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(54) **A window and a screening arrangement comprising a screening device and improved engagement means, and a method for operating the screening arrangement**

(57) The screening arrangement in the form of a screening device (1) comprises a top element (2), side rails (3, 4) and a screening body (5). The screening body is adapted to be rolled up on and unrolled from the top element. Operation of the screening device is carried out by turning the sash to a position, in which the bottom member of the sash is close to the top member of the frame, and in which engagement means of the sash engage with engagement means of the screening device.

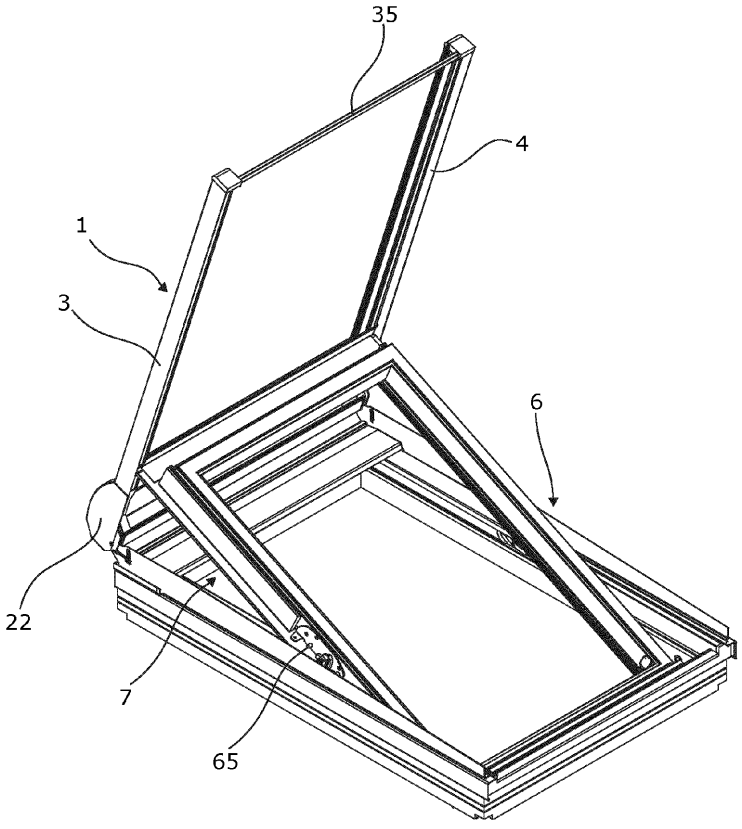

Fig. 7

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Description

[0001] The present invention relates to a window comprising a frame and a sash, each having a top member, a bottom member and two side members, said sash being pivotally connected to the frame substantially at a centre axis, and a screening arrangement including a screening device with a top element mounted at the top member of the frame, two side rails, and a screening body, said screening body being adapted to be brought from a non-screening to a screening position from the top element, and at least one set of engagement means to provide operation of the screening arrangement, said set of engagement means including a first engagement means connected to the screening arrangement and a second engagement means. The invention furthermore relates to a screening arrangement, and to a method for operating a screening arrangement.

[0002] Such screening arrangements including screening devices in the form of roller shutters are traditionally used for screening an aperture of a building structure, most often the light-admitting aperture of windows, but also of doors and other building openings. The roller shutters are either installed to extend substantially vertically in a building façade, or in an obliquely positioned roof window installed in an inclined roof surface, or as a horizontally extending cover for openings in a horizontal surface. When not screening the aperture, the screening body is normally rolled up on a roller bar accommodated in the top element of the roller shutter. The rolling up of the screening body may be effected either by a spring bias in the roller bar or by a drive motor. The unrolling of vertically situated roller shutters is normally effected in that the screening body moves by means of the gravity in the direction of the bottom of the aperture during simultaneous successive unrolling of the slats from the roller bar, and in roller shutters installed in for instance roof windows in an inclined roof, the unrolling normally takes place by means of drive devices.

[0003] Manual unrolling and rolling-up of the screening body in roller shutters has been treated extensively in the prior art, and most solutions are often quite complex and require a rather extensive cord arrangement which may be a considerable drawback due to the limited place on the site of incorporation which is the case with e.g. roller shutters and other screening devices used in connection with roof windows. Furthermore, the positioning of the drive mechanism and its operating device is not always compatible with a need for a compact design of the roller shutter, and may furthermore require a particular design of the screening body and other parts.

[0004] Several suggestions to solve this problem have been made, including examples known from DE 20 2007 011 166 U1, EP 0 145 628, EP 0 317 461 and DE 40 00 908. Other examples include WO 98/19038 and WO 2009/143853 which provide well-functioning driving devices but which are still relatively complex.

[0005] With this background it is an object to provide a window with a screening device having a simplified structure and which is more easily operated as compared to prior art screening devices.

[0006] In a first aspect, this and further objects are met by a window of the kind mentioned in the introduction, which is furthermore **characterized in that** said second engagement means is provided at the bottom member of the sash, and that operation of the screening body between the non-screening and the screening position is carried out by pivoting the sash to enable engagement of the second engagement means with the first engagement means.

[0007] In this manner, a new approach has been taken to designing and operating of the screening device. By providing the second engagement means at the bottom member of the sash so that the second engagement means moves with sash, a very straightforward operation of the screening device has been made possible, as operation is simply carried out by pivoting the sash in a normal opening movement through an angle bringing the bottom sash member to a position at or near the top frame member to enable engagement of the second engagement means with the first engagement means as the sash bottom member is located at or near the frame top member and hence the top element of the screening device. Following the mutual engagement, the sash is pivoted back in the closing direction, thus bringing the screening body from a non-screening to a screening position. Hence, when the screening body is in a screening position either fully or partly screening an opening of the window, the first engagement means and the second engagement means are coupled so that the sash may be used as an operating means for operating the screening body of the screening arrangement. This is generally achieved by positioning the second engagement means on the lower portion of the sash where the bottom member is positioned, e.g. on the bottom member of the sash or on a side member of the sash.

[0008] Depending on the position of the centre axis of the frame around which the sash with the second engagement means rotates, the position of the first engagement means on the screening device is adjusted, so that when the sash with the second engagement means is pivoted the desired engagement between the first and second engagement means may be achieved.

[0009] The engagement and disengagement may be carried out manually or automatically.

[0010] In a presently preferred embodiment, the engagement of the second engagement means with the first engagement means is adapted to be carried out automatically. By "automatic" in the present context is to be understood that the engagement occurs as a result of the movement of the sash relative to the frame, i.e. coupling of the first and second engagement means is established at the final stage of pivoting the sash in which the sash bottom member is brought to a position at or near with the frame top member without a user operating the set of engagement means. The sash bottom member

and frame top member should be moved into such into close proximity that the first engagement means may engage the second engagement means.

[0011] In an embodiment, in which the engagement is carried out manually, the sash is operated to a position where the bottom member of the sash is located at or near the frame top member and hence the top element of the screening device, and the set of engagement means is manually engaged by the user of the window. When the engagement is carried out manually the user of the window must manually engage the engagement means e.g. by manually engaging the engagement means or by unfixing the screening body from the top element so that it may be moved to the screening position.

[0012] In a further presently preferred embodiment, the disengagement of the second engagement means from the first engagement means is adapted to be carried out automatically. As for the term "automatic" in the context of disengagement, it is to be understood that the disengagement occurs as a result of the movement of the sash relative to the frame, i.e. decoupling of the first and second engagement means is established at the final stage of pivoting the sash in which the sash bottom member is brought to a position at or near with the frame top member without a user operating the set of engagement means.

[0013] In general, the term "automatic" should in the present context also be interpreted as encompassing any operations not requiring the direct intervention of a user to occur. Other such automatic or semi-automatic operations include embodiments, in which for instance the sash is moved further in the pivoting movement relative to the frame during disengagement than during engagement, and the possibility of manual synchronization of the set of engagement means.

[0014] When the disengagement is carried out manually the user of the window must manually disengage the engagement means e.g. by manually disengaging the engagement means or by fixing the screening body to the top element.

[0015] In a combination of the presently preferred embodiments, i.e. when the engagement and the disengagement are carried out automatically, the sash is operated to a position where the bottom member of the sash is located at or near the frame top member and hence the top element of the screening device. If the sash returns to this position with the screening body from a screening position, the screening body is returned to the non-screening position in the top element and the set of engagement means is configured to disengage when the screening body has reached the non-screening position. If the screening body is in the non-screening position and the sash is moved to the position where the bottom member of the sash is located at or near the frame top member and hence the top element of the screening device, the set of engagement means is configured to engage so that when the sash is returned to a closed position the screening body is brought from the non-screening position to the screening position.

[0016] Embodiments combining automatic or manual engagement and automatic or manual engagement is conceivable as well.

[0017] In a preferred embodiment the first engagement means comprises at least one hook and a locking and release mechanism, and the second engagement means comprises at least one block including a hook portion and an inclined portion. This allows for a very stable engagement between the first and second engagement means and thereby a stable operation of the screening body between the screening position and the non-screening position and vice versa. Moreover, this configuration of the first and second engagement means allows an automatic engagement and disengagement of said first and second engagement means due to the locking and release mechanism and the inclined portion. When engaged the hook portions of the first and second engagement means are connected so that the screening body may be pushed to or pulled from the top element.

[0018] In a further development of this embodiment that provides for an even more stable operation, the first engagement means comprises a longitudinally extending profile and an end piece at each end of the profile, one hook being connected to a respective end piece.

[0019] In a further development of this embodiment, the second engagement means comprises a longitudinally extending bar and a mounting fitting at each end of the bar, one block being connected to a respective mounting fitting, preferably via a shaft portion. This mounting fitting allows for a stable connection between the second engagement means and the bottom member of the sash.

[0020] In an even further developed embodiment, the block is guided in one of said side rails. This ensures that when the bottom member of the sash is moved to an open position wherein it is located at or near the frame top member and hence the top element of the screening device, the block is guided to a position allowing the second engagement means to engage with the first engagement means.

[0021] In a further embodiment that allows for more stable movement of the block and thereby a more stable operation of the screening body between the screening and the non-screening position, the side rail comprises a set of guide profiles, and wherein the block is connected to the mounting fitting via a shaft portion, the shaft portion being guided between the guide profiles.

[0022] In an alternative embodiment the first engagement means comprises at least one shaft portion and the second engagement means comprises at least one block including at least one hook and a locking and release mechanism.

[0023] In a further practically simple embodiment the first engagement means comprises at least one leaf spring adapted to engage with the bottom member of the sash. This allows for automatic engagement and manual disengagement of the first and second engagement

means.

[0024] In a further practically simple embodiment, which also is preferred for automatic engagement and manual or automatic disengagement, at least one of the first engagement means and second engagement means comprises a magnet.

[0025] In a second aspect, a screening arrangement is provided for use in such a window, the screening arrangement comprising a screening device with a top element adapted to be mounted at the top member of the frame, two side rails, and a screening body, said screening body being adapted to be rolled up on and unrolled from the top element, the top element of the screening device is adapted to be mounted at the top member of the frame, and at least one set of engagement means to provide operation of the screening device, said set of engagement means include a first engagement means connected to the screening device and a second engagement means, the screening arrangement being **characterized in that** said second engagement means is adapted to be provided at the bottom member of the sash, and that, in a condition of use, operation of the screening body between the non-screening and the screening position is carried out by pivoting the sash to a position in which the bottom member of the sash is located at or near the top member of the frame to enable engagement of the second engagement means with the first engagement means.

[0026] In a third aspect is provided a method for operating a screening arrangement of a window, which comprises a frame and a sash, each with a top member, a bottom member and two side members, of which the sash is pivotally to the frame substantially at a centre axis, said method comprising the steps of: providing a screening device with a top element, two side rails, a screening body, and first engagement means, said screening body being adapted to be brought from a non-screening to a screening position, mounting the top element of the screening device at the top member of the frame, providing second engagement means at the bottom member of the sash, pivoting the sash in an opening direction about substantially the centre axis to bring the bottom member to a position at or near the top element of the screening device at top member of the frame, engaging the second engagement means with the first engagement means, and pivoting the sash in a closing direction thereby bringing the screening body from the top element.

[0027] The advantages of the second and third aspects of the invention and further developed embodiments also applicable to the second and third aspects of the invention have been explained in the above description, and reference is made thereto.

[0028] In further aspects, a window is provided comprising a frame and a sash, each having a top member, a bottom member and two side members, said sash being pivotally connected to the frame substantially at a centre axis, and a screening arrangement including a screening device with a top element mounted at the top member of the frame, and a screening body, said screening body being adapted to be brought from a non-screening to a screening position from the top element, the top element of the screening device being mounted at the top member of the frame, and at least one set of engagement means to provide operation of the screening arrangement, said set of engagement means including a first engagement means connected to the screening arrangement and a second engagement means. This further aspect is **characterized in that** said second engagement means is provided at the bottom member of the sash, and that operation of the screening body between the non-screening and the screening position is carried out by pivoting the sash to enable engagement of the second engagement means with the first engagement means, and the engagement of the second engagement means with the first engagement means is adapted to be carried out automatically.

[0029] In preferred embodiment disengagement of the second engagement means from the first engagement means is adapted to be carried out automatically.

[0030] In further embodiment disengagement of the second engagement means from the first engagement means is adapted to be carried out manually.

[0031] In a further embodiment the first engagement means comprises a leaf spring adapted to engage with the bottom member of the sash.

[0032] In a further embodiment the first and second engagement means comprise magnets.

[0033] Further to that aspect a screening arrangement for use in the proceeding aspect is provided comprising a screening device with a top element adapted to be mounted at the top member of the frame, and a screening body, said screening body being adapted to be brought from a non-screening to a screening position from the top element, the top element of the screening device is adapted to be mounted at the top member of the frame, and a set of engagement means to provide operation of the screening device, said set of engagement means including a first engagement means connected to the screening device and a second engagement means. This further aspect is **characterized in that** second engagement means is adapted to be provided at the bottom member of the sash, and that, in a condition of use, operation of the screening body between the non-screening and the screening position is carried out by pivoting the sash to enable engagement of the second engagement means with the first engagement means, and the engagement of the second engagement means with the first engagement means is adapted to be carried out automatically.

[0034] Even further to the two preceding aspects a method for operating a screening arrangement of a window is provided, which window comprises a frame and a sash, each with a top member, a bottom member and two side members, of which the sash is pivotally to the frame substantially at a centre axis, said method com-

prising the steps of: providing a screening device with a top element, a screening body, and first engagement means, said screening body being adapted to be brought from a non-screening to a screening position, mounting the top element of the screening device at the top member of the frame, providing second engagement means at the bottom member of the sash, pivoting the sash in an opening direction about substantially the centre axis to bring the bottom member to a position at or near the top element of the screening device at top member of the frame, engaging the second engagement means with the first engagement means, and pivoting the sash in a closing direction thereby bringing the screening body from the top element.

[0035] Further details are described, and further advantages stated, in the description of particular embodiments of the invention.

