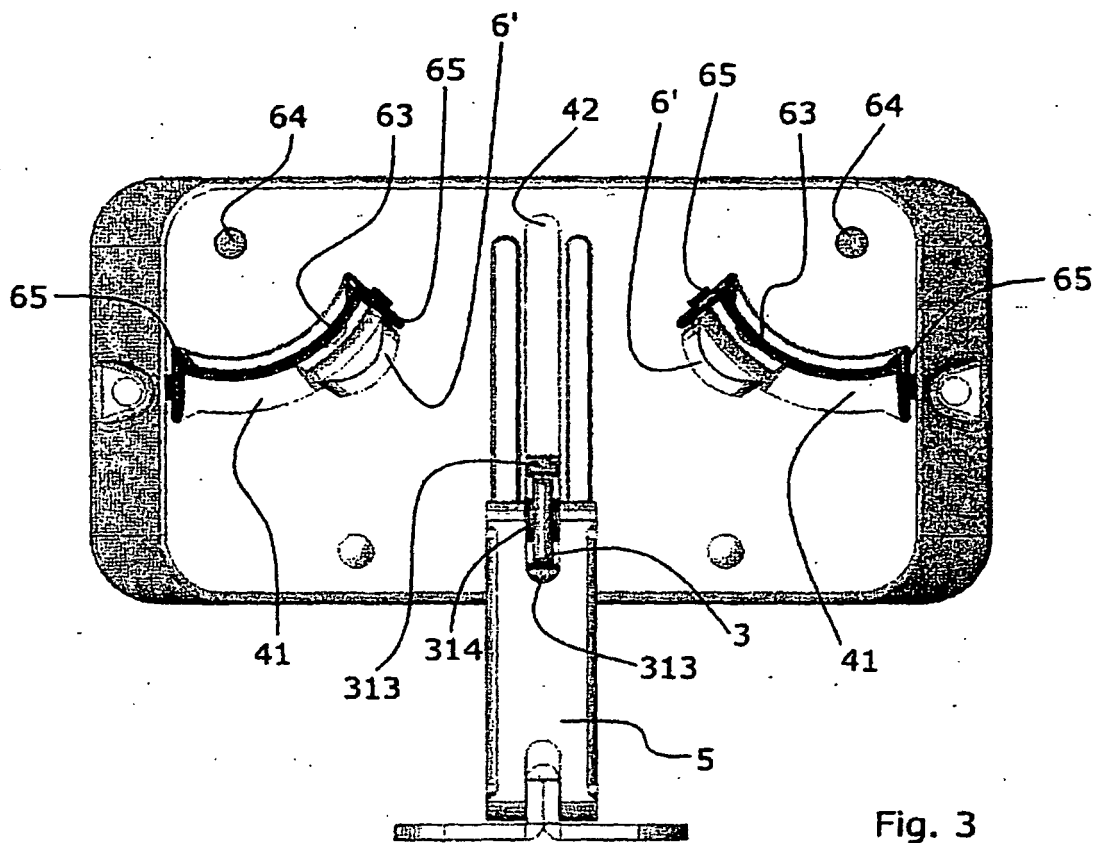
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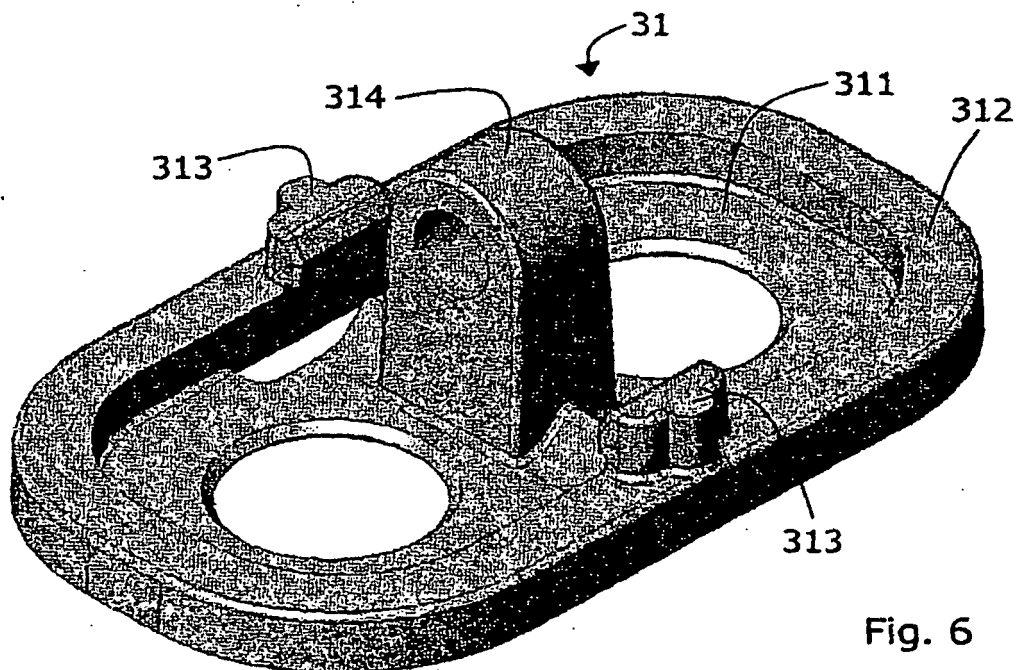
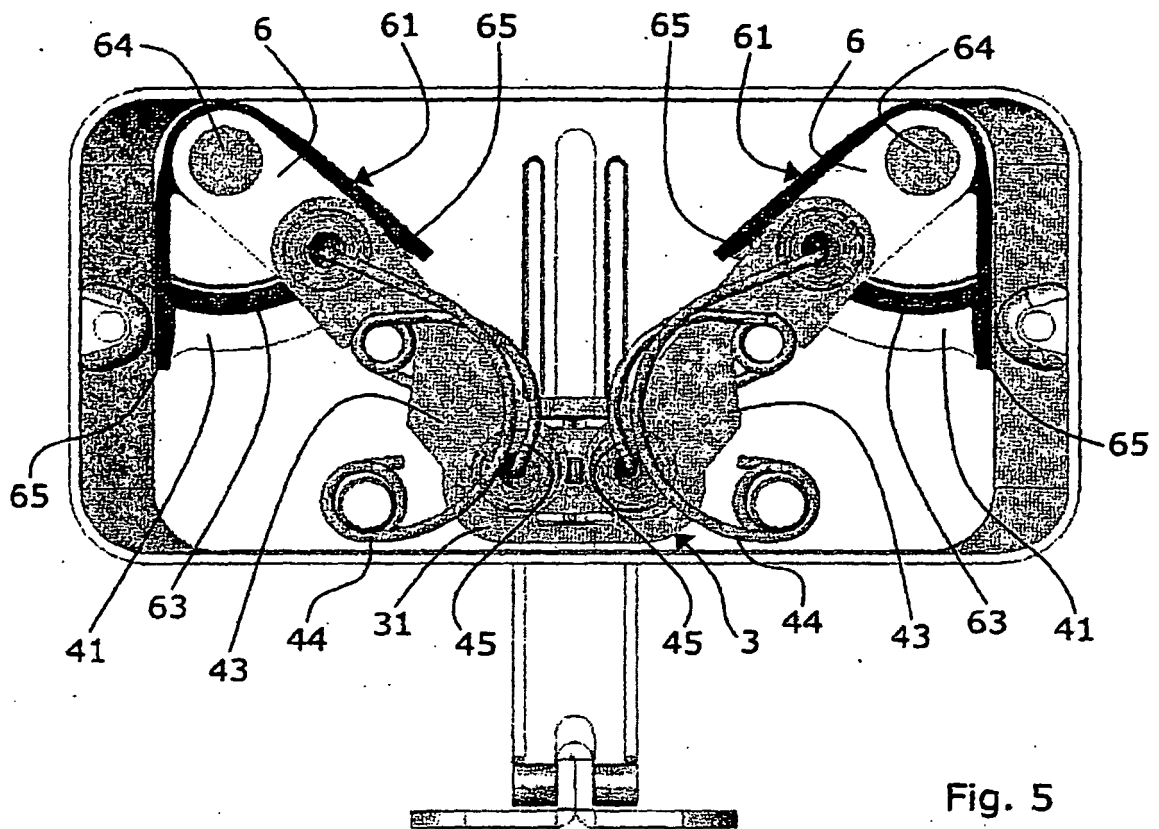
