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(54) Reversible window assembly with a safety latch

(57) Reversible window assembly (1) comprising: a window frame (2) comprising four frame elements, a window sash (3) comprising four sash elements, and where the window sash is arranged inside the window frame so that when the window is closed, a fitting cavity (22) is provided between the upper frame element (2a) and the upper sash element (3a) and at least one safety latch system (4,6) for locking the position of the window sash in the window sash's cleaning position. The safety latch system comprises a first part (4) which is mounted to the upper sash element (3a) and a second part (5) which is mounted to the lower frame element (2c), and where the first part (4) comprises i) a fixed element (6) which is fixed to the upper sash element (3a) and ii) a moveable element (7) moveably attached to the fixed element (6). The moveable element assumes a collapsed position when the window sash is in its closed position and an expanded position when the window sash is in its cleaning position. The second part (5) has an engaging element (18) which is formed complementary to the first part's moveable element (7). The first part's moveable element automatically goes into engagement with the second part's engaging element when the window sash assumes its cleaning position.

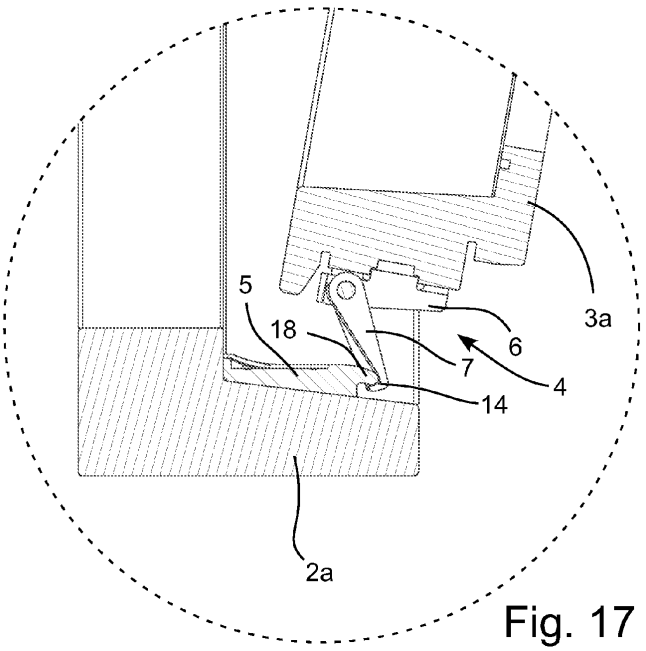


Fig. 17

EP 2 372 062 A2

Description

[0001] The current invention relates to a reversible window assembly comprising i) a window frame comprising four frame elements: an upper frame element, a lower frame element and two side frame elements, ii) a window sash comprising four sash elements: an upper sash element, a lower sash element and two side sash elements, and where the window sash is arranged inside the window frame so that when the window is closed, a fitting cavity, or a well defined fitting cavity, is provided between the upper frame element and the upper sash element, iii) two reversible window fittings, each reversible window fitting arranged between one side sash element and one side frame element, and iv) at least one safety latch system for locking the position of the window sash in the window sash's cleaning position.

[0002] Reversible windows are windows where the sash can be rotated approximately 180 degrees, typically about a mid-point of the sash, so that the surface of the sash which typically faces outside can be rotated to face inside. This allows the outer face of the sash to be cleaned by a user which is standing on the inside of the window.

[0003] In the reversed position, often called the "cleaning position", it is usually desired to be able to lock the sash in position with some form of safety latch system so that the sash does not accidentally open during cleaning. This reduces the risk of the person who is cleaning the window from falling out of the window while cleaning the window.

Description of related art

[0004] Reversible window assemblies typically fall into two categories. In a first category, the window is provided with a linkage arrangement and a sliding rail on each side of the sash. When rotating the window sash, typically the top edge of the sash slides along the rail while the window sash pivots about a pivot point controlled by the linkages. In these types of reversible windows, the window sash remains either outside or inside the window frame at all times depending on whether the window assembly is an outwardly or an inwardly opening window assembly respectively. Examples of such reversible windows are given in WO 2006/078169 and NO 942,703. In these types of reversible windows, a safety latch is integrated into the linkages themselves. When the window is reversed, the safety latch is automatically engaged. When it is desired to close the window, the safety latch has to be manually disengaged before the window sash can be moved.

[0005] In the other type of reversible window, the window sash pivots about a fixed point on the frame. In this case, half of the window is arranged inside the frame and half of the window is arranged outside the frame during the rotation of the window. Examples of this type of reversible window are shown in US 4,086,727, GB 1,088,161 and GB 595,932. In these types of reversible windows, the safety latch is usually arranged between the frame and the sash and is manually activated.

[0006] The above mentioned examples all solve the problem of locking the window in the "cleaning position", but they all have one or more drawbacks as will be discussed in the detailed description below.

Summary of the invention

[0007] It is therefore the main object of the current invention to provide a new type of safety latch system for reversible windows which is better than the above mentioned examples of safety latch systems for reversible windows.

[0008] This is provided in that said at least one safety latch system comprises a first part which is mounted to either the upper sash element or the lower frame element and a second part which is mounted to either the lower frame element or the upper sash element respectively, and where the first part comprises i) a fixed element which is fixed to the upper sash element or the lower frame element and ii) a moveable element moveably attached to the fixed element, and where the moveable element assumes a collapsed position when the window sash is in its closed position and an expanded position when the window sash is in its cleaning position, and where the second part has an engaging element which is formed complementary to the first part's moveable element and where the first part's moveable element automatically goes into engagement with the second part's engaging element when the window sash assumes its cleaning position. When the first part's moveable element goes into engagement with the second part's engaging element, the window is prevented from opening accidentally.

[0009] In this way, a safety latch mechanism is provided which automatically goes into engagement when the window sash is rotated into its cleaning position. In addition, the safety latch system is attached directly between the frame and the sash, thereby providing a very strong locking function without there being applied any undesired forces on the reversible window fittings. Furthermore, since the safety latch system is connected in part to the upper sash element, the forces on the safety latch system are reduced when compared to a safety latch system which is located closer to the pivot point of the window assembly.

[0010] In a preferred embodiment, the first part can be mounted on the upper sash element and the second part can be mounted on the lower frame element.

[0011] In one typical embodiment of the reversible window assembly according to the invention, the reversible window fittings could each comprise: a linkage mechanism arranged between a side frame element and a side sash element, a rail arranged along the side frame element and a sliding element slideably arranged in said rail, said sliding element being pivotably fastened to the window sash. This type of window assembly will always have the window sash arranged either outside or inside the window frame depending on whether the window is

an outwardly or inwardly opening window.

[0012] In order to hide the first part of the safety latch mechanism in the closed position of the window assembly, the first part could be mounted to a surface of the upper sash element, said surface being a part of the inner surface of the fitting cavity between the upper frame element and the upper sash element in the window's closed position such that the first part is hidden in the fitting cavity between the upper frame element and the upper sash element in the closed position of the window assembly. The second part of the safety latch mechanism could also be mounted in a similar way to the lower frame element.

[0013] In one embodiment, the moveable element of the first part can be pivotably attached to the fixed element of the first part. More specifically, the moveable element of the first part could be arranged such that it is freely pivotable with respect to the fixed part and such that it can go from its collapsed position to its expanded position due to the effect of gravity when the window sash is moved from its closed position to its cleaning position.

[0014] In another embodiment, the moveable element of the first part could be arranged such that it goes from its collapsed position to its expanded position due to the effect of a spring force.

[0015] In a typical embodiment, the moveable element and the engaging element can be formed as complementary hooks which hook into each other in the cleaning position of the window. More specifically, the inner surface (concave surface) of the hook portion of the first part could face towards the inside or the outside of the window and the inner surface of the hook portion of the second part could face towards the outside or the inside of the window respectively in the cleaning position of the window assembly.

[0016] For large windows, or to increase the effectiveness of the safety latch system, the reversible window assembly could comprise two safety latch mechanisms, the two first parts of said two safety latch mechanisms being mounted less than a typical adult person's arm span apart from each other. This allows a user to easily de-activate the safety latches when desired. Of course, other numbers of safety latch mechanisms could also be used.

[0017] It should be emphasized that the term "comprises/comprising/comprised of" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Brief description of the drawings

[0018] In the following, the invention will be described in greater detail with reference to embodiments shown by the enclosed figures. It should be emphasized that the embodiments shown are used for example purposes only and should not be used to limit the scope of the invention unnecessarily.

Figure 1 shows an exploded perspective view of a window frame and a window sash of a window assembly according to the current invention.

Figure 2 shows a perspective close-up of the first part of the safety latch system.

Figure 3 shows a perspective close-up of the second part of the safety latch system.

Figure 4 shows an exploded close-up view of the first part of the safety latch system.