[0036] In the following the invention will be described in further detail by means of examples of embodiments with reference to the schematic drawings, in which

Fig. 1 is an isometric view of a window comprising a screening arrangement including a screening device and engagement means in an embodiment of the invention and in a closed position of the window;
Fig. 2 is a partial isometric view, on a larger scale, of the window of Fig. 1;
Fig. 3a shows a view corresponding to Fig. 2, with parts of the screening device removed;
Fig. 3b shows a view corresponding substantially to Fig. 2, with parts of the screening device removed;
Fig. 4 shows, on a still larger scale, a partial view of the window shown in Fig. 1, with parts of the screening device removed;
Fig. 5 is another partial view of the window shown in Fig. 2;
Fig. 6 is an isometric view of a screening arrangement in an embodiment of the invention;
Fig. 7 is an isometric view of a window comprising a screening arrangement including a screening device and engagement means in an embodiment of the invention and in an open position of the window, in which engagement of the engagement means is enabled and the screening device is activated;
Fig. 8 is a partial perspective view, on a larger scale, of the window shown in Fig. 7, with parts of the screening device removed;
Fig. 9 shows, on a still larger scale, a partial perspective view of the window shown in Fig. 7, with parts of the screening device removed;
Fig. 10 is an isometric view of a window comprising a screening arrangement including a screening device and engagement means in an embodiment of the invention and in a partially open position of the window, in which engagement of the engagement means is enabled and the screening device is activated;
Fig. 11 is a partial perspective view, on a larger scale, of the window shown in Fig. 10, with parts of the screening device removed;
Figs 12a and 12b are partial perspective views of two different positions of the engagement means of a screening arrangement an embodiment of the invention;
Figs 13a to 13g are views showing the positions of the first and second sets of engagement means in different situations;
Figs 14a and 14b are schematic partial perspective views showing a detail of the window and the screening arrangement in another embodiment of the invention;
Fig. 15 is a schematic partial perspective view showing a detail of the window and the screening arrangement in a further embodiment of the invention;
Figs 16a and 16b are perspective views of alternative embodiments of a screening arrangement according to the invention;
Fig. 17 is a schematic side view showing the window and the screening arrangement in a still further embodiment of the invention;
Figs 18 to 29 show views of a still further alternative embodiment; and
Figs 30a to 30c show schematic overviews of details of a window with a screening arrangement in an embodiment of the invention with the screening body in a correct and an incorrect position with accompanying manual synchronization, respectively.

[0037] Figs 1 to 13 show a first embodiment of a window comprising a screening arrangement comprising a screening device, which in the embodiment shown is a roller shutter generally designated 1. The roller shutter 1 has a top element 2 and two side rails 3 and 4 extending at right angles to the top element 2. A screening body 5 includes a plurality of slats 51 in the embodiment shown. Screening bodies having different configurations, such as a cloth, are conceivable.

[0038] The roller shutter 1 is mounted on a window, for instance a roof window adapted for installation in an inclined roof. The window comprises in a manner known per se a window frame 6 and a window sash 7 encasing a pane (not shown). The frame 6 and the sash 7 each has a top member 62, 72, a bottom member 61, 71 and two side members 63, 64, 73, 74, respectively. The window sash 7 is openable relative to the window frame 6, viz. hinge connected to the window frame 6 by means of a set of pivot hinges 65 positioned close to a centre axis of the window, i.e. at substantially a position approximately halfway between the top and bottom members of the sash and the frame, to allow the window sash 7 to pivot relative to the window frame 6. This makes it possible to operate the sash to a position where the bottom member of the sash is located at or near the frame top member and hence the top element of the screening device.

[0039] The aperture to be screened is defined by the

area limited by the top element 2, the side rails 3, 4, and the bottom of the window. This aperture thus corresponds in substance to the pane (not shown). In order to attain the desired screening, the screening body 5 is adapted to be moved from a non-screening position to a screening position, in which it covers the pane and other parts of the window to a larger or lesser degree. Each slat 51 extends in a longitudinal direction between two end edges and has first and second side edges parallel to the longitudinal direction, i.e. in parallel with the top element 2.

[0040] In the embodiment shown, the screening body 5 is adapted to be wound up in and rolled out from the top element 2 in a direction perpendicular to said longitudinal direction to a desired screening position. Other manners of bringing the screening body from a non-screening to a screening position and vice versa are of course conceivable, including un-stacking and stacking, unfolding and folding the screening body, such as a screening body with a plurality of slats connected along the longitudinal direction or at their end portions.

[0041] In the position shown in Fig. 1, the screening body 5 is entirely accommodated in the top element 2 of the roller shutter 1.

[0042] The top element 2 is positioned at the top of the window and comprises in the embodiment shown a top cover 21 and two outer end covers, of which the left-hand end cover 22 is visible in Fig. 1. As will be described in further detail below, the top cover 21 and outer end covers 22 serve to hide and protect the inner parts of the roller shutter 1. Terms such as "left-hand" and "right-hand" refer to the orientation shown in for instance Fig. 1 and are utilized for reasons of convenience only.

[0043] The side rails 3, 4 each has a structure extending substantially throughout the height of the window and are rigidly connected to the top element 2. At the opposite end, each side rail 3, 4 has a bottom cover 30, 40 at the bottom of the window. The side rails 3, 4 are connected to each other at the bottom part of the roller shutter 1, namely by a cross bar 35 connected to the bottom cover 40 of side rail 4 and its counterpart bottom cover 30 of side rail 3. The cross bar 35 may for instance be connected to each bottom cover 30, 40 by means of protrusions extending from the bottom covers 30, 40 into a track of the cross bar 35, which track extends in the longitudinal direction of the cross bar 35. The cross bar 35 provides a rectangular shape of the screening device and contributes to the strength and as well as resistance of the screening device. The position of the cross bar 35 between side rails 3, 4 is particularly clear from Fig. 7.

[0044] In the following, a particularly advantageous embodiment of the engagement means to provide operation of the roller shutter will be described in further detail. In this embodiment the set of engagement means include a first engagement means 8 connected to the roller shutter 1 and a second engagement means 9 provided on the bottom member 71 of the sash. Operation of the roller shutter 1 to be carried out by pivoting the sash to enable engagement of the second engagement means 9 with the first engagement means 8 will also be described further on.

[0045] The engagement of the second engagement means 9 with the first engagement means 8 may either be carried out automatically or manually, just as disengagement of the second engagement means 9 from the first engagement means 8 may be carried out automatically or manually.

[0046] By "automatic" in the present context is to be understood that the engagement occurs as a result of the movement of the sash 7 relative to the frame 6, i.e. coupling of the first and second engagement means 8, 9 is established at the final stage of pivoting the sash 7 in which the sash 7 bottom member 61, 71 is brought to a position at or near with the frame top member 62, 72 without a user operating the set of engagement means. The sash bottom member 61, 71 and frame top member 62, 72 should be moved into such close proximity that the first engagement means 8 may engage the second engagement means 9. In general, the term "automatic" should in the present context also be interpreted as encompassing any operations not requiring the direct intervention of a user to occur. Other such automatic semi-automatic operations includes embodiments, in which for instance the sash 7 is moved further in the pivoting movement relative to the frame 6 during disengagement than during engagement, and the possibility of manual synchronization of the set of engagement means.

[0047] In the preferred embodiment, the first engagement means 8 comprises at least one hook 85 and a locking and release mechanism 86. The second engagement means 9 comprises at least one block 95 including a hook portion 96 and an inclined portion 97.

[0048] In order to provide a mechanically stable and manageable structure, the first engagement means 8 comprises a longitudinally extending profile 81, for instance formed as an end slat of the screening body 5 and an end piece 83 at each end of the profile 81, one hook 85 being connected to a respective end piece 83 in the embodiment shown, cf. in particular Fig. 5.

[0049] Referring in particular to Figs 2-4, the second engagement means 9 comprises a set of blocks 95 connected to a mounting fitting 93, 94. In the embodiment shown, each block 95 is connected to mounting fittings 93, 94 via a shaft portion 98 so that the block 95 is rotatably connected to the respective mounting fitting 93, 94. The mounting fittings 93, 94 are in turn connected to the sash 7 at the bottom member 71 thereof, possibly also to the lower portions of the sash side members 73, 74, respectively. Furthermore, the second engagement means 9 comprises a cover 92, which has been removed for the sake of clarity in Fig. 3b.

[0050] In the embodiment shown, each block 95 is guided in a track formed in the respective side rail 3, 4. In this manner, the blocks 95 slide in the side rails 3, 4 when the sash is moved between a closed position and an open position. The engagement means are thus at all

times protected by the respective side rail. To this end, each side rail 3, 4 comprises a set of guide profiles 31, 32 as shown in connection with the left-hand side rail 3. As each block 95 in the embodiment shown is rotatably connected to the respective mounting fitting 93, 94 via the shaft portion 98, the shaft portion 98 is guided between the guide profiles 31, 32. The track formed in the side rails, here side rail 3, is shown in the perspective view of Fig. 3b, in which bottom cover 30 has been removed. When the sash 7 is moved to an open position and the sash 7 is moved towards the top member 62, 72 of the frame, the shaft portion 98 extends between the side rails 3, 4 along which each block 95 is guided. In the embodiment shown, the blocks 95 in each side rail 3, 4 are positioned so that their respective hook portions 96 face each other.

[0051] Operation of the roller shutter 1 is carried out by bringing the sash 7 from the position shown in Fig. 1 to the position shown in Fig. 7, in which engagement between the first engagement means 8 and the second engagement means 9 is enabled. The engagement itself will be described with particular reference to Figs 9 and 12a-12b, and Figs 13a-13g.

[0052] Following the engagement, the screening body 5 is unrolled from the top element 2 following the pivoting movement of the sash 7 to attain the desired screening position, for instance to the position shown in Fig. 10. Generally, the screening body 5 is pulled from the top element 2 towards a screening position by the sash 7. Likewise, the sash 7 may push the screening body 5 towards the storage position, which may be facilitated by e.g. a spring-bias acting on the screening body 5. In order to facilitate operation of the window and the screening device, the screening body 5 may, when comprising a plurality of slats 51, be configured with a light aperture allowing a small amount of light to enter between the slats 51 when the screening body 5 is positioned in the screening position. Preferably, the light aperture is provided between the slats when the screening body is moved to towards the screening position, and when the slats are moved slightly towards the storage position by movement of the sash towards an open position, the light aperture between the slats is eliminated.

[0053] Referring now to the detailed Figs 9 and 12a-12b and 13a-13g, it is initially noted that the principle underlying the function of the first engagement means 8 corresponds to that of for instance a ball point pen. Activation of the locking mechanism is carried out by pushing a button-like structure to bring a ball point-like structure from one position to another and the locking mechanism may be disengaged to allow the ball point to retract by pushing a button or lever mounted externally on the pen.

[0054] In a corresponding manner, the hook 85 of the first engagement means 8 is able to assume two stable positions, namely a first position in which the hook 85 is held in a position in which it protrudes from the end piece 83 to allow engagement between the first and second engagement means 8, 9, and a second position in which the hook 85 is held close to the end piece 83 and the first and second engagement means 8, 9 are not engageable. Furthermore, the hook 85 may be biased in a direction away from the profile 81 and the end piece 83.

[0055] In the first position of the hook 85, engagement with the hook portion 96 of the second engagement means 9 is ensured. The engagement entails that the locking and release mechanism 86 assumes its locked position. The screening body 5 will thus follow the movement of the sash 7 during pivoting to assume a screening position, for instance the one shown in Fig. 10 with details shown in Fig. 11. When pivoting the sash 7 back again towards an open position, the bottom member 71 of the sash 7 is again brought to a position near the top member 62 of the sash and hence the top element 2 of the roller shutter 1. Disengagement of the mutual engagement between the first and second sets of engagement means 8, 9 now takes place in the following manner: At the end of the movement of the roller shutter 1, for instance when the entire screening body 5 has been rolled up on the roller bar, the first engagement means 8 has reached the end of its travel. The position of the hook 85 is now fixed in the longitudinal direction of the side of the window. The sash 7 may, however, be pivoted slightly further, and the inclined portion 96 of the block 95 now pushes the hook 85 to the right, in the direction of the profile 81, thus releasing the locking and release mechanism 86 and allows the hook 85 to return to its second position close to the end piece 83. This position corresponds to the activated position of the ball point pen analogy. Modifications of this embodiment are conceivable and are apparent to the person skilled in the art.

[0056] Referring now to the exploded view of Fig. 13a, the parts which in the mounted position are located wholly or partially in the end piece 83 are shown. The locking and release mechanism 86 to bring the hook 85 from the first to the second position and vice versa thus comprises a ball point element 87, a ratchet element 88, a spring holder 82 and a spring 84, and a head element 89. In the end piece 83, a spring 80 is furthermore accommodated to provide a spring bias to the hook 85. The hook 85 is pivotally connected to the end piece 83 at a pivot point 851 at connection point 831 of the end piece 83. The end piece 83 furthermore comprises a bearing surface 832 for receiving the ball point element 87 in slidable contact. A hollow portion 833 of the end piece 83 serves partly as an engagement section to the profile 81, partly for receiving head element 89.

[0057] The ball point element 87 comprises an engagement portion 871 facing the hook 85, an opposite guide portion 872 to be accommodated in the ratchet element 88, a number of circumferential cams 873 and a number of protrusions 874, here four, for cooperation with corresponding tracks on the inner side of the end piece 83. The ratchet element 88 comprises a number of ribs, here four, with inclined end portions 881 to engage with the cams 873 of the ball point element 87. At the opposite

end, the ratchet element 88 has an abutment face 882 facing the spring holder 82. In the assembled state, the spring 84 is compressed and accommodated in the head element 89. The head element 89 is furthermore provided with two tongues 891 received in corresponding apertures 834 in the end piece 83 such that the head element 89 is held stationary with respect to the hollow portion 833 of the end piece 83.

[0058] In the assembled state, the parts of the locking and release mechanism 86 are movable with respect to each other to allow the hook 85 to assume the first and second positions, respectively. The ball point element 87 is slidably guided in the end piece 83 by means of the bearing surface 832 and the tracks (not shown) inside the end piece 83 for receiving the protrusions 874. When the ball point element 87 is moved in the direction towards the head element 89, the cams 873 interact with the inclined end portions 881 of the ratchet element 88 which in turn effects the spring holder 82 via abutment face 882. The ratchet element 88 is moved against the spring bias from the spring 84 accommodated on the spring holder 82 and a rotating motion is obtained, which effects a shift in the engagement between the cams 873 and the inclined end portions 881, and in turn, this moves the ball point element 87 from a position in which the ball point element 87 is retracted, i.e. corresponding to the first position of the hook 85, to a protruding position of the ball point element 87, i.e. the second position of the hook 85, and vice versa.

[0059] The positions of the parts of the locking and release mechanism 86 are best understood in reference to Figs 13b-13d in conjunction with the respective Figs 13e-13g.

[0060] In Fig. 13b, the hook 85 is in its second position close to the end piece 83, and no engagement with the block 95 is possible. The ball point element 87 is located close to the ratchet element 88 as shown in Fig. 13e. This situation has been reached when manually synchronizing the engagement means, in the shown embodiment by handling a pin in the end piece 83 corresponding to the pin 5837 of the embodiment shown in Figs 18 to 29. This may be particularly relevant if engagement means are provided at either side of the window. In this case, it may occur that the engagement means 8 at one side is ready for engagement, and the corresponding engagement means at the other side is not. Manual synchronization will then be necessary to bring the engagement means to the same positions. In Fig. 13c, the hook 85 is ready for engagement and will engage with the block 95 if the window sash 7 is pivoted further. Manual synchronization is shown in further detail in Figs 30a to 30c, showing a window with a screening arrangement in an embodiment of the invention with the screening body in a correct and an incorrect position with accompanying manual synchronization, respectively.

[0061] The activation of the locking and release mechanism 86 to pivot the hook 95 about its pivot point 851 may take place by pushing the ball point element 87 in the direction of the head element 89 by pressing the hook 85 itself manually, or semi-automatically, by the interaction between the inclined surface 96 of the block 95 when moving the block 95 past the end position of the profile 81 and the end piece 83 as described in the above.

