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(54) SCREENING ARRANGEMENT COMPRISING AN END PIECE WITH A RACK SEGMENT

(57) In the screening arrangement (10), a top casing (11) is configured to be connected to the frame at a top member thereof and to an upper end of respective side rails (12, 13) in the mounted condition of the screening arrangement (10). The top casing (11) is composed by at least one longitudinal profile (11a, 11b) extending in a direction parallel to the width direction (W) in the mounted condition, and two end pieces (25) connected to respective longitudinal ends of the top casing (11). A bottom element (14) connected to a bottom portion of a screening body is configured to be longitudinally positionable in a longitudinal direction (L) between a non-screening position of the screening body and a screening position by means of drive means (22) operably connecting the bottom element (14) and the side rails (12, 13), said drive means (22) comprising operating means including first transmission means including a cogwheel (144) at each longitudinal end portion of the bottom element (14) and second transmission means including a rack (124) arranged in each of the side rails (12, 13). Each end piece (25) of the top casing (11) is provided with a rack segment (254) configured to be adjoined with the rack (124) of the respective side rail (12, 13) in the mounted condition of the screening arrangement (10) so as to form a continuous rack path for the cogwheel (144) of the first transmission means.

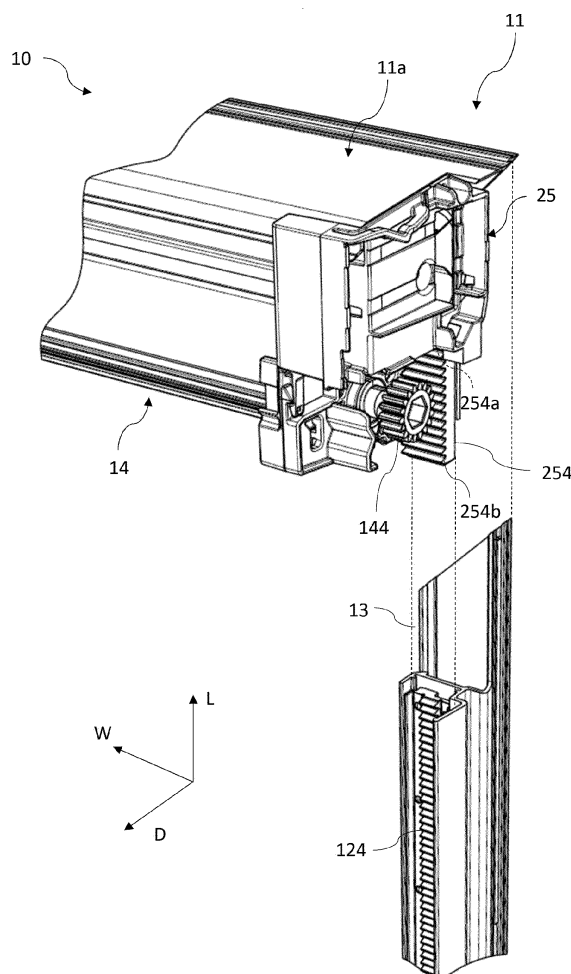


FIG. 10

Description

Technical Field

[0001] The present invention relates to a screening arrangement for a window, preferably a roof window, said window comprising a frame with a top member, a bottom member and two mutually parallel side members, said screening arrangement comprising a screening body having two side edges and a top and bottom portion, two side rails, each extending in a longitudinal direction, a width direction and a depth direction, each side rail being configured to be connected to a respective side member of the frame in a mounted condition of the screening arrangement, a top casing accommodating at least the top portion of the screening body and configured to be connected to the top member of the frame and to an upper end of the respective side rail in the mounted condition of the screening arrangement, the top casing being composed by at least one longitudinal profile extending in a direction parallel to the width direction in the mounted condition, and two end pieces connected to respective longitudinal ends of the top casing, a bottom element connected to the bottom portion of the screening body and being configured to be longitudinally positionable in said longitudinal direction between a non-screening position of the screening body and a screening position by means of drive means operably connecting the bottom element and the side rails, said drive means comprising operating means including first transmission means including a cogwheel at each longitudinal end portion of the bottom element and second transmission means including a rack arranged in each of the side rails.

Background Art

[0002] Screening arrangements of this kind are known in the art. Applicant's International publication WO 02/068786 A1, European patents No. 2738342, 2738343 and 2738344, and published European patent application EP 3091168 A1 show and describe screening arrangements of the kind mentioned in the introduction. While the challenges in installing such screening arrangements are to some extent alleviated, there is still room for improvement.

Summary of Invention

[0003] With this background, it is therefore an object of the invention to provide a screening arrangement by which the assembly and mounting procedures are made easier.

[0004] This and further objects are met by a screening arrangement of the kind mentioned in the introduction, which is furthermore characterised in that each end piece of the top casing is provided with a rack segment configured to be adjoined with the rack of the respective side rail in the mounted condition of the screening arrange-

ment so as to form a continuous rack path for the cogwheel of the first transmission means.

[0005] By providing the end piece with a rack segment, the suspension elements present in the prior art arrangements may be dispensed with. This provides for a facilitated assembly operation already at the factory side, since the step of setting the suspension elements in the correct position is rendered superfluous. During installation of the screening arrangement, the user simply mounts the top casing including end pieces and respective rack segments in a first step, while the continuous rack path necessary to allow coherent engagement of the first and second transmission means is obtained in the subsequent mounting of the side rails including their respective rack. In the mounted condition of the screening arrangement, the cogwheels of the first transmission means are thus prepared for engagement with the rack segments and the racks of the second transmission means such that screening arrangement is ready for use.

[0006] In a presently preferred embodiment, the rack segment of each end piece has a top end and a bottom end, the distance between the top and bottom ends defining a length of the rack segment in the longitudinal direction, the length being such that the cogwheel of the first transmission means is in engagement with the rack segment in a supply condition of the screening arrangement. In other words, in this embodiment, the rack segment has at least such a length that it extends at least to the lowermost point of the cogwheel, as seen in the depth direction. Thus, in the supply condition, the cogwheels of the first transmission means are safely positioned on the respective rack segment.

[0007] In a further development of this preferred embodiment, the length of the rack segment of each end piece substantially corresponds to a height of the bottom element as seen in the longitudinal direction. In addition to the safe positioning, this configuration contributes to the compact appearance of the screening arrangement in the supply condition and also to some extent provides protection of the rack segment.

[0008] In a further embodiment, the top end of the rack segment of each end piece is positioned at a transition portion formed at a lower edge of the end piece. By providing such a transition portion, the functionality of the end piece to be able to be guided over the mounting bracket during installation is ensured, as the rack segment is thus separated from the mounting bracket engagement section of the end piece.

[0009] In a mechanically simple and reliable embodiment, each end piece comprises a body portion which is substantially plane and parallel to a plane spanned by the length direction and the depth direction, and wherein a top resilient arm and a bottom flange form engagement means configured to interact with a mounting bracket connected with the associated side member of the frame of the roof window in the mounted condition of the screening arrangement.

[0010] In a further embodiment, the rack segment is

formed integrally with the respective end piece. This may be carried out by moulding the end piece in one piece with the rack segment. The end pieces with integrated rack segments may then be connected to the remaining components of the top casing, thus ensuring a supply condition which is particularly easily obtained when assembling the screening arrangement.

[0011] In order to ensure reliable connection of the end piece with the top casing, each end piece may comprise a first connection portion extending from the body portion, optionally also a second and a third connection portion. The connection portions may extend substantially perpendicularly to the body portion. In embodiments in which the top casing is composed by a set of profiles, suitable engagement means may be provided to receive the connection portion(s).

[0012] In a further embodiment, an abutment portion is formed protruding from the body portion, and wherein the transition portion, if present, is formed in conjunction with said abutment portion. This configuration contributes to the structural integrity of the end piece.

[0013] In a presently preferred embodiment, the top casing comprises a front rail, a top cover portion, and a back cover portion. In this way, a reliable connection of the end piece to the top casing is ensured.

[0014] The top casing may be composed by a set of profiles defining a cross-sectional shape of the top casing, which ensures flexible design and manufacture of the screening arrangement.

[0015] In a further development of this embodiment, a first profile comprises the front rail, the cover top portion and the cover back portion, and a second profile comprises an additional back element adjoining the cover back portion. In addition to providing further connection points for the end piece, such a configuration also protects the exterior side of the screening body from incident light exposure.

[0016] In a still further embodiment, the bottom element comprises a main portion composed by a set of profiles defining a cross-sectional shape of the bottom element, and two end portions surrounding respective longitudinal ends of the main portion of the bottom element. This provides for optimum flexibility in the design of the bottom element, including tailoring the end portions to accommodate the rack segment of the end piece of the top casing in such embodiments in which the rack segment has an extension overlapping the bottom element.

[0017] In one embodiment, flexibility and modularity are improved by the provision of a rack in each side rail which is composed by a plurality of rack segments adjoining with each other in the mounted condition of the screening arrangement so as to form a continuous rack path for the cogwheel of the first transmission means together with the rack segment of the associated end piece.

[0018] While the configuration of the side rails is in principle arbitrary, as long as they fulfil the purposes of receiving the racks of the second transmission means, it

is preferred that each side rail comprises a first flange forming a front of the side rail, and a leg extending at substantially right angles to the first flange and by which the side rail is configured to be connected to the respective side member of the frame, wherein a second flange protrudes from the leg at a distance from the first flange as seen in the depth direction, and wherein the rack of the side rail is provided on an underside of the second flange.

[0019] In a further development of this embodiment, the first flange is longer than the second flange so as to accommodate the rack segment of the associated end piece in the mounted condition of the screening arrangement. This provides for optimum ease of installation and accommodation of the rack segment of the end piece.

[0020] The rack of the side rail may extend up to a predefined point on the underside of the second flange of the side rail to accommodate the rack segment on an upper portion of the underside of the second flange. In addition to providing flexibility in the design of the components of the screening arrangement, this configuration also provides reliable support of the rack segment in the mounted condition of the screening arrangement.

[0021] In principle, the screening arrangement may be operated either electrically or manually, in which case the transmission means ensure proper guidance of the bottom element in the side rails. In one embodiment, the drive means operably connecting the bottom element and the side rails are electric drive means, and the electric drive means comprise an electric motor located in the bottom element or in the top casing, and the operating means of the electric drive means accommodated in the bottom element comprise a rotatable shaft connected with the first transmission means, and wherein the electric drive means is powered by solar panels and/or mains power, preferably supplemented by battery means. This ensures optimum flexibility in the selection of components according to user demands.

[0022] Alternatively or additionally, the drive means comprise a clutch mechanism. In this way, it is possible to override the engagement between the first and second transmission means to manually move the bottom element, while at the same time, safe engagement during normal operation is ensured.

[0023] Other presently preferred embodiments and further advantages will be apparent from the subsequent detailed description and drawings.

[0024] A feature described in relation to one of the aspects may also be incorporated in the other aspect, and the advantage of the feature is applicable to all aspects in which it is incorporated.