Figure 5 shows an exploded close-up view of the second part of the safety latch system.

Figure 6 shows a cross section view of the top part of the window when the window is closed, said cross section being defined by the line VI-VI in figure 1.

Figure 7 shows a cross section view of the bottom part of the window when the window is closed, said cross section being defined by the line VI-VI in figure 1.

Figure 8 shows a perspective view of the window of figure 1 in a partly open position.

Figure 9 shows a close-up perspective view of the first part of the safety latch system, said view being defined by the circle marked IX in figure 8.

Figure 10 shows a perspective view of the window of figure 1 in a position, just before the window sash reaches its "cleaning position".

Figure 11 shows a close-up perspective view of the safety latch system, said view being defined by the circle marked XI in figure 10.

Figure 12 shows a cross section view of the window of figure 1, in the position shown in figure 10, said view being defined by the line VI-VI in figure 1.

Figure 13 shows a detailed cross section view as defined by the circle marked XIII in figure 12.

Figure 14 shows a perspective view of the window of figure 1 in its "cleaning position".

Figure 15 shows a detailed perspective view according to the circle marked XV in figure 14.

Figure 16 shows a cross section view of the window of figure 1, in the position shown in figure 14, said view being defined by the line VI-VI in figure 1.

Figure 17 shows a detailed cross section view as defined by the circle marked XVII in figure 16.

Figure 18 shows a perspective view of an embodiment of a window assembly according to the invention. It should be noted that figures 1-17 have shown the window assembly without the reversible window fittings for the sake of simplicity. Figure 18 shows an embodiment of a window assembly where the reversible window fittings are shown for the sake of completeness.

Detailed description of the embodiments

[0019] Figures 1-17 show different views of the same embodiment of a reversible window assembly with a safety latch. It should be noted that for the sake of simplicity, the fittings associated with the reversible window function have not been shown. These fittings are however shown in figure 18 and include a linkage 101 mounted on either side of the window assembly as well as two rails 102, one mounted on either side of the window frame and two sliding elements 103, each slideably arranged within one of the two rails and each being mounted on the window sash 3. These types of fittings are well known to the person skilled in the art. An example of such a reversible window fitting is provided in EP2069599A1. Two other examples are provided in the documents listed earlier in this document. It should also be noted that for the sake of simplicity the window assembly is shown without any seals, window pane, glazing beads, etc.. The person skilled in the art should be able to supply the missing details based on his or her knowledge of the field of windows.

[0020] Since figures 1-17 all show the same embodiment of a reversible window assembly, the same reference numerals will be used throughout the figures and description.

[0021] The reversible window assembly 1 comprises a window frame 2 and a window sash 3. The window frame 2 comprises an upper frame element 2a, a lower frame element 2c and two side frame elements 2b, 2d. Likewise the window sash 3 comprises an upper sash element 3a, a lower sash element 3c and two side sash elements 3b,3d.

[0022] In this embodiment, a first part 4 of a safety latch system is mounted to the upper sash element 3a and a second part 5 of the safety latch system is mounted to the lower frame element 2c. In this example embodiment, only a single safety latch system is shown, however, additional safety latch mechanisms could be added to the window assembly. In general, two safety latch mechanisms/systems would be used per window, offset a similar amount from the middle of the window. However, more than two safety latch systems could be used in certain cases. For practical use, the safety latch systems could be arranged at a distance from each other which is less than the typical arm span of an adult human being. In this way, it is easier for a person to release the safety latch systems manually.

[0023] The first part 4 of the safety latch system is in this embodiment comprised of two elements, a fixed element 6 and a moveable element 7. See figures 2 and 4 for details of the first part 4. The fixed element 6 is fastened to the upper sash element via screws (not shown) which pass through screw holes 8 in the fixed element 6 of the first part 4. The moveable element 7 is moveably attached to the fixed element via a rivet 9. As can be seen from figure 4, the moveable element 7 is freely pivotable with respect to the fixed element 6. There are no springs or other biasing elements in this embodiment. It should however be noted that depending on the arrangement of the first part, a spring could be included between the moveable element and the fixed element. It can also been seen from figure 4 that the moveable element 7 is provided with stop element 10. These stop elements prevent the moveable element from rotating past a predefined maximum angle with respect to the fixed element. In the embodiment shown, the stop elements 10 will come into contact with the back wall 11 of the fixed element when the moveable element reaches a particular angle with regards to the fixed element. It should be noted that the stop elements could be formed in many different ways, the one shown being just one example.

[0024] It can also be seen from figure 4 that the fixed element in this embodiment is provided with flanges 12 which can be placed in a groove 13 in the upper sash element during assembly, see figure 6. This allows the fixed element to be placed precisely with respect to the groove. In this embodiment, the groove is part of the profile of the sash element and is also used to mount most of the window fittings (not shown) and the espagnolette system (not shown). As such it has a very well defined location on the sash.

[0025] The moveable element 7 has a hook shaped feature 14 at the end opposite the end which is pivotably fastened to the fixed element. In the current embodiment, when the first part is mounted on the window sash and when the window is in its closed position, the hook shaped feature has its inner surface (concave surface) facing upwardly.

[0026] The second part 5 is comprised of a main element 15 and a cover element 16. The main element 15 is fixed to the lower frame element via screws (not shown) placed through screw holes 17 in the main element 15. Once the main element is mounted to the frame element, the cover is snapped over the main element thereby hiding the screws from view. The cover element can be made from many different materials, but is in a preferred embodiment made from plastic. The main element 15 is made from a strong and robust material, for example steel.

[0027] The main element 15 has at one end an engaging element 18. This engaging element is formed as a hook. The inner surface (concave surface) 19 of the hook

18 faces downwardly. The engaging element 18 of the second part is formed complementary to the hook portion 14 of the moveable element 7 of the first part 4. When the moveable part 7 of the first part 4 approaches the nose portion of the engaging element 18 of the second part, the moveable element is displaced such that it slides along the nose portion of the engaging element 18. When the hook portion 14 of the moveable part 7 has passed the end of the nose portion, the hook portion 14 of the moveable element snaps back into its fully expanded position due to gravity which causes the moveable element to rotate. This can be best seen by comparing figure 13 to figure 17 and figure 11 to figure 15.

[0028] From figure 11, it can be seen that the hook portion 14 of the moveable element 7 of the first part 4 has a slot and the engaging element 18 of the second part 5 is provided with a supporting flange 21 on the lower side of the engaging element. The supporting flange 21 increases the strength of the engaging element 18 of the second part 5. The slot 20 in the hook portion 14 of the moveable element provides room for the flange when the hook portion 14 of the moveable element 7 engages with the engaging element 18 of the second part.

[0029] In the following, the function of the safety latch system is described with reference to the figures. In figures 1, 6 and 7, the window assembly can be seen in the closed position. As can be best seen from figure 6, the first part 4 is located in the fitting cavity 22 between the upper sash element 3a and the upper frame element 2a. The first part 4 is attached to a surface 23 of the sash which forms a part of the inner surface of the fitting cavity. Since the first part is arranged inside the fitting cavity, it cannot be seen from outside the window when the window is closed. It can also be noted that since the first part is comprised of a moveable element 7 which collapses as shown in figure 6, the first part is quite small in the closed position of the window.

[0030] Likewise, as best seen in figure 7, the second part 5 is mounted on a surface 24 of the lower frame element which forms a part of the fitting cavity between the lower frame element and the lower sash element in the closed position of the window. As with the first part, the second part is completely hidden in the fitting cavity in the closed position of the window.

[0031] In figure 8 and 9, the window is slightly opened. However, as can be seen the first part is still collapsed and is still pretty well hidden. The user of the window during normal use is therefore not made aware of the first part 4 of the safety latch system. The second part is more visible, but is still partly hidden behind the lower frame element.

[0032] Only when the window sash rotates past its horizontal position, does the moveable element expand away from the fixed element. This is shown in figures 10-13. This is the position just before the window sash reaches its cleaning position. As can be seen especially from figure 13, the hook portion 14 of the moveable element 7 of the first part 4 is in this case, just about to contact the nose portion of the engaging element 18 of the second part 5. When the window sash continues its downward motion, the moveable part is forced to the right in the figure. The hook is forced to the right due to the slope on the nose portion of the engaging element of the second part. The hook moves to the right against the force of gravity. The hook portion continues to the right until the hook portion 14 passes the end of the nose portion of the engaging part.

[0033] Figures 14-17 show the window assembly when the window sash has reached its cleaning position. In this case, as can be seen from figure 17, the hook portion 14 of the moveable element of the first part has gone into engagement with the engaging element. In order to provide more security, the hook portion 14 of the moveable element of the first part is provided with an extra groove 25 and the engaging part 18 of the second part 5 is provided with an extra protrusion 26. In the locked position as shown in figure 17, the protrusion 26 is placed in the groove 25. This further ensures that the hook portion of the first part does not accidentally release the engaging portion of the second part.

[0034] When it is desired to move the window from its cleaning position to its closed position, a used must manually disengage the hook portion 14 of the first part from the engaging element 18 of the second part by rotating the moveable element to the right according to figure 17, and then pushing the window sash upwards. When the window sash again rotates past its horizontal position, the moveable element of the first part automatically collapses into its collapsed position due to gravity.

[0035] While only one embodiment has been shown in figures 1-17, the person skilled in the art will be able to develop other embodiments based on the teachings of this specification. For example, in the embodiments, the engaging element of the second part has faced towards the outside of the window. However, it could be imagined that the engaging element of the second part could be facing towards the inside of the window if the first part was also rotated accordingly. Also, in the embodiments, it was shown that the second part was attached to the frame while the first part was attached to the sash. However, it could be imagined that the first part was attached to the frame and the second part was attached to the sash. In this case, since the first part would be located on the frame which doesn't move, a spring could be required to expand the moveable part instead of gravity.

[0036] Furthermore, it should be noted that most window assemblies are formed of sash elements and frame elements which are extruded/pultruded or machined as elongated profile elements having standard cross sections along their entire lengths. By standard cross section is meant the predefined and constant cross section along the length of the profile element which the profile element has before any other further machining is performed to make room for specific fittings. A "standard fitting cavity" is therefore provided between the standard cross section

of the frame element and the standard cross section of the sash element in the closed position of the window assembly. It should be noted that in most window assemblies, there are four standard fitting cavities, one between the upper frame element and upper sash element, one between the lower elements, one between the left side elements and one between the right side elements. In the current embodiment, all four standard fitting cavities are identical since the standard profiles of all four frame elements are the same and the standard profiles of the four sash elements are the same. However, in many window assemblies the four standard fitting cavities will be different due to the side, upper and lower profile elements having different standard cross sections.

[0037] In certain cases, the profile elements of the sash and/or frame are further machined prior to assembly to make room for a particular fitting. According to the definition of the term "standard fitting cavity" in this specification, the area of the extra machined recess would not be considered to be part of the standard fitting cavity, but is considered a separate cavity which is connected to the standard fitting cavity. It should be noted that this definition of the term standard fitting cavity should be in agreement with the understanding that the person skilled in the art of window design would have in advance.

[0038] In one particular embodiment of the current invention, as shown in figure 6, the first part of the safety latch system could be hidden in the standard fitting cavity between the upper frame element and the upper sash element in the closed position of the window assembly and/or the second part of the safety latch system could be hidden in the standard fitting cavity between the lower frame element and the lower sash element in the closed position of the window assembly.

[0039] It is to be noted that the figures and the above description have shown the example embodiments in a simple and schematic manner. The mechanical details have not been shown since the person skilled in the art should be familiar with these details and they would just unnecessarily complicate this description. For example, details such as seals, locking fittings, etc have not been shown.

Claims

1. Reversible window assembly (1) comprising:

- a window frame (2) comprising four frame elements: an upper frame element (2a), a lower frame element (2c) and two side frame elements (2b,2d),
- a window sash (3) comprising four sash elements: an upper sash element (3a), a lower sash element (3c) and two side sash elements (3b, 3d), and where the window sash is arranged inside the window frame so that when the window is closed, a fitting cavity (22) is provided between the upper frame element (2a) and the upper sash element (3a),
- two reversible window fittings, each reversible window fitting arranged between one side sash element (3b,3d) and one side frame element (2b,2d), and
- at least one safety latch system (4,6) for locking the position of the window sash in the window sash's cleaning position,

characterized in that said at least one safety latch system comprises a first part (4) which is mounted to either the upper sash element (3a) or the lower frame element (2c) and a second part (5) which is mounted to either the lower frame element (2c) or the upper sash element (3a) respectively, and where the first part (4) comprises i) a fixed element (6) which is fixed to the upper sash element (3a) or the lower frame element (2c) respectively and ii) a moveable element (7) moveably attached to the fixed element (6), and where the moveable element assumes a collapsed position when the window sash is in its closed position and an expanded position when the window sash is in its cleaning position, and where the second part (5) has an engaging element (18) which is formed complementary to the first part's moveable element (7) and where the first part's moveable element automatically goes into engagement with the second part's engaging element when the window sash assumes its cleaning position.

2. Reversible window assembly (1) according to claim 1, **characterized in that** the first part (4) is mounted on the upper sash element (3a) and the second part (5) is mounted on the lower frame element (2c).

3. Reversible window assembly according to claim 1 or 2, **characterized in that** the reversible window fittings each comprise:

- a linkage mechanism arranged between a side frame element and a side sash element,
- a rail arranged along the side frame element, and
- a sliding element slideably arranged in said rail, said sliding element being pivotably fastened to the window sash.

4. Reversible window assembly (1) according to any one of claims 1-3, **characterized in that** the first part (4) is mounted to a surface (23) of the upper sash element (3a), said surface being a part of the inner surface of the fitting cavity (22) between the upper frame element (2a) and the upper sash element in the window's closed position such that the first part is hidden in the fitting cavity between the upper frame element and the upper sash element in

the closed position of the window assembly.

5. Reversible window assembly (1) according to any one of claims 1-4, **characterized in that** the moveable element (7) of the first part (4) is pivotably attached to the fixed element (6) of the first part.

6. Reversible window assembly (1) according to claim 5, **characterized in that** the moveable element (7) of the first part (4) is arranged such that it is freely pivotable with respect to the fixed part (6) and that it goes from its collapsed position to its expanded position due to the effect of gravity when the window sash (3) is moved from its closed position to its cleaning position.

7. Reversible window assembly (1) according to claim 5, **characterized in that** the moveable element (7) of the first part (4) is arranged such that it goes from its collapsed position to its expanded position due to the effect of a spring force.

8. Reversible window assembly (1) according to any one of claims 1-7, **characterized in that** the moveable element (7) and the engaging element (18) are formed as complementary hooks (14,18) which hook into each other in the cleaning position of the window.

9. Reversible window assembly (1) according to claim 8, **characterized in that** the inner surface of the hook portion (14) of the first part (4) faces towards the inside or the outside of the window and **in that** the inner surface of the hook portion (18) of the second part (5) faces towards the outside or the inside of the window respectively in the cleaning position of the window assembly.

10. Reversible window assembly according to any one of claims 1-9, **characterized in that** the reversible window assembly comprises two safety latch mechanisms (4,5), the two first parts (4) of said two safety latch mechanisms being mounted less than a typical adult person's arm span apart from each other.