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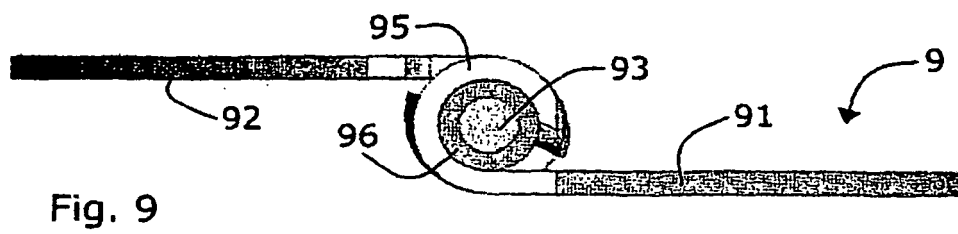
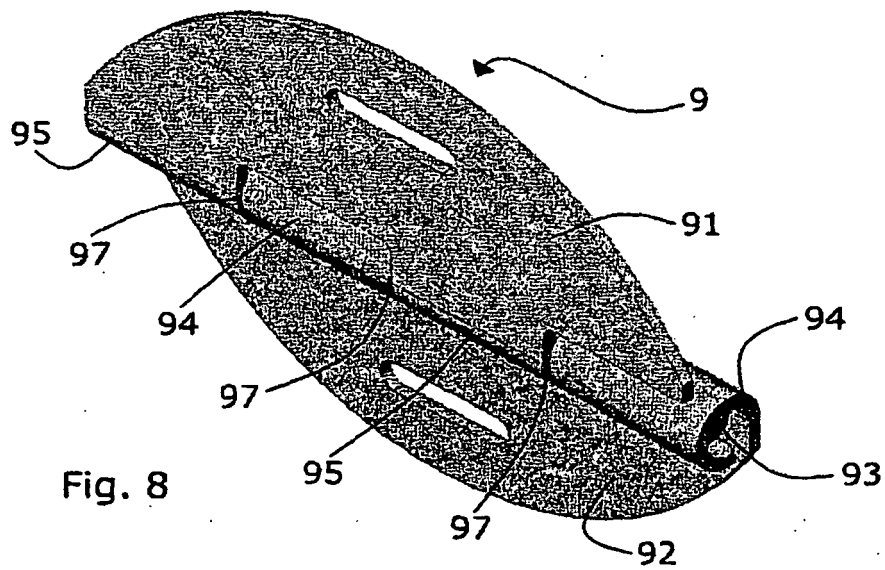
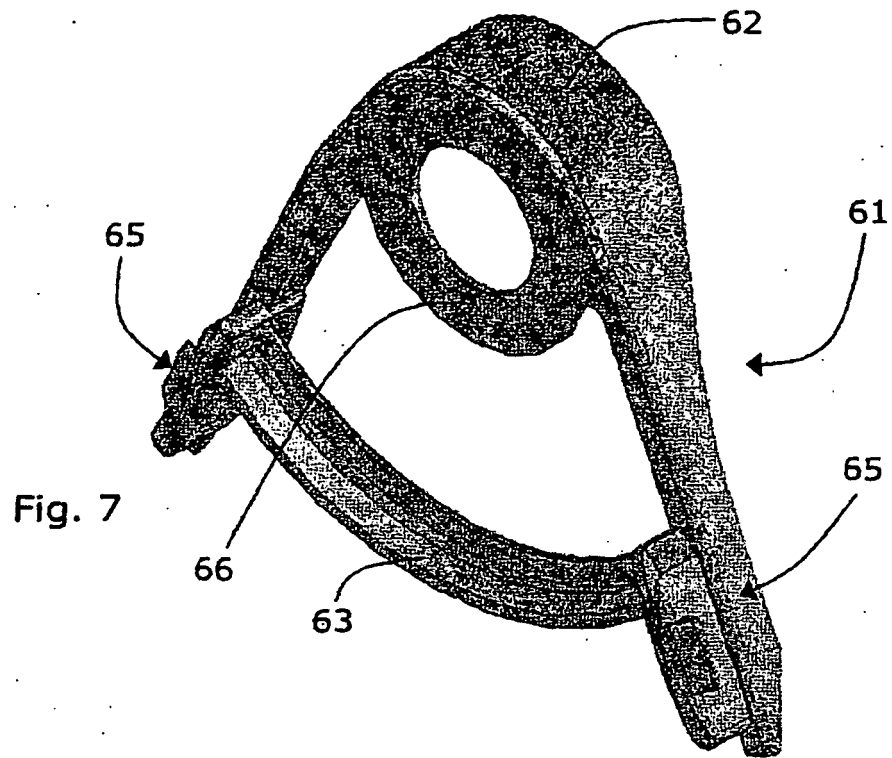