Brief Description of Drawings

[0025] In the following description embodiments of the invention will be described with reference to the drawings, in which

FIG. 1 is a plan view of a screening arrangement in an

embodiment of the invention, mounted in a frame of a window;

FIG. 2 is a partial view, on a larger scale, of the upper right-hand corner of the screening arrangement and window of FIG. 1;

FIG. 3 is a partial perspective view of a position indicator mounted on a side rail of the screening arrangement in the embodiment of FIGS. 1 and 2;

FIG. 4 is a perspective view of a screening arrangement in an embodiment of the invention, with the screening body in a screening position;

FIG. 5 is a perspective view of the screening arrangement of FIG. 4, seen from a back side;

FIG. 6 is a partial perspective view, on a larger scale, of a bottom element and a side rail of the screening arrangement of FIG. 5;

FIG. 7 is a partial perspective view, on a larger scale of the bottom element and the other side rail of the screening arrangement of FIG. 5;

FIGS. 8 and 9 are schematic views of steps during mounting of a prior art screening arrangement;

FIG. 10 is an exploded, partial perspective view of a screening arrangement in an embodiment of the invention;

FIGS. 11 and 12 are perspective views, from different angles, of an end piece of the screening arrangement of FIG. 10;

FIG. 13 is an exploded, partial perspective of a screening arrangement in an embodiment of the invention, including further details in the form of rack segments;

FIG. 14 is a partial perspective view of a screening arrangement including an end piece and a side rail in an embodiment of the invention;

FIG. 15 is a partial side view of a top casing, bottom element and a side rail of a screening arrangement in an embodiment of the invention;

FIGS. 16A and 16B are cross-sectional views of a side rail of a screening arrangement in an embodiment of the invention, corresponding to cross-sections taken along lines AA-AA and BB-BB, respectively, of FIG. 14 and FIG. 15; and

FIG. 17 is a cross-sectional view of a top casing and a bottom element of a screening arrangement in an embodiment of the invention.

Description of Embodiments

[0026] In the following detailed description, preferred embodiments of the present invention will be described. However, it is to be understood that features of the different embodiments are exchangeable between the embodiments and may be combined in different ways, unless anything else is specifically indicated. It may also be noted that, for the sake of clarity, the dimensions of certain components illustrated in the drawings may differ from the corresponding dimensions in real-life implementations.

[0027] It is noted that terms such as "up", "down", "left-hand", "right-hand", "exterior", "interior", "outer", "inner" are relative and refers to the viewpoint in question.

[0028] Referring initially to FIGS. 1 to 3, an embodiment of a screening arrangement generally designated 10 is shown, mounted in a frame 2 representing a window. In the shown configuration, the frame 2 constitutes a pane-carrying sash of a roof window 1 and may be pivotable about a centre axis, or top-hung, relative to a stationary frame (not shown) of the roof window 1. The frame 2 may likewise be a stationary frame, which in a mounted position of the window lines an aperture in a building. It is noted that the term "frame" is to be understood as incorporating any substantially rectangular structure positioned in any opening in a building, whether in a wall or the roof, and surrounding an opening 3 to be screened. The screening arrangement 10 may thus be utilised in connection with e.g. windows having a frame only, windows having a sash and a frame, or in doors. In the present context, the screening arrangement 10 will be described as an interior screening arrangement mounted on the interior side of a roof window, i.e., the side facing an inside room of a building, in other words an internal, or an interior, roof window screening arrangement 10.

[0029] The frame 2 has a top member 2.1, two mutually parallel side members 2.2, 2.3, and a bottom member 2.4, surrounding the opening 3 to be screened, covered by a suitable panel element such as insulating glazing in the form of a pane 4.

[0030] The screening arrangement 10 comprises a screening device including a screening body 15 having two side edges and a top and bottom portion, to be shown and described below.

[0031] Two side rails 12, 13 are provided in the screening device, each extending in a longitudinal direction L, a width direction W and a depth direction D as defined by one of the side rails 12, 13 as shown in FIG. 3. Referring also to figures of other embodiments described below, each side rail 12 comprises a first flange 121, a second flange 122 and a leg 123. The leg 123 extends at substantially right angles to the first and second flanges 121, 122 and serves to fasten the side rail 12 to the frame 2.

[0032] The screening device of the screening arrangement 10 further comprises a top casing 11 located at the top member 2.1 of the frame. A top portion 151 of the screening body 15 is typically fastened to a winding, folding, or rotating structure such as a spring-biased roller bar in a roller blind accommodated in the top casing 11, which also accommodates the top portion of the screening body 15 and connected to an upper end of the side rails.

[0033] Referring now also to FIG. 4 and FIG. 5, the whole screening device of the screening arrangement 10 in an embodiment of the invention is shown in front and rear view. A bottom element 14 of the screening device of the screening arrangement 10 is connected to a bottom portion 154 of the screening body 15 and configured to be longitudinally positionable in the longitudinal direction L

between a non-screening position, cf. FIG. 1, of the screening body 15 and a screening position as shown in FIGS. 4 and 5.

[0034] In the embodiments of the invention, the movement is provided by means of electric drive means operably connecting the bottom element 14 and the side rails 12, 13 as will be described in some detail below. However, it is conceivable to form the drive means as manual drive means, in which case the first and second transmission means serve to keep the bottom element 14 in parallel with the top casing 11 throughout the movement.

[0035] Such electric drive means 22 may comprise an electric motor located in the bottom element 14 or in the top casing 11, and the operating means of the electric drive means 22 accommodated in the bottom element 14 comprise a rotatable shaft connected with the first transmission means. The electric drive means 22 may be powered by solar panels 27 and/or mains power, preferably supplemented by battery means 28 as shown in the embodiment of Fig. 17. Further elements of the operating means of the electric drive means accommodated in the bottom element 14 may include the battery means 28 and a printed circuit board.

[0036] The drive means may comprise a clutch mechanism. Such a clutch mechanism is well-known in the art and allows a certain amount of adjustment of the rotational position of the first transmission means while at the same time providing a reliable engagement with the second transmission means.

[0037] The screening body 15 defines a screening plane in the screening position substantially parallel to a plane defined by the longitudinal direction L and the width direction W. Side edges 152, 153 of the screening body 15, or elements at the side edges, are guided in respective side rails 12, 13.

[0038] It is noted that the terms top portion and bottom portion of the screening body 15 denote the position the respective portions assume in the mounted condition of the screening arrangement 10. Other mounting positions are conceivable.

[0039] The screening body 15 is typically made from cloth or fabric, which may be flexible to allow rolling up, but may also be pleated. However, other screening devices having other kinds of screening bodies are conceivable for use in the screening arrangement of the invention. Hence, it is noted that as used herein the term "screening body" is intended to encompass all feasible types of screening bodies, examples being roller blinds, lamella blinds, curtains, awnings, roller shutters, and shades.

[0040] The screening arrangement comprises a position indicator 16 slidably positionable along one or the other of the side rails 12, 13 for manually indicating a desired longitudinal position of the bottom element 14. In the following, the position indicator 16 will be described as being positioned on the right-hand side rail 12. The longitudinal position of said position indicator 16 is manually adjustable by physical movement of the position

indicator to an arbitrary longitudinal position along the side rail 12. The bottom element 14 is provided with a notch 141 by which the position indicator 16 is able to be brought into releasable positive engagement. Further details of such a position indicator are given in Applicant's co-pending EP applications.

[0041] In the embodiments shown, the screening device is electrically operated by means of electric drive means 22 of the screening arrangement 10, to be described in further detail below. In order for the electric drive means to work, energy is required. The energy may be collected from the solar panels 27 as shown in FIGS. 5 and 6 and/or mains power supply, preferably supplemented by battery means 28 (shown in Fig. 17). For the solar panels to be able to be exposed to as much sunlight as possible it is preferred to have the solar panels 27 placed on the side of the bottom element 14 facing the window glazing, assuming the screening arrangement 10 is mounted on the inside side of a window. The solar panel generally extends in a plane parallel to the screening plane SP.

[0042] Further details shown in FIGS. 6 and 7 include operating means of the electric drive means 22. The operating means comprise a cogwheel 144 for interacting with a rack 124 on each side rail 12, 13 to translate rotational movement of the cogwheel 144 to translational movement of the bottom element 14. One cogwheel 144 is present at each longitudinal end portion of the bottom element 14, as shown on a rotatable shaft 143, and the cogwheels 144 constitute first transmission means to interact with second transmission means including the two racks 124 arranged in the respective side rails 12, 13 to facilitate the translational movement of the bottom element 14 along the longitudinal direction L. By the term "at each longitudinal end portion" etc. is to be understood throughout the description and claims that the cogwheels are provided at, near, or proximate such end portions of the bottom element. This does not exclude that parts, portions or components of the bottom element may be present beyond the position of the cogwheel, as seen the longitudinal direction of the bottom element, or width direction W of the screening arrangement 10. By near or proximate, it is meant that the cogwheels are disposed or oriented so as to engage a corresponding rack to move the screening body between a screening position or state and a non-screening position or state when such operation is desired, i.e., moving between a screening position or state and a non-screening position or state. Typical ranges for any distance between the cogwheels and the respective physical end portion of the bottom element are 0 to 20 mm, in particular 5 to 10 mm.

[0043] By the term "in the side rail" etc. is to be understood that the rack is located in conjunction with, associated with, or on the side rail in question. The rack may be formed as a separate part connected to the side rail, be formed integrally with, or constitute a portion of the side rail.

[0044] Depending on whether the screening arrange-

ment is powered by solar panels 27, possibly supplemented by battery means, or mains power, end pieces of the top casing 11 interact with suitable mounting brackets (not shown) provided for instance on the side members 2.2, 2.3 of the frame 2. Such mounting brackets are well-known in the art and are typically premounted in commercially available roof windows, comprising a standard version or a version including electric contacts as described in Applicant's European patents Nos. 2002079 and 3203008.

[0045] In that regard, the embodiment shown in FIG. 14 provides a detailed rear view of the top casing 11 as shown in FIG. 5, in which an end piece 25 is shown to interact with a standard version mounting bracket. This is made possible, since the solar panels 27, possibly supplemented by battery means, provide the power required to operate the screening arrangement 10.

[0046] Differently, FIG. 15 shows a detailed side view of the top casing 11 of an alternative embodiment in which the end piece 25 is provided with electric terminals 25a for interaction with a mounting bracket including electric contacts, for instance of the kind mentioned in the above.

[0047] Referring now to FIGS. 8 and 9 these figures show an example of the mounting of a unit comprising the top casing 11, screening body 15 and bottom element 14 of a screening arrangement of the prior art, specifically of a commercially available screening arrangement for mounting in the frame 2 of a roof window 1. Here, the top casing 11 is clicked onto the mounting bracket 24 by means of an end piece (not shown), correspondingly at the other side (part 2 of Fig. 8). An angular bracket 26 is positioned at the end of the top casing 11 and interacts with a side guidance element 142 at the end of the bottom element 14. The top casing 11 and the bottom element 14 are now ready for further mounting of the side rails 13 (opposite side rail not shown). Fig. 9 shows the side rail 13 being slid along the side member 2.3 (part 1). The arrows depicted on the figure indicate the motion of the side rail 13 going towards the angular bracket 26 and the side guidance element 142. To connect the side rail 13 to the bottom member 2.4 the side rail is clicked onto a fitting (not shown in detail) at the bottom member 2.4 (part 2). The prior art drawings further show a band around the top casing 11 and the bottom element 14, which allows the user to mount the parts without the screening body 15 rolling down.

