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(54) **Reversible window assembly**

(57) Reversible window assembly (1) comprising: i) 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) and ii) 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). The window frame elements and the window sash elements are arranged such that a fitting cavity (A) which stretches the length of the upper sash element is provided between the upper frame element and the upper sash element in the closed position of the window assembly. The window assembly further comprises two reversible window fittings (4). Each reversible window fitting is arranged between one side frame element and one side sash element and each reversible window fitting comprises: a rail (6) mounted on a side frame element (2b,2d), and a slider (7) having a sliding portion (20) slidably arranged in said rail and being rotatably connected to the window sash. Two recesses (9,B) are provided in the upper frame element (2a) in extension of the two rails (6) of the two reversible window fittings (4), in order to allow the sliding portion (20) of the slider (7) of each reversible window fitting to enter the recesses in the closed position of the window assembly. In this way, the distance that the slider can travel along the rail is increased and the amount of overshoot of the lower sash element can be minimized.

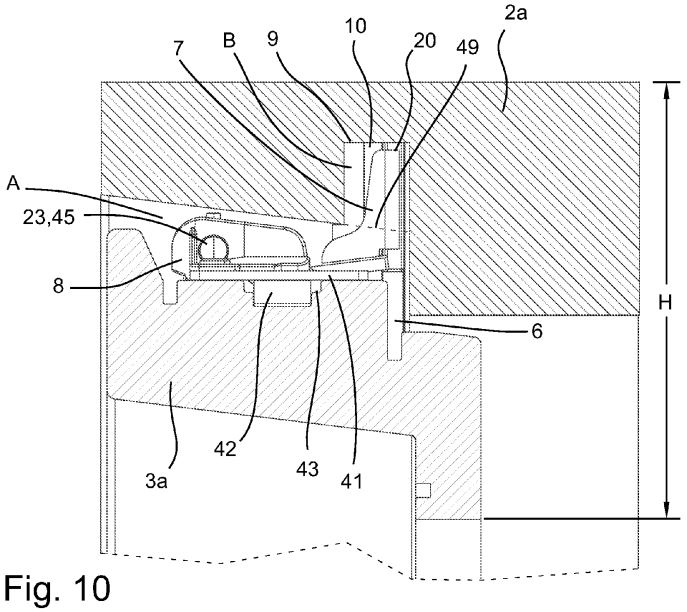

Fig. 10

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Description

[0001] The current invention relates to a reversible window assembly. Reversible windows are windows where the window sash can be rotated approximately 180 degrees so that the face of the window sash which typically faces outside can be rotated to face inside. This allows the outer surface of the sash to be cleaned by a person standing on the inside of the window assembly. In most cases the window sash comprises a window pane which needs to be cleaned at regular intervals. In many cases it is difficult to access the outer surface of the window pane, for example in high rise buildings. In these situations, a reversible window makes cleaning the outer surface of the window pane easier.

[0002] More specifically the reversible window assembly of the current invention comprises 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. The window frame elements and the window sash elements are arranged such that a fitting cavity, or well-defined fitting cavity, which stretches the length of the upper sash element is provided between the upper frame element and the upper sash element in the closed position of the window assembly. The window assembly further comprises two reversible window fittings, each reversible window fitting arranged between one side frame element and one side sash element. Each reversible window fitting comprises: a rail mounted on a side frame element, and a slider having a sliding portion slidably arranged in said rail and said slider being rotatably connected to the window sash.

[0003] In these types of reversible window assemblies, the sash remains either fully outside or fully inside the frame at all times depending on whether it is an outwardly opening or inwardly opening window assembly respectively.

Description of related art

[0004] Reversible window assemblies of this kind are well known. Some typical examples are disclosed in US 1,443,933, US 4,007,558, EP 659,228 and EP 141 000. One of the problems which these types of reversible window assemblies face is how to maximize the amount that the window can reverse and how to reduce the amount of overshoot of the lower sash element in the reversed position of the window, in other words the amount that the lower sash element extends above the upper frame element in the reversed position of the window.

Summary of the invention

[0005] One aspect of the current invention is therefore to provide a reversible window assembly as mentioned in the introductory paragraph which can reverse more than prior art reversible windows of this kind.

[0006] Another aspect of the current invention is to provide a reversible window assembly as mentioned in the introductory paragraph where the amount of overshoot of the lower sash element in the reversed position of the window assembly is minimized.

[0007] This is provided in that in that two recesses are provided in the upper frame element in extension of the two rails of the two reversible window fittings, in order to allow the sliding portion of the slider of each reversible window fitting to enter the recesses in the closed position of the window assembly. Since the sliding portion of the slider can slide into this recess, the window sash can travel further along the rail, thereby allowing a greater amount of rotation of the window sash. In addition, since the sash can travel further, the amount which the lower sash element extends above the upper frame element when the window assembly is fully reversed is reduced or even completely eliminated.

[0008] In a preferred embodiment of the invention, the dimension of the sliding portion of the slider which is parallel to the rail's longitudinal axis can be made greater than the dimension of the sliding portion of the slider which is perpendicular to the rail's longitudinal axis and the axis of rotation between the slider and the window sash can be arranged in plane with the lower end of the sliding portion of the slider. This type of configuration allows the sliding portion to support large moments about an axis which is perpendicular to the longitudinal axis of the rail.

[0009] It should be noted that "in plane with the lower end of the sliding portion" should be understood as being located on a plane which is perpendicular to the longitudinal axis of the rail and that said plane goes through the lower end of the sliding portion or passes close by the lower end of the sliding portion (when considering the length of the sliding portion). In general, it should be considered as the plane being located below the middle of the sliding portion of the slider. In another embodiment, the plane is located at a distance of maximum +/- 1/4th of the length of the sliding portion from the bottom of the sliding portion.

[0010] In another embodiment, the axis of rotation between the slider and the window sash can be offset from the longitudinal axis of the rail. This type of setup usually places large moments on the sliding portion of the slider. As could be imagined, the greater the offset distance, the greater the moments on the sliding portion. However, in many modern windows, the rotation point of the window is placed very close to the outside of the window whereas the rail is placed nearer the inside of the window. Therefore the offset distance perpendicular to the longitudinal axis of the rail can be equal to or greater than the dimension of the sliding portion of the slider in the direction which is parallel to the longitudinal axis of the rail.

[0011] In one particular embodiment, the top portions of the rails can be arranged in the recesses. This provides a strong support for the sliding portion of the sliders when

they are in their uppermost position.

