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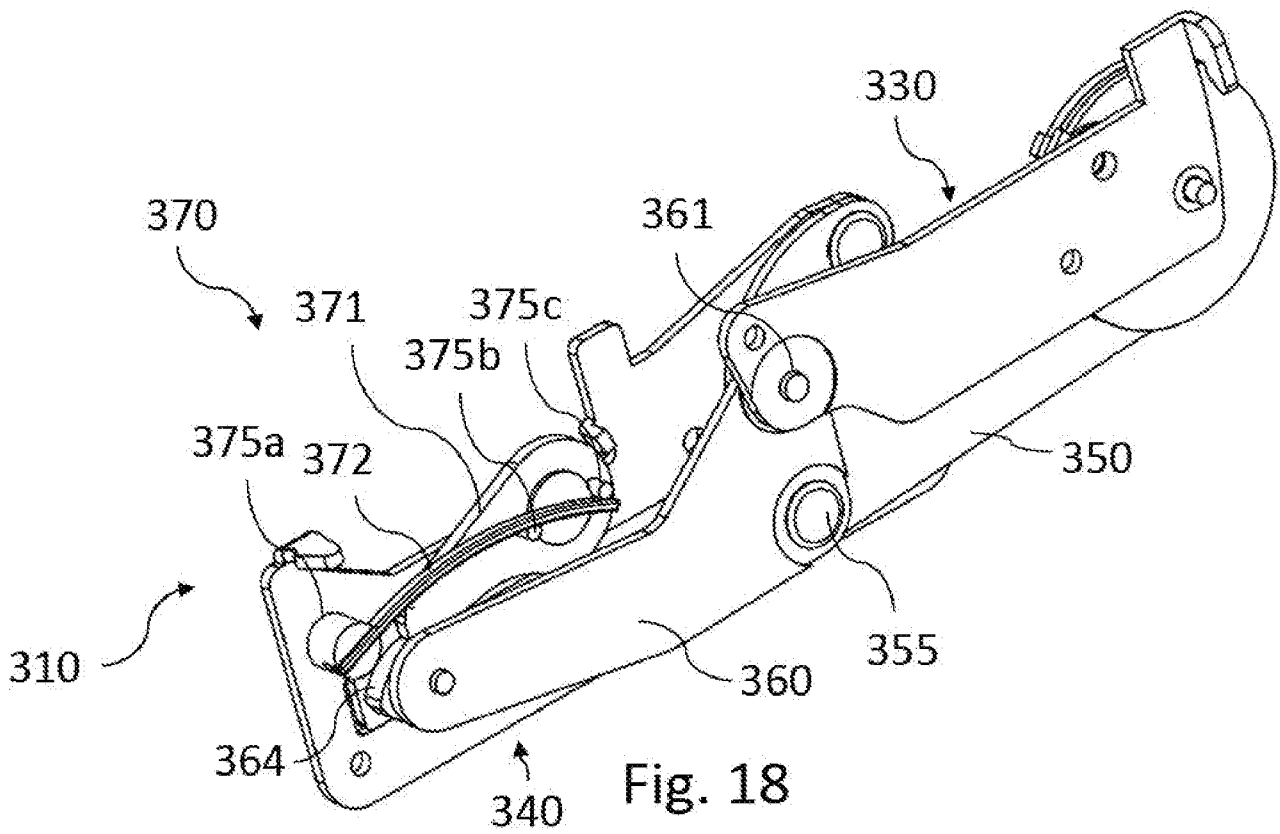
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In the roof window, each hinge (310) of the set of hinges comprises a frame hinge part (330), a sash hinge part (340), and a movement supporting assembly comprising guiding means including a linkage mechanism with at least two links (350, 360) providing connection between the sash hinge part and the frame hinge part. Each link is connected to at least one of the frame hinge part and the sash hinge part at a joint and connected to each other. A force transmission device (370) is provided for exerting lifting assistance to the movement of the sash (2) relative to the frame (1) during opening of the roof window in the mounted condition of the hinge (310). The force transmission device is provided with biasing means selected from the group comprising leaf springs, torsion springs and tension/compression springs. The force transmission device (370) may comprise a pick-up (371) biased by a leaf spring (372) connected to the frame hinge part or the sash hinge part (340) by means of a fastening protrusion (375a) and/or a first abutment protrusion (375b) and/or a second abutment protrusion (375c).

Fortsættes...



5 Technical Field

The present invention relates to a hinge for a roof window with a stationary primary frame, and at least one secondary frame including a sash and optionally an intermediate frame, said hinge being configured to define a hinge axis of the roof window and comprising a frame hinge part, a sash hinge part, and a movement supporting assembly comprising guiding means configured to allow the sash hinge part to assume an angle relative to the frame hinge part substantially around said hinge axis. The invention furthermore relates to a roof window including a set of hinges.

15 Background Art

Windows for installation in an inclined roof surface may be provided in a number of varieties and include more or less complicated operational structures to allow opening of the sash and to fulfil other functions, such as ventilation. Such roof windows include the pivoting type hinged at or near the centre, the top-hinged type, and finally the roof windows that are top-hinged during normal operation but which pivot for cleaning. Roof windows of the top-hinged type have a primary hinge axis provided by a top hinge and pivot for cleaning by means of an intermediate frame in which the sash is hinged to provide a secondary hinge axis.

Basically, the hinges in such a window need to fulfil a number of requirements, in particular with regard to the movement pattern required to allow an overlap between the cover members fastened to the frame and the counterpart cover members fastened to the sash to be established in the closed position of the roof window. To improve the user experience, lifting assistance by force transmission to selected parts of the hinge may be provided to assist in particular the opening movement. Furthermore, braking means may be provided to modulate the movement of the sash during opening and closing and/or to render parking of the sash in arbitrary open positions easy and

uncomplicated. Typically, one hinge will be located at either side of the roof window to define a substantially horizontal hinge axis.

One very well-proven type of hinge providing the required pattern of movements is the pivot hinge, which includes a guidance on the frame hinge part cooperating with a slide rail on the sash hinge part. Such pivot hinges are for instance disclosed in Applicant's EP 1 038 083 B1 and EP 1 781 883 B1 and are very versatile as regards operational areas and adaptation of components. Examples of roof windows incorporating such adapted hinges are shown in Applicant's published European patent applications EP 2 770 146 A1 and EP 2 770 149 A1.

However, as an alternative to the traditional pivot hinges in certain fields of application, so-called pantograph hinges are known, in which the desired pattern of movements is provided by a linkage mechanism. The use of hinges including linkage mechanisms is traditionally most often known from the furniture field, but such hinges are also well-known to use for roof windows. Prior art examples include Danish patent No. 114 321, US patent No. 4,446,597, and Applicant's European patents EP 22 657 B1 and EP 89 813 B1. In a modern update of this so-called pantograph hinge, Applicant's international published application WO 2017/076416 A1 presents a hinge of the kind mentioned in the introduