



(51) International Patent Classification:
E06B 9/34 (2006.01)

(21) International Application Number:
PCT/DK2008/050120

(22) International Filing Date:
28 May 2008 (28.05.2008)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): **VKR HOLDING A/S** [DK/DK]; Breettevej 18, DK-2970 Hørsholm (DK).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **EBBESEN, Henning** [DK/DK]; Gåsdalvej 10, Borris, DK-6900 Skjern (DK). **ULRIKSEN, Ulrik** [DK/DK]; Fyrstenborgvej 9, DK-6900 Skjern (DK).

(74) Agents: **CARLSSON, Eva** et al.; Rigersgade 11, DK-1316 København K (DK).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: ROLLER SHUTTER WITH TILTABLE SLATS

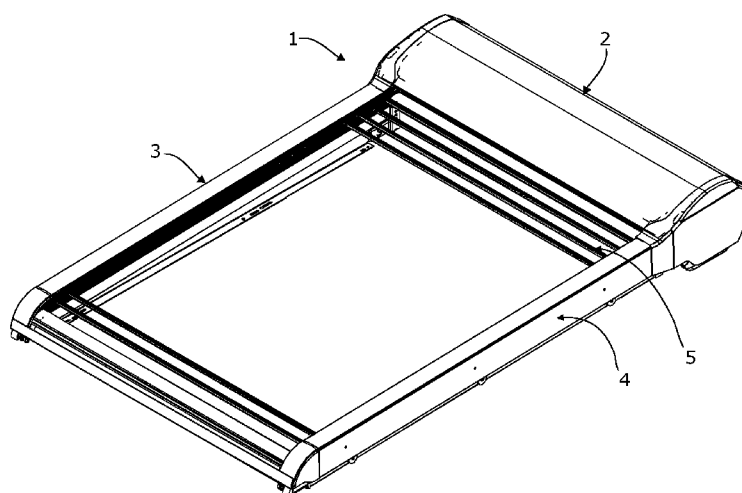


Fig. 12

(57) Abstract: The roller shutter (1) comprises a top element (2) and a shutter body (5) including a plurality of slats. Each slat extends in a longitudinal direction between two end edges and has first and second side edges parallel to the longitudinal direction. The shutter body (5) is adapted to be wound up in and rolled out from said top element (2) by means of a driving device, in a direction perpendicular to said longitudinal direction to a first screening position, in which the shutter body (5) defines a general screening plane, wherein at least some slats of said plurality of slats are tiltable about an axis parallel to said longitudinal direction between the first screening position to a second screening position, in which each tiltable slat forms an angle with said general screening plane. The roller shutter (1) is furthermore provided with two side rails (3, 4), and each side rail comprises at least one part that is movable relative to other parts of the side rail, and the end edges of each slat include guide means adapted to be guided in the at least one movable part of a respective side rail.

ROLLER SHUTTER WITH TILTABLE SLATS

The present invention relates to a roller shutter comprising a top element and a shutter body including a plurality of slats, each slat
5 extending in a longitudinal direction between two end edges and having first and second side edges parallel to the longitudinal direction, said shutter body being adapted to be wound up in and rolled out from said top element by means of a driving device, in a direction perpendicular to
10 said longitudinal direction to a first screening position, in which the shutter body defines a general screening plane, wherein at least some slats of said plurality of slats are tiltable about an axis parallel to said longitudinal direction between the first screening position to a second
screening position, in which each tiltable slat forms an angle with said general screening plane.

15 Traditional roller shutters are well-known in the art and have gained widespread usage for providing almost complete screening from the outside of for instance roof windows. Roller shutters offer outstanding light and sound dampening screening relative to other
screening arrangement such as marquises, Venetian blinds, roller
20 blinds and the like. As they are furthermore positioned on the outside and due to the robust structure of the shutter body, roller shutters provide an additional security against burglary. Furthermore, the shutter body protects the pane, and thus in turn the room beneath the window,
from downfall emanating from for instance building parts in areas
25 exposed to violent weathering. In closely built residential areas, roller shutters may be required as an additional security in the case of fire.

However, due to the structure of traditional roller shutters, the only available screening option is that of almost complete screening. In order to meet customer demands to more flexible screening options, so-
30 called louverable roller shutters have emerged. Such louverable roller shutters have adjustable slats that may be tilted about a longitudinal axis to form an angle with the general screening plane defined by the slats in their plane, non-tilted position. The louverable roller shutters have been developed over recent years and thus combine the advan-

tages of a roller shutter and a Venetian blind.

In its most simple form, the slats are interconnected at their longitudinal side edges, such that a front side edge of one slat is connected to the respective front side edge of adjacent slats, and correspondingly as regards the trailing side edges. In case tilting of the slats is desired, the edges of all adjustable slats are moved simultaneously to attain the tilted position. Examples of louverable shutters of a more recent kind are disclosed in, i.a., EP 1 286 016 A2 and WO 2007/017218 A2. Common to these and other items of prior art is the fact that a relatively elaborate structure is provided for allowing tilting of the slats. In the former document, only a limited number of screening positions allow for tilting of the slats, as the slat ends need to be inserted into slots positioned at a distance from each other. Furthermore, the mechanical structure of this document is particularly complicated. The roller shutter disclosed in the latter document has the further disadvantage that tilting of the slats is limited to the fully screened position, i.e. when substantially all of the slats have been rolled out from the top element.

It is an object of the invention to provide a roller shutter in which the adjustment of the slats is carried out in a simple and reliable manner, and in which adjustment may take place at any point of rolling out of the shutter body.

These and further objects are met by a roller shutter of the kind mentioned in the introduction, which is furthermore characterized in that the roller shutter is furthermore provided with two side rails, that each side rail comprises at least one part that is movable relative to other parts of the side rail, and that the end edges of each slat include guide means adapted to be guided in the at least one movable part of a respective side rail.

This provides for the advantage that the relative movement required to invoke the tilting of the slats is provided moving parts of the side rails of the roller shutter relative to each other. In turn, this makes it possible to provide the simple and reliable solution aimed at, as the side rail parts are simple to design and manufacture for allowing

accommodation and guidance of the guide means of the slats interacting with the side rails. There is thus no need for separate mechanisms for inserting the slat ends into tilting means.

In one embodiment of the invention a driving element of the driving device is connected to at least one fixed part of the respective side rail. The driving element is that element of the driving device which transmits and/or performs the movement of the driving device to the shutter body during unrolling and rolling-up thereof. In a manner known *per se*, the driving element may comprise a cord, belt, chain etc. In this manner, the slats are tilted by simply moving the movable part guiding the guide pins with respect to the fixed parts supporting the driving element of the driving device.

In a mechanically simple development of this embodiment, the end edge of each tiltable slat includes fastening means for fastening the slat to the driving element of the driving device at the first side edge of the slat, and wherein the guide means for establishing the connection with the at least one movable part of the side rail are provided at the second side edge.

Advantageously, the guide means comprise a pin protruding from each end edge of each adjustable slat. A pin constitutes an element able to be guided smoothly on the movable part of the side rail and allowing the slat to be tilted, as it will only follow the movable side rail part during its movement.

In principle, the movable part or parts of the side rail may be moved following any suitable pattern in order to induce the tilting of the slats. Preferably, however, the at least one movable part of the side rail is movable along a curved path relative to the other parts of the side rail. This entails a movement both perpendicularly to the general screening plane, but also along the direction perpendicular to the longitudinal direction of the top element and the slats. This movement is considered to provide particularly smooth lifting of the one edge of the slats, relative to for instance a movement involving lifting perpendicularly to the general screening plane only.

In a structurally simple embodiment, said at least one movable

part is an outer side rail part connected to an inner side rail part.

Again, the movement may be carried out in any suitable manner; however, said outer side rail part is preferably connected to the inner side rail part by means of a number of link elements, each link
5 element being pivotably connected to one and the other part. This is a mechanically simple and reliable connection to achieve the curved path (in fact part-circular path).

Alternatively, the outer side rail part may be connected to the inner side rail part by means of a pin mounted on one part adapted to be
10 guided in a track in the other part.

The movable side rail part is preferably compartmentalized in order to allow for the guiding function. Hence, the outer side rail part may include a first flange and a second flange forming between them a track for guiding the guide means of the slats.

15 The movement between the parts of the side rail may in principle be carried out in any suitable manner, including for instance a lifting device positioned in the side rail itself. However, preferably the at least one movable part is adapted to be actuated by a tilt mechanism at the top element.

20 In one embodiment, the tilt mechanism comprises a toothed rack connected to the movable part and a toothed wheel cooperating with the toothed rack, said toothed wheel being adapted to be rotated by means of a drive motor.

In order to obtain the simple structure and reliable function
25 aimed at, the drive motor for the toothed wheel is preferably separate from the motor of the driving device for the shutter body. In this manner, no complicated coupling between the different functions of the motor is necessary, which would be the case if a single motor were to be used for driving the shutter body and achieve the tilting. This improves
30 the flexibility in operating the roller shutter, i.e. the shutter body may be unrolled and rolled out independently, and the slats may be tilted at any position of the shutter body.

However, the drive motor preferably operates on a shaft common to each side rail. In addition to the advantages connected to having

a single motor to be positioned in the top element, this provides for synchronous operation in both sides of the roller shutter.

A self-supporting unit transferring a suitable torque to the toothed wheel cooperating the toothed rack is provided in an embodiment, in which the drive motor is connected to the shaft by means of a planet gear. By utilizing a planet gear, it is possible to provide a simple solution to the wish for having a through-going shaft while having one motor only.

In order to unroll and roll up the shutter body, a driving element connected to the shutter body is used. The driving element of the driving device for unrolling and rolling up of the shutter body could in principle be any element capable of transferring the rotating movement of the roller bar to a translatory movement, such as for instance a chain. Preferably, however the driving element is a toothed belt.

As an alternative to the toothed rack-toothed wheel connection, the tilt mechanism may comprise a linear actuator.

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

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 roller shutter in an embodiment of the invention, mounted on a window and in a first screening position, part of the shutter body being removed for clarity reasons;

Fig. 2 is an isometric view of a roller shutter in an embodiment of the invention, in a first screening position, part of the shutter body being removed for clarity reasons;

Fig. 3 shows a view corresponding to Fig. 2, with parts of the roller shutter removed;

Fig. 4 shows, on a larger scale, a partial view of the roller shutter shown in Fig. 2, with parts of the roller shutter removed;

Fig. 5 is a view corresponding to Fig. 4; with other parts of the roller shutter removed;

Figs 6 to 9 show, on a larger scale, partial perspective views of

the roller shutter shown in Fig. 2;

Fig. 10 is an isometric view of a detail of the roller shutter shown in Fig. 2;

Fig. 11 is an isometric view of a roller shutter in an embodiment of the invention, mounted on a window and in a second screening position, part of the shutter body being removed for clarity reasons;

Fig. 12 is an isometric view of a roller shutter in an embodiment of the invention, in a second screening position, part of the shutter body being removed for clarity reasons;

Fig. 13 shows a view corresponding to Fig. 12, with parts of the roller shutter removed;

Fig. 14 shows, on a larger scale, a partial view of the roller shutter shown in Fig. 12, with parts of the roller shutter removed;

Fig. 15 is a view corresponding to Fig. 14; with other parts of the roller shutter removed; and

Figs 16 to 17 show, on a larger scale, partial perspective views of the roller shutter shown in Fig. 12.

Figs 1 to 10 of the drawings show an embodiment of a roller shutter generally designated 1 in a first screening position. 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 shutter body 5 includes a plurality of slats 51, of which some have been left out for clarity reasons only.