[0012] In another way of describing the recesses, one could write that the top portion of the sliding portion of the slider could be arranged above the top most surface of the inner surface of the fitting cavity which stretches the length of the upper sash element in the closed position of the window assembly.

[0013] In one embodiment, the top portion of the sliding portion of the slider is arranged above the axis of rotation between the slider and the window sash. The axis of rotation between the sash and the slider can also advantageously be arranged in the fitting cavity between the upper sash element and the upper frame element in the closed position of the window.

[0014] In one embodiment, the connections between the sash and the sliders can be provided via two sash fittings which are mounted to the two upper corners of the window sash, each sash fitting being connected to both a side sash element and the upper sash element. This helps to increase the strength of the sash at the corners of the sash.

[0015] In a preferred embodiment of the invention, a locking plate for the espagnolette system can be mounted on each side frame element below each rail, said locking plate acting as a stop fitting for the slider. The stop fitting could stop the motion of the slider before the slider abuts the lower frame element. Due to the arrangement of the recesses in the upper frame element, the locking plate does not have to be machined into the side frame element, but can be placed in the fitting cavity between the side frame element and the side sash element.

[0016] In order to make assembly between the slider and the sash easier, the cross section of the sliding portion of the slider taken along a plane which is perpendicular to the longitudinal axis of the sliding portion of the slider could be made non-circular. This prevents the slider from rotating about the longitudinal axis of the rail during assembly.

[0017] It should also be mentioned that in one embodiment of the invention, the reversible window assembly could be one variant of a number of different window assemblies in a system of window assemblies. The different window assemblies of the system of window assemblies share a common sash and a common frame profile. In other words the fitting cavity is the same in the different window assemblies of the system of window assemblies. Examples of other window assemblies which could be found in the window system are side hung windows, top hung windows, fixed windows, etc.

[0018] 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

[0019] 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 unnecessarily limit the scope of the invention.

Figure 1 shows a perspective view of an embodiment of a reversible window assembly according to the invention.

Figure 2 shows a close-up view of the area marked with "II" in figure 1.

Figure 3 shows another perspective view of the window of figure 1.

Figure 4 shows the perspective view of figure 3, but with the window sash removed so that it is easier to see the fittings.

Figure 5 shows an exploded perspective view of the area marked with "V" in figure 4.

Figure 6 shows a close-up perspective view of the slider of the reversible window fitting.

Figure 7 shows a cross section view of the rail.

Figure 8 shows a detail perspective view of the sash fitting.

Figure 9 shows an exploded view of the sash fitting.

Figure 10 shows a cross section view of the top of the reversible window assembly shown in figure 1 according to the line X-X in figure 1, but in the closed position of the window assembly.

Figure 11 shows a cross section view of the reversible window assembly of figure 1 in its reversed or "cleaning" position according to the line marked X-X in figure 1.

Figure 12 shows a close-up view of the area marked XII in the cross section of figure 11.

Figure 13 shows a cross section of the upper sash element and the upper frame element clearly showing the fitting cavity between the upper sash element and the upper frame element.

Figure 14 shows a cross section of the upper sash element and the upper frame element which shows the recess in the upper frame element.

Detailed description of the embodiments

[0020] Figures 1-14 show different views of an embodiment 1 of a reversible window assembly according to the current invention. The reversible window assembly comprises a window frame 2 and a window sash 3. The window frame is comprised of four frame elements: an upper frame element 2a, a lower frame element 2c and two side frame elements 2b,2d. The window sash 3 is similarly comprised of four sash elements: an upper sash element 3a, a lower sash element 3c and two side sash elements 3b,3d.

[0021] The sash 3 is connected to the frame 2 via two reversible window fittings 4. Each of the reversible frame fittings is comprised of a linkage mechanism 5, a rail 6, a slider 7 and a sash fitting 8. Each of the two linkage mechanisms is attached between a frame side element 2b,2d and a sash side element 3b,3d. Since linkage mechanisms of this kind are known in the art, they won't be described in more detail here. Examples of suitable linkage mechanisms are shown in the above mentioned prior art applications. Another example is provided in EP 2,069,599.

[0022] The rail 6 of the reversible window fitting is attached to a side frame element 2b,2d. A portion of the slider 7 of the reversible window fitting is slidably arranged in the rail. The slider 7 is pivotably connected to the sash via the sash fitting 8. The sash fitting 8 is provided as an angle fitting and is mounted at the corner of the window sash and has a firm connection to both a side sash element 3b,3d and the upper sash element 3a. In this way, the sash fitting increases the strength of the connection between the side sash element and the upper sash element. The sash fitting 8 and the slider 7 are pivotably connected to each other so that the window sash 3 can rotate with respect to the frame 2 about an axis of rotation C. This axis of rotation C displaces up or down as the slider is slid up or down in the rail.

[0023] As can be seen from figures 5 and 10, a recess 9 is provided in the upper frame element in extension of the rail 6. A recess is also provided in the opposite end of the upper frame element in extension of the second rail. The top parts 10 of the rails 6 are arranged in these recesses. The recess also allows the sliding portion of the slider 7 which is arranged in the rail to extend up into this recess when the window assembly is in its closed position. The recess 9 thereby allows the effective sliding length of the rails to be increased.

[0024] Figure 6 shows a close-up view of the slider 7. The structural frame of the slider is made from steel plate material which has been cut and bent into the shape shown in figure 6. In order to increase the sliding abilities of the slider, the sliding portion 20 of the slider which is arranged in the rail 6 when the reversible window fitting is assembled is made from a material with low friction which is cast/moulded around the steel frame of the slider 7. The dimension (length) of sliding portion 20 in the direction which is parallel to the longitudinal axis of the rail is greater than the dimension (width) of the sliding portion 20 which is perpendicular to the longitudinal axis of the rail. In the embodiment shown, the length of the sliding portion is at least double the width of the sliding portion. This allows the sliding portion to support large moments about axes which are perpendicular to the longitudinal axis of the rail. In this embodiment, the sliding portion has a cross sectional area which is L shaped when a cross section is taken along a plane which is perpendicular to the longitudinal axis of the sliding portion.