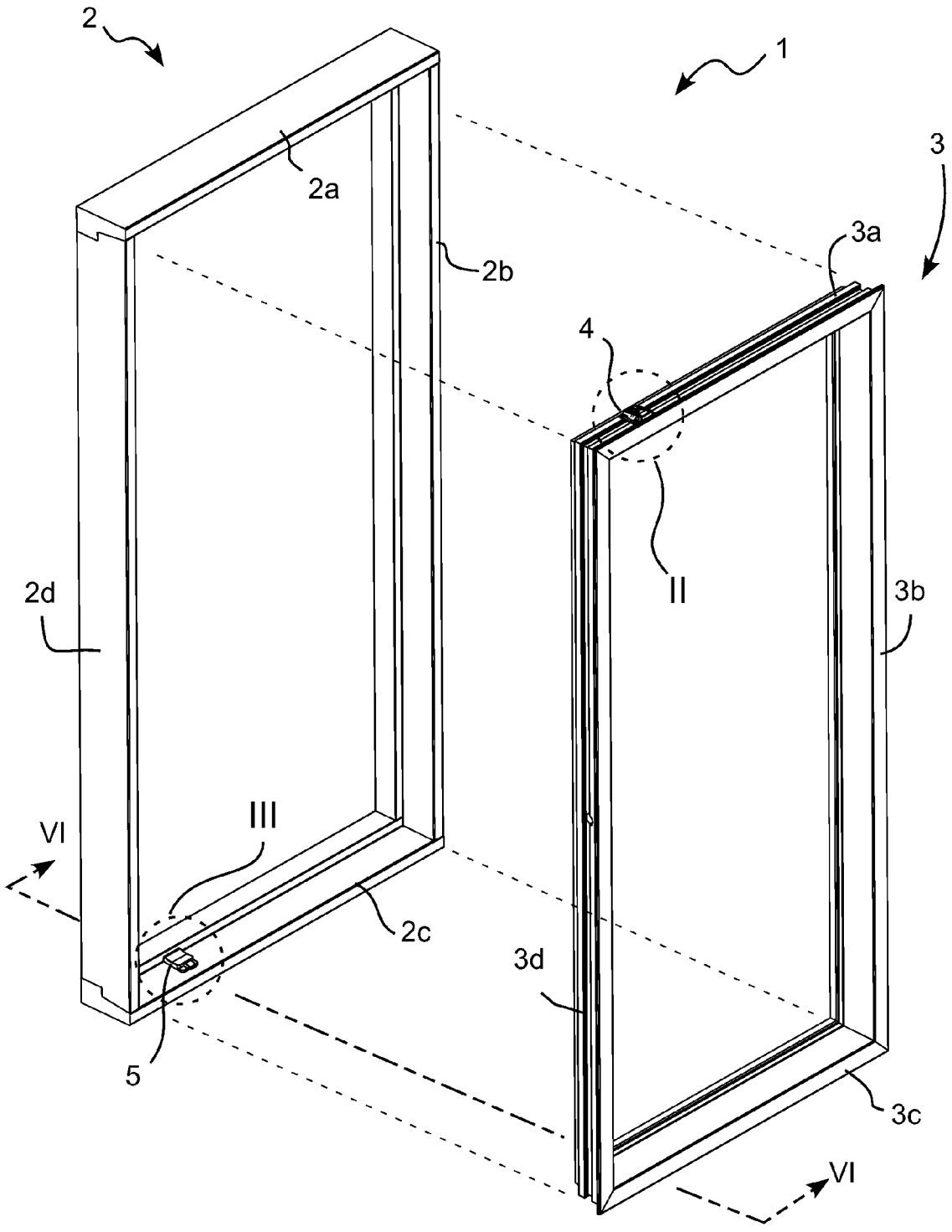


Fig. 1

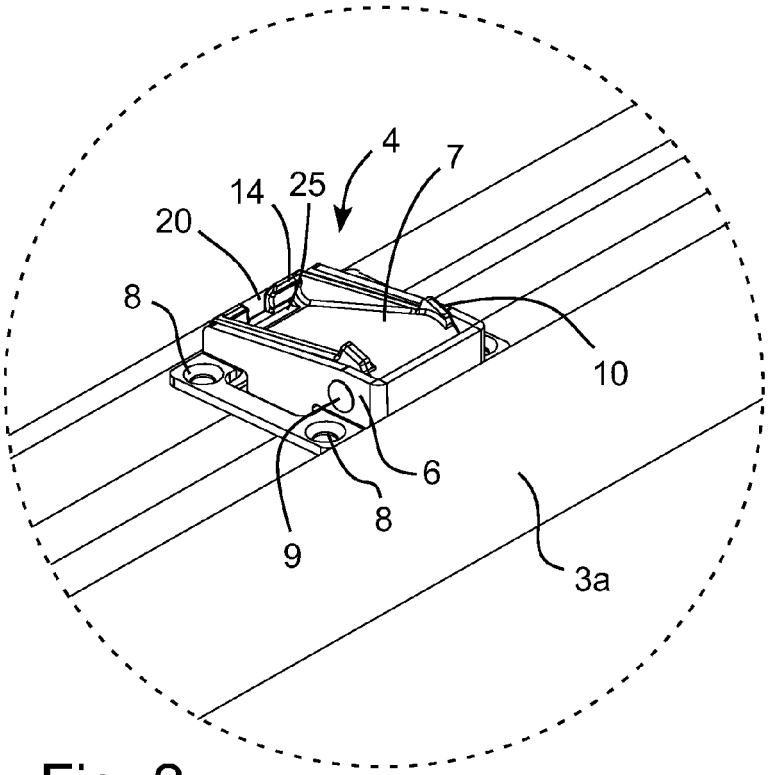


Fig. 2

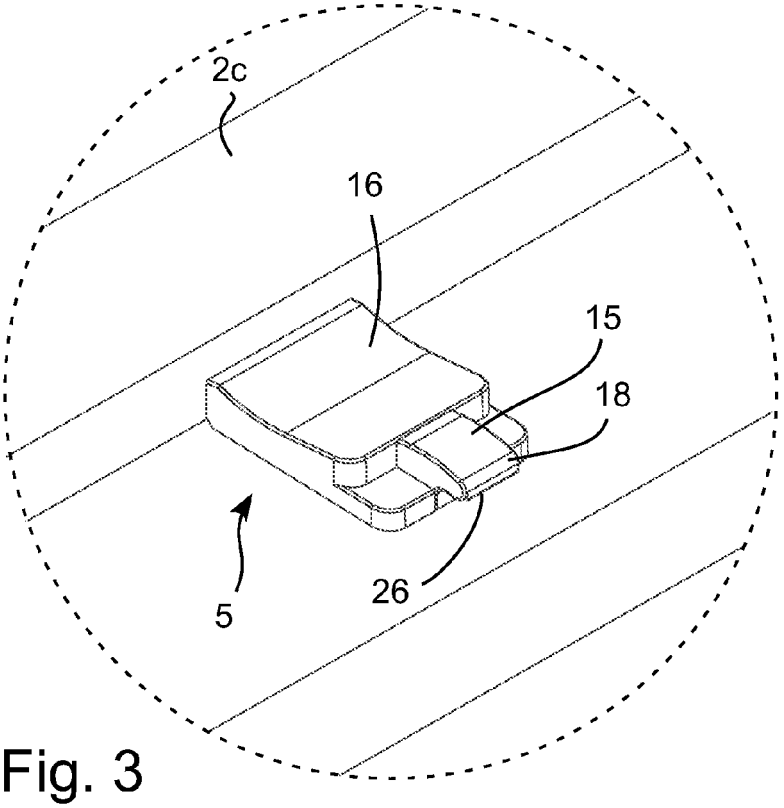


Fig. 3

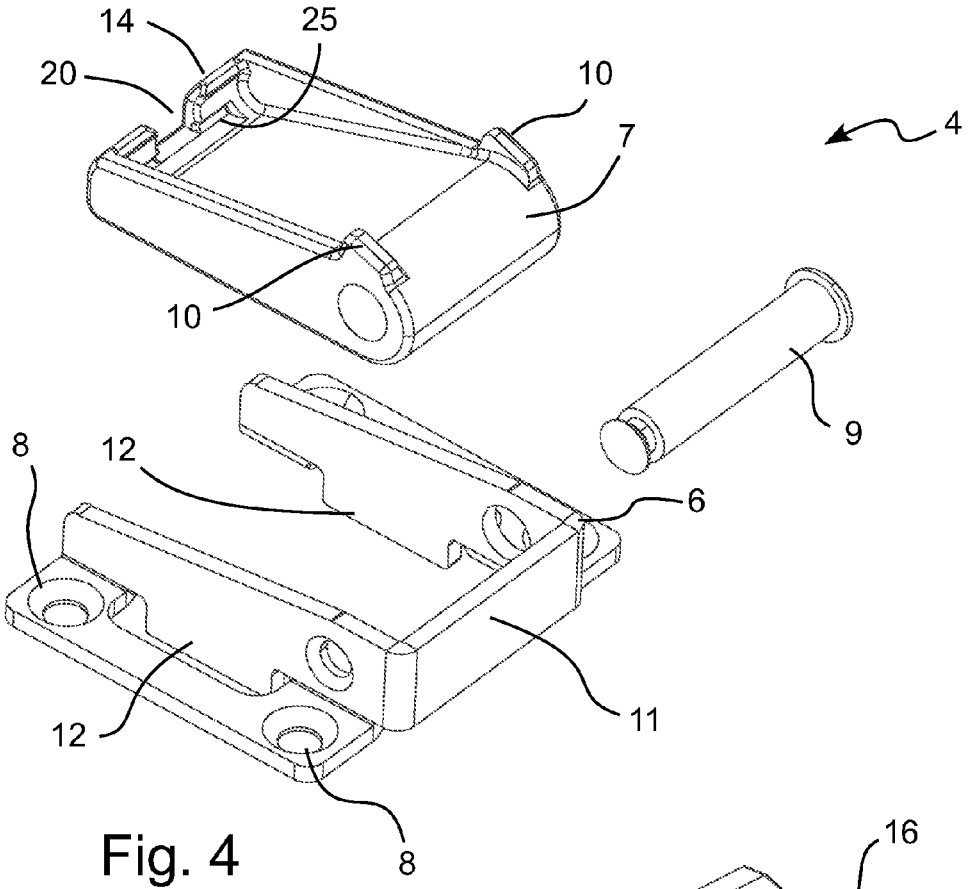


Fig. 4