[0048] Referring now to FIGS. 10 and 11, it is shown how the end piece 25 of the top casing 11 is provided with a rack segment 254 configured to be adjoined with the rack 124 of the respective side rail 12, 13 in the mounted condition of the screening arrangement 10 to form a continuous rack path for the cogwheel 144 of the first transmission means. It is noted that the configuration of the end piece 25 applies to versions including electric terminals and versions without such terminals. Details of the top casing 11 including the cogwheel 144 of the first transmission means are not indicated for clarity reasons.

[0049] In the embodiment of the screening arrange-

ment 10 shown in FIG. 10, the rack segment 254 of each end piece 25 has a top end 254a and a bottom end 254b. The distance between the top and bottom ends 254a, 254b defines a length of the rack segment 254 in the longitudinal direction L. The length is selected such that the cogwheel 144 of the first transmission means is able to be put in a position in which the cogwheel 144 is engaged with the rack segment 254 in a supply condition of the screening arrangement 10. Thus, the rack segment 254 has at least such a length that it extends at least to the lowermost point of the cogwheel 144, as seen in the depth direction D. In the specific embodiment shown in FIG. 10, the length is such that the bottom end 254b is located at some distance below the lowermost point of the cogwheel 144.

[0050] While the length of the rack segment 254 depends on factors such as the position of the top end 254a and the position of the cogwheel 144 of the first transmission means, a suitable length of the rack segment 254 of each end piece 25 is as indicated in FIG. 10, in which the length substantially corresponds to a height of the bottom element 14 as seen in the longitudinal direction L.

[0051] In the embodiment shown, the top end 254a of the rack segment 254 of each end piece 25 is positioned at a transition portion 255 formed at a lower edge of the end piece 25. The presence of the transition portion 255 ensures that the functionality of the end piece 25 is not impaired, i.e. that the end piece 25 is still able to be guided over the mounting bracket 24, thus ensuring connection of the top casing 11 with the frame 2.

[0052] As shown, each end piece 25 of the shown embodiment comprises a body portion 250 which is plane and parallel to a plane spanned by the length direction L and the depth direction D. A top resilient arm 251 and a bottom flange 252 form engagement means to interact with the mounting bracket 24 (FIG. 8) connected with the associated side member 2.2, 2.3 of the frame 2 of the roof window 1 in the mounted condition of the screening arrangement 10.

[0053] The rack segment 254 is here formed integrally with the end piece 25. The end piece 25 including the transition portion 255 may for instance be moulded in one piece with the rack segment 254. As an alternative, the rack segment 254 may be formed separately and then connected with the end piece 25 at the transition portion 255, or to other parts of the end piece 25 in case no transition piece is present.

[0054] FIG. 11 and FIG. 12 further show that each end piece 25 in the embodiment shown comprises a first connection portion 256 extending from the body portion 250, here also a second connection portion 257 and a third connection portion 258, for connection of the end piece 25 with the top casing 11, for instance to longitudinal profiles of the top casing 11 to be described below. Depending on the shape of the top casing 11, the first, second and third connection portions 256, 257 and 258 extend perpendicularly to the body portion 250.

[0055] To improve the structural integrity of the end

piece 25, an abutment portion 253 is formed protruding from the body portion 250, and the transition portion 255 is formed in conjunction with the abutment portion 253. The abutment portion 250 further serves as a stop for the movement of the top casing 11 onto the mounting bracket 24.

[0056] Finally, the end piece 25 has a stub 259 to receive a roller shaft 23 (FIG. 17).

[0057] FIG. 13 shows an embodiment of the screening arrangement where the rack 124 in each side rail 12, 13 is composed by a plurality of rack segments 1241, 1242 adjoined with each other in the mounted condition of the screening arrangement 10 by means of connection means 1241a, 1241b, 1242a, 1242b so as to form a continuous rack path for the cogwheel 144 of the first transmission means together with the rack segment 254 of the associated end piece 25. Typically, such rack segments 1241, 1242 are manufactured in standard lengths and then a suitable combined length is selected in accordance with the size of the screening arrangement 10, on which the length of the side rails 12, 13 is dependent.

[0058] FIG. 14 shows an embodiment of the end piece 25 provided with the rack segment 254 and interacting with the rack 124 of the side rail 13 extending in the longitudinal direction L to form a continuous rack path in the side rail 13. As mentioned in the above, the end piece 25 of the embodiment of FIG. 14 is an end piece without electric terminals and is configured for cooperating with a standard mounting bracket 24. In contrast, FIG. 15 shows an embodiment in which electric terminals 25a are included.

[0059] Regardless of the configuration of the end piece 25, further features of one embodiment are illustrated by the difference in cross-section of the side rails 12, 13 along the lines AA-AA and BB-BB in FIGS. 14 and 15.

[0060] Turning now to FIGS. 16A and 16B, the configuration of the side rails 12, 13 and optional adaptation thereof will be described. As mentioned in the above, the first flange 121 forms a front of the side rail 12, and the leg 123 extending at the right angles to the first flange 121 forms a connection section by which the side rail 12, 13 is to be connected to the respective side member 2.2, 2.3 of the frame 2.

[0061] As shown in FIG. 16B, the second flange 122 protrudes from the leg 123 at a distance from the first flange 121 as seen in the depth direction D. In this way, a track 12b is defined between the first and second flanges 121, 122 for guiding the side edge portions 152, 153 of the screening body 15, or elements positioned at these side edge portions.

[0062] The rack 124 of the side rail 12, 13 is provided on an underside of the second flange 122 in the section along lines BB-BB, i.e. as shown in FIG. 16B. Regarding the extension of the rack 124 in the longitudinal direction, several possibilities are conceivable:

As a first alternative, the rack 124 is formed such that it extends up to a predefined point on the underside of the

second flange 122 of the side rail 12, 13. At the upper portion of this underside, which is thus free of rack from the outset, the rack segment 254 of the end piece 25 may then be accommodated in the mounted condition. In this way, the rack segment 254 is supported by abutment with the second flange 122.

[0063] As a second alternative, the first flange 121 is longer than the second flange 122 so as to accommodate the rack segment 254 of the associated end piece 25 in the mounted condition of the screening arrangement 10. This configuration is illustrated in FIG. 16A. While this embodiment may contribute to facilitating mounting, it also puts stricter requirements to the rigidity of the rack segment 254.

[0064] Regarding the configuration of the top casing 11 and the interaction with the bottom element 14, reference is made to FIG. 17, in which it is seen how the bottom portion 154 of the screening body 15 in the embodiment shown is connected to the bottom element 14 at or near a top edge 140a of a front 140 of the bottom element 14. In order to provide connection of the screening body 15 and the bottom element 14, the bottom portion 154 is folded around a locking wire 154a; the package thus obtained is accommodated in the bottom element 14. In addition to the front 140, the bottom element 14 comprises an upwards facing surface 145 and a back portion 149 with a top edge 149a. The back portion 149 accommodates the solar panel 27 on an exterior side. A receiving space RS is delimited in the longitudinal direction L by a first plane P1 substantially parallel with a plane spanned by the width direction W and the depth direction D, and a second plane P2 parallel with the first plane P1 and located at a higher level than the first plane P1.

[0065] The bottom element 14 in FIG. 17 is in a position corresponding to the non-screening position of the screening arrangement 10, as the bottom element 14 abuts or is close to a bottom edge 114b opposite a top edge 114a of a front rail 114 of the top casing 11 and a portion of the screening body 15 is rolled up on the roller shaft 23, for instance such that a majority of the rolled-up screening body 15 is accommodated in the receiving space RS. Furthermore, first, second and third profiles 14a, 14b, and 14c are shown in FIG. 17. The profiles 14a, 14b, 14c form an outer shell of the bottom element 14 extending over the whole width of the bottom element. The second profile 14b comprises protrusions to support the solar panel 27 and an opening to allow the solar panel to be exposed to light. The first and third profile 14a, 14c are interconnected by overlapping portions of the profiles. As it also appears from FIG. 17, the bottom element 14 comprises an operating space OS to accommodate operating means of the electric drive means. The operating space OS also accommodates the battery means 28. Finally, the top casing 11 comprises a cover top portion 113 and a cover back portion 115 with a bottom edge 115b. The top casing 11 is in the embodiment shown composed by a set of profiles 11a, 11b defining a cross-sectional shape of the top casing 11. Here, the first profile

11a comprises the front rail 114, the cover top portion 113 and the cover back portion 115, and the second profile 11b comprises an additional back element adjoining the cover back portion 115. Also, the bottom element 14 of the embodiment shown comprises a main portion composed by a set of profiles, for instance the profiles 14a, 14b, 14c shown in FIG. 17, defining a cross-sectional shape of the bottom element 14. The third profile 14c is curved, forming a hollow to accommodate the screening body 15 in the non-screening position. The bottom element 14 further comprises two end portions surrounding respective longitudinal ends of the main portion of the bottom element 14, closing the openings created by the set of profiles. Further details of the configuration of the top casing 11 and the bottom element 14 are given in Applicant's co-pending patent application filed on the same date as the present application.

[0066] During operation of the screening arrangement, the desired screening position and of the non-screening position may be indicated by means of the above-mentioned position indicator, which could have the following functionality in a screening arrangement (10):

the screening arrangement further comprises a position indicator (16) slidably positionable along at least one of the side rails (12) for manually indicating a desired longitudinal position of the bottom element (14), the longitudinal position of said position indicator (16) being manually adjustable by physical movement of the position indicator (16) to an arbitrary longitudinal position along the at least one side rail (12), the position indicator (16) being configured to engage the bottom element (14) by releasable positive engagement means when the bottom element (14) is brought into contact with the position indicator (16) to assume an engaged condition, in such a way that:

- i) the positive engagement means is arranged to be released when the longitudinal position of the position indicator (16) is manually adjusted by applying a force on the position indicator substantially in said longitudinal direction (L), and
- ii) the positive engagement means is arranged to keep the position indicator (16) in the engaged condition with the bottom element (14) to follow the movement of the bottom element (14) in said longitudinal direction (L) when the bottom element (14) is moved in the longitudinal direction (L) by activation of the electric drive means (22).

[0067] Specific embodiments of the invention have now been described. However, several alternatives are possible, as would be apparent for someone skilled in the art.

[0068] Such and other obvious modifications must be considered to be within the scope of the present invention, as it is defined by the appended claims.