[0025] At the lower end of the sliding portion 20, the slider has a flange 21 which is arranged perpendicular to the longitudinal axis of the sliding portion and the longitudinal axis of the rail when the reversible window fitting is assembled. A cylindrical housing 22 is attached to one end of this flange. Inside the cylindrical housing, two cylindrical pins 23 are arranged, the pins being biased away from each other with a spring (not shown) also arranged in the cylindrical housing. Set screws 24 arranged in slots 25 are screwed into the pins to keep the pins from falling out of the housing. The slots 25 in the cylindrical housing allow the pins to be pressed into the housing during assembly or disassembly with the sash fitting. The longitudinal axis C of the cylindrical housing is arranged perpendicular to but offset from the longitudinal axis of the sliding portion of the slider.

[0026] Since the flange 21 is arranged at the lower end of the sliding portion 20, the slider is able to slide in the rail until the flange abuts the stop fitting 26 arranged at the bottom of the rail 6 (see figure 12). In addition, due to the recess in the upper frame element, the slider is able to slide up the frame until the flange 21 almost abuts the lower surface 27 of the upper frame element 2a (see figure 10).

[0027] It should be noted that the "stop fitting 26" located at the bottom of the rail is not designed as a stop fitting for the rail, but rather is designed as a locking plate for the espagnolette system (not shown). In the espagnolette system according to this example, two locking rods (not shown) are displaced outwards along the lower surface of the lower sash element when it is desired to lock the window. The outer ends of the locking rods engage with the recesses in the locking plate 26. This locking plate is screwed into the side frame element to establish a good strong connection to make sure that when the window is locked, it is very resistant against break-in. If the locking plate 26 were not present, then the sliding portion of the slider could be designed to protrude downward from the flange 21. In this case it would not be necessary to have the recesses 9 in the upper frame element. However, the locking plate is required for the locking system and can't just be removed.

[0028] In certain cases, it could be imagined that said locking plate could be placed in a recess which is machined in the side frame element. This would allow the slider to slide past the locking plate and in this way have a greater travel length. However, machining such a recess is costly and time consuming. Furthermore, since

the frame cross section is already quite thin, machining a recess into the frame would decrease the strength of the frame. Furthermore, machining into the corner of the frame would cause problems with the connection between the side and lower frame elements. Furthermore, in most cases, a reversible window assembly is part of a number of different types of window assemblies which form a window system sharing frame members, sash members, fittings, locking system etc. If the locking plate were recessed into the frame for the reversible window, then it should also be recessed into the frame in all the other window assemblies of the system. This would unnecessarily increase the cost of all the other windows in the system. In the current embodiment, the locking plate can be placed in the fitting cavity in all the window assemblies of the window system. Another advantage of the current invention is that it is much easier to drill two round holes in the upper frame element instead of machining two recesses for the locking plates.

[0029] It could also be imagined that the locking plate had a recess which could accept a downwardly extending sliding portion of the slider. However, in this case, the locking plate could not be made quite as strong and/or the connection between the locking plate and the side frame element could not be made as strong.

[0030] It should also be noted that since the pivotable connection between the slider and the sash fitting (having an axis C aligned with the longitudinal axis of the cylindrical housing) is located at an offset from the sliding portion 20 of the slider, the moments on the sliding portion 20 about an axis perpendicular to the rail are increased. This type of connection between the sash and the sliding portion of the slider place large demands on the sliding portion of the slider and typically require the sliding portion to be quite long. Having a long sliding portion reduces the distance which the slider can travel along the rail. This is in contrast to reversible window assemblies where the pivotable connection between the sash and the portion arranged in the rail are arranged without an offset. This type of connection is disclosed in EP 141 000. In this example, the slider is in the form of a roller element arranged in the rail. The sash is directly connected to the roller element and can rotate about the roller element. In this case there are no moments on the slider and the slider can therefore be made quite small. This allows the slider to travel a greater distance along the rail.

[0031] Figure 7 shows a cross section of the rail 6 taken along a plane which is perpendicular to the longitudinal axis of the rail. In this embodiment of the rail, the rail has an L-shaped area 30 which is shaped complementary to the sliding portion 20 of the slider 7. Due to the shape, the sliding portion is not able to rotate in the rail, but only slide along it. This makes assembly between the slider and the sash fitting easier. Screw holes 31 in the rail placed at spaced apart intervals along the length of the rail, allow the rail to be fastened to the side frame element. However, within the scope of the current invention the internal shape of the rail could take many different forms, circular forms being included.

[0032] Figures 8 and 9 show the sash fitting 8 of the reversible window fitting 4. The sash fitting has two flanges 40,41 which are arranged at 90 degrees to each other. A first 40 of the two flanges is fastened to a side sash element 3b and a second 41 of the two flanges is fastened to the upper sash element 3a. The flanges are in the current embodiment formed from a single piece of steel plate material which has been cut and bent into the shape shown in figures 8 and 9. The sash fitting also has a locating portion 42 which is designed to be placed in the fitting groove 43 (see figure 10) in the sash. This ensures the correct placement of the sash fitting with respect to the sash as well as increasing the strength of the connection between the sash and the sash fitting.

[0033] In order to connect the sash fitting and the slider, the sash fitting has two connection flanges 44. The connection flanges are formed with a hole 45 which is sized to accept the pins 23 of the slider 7. When connecting the sash fitting with the slider, the pins are compressed into the cylindrical housing, the sash fitting and the slider are moved together so that the centre axis of the holes 45 of the sash fitting are aligned with the longitudinal axis of the cylindrical housing of the slider and then the pins are released so that they extend into the holes 45 of the connection flanges 44 of the sash fitting 8. The sash fitting can now pivot with respect to the slider about an axis C which is aligned with the centre axis of the holes 45 and the longitudinal axis of the cylindrical housing 22.

[0034] In the current embodiment of the sash fitting, two moulded ramp elements 46 are provided at each connection flange. The moulded ramp elements 46 are each provided with a ramp which helps in compressing the pins 23 of the slider. Due to the ramps, the person who is assembling the slider and the sash fitting, only needs to press the slider against the sash fitting. The pins are automatically compressed into the cylindrical housing by the ramps. When the pins reach the holes 45 in the connection flanges 44 of the sash fitting, the pins snap out due to the spring and the sash fitting is locked to the slider. When it is desired to remove the sash fitting from the slider, the pins 23 are retracted into the cylindrical housing via the set screws 24. Since the strength of the ramp elements is not so critical, the ramp elements can be made from a suitable plastics material and injection moulded into the correct form. The ramp elements are connected to the sash fitting via rivets 48 in the current embodiment, but could be connected in other ways in other embodiments.

[0035] Figure 10 shows in greater detail how the recess 9 allows the sliding portion 20 of the slider 7 to travel a greater distance along the rail than if no recess were provided. As can be seen, the top portion 10 of the rail 6 and the greater part of the sliding portion 20 of the slider are arranged in the recess 9 in the closed position of the window. The flange 21 and cylindrical housing 22 of the slider and the connection flanges 44 and ramp elements 46 of the sash fitting 8 are arranged in the fitting cavity A.

[0036] Note that if the recess 9 were not present then the fitting cavity would be completed by the dashed line 49. The top of the sliding portion 20 of the slider could then only proceed as far as this dotted line and would therefore necessarily have to be designed differently. Typically this would be done by placing the flange 21 at the top of the sliding portion or in the middle of the sliding portion. This would allow the slider to go as far up in the rail as the current embodiment, but when the sliding portion of the slider reaches the bottom of the rail, then it could not travel as far since it would run into the end stop sooner.

[0037] It can also be noted that another way of solving the problem above is to make the fitting cavity larger so that a larger sliding portion can be accommodated. However, since the sliding portion 20 of the slider is arranged in the recess in this embodiment, the fitting cavity can be made smaller without a negative impact on the length of the sliding portion. By having a smaller fitting cavity, the frame and sash elements can be made with a lower assembled height H. The above problem could also be solved by making the sliding portion shorter. However this would decrease the sliding capabilities of the slider. By providing the recesses, the sliding portion can be made longer.

[0038] From figure 12 it can be seen that in the reversed position (or cleaning position) of the window, the upper sash element 3a has almost reached the lower frame element 2c. Since the flange 21 of the slider 7 is located at the bottom of the sliding portion 20, the slider can slide down along the rail until the flange reaches the end stop 26 of the rail 6. This allows the sash to be rotated such that the lower sash element 3c remains below the upper surface of the upper frame element 2a at all times, see the dotted line D. This allows the window assembly of the current invention to be used in a greater number of wall openings, even those with a restricted amount of clearance above the window assembly. This is in contrast to many other types of reversible windows where the lower sash element is arranged above the upper frame element in the reversed position of the window assembly. In the case where the lower sash element is arranged above the upper frame element when reversed, the lower sash element can crash into the wall opening above the window if the wall opening is not made large enough. In modern buildings with thick walls where there is a large overhang over the window, having a reversible window with a low overshoot is especially important.

[0039] When assembling the reversible window assembly according to the current invention, the sliding portions 20 of the sliders 7 are inserted into the rails 6 of the two reversible window fittings 4 before the rails 6 are mounted on the window frame. Once the sliding portions of the sliders have been inserted in the rails, the top portions of the rails 10 are inserted into the recesses 9 in the upper frame element 2a and the rails 6 are screwed onto the side frame elements 2b,2d. The sash fittings 8 are then screwed onto the upper corners of the window sash 3. The window sash is then moved towards the sliders where the sash fittings are pressed onto the sliders, thereby causing the pins 23 of the sliders to compress and then snap into engagement with the sash fittings. The free ends 50 of the linkages 5 are then connected to a pivot point 51 on the sash.

[0040] Figures 13 and 14 illustrate in more details what the term "fitting cavity" means according to the current specification. Figure 13 shows the fitting cavity shaded and marked with A. The fitting cavity A is the area between the frame element 2a and the sash element 3a. Most window assemblies are formed of sash elements and frame elements which are extruded or machined as elongated profile elements having constant cross sections along their entire lengths. The "fitting cavity" as defined in this specification is the open area which is arranged 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 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 fitting cavities are identical since the profiles of all four frame elements are the same and the profiles of the four sash elements are the same. However, in many window assemblies the four fitting cavities will be different due to the side, upper and lower profile elements having different cross sections.

[0041] In certain cases, as is the case with the recess for the sliding portion of the slider according to the current invention, the profile elements are further machined prior to assembly to make room for a particular fitting. This is shown in figure 14 where the fitting cavity is marked with A and with a light shading and the recess is marked with B and with a darker shading. According to the definition of the term "fitting cavity" in this specification, the area of the recess B is not considered to be part of the fitting cavity, but is considered a separate cavity which is connected to the fitting cavity. It should be noted that this definition of the term fitting cavity should be in agreement with the understanding that the person skilled in the art of window design would have in advance.

[0042] The above description and the figures of this specification have only shown a single embodiment of this invention, however, the person skilled in the art should be able to apply the teaching of this invention to other embodiments which would be within the scope of the current invention. It should also be noted that the current claim set is focused on the invention concerning the recess in the upper frame element for the sliding portion of the slider. However, a separate invention is also disclosed in this specification, namely the use of a snap connection between the slider and the sash fitting which makes the assembly of the window assembly quicker and easier. In this case, the sash fitting is provided with means for automatically compressing spring loaded pins

of the slider when the sash fitting is pressed against the slider and means for holding the pins compressed until the pins are aligned with connection recesses on the sash fitting where after the pins spring out and engage with the connection recesses on the sash fitting.

[0043] It is to be noted that the figures and the above description have shown the example embodiments in a simple and schematic manner. Many of the more specific 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. These details comprise for example: seals, window panes, glazing beads, etc.

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 frame elements and the window sash elements are arranged such that a fitting cavity (A) which stretches the length of the upper sash element is provided between the upper frame element and the upper sash element in the closed position of the window assembly, and
- two reversible window fittings (4), each reversible window fitting arranged between one side frame element and one side sash element, and where each reversible window fitting comprises:

  - a rail (6) mounted on a side frame element (2b,2d), and
  - a slider (7) having a sliding portion (20) slidably arranged in said rail and said slider being rotatably connected to the window sash,

characterized in that two recesses (9,B) are provided in the upper frame element (2a) in extension of the two rails (6) of the two reversible window fittings (4), in order to allow the sliding portion (20) of the slider (7) of each reversible window fitting to enter one of the recesses in the closed position of the window assembly.

2. Reversible window assembly (1) according to claim 1, **characterized in that** the dimension of the sliding portion (20) of the slider (7) which is parallel to the rail's (6) longitudinal axis is greater than the dimension of the sliding portion of the slider which is perpendicular to the rail's longitudinal axis and **in that** the axis of rotation (C) between the slider (7) and the window sash (3) is arranged in plane with the lower end of the sliding portion of the slider.

3. Reversible window assembly (1) according to claim 1 or 2, **characterized in that** the axis of rotation (C) between the slider (7) and the window sash (3) is offset from the longitudinal axis of the rail (6).