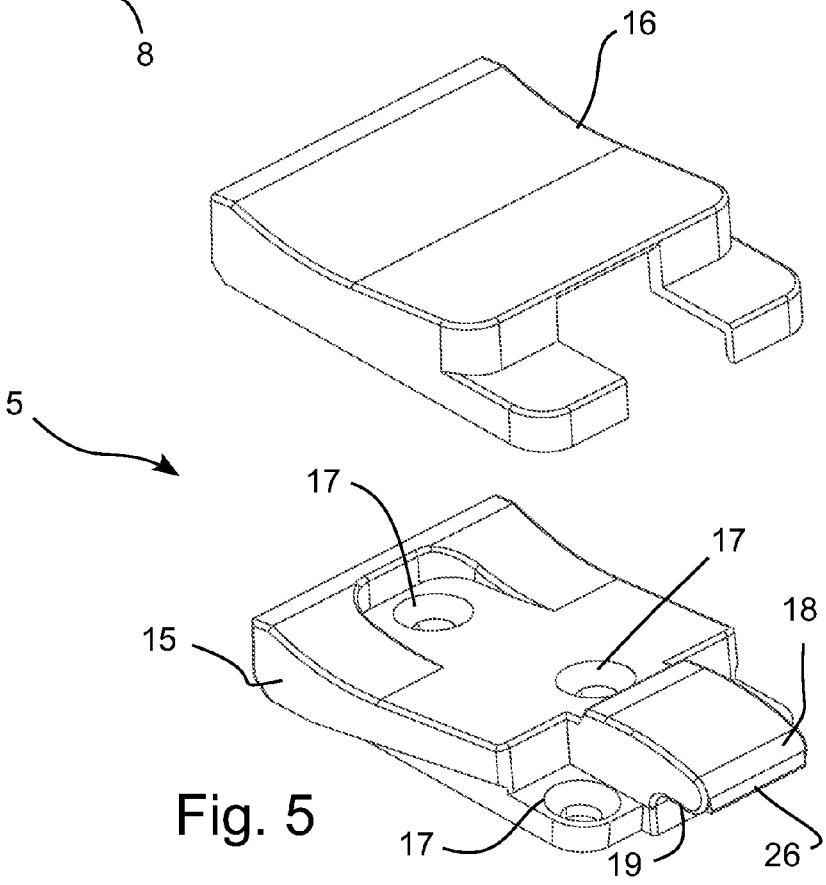


Fig. 5

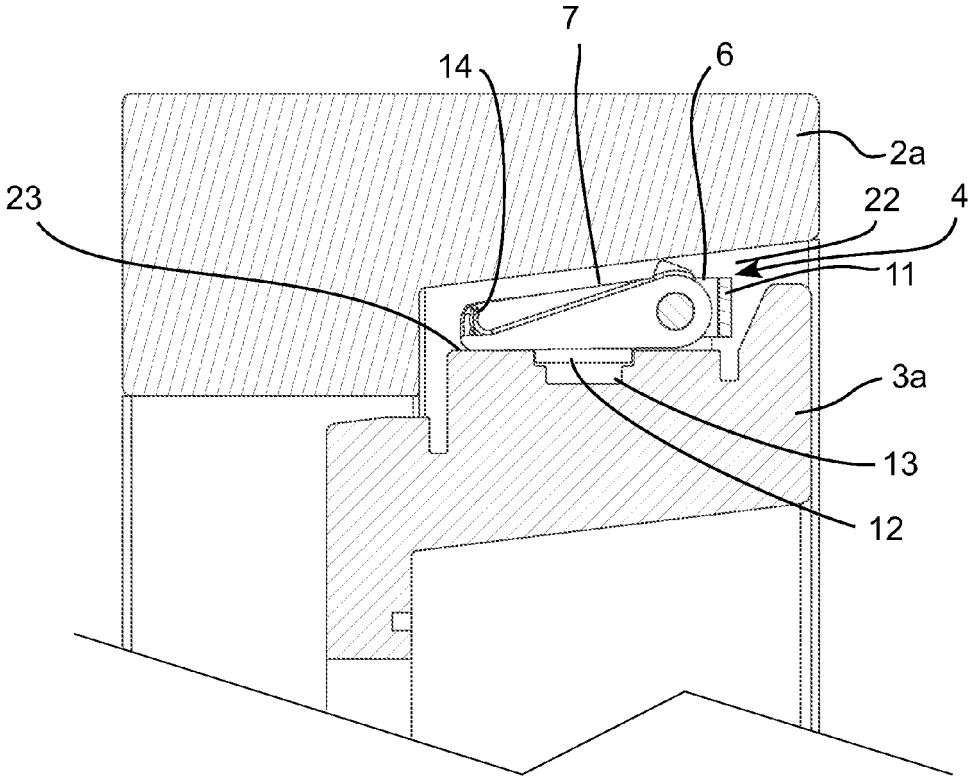


Fig. 6

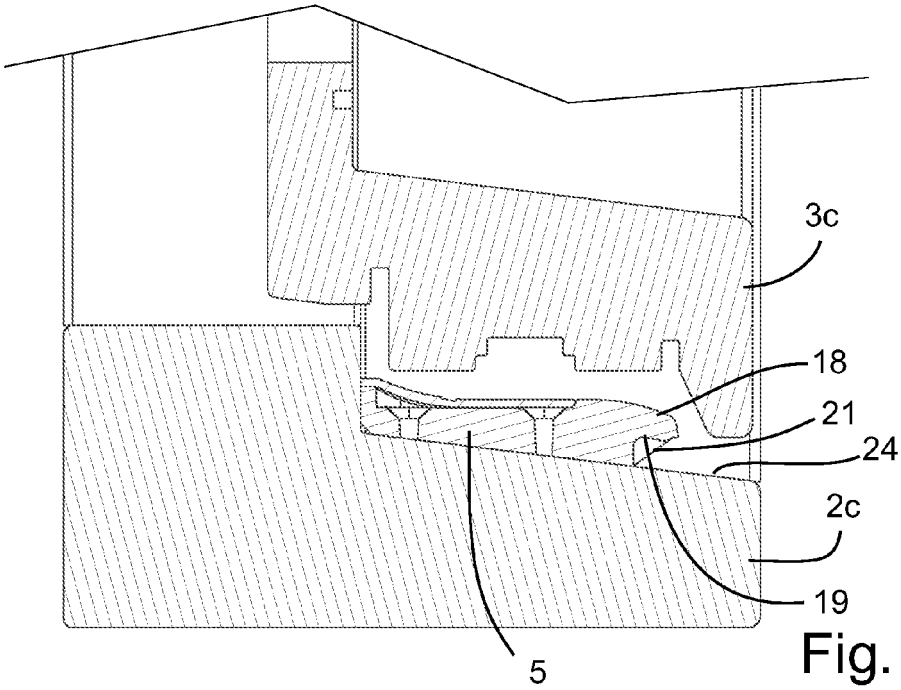


Fig. 7

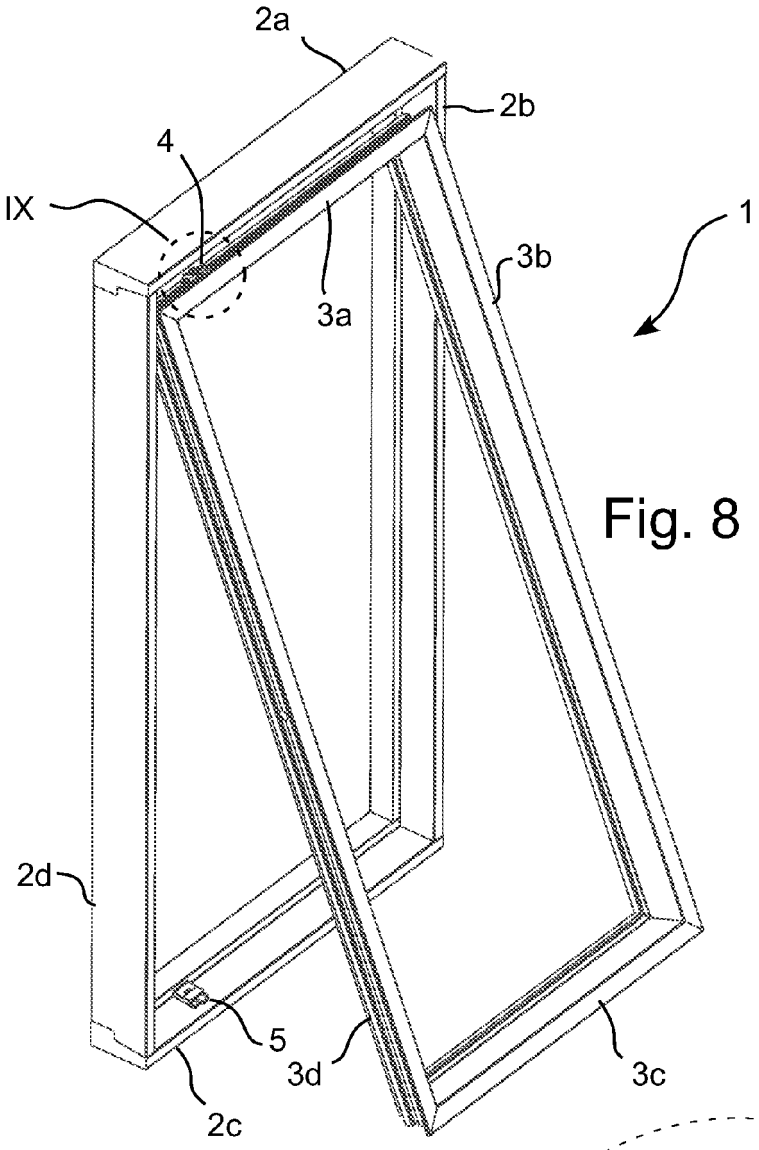
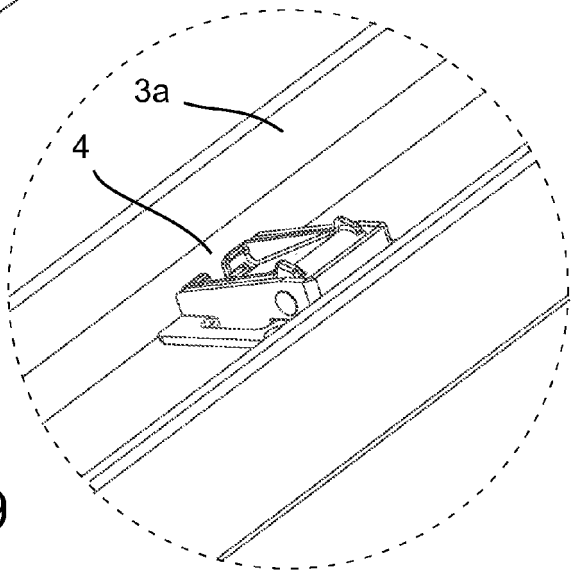