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 8. The window sash 7 will most often be openable relative to the window frame 6, viz. hinge connected to the window frame 6, for instance by means of a set of pivot hinges positioned close to a central axis of the window to allow the window sash 7 to pivot relative to the window frame 6, or by a more traditional hinge positioned at the top of the window.

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 8. In order to

attain the desired screening, the shutter body 5 is adapted to be moved from a non-screening position to a screening position, in which it covers the pane 8 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 have first and second side edges parallel to the longitudinal direction, i.e. in parallel with the top element 2. The shutter body 5 is adapted to be wound up in and rolled out from the top element 2 by means of a driving device, generally designated 10, in a direction perpendicular to said longitudinal direction to a first screening position. In the first screening position shown in Fig. 1, the shutter body 5 has been rolled out to cover the entire aperture and defines a general screening plane. In the non-screening position, in which the shutter body 5 does not cover any part of, or virtually not any part of, the pane 8, the shutter body 5 is accommodated, possibly in its entirety, in the top element 2.

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 right-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, such as for instance the drive mechanisms for the rolling up and unrolling of the shutter body 5 and the tilting of the slats 51. 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.

The side rail 4 has a structure comprising parts that are movable relative to each other. In Fig. 1, only an outer side rail part 41 is visible. The side rail 4 has a bottom cover 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 riveted to each bottom cover 30, 40. The cross bar 35 (not shown in the detailed figures) contributes to the strength and resistance as well. However, the cross bar 35 is not strictly necessary, as sufficient strength may be provided

by the side rails 3,4 themselves.

With reference to Figs 11 to 17, it may be seen that the roller shutter according to the invention is a so-called louverable roller shutter, i.e. a roller shutter having at least some tiltable slats that may be angle-adjusted relative to the general screening plane. Thus, the shutter body 5 may be brought from its first screening position shown in Fig. 1 to a second screening position, in which the slats 51 are tilted about an axis parallel to the longitudinal direction of the slats from the first screening position to a second screening position, in which each tiltable slat forms an angle with the general screening plane, cf. for instance Fig. 11.

The mechanisms required to provide the tiltability of the slats will now be described in detail. The description refers to one side of the roller shutter 1 only; the opposite side is structured in substantially the same, however mirror-inverted manner.

Referring now to Figs 1 to 17 of the drawings, it is noted that in some of the figures, parts of the top element 2 and the right-hand side rail 4 have been removed in order to show the structure of some of the internal parts of the roller shutter 1, i.e. parts that are not, or only partly, visible in the mounted position or position of use shown in for instance Figs 1 and 11. In the top element 2, the top cover 21 and the outer end cover 22 have been removed. Furthermore, an intermediate end cover (not shown) has been removed to expose an inner end cover 23. In the side rail 4, the outer side rail part 41 has been removed in Figs 3 and 13 to expose an inner side rail part 42. Eventually, the bottom cover 40 has been removed to expose an intermediate bottom cover 401.

As mentioned in the above, the roller shutter 1 is provided with two side rails 3 and 4, and each side rail 3, 4 comprises at least one part that is movable relative to other parts of the side rail. In the embodiment shown, this is accomplished by connecting the outer side rail part 41 and the inner side rail part 42 to each other by means of a number of link elements in the form of side rail fittings 45 that are pivotably connected to each side rail part 41 and 42. Hence, the movable part of the side rail, outer side rail part 41, is movable along a curved path

relative to the other parts of the side rail, that is fixed inner side rail part 42 in addition to other parts to be described further on. As an alternative, the outer side rail part may be connected to the inner side rail part by means of a pin mounted on one part adapted to be guided in a track
5 in the other part. Preferably, such a track would be curved.

In order to allow the unrolling and rolling-up of the shutter body 5, the end edge of each tiltable slat 51 includes fastening means for fastening the slat to a driving element of the unrolling and rolling-up driving device at the first side edge of the slat, and the guide means for
10 establishing the connection with the at least one movable part of the side rail are provided at the second side edge. The structure of the slats 51 may be of any suitable kind, and a detailed description of one preferred embodiment is given in Applicants' co-pending international application filed on the same day as the present application and the
15 contents of which are incorporated herein by reference.

Referring now in particular to the large scale perspective views of Figs 6-9 and 16-17 of the embodiment shown, the slat 51 comprises a slat body 510 of a suitable material, for instance extruded or roll-formed aluminium or steel, possibly filled with foam or other sound-dampening
20 material. Another alternative could be to form the slats of a composite material, manufactured by moulding or in any other suitable manner. Into the end of the slat body 510 a first end piece 511 is inserted, the first end piece 511 including a pin 512 acting as a fastening means for fastening each slat 51 onto the driving element formed as a toothed belt
25 11. In the embodiment shown, the fastening is achieved by the formation of a number of eyes 111 in the toothed belt 11, through which the pins 512 of the slats 51 are introduced. The pin receiving openings or eyes could also be formed by two upstanding portions converging at the top, but not necessarily forming a closed structure. Alternatively, the
30 pin receiving opening could be formed in the belt itself. A second end piece 513 is connected to the first end piece 511 and has a guide means formed as a pin 514 adapted to be guided in the movable outer side rail part 42. Eventually, the slat 51 is provided with a sealing strip 519 made of for instance rubber at the second side edge. The sealing strip 519

abuts on the subsequent slat 51 of the shutter body 5, on the first side edge thereof, and has the function of providing a seal between adjacent slats and also has a sound dampening effect. Although the element at the slat end is described as a relatively elaborate structure comprising first and second end pieces 511, 513, a simpler element is conceivable as well. In principle, the slat end could be formed with two protruding pins of different lengths.

The outer side rail part 41 includes a first flange 411 and a second flange 412 between which two flanges the guide means of the slats are accommodated in such a way that the pin 514 of each slat 51 abuts on and slides on the second flange 412 when unrolling and rolling up the shutter body 5. Eventually, the outer side rail part 41 has a track in the first flange 411 for receiving a first extra rail 414.

The inner side rail part 42 includes a flange 421 for guiding the toothed belt 11. A further flange 422 forms an abutment for the second flange 412 of the outer side rail part 41 in the first screening position. In the embodiment shown, the inner side rail part 42 is formed substantially as an inverted U and has a further flange 423 extending at right angles to the flange 421 forming the support for the toothed belt 11. The inner side rail part 42 has a track 424 for receiving a second extra rail 425. The first and second extra rails 414, 425 assist in the guidance of the slats 51. Furthermore, they contribute to preventing light from entering the interior, as the extra rails overlap the shutter body 5. It is also an important contribution of the extra rails 414, 425 that they hold the shutter body in position. This is particularly important during tilting of the shutter body, as the slats will have a tendency of moving towards the tilted position to an undesired extent, if not kept in place by the flanges and/or the extra rails. However, also in the non-tilted position, the extra rails support the shutter body.

Finally, the side rail 4 comprises a mounting rail part 43 for mounting the side rail to the window frame 6. To that end, the mounting rail part 43 being provided with a number of holes 430 for receiving fastening means (not shown).

Whereas the movable outer side rail part 41 is connected to the

fixed inner side rail part 42 by means of the link elements in a manner allowing the outer side rail part 41 to be moved relative to the inner side rail part 42, the inner side rail part 42 is, in turn, fixedly connected to the mounting rail part 43 and the top element 2. This connection may be
5 carried out in any suitable manner.

At the bottom of the side rail 4, the toothed belt 11 is passed below the intermediate bottom cover 401. The two bottommost slats 51 are guided on top of the intermediate bottom cover 401 and hence below the bottom cover 40. In the embodiment shown, the two
10 bottommost slats are not tiltable, but are fixedly connected to each other along the facing side edges. This mutual connection enforces the entire roller shutter to prevent it from possible damage in case of strong wind. These slats may also be provided with supplemental reinforcement in comparison with the remaining slats.

15 In order to actuate the tilting, i.e. the movement of the outer side rail part 41 relative to the inner side rail part 42 in the embodiment shown and described, a tilt mechanism 15 is provided. The tilt mechanism 15 is positioned at the top element 2, and extends on both sides of the inner end cover 23 thereof as will be described in further
20 detail. The tilt mechanism comprises a toothed rack 151 connected to the movable part of the side rail, i.e. in the embodiment shown the outer side rail part 41. To this end, the toothed rack 151 has a protrusion 153 including a fastening portion 154 for connection to the outer side rail part 41. A toothed wheel 155 adapted to be rotated by means of a drive
25 motor 16, shown in Fig. 10 cooperates with an oblong toothed aperture 152 of the toothed rack 151. The drive motor 16 is separate from the motor of the driving device for the shutter body and operates on a shaft 17 common to each side rail 3 and 4. The drive motor 16 is connected to the shaft 17 by means of a planet gear (not shown in detail). In this
30 way, a single motor 16 positioned in the top element 2 provides for synchronous operation in both sides of the roller shutter 1. Furthermore, a self-supporting unit transferring a suitable torque to the toothed wheel 155 cooperating with the toothed rack 151 by the connection to the shaft by means of a planet gear. By utilizing a planet gear, it is possible

to provide a simple solution to the wish for having a through-going shaft while having one motor only. Visible in Fig. 10 is furthermore the roller bar 24, on which the slats 51 of the shutter body 5 are rolled up.

Comparing Figs 4 and 14, it may be seen that following actuation of the drive motor 16, the shaft 17 has rotated the toothed wheel 155 within the oblong toothed aperture 152 and hence moved the outer side rail part 41 upwards and in a direction towards to the top element 2. During this movement, the toothed rack 151 is rotated slightly clockwise, seen from the external side of the inner cover 23 and has at the same time moved in a direction away from the bottom of the roller shutter. Simultaneously, the outer side rail part 41, the top cover 21, the outer cover 22, the not shown intermediate top cover, and the bottom cover 40 are lifted as a single unit. The effect on the shutter body 5 appears most clearly from Figures 15 to 17, i.e. the movable outer side rail part 41 has lifted the guide pins 514 of the slats 51 such that the slats 51 are tilted about an axis extending substantially in the longitudinal direction at the first side edge, i.e. at the fastening pins 512 accommodated in the driving element.

As an alternative to the tilt mechanism shown and described in the above, the tilt mechanism may for instance comprise a linear actuator controlled in any suitable manner.

The unrolling and rolling up of the shutter body may be performed in any suitable manner by using any driving device available in the art. In the embodiment shown, the driving element of the driving device is a toothed belt. A full description of a preferred embodiment of a driving device of a roller shutter is found in Applicant's co-pending international application filed on the same day as the present invention, the contents of which are incorporated herein by reference.

Further alternative embodiments falling within the concept of the invention involve the possibilities of having a different structure of the side rail. Hence, the outer side rail part may be made fixed, and one or more inner side rail parts consequently be made movable. Another conceivable alternative would be to have two side rail parts which are both movable.

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 other kinds of windows and in other
5 positions. For instance, the roller shutter may be mounted on the window sash, or on the frame or sash of a fixed, i.e. not openable, window, or on a window for installation in a building façade.