4. Reversible window assembly (1) according to claim 3, **characterized in that** the offset distance which is perpendicular to the longitudinal axis of the rail (6) is equal to or greater than the dimension of the sliding portion (20) of the slider (7) in the direction which is parallel to the longitudinal axis of the rail (6).

5. Reversible window assembly (1) according to any one of claims 1-4, **characterized in that** the top portions (10) of the rails (6) are arranged in the recesses (9,B).

6. Reversible window assembly (1) according to any one of claims 1-5, **characterized in that** the top portion of the sliding portion (20) of the slider (7) is arranged above the top most surface of the inner surface of the fitting cavity (A) which stretches the length of the upper sash element (3a) in the closed position of the window assembly.

7. Reversible window assembly (1) according to any one of claims 1-6, **characterized in that** the top portion of the sliding portion (20) of the slider (7) is arranged above the axis of rotation (C) between the slider and the window sash (3).

8. Reversible window assembly (1) according to any one of claims 1-7, **characterized in that** the axis of rotation (C) between the sash (3) and the slider (7) is arranged in the fitting cavity (A) between the upper sash element (3a) and the upper frame element (2a) in the closed position of the window assembly.

9. Reversible window assembly (1) according to any one of claims 1-8, **characterized in that** the connections between the window sash (3) and the sliders (7) is provided via two sash fittings (8) which are mounted to the two upper corners of the window sash, each sash fitting being connected to both a side sash element (3b,3d) and the upper sash element (3a).

10. Reversible window assembly (1) according to any one of claims 1-9, **characterized in that** a locking plate (26) for the espagnolette system is mounted on each side frame element below each rail (6), said locking plate (26) acting as a stop fitting for the slider (7)