Fig. 8



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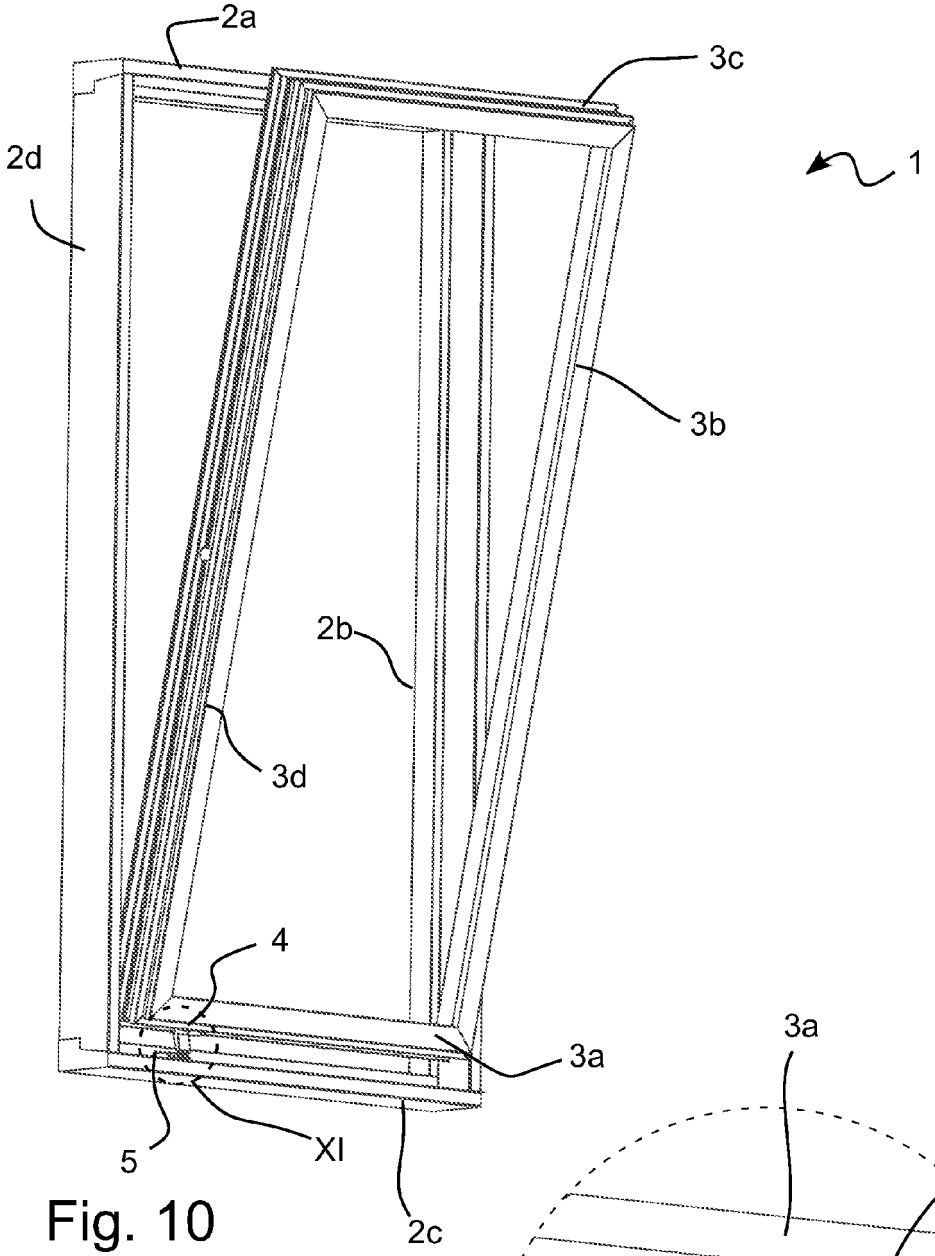

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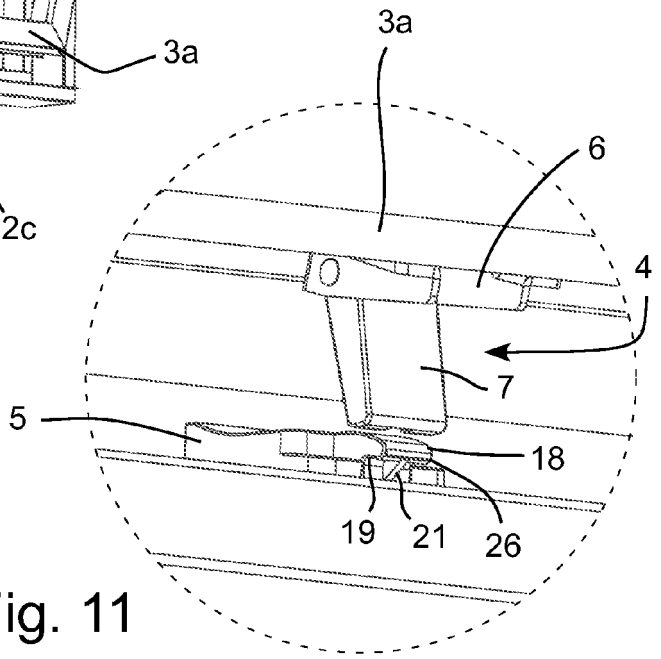

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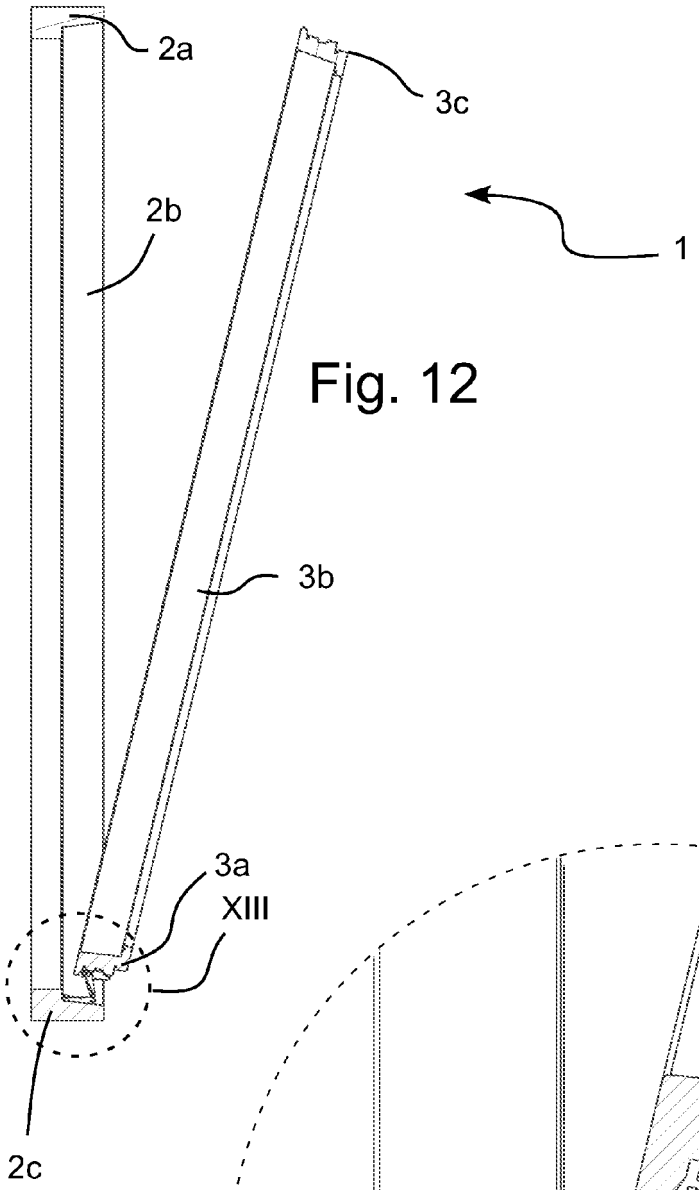