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

Reference numerals

1 roller shutter	5 shutter body
10 driving device	51 slat
11 toothed belt	510 slat body
111 eye	511 first end piece
15 tilt mechanism	512 fastening pin
151 toothed rack	513 second end piece
152 toothed aperture	514 guide pin
153 protrusion	519 sealing strip
154 fastening portion	
155 toothed wheel	6 window frame
16 drive motor	
17 shaft	7 window sash
2 top element	8 pane
21 top cover	
22 end cover	
23 inner cover	
24 roller bar	
3 side rail	
30 bottom cover	
35 cross bar	
4 side rail	
40 bottom cover	
401 intermediate	
bottom cover	
41 outer side rail part	
411 first flange	
412 second flange	
413 track	
414 first extra rail	
42 inner side rail part	
421 flange	
422 flange	
423 flange	
424 track	
425 second extra rail	
43 mounting rail part	
45 side rail fitting	

P A T E N T C L A I M S

1. A roller shutter (1) comprising a top element (2) and a shutter body (5) including a plurality of slats (51), each slat extending in a longitudinal direction between two end edges and having first and second side edges parallel to the longitudinal direction, said shutter body being adapted to be wound up in and rolled out from said top element (2) by means of a driving device (10), in a direction perpendicular to said longitudinal direction to a first screening position, in which the shutter body (5) defines a general screening plane, wherein at least some slats (51) of said plurality of slats are tiltable about an axis parallel to said longitudinal direction between the first screening position to a second screening position, in which each tiltable slat (51) forms an angle with said general screening plane, characterized in that the roller shutter (1) is furthermore provided with two side rails (3, 4), that each side rail comprises at least one part (41) that is movable relative to other parts (42, 43) of the side rail, and that the end edges of each slat include guide means (514) adapted to be guided in the at least one movable part (41) of a respective side rail.

2. A roller shutter according to claim 1, wherein a driving element (11) of the driving device (10) is connected to at least one fixed part (42) of the respective side rail.

3. A roller shutter according to claim 2, wherein the end edge of each tiltable slat (51) includes fastening means (512) for fastening the slat (51) to the driving element (11) of the driving device (10) at the first side edge of the slat, and wherein the guide means (514) for establishing the connection with the at least one movable part (41) of the side rail are provided at the second side edge.

4. A roller shutter according to claim 3, wherein the guide means comprise a pin (514) protruding from each end edge of each adjustable slat (51).

5. A roller shutter according to any one of the preceding claims, wherein the at least one movable part (41) of the side rail is movable along a curved path relative to the other parts of the side rail.

6. A roller shutter according to any one of the preceding claims,

wherein said at least one movable part is an outer side rail part (41) connected to an inner side rail part (42).

7. A roller shutter according to claim 6, wherein said outer side rail part (41) is connected to the inner side rail part (42) by means of a number of link elements (45), each link element being pivotably connected to one and the other part.

8. A roller shutter according to claim 6, wherein said outer side rail part is connected to the inner side rail part by means of a pin mounted on one part adapted to be guided in a track in the other part.

9. A roller shutter according to any one of claims 6 to 8, wherein the outer side rail part (41) includes a first flange (411) and a second flange (412) forming between them a track for guiding the guide means (514) of the slats (51).

10. A roller shutter according to any one of the preceding claims, wherein the said at least one movable part (41) is adapted to be actuated by a tilt mechanism (15) at the top element (2).

11. A roller shutter according to claim 10, wherein the tilt mechanism (15) comprises a toothed rack (151) connected to the movable part (41) and a toothed wheel (155) cooperating with the toothed rack, said toothed wheel being adapted to be rotated by means of a drive motor (16).

12. A roller shutter according to claim 11, wherein the drive motor (16) for the toothed wheel is separate from the motor of the driving device (10) for the shutter body (5).

13. A roller shutter according to claim 11 or 12, wherein the drive motor (16) operates on a shaft common to each side rail (17).

14. A roller shutter according to claim 13, wherein the drive motor (16) is connected to the shaft (17) by means of a planet gear.

15. A roller shutter according to any one of claims 2 to 14, wherein the driving element of the driving device (10) for unrolling and rolling up of the shutter body (5) is a toothed belt (11).

