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Description

The invention relates to a rolling door according to the preamble of claim 1.

Such rolling doors are described, for example, in DE 10 2009 017 767 A1. They are used, for example, as so-called high-speed doors for closing industrial facilities. It is therefore important firstly that the door leaf movement is safely guided. Secondly, it is also significant that often only a small amount of space is available to accommodate the door leaf in the open position. In view of these requirements, a rolling door is already proposed in the aforementioned document wherein a joint assembly has at least one joint plate arranged on and attached to a face, running approximately perpendicular to the joint axis, of a rigid door leaf element designed, for example, as sandwich elements. This enables any increase of the thickness of the overall construction as a result of the joint assembly to be avoided and the space required for rolling doors in the open position to be reduced. However, it has been shown that such doors still require a considerable amount of space anyway and the speed of door leaf movement is limited. Rolling doors according to the preamble of claim 1 are described in DE 10 236 648 A1 and DE 203 203 36 U1.

In view of these problems in the prior art, the aim of the invention is to provide a rolling door which can be mounted such that only minimal space is required in the open position and which allows for high opening and closing speeds while concomitantly ensuring reliable guiding of the door leaf movement.

According to the invention, this aim is resolved with the further development of the known doors detailed in the characterising portion of this claim.

Door leaves of doors according to the invention can be moved into the open position at a particularly high speed. However, it must be ensured that when the door leaf reaches the open position and is correspondingly braked, this does not cause it to become warped in the region of the edge of the door leaf which is a trailing edge during the opening movement. According to the invention, a biasing device is provided which can only be coupled to an edge of the door leaf that is trailing during the opening movement once the opening movement is in progress for braking the opening movement and for providing a biasing force which forces the door leaf from the open position into the closed position. By coupling the biasing device to the trailing edge of the door leaf, it is ensured that, through the biasing device, the area of the door leaf which is at the bottom in the closed position is biased in the desired manner with the edge of the door leaf that is trailing during the opening movement when the open position is reached. Any warping of the door leaf in the region of the edge of the door leaf which is a trailing edge in the opening movement can thus be avoided. At the same time, a breakaway torque conducive to the initiation of a closing movement can be provided through the biasing device, as the door leaf is biased into the closed position with the biasing device coupled, possibly indirectly, to the edge of the door leaf which is a trailing edge in the opening movement.

Forming the door leaf at least partially from a bendable material allows for a reduced required space, as the material itself conforms to a winding to be formed in the open position, thus allowing a small helix diameter in the open position. At the same time, a sturdy door leaf is achieved with the stabilising devices of the door leaf. The door leaf is guided with the joint elements of the joint assemblies, which are coupled to the stabilising devices, as a result of which the pulling and pushing forces arising during the door leaf movement can be transmitted via the joint assemblies. The door leaf can be made to be correspondingly lightweight. It must

merely be ensured that the stabilising devices of the door leaf are securely coupled to the joint elements of the joint assemblies.

A commercially available, preferably transparent, PVC and/or polycarbonate can be used as a bendable material for manufacturing doors according to the invention. The thickness of the plastic sheet is chosen according to the requirements. Using the bendable material in the form of a plastic film or sheet may ensure that the shape of the door leaf matches the helical shape in the open position, while maintaining a low winding radius.

Polycarbonate in particular has established itself as a material with excellent properties for use in doors according to the invention. The material has a high elasticity with sufficient bending stiffness to follow the contour of the winding even in the case of large widths. In addition, the material has further positive properties such as high impact resistance.

The rolling doors according to the invention thus combine the advantages of a rolling door construction with rigid blades and lateral joint assemblies with the benefits of film doors to thus provide a high-speed door which allows for high opening and closing speeds, due to the bendable construction of the door leaf, while still providing reliable guiding due to the joint assemblies and reducing the stress on the door leaf due to the transmission of pulling and pushing forces via the joint assemblies. A particularly stable connection of the door leaf to the joint assemblies can be achieved by using the stabilizing devices already provided for avoiding bulges due to wind loads. Together with the joint assemblies, the stabilising devices effectively form a rigid frame for the flexible door leaf.

In a preferred embodiment of the invention, the door leaf has a segment (hereinafter also referred to as a "pane") made from a preferably transparent and bendable material with segment or pane edges running approximately perpendicular to the lateral edges of the door leaf, wherein the segment or pane edges have a thickened portion and at least one stabilising device has a stabilising profile having at least one receiving region for receiving the thickened portion on a segment or pane edge. The stabilising profile preferably extends across the entire width of the door leaf in a direction running perpendicular to the lateral door leaf edges, wherein the receiving region advantageously also extends across the entire width of the door leaf. In addition or alternatively to this, at least one segment edge can be embodied without a thickened portion and is firmly bonded and/or positively attached to the stabilising device, for example with a clamping strip.

In all embodiments of the invention, the segment or pane can extend across two, three or more joint elements in the direction of the door leaf movement or in a direction running parallel to the lateral edges of the door leaf. In this case, the joint elements arranged between the stabilising devices are only indirectly connected to the door leaf via the joint elements that are connected directly to the stabilising device.

The stabilising profile can be embodied, for example, as a plastic extruded profile. In a particularly preferred embodiment of the invention, however, the stabilising profile is embodied as an aluminium extruded profile. Such an aluminium extruded profile combines high strength with low weight.

The thickened portion on the segment or pane edges can be achieved with weatherstrips glued or welded thereto, said strips being positively received in the corresponding receiving areas of the stabilising profiles. In addition, however, other possibilities for connecting the weatherstrips

are also envisaged, for example by means of a clamping strip, that allows for easy replacement of the flexible or resilient segments when installed.

In rolling doors according to the invention, the door leaf is only connected to the joint assembly, which can be implemented as a flap joint for example, by means of stabilising profiles also serving as cross-bracing. The lateral edges of the individual panes or door leaf segments can extend across two, three or more joint elements, wherein individual joint elements are only indirectly connected to the door leaf segments or panes via the joint elements that are connected directly to the stabilising profiles.

In the context of the invention, it has proved particularly advantageous to attach the stabilising device to at least one segment edge having a clamping element which can be detachably fixed on the stabilising device and is preferably at least partially received in the stabilising device and/or delimits the stabilising device. In this embodiment of the invention, the individual panes or door leaf segments can be replaced particularly easily by detaching the clamping element from the stabilising device and then removing the corresponding segment edge from the stabilising device. If both edges of a segment are attached to the stabilising device through respective clamping elements, the corresponding segment can be completely removed from the door leaf without this impairing the stability of the framework consisting of the joint assemblies and stabilising devices.

In a particularly preferred embodiment of the invention, the segment edge is arranged between the clamping element and a sealing strip, which clamping element can be detachably fixed on the stabilising device, in order to ensure a sealed transition between the stabilising device and door leaf segment.

The interjacent hinge points of the joint assembly or flap joint are not connected to the bendable material. The flap joint or joint assembly absorbs the pulling and pushing forces during the opening and closing movement. The stabilising profiles or cross-bracings can be connected to the flap joint as desired within the grid of the hinge points. This enables different pane heights to be achieved. In the case of narrow doors, a smaller number of stabilising profiles or cross-bracings can be chosen, in other words the section height can be particularly high, while wider doors can be fitted with multiple stabilising profiles or cross-bracings with a smaller section height for the purpose of stabilisation.

Structurally, it has proved advantageous if the door leaf has at least two panes made of a bendable material arranged one behind the other in the direction of the door leaf movement, between which panes a stabilising profile with receiving regions for receiving thickened portions on pane edges facing each other is located. Thus, the stabilising profile connects adjacent panes of bendable material..

As already explained above, it has proved advantageous with regard to maintaining a stable door leaf construction if at least one stabilising device extends across the full width of the door leaf approximately parallel to a joint axis. A trouble-free connection of the stabilising device without impeding the movability of the joint assembly is achieved if the stabilising device is connected to at least one, preferably to two joint assemblies provided on opposite lateral door leaf edges, along the joint axis.

Specifically with particularly high and/or wide door leaves, it has proved advantageous, with regard to the desired stabilisation, to provide at least one reinforcing strip extending

approximately parallel to the lateral door leaf edge and secured to the door leaf. Using such reinforcing strips which can, for example, be glued/welded to the panes of the door leaf, a sufficient overall stability can be achieved if the material of the pane itself does not provide sufficient bending stiffness.

Similarly to the rolling doors described in DE 10 2009 017 767 A1, at least one helical guide track for guiding the door leaf movement and for determining the open position of the door leaf can be associated with a rolling door according to the invention with a flexible door leaf, wherein at least one joint element can have, on a side facing away from the door leaf, a guide arrangement which cooperates with the guide track in guiding the door leaf movement, and which preferably comprises at least one guide roller rotatably mounted relative to a roller axis running parallel to the joint axes and preferably received within a guide track at least in the open position of the door leaf.

When operating the known rolling doors having a door leaf made in part at least of a bendable material, such as a plastic film, and a possibly ovally helical guide track for guiding the door leaf movement, it has been proved that high door leaf speeds can increase the wear of the guide track and door leaf. According to a further aspect of the invention, the edge of the door leaf which is a leading edge in an opening movement is formed by a leading stabilising device connected in a non-rotary manner to an upper edge of a segment, which is an upper edge in the closed position, made of a bendable material, said stabilising device being connected in a non-rotary manner to a guide arrangement which cooperates with a guide track preferably defined by guide rails and running, in sections at least, on a curve, wherein the alignment of the guide arrangement follows the course of the guide track.

This solution is based on the finding that the increased wear observed at high door running speeds when operating conventional doors is substantially caused by the fact that the upper edge of the door leaf made of a bendable material is deflected out of the door leaf plane as it moves into the helical guide track, such that an inward bulge of the door leaf occurs initially which suddenly becomes an outward bulge as the opening process advances, which outward bulge is then retained in the open position. The sudden change from the inward bulge to an outward bulge during the course of the opening movement firstly results in a high load on the door leaf itself and secondly increases the radial load on the guide track, thus causing the increased wear observed.

The connection in a non-rotary manner of the upper edge of a segment, made of a bendable material, to the stabilising device forming the leading edge of the door leaf during the opening movement on the one hand, and the connection in a non-rotary manner of the stabilising device to the guide arrangement which cooperates with the guide track and follows the course thereof on the other hand, result in the upper edge of the door leaf segment, made of a bendable material, forcibly being deflected outwards as the guide arrangement moves into the helical guide track, thereby forcing the door leaf segment into an outward bulge. The transfer of this outward bulge of the upper segment in the course of the opening movement is transferred to the following segments of the door leaf if the following stabilising devices between the individual door leaf segments are connected rotatably to the guide rollers to be guided through the guide track, wherein the roller axes can, as already discussed above, run parallel to the joint axes of the joint elements connected to each other in an articulated manner, in particular coaxially to these axes. Overall, a defined bulge of the door leaf can thus be ensured in the course of the opening

movement, thereby avoiding excessive loads on the door leaf and guide track and preventing increased wear.