[0062] Alternatively, in embodiments where the end piece 83 at each end of the profile 81 comprises first engagement means e.g. a hook 85, the spring biased hook 85 may obtain a first position as shown in Fig. 12a, where the first engagement means and the second engagement means are coupled together, and a second position as shown in Fig. 12b where the first engagement means and the second engagement means are decoupled. In such embodiments it is preferred that the hook 85 pivotally connected to the end piece 83 and further to the profile 81 by means of a pivot point 851 comprises a further portion 852 extending inside the end piece 83, preferably extending from the pivot point 851. From an end 853 of the further portion 852 a pin (not shown in this embodiment) extends into a part circular groove in the rear side of the end piece 83, i.e. the opposite side of that shown in Figs. 12a and 12b. This allows the user of the screening device to manipulate the position of the hook 85 by operating the pin extending in the part circular groove. This will be described in further detail below with particular reference to Figs 18 to 30.

[0063] Following activation, the ball point element 87 is forced outwards away from the head element 89, and the hook 85 is pivoted about its pivot point 851 to attain the position shown in Figs 13c and 13d. From the position shown in Fig. 13d, the screening device may be operated in pivoting the sash towards its closed position and back again. In case screening is no longer desired, the engagement between the first and second engagement means is released as described in the above to attain the position shown in Fig. 13b allowing the window sash to pivot without simultaneously unrolling the screening body.

[0064] In the further embodiment shown in Figs 14a and 14b elements having the same or analogous function as corresponding elements of the first embodiment shown in Figs 1 to 11 carry the same reference numerals to which 100 has been added. In an embodiment according to Figs 14a and 14b, the first engagement means comprises at least one shaft portion (not shown) and the second engagement means comprises at least one block 195 including in the embodiment shown two hooks 192 and a locking and release mechanism not shown in detail. In Fig. 14, the second engagement means is shown in its open position, i.e. when there is no engagement with the screening body represented by its bottom-most slat or the first engagement means. Following activation of the locking and release mechanism on pushing the button 196, the hooks 192 are free to move to the position shown in Fig. 14b.

[0065] In the alternative embodiment of Fig. 15, in which elements having the same or analogous function as corresponding elements of the first embodiment

shown in Figs 1 to 11 carry the same reference numerals to which 200 has been added, the first engagement means 208 comprises a leaf spring 281 adapted to engage with the bottom member 271 of the sash. The leaf spring 281 may be arranged in such a manner that engagement is carried out automatically. However, disengagement is carried out by lifting the leaf spring 281 slightly, thus releasing the engagement between the sash bottom member 271 and the roller shutter 281.

[0066] In Figs 16a and 16b, two different screening arrangements are shown, which also make use of the first and second engagement means according to the invention and which are thus operated in a substantially corresponding manner, i.e. by operating the screening body by pivoting the sash of the window to a position in which the bottom member of the sash is located at or near the top member of the frame to enable engagement of the second engagement means with the first engagement means. Elements having the same or analogous function as in the embodiment of Figs 1 to 13 carry the same reference numerals to which 400 has been added. Only differences from that embodiment will be described in detail. In these Figures, the screening arrangement comprises a screening device in the form of an awning blind having a top element 402, which in the version shown in Fig. 16a is positioned in the same plane as or below a corresponding top element of the window frame, and which in the version shown in Fig. 16b is located on top of the top element of the window frame. From the top element 402, a screening body 405 in the form of screening cloth or screen is able to be pulled out when activating the screening device. The first engagement means 408 connected to the awning blind may take the form of a bar or rod to engage with second engagement means 409, which for instance may take the form of the blocks shown in the embodiment of Figs 14a and 14b, or a leaf spring as in the embodiment of Fig. 15. Further engagement means are of course conceivable, including magnets. Common to both versions of the awning blind is that this kind of screening device is not provided with side rails. This makes it more difficult to obtain precise alignment of the first and second engagement means with respect to each other. The presence of second engagement means in the form of a bar to cooperate with the first engagement means having a relatively wide receiving opening allows for relatively large deviations in the alignment and still provides for secure engagement. Also in this kind of screening arrangement, the engagement and disengagement may be provided to be automatic, semi-automatic or manual.

[0067] Referring now to the schematic side view of Fig. 17 showing a still further embodiment, in which elements having the same or analogous function as corresponding elements of the first embodiment shown in Figs 1 to 11 carry the same reference numerals to which 300 has been added. In this embodiment, the first and second sets of engagement means comprise magnets 308, 309 positioned at the top element of the roller shutter 301 and the bottom sash member 371, respectively. In this simple embodiment an operating member 350 to provide manual disengagement may be provided at the top element of the screening device 301. In order to facilitate the disengagement of the magnetic attraction, a handle may for instance be provided.

[0068] Other engagement means providing the functionality aimed at are conceivable as well to provide the desired combination of automatic and manual engagement and disengagement, where engagement relates to coupling a first engagement means together with a second engagement means, and disengagement relates to decoupling first engagement means and second engagement means.

[0069] Referring now to Figs 18 to 29, an alternative embodiment of the screening arrangement according to the invention will be described. Elements having the same or analogous function as in the embodiment of Figs 1 to 13 carry the same reference numerals preceded by the number 5. Only differences from that embodiment will be described in detail.

[0070] In this embodiment, the end profile 581 carries a sealing profile 555 to provide light-tightness when the roller shutter screening body is completely rolled out and abuts the cover 592 at the bottom of the sash. The hook 585 is provided with pivot pin 5851 and end 5853 to receive pin 5837 which protrudes through part circular groove 5836 in the back side of end piece 583 (cf. Fig. 20) to allow manual resetting or synchronization of the locking and release mechanism 586. Furthermore, the ratchet element 588 is provided with a guide portion 5883 to engage with the ball point element 587, thus fulfilling the function of guide portion 872 in the embodiment of Figs 1-13.

[0071] The manual synchronization is shown in further detail in Figs 30a to 30c, showing a window with a screening arrangement 501 corresponding to the above embodiment of Figs 18 to 29, with the screening body in a correct and an incorrect position with accompanying manual synchronization, respectively. As shown in Fig. 30a with its enlarged schematic views of the respective ends of the end profile of the screening arrangement 501, the pins 5837 are positioned correctly in the lower portion of groove 5836 in the right-hand and the left-hand sides (denoted by the marking "1" at the side of the groove 5836). Correspondingly, in Fig. 30b, the left-hand side pin 5837 is in its correct position of release (denoted by the marking "2" at the side of the groove 5836), whereas the right-hand side pin 5837 is still in its locking position at the end of the groove 5836. As indicated in Fig. 30c, the right-hand side pin 5837 is moved in the direction indicated by arrow A towards the other end of the groove 5836. A marking "R" accompanied by an arrow may as shown be present at that end of the groove 5836 to indicate the reset or synchronization in a simple and logical manner.

[0072] Other parts of the locking and release mechanism 586 function in substantially the same manner as

has already been described, and the parts of the locking and release mechanism 586 are movable with respect to each other to allow the hook 585 to assume the first and second positions, respectively. When pushing the ball point element 587 in the direction towards the head element 589, the cams 5873 interact with the inclined end portions 5881 of the ratchet element 588 which in turn effect the spring holder 582 via abutment face 5882. The ratchet element 588 is moved against the spring bias from the spring 584 accommodated on the spring holder 582 and a rotating motion is obtained, which effects a shift from a position in which the ball point element 587 is retracted, i.e. corresponding to the first position of the hook 585, to a protruding position of the ball point element 587, i.e. the second position of the hook, and vice versa.

[0073] One further detail of this alternative embodiment is seen in particular in Figs 19-20 and 28, namely that a shoulder portion 5951 on the block 595, at the inclined portion 597, which is adapted to be accommodated in recess 5835 in end piece 583, when the block 595 with its hook portion 596 is moved past the final position of the end piece 583. This provides for a particularly secure engagement between the parts.

[0074] Eventually, the roller shutter according to the invention has been described as being intended to be installed on the window frame of an openable roof window for installation in an inclined roof. However, the invention is applicable also with windows mounted in other positions, for instance on a window for installation in a building façade.

[0075] The invention should not be regarded as being limited to the described embodiments. Several modifications and combinations of the different embodiments will be apparent to the person skilled in the art.

Claims

1. A window comprising:

a frame (6) and a sash (7), each having a top member (62, 72), a bottom member (61, 71) and two side members (63, 64, 73, 74), said sash being pivotally connected to the frame substantially at a centre axis, and

a screening arrangement including a screening device (1) with a top element (2) mounted at the top member (62) of the frame, two side rails (3, 4), and a screening body (5), said screening body being adapted to be brought from a non-screening to a screening position from the top element, , and at least one set of engagement means to provide operation of the screening arrangement, said set of engagement means including a first engagement means (8) connected to the screening arrangement and a second engagement means (9),

characterized in that said second engagement means (9) is provided at the bottom member (71) of the sash, and that operation of the screening body (5) between the non-screening and the screening position is carried out by pivoting the sash to a position in which the bottom member (71) of the sash is located at or near the top member (62) of the frame to enable engagement of the second engagement means (9) with the first engagement means (8).

2. A window according to claim 1, wherein the engagement of the second engagement means (9) with the first engagement means (8) is adapted to be carried out automatically.

3. A window according to claim 1, wherein the engagement of the second engagement means with the first engagement means is adapted to be carried out manually.

4. A window according to claim 1 or 2, wherein disengagement of the second engagement means (9) from the first engagement means (8) is adapted to be carried out automatically.

5. A window according to claim 1 or 2, wherein disengagement of the second engagement means from the first engagement means is adapted to be carried out manually.

6. A window according to claims 2 and 4, wherein the first engagement means (8) comprises at least one hook (85) and a locking and release mechanism (86), and the second engagement means (9) comprises at least one block (95) including a hook portion (96) and an inclined portion (97).

7. A window according to claim 6, wherein the first engagement means (8) comprises a longitudinally extending profile (81) and an end piece (83) at each end of the profile (81), one hook (85) being connected to a respective end piece.

8. A window according to claim 6 or 7, wherein the second engagement means (9) comprises a set of blocks (95) connected to a mounting fitting (93, 94), preferably via a shaft portion (98).

9. A window according to claim 8, wherein the block (95) is guided in one of said side rails (3, 4).

10. A window according to claim 9, wherein the side rails (3, 4) comprises a set of guide profiles (31, 32), and wherein the block (95) is connected to the mounting fitting (93, 94) via a shaft portion (98), the shaft portion (98) being guided between the guide profiles (31, 32).

11. A window according to claims 2 and 4, wherein the first engagement means comprises at least one shaft portion (180) and the second engagement means (190) comprises at least one block (191) including at least one hook (192) and a locking and release mechanism.

12. A window according to claims 2 and 5, wherein the first engagement means (280) comprises at least one leaf spring (281) adapted to engage with the bottom member (71) of the sash.

13. A window according to claim 2 and 4, wherein at least one of the first and second engagement means (380, 390) comprise a magnet.

14. A screening arrangement for use in the window according to any one of the preceding claims, comprising a screening device (1) with a top element (2) adapted to be mounted at the top member (62) of the frame, two side rails (3, 4), and a screening body (5), said screening body being adapted to be brought from a non-screening to a screening position from the top element, the top element (2) of the screening device is adapted to be mounted at the top member (62) of the frame, and at least one set of engagement means to provide operation of the screening device, said set of engagement means including a first engagement means (8) connected to the screening device and a second engagement means (9), **characterized in that** said second engagement means (9) is adapted to be provided at the bottom member (71) of the sash, and that, in a condition of use, operation of the screening body (5) between the non-screening and the screening position is carried out by pivoting the sash to a position in which the bottom member (71) of the sash is located at or near the top member (62) of the frame to enable engagement of the second engagement means (9) with the first engagement means (8).

15. A method for operating a screening arrangement of a window, which comprises a frame (6) and a sash (7), each with a top member (62, 72), a bottom member (61, 71) and two side members (63, 64, 73, 74), of which the sash is pivotally to the frame substantially at a centre axis, said method comprising the steps of:

providing a screening device (1) with a top element (2), two side rails (3, 4), a screening body (5), and first engagement means (8), said screening body being adapted to be brought from a non-screening to a screening position,
mounting the top element (2) of the screening device (1) at the top member (62) of the frame,
providing second engagement means (9) at the bottom member (71) of the sash,
pivoting the sash in an opening direction about substantially the centre axis to bring the bottom member (71) to a position at or near the top element (2) of the screening device (1) at top member (62) of the frame,
engaging the second engagement means (9) with the first engagement means (8), and
pivoting the sash in a closing direction thereby bringing the screening body (5) from the top element (2).