List of reference numerals

[0069]

- | | | |
|----|-------|-------------------------------------|
| 5 | 1 | roof window |
| | 2 | frame |
| | 2.1 | top member |
| | 2.2 | side member |
| 10 | 2.3 | side member |
| | 2.4 | bottom member |
| | 3 | window opening |
| 15 | 4 | pane |
| | 10 | screening arrangement |
| | 11 | top casing |
| 20 | 11a | first profile |
| | 11b | second profile |
| | 113 | cover top portion |
| | 114 | front rail |
| | 114a | top edge of front rail |
| 25 | 114b | bottom edge of front rail |
| | 115 | cover back portion |
| | 115b | bottom edge of cover back portion |
| | 12 | side rail |
| 30 | 12b | track |
| | 121 | first flange |
| | 122 | second flange |
| | 123 | leg |
| | 124 | rack |
| 35 | 1241 | rack segment |
| | 1241a | connection means |
| | 1241b | connection means |
| | 1242 | rack segment |
| 40 | 1242a | connection means |
| | 1242b | connection means |
| | 13 | side rail |
| | 14 | bottom element |
| 45 | 14a | first profile |
| | 14b | second profile |
| | 14c | third profile |
| | 140 | front of bottom element |
| | 140a | top edge of front of bottom element |
| 50 | 141 | notch |
| | 142 | side guidance element |
| | 143 | shaft |
| | 144 | cogwheel |
| | 145 | plane upwards facing surface |
| 55 | 149 | back portion |
| | 149a | top edge of back portion |
| | 15 | screening body |

	151 top portion	
	152 side edge	
	153 side edge	
	154 bottom portion	
	154a locking wire	5
16	position indicator	
22	electric drive means	
23	roller shaft	10
24	mounting bracket	
25	end piece	
	25a electric terminals	
	250 body portion	
	251 top resilient arm	15
	252 bottom flange	
	253 abutment portion	
	254 rack segment	
	254a top end	
	254b bottom end	20
	255 transition portion	
	256 first connection portion	
	257 second connection portion	
	258 third connection portion	
	259 stub	25
26	angular brackets	
27	solar panel	
28	battery means	
L	longitudinal direction	30
W	width direction	
D	depth direction	
SP	screening plane	35
P1	first plane	
P2	second plane	
RS	receiving space	
OR	operating space	40

Claims

1. A screening arrangement (10) for a window, preferably a roof window (1), said window comprising a frame (2) with a top member (2.1), a bottom member (2.4) and two mutually parallel side members (2.2, 2.3), said screening arrangement (10) comprising:
 - a screening body (15) having two side edges (152, 153) and a top and bottom portion (151, 154),
 - two side rails (12, 13), each extending in a longitudinal direction (L), a width direction (W) and a depth direction (D), each side rail (12, 13) being configured to be connected to a respective side member (2.2, 2.3) of the frame (2) in a mounted condition of the screening arrangement (10),

a top casing (11) accommodating at least the top portion (151) of the screening body (15) and configured to be connected to the frame at the top member (2.1) thereof and to an upper end of the respective side rail (12, 13) in the mounted condition of the screening arrangement (10), the top casing (11) being composed by at least one longitudinal profile (11a, 11b) extending in a direction parallel to the width direction (W) in the mounted condition, and two end pieces (25) connected to respective longitudinal ends of the top casing (11),

a bottom element (14) connected to the bottom portion (154) of the screening body (15) and being configured to be longitudinally positionable in said longitudinal direction (L) between a non-screening position of the screening body (15) and a screening position by means of drive means (22) operably connecting the bottom element (14) and the side rails (12, 13),

said drive means (22) comprising operating means including first transmission means including a cogwheel (144) at each longitudinal end portion of the bottom element (14) and second transmission means including a rack (124) arranged in each of the side rails (12, 13),

characterised in that

each end piece (25) of the top casing (11) is provided with a rack segment (254) configured to be adjoined with the rack (124) of the respective side rail (12, 13) in the mounted condition of the screening arrangement (10) so as to form a continuous rack path for the cogwheel (144) of the first transmission means.

2. A screening arrangement according to claim 1, wherein the rack segment (254) of each end piece (25) has a top end (254a) and a bottom end (254b), the distance between the top and bottom ends (254a, 254b) defining a length of the rack segment (254) in the longitudinal direction (L), the length being such that the cogwheel (144) of the first transmission means is in engagement with the rack segment (254) in a supply condition of the screening arrangement (10).
3. A screening arrangement according to claim 2, wherein the length of the rack segment (254) of each end piece (25) substantially corresponds to a height of the bottom element (14) as seen in the longitudinal direction (L).
4. A screening arrangement according to any one of claims 2 or 3, wherein the top end (254a) of the rack segment (254) of each end piece (25) is positioned at a transition portion (255) formed at a lower edge of the end piece (25).

5. A screening arrangement according to any one of the preceding claims, wherein each end piece (25) comprises a body portion (250) which is substantially plane and parallel to a plane spanned by the length direction (L) and the depth direction (D), and wherein a top resilient arm (251) and a bottom flange (252) form engagement means configured to interact with a mounting bracket (24) connected with the associated side member (2.2, 2.3) of the frame (2) of the roof window (1) in the mounted condition of the screening arrangement (10). 5 10
6. A screening arrangement according to any one of the preceding claims, wherein the rack segment (254) is formed integrally with the respective end piece (25). 15
7. A screening arrangement according to any one of claims 5 or 6, wherein each end piece (25) comprises a first connection portion (256) extending from the body portion (250), preferably also a second connection portion (257), and more preferably also a third connection portion (258), for connection of the end piece (25) with the at least one longitudinal profile (11a, 11b) of the top casing (11), each first and optionally second and third connection portion (256, 257, 258) extending preferably substantially perpendicularly to the body portion (250). 20 25
8. A screening arrangement according to any one of claims 5, 6 or 7 when dependent on at least claim 4, wherein an abutment portion (253) is formed protruding from the body portion (250), and wherein the transition portion (255) is formed in conjunction with said abutment portion (253). 30 35
9. A screening arrangement according to any one of the preceding claims, wherein the top casing (11) comprises a front rail (114), a top cover portion (113), and a back cover portion (115). 40
10. A screening arrangement according to claim 9, wherein the top casing (11) is composed by a set of profiles (11a, 11b) defining a cross-sectional shape of the top casing (11). 45
11. A screening arrangement according to claim 10, wherein a first profile (11a) comprises the front rail (114), the cover top portion (113) and the cover back portion (115), and a second profile (11b) comprises an additional back element adjoining the cover back portion (115). 50
12. A screening arrangement according to any one of the preceding claims, wherein the bottom element (14) comprises a main portion composed by a set of profiles (14a, 14b, 14c) defining a cross-sectional shape of the bottom element (14), and two end portions surrounding respective longitudinal ends of the main portion of the bottom element (14). 55
13. A screening arrangement according to any one of the preceding claims, wherein the rack (124) in each side rail (12, 13) is composed by a plurality of rack segments (1241, 1242) adjoined with each other in the mounted condition of the screening arrangement (10) so as to form a continuous rack path for the cogwheel (144) of the first transmission means together with the rack segment (254) of the associated end piece (25).
14. A screening arrangement according to any one of the preceding claims, wherein each side rail (12, 13) comprises a first flange (121) forming a front of the side rail (12), and a leg (123) extending at substantially right angles to the first flange (121) and by which the side rail (12, 13) is configured to be connected to the respective side member (2.2, 2.3) of the frame (2), wherein a second flange (122) protrudes from the leg (123) at a distance from the first flange (121) as seen in the depth direction (D), and wherein the rack (124) of the side rail (12, 13) is provided on an underside of the second flange (122).
15. A screening arrangement according to claim 14, wherein the first flange (121) is longer than the second flange (122) so as to accommodate the rack segment (254) of the associated end piece (25) in the mounted condition of the screening arrangement (10).
16. A screening arrangement according to claim 14 or 15, wherein the rack (124) of the side rail (12, 13) extends up to a predefined point on the underside of the second flange (122) of the side rail (12) to accommodate the rack segment (254) on an upper portion of the underside of the second flange (122).
17. A screening arrangement according to any one of the preceding claims, wherein the drive means operably connecting the bottom element (14) and the side rails (12, 13) are electric drive means (22), wherein the electric drive means (22) comprise an electric motor located in the bottom element (14) or in the top casing (11), and wherein operating means of the electric drive means (22) accommodated in the bottom element (14) comprise a rotatable shaft connected with the first transmission means, and wherein the electric drive means (22) is powered by solar panels (27) and/or mains power, preferably supplemented by battery means (28).
18. A screening arrangement according to any one of the preceding claims, wherein the drive means comprise a clutch mechanism.