The guide arrangement connected to the leading stabilising device in a non-rotary manner can have two, three or more guide pins or rollers, arranged one behind the other in the direction of the door leaf movement, which are attached to a common carrier which is connected in a non-rotary manner to the leading stabilising device. Using two, three or more guide pins or rollers which are attached one behind the other to a common carrier and cooperate with the guide rail results in the alignment of the guide arrangement generally roughly following the curved course of the guide track. The carrier is preferably attached to a joint element which is the leading joint element during the opening movement, wherein the carrier can also be attached to the joint element in a non-rotary manner. If the guide arrangement has two, three or more guide rollers arranged one behind the other in the direction of the door leaf movement, each guide roller can be connected to a common carrier in a rotating manner relative to a roller axis running parallel to the joint axes, which common carrier is connected to the leading stabilising device in a non-rotary manner.

In addition to the usual helical guide track, alternative guide tracks such as an oval helix, a horizontal deflection or even a vertical guide can be implemented depending on the space required on the structure.

In all embodiments of the invention, it has proved advantageous if at least a sealing arrangement which may abut a boundary surface of the door leaf in the closed position is associated with at least one joint element. It has proved particularly advantageous in this context if the individual sealing arrangements associated with the joint elements form a continuous sealing strip akin to a track seal in the closed position, whereby individual segments or panes of the door leaf, or even the lateral edges of the door leaf generally, may abut said track seal in the closed state.

In the context of the invention, such embodiments are also envisaged where the sealing arrangement abuts the outer boundary surface of the door leaf facing away from the space to be closed with the door leaf. However, it has also been proved that a particularly reliable seal can be achieved if the sealing arrangement abuts the inner boundary surface of the door leaf facing away from the outer boundary surface and towards the space to be closed by the door leaf. This aspect of the invention is again based on a precise examination of the kinematics of the door leaf movement on moving into the helical guide track. In this phase of the movement the gate leaf is forced outwards and can thus hit a sealing arrangement abutting the outside of the gate leaf, which in turn can increase the wear on the door leaf itself and on the sealing arrangement. If, however, the sealing arrangement hits an inner boundary surface of the door leaf, this cause of wear will be removed, thus achieving a generally improved seal.

As already discussed above, it has proved advantageous if the sealing arrangements associated with the joint elements form a continuous sealing strip akin to a track seal in the closed position. In this context, such embodiments where the sealing arrangements have at least one sealing member extending across two, three or more joint elements are envisaged, creating a continuous seal across the corresponding number of joint elements. This sealing member can be connected to the joint elements by means of separate fixing elements attached to the joint elements. Alternatively, or in addition to this, the means for receiving the seal can also be integrated into the individual joint elements. A composite material comprising plastic and metal can be used to manufacture the joint elements, possibly with integrated sealing members.

In the context of the invention, it has proved particularly advantageous if the biasing device has a tension spring extending approximately in the direction of gravity and embodied, for example, as an elastic cord, the upper end of which is captured and entrained during the opening movement by a driver attached in the region of the edge of the door leaf which is a trailing edge in the opening movement. In addition, or alternatively, the use of tension springs is also envisaged.

In all embodiments of the invention, it has proved beneficial for kinematic reasons if the length of at least one joint element in a direction running parallel to the lateral edges in the closed position is more than 20 mm, preferably more than 30 mm and/or less than 400 mm.

The invention is explained below with reference to the drawing to which express reference is made with respect to all details material to the invention and not explored further in the description. In the drawing,

Figure 1 shows a view of a rolling door according to the invention in the closed position,

Figure 2 shows a partially cut away side view of a rolling door according to the invention at the transition from the closed position to the open position,

Figure 3 shows a detailed illustration of the door leaf of a rolling door according to the invention,

Figure 4 shows a detailed illustration of the rolling door in accordance with Fig. 1,

Figure 5 shows an embodiment of a stabilising device of a door according to the invention,

Figure 6 shows a further embodiment of a stabilisation device of a door according to the invention,

Figure 7 shows detailed illustrations of a joint element of a joint assembly of a door according to the invention,

Figure 8 shows illustrations of joint elements, fitted with sealing arrangements, of a door according to the invention,

Figure 9 shows the connection of a stabilising device of a door according to the invention to a joint element of a door according to the invention,

Figure 10 shows detailed illustrations of a guide arrangement of a door according to the invention,

Figure 11 shows a detailed illustration of the sealing arrangement of a door according to the invention, and

Figure 12 shows a detailed illustration of a biasing device of the door according to the invention.

The rolling door shown in Figure 1 comprises a door leaf referenced as a whole with the number 10 which is formed from panes 12 made of a bendable, transparent material, said panes being connected to each other by means of stabilising profiles 40. Joint assemblies in the form of flap joints 20 and 30 are arranged along the lateral edges of the door leaf 10, said joint assemblies being connected to the door leaf 10 by means of the stabilising profiles 40. The flap joints have

guide rollers 22 and 32 on the joints between the individual hinge members on the side of the hinge members facing away from the door leaf 10, which guide rollers can be used to guide the door leaf movement using appropriate guide rails.

In accordance with Figure 1, the flap joints 20 and 30 forming a push-pull assembly are formed from hinge members 26 and 36, which have at one end a fork-shaped receiving structure or the like in which a stud of a neighbouring hinge member engages. A common hinge pin penetrates the fork and stud, thus creating an articulated connection between consecutive hinge members. The roller axes of the guide rollers 22 and 32 run parallel to the joint axes, and preferably colinearly to them. Similarly, the stabilising profiles 40 embodied as aluminium extruded profiles run parallel to the joint axes and roller axes. The stabilising profiles 40 can be connected to the joint assemblies 20 and 30 at the pivot points of the flap joints.

In accordance with Figure 2, a rolling door according to the invention has a helical guide track 100 into which the guide rollers 22 and 32 attached to the flap joints 20 and 30 move as the open position is reached. The hinge members 26 and 36 in the region of the helical guide track are hidden in Figure 2 to achieve a better view of the door leaf itself. It can be seen that panes 12 made of bendable material automatically conform to the desired helical shape. It is not actually necessary for the panes 12 themselves to be connected to the flap joints for this to happen. Rather, it is sufficient if only the stabilising profiles 40 between the individual panes are connected to the joint assemblies in the form of flap joints 20 and 30. It can further be seen that the individual panes made of bendable material can extend beyond a considerable height of the door leaf. That is a particular advantage compared to conventional sectional doors, which allows the helix diameter to be minimised.

In accordance to Figure 3, the panes 12 have thickened portions formed with welded-on weatherstrips 14 on the pane edges running perpendicular to the lateral edges, and said thickened portions are received in the receiving regions 42 and 44 of the stabilising profiles. The width of the receiving regions 42 and 44 tapers in a radial direction starting from the receiving regions 42 and 44 such that the opening regions of the receiving regions are only sufficiently large for the panes 12 with the weatherstrip lugs glued on to the panes to pass through, but not the thickened portions or weatherstrips 14. This achieves a secure connection of individual panes by means of the stabilising profiles 40. However, no transmission of pulling or pushing forces by said connections is necessary. These are transmitted via the flap joints 20 and 30.

In accordance with Figure 4, the flap joints 20 and 30 are connected by means of the stabilising elements 40 using a screw which runs colinearly to the roller axis of the guide rollers 22 and 32 and is secured with a lock nut. The screw engages in a corresponding recess 52 (cf. Figure 3) in the stabilising profiles 40. It can be seen in Figure 4 that the joint axis of the articulated connection between consecutive hinge members 26, the roller axis, screw axis and the axis of the stabilising profile 40 run approximately colinearly.

The embodiment of the invention shown in Figure 5 differs from the embodiment described in Figure 3 primarily in that the stabilising profile 140 has two receiving regions 142 and 144 which are designed to receive a clamping element 150 (cf. Figure 5b) and a sealing strip 160 (cf. Figure 5c). In the installed state, the clamping element and sealing strip are received in the receiving regions 142 and 144, wherein a segment or pane edge is arranged between the clamping element 150 and sealing strip 160 (cf. Figure 5d).

The embodiment of the invention shown in Figure 6 differs from the embodiment described in Figure 5 primarily in that the clamping element 250 delimits the stabilising device 240. To this end, the clamping element 250 is clipped into the stabilising profile 240, as shown in Figure 6. In this embodiment of the invention, the edge of the pane 212 is again arranged between the clamping element 250 and the sealing strip in the installed state, wherein the sealing strip is received in a corresponding receiving structure in the stabilising profile through a fastening bead.

Figure 7a) shows joint elements 126 embodied as aluminium extruded elements, wherein the connection of the rollers to the joint assembly using plain bearings is shown.

Figure 7b) shows joint elements embodied as a plastic injection-moulded hybrid comprising a plastic injection-moulded shell and a sheet steel core.

In the embodiment of the invention shown in Figure 8, a sealing arrangement 370 is placed on the joint elements 360. The sealing arrangement 370 has a sealing strip 380 which forms a continuous seal in the closed state, as the sealing strip 380 extends across a plurality of hinge members 360. An outer boundary surface of the individual segments or panes of the door leaf may abut the sealing strip when the door leaf is in the closed state.

Figure 9 shows the connection of the stabilising profiles 240 to the joint assembly with threaded studs running colinearly to the joint axes, wherein the stabilising profile is arranged on one side of the joint assembly and the guide rollers are arranged on the other side of the guide rollers.

In the embodiment of the invention shown in Figure 10a, the edge of the door leaf which is a leading edge in an opening movement is formed by a stabilising device 40 which is connected in a non-rotary manner to a guide arrangement referenced as a whole with 60. The guide arrangement comprises a roughly U-shaped holder 62. An outer leg of the U-shaped holder 62 is fixed to the stabilising device 40 with a stud 64 and locking screw 66. The stud 64 and screw 66 are spaced from each other in the direction of the door leaf movement indicated by the arrow P. A non-rotary connection of the holder 62 to the stabilising device 40 is thus created. Two guide rollers 22 arranged one behind the other in the direction of the door leaf movement P are attached to the holder 62, each of which is fixed to the holder 62 in a rotating manner relative to roller axes running parallel to the joint axes of the joint elements or hinge members 26. The holder 62 is also connected in a non-rotary manner to the hinge member or joint element 26 which is a leading hinge or joint element in the opening movement.

In Figure 10b the door leaf fitted with the guide arrangement is shown as it moves into the helical guide track. Due to the forced guiding of the guide rollers 22 arranged in a rotating manner on the holder 62, the stabilising device 40 connected to the guide arrangement 60 in a non-rotary manner and the edge of the pane 12 which, connected in an non-rotary manner, is therefore the leading edge during the opening movement are entrained and aligned according to the guide track and the pane 12 is thus forcibly bulged outwards. This bulge is transferred to the subsequent panes of the door leaf, as the stabilising devices 40 provided between the individual panes 12 are connected to the guide rollers 22 in a rotating manner relative to a roller axis running colinear to the joint axes of the joint elements. Due to this forced guiding of the guide arrangement 60, of the guide rollers 22 attached thereto, of the stabilising device 40 connected in a non-rotary manner thereto and of the upper edge, connected in a non-rotary manner to the stabilising device 40, of the segment which is the leading segment during the opening movement or the pane 12 which is the leading pane in the opening movement, an

uncontrolled transition of the pane 12 and the subsequent panes 12 from an inner bulge to an outer bulge is avoided and the resistance to wear of a door according to the invention in increased.