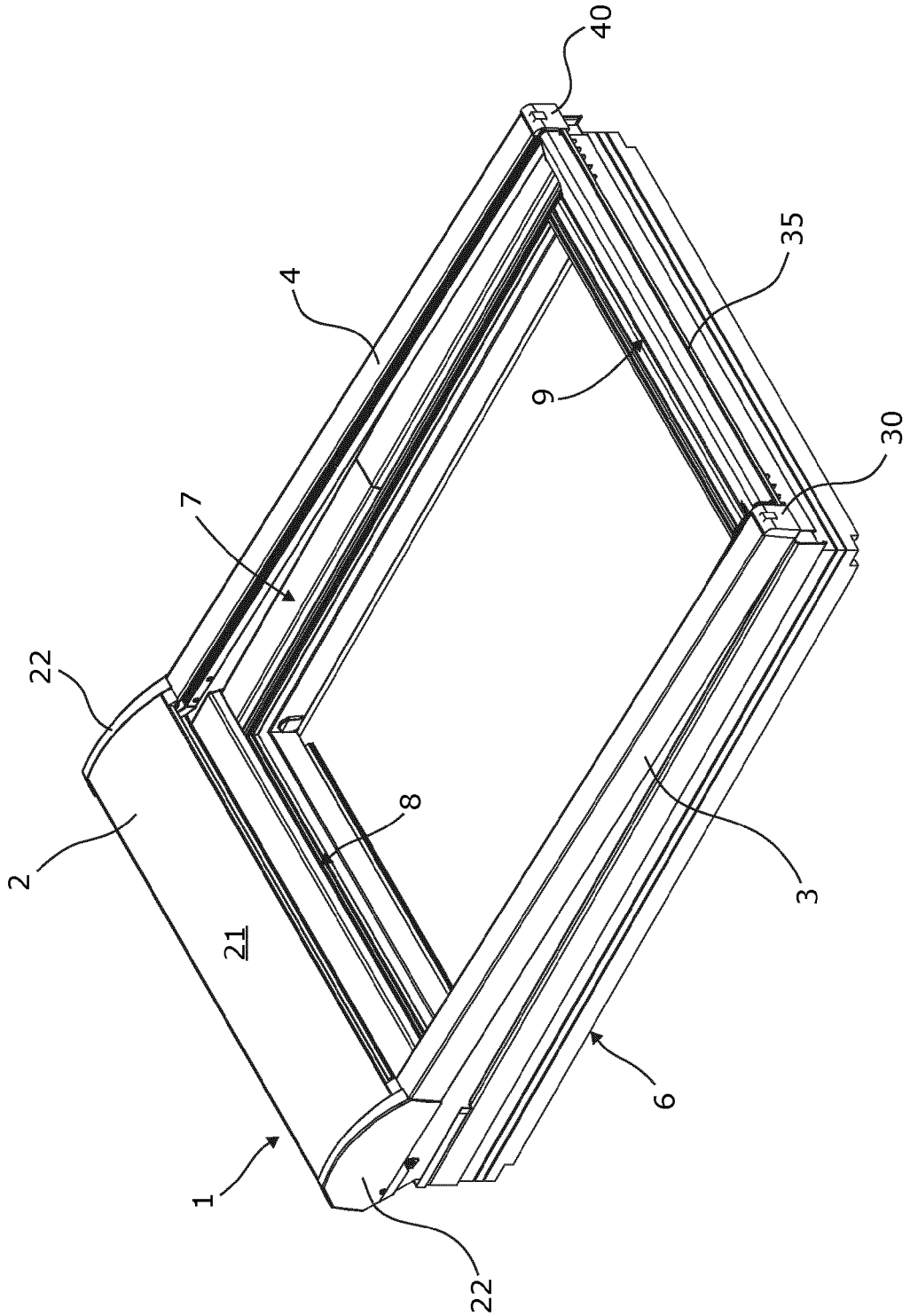


Fig. 1

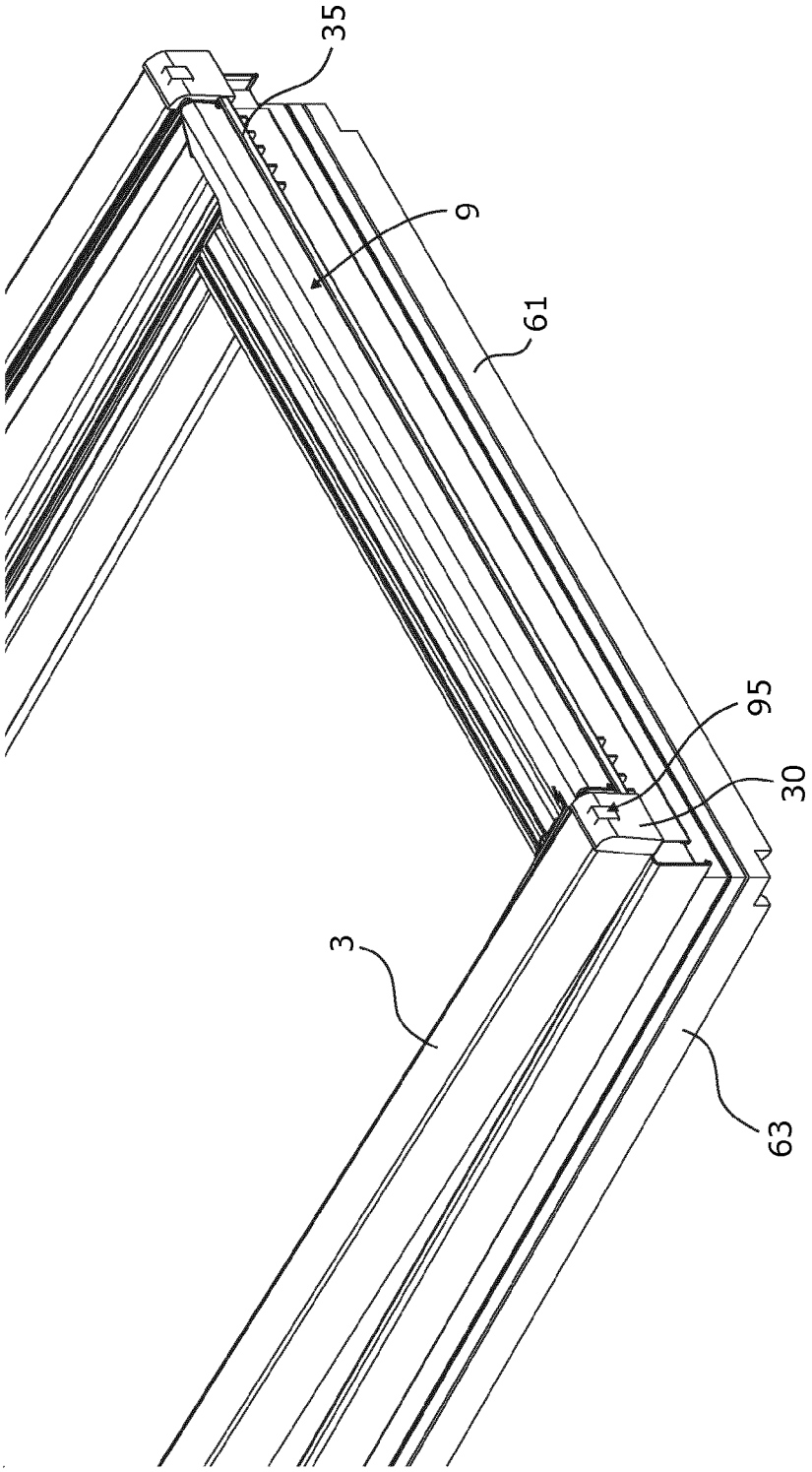


Fig. 2

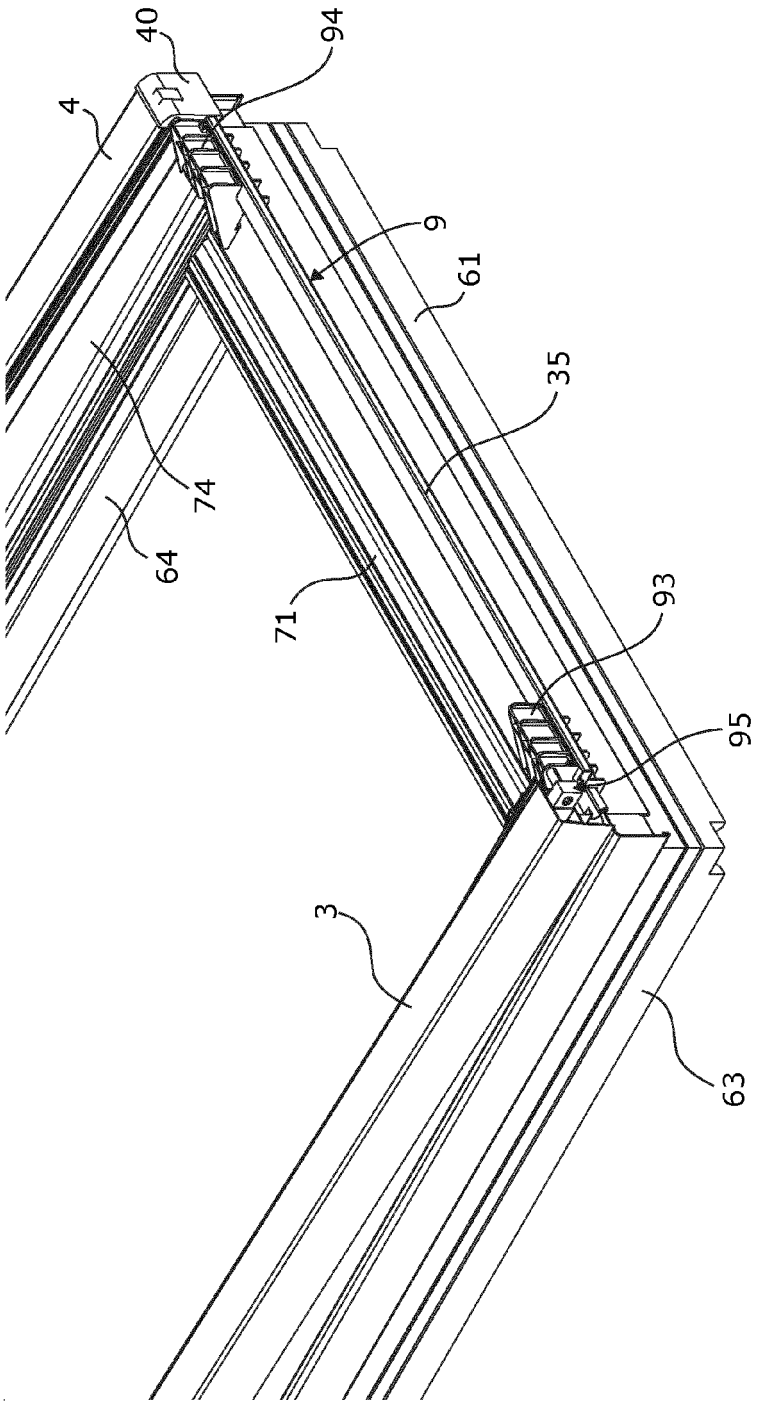


Fig. 3a

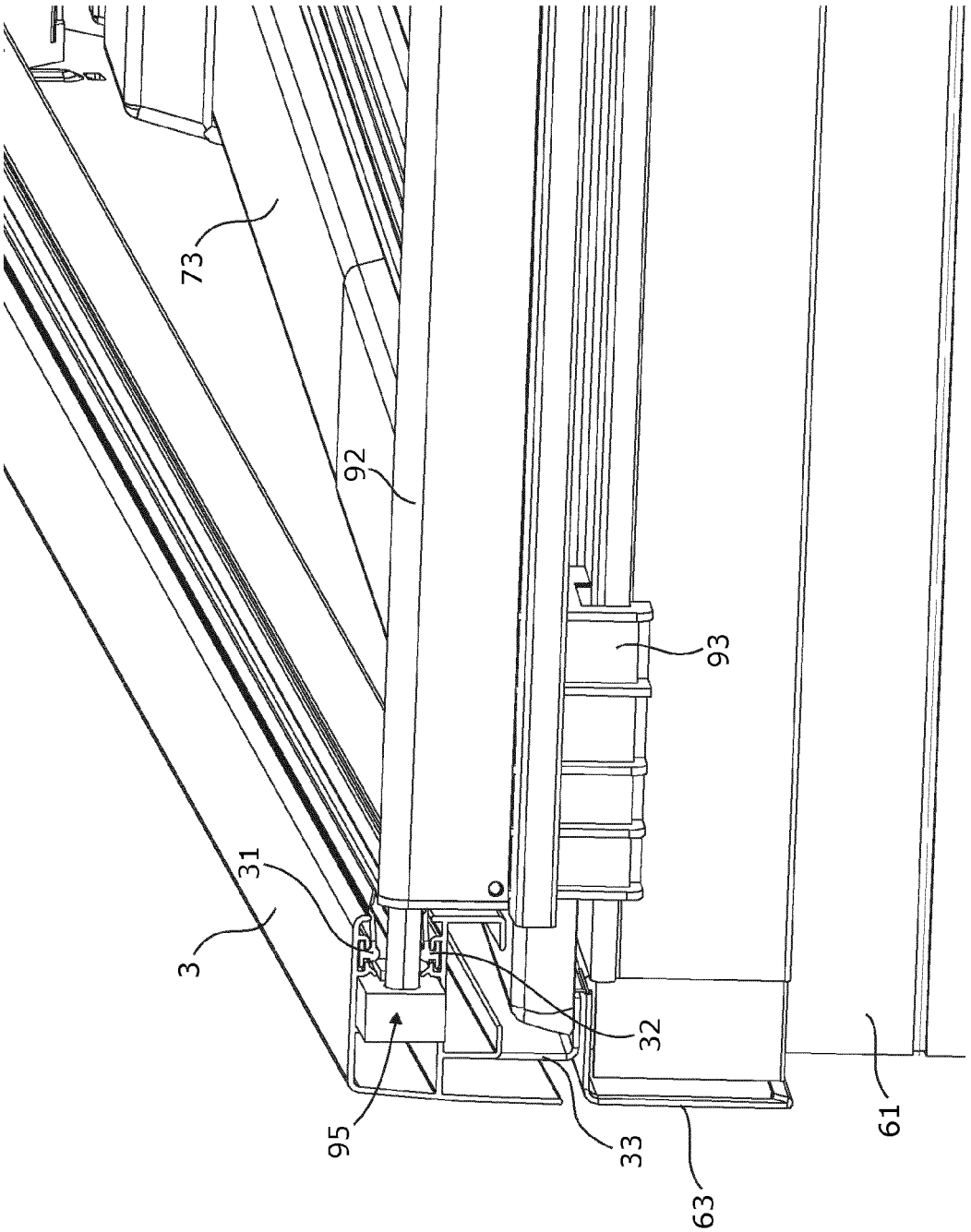


Fig. 3b

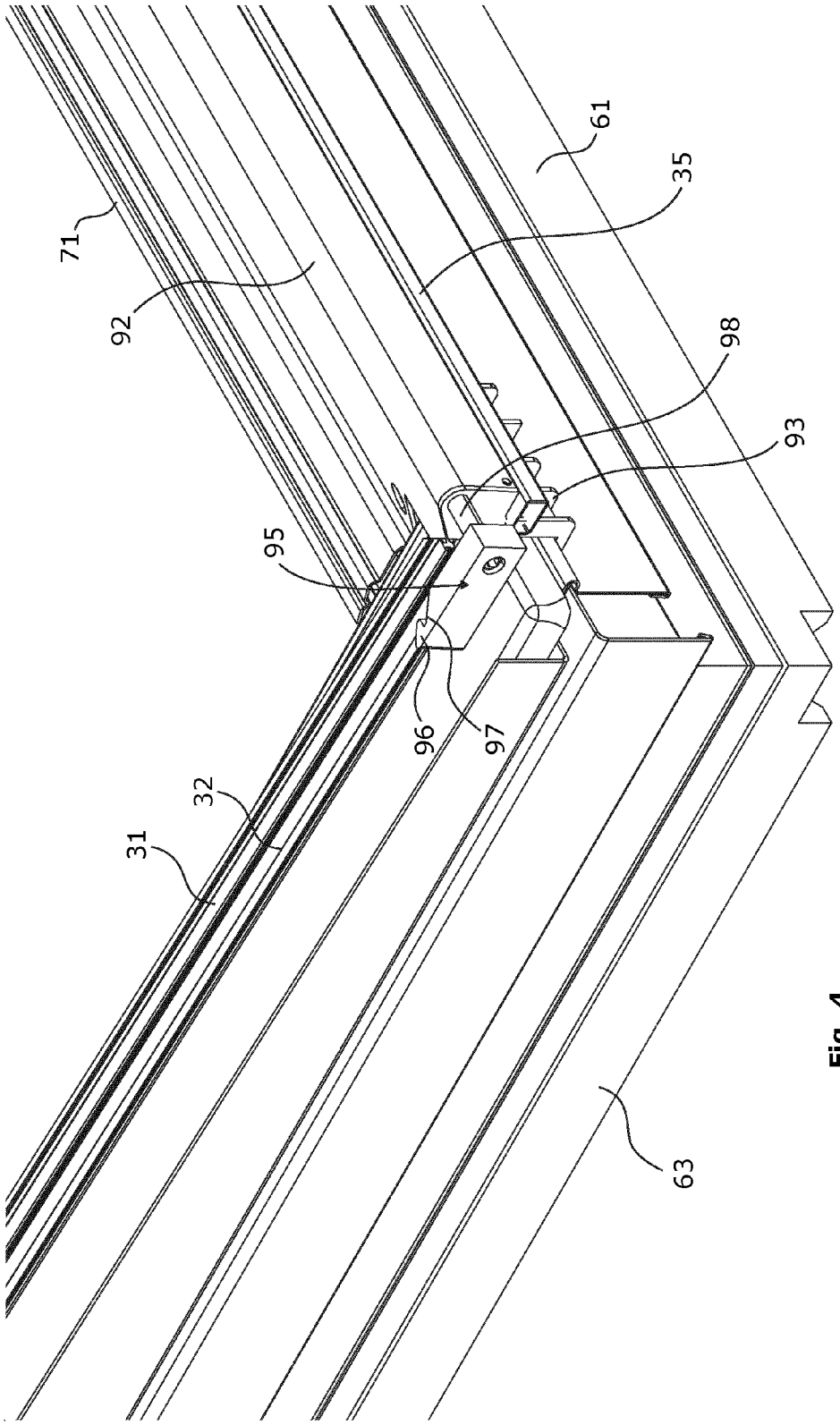