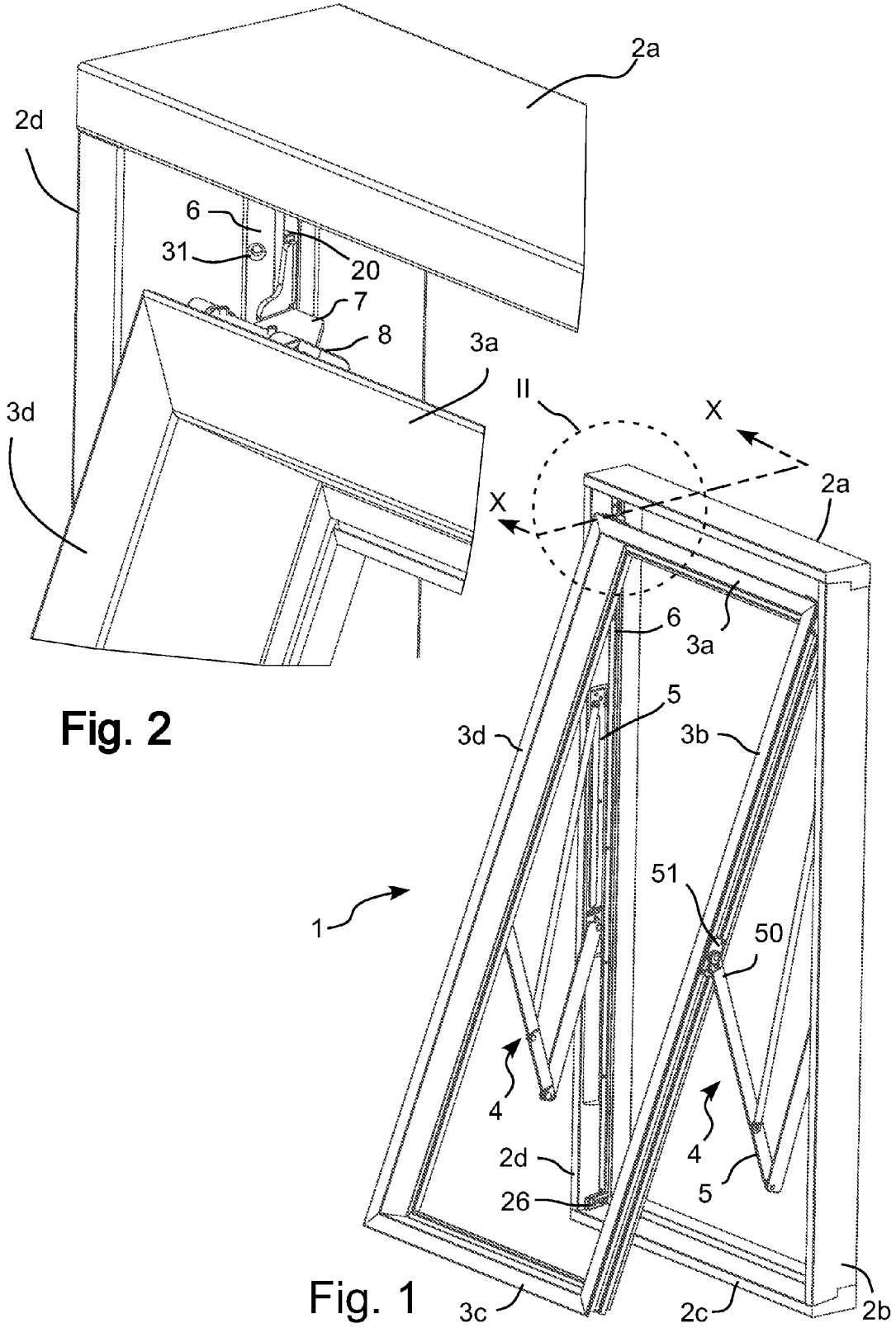


Fig. 2

Fig. 1

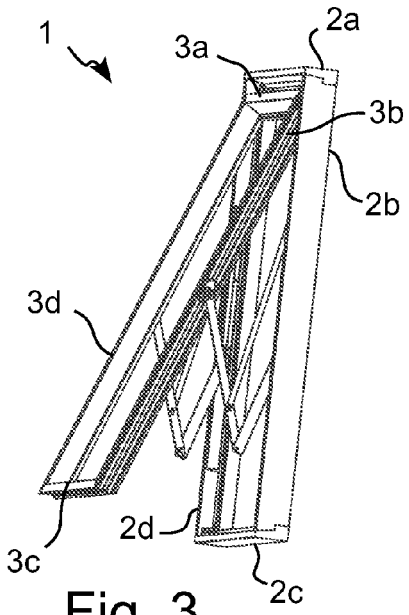


Fig. 3

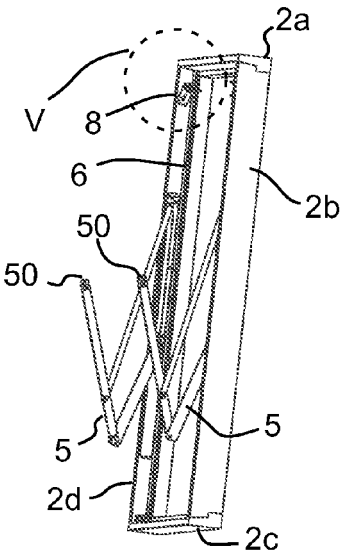


Fig. 4

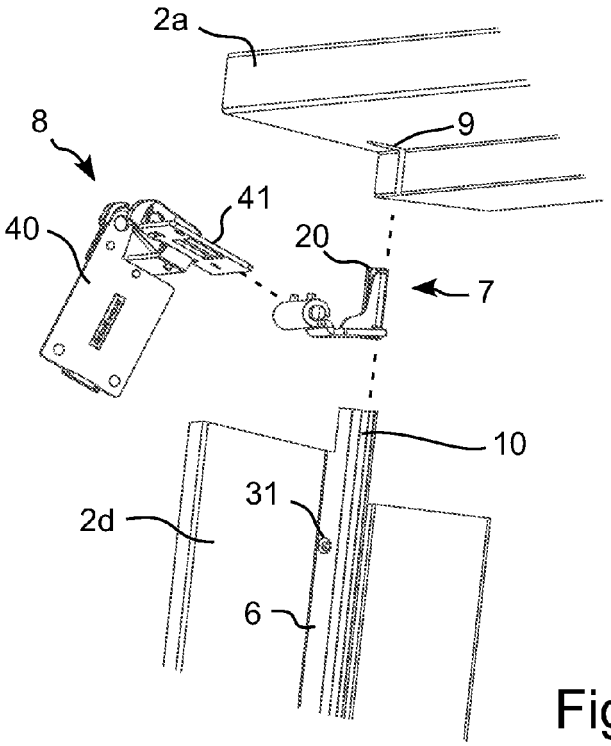


Fig. 5

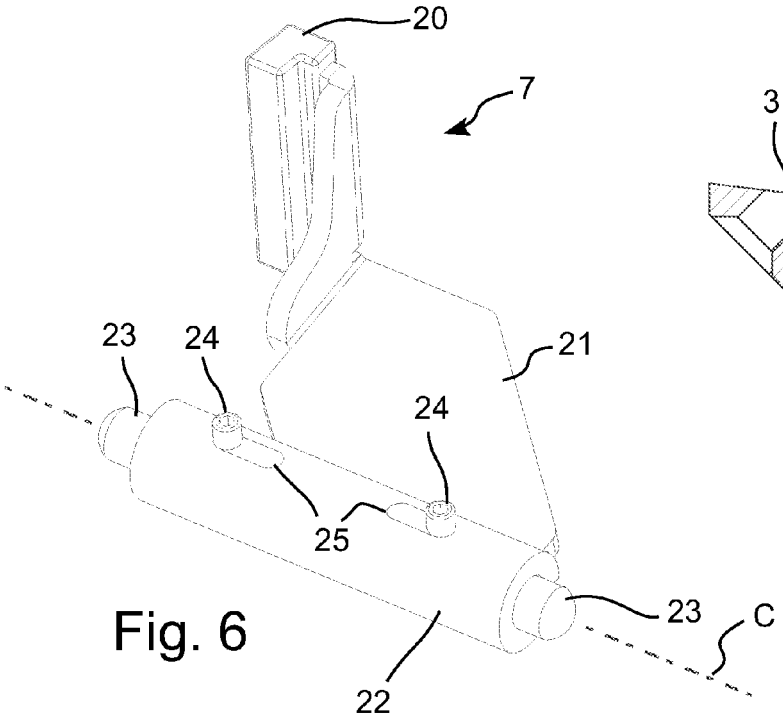


Fig. 6

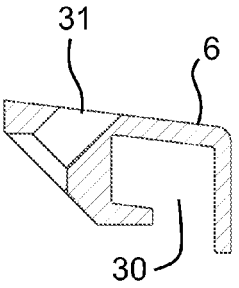


Fig. 7

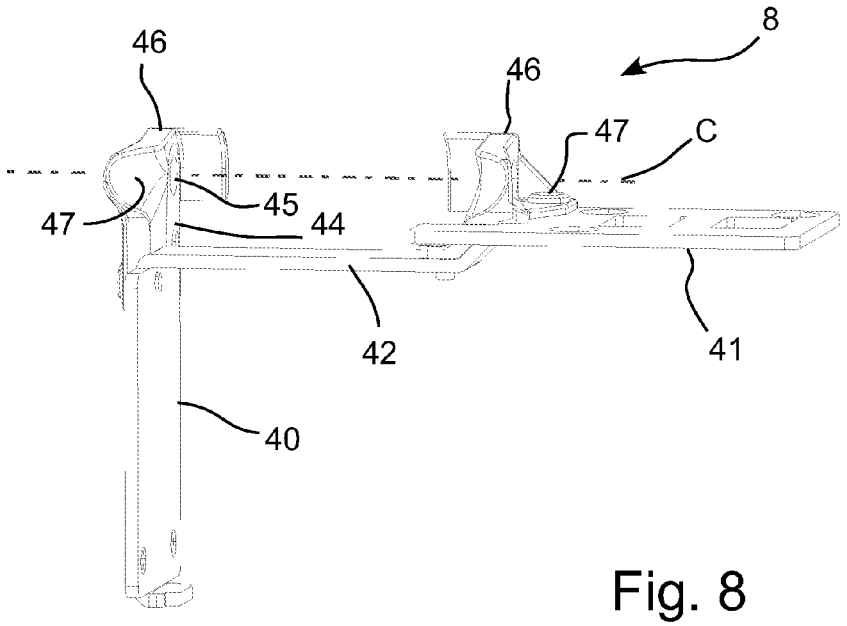
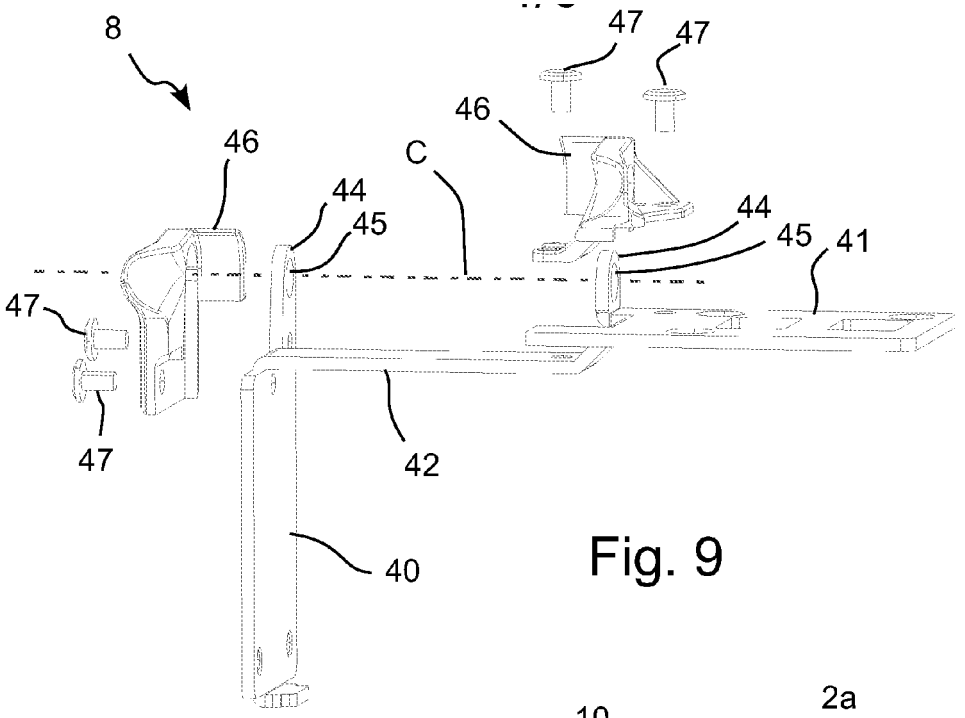