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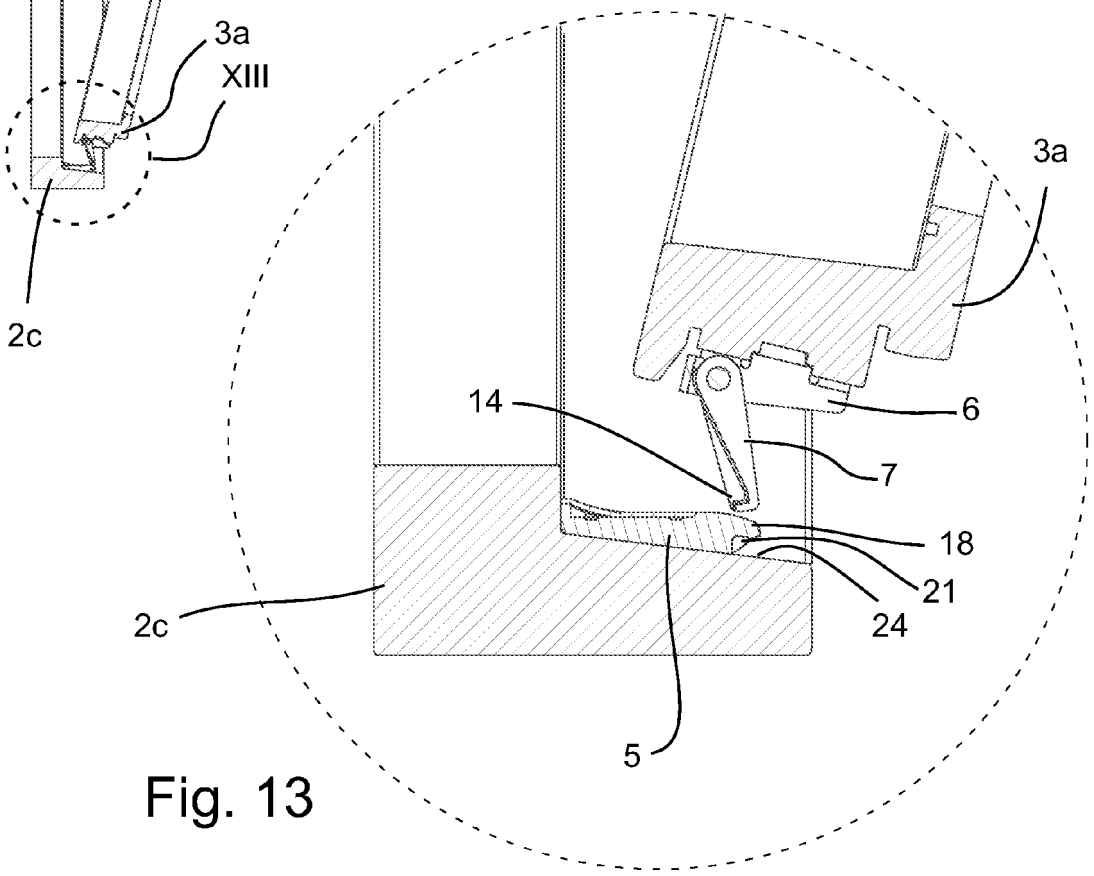