Fig. 4

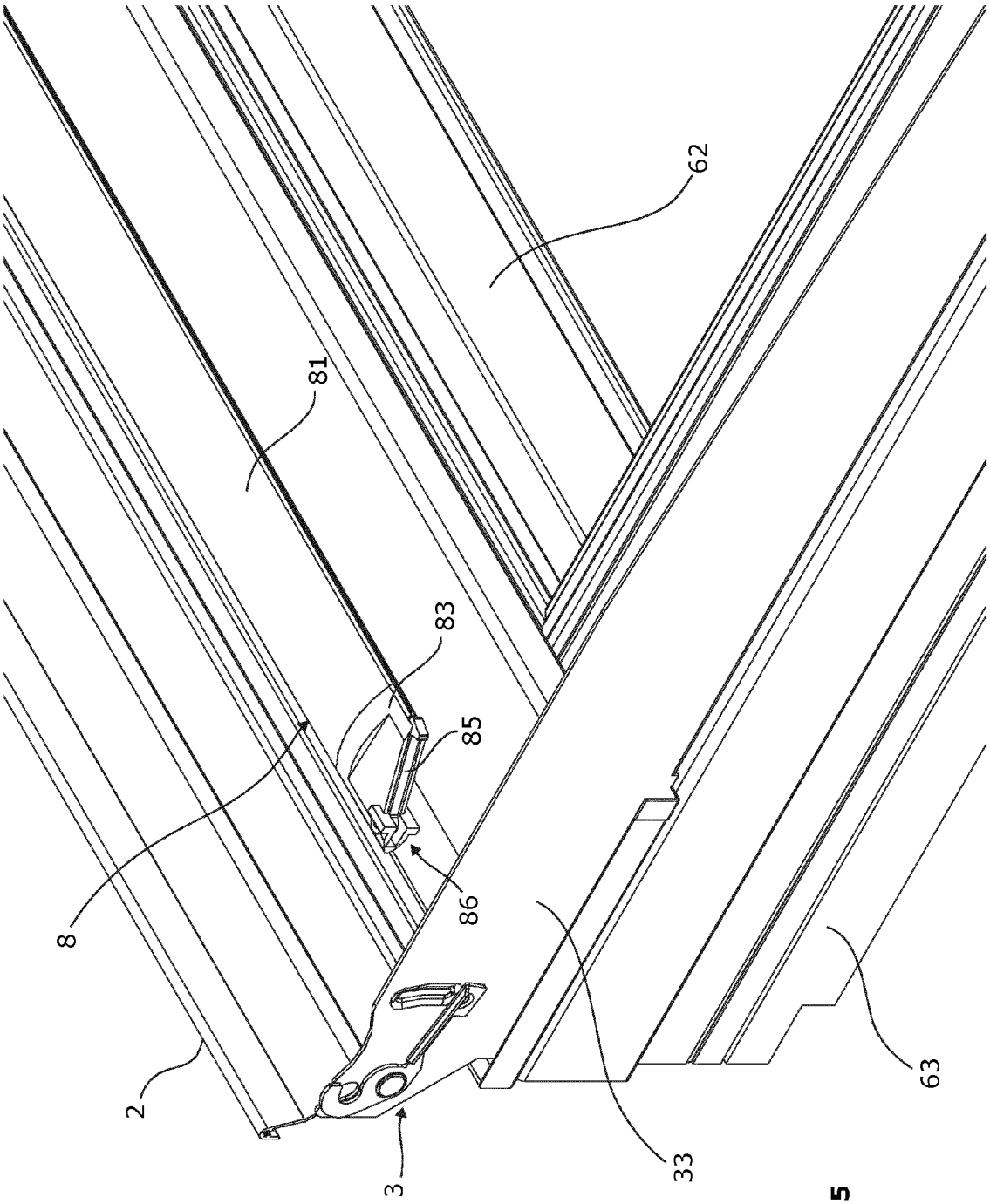


Fig. 5

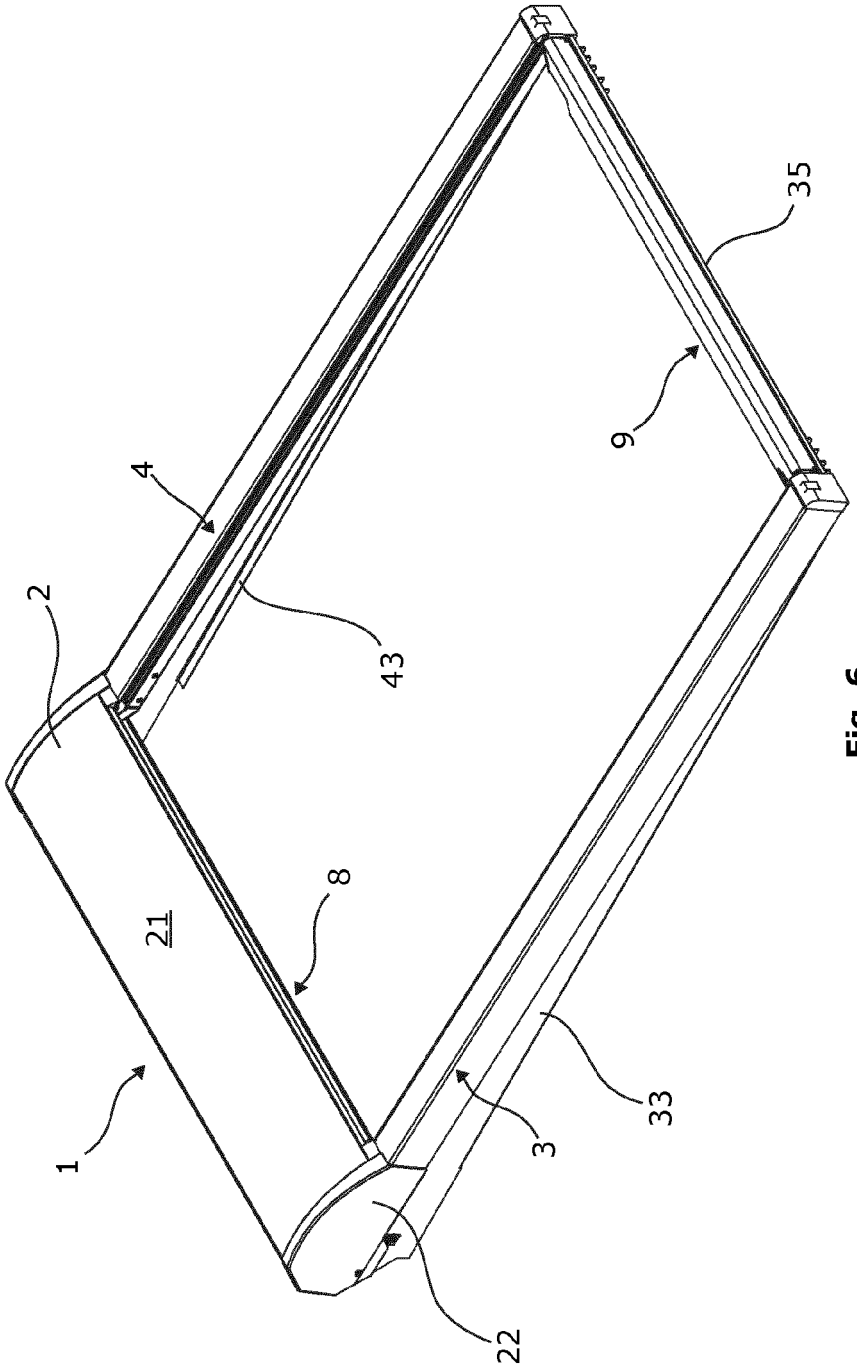


Fig. 6

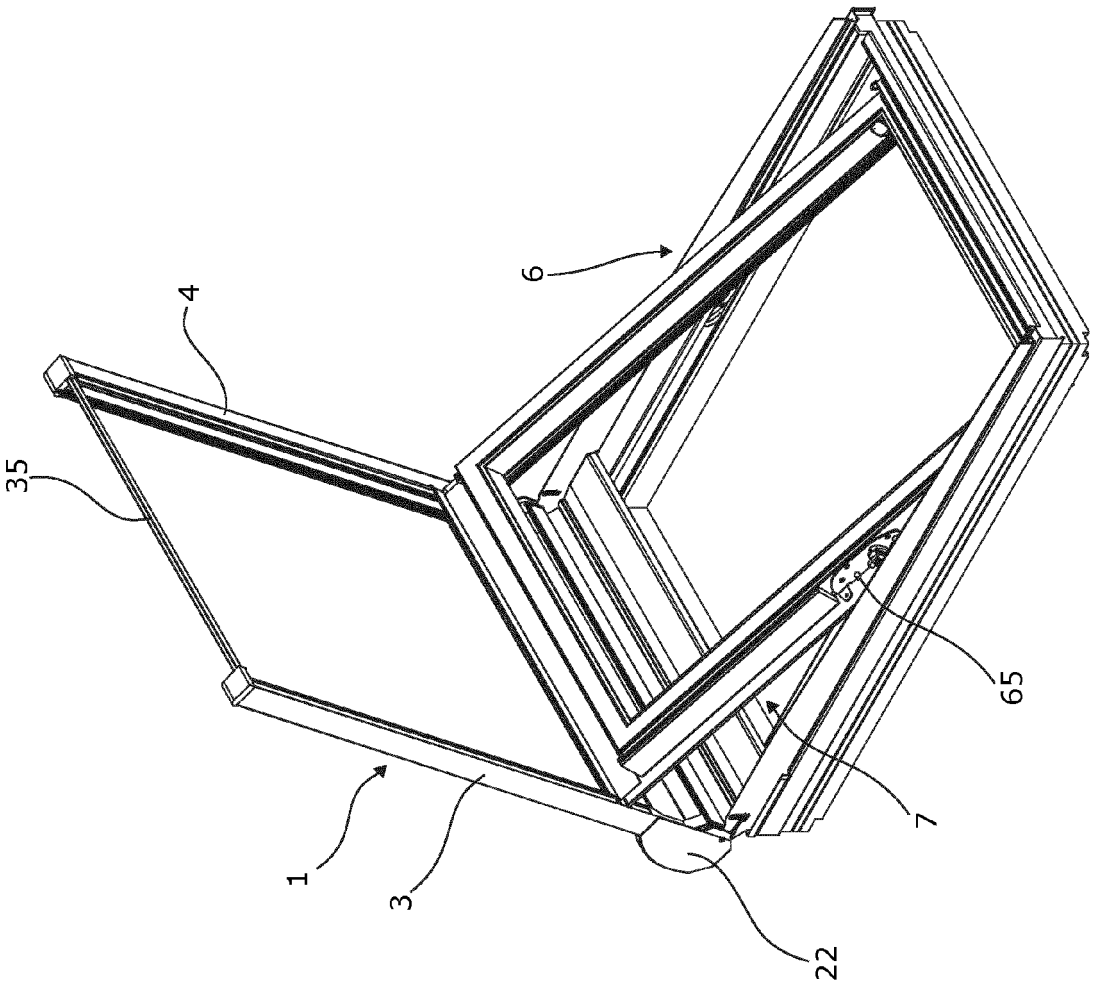


Fig. 7

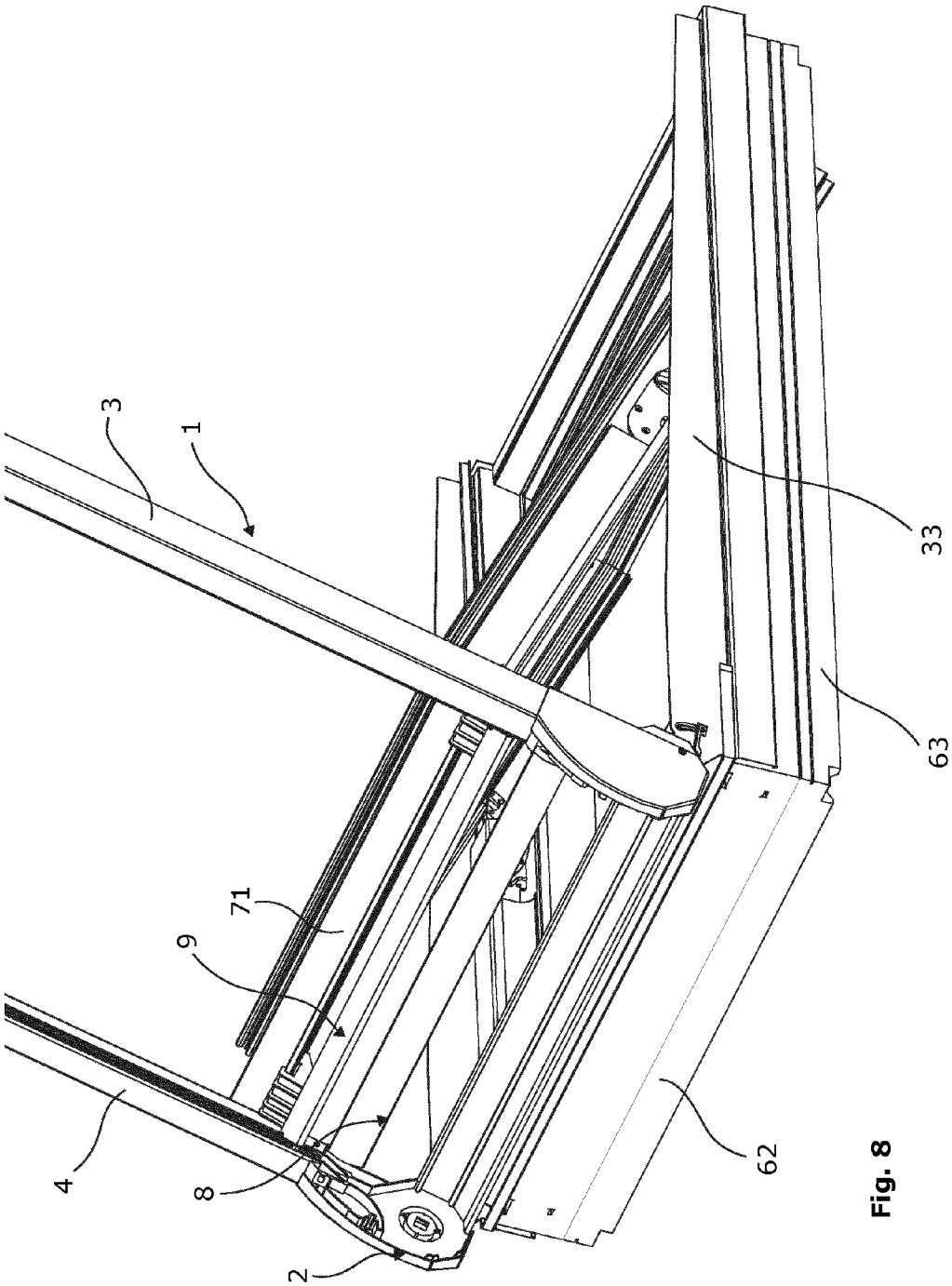
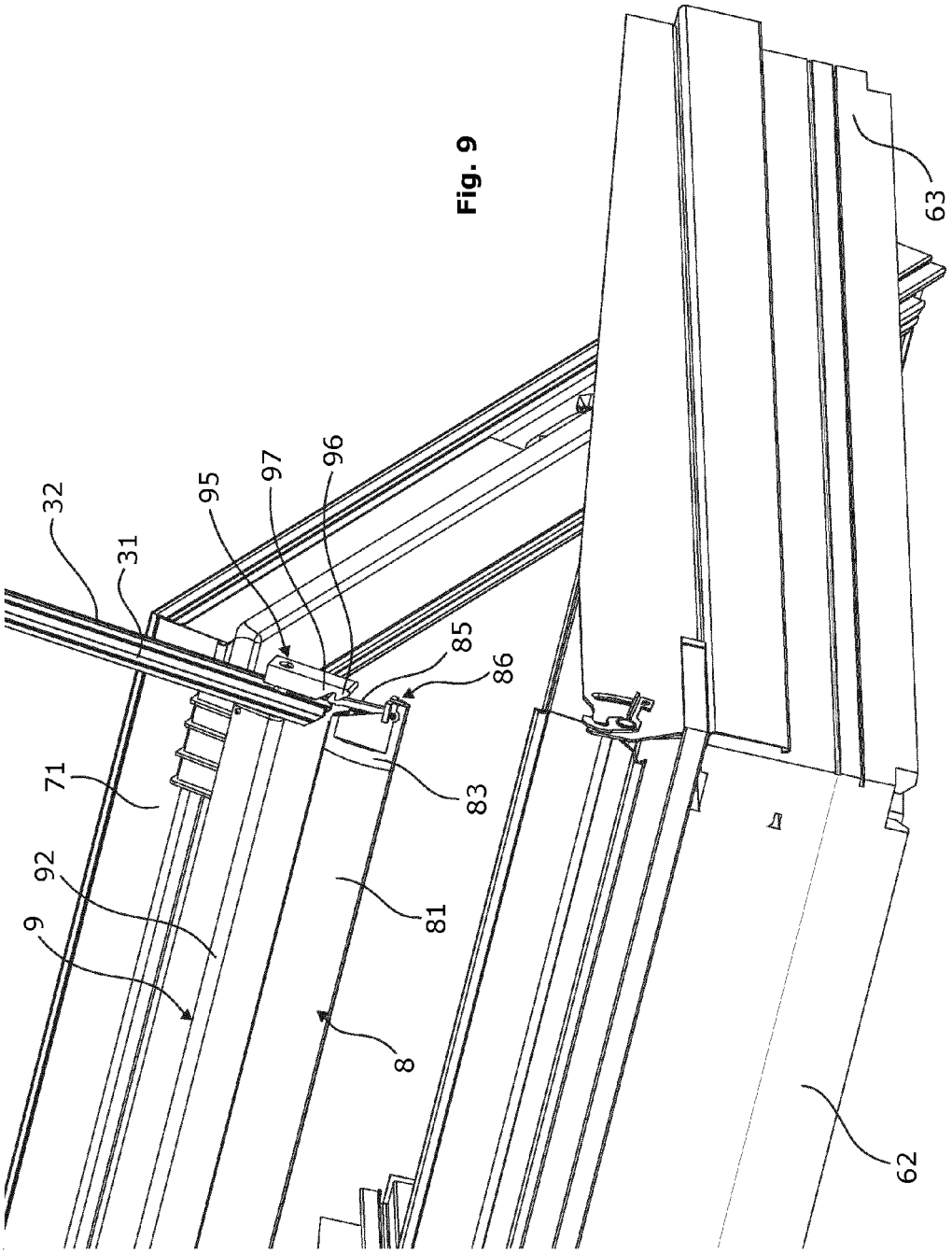