The embodiment of the invention shown in Figure 10 further differs from the embodiments of the invention shown in Figures 1 to 4 in that the individual joint elements have two fork-shaped receiving structures on one side and studs engaging in the fork-shaped receiving structures of a neighbouring joint element on the other side. This improves the torsional stiffness of the joint assembly.

In the embodiment of the invention illustrated in Figure 11, a sealing arrangement 470 which in the closed position abuts an inner surface of the panes 12 which faces the space to be closed with the door leaf is shown. The sealing arrangement 470 comprises a U-shaped sealing profile spanning two, three or more joint elements 26, starting from which a sealing lip 472 extends in the direction of an inner boundary surface of the pane 12.

The sealing lip 472 is fitted with a hollow chamber seal 474 on its edge facing the inner boundary surface of the pane 12, though which a particularly reliable sealing effect can be achieved. The sealing profile 476 of the sealing arrangement shown in Figure 11 can extend across two, three or more hinge members extending between consecutive stabilising devices 240. Overall, the sealing arrangement 470 extends approximately in the direction of gravity with the door in the closed position.

Figure 12 shows a top perspective view of one of two lateral frame profiles 600 of an embodiment of the door according to the invention. The lateral frame profile 600 has a channel 610 running in the direction of gravity which receives a tension spring 500, the upper end of which can be seen in Figure 12. An exposed cantilever arm 520 is attached to the upper end of the tension spring 500, and a driver (not shown) which is attached to a lower joint element 26 which is a trailing joint element in the opening movement is brought to rest against this cantilever arm in the course of the opening movement. With the driver, the cantilever arm 520 and therefore also the upper end of the tension spring 500 can be entrained upwards during the opening movement and the tension spring 500 can thus be tensioned. On the one hand, this brakes the opening movement of the door leave and on the other hand a breakaway torque conducive to the initiation of a closing movement is provided when the door leaf is in the open position.

The invention is not limited to the embodiment described in the drawings. Rather, it is also envisaged that additional stabilising strips be provided parallel to the lateral edges of the door leaf in order to achieve additional stabilisation with respect to wind loads. The push-pull assemblies embodied in the form of flap joints in the embodiment described can also be embodied differently. The connection of the stabilising elements to the push-pull assembly can also be configured in an articulated manner, avoiding a rigid connection. This creates a floating mounting arrangement which helps to avoid a transmission of torsional forces from the wound segments to the push-pull assembly.

References

P	Direction of door leaf movement
20/30	Flap joints
22/32	Guide rollers
26/36	Hinge members
42/44	Receiving regions
10	Door leaf
12	Panes
14	Weatherstrip
40	Stabilising profile
52	Recess
60	Guide arrangement
62	Holder
64	Stud
66	Locking screw
100	Guide track
122	Rollers
126	Joint elements
140	Stabilising profile
142	Receiving region
144	Receiving region
150	Clamping element
160	Sealing strip
212	Pane
240	Stabilising device
250	Clamping element
260	Sealing strip
360	Joint elements
370	Sealing arrangement
380	Sealing strip
470	Sealing arrangement

472	Sealing lip
474	Hollow chamber seal
476	Sealing profile
500	Tension spring
520	Cantilever arm
600	Lateral frame profile
610	Channel

Patentkrav

1. Rulleport med et portblad (10), som kan bevæges mellem en åbnestilling, i hvilken det frigiver en vægåbning i det mindste delvist og oven over vægåbningen danner en rulle i flere lag, og en lukkestilling, i hvilken det lukker vægåbningen i det mindste delvist, og ledindretninger (20, 30), som er anbragt i området af portbladets (10) sidekanter i lukkestillingen, hvilke sidekanter i det mindste sektionsvis forløber i tyngderetningen, og hvilke ledindretninger er fastgjort på portbladet, til føring af portbladsbevægelsen, hvoraf hver ledindretning har en flerhed af ledelementer (26, 36), der er ledforbundet med hinanden i forhold til ledakser, der forløber vinkelret på sidekanterne og omtrent parallelt med portbladsplanet, hvor portbladet i det mindste sektionsvis er fremstillet af et bøjeligt materiale, såsom for eksempel en kunststoffolie, som er stabiliseret ved hjælp af to, tre eller flere stabiliseringsindretninger (40), der forløber vinkelret på sidekanterne og i portbladsplanet, hvor portbladet (10) kun er forbundet med ledindretningerne (20, 30) via stabiliseringsindretningerne (40), **kendetegnet ved** en forspændingsindretning, der først i løbet af åbnebevægelsen kan kobles til en kant af portbladet, der løber efter ved en åbnebevægelse, og kan forspændes i løbet af åbnebevægelsen, til nedbremsning af åbnebevægelsen og til tilvejebringelse af en forspændingskraft, der tvinger portbladet fra åbnestillingen ind i lukkestillingen.

2. Rulleport ifølge krav 1, **kendetegnet ved, at** portbladet (10) har mindst et segment (12) af fortrinsvis transparent, bøjeligt materiale med skivekanter, der forløber omtrent vinkelret på portbladets (10) sidekanter og er forsynet med en fortykning (14), hvor mindst en stabiliseringsindretning (40) har et stabiliseringsprofil med mindst et optagelsesområde (42, 44) til optagelse af fortykningen på en segmentkant.

3. Rulleport ifølge krav 2, **kendetegnet ved, at** mindst en segmentkant er anbragt materiale- og/eller formsluttende på en stabiliseringsindretning.

4. Rulleport ifølge et af kravene 2 eller 3, **kendetegnet ved, at** der er anbragt mindst et segment (12) af bøjeligt materiale mellem to stabiliseringsindretnin-

ger (40), hvor en kant af segmentet (12), der forløber vinkelret på stabiliseringsindretningerne (40) og omtrent parallelt med ledindretningerne (20, 30), strækker sig over to, tre eller flere ledelementer.

5. Rulleport ifølge et af kravene 2 til 4, **kendetegnet ved, at** der på stabiliseringsindretningen er anbragt mindst en segmentkant med et klemmeelement (150, 250), der kan fastgøres aftageligt på stabiliseringsindretningen og fortrinsvis er optaget i det mindste delvist i stabiliseringsindretningen og/eller begrænser stabiliseringsindretningen.

6. Rulleport ifølge krav 5, **kendetegnet ved, at** der er anbragt mindst en segmentkant mellem klemmeelementet og en tætningsliste (160), der strækker sig fortrinsvis over hele portbladets bredde.

7. Rulleport ifølge et af de foregående krav, **kendetegnet ved, at** portbladet (10) har mindst to segmenter (12) af bøjeligt materiale, der er anbragt efter hinanden i portbladets bevægelsesretning, mellem hvilke der er anbragt et stabiliseringsprofil (40) med to optagelsesområder (42, 44) til optagelse af fortykninger (14), der er tilvejebragt på skivekanter, der vender mod hinanden.

8. Rulleport ifølge et af de foregående krav, **kendetegnet ved, at** mindst en stabiliseringsindretning (40) strækker sig omtrent parallelt med en ledakse og langs med denne ledakse er forbundet med mindst en, fortrinsvis med to ledindretninger, der er tilvejebragt på over for hinanden beliggende portbladssidekanter.

9. Rulleport ifølge et af de foregående krav, **kendetegnet ved** mindst en forstærkningsstrimmel, der strækker sig omtrent parallelt med portbladssidekanten og er fastgjort på portbladet.

10. Rulleport ifølge et af de foregående krav, **kendetegnet ved** mindst en evt. oval spiralformet føringsbane (100) til føring af portbladsbevægelsen og til fastlæggelse af portbladets (10) åbnestilling.

11. Rulleport ifølge krav 10, **kendetegnet ved, at** mindst et ledelement (26, 36) på den side, der vender bort fra portbladet, har en føringsindretning, som samarbejder med føringsbanen med henblik på at føre portbladsbevægelsen, og som fortrinsvis omfatter mindst en føringsrulle (22, 32), som er lejret drejeligt i forhold til en rulleakse, der forløber parallelt med ledakserne, og som fortrinsvis er optaget i en føringsbane (100) i det mindste i portbladets (10) åbnestilling.

12. Rulleport ifølge et af kravene 2 til 10, **kendetegnet ved, at** den kant af portbladet (10), der kommer først ved en åbnebevægelse, er dannet af en stabiliseringsindretning (40), som kommer først og er forbundet med en i lukkestillingen øvre kant af et segment af et bøjeligt materiale, og som er forbundet drejningssikkert med en føringsindretning (60).

13. Rulleport ifølge krav 12, **kendetegnet ved, at** føringsindretningen (60), der er forbundet drejningssikkert med stabiliseringsindretningen (40), der kommer først, har to føringsruller (22), der er anbragt efter hinanden i portbladets bevægelsesretning, hvoraf hver føringsrulle i forhold til en parallelt med ledakserne forløbende rulleakse er forbundet drejeligt på en fælles holder (60), der er forbundet drejningssikkert med stabiliseringsindretningen (40), der kommer først, hvor holderen (60) fortrinsvis er anbragt på et ledelement (26), der kommer først ved åbnebevægelsen.

14. Rulleport ifølge et af de foregående krav, **kendetegnet ved, at** der til mindst et ledelement (26) er knyttet en tætningsindretning (370, 470), der i lukkestillingen kan lægges an mod en begrænsningsflade, især den indvendige begrænsningsflade, af portbladet.

15. Rulleport ifølge krav 14, **kendetegnet ved, at** tætningsindretningen (370, 470) har mindst et tætningselement, der strækker sig over to, tre eller flere ledelementer.

16. Rulleport ifølge et af de foregående krav, **kendetegnet ved, at** forspændingsindretningen har en trækfjeder (500), som strækker sig omtrent i tyngderetningen og eksempelvis er udført som et ekspanderkabel, hvis øvre ende i

løbet af åbnebevægelsen gribes fat i og føres med af en medbringer, der er anbragt i området ved den kant af portbladet, der kommer sidst ved åbnebevægelsen.

17. Rulleport ifølge et af de foregående krav, **kendetegnet ved, at** længden af mindst et ledelement i en retning, som i lukkestillingen forløber parallelt med portbladets sidekanter, udgør mere end 20 mm, fortrinsvis mere end 30 mm og/eller mindre end 400 mm.