16. A roller shutter according to claim 10, wherein the tilt mechanism comprises a linear actuator.

1/17

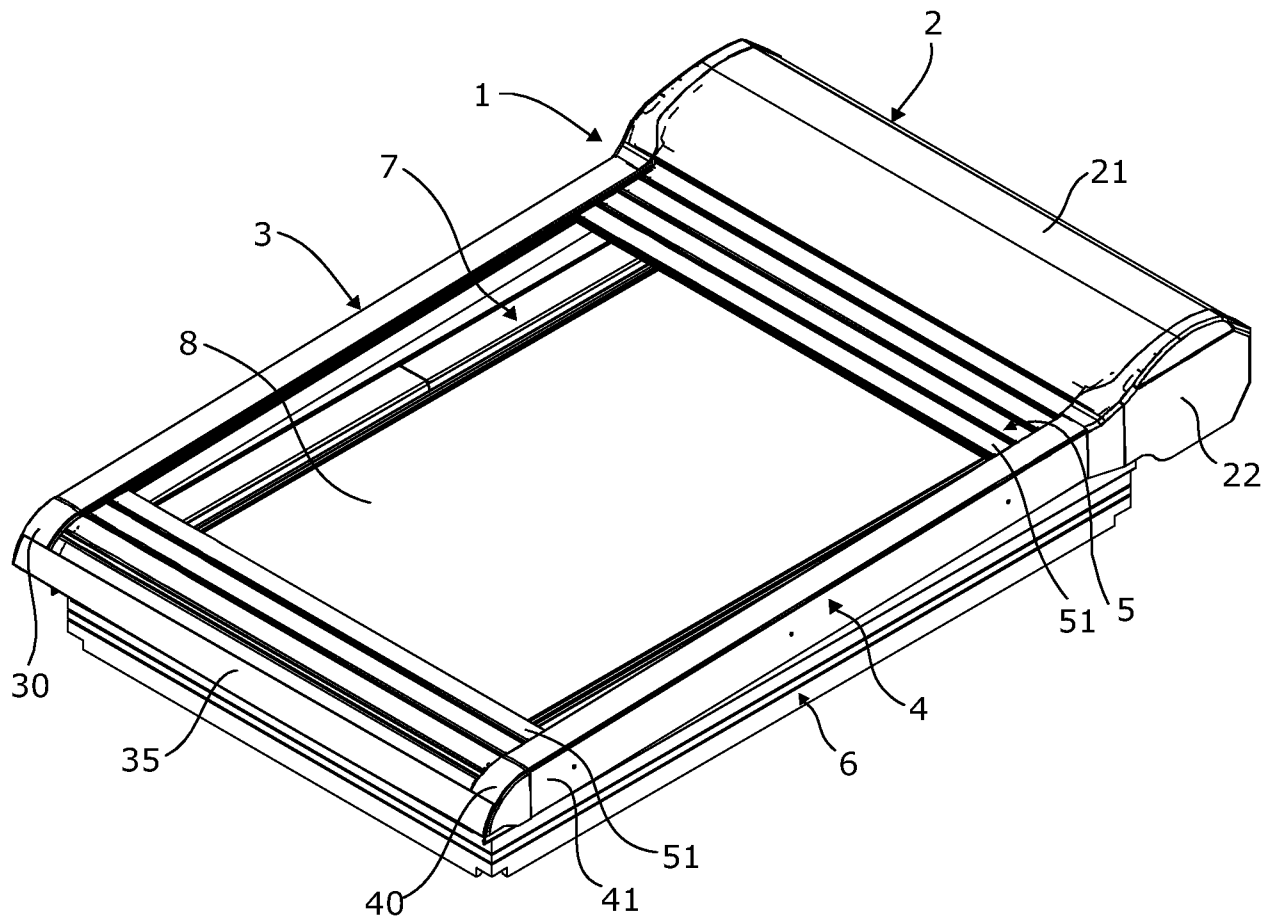


Fig. 1

2/17

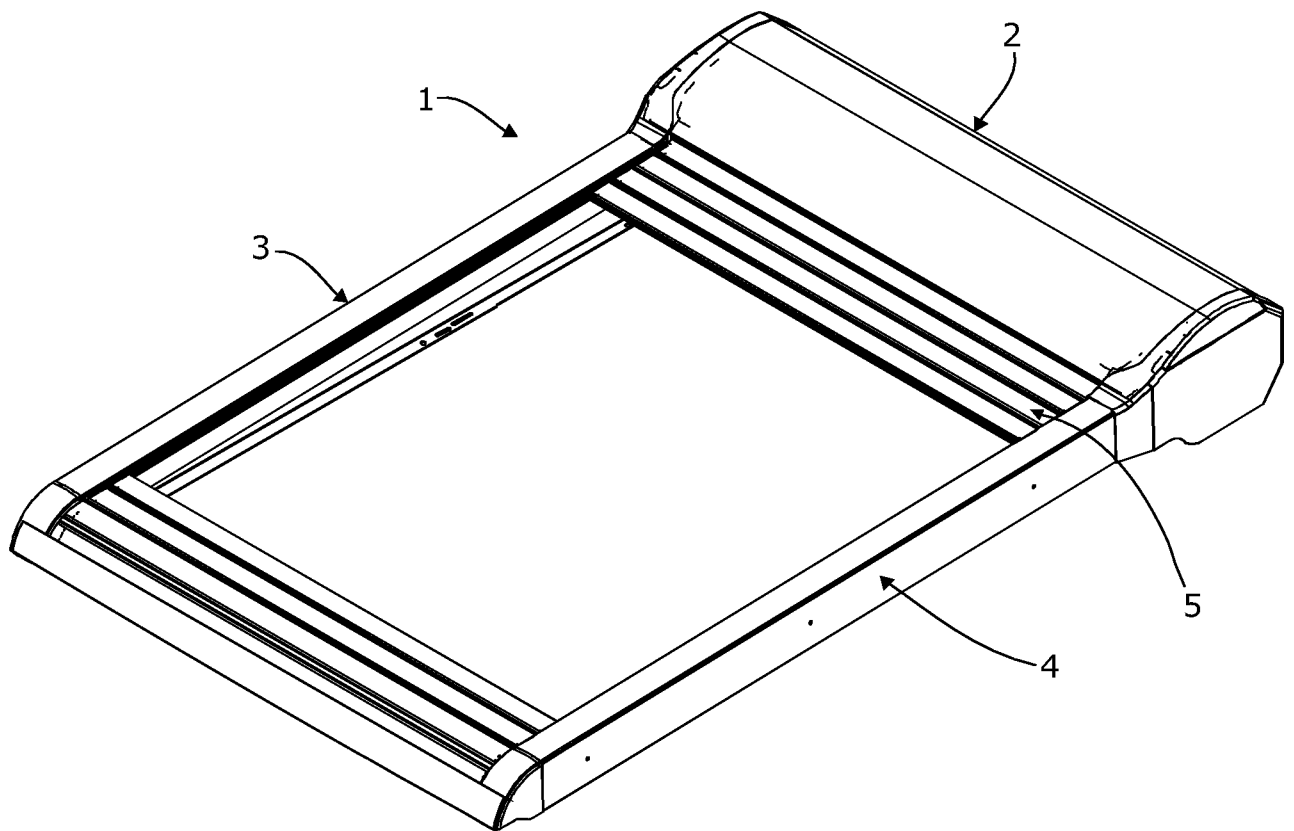


Fig. 2

3/17

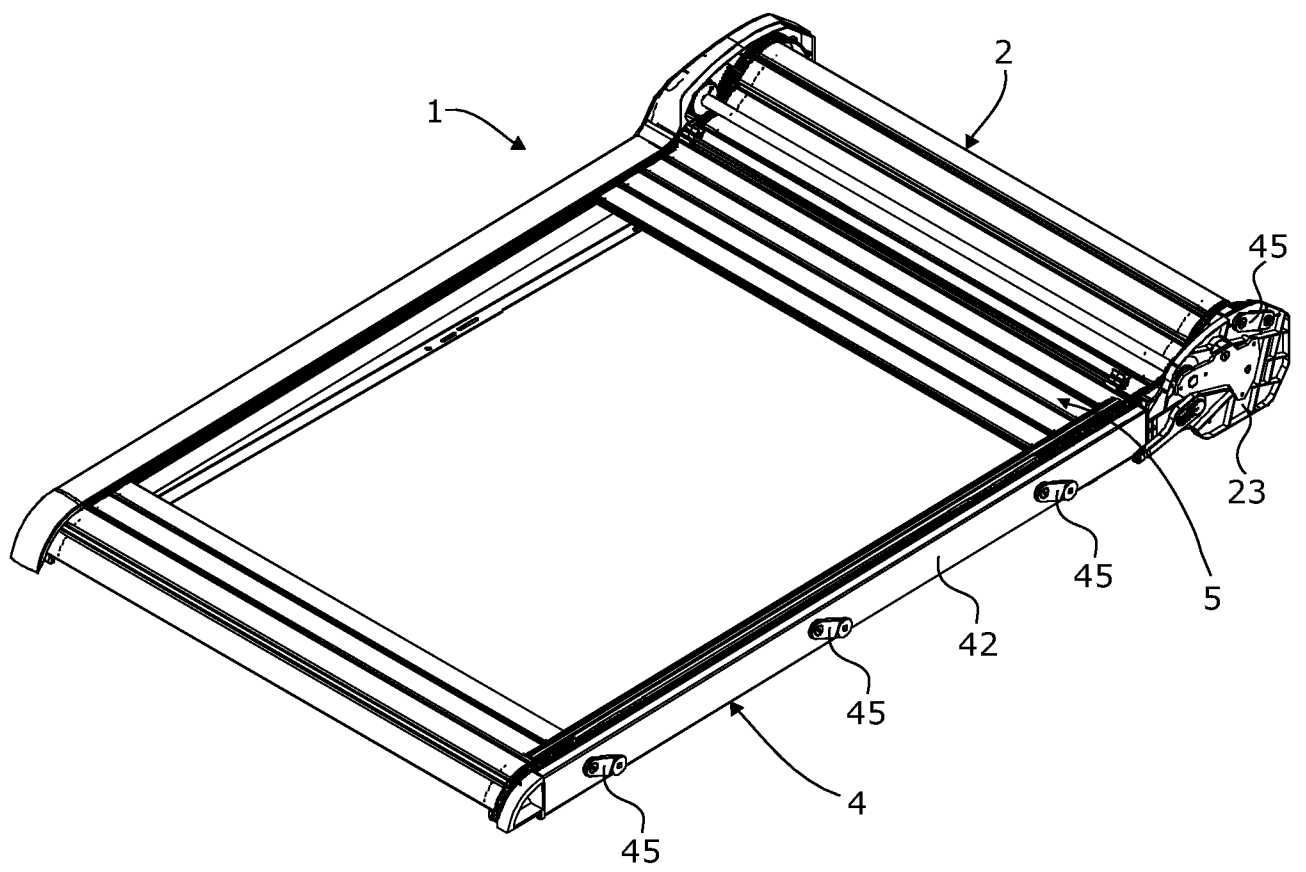


Fig. 3

4/17

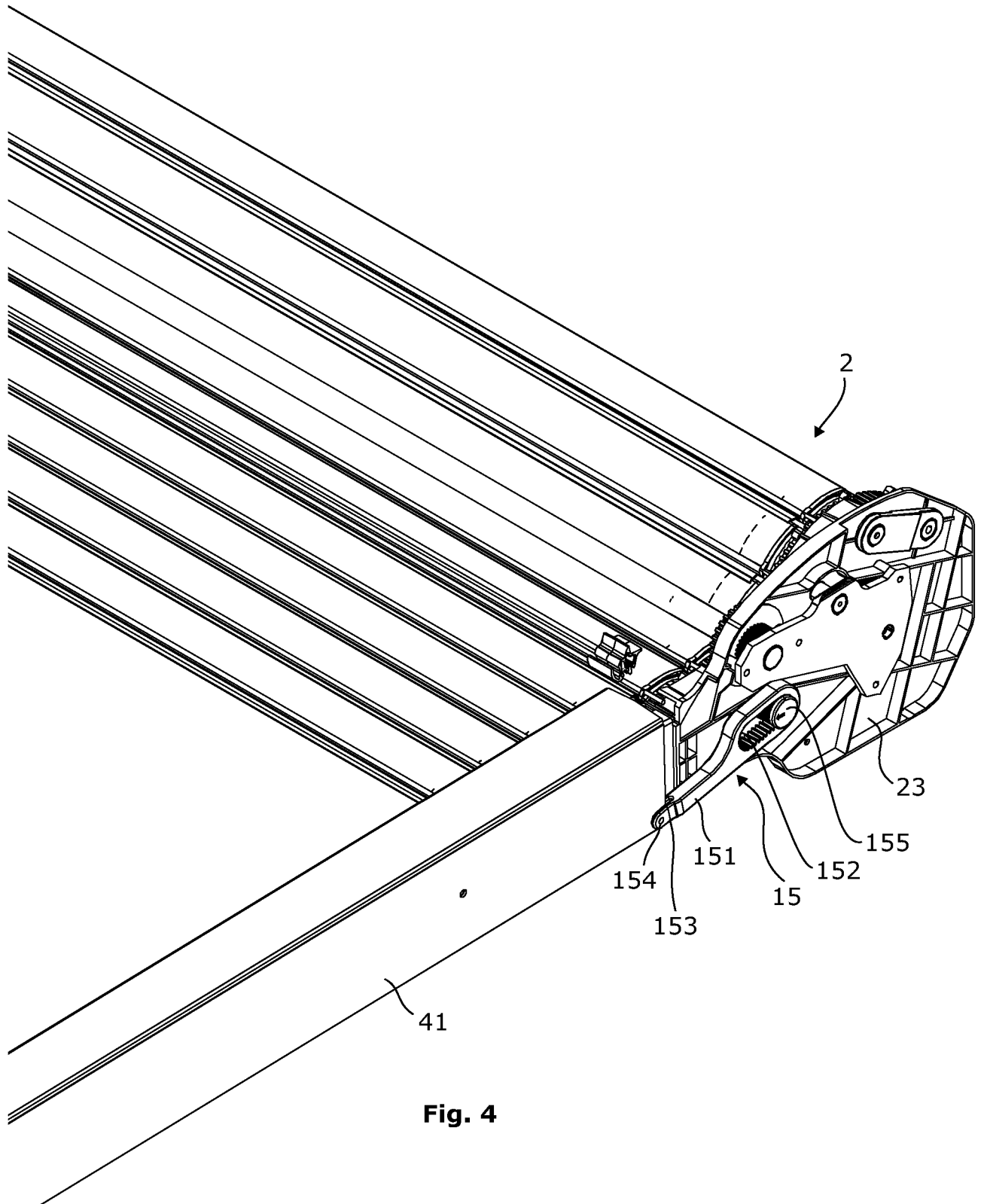


Fig. 4

5/17

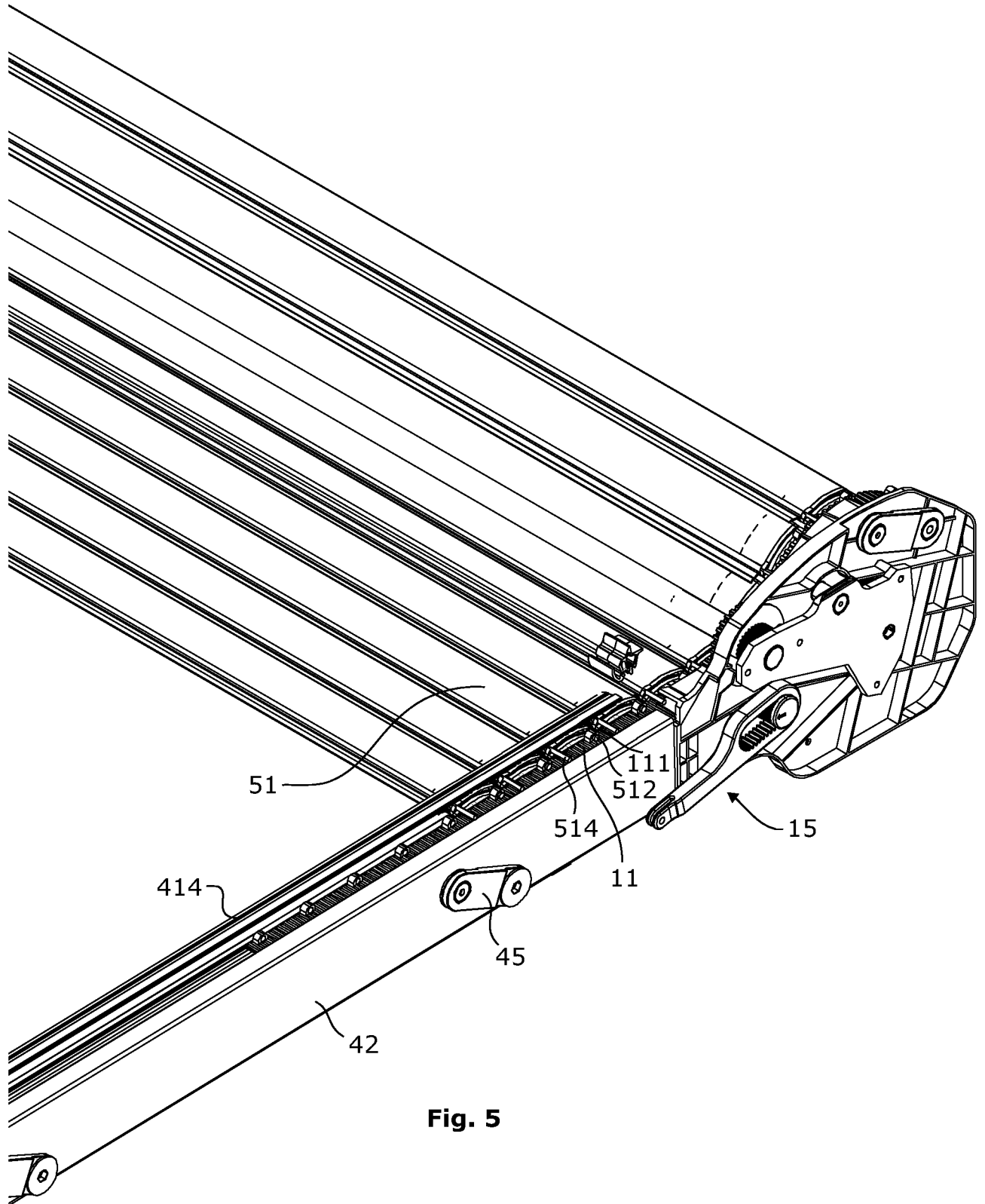


Fig. 5

6/17

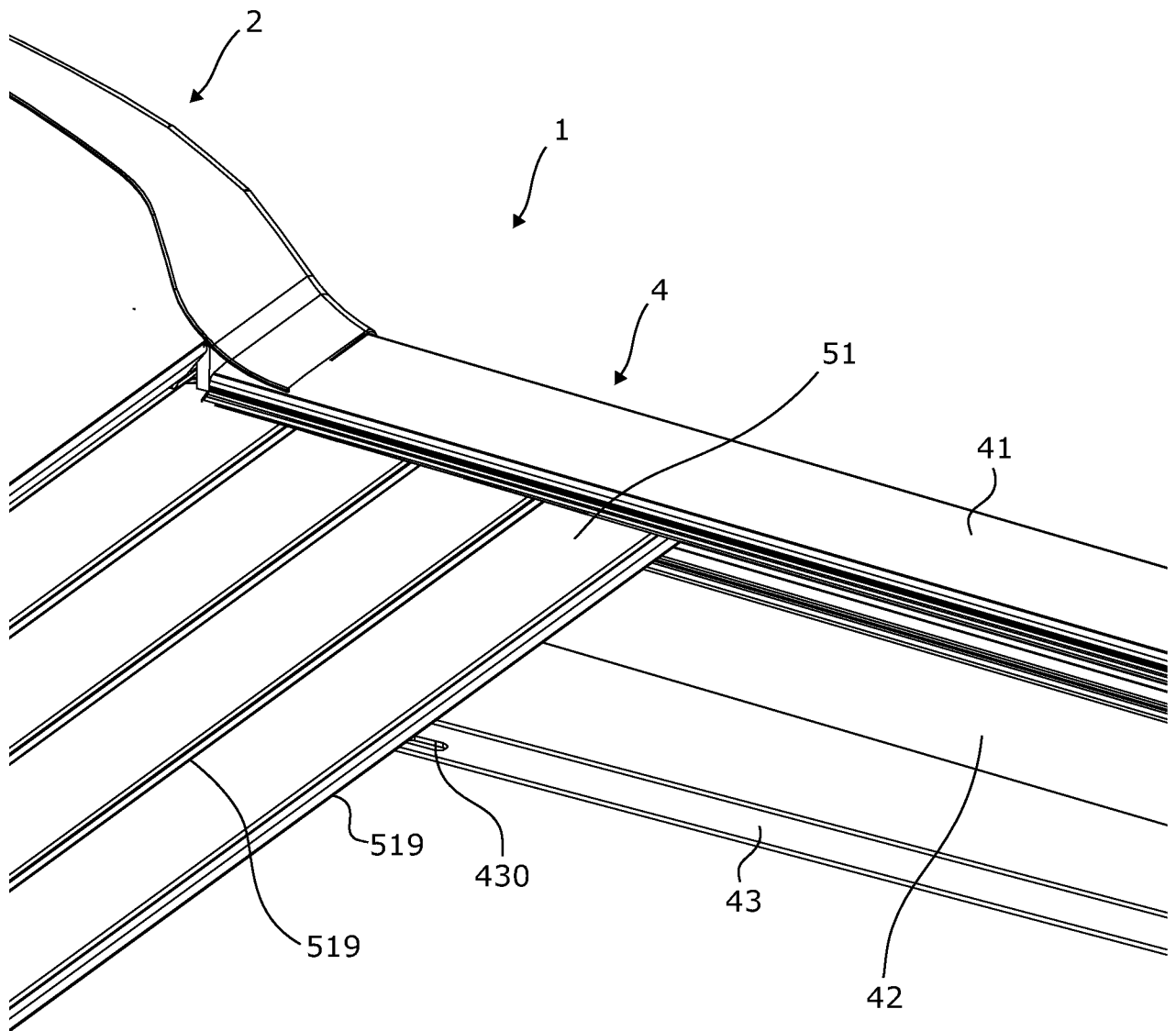


Fig. 6

7/17