Fig. 8

Fig. 9



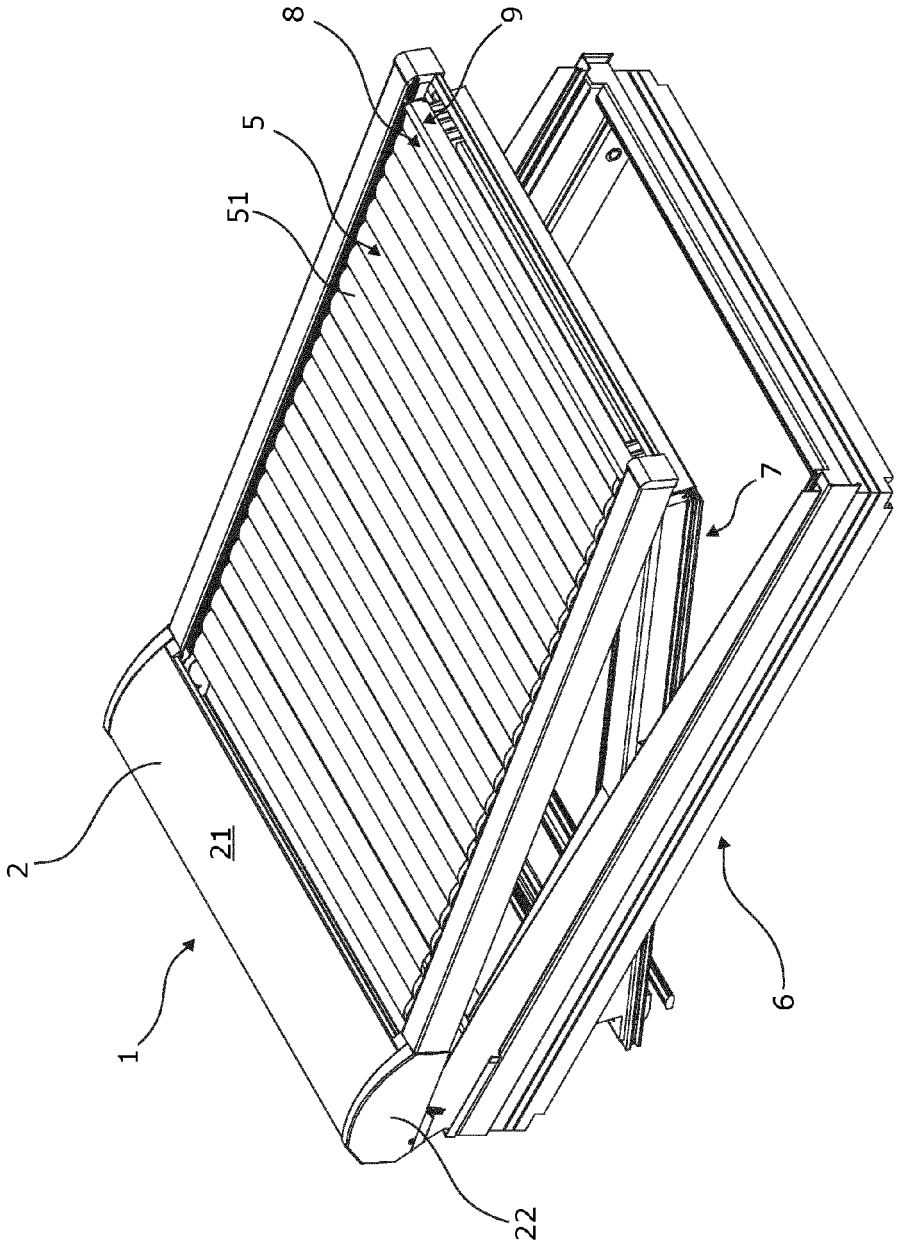


Fig. 10

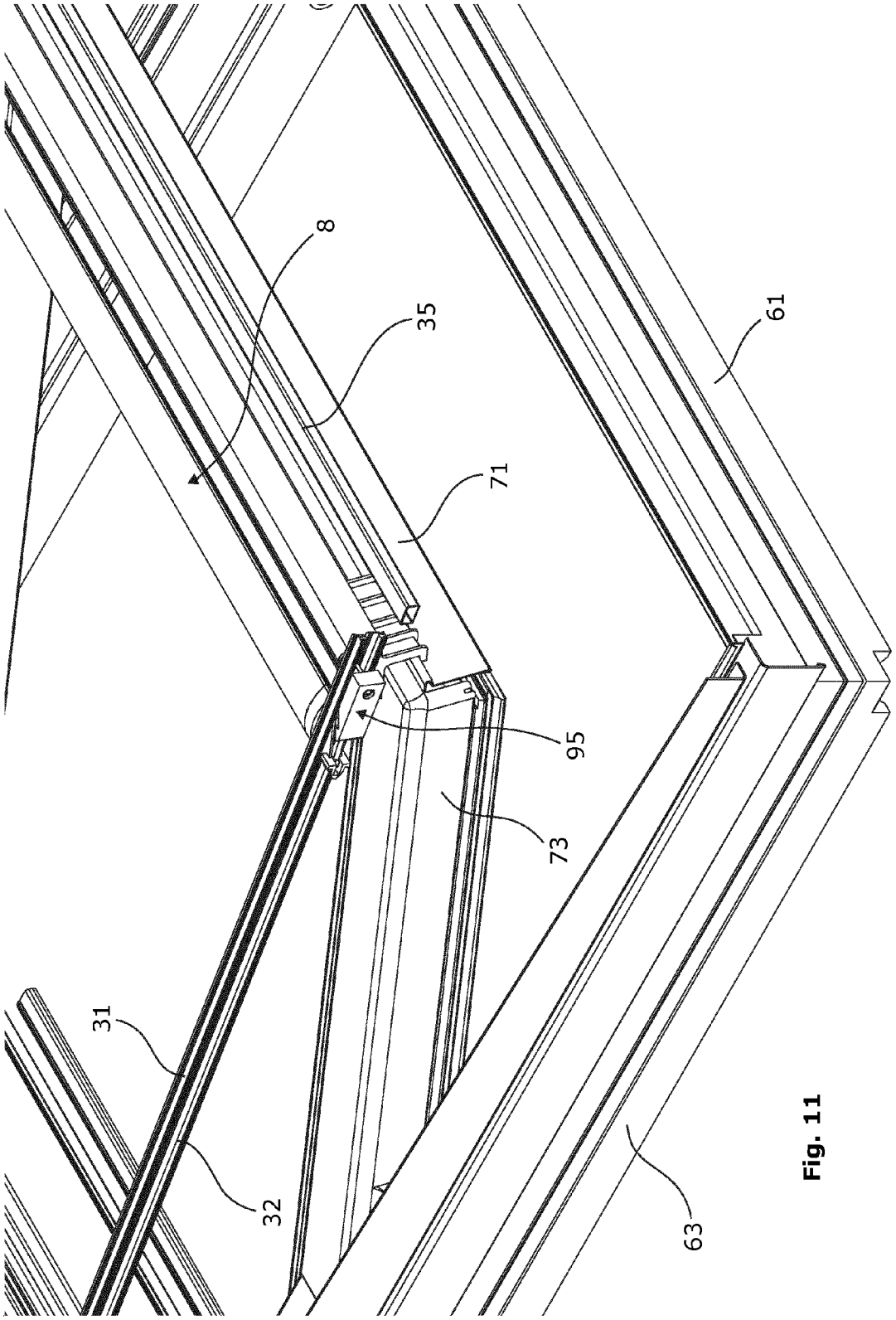


Fig. 11

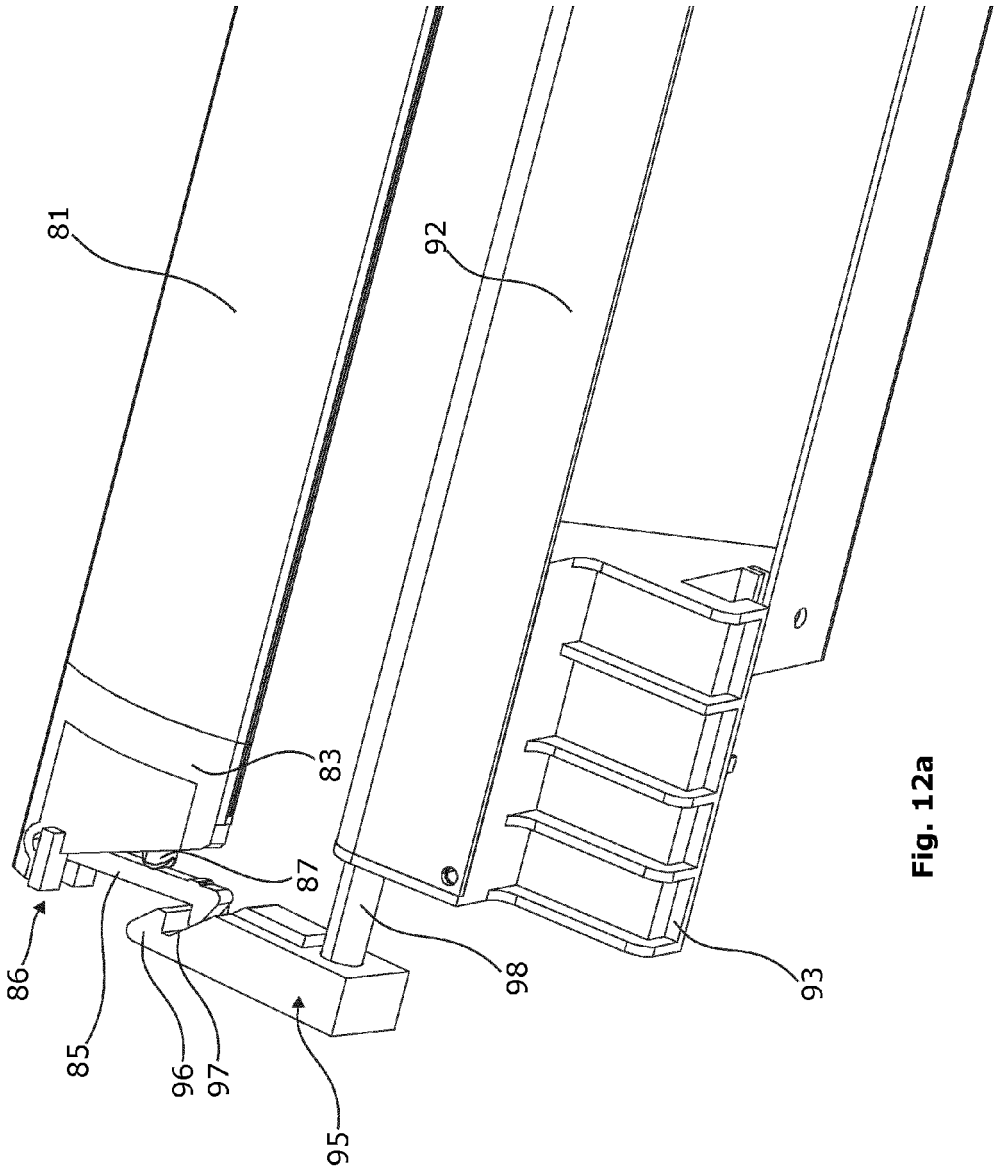


Fig. 12a

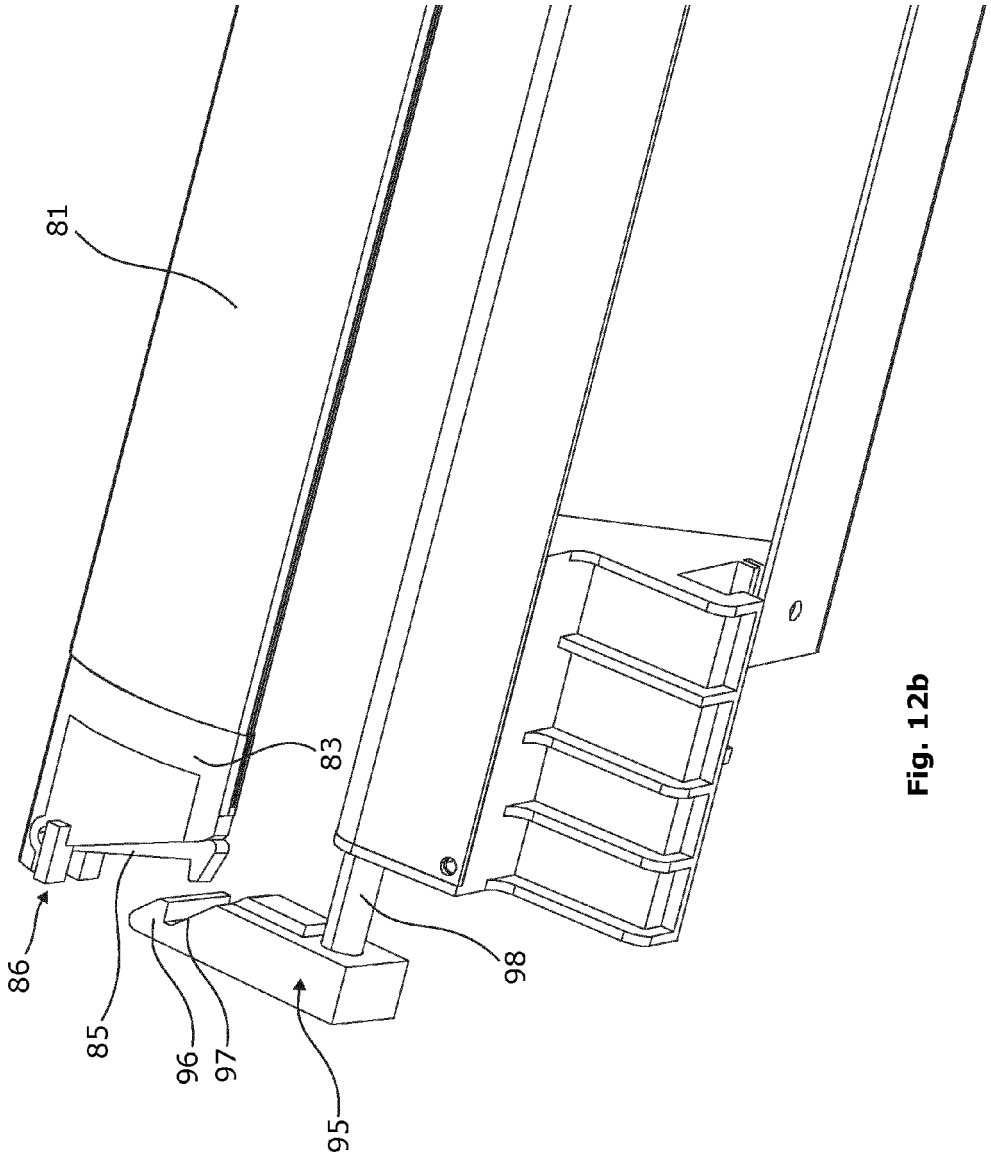


Fig. 12b

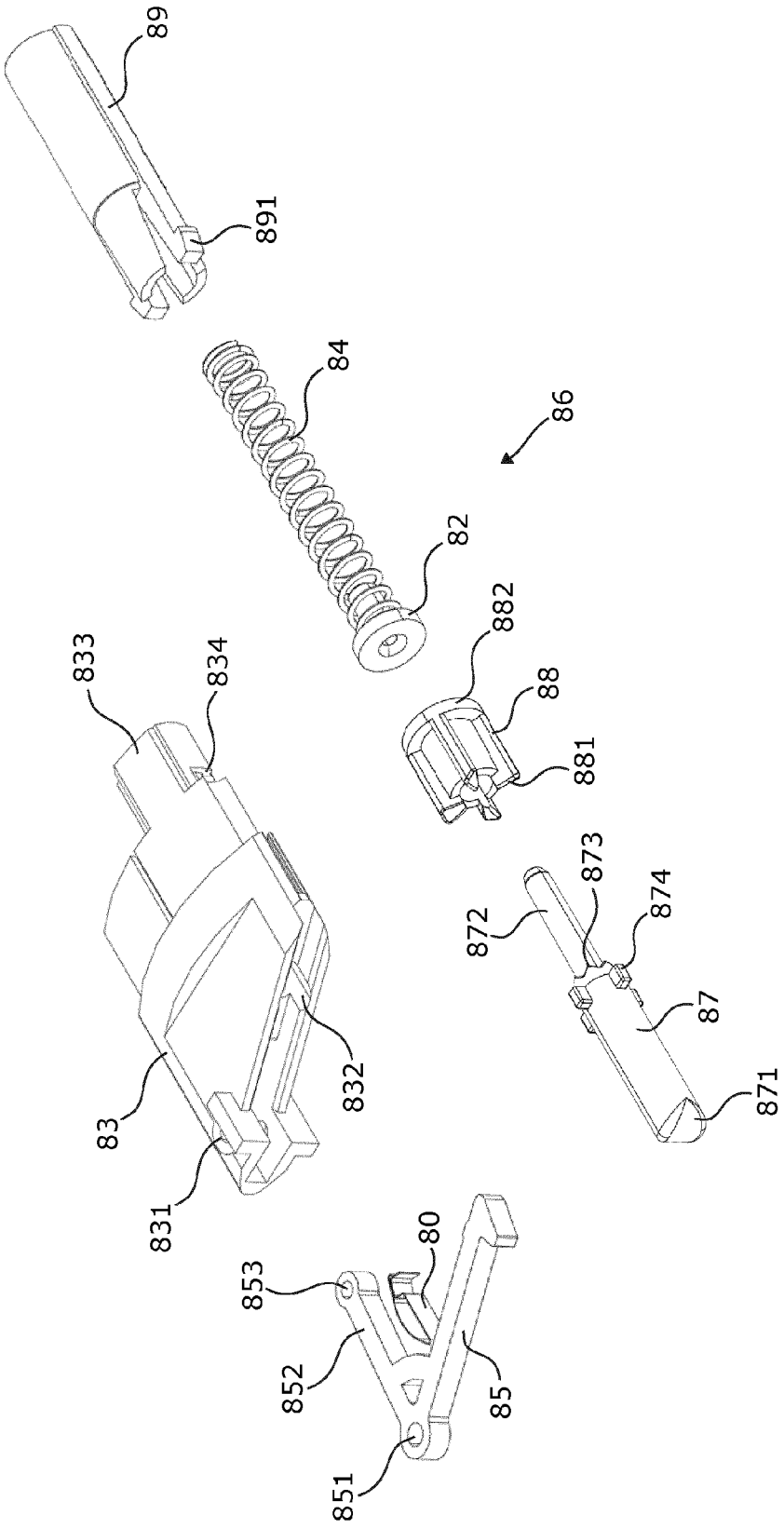

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Fig. 13a

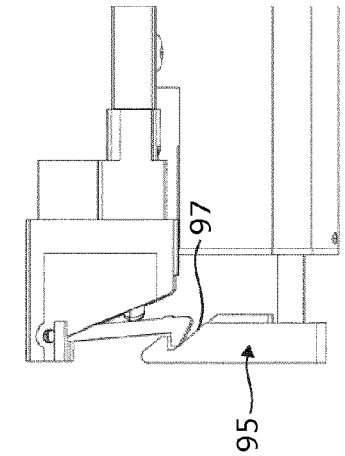

Fig. 13d

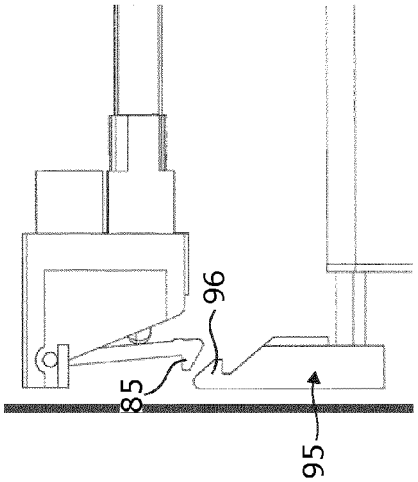

Fig. 13c

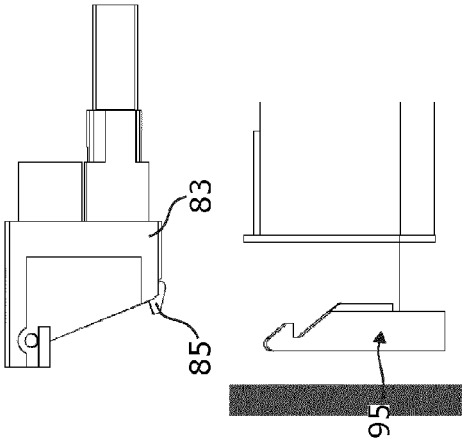

Fig. 13b

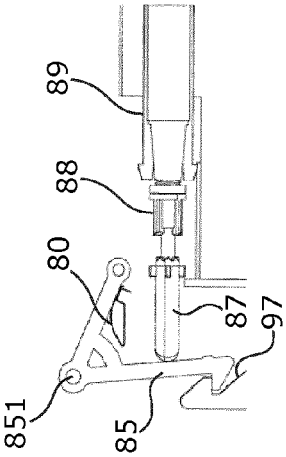

Fig. 13g

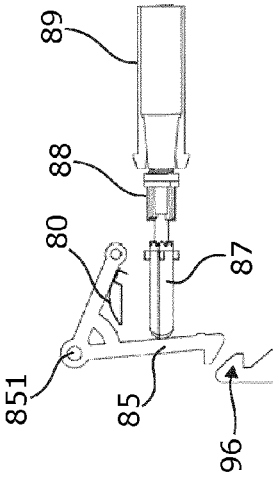

Fig. 13f