Fig. 8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47
46
C
46
44
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44
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41
47
47
42
40

Fig. 9

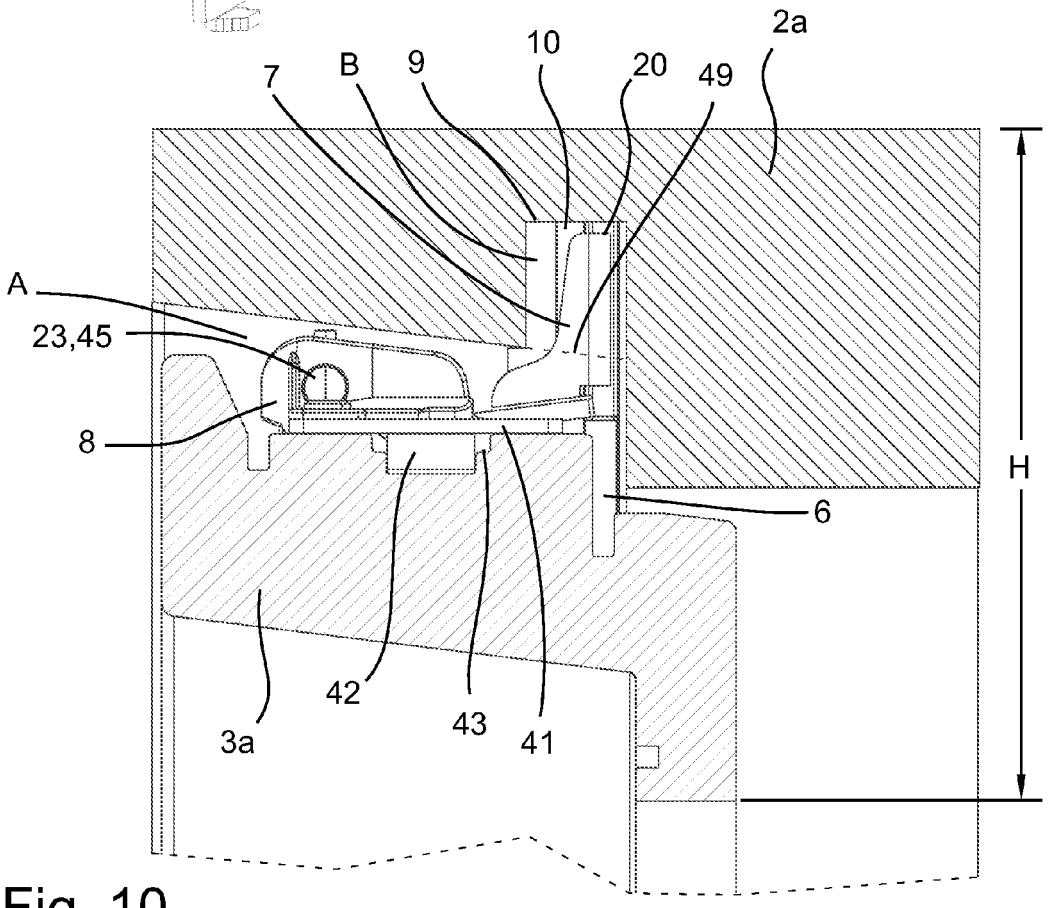
2a
10
7
B
9
20
49
A
23,45
8
H
6
42
43
41
3a