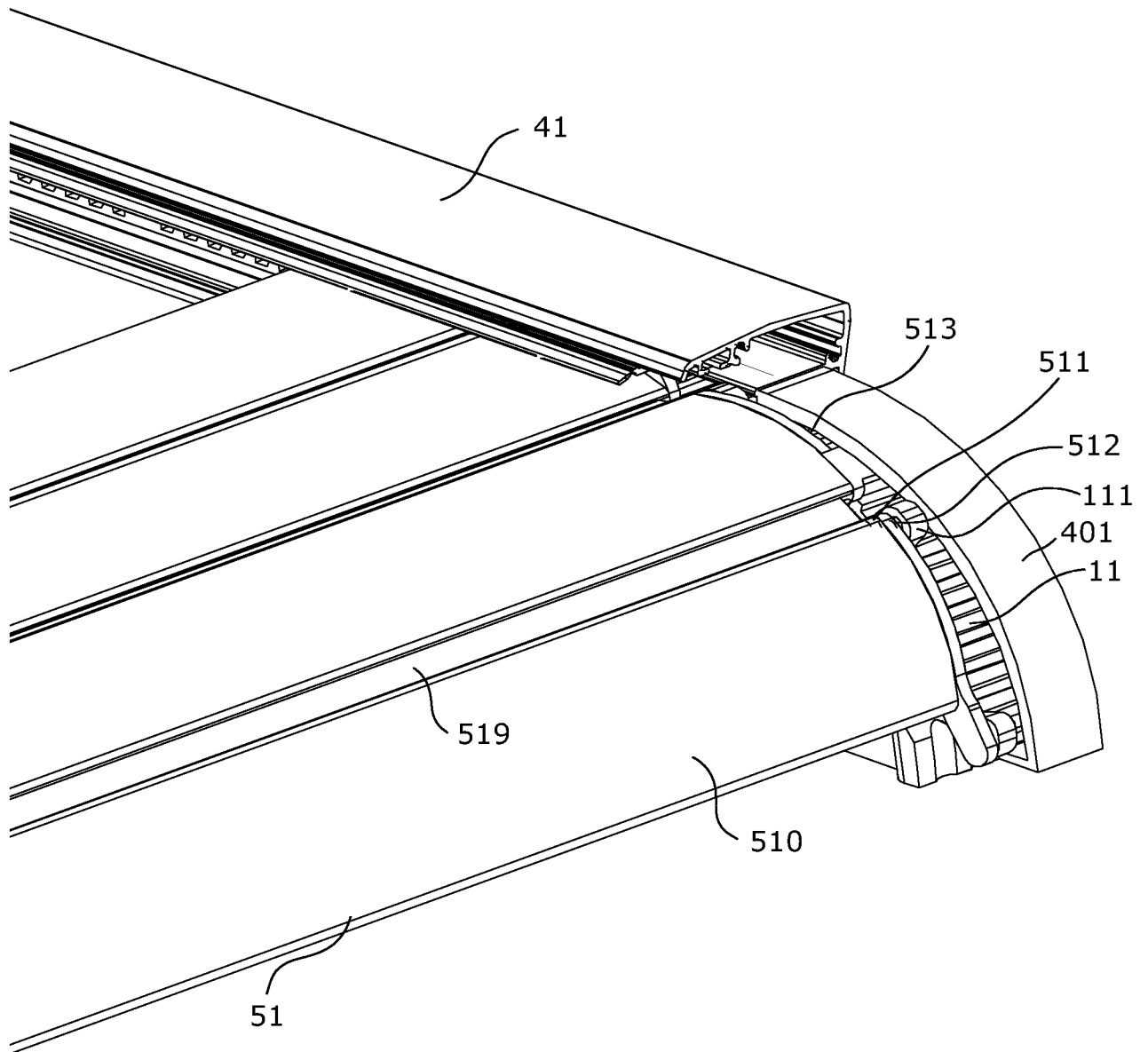


Fig. 7

8/17

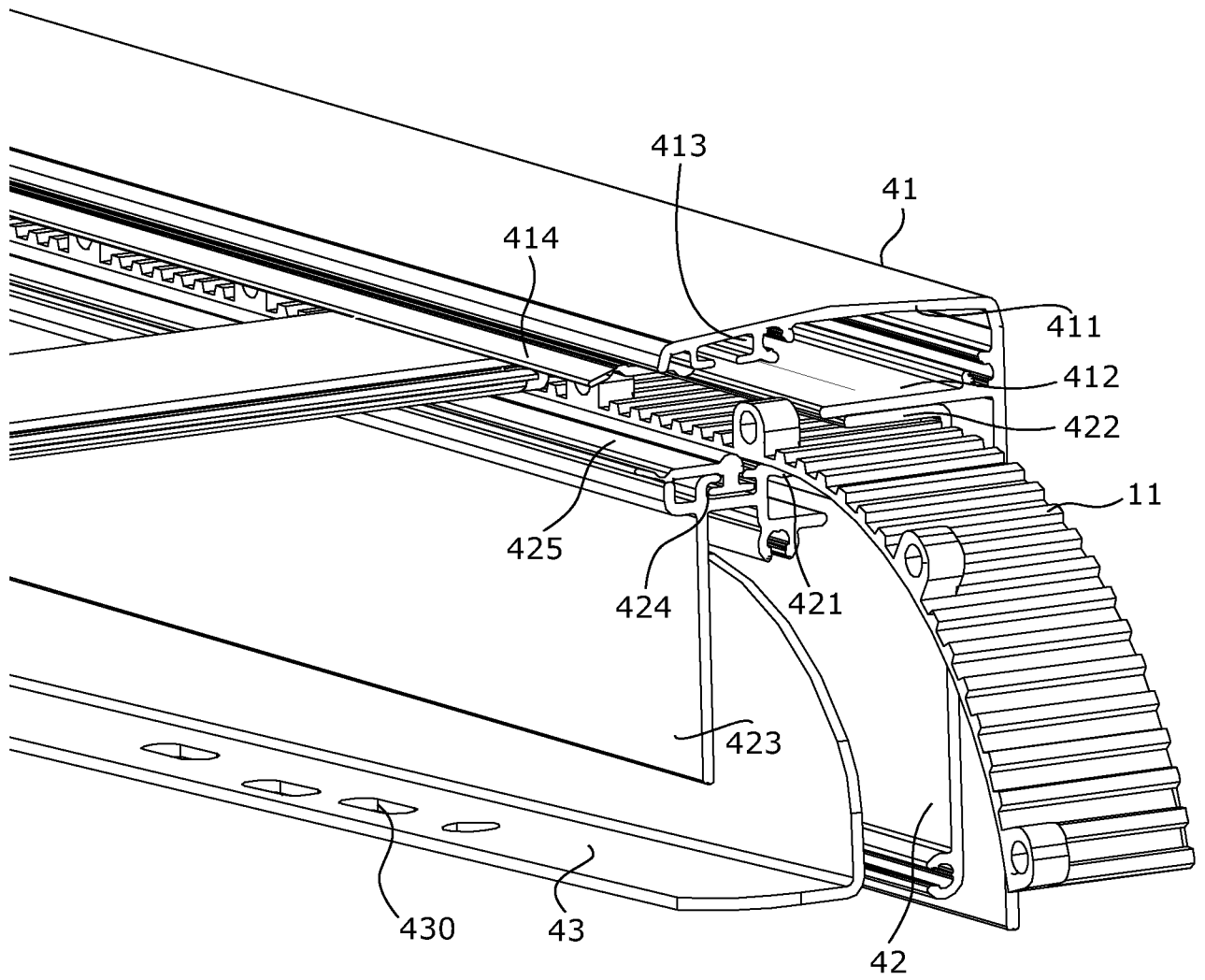


Fig. 8

9/17

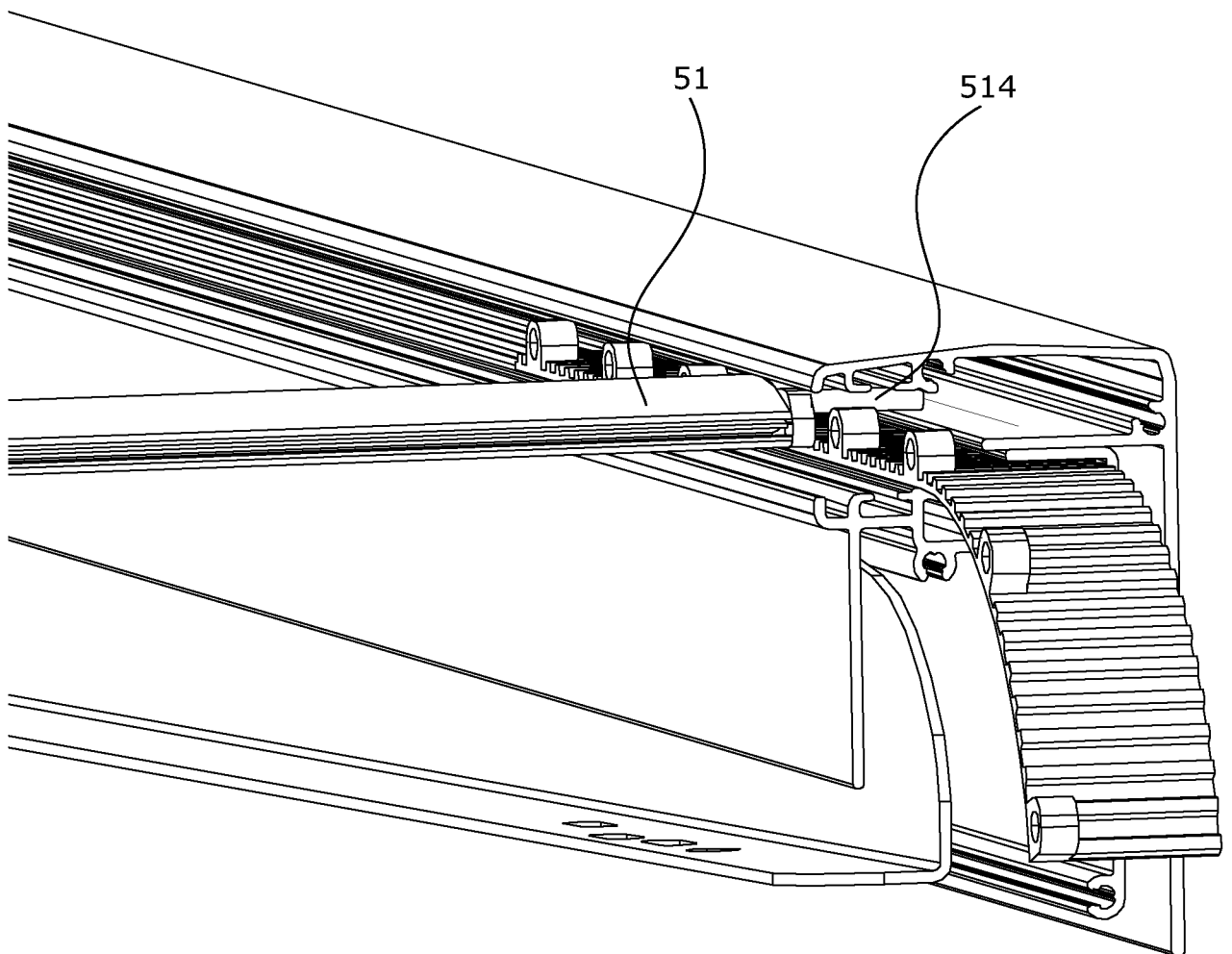


Fig. 9

10/17

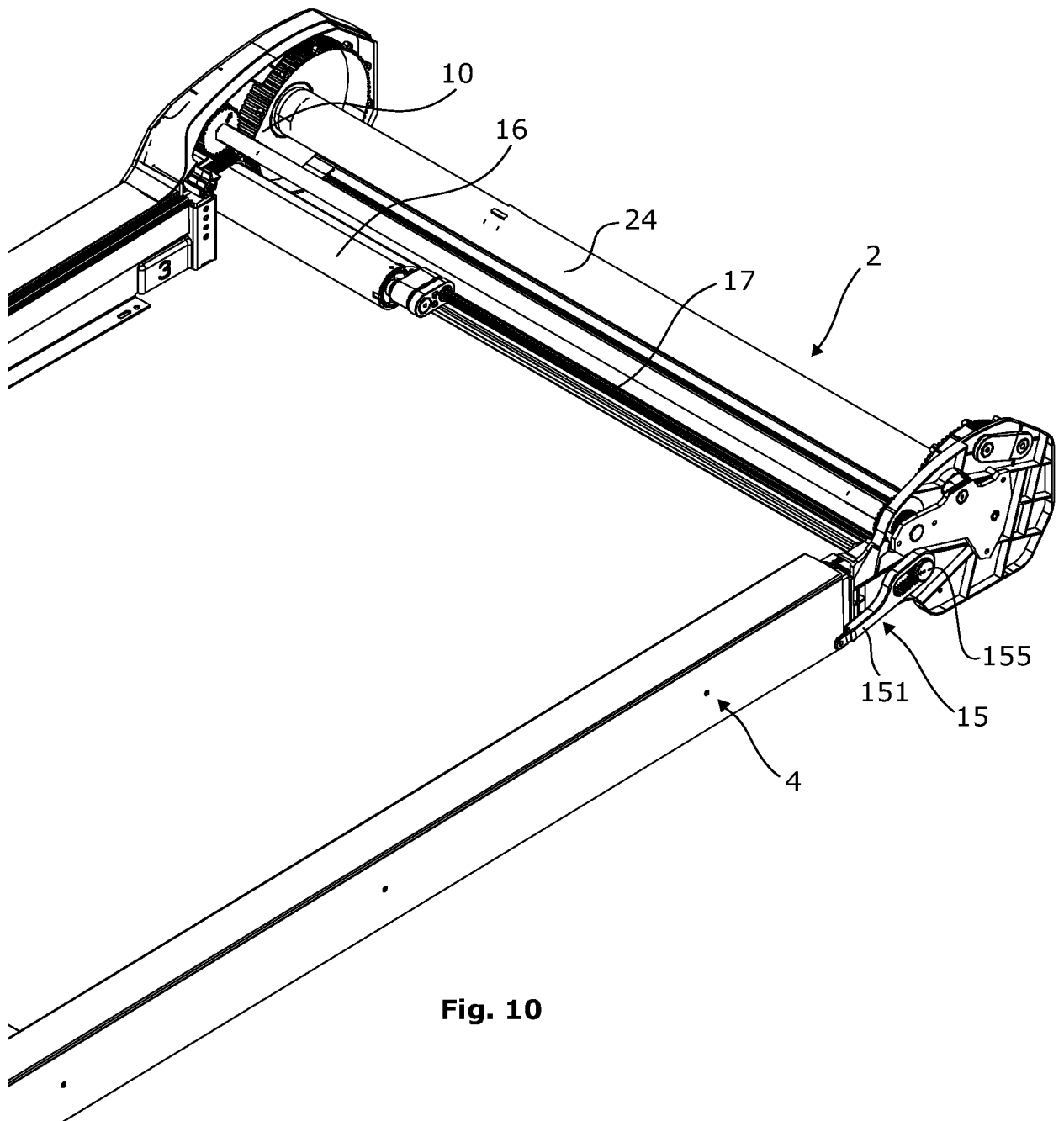


Fig. 10

11/17

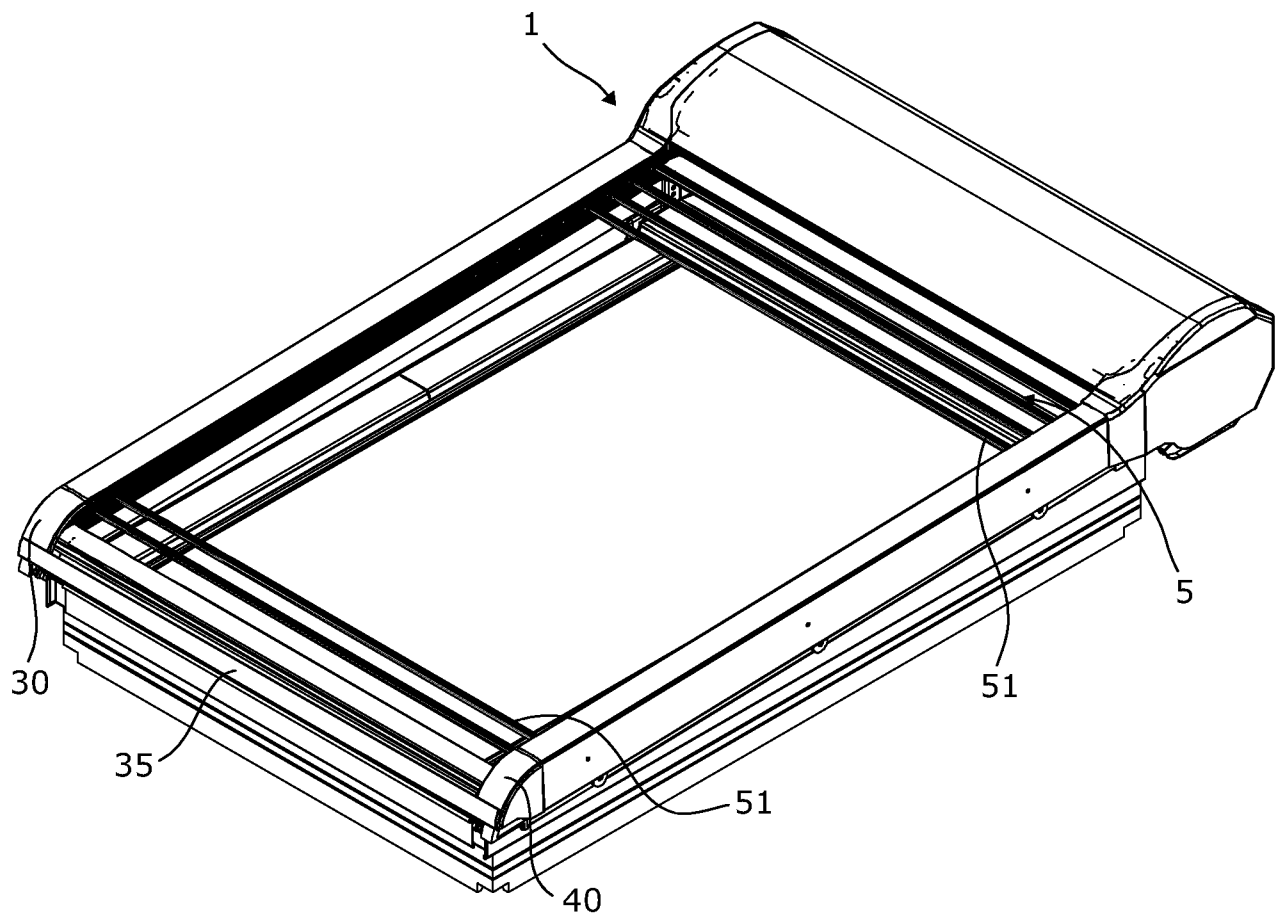


Fig. 11

12/17

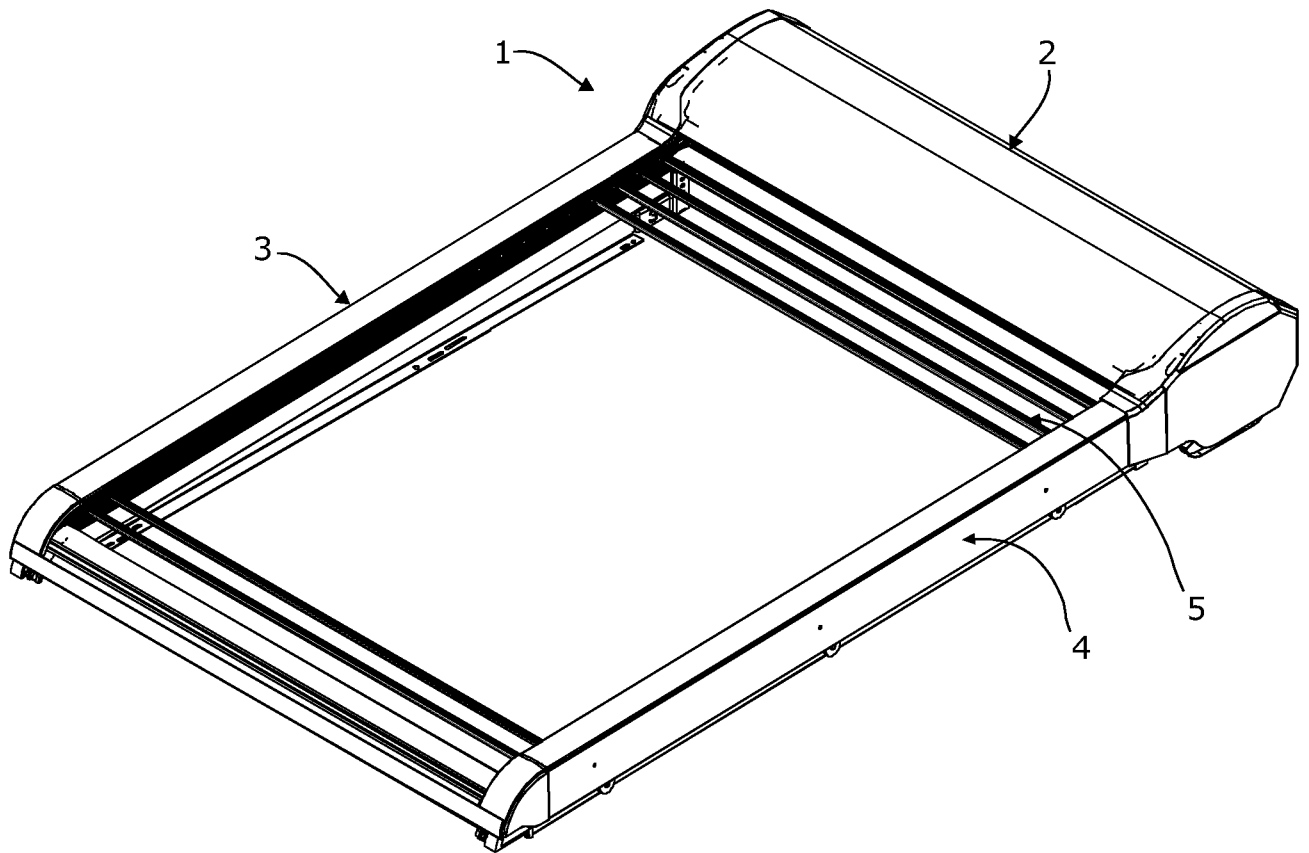


Fig. 12

13/17

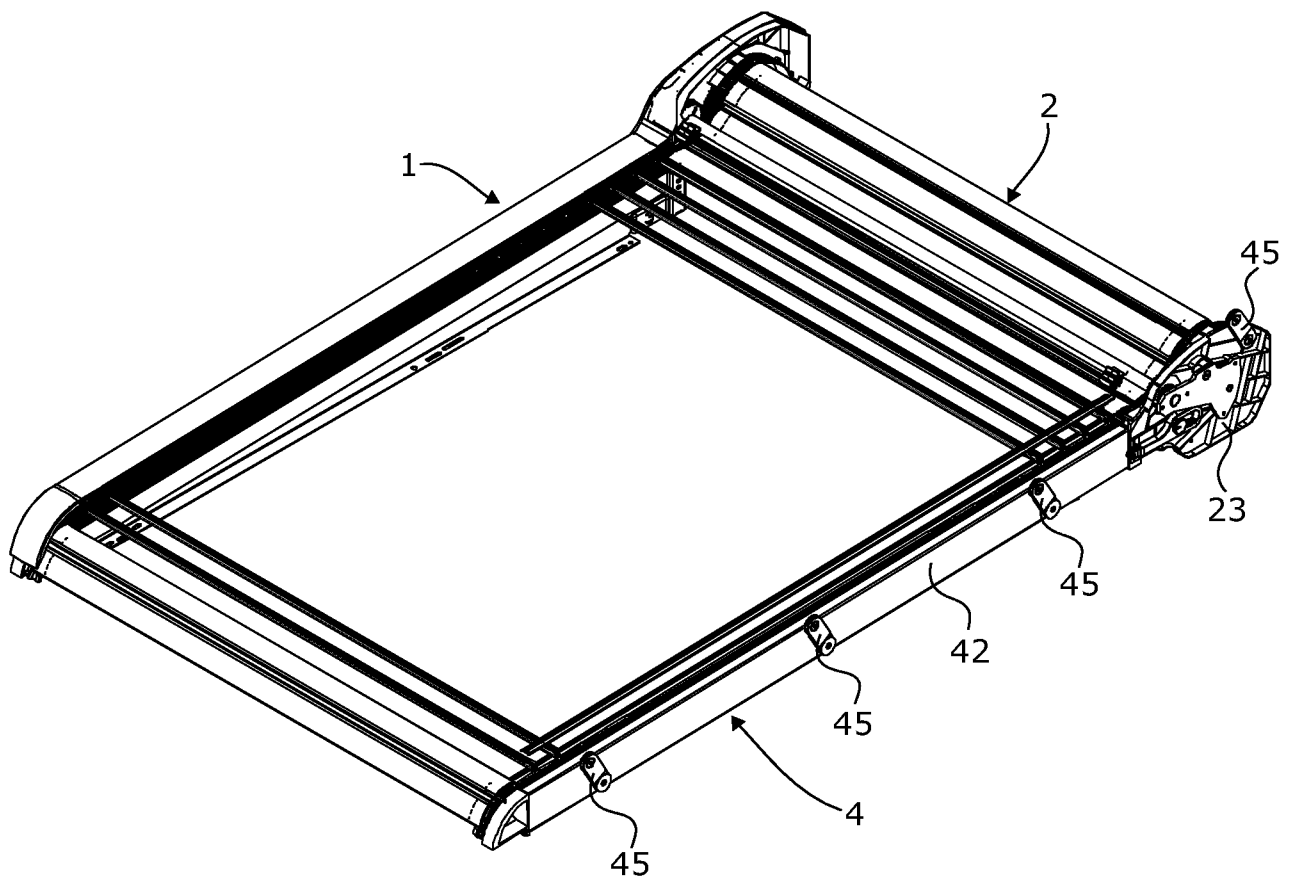


Fig. 13

14/17

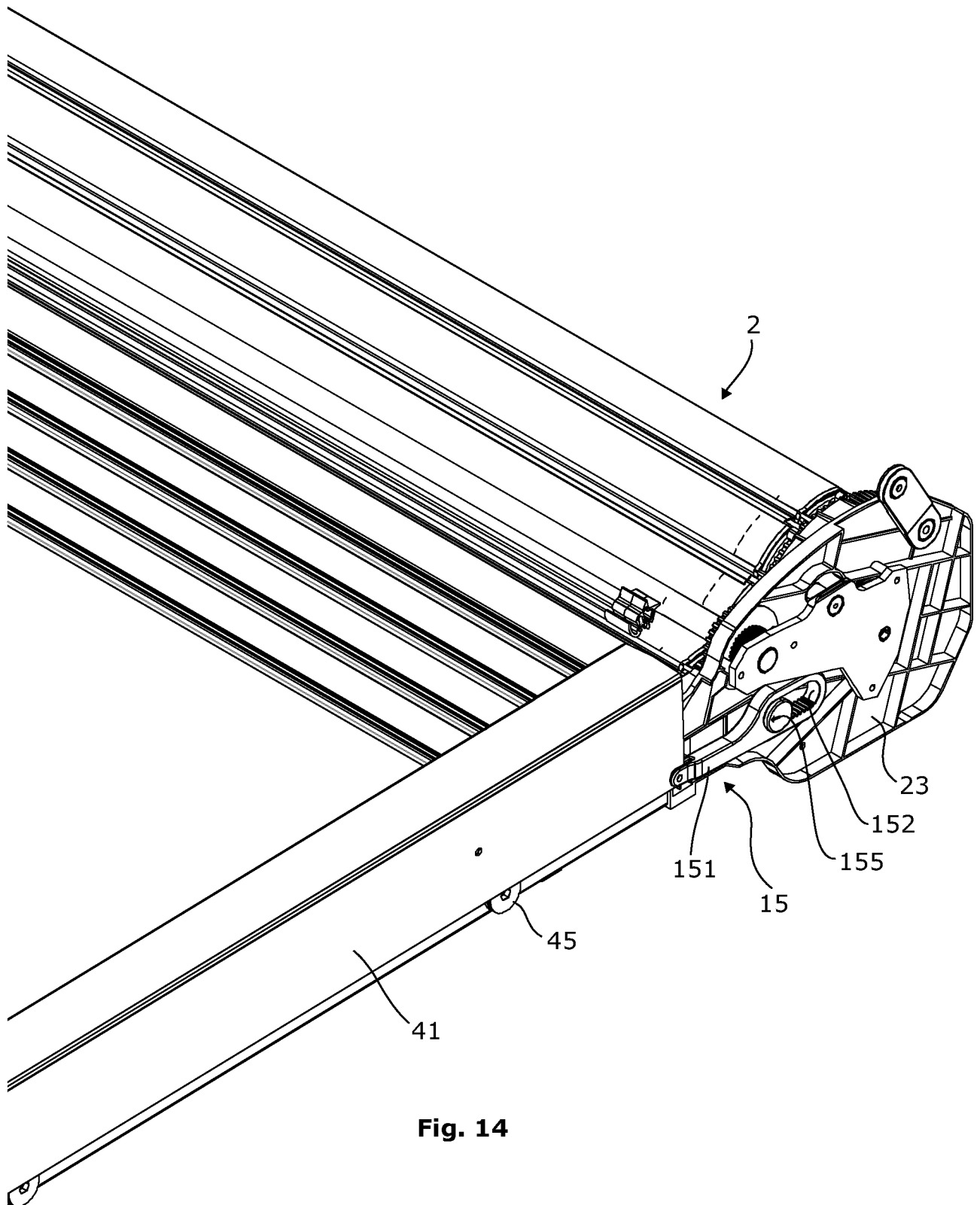


Fig. 14

15/17

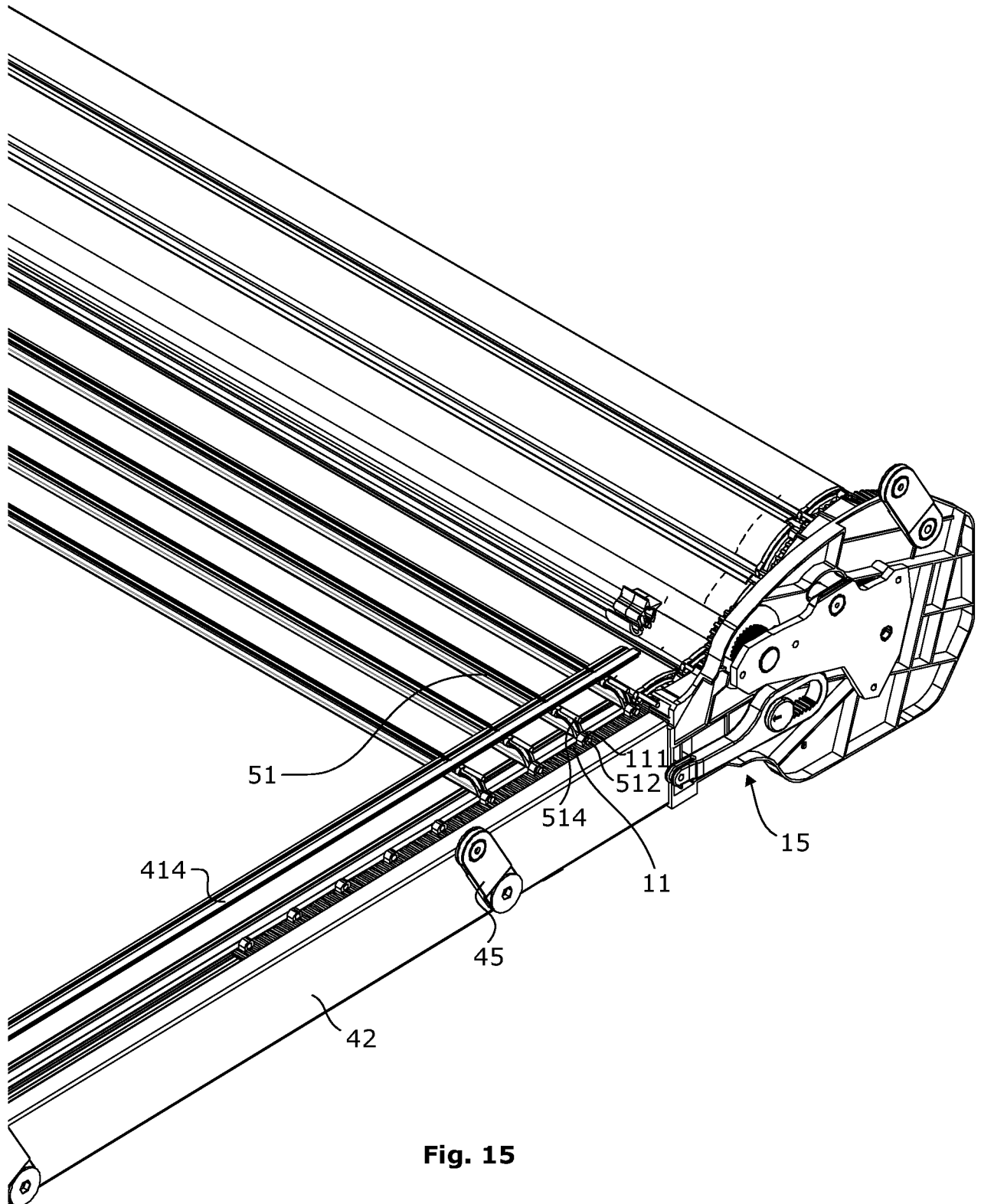