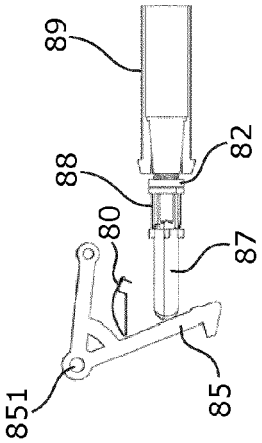

Fig. 13e

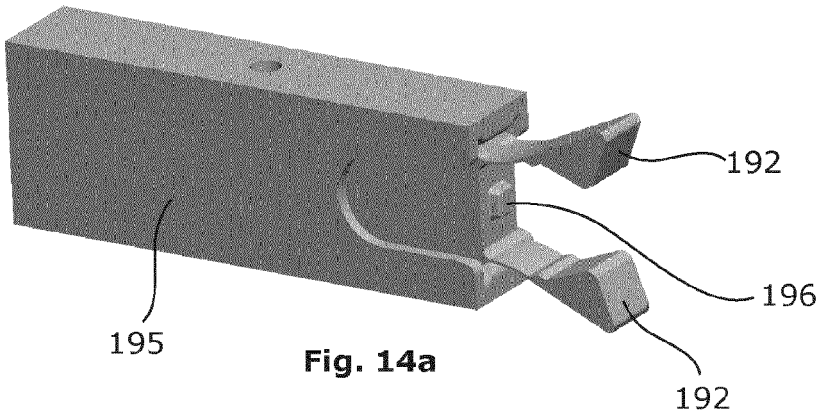

Fig. 14a

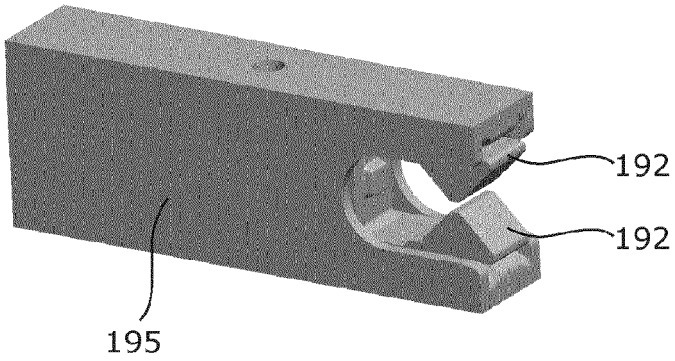

Fig. 14b

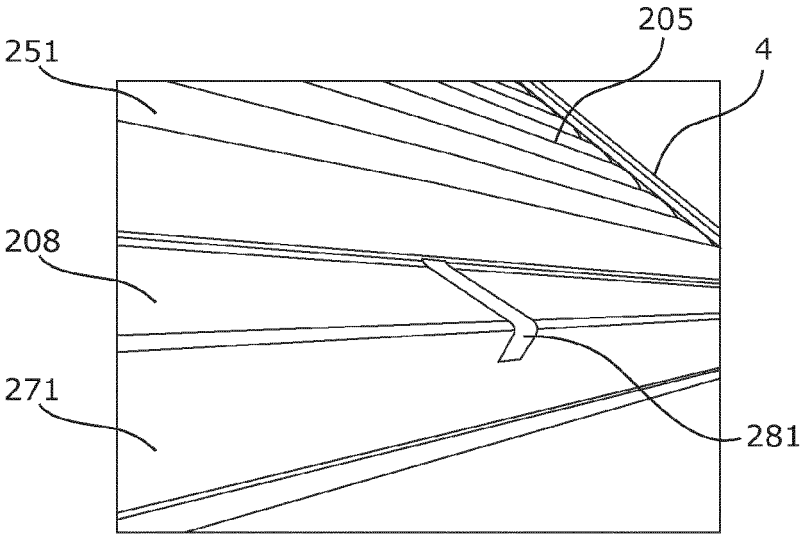

Fig. 15

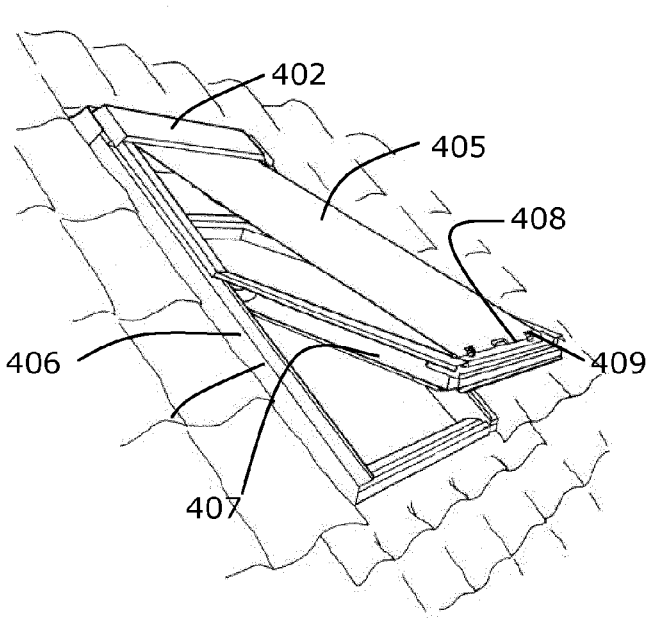

Fig. 16a

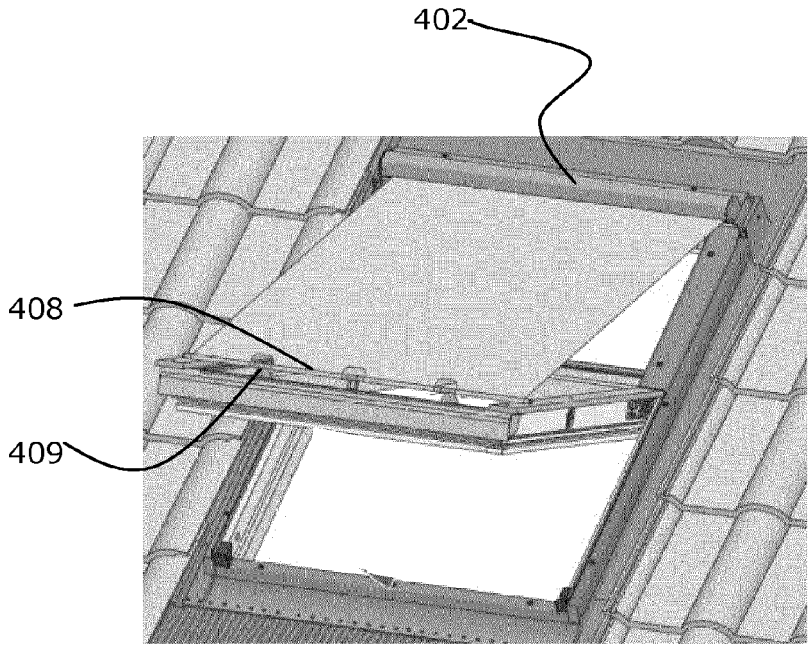

Fig. 16b

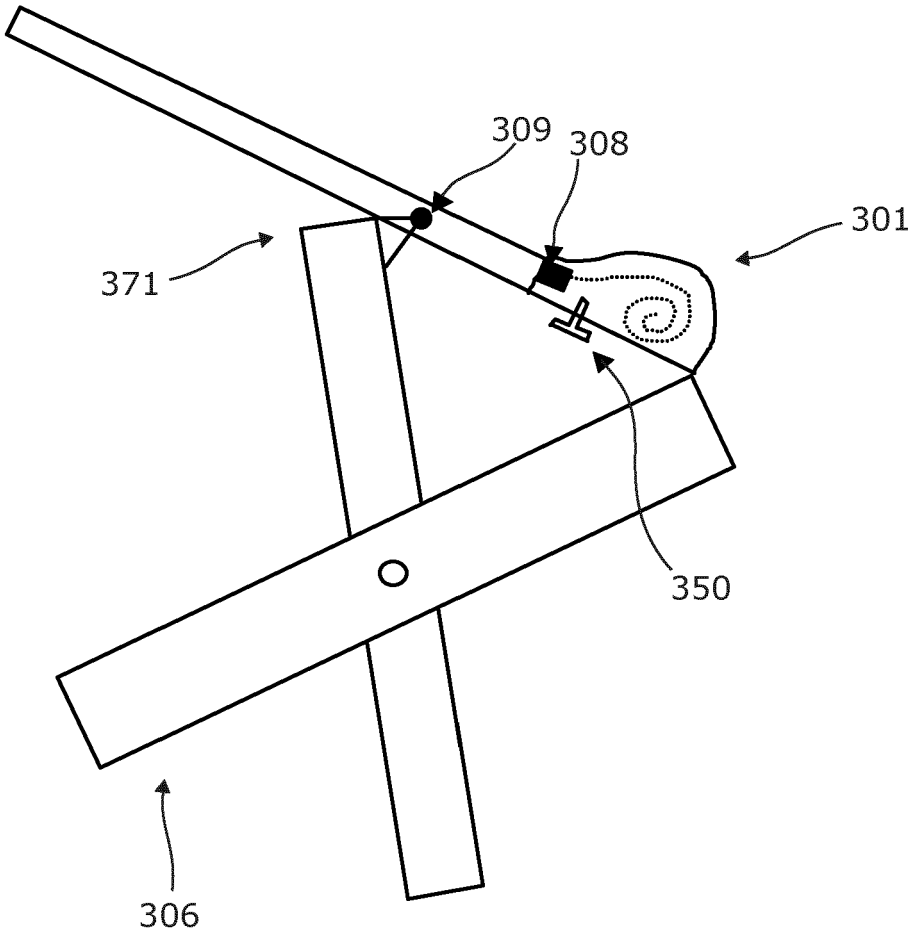

Fig. 17

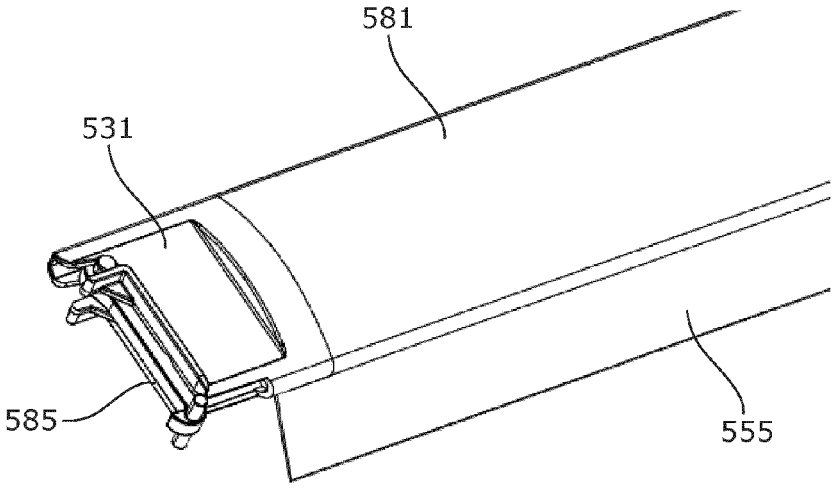

Fig. 18

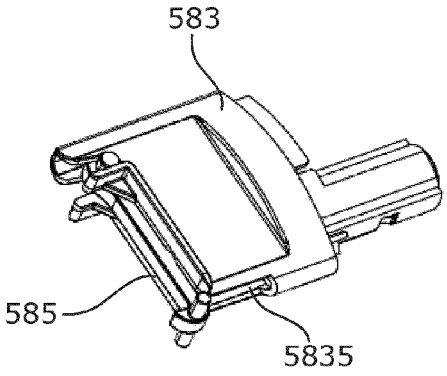

Fig. 19

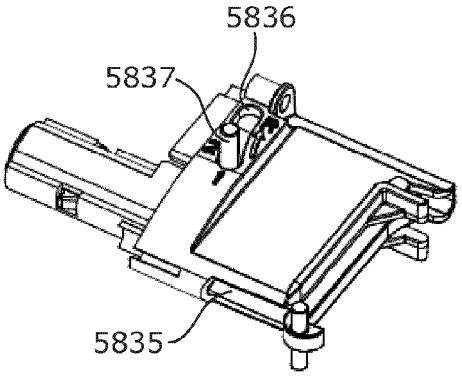

Fig. 20

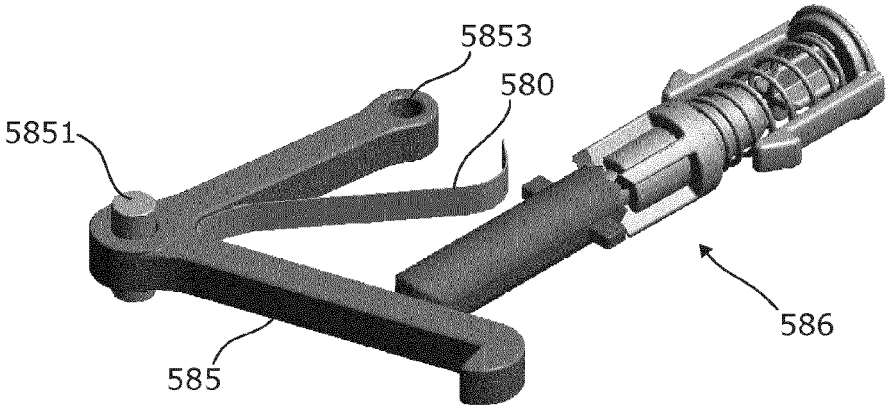

Fig. 21

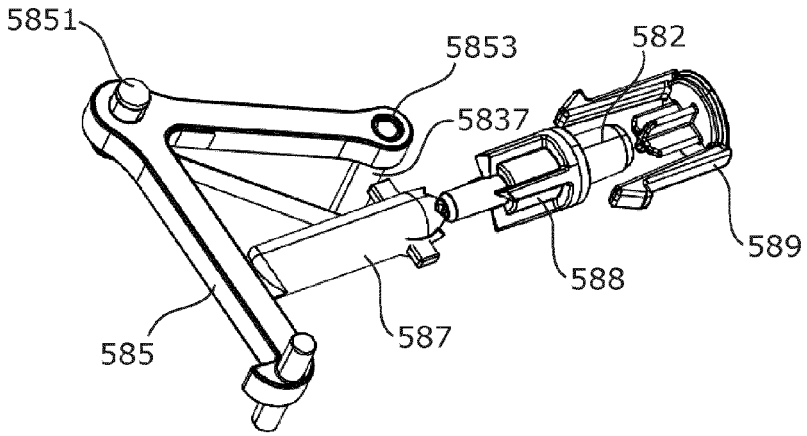

Fig. 22