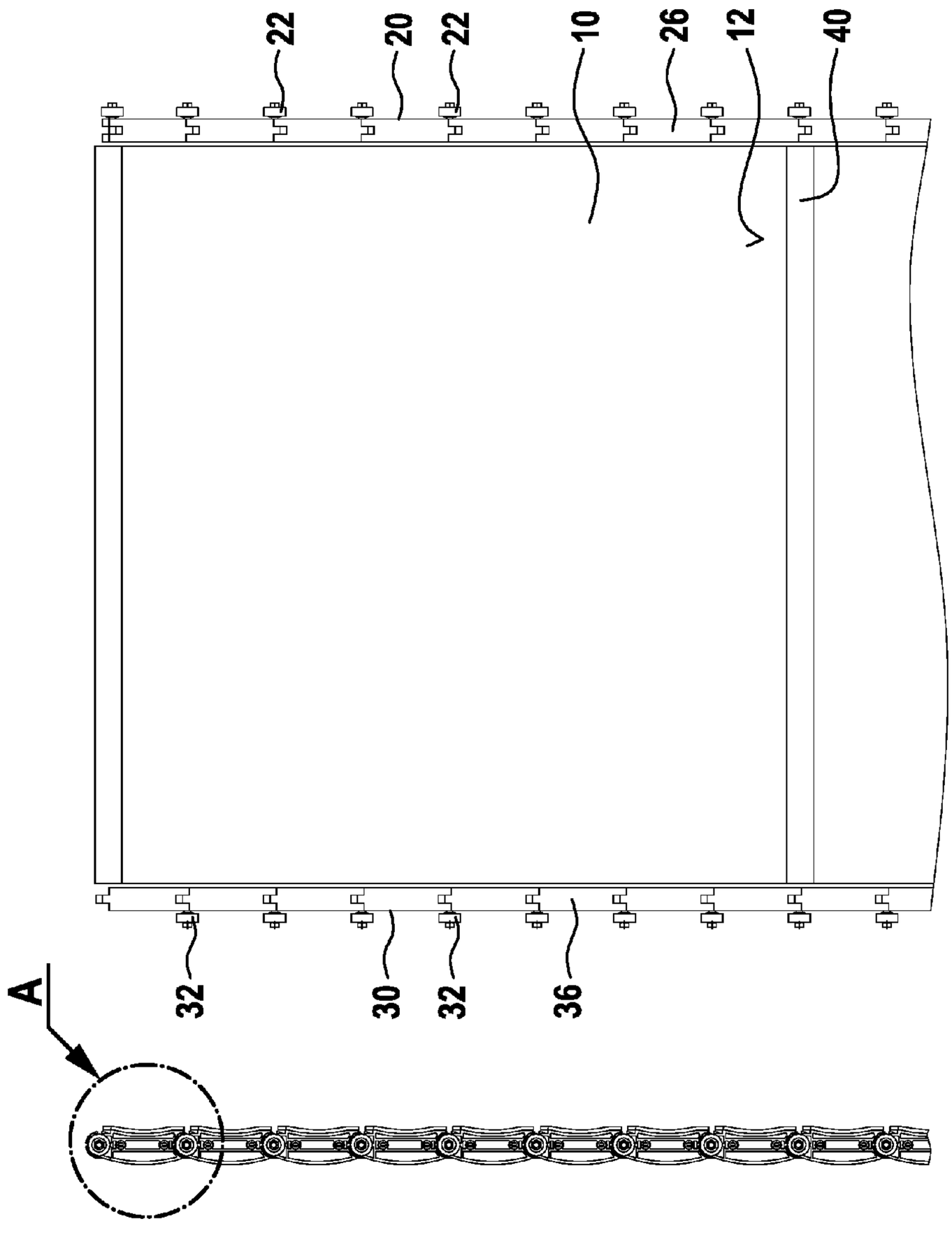
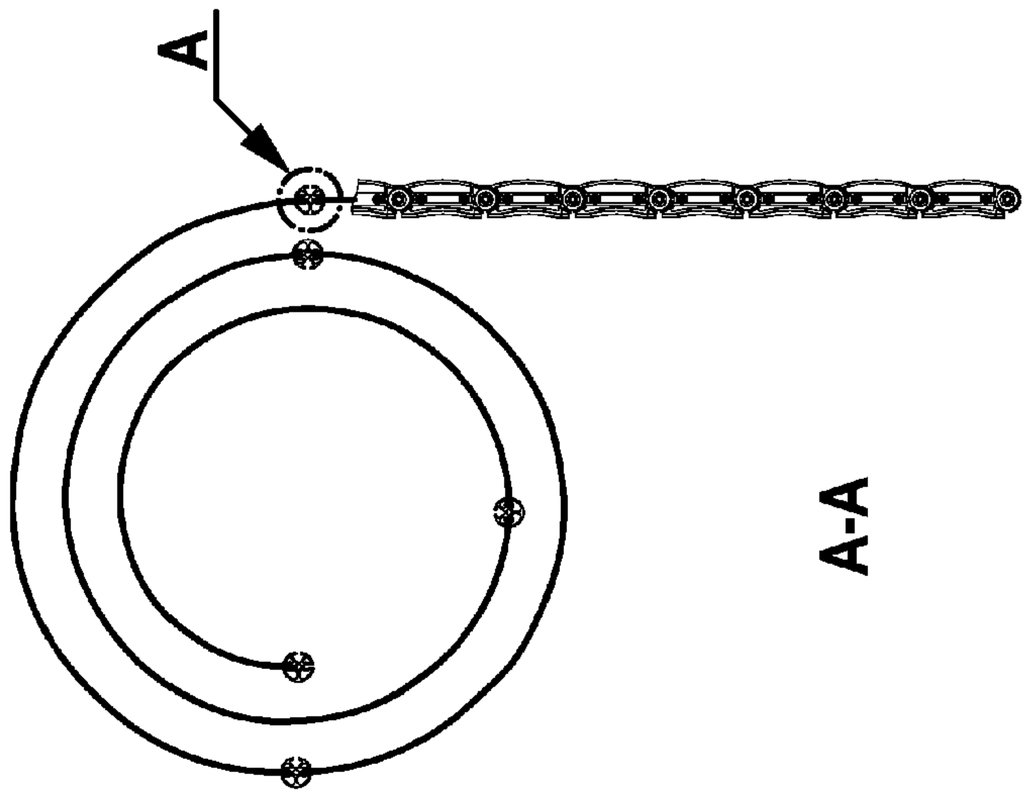