Fig. 10

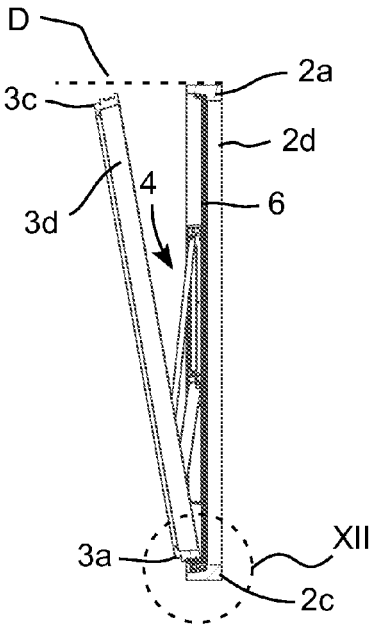

Fig. 11

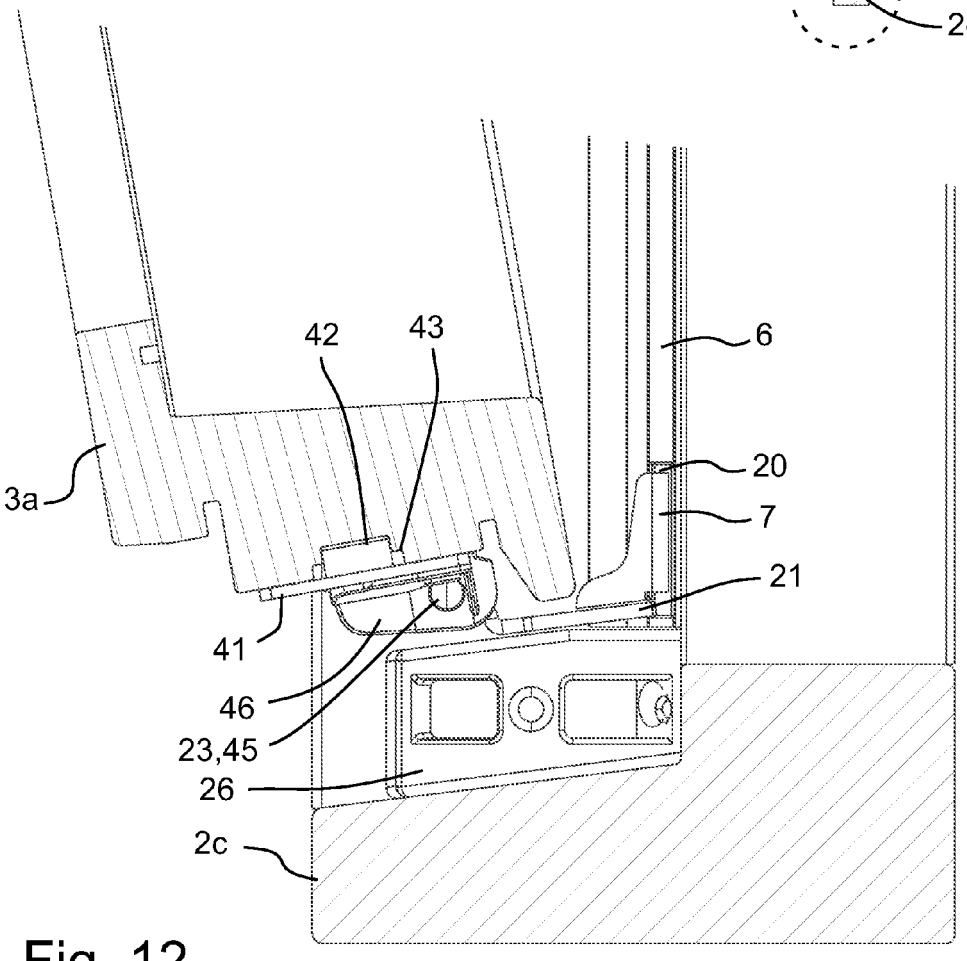

Fig. 12

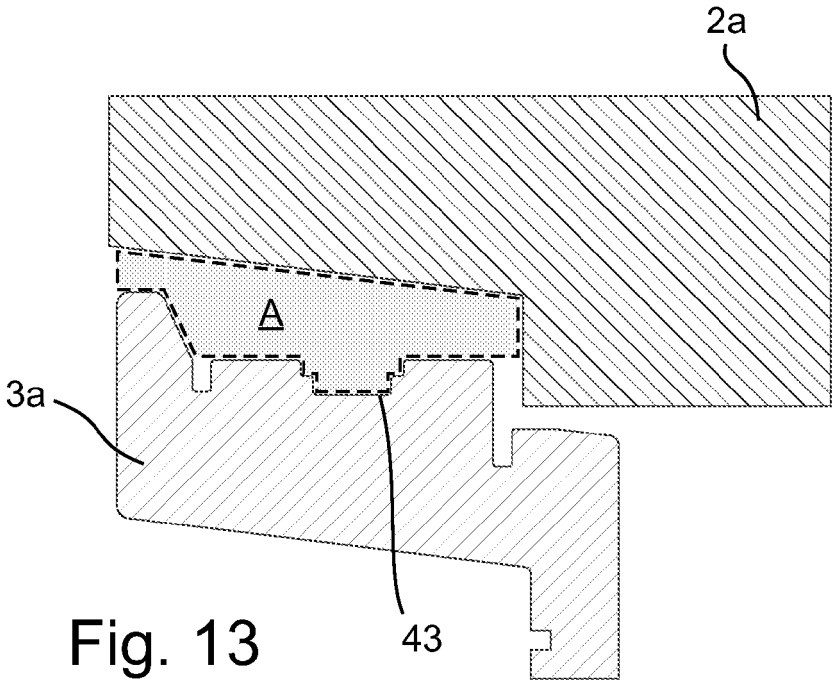

Fig. 13

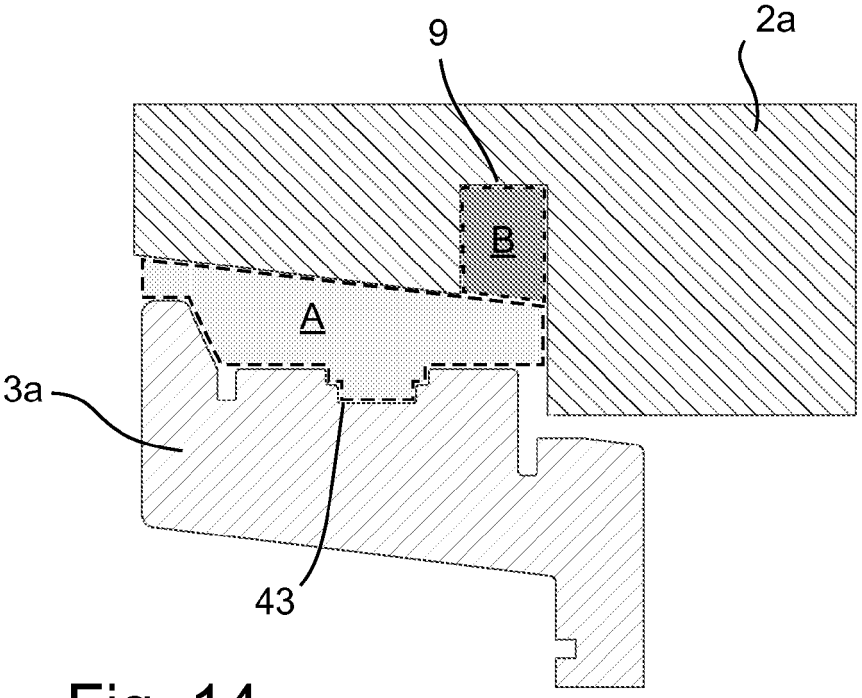

Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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