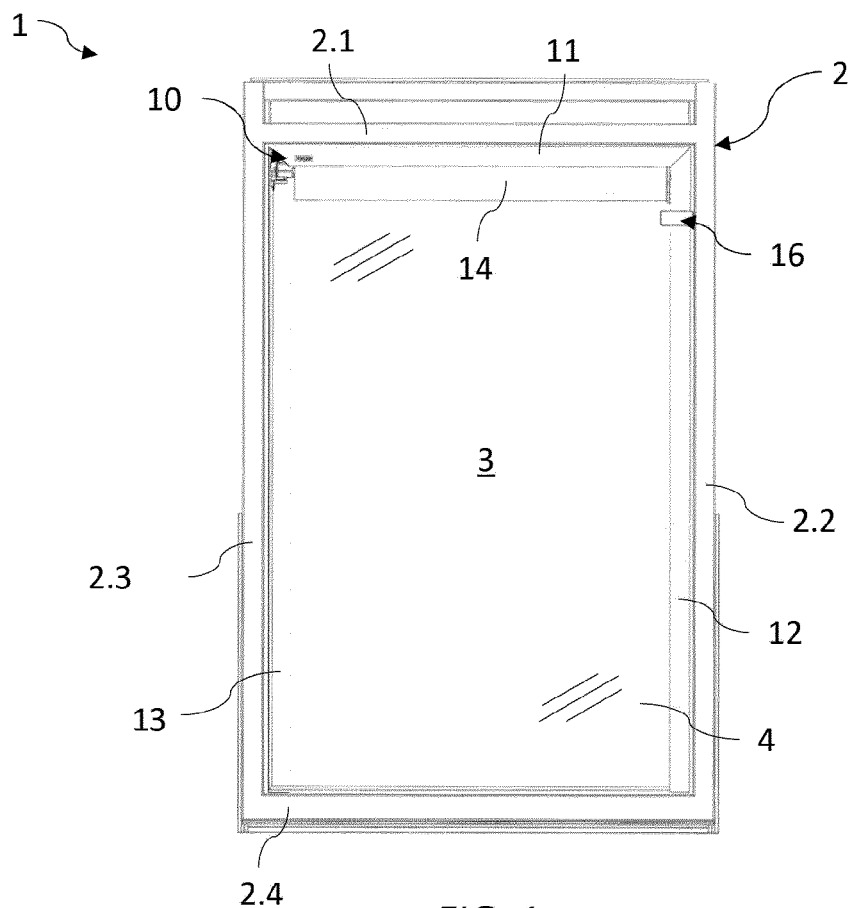


FIG. 1

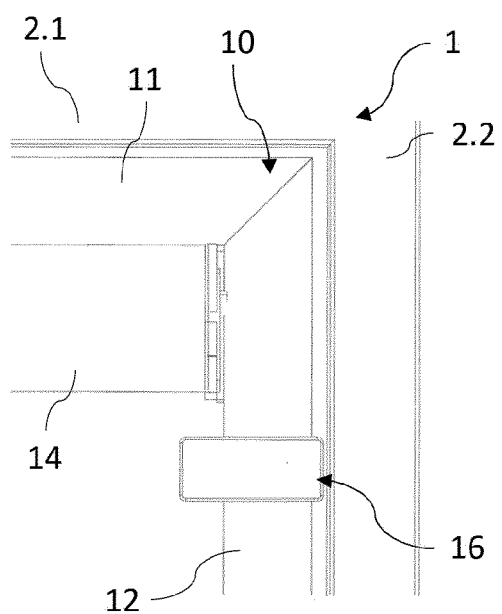


FIG. 2

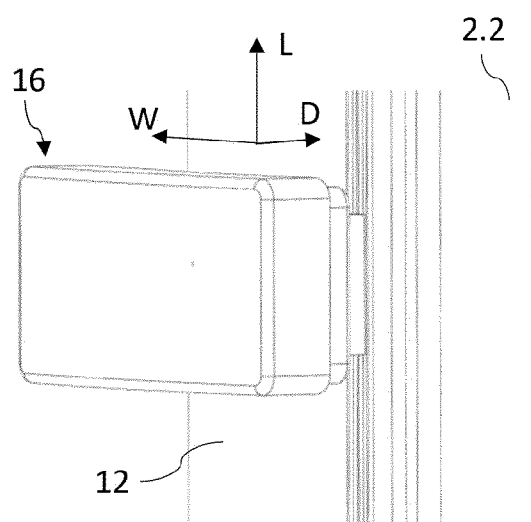


FIG. 3

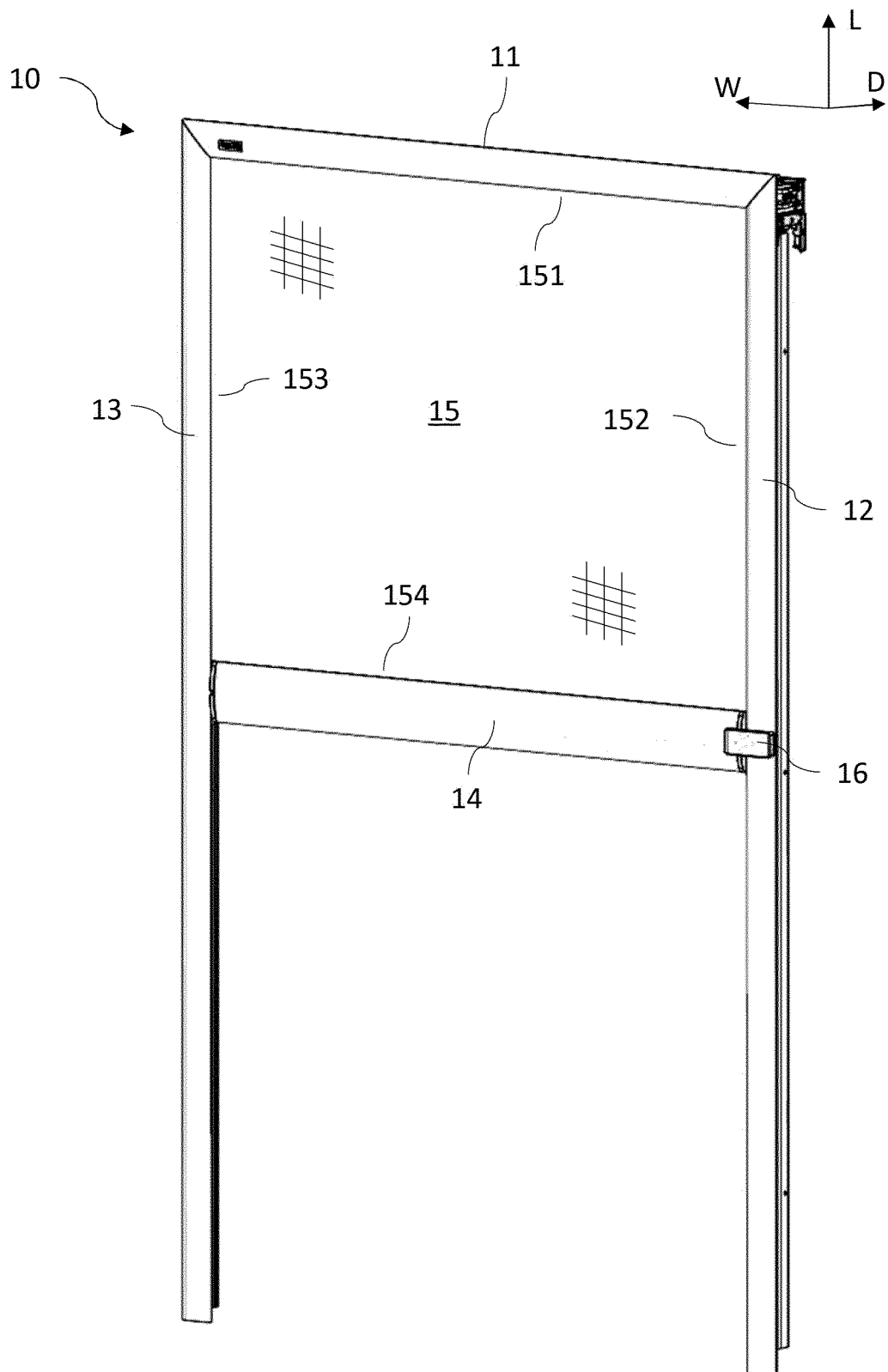


FIG. 4

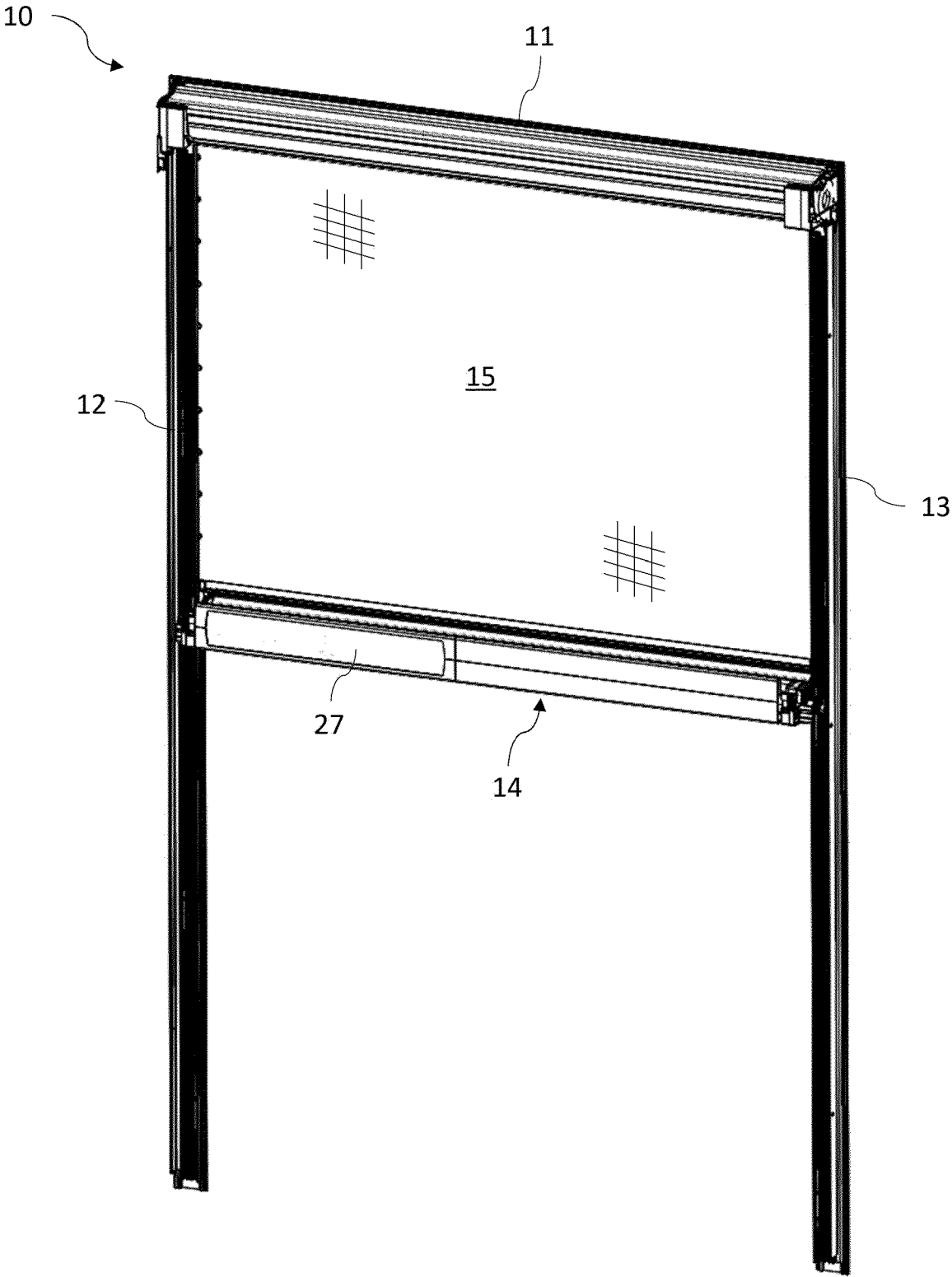