Fig. 1



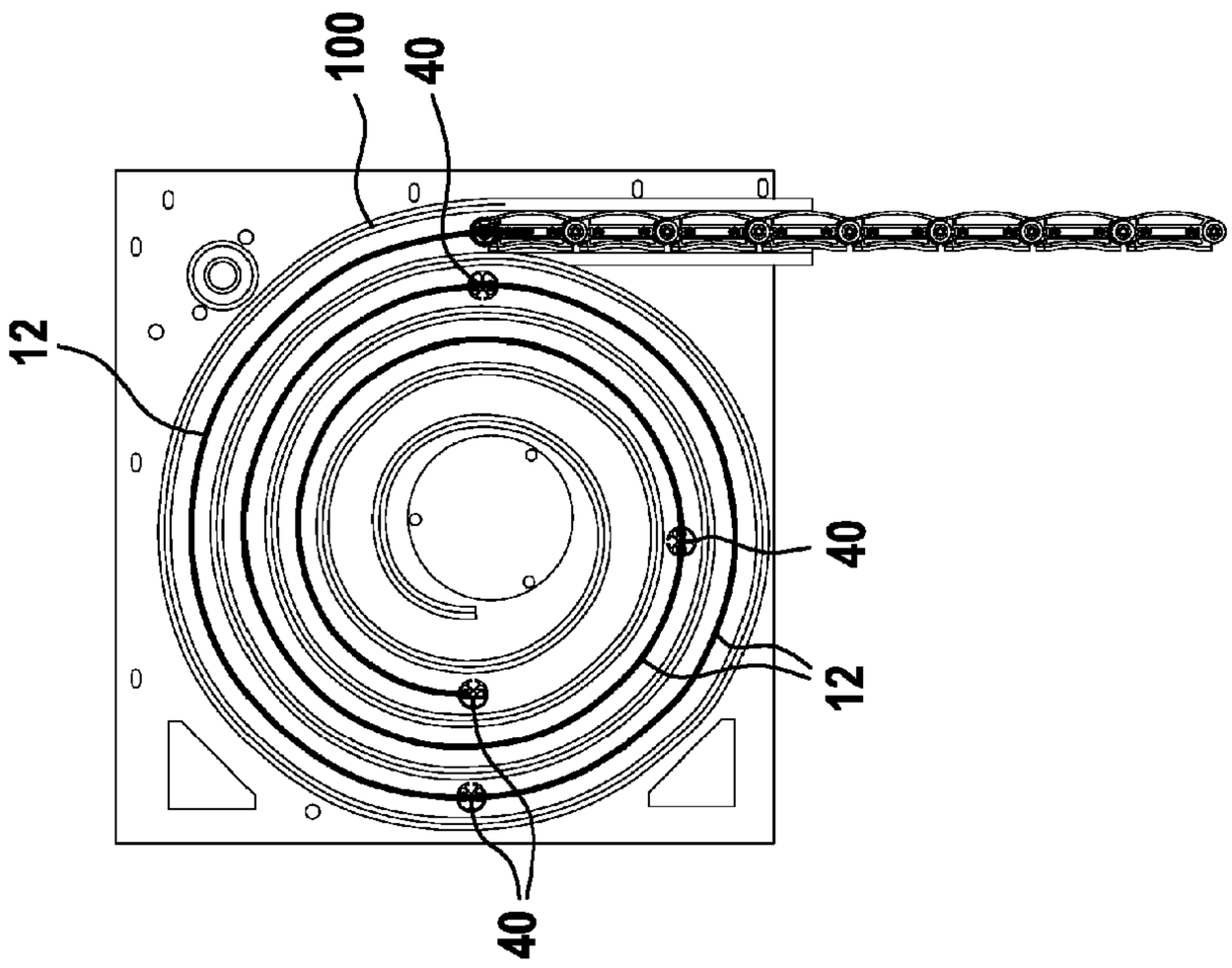


Fig. 2

Fig. 3

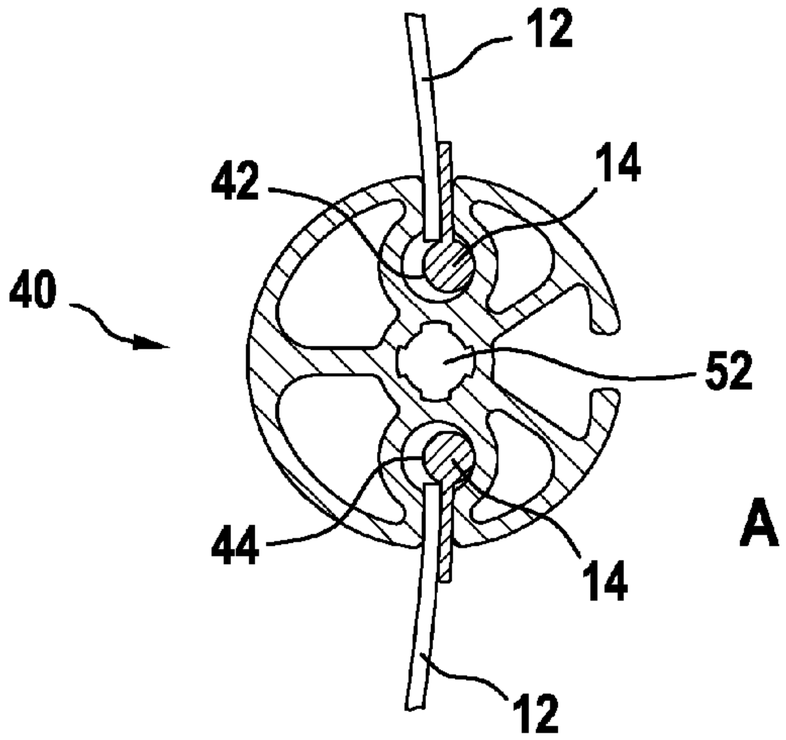


Fig. 4

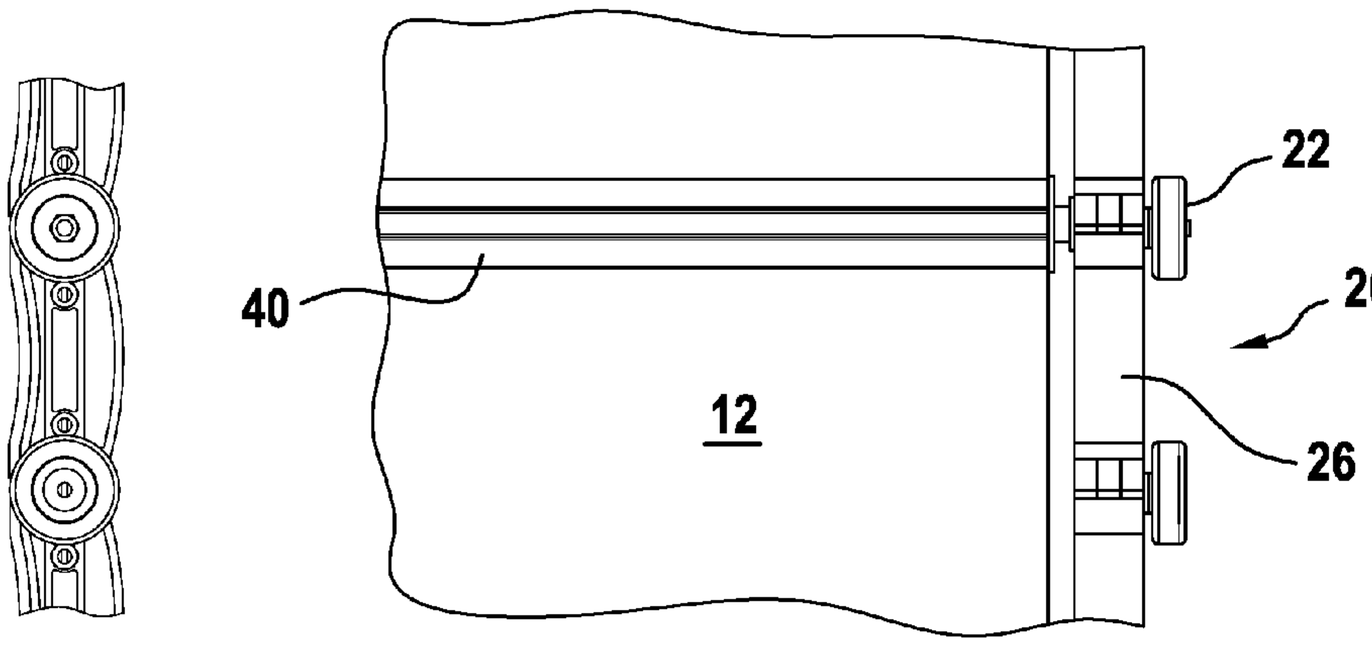


Fig.5a

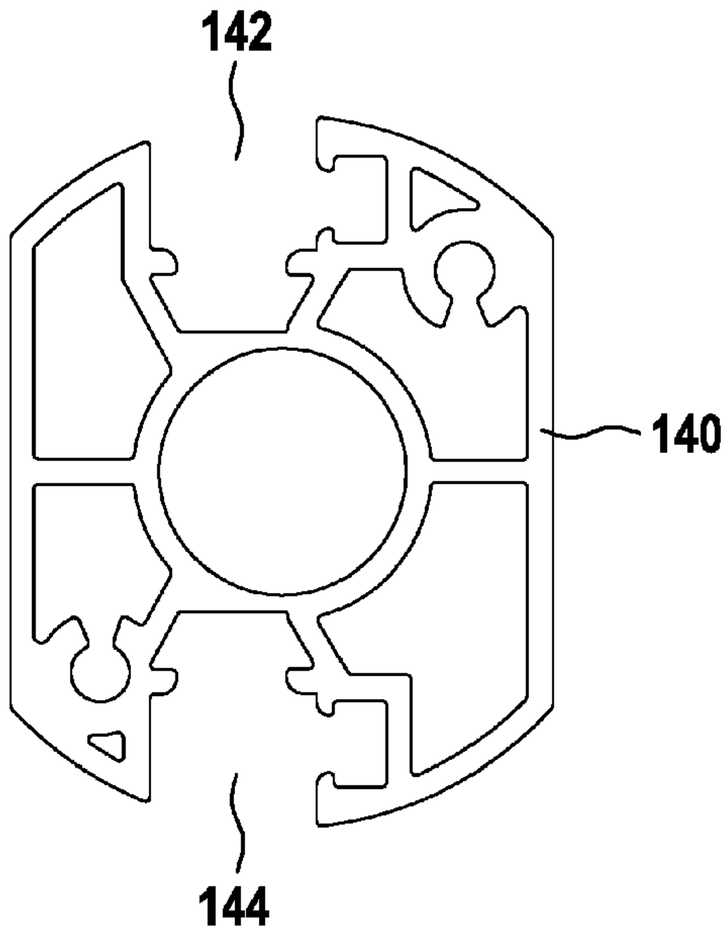


Fig.5b