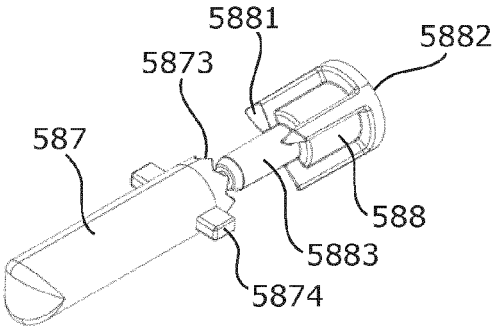

Fig. 23

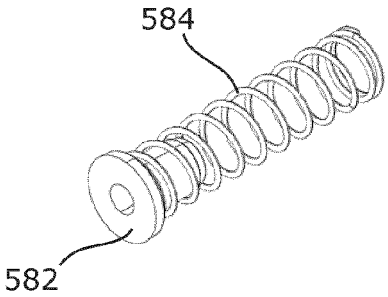

Fig. 24

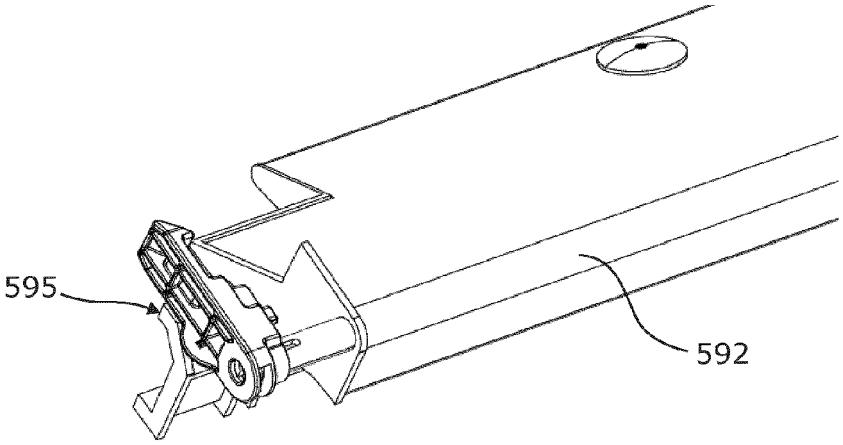

Fig. 25

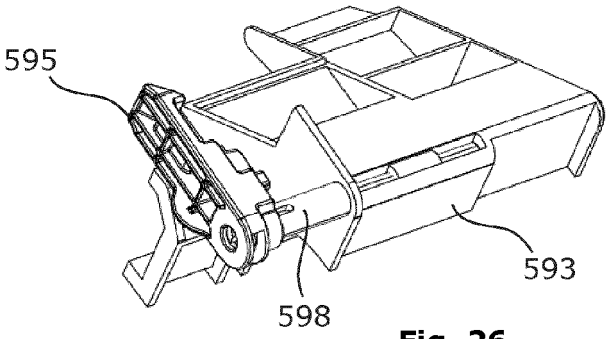

Fig. 26

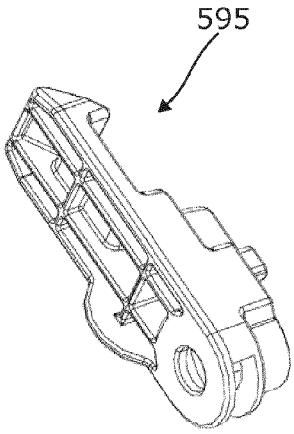

Fig. 27

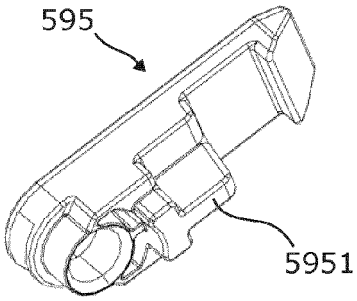

Fig. 28

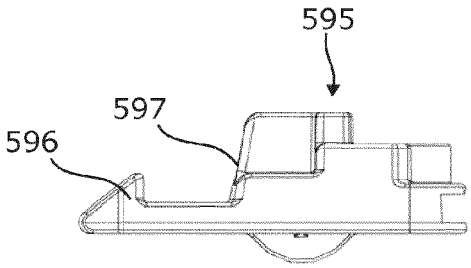

Fig. 29

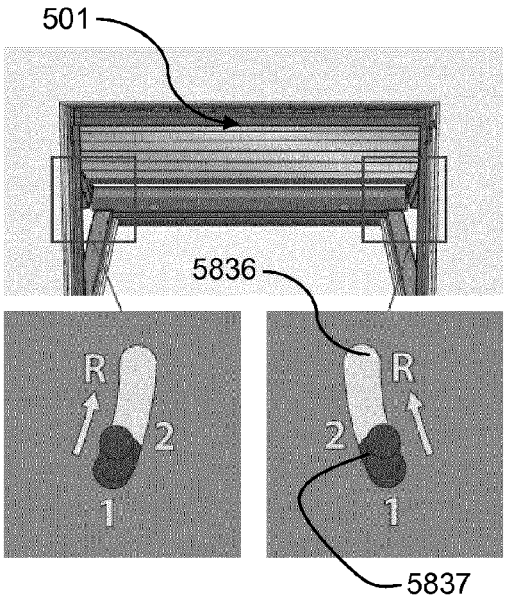

Fig. 30a

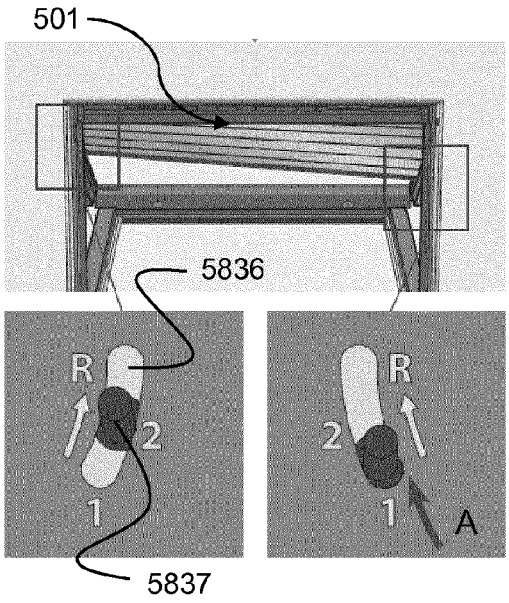

Fig. 30b

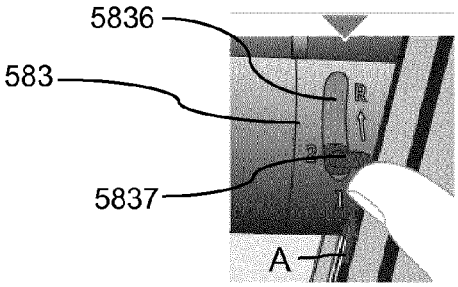

Fig. 30c

REFERENCES CITED IN THE DESCRIPTION

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