FIG. 5

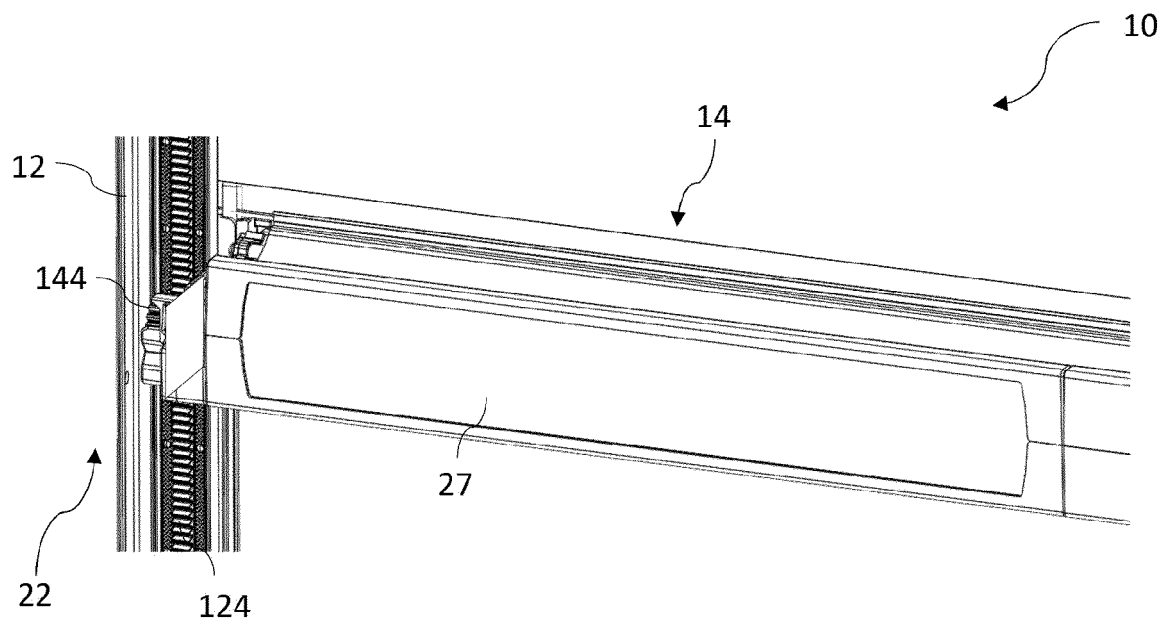


FIG. 6

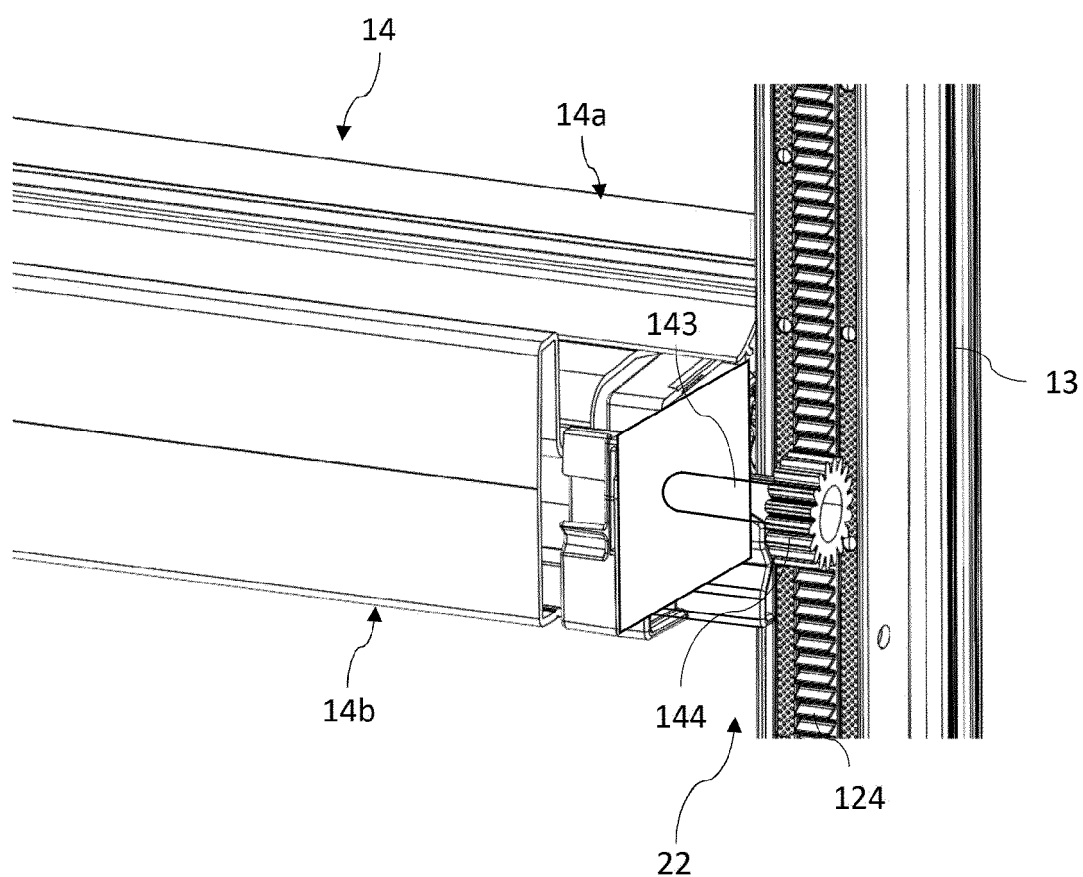


FIG. 7

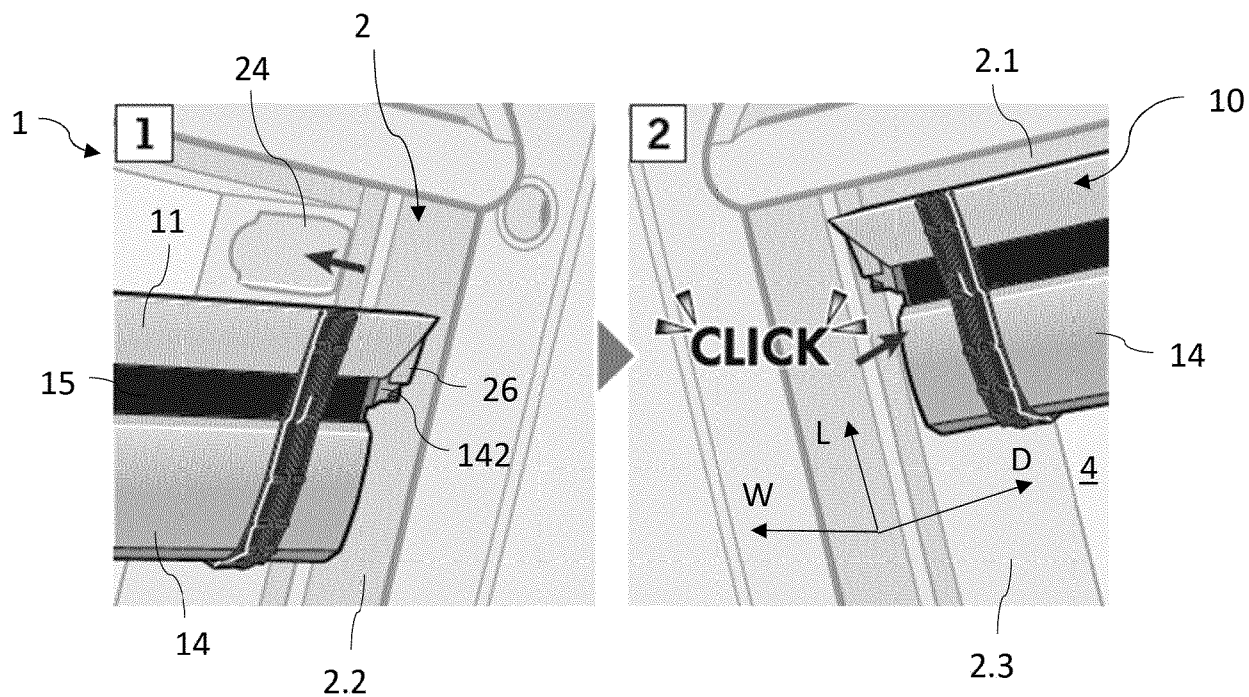


FIG. 8 (PRIOR ART)

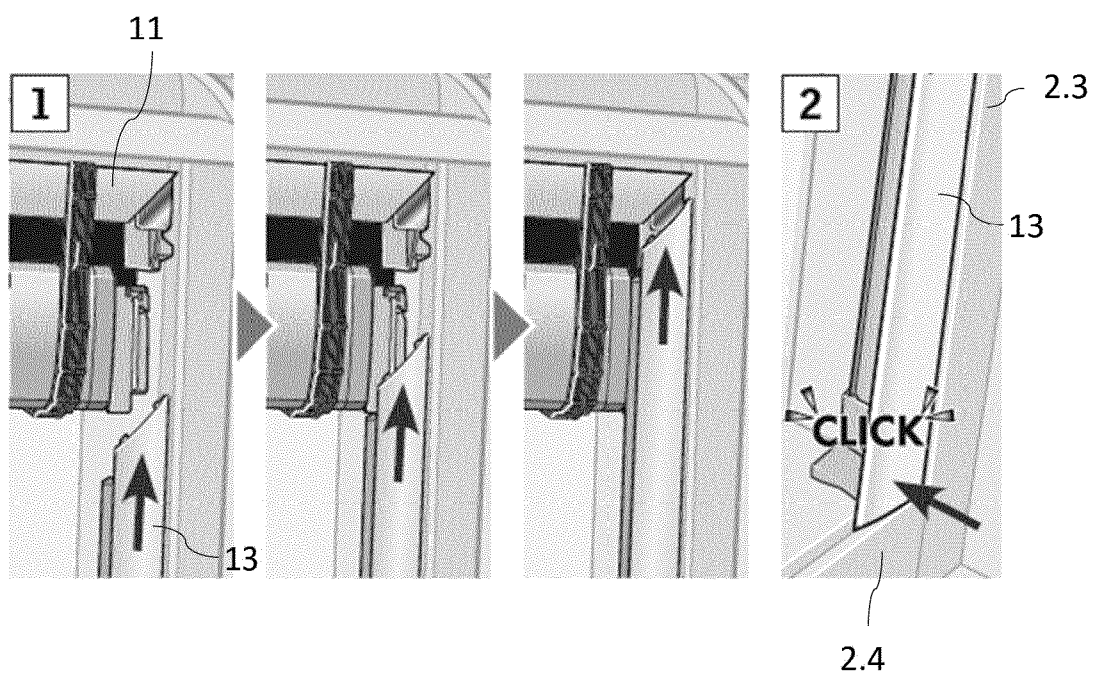


FIG. 9 (PRIOR ART)