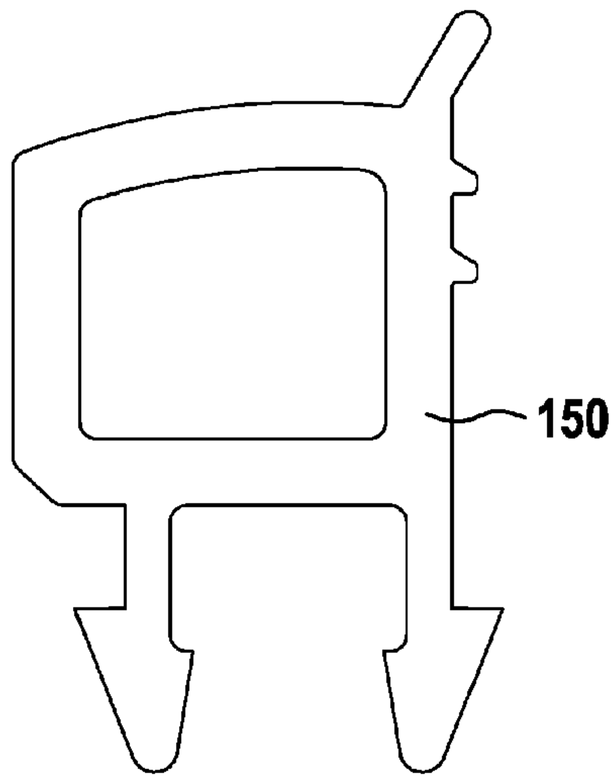


Fig.5c

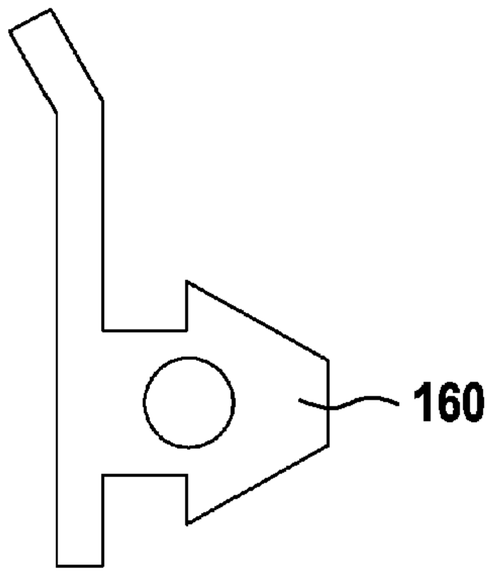


Fig.5d

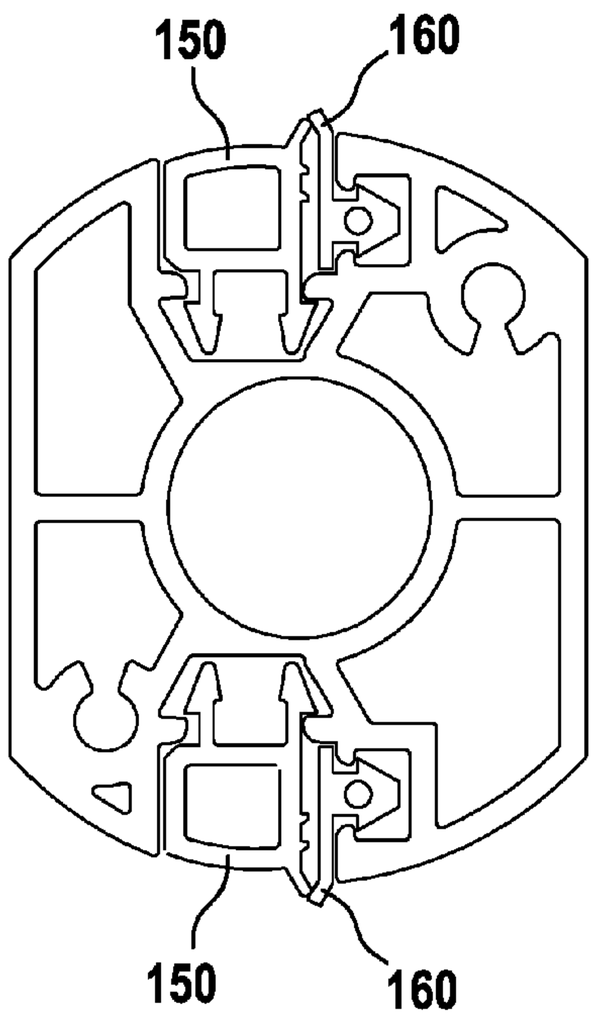


Fig. 6

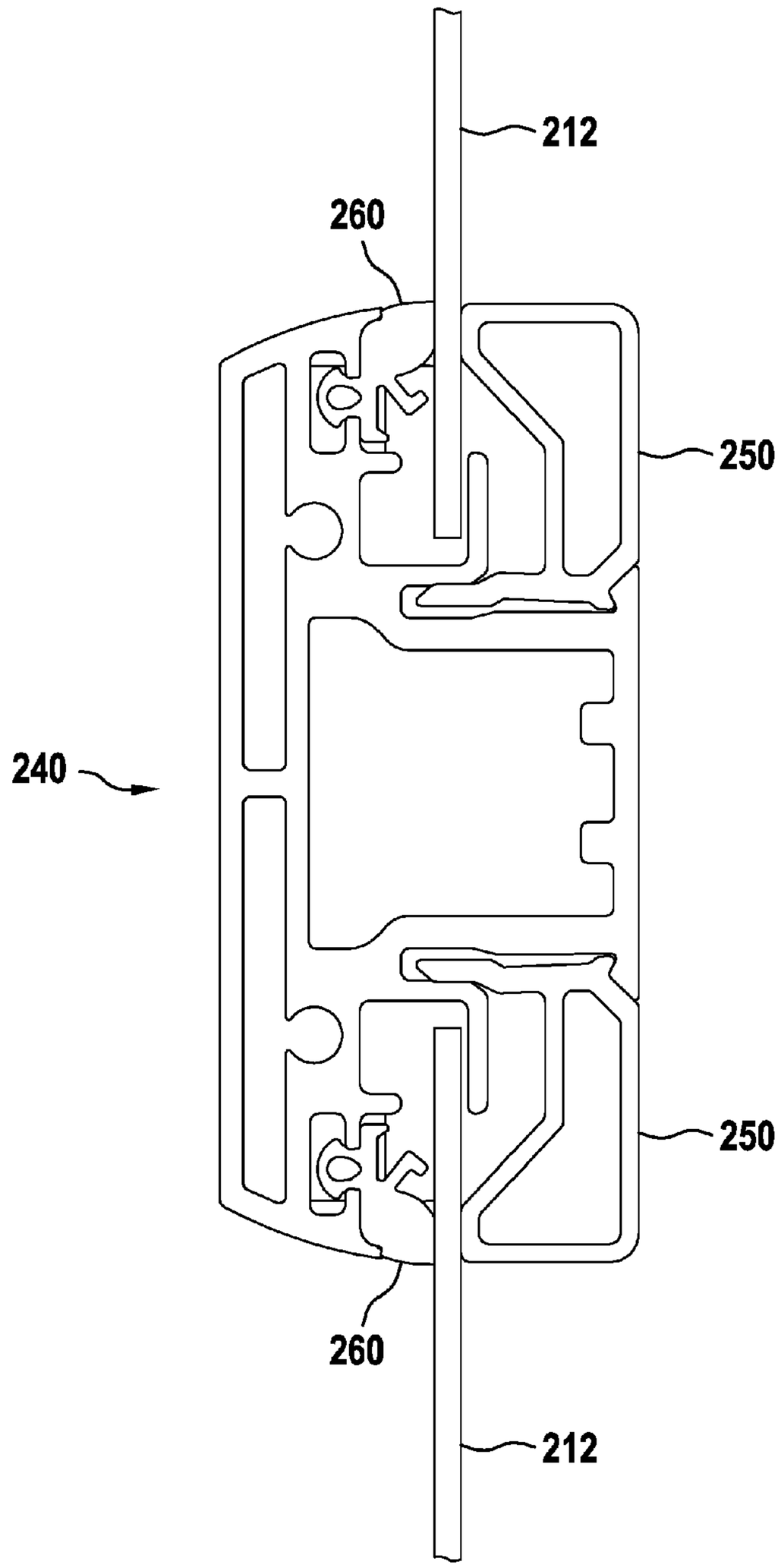


Fig. 7a