Fig. 15

16/17

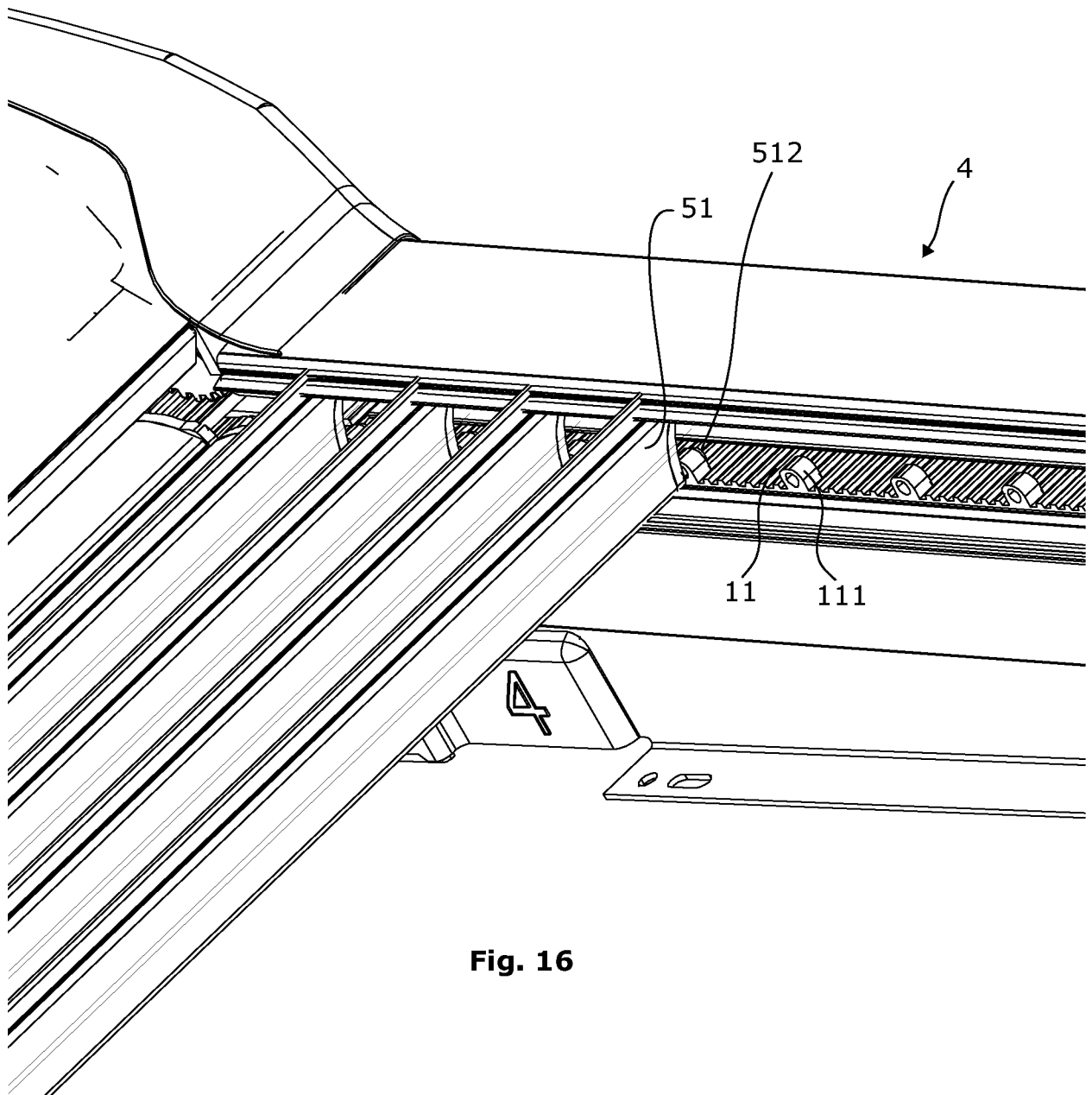


Fig. 16

17/17

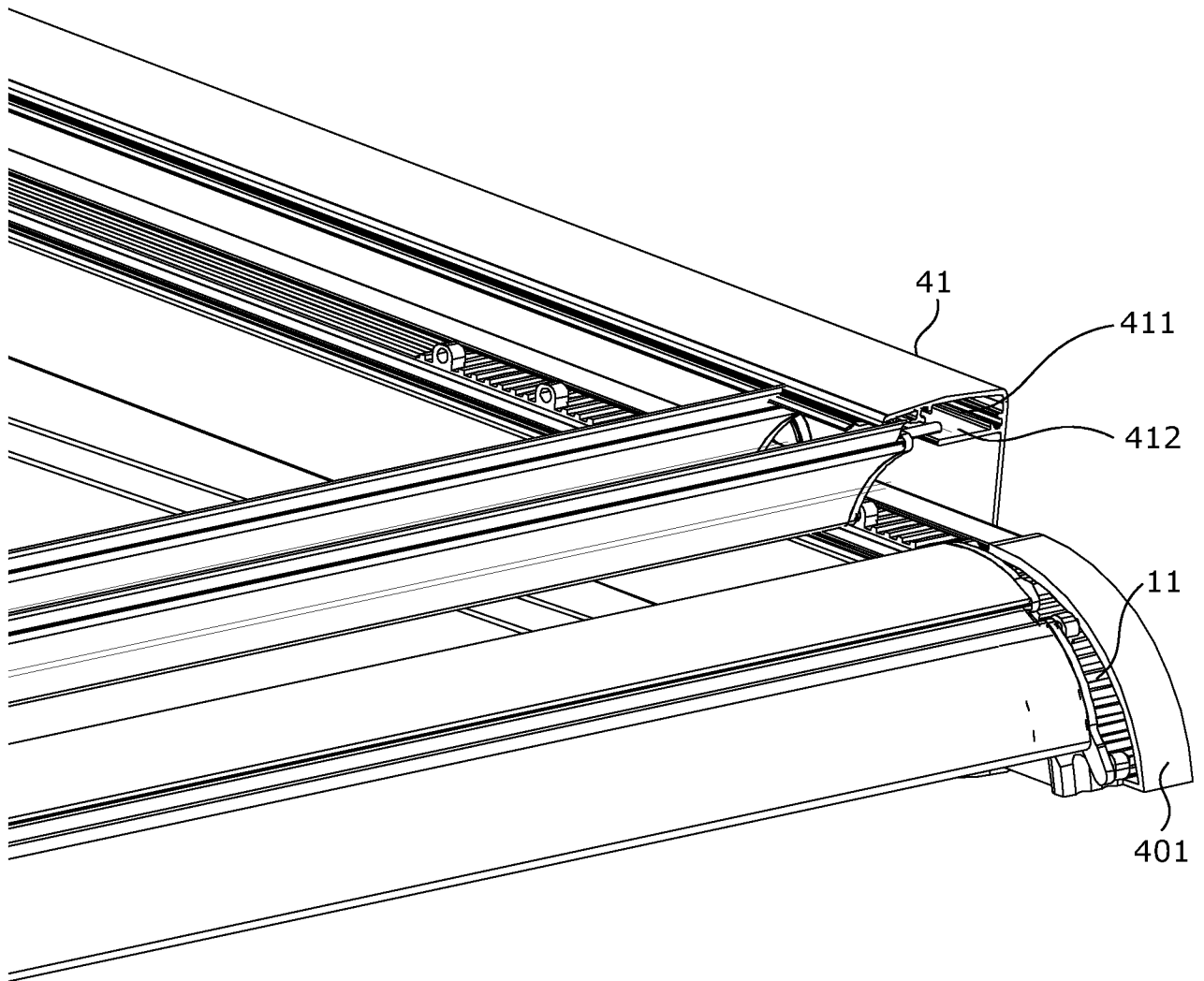


Fig. 17

INTERNATIONAL SEARCH REPORT

International application No

PCT/DK2008/050120

A. CLASSIFICATION OF SUBJECT MATTER
INV. E06B9/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
E06B E04D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 059 362 A (HOFMAN JAN) 8 September 1982 (1982-09-08) figures 1-4	1-10, 15
A	claims 1, 3, 8, 14, 15	11-14
X	DE 85 16 303 U1 (ERNST SELVE GMBH & CO KG, 5880 LUEDENSCHIED, DE) 25 October 1990 (1990-10-25) figures 1-4	1, 5
A	page 11 - page 13	7
X	EP 1 286 016 A (ARPAL ALUMINIUM LTD [IL]) 26 February 2003 (2003-02-26) cited in the application figures 1A, 3A-C, 4A-C	1, 5, 10, 16
A	ES 2 138 482 A1 (MIEDES FUERTES JUSTO [ES]) 1 January 2000 (2000-01-01) figure 1	15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

19 February 2009

Date of mailing of the international search report

03/03/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Tänzler, Ansgar

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/DK2008/050120

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0059362	A	08-09-1982	DD 207395 A1	29-02-1984
			DE 3108054 A1	23-09-1982
			DK 67982 A	05-09-1982
			HU 181628 B	28-10-1983
DE 8516303	U1	25-10-1990	NONE	
EP 1286016	A	26-02-2003	NONE	
ES 2138482	A1	01-01-2000	ES 2154113 A1	16-03-2001