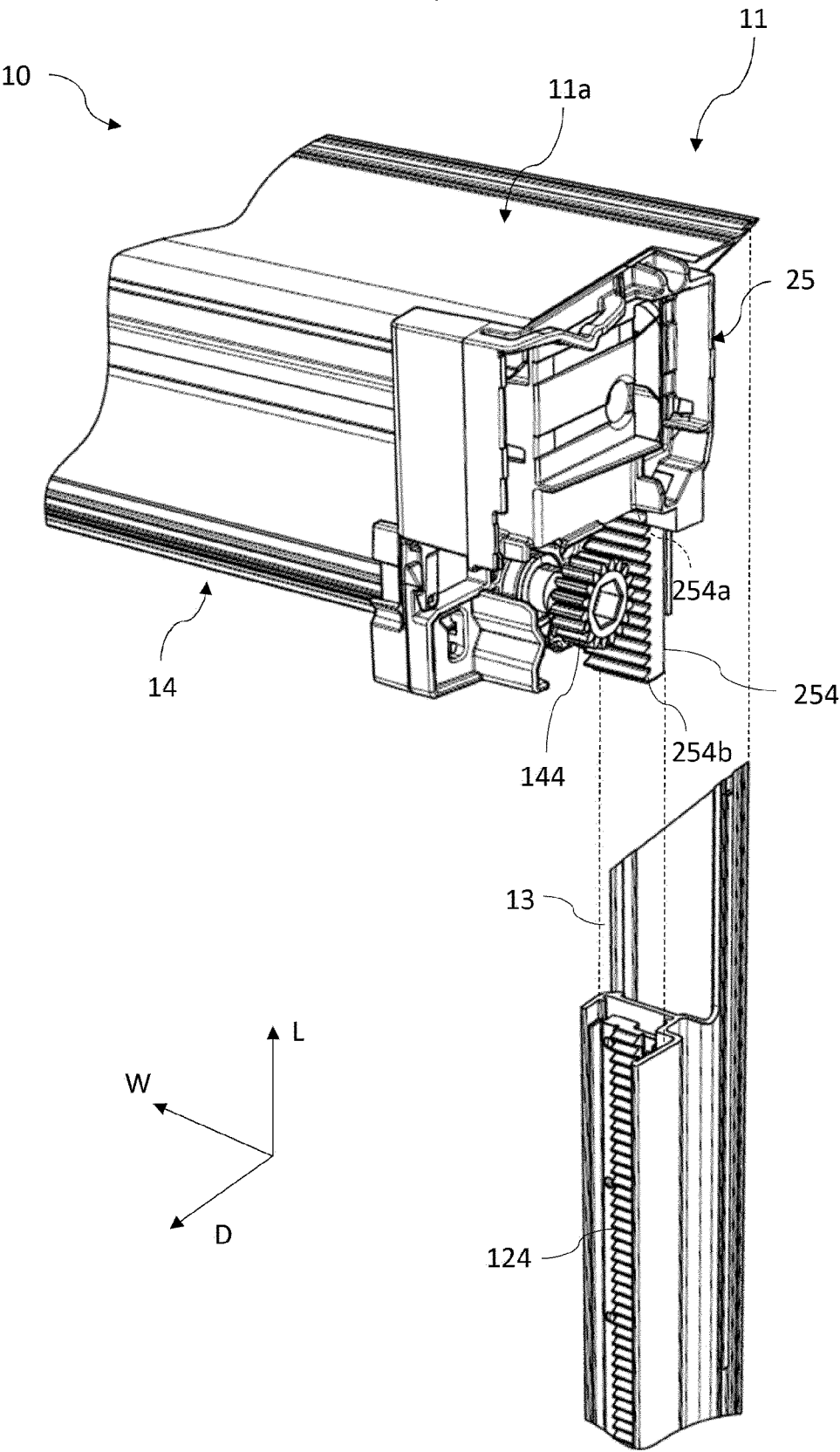


FIG. 10

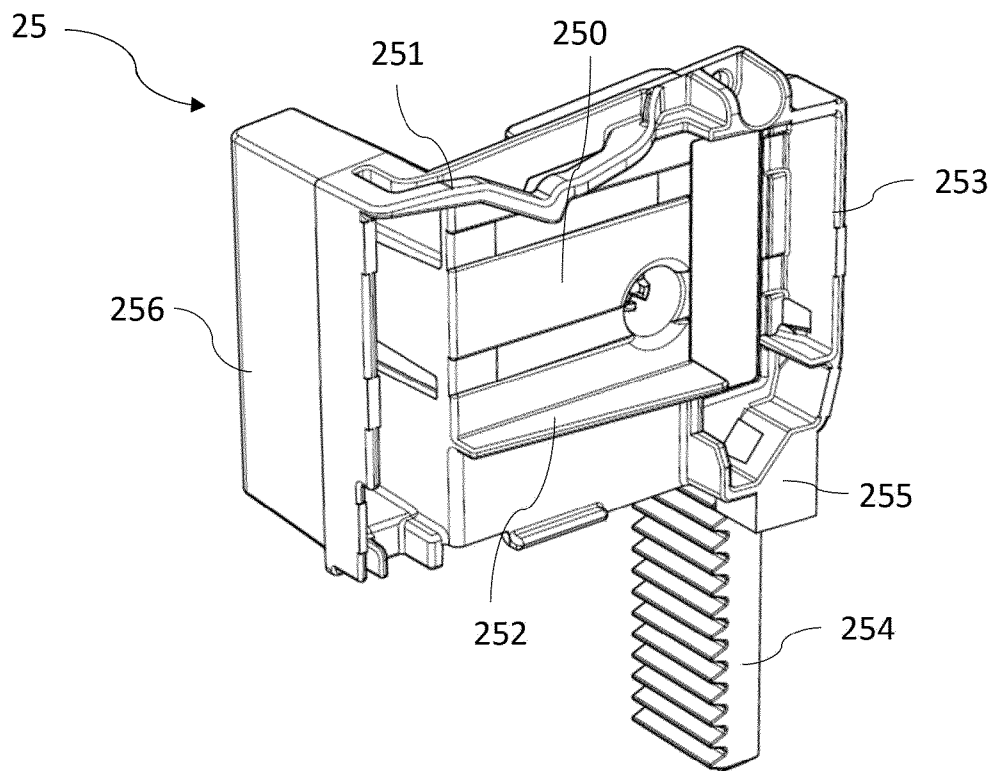


FIG. 11

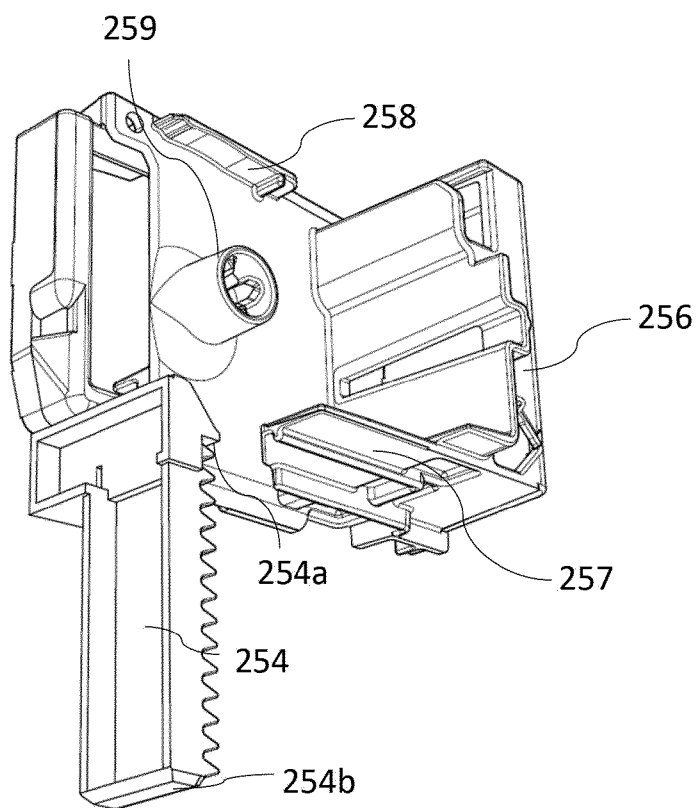


FIG. 12

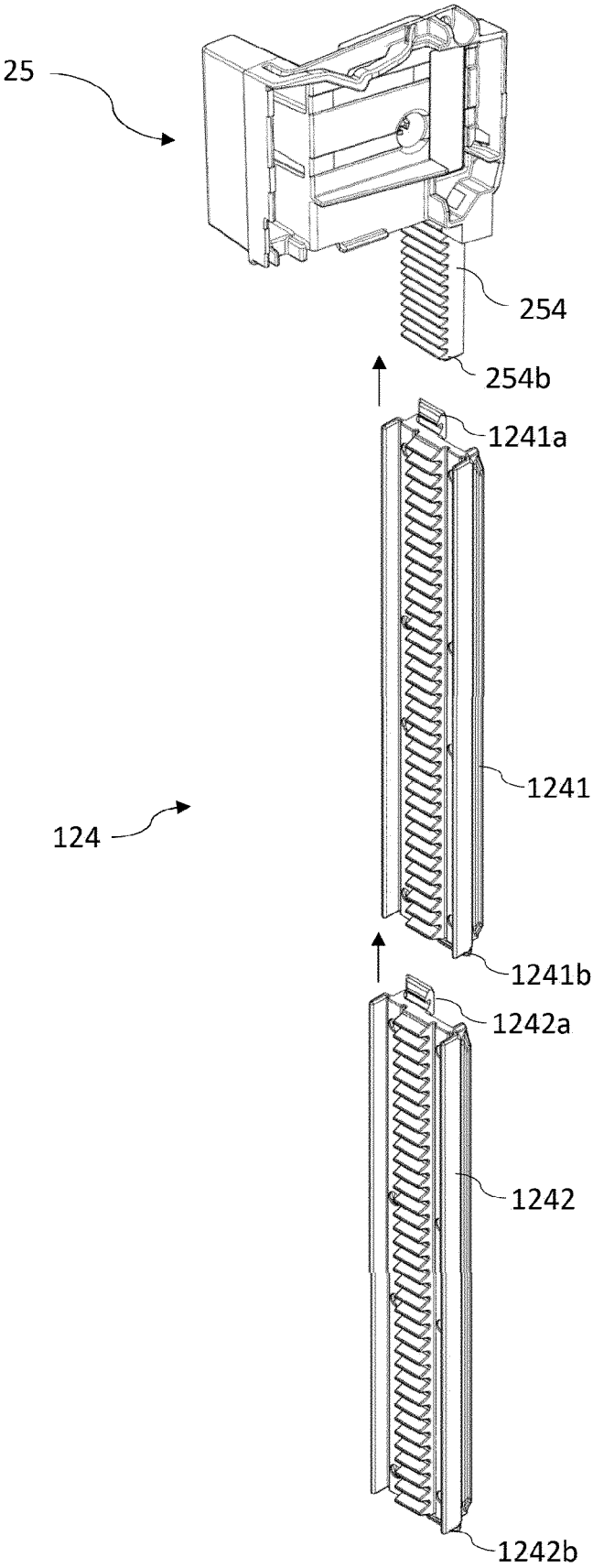


FIG. 13

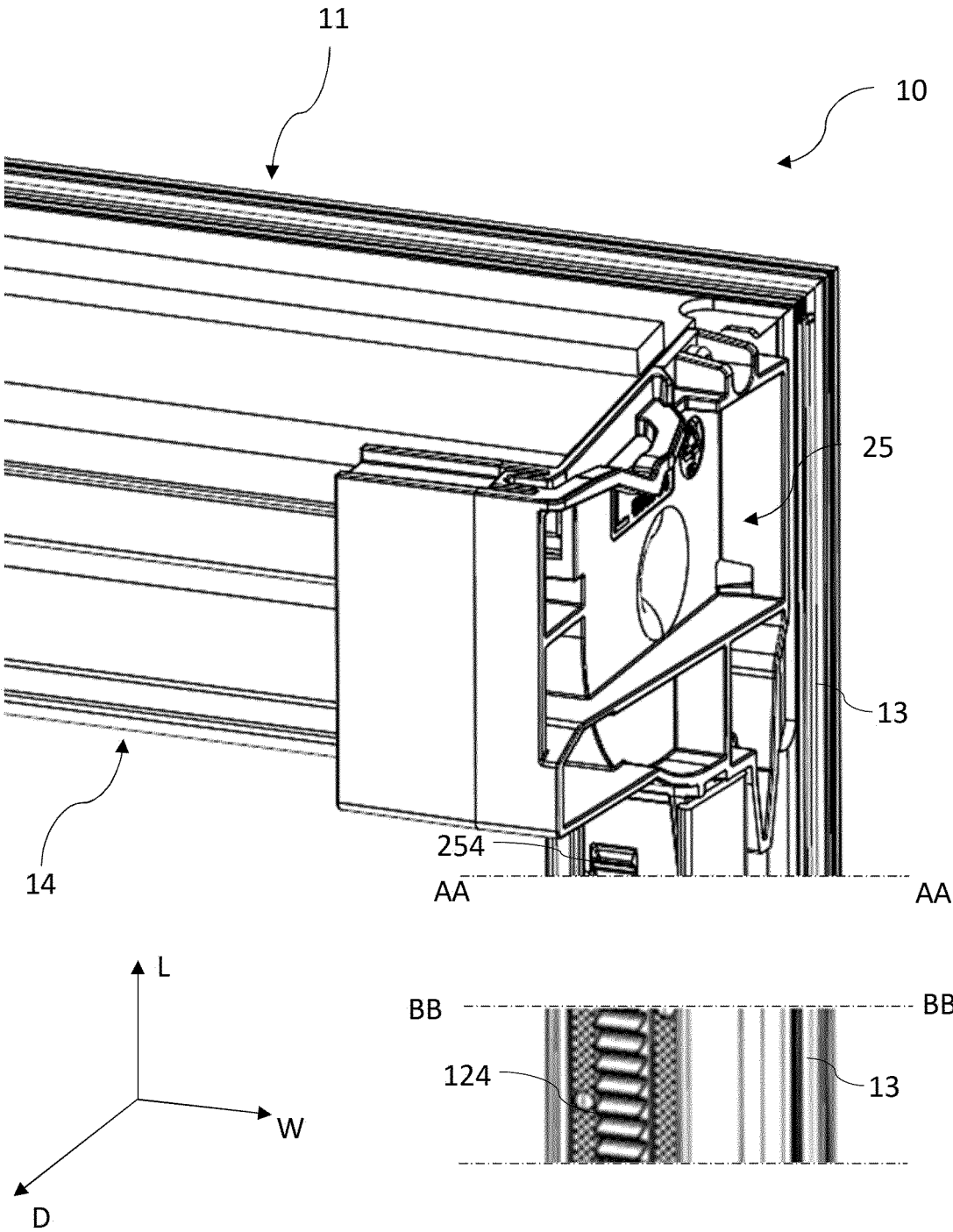


FIG. 14

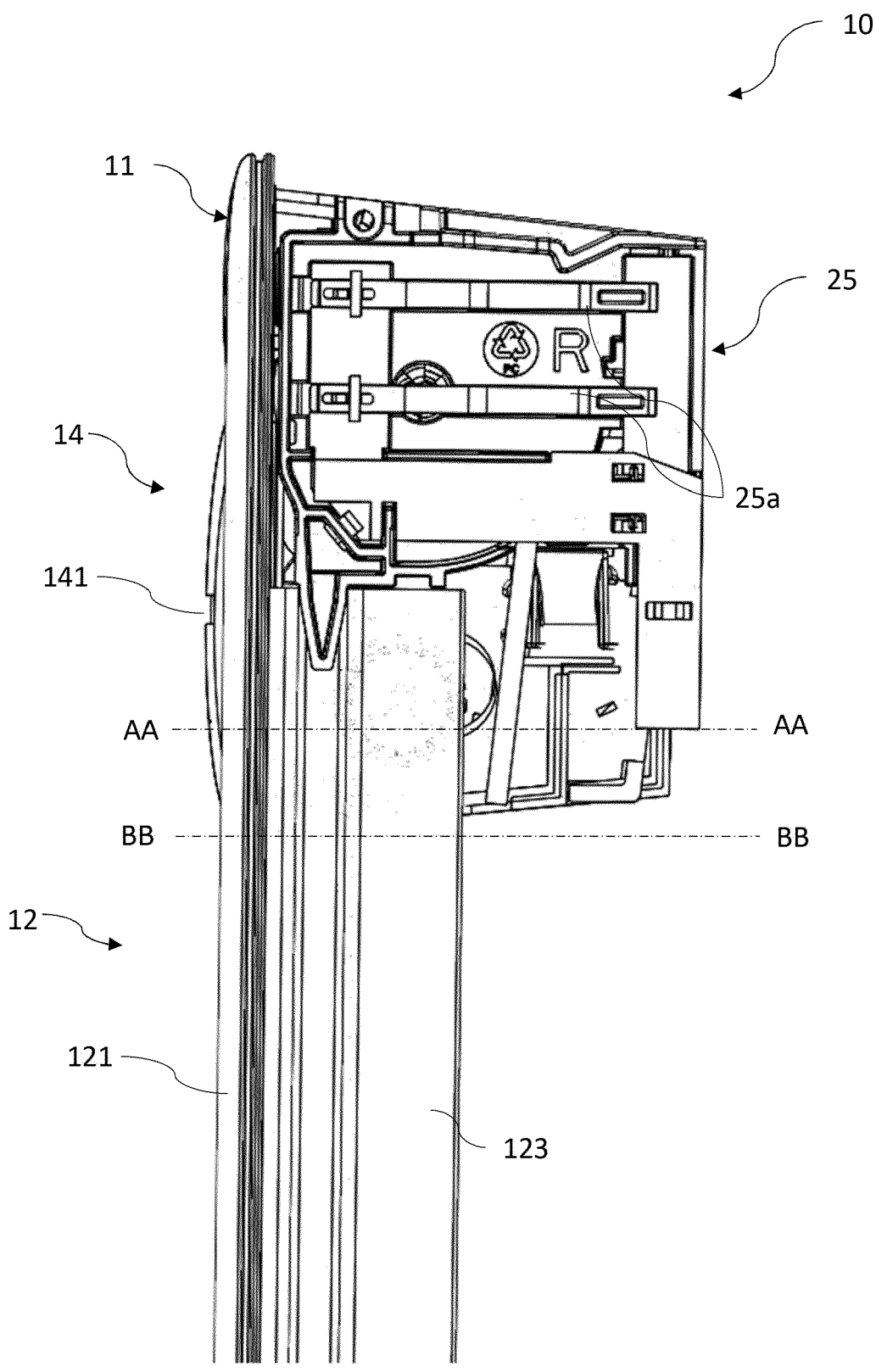


FIG. 15

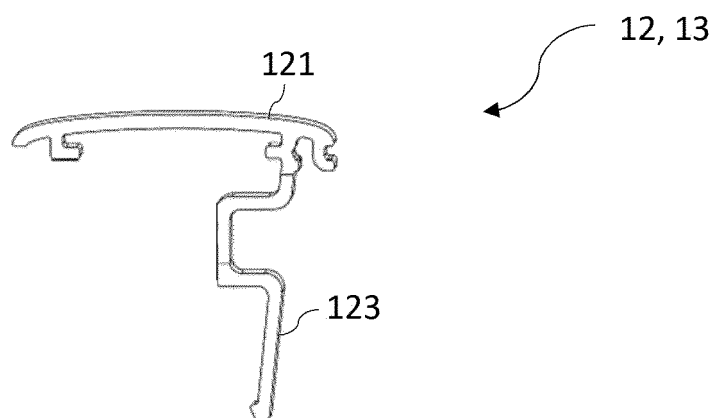


FIG. 16A

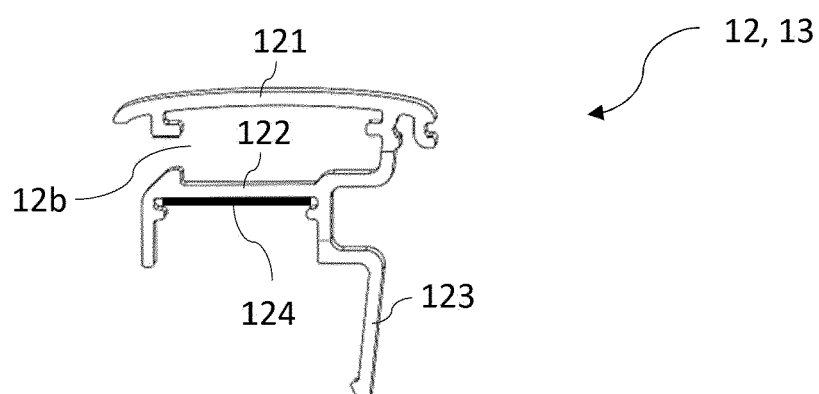
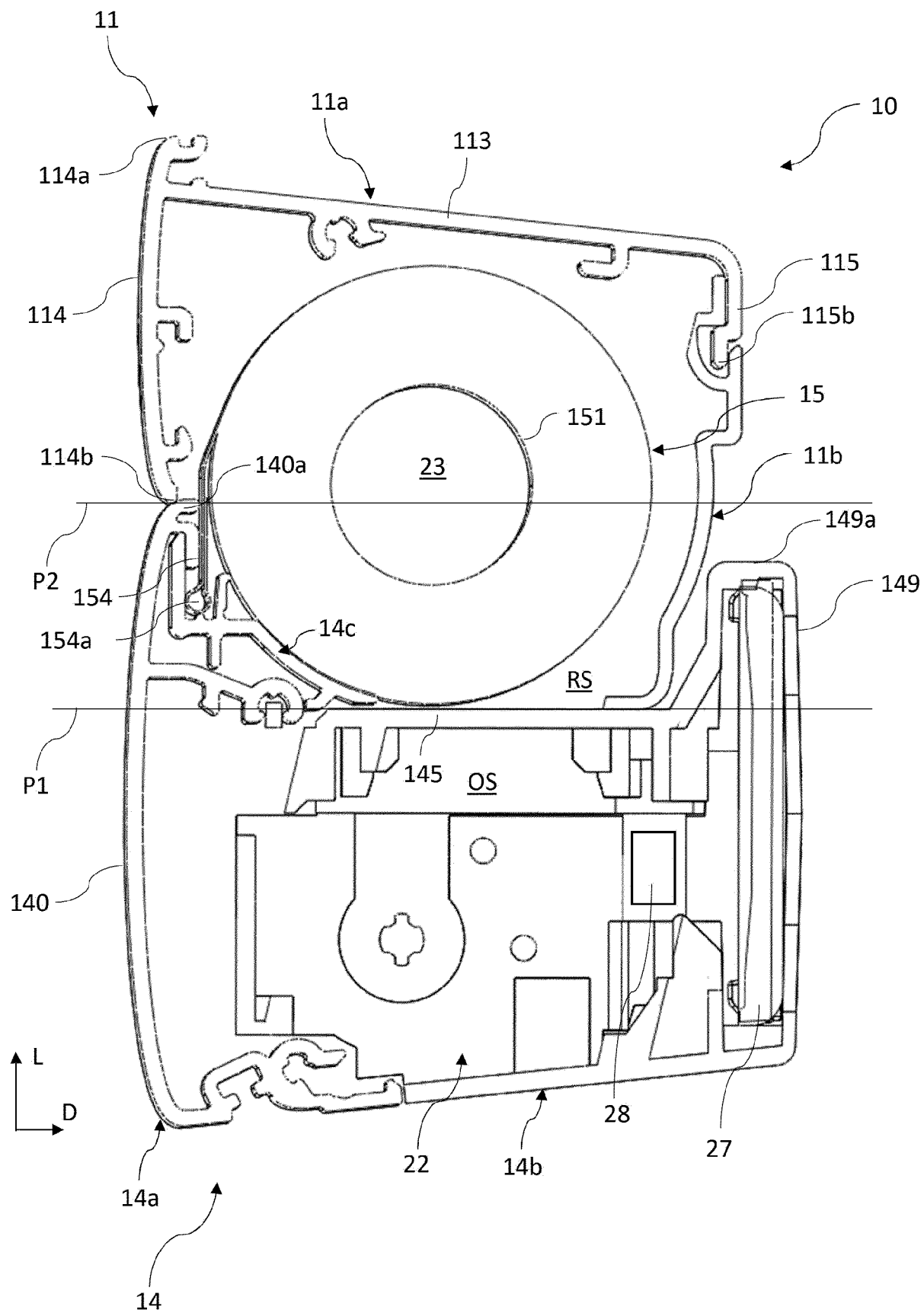


FIG. 16B





EUROPEAN SEARCH REPORT

Application Number

EP 23 21 7799

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 738 342 B1 (VKR HOLDING AS [DK]) 30 September 2015 (2015-09-30) * the whole document * -----	1 - 18	INV. E06B9/58 E04D13/03 E06B9/64 E06B9/70
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B E04D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		3 June 2024	Bourgoin, J
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T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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03 - 06 - 2024

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