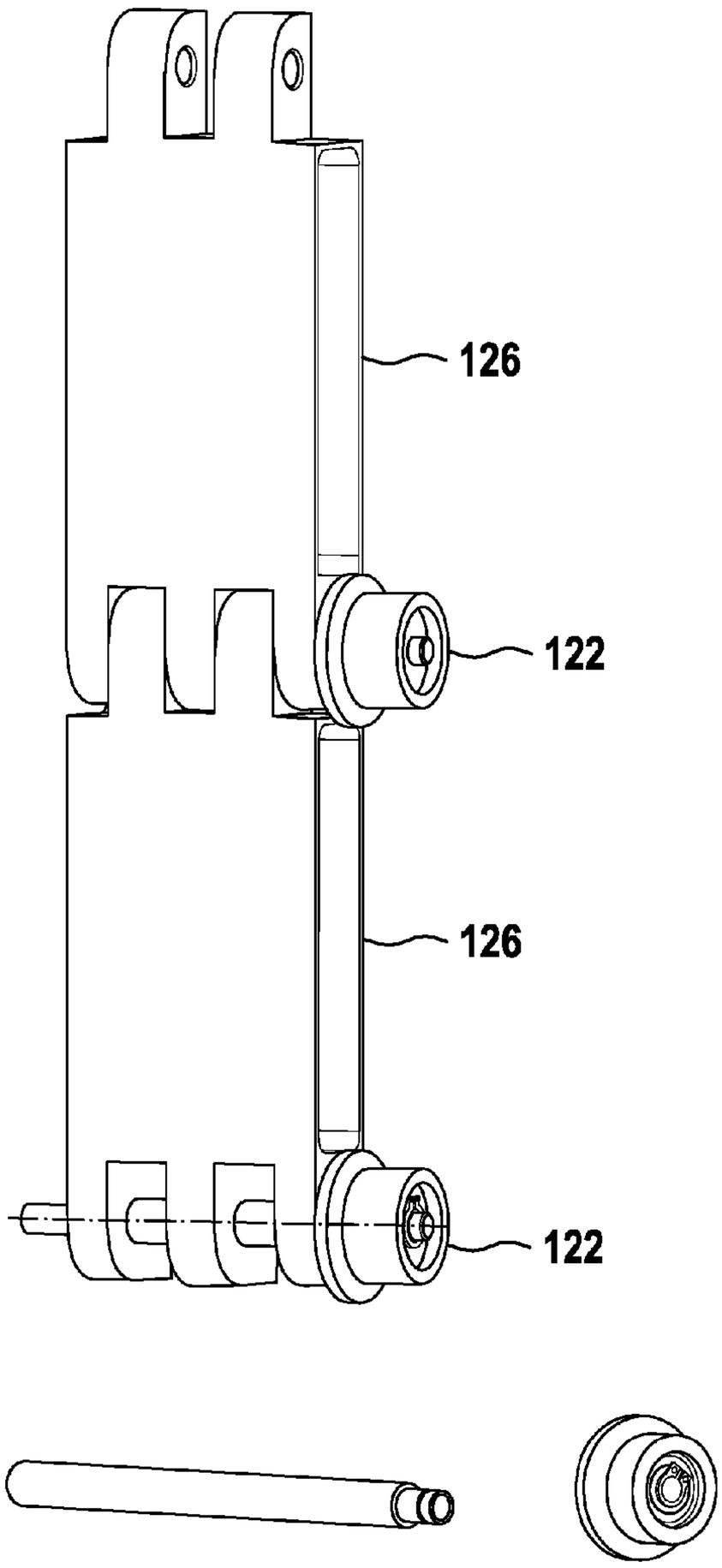


Fig. 7b

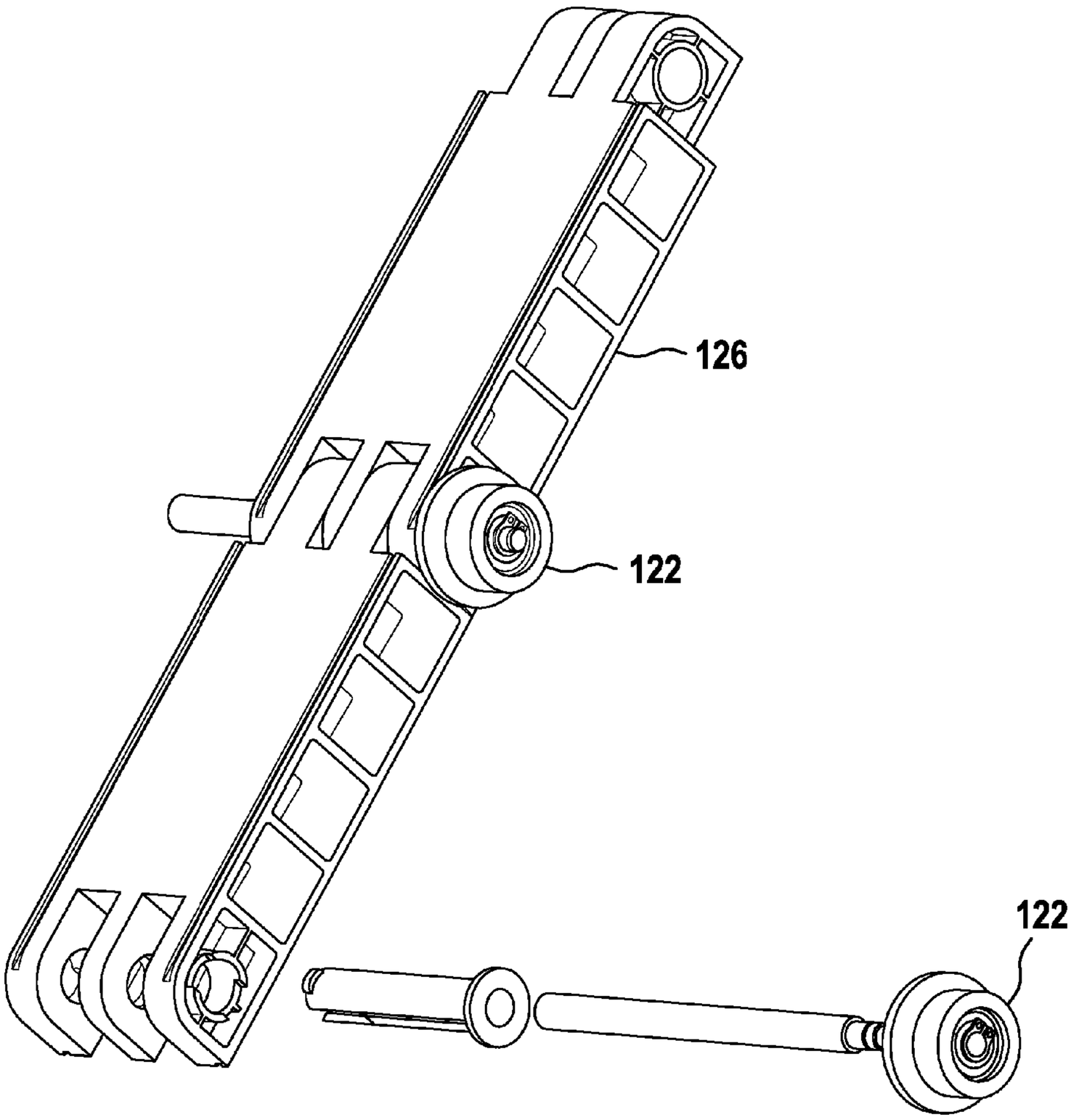


Fig.8

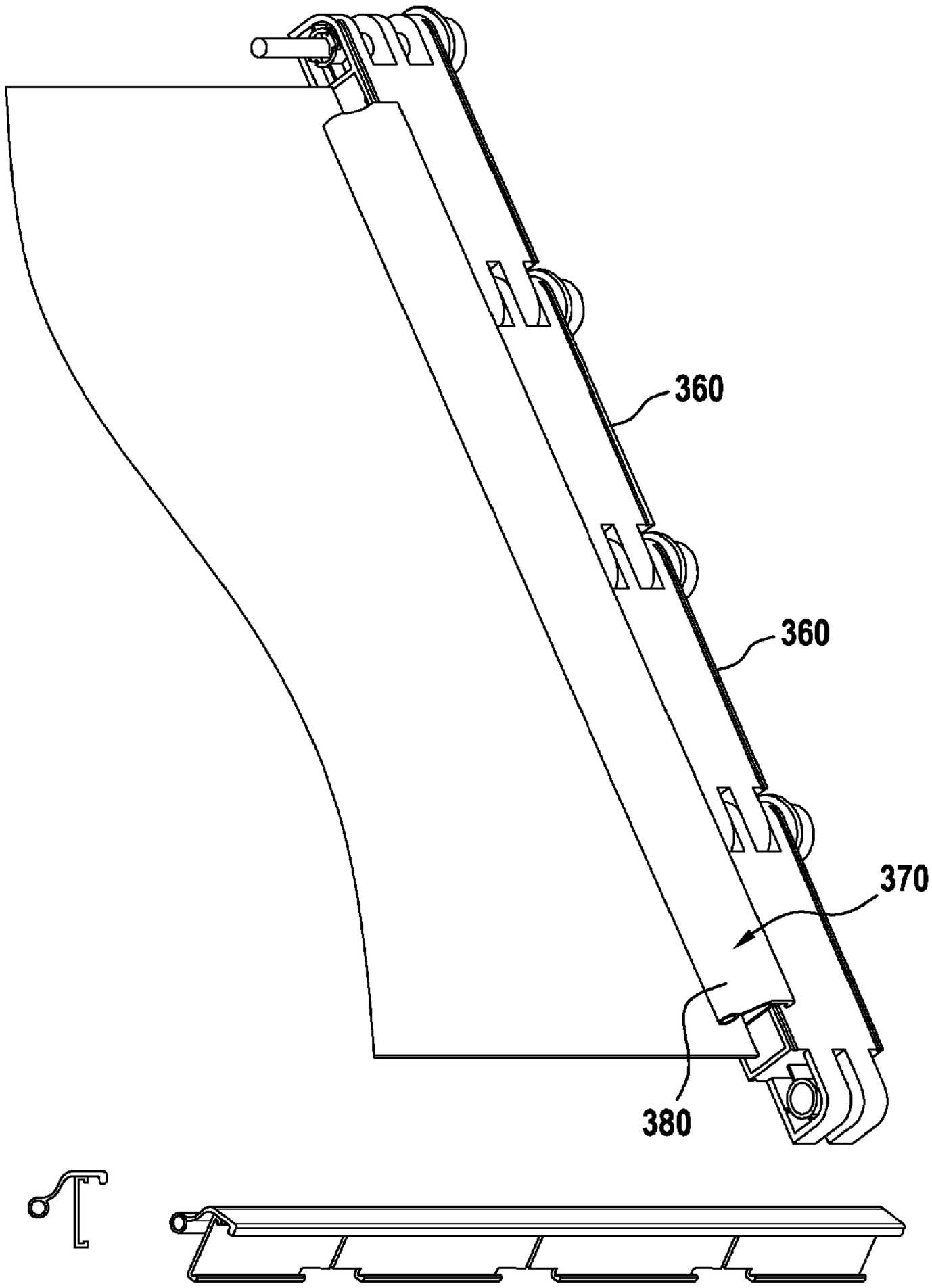


Fig. 9

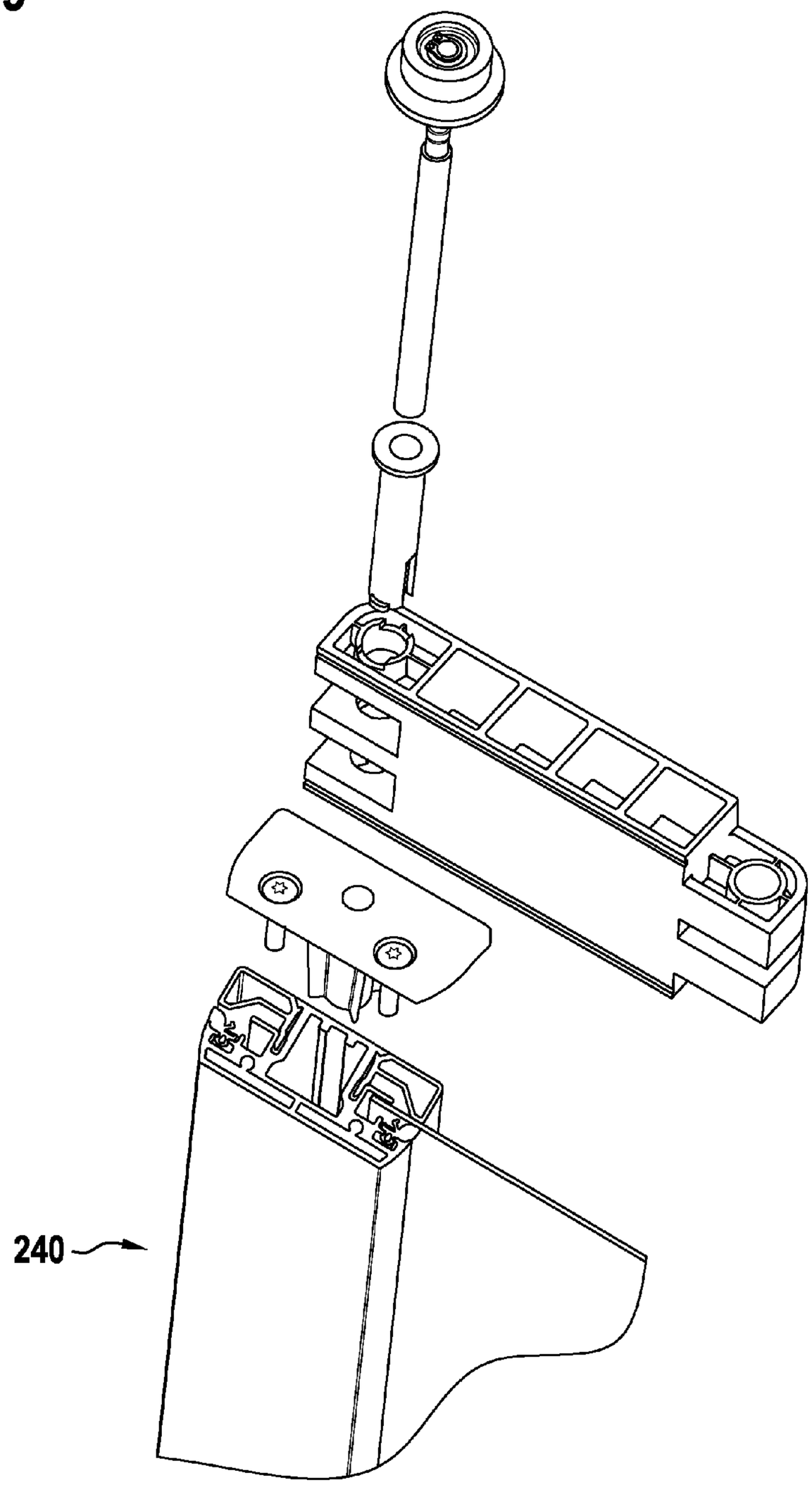
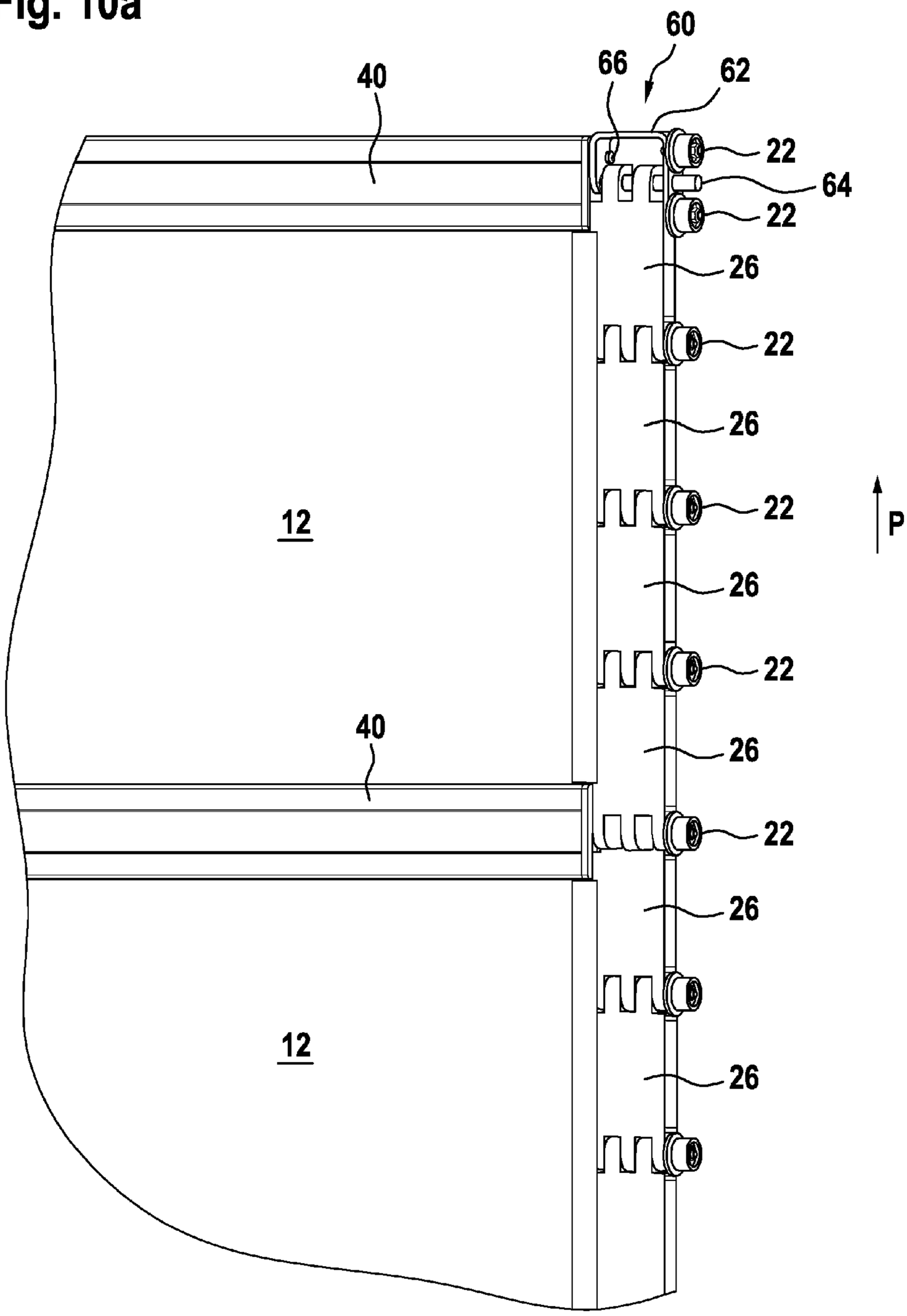