Fig. 13

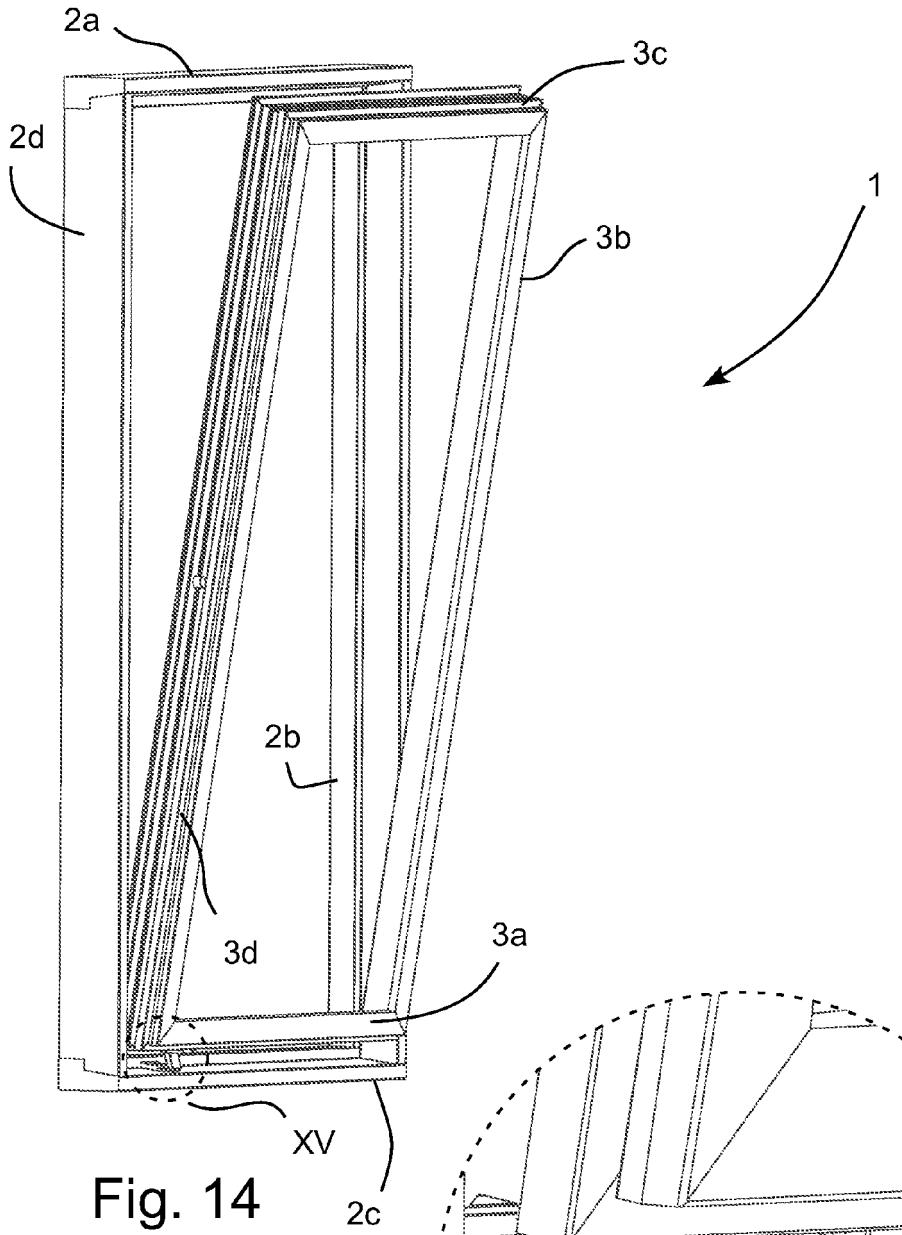

Fig. 14

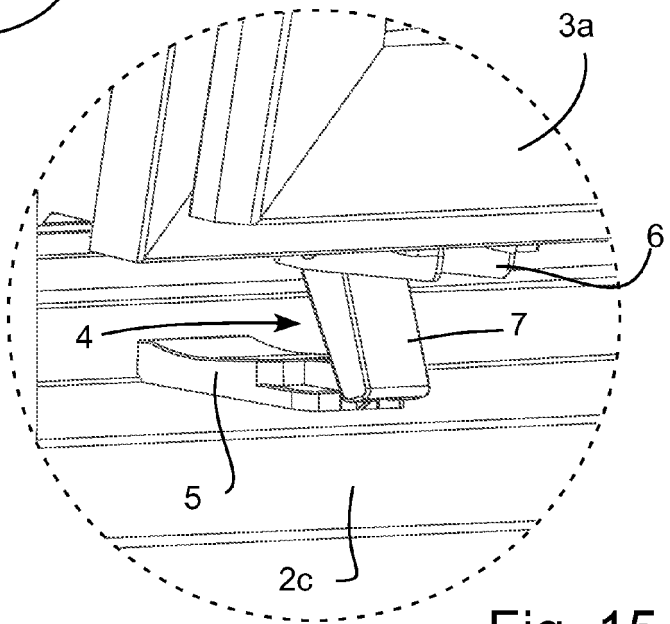

Fig. 15

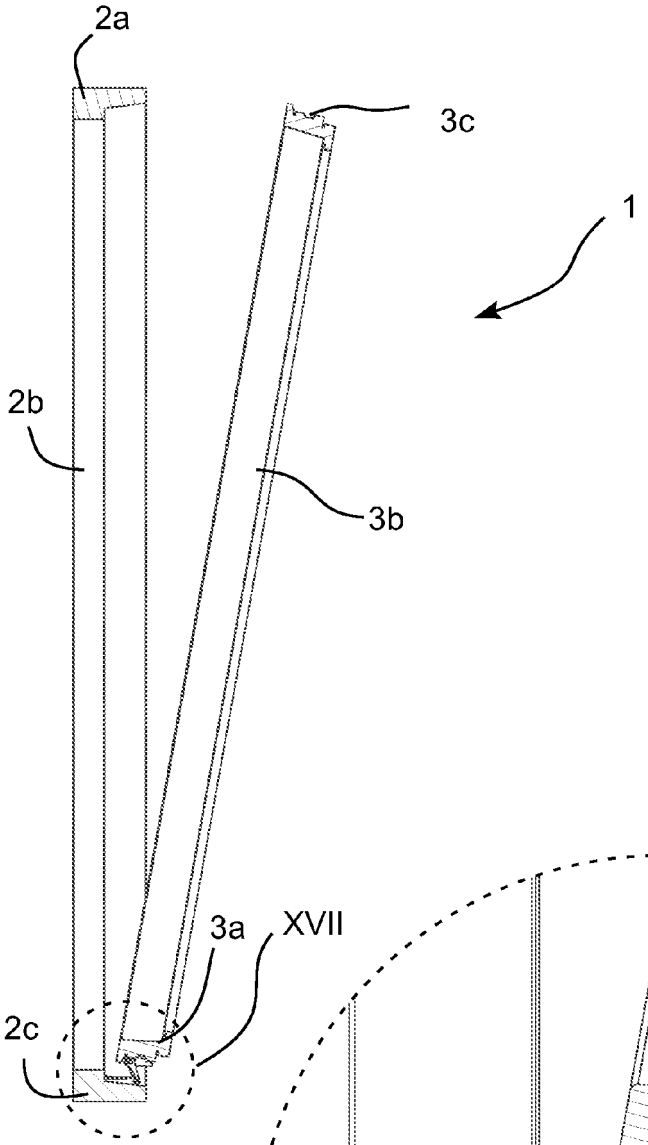

Fig. 16

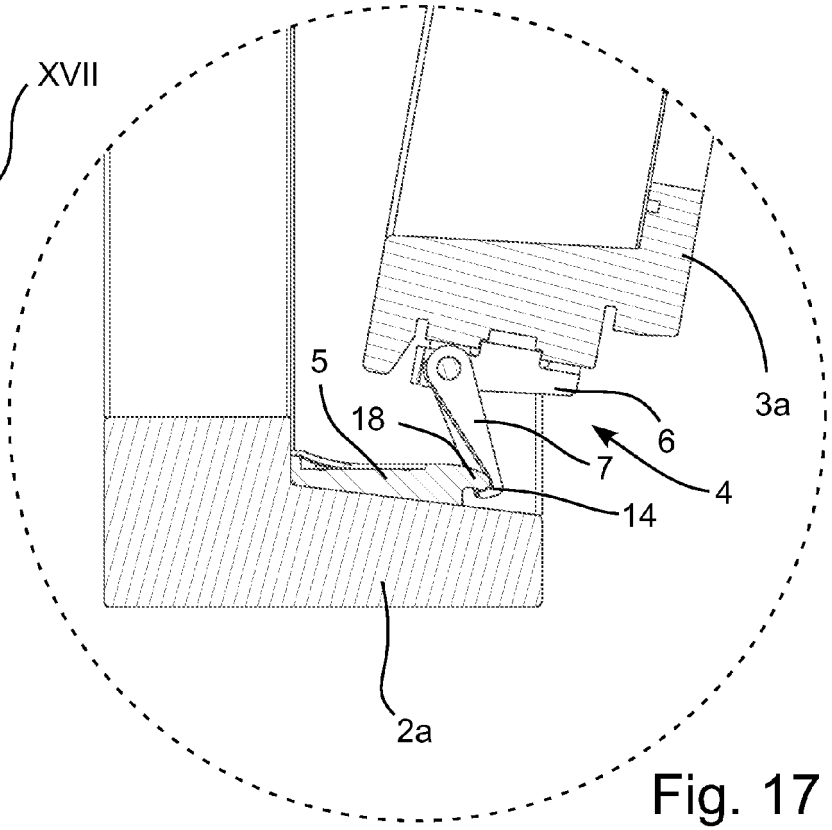

Fig. 17

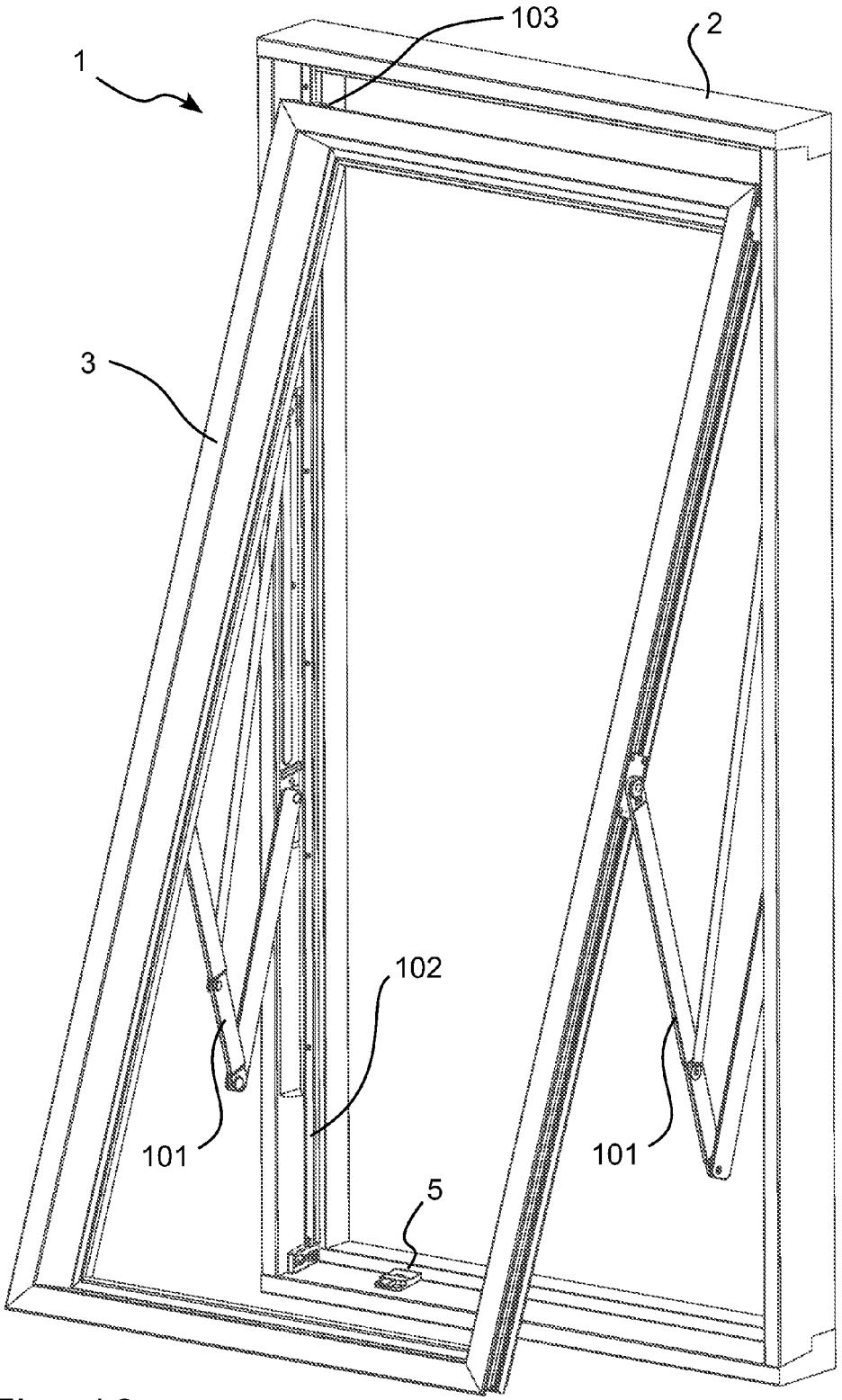

Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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