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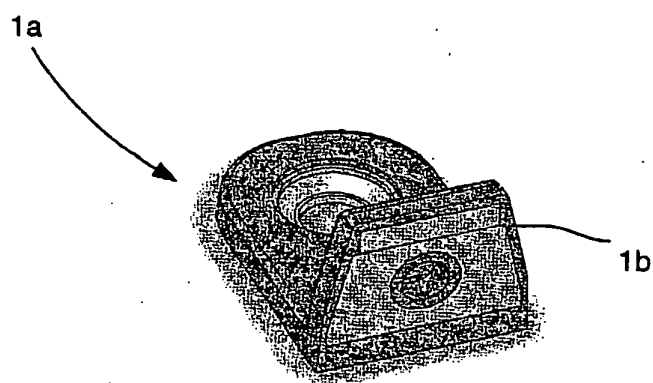
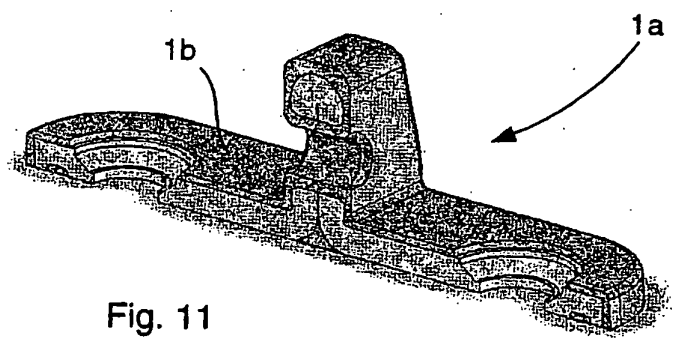
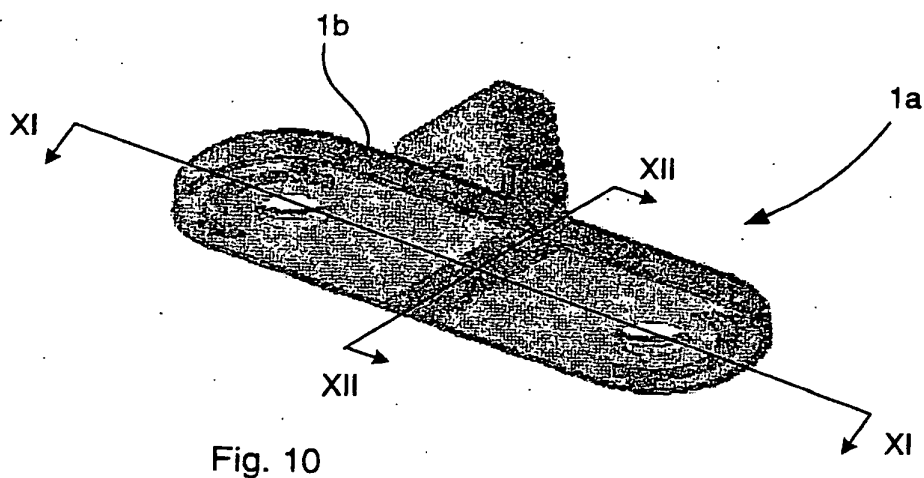
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REFERENCES CITED IN THE DESCRIPTION

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