Fig. 10a



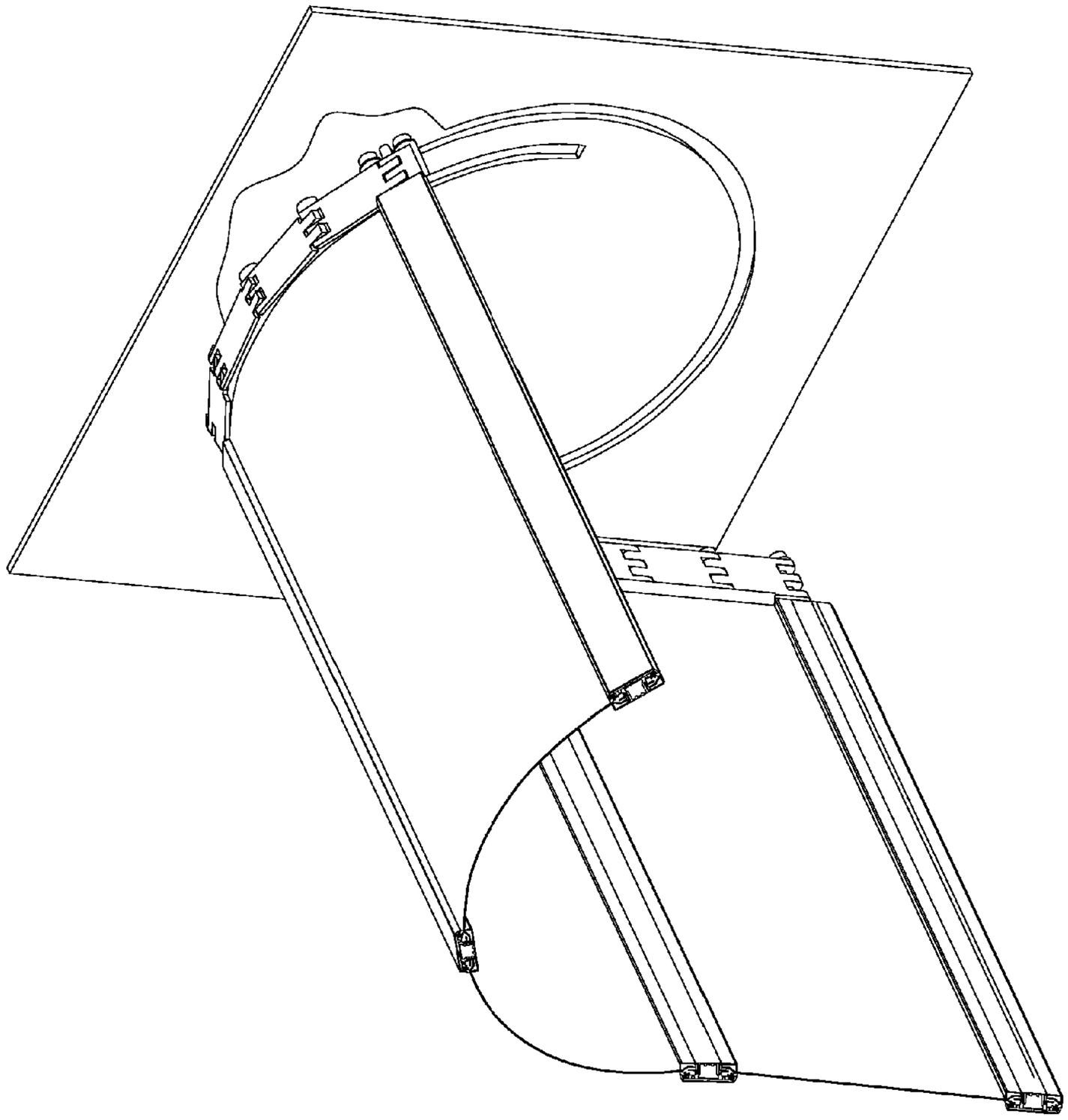


Fig. 10b

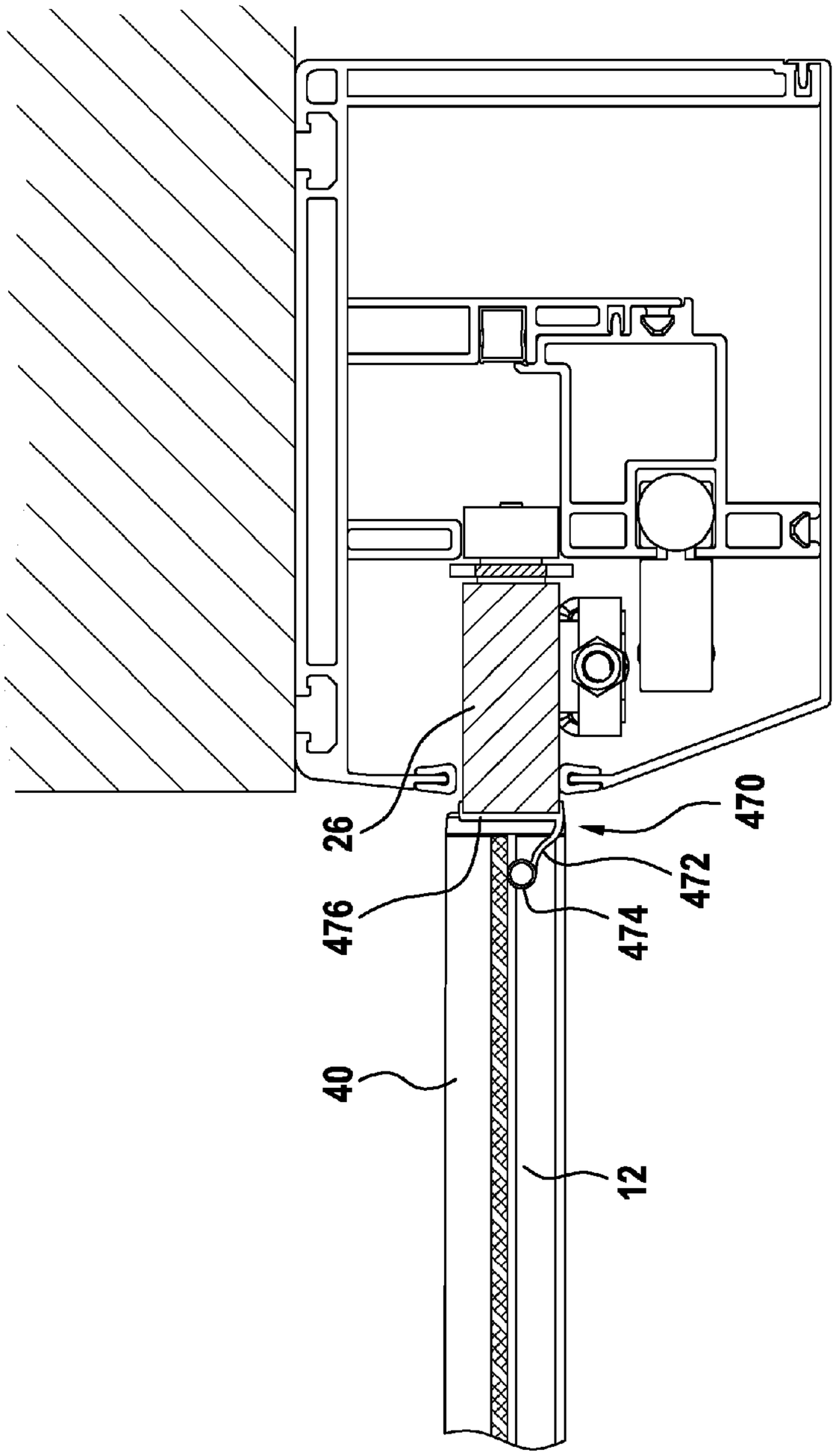


Fig. 11

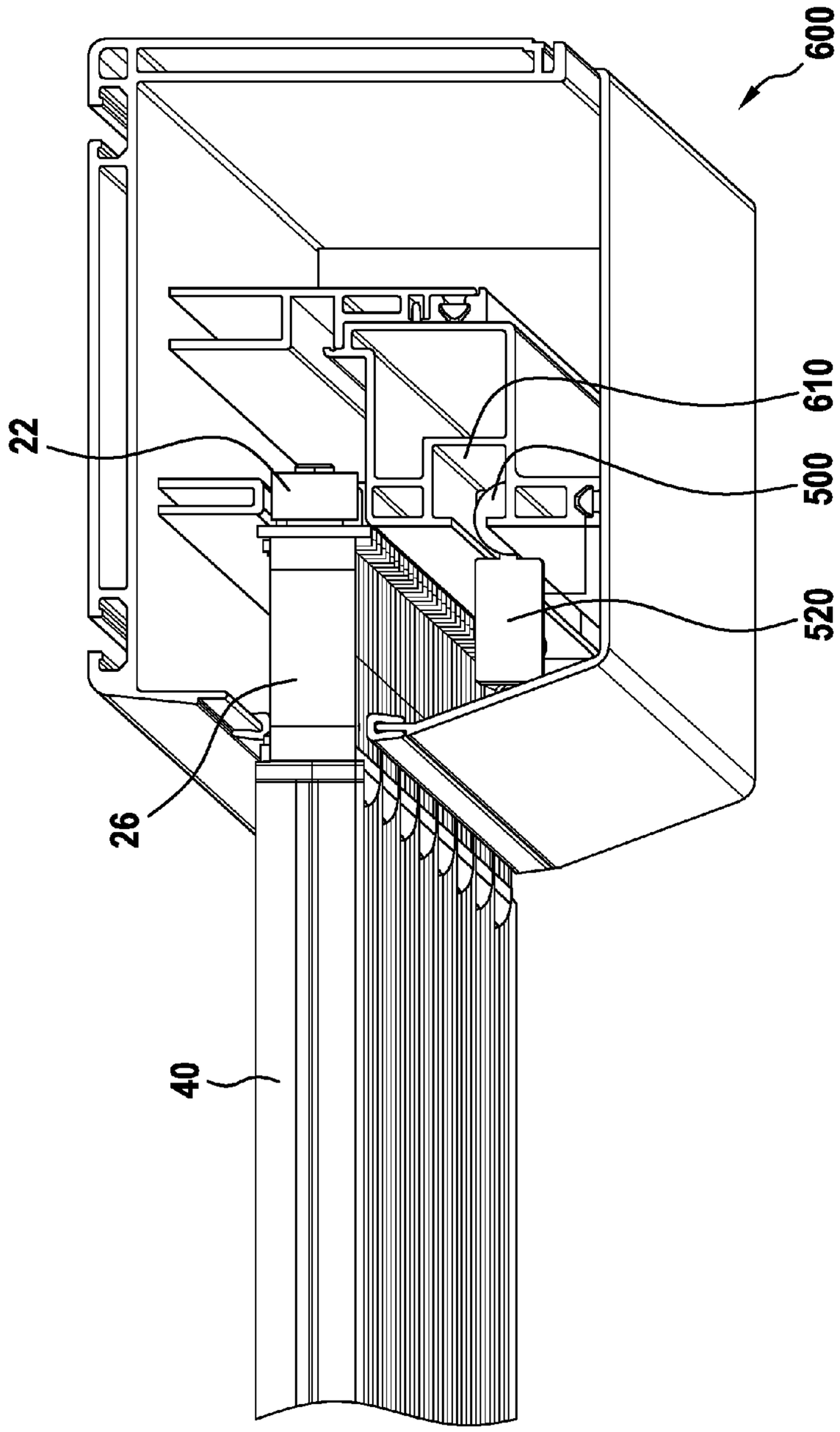


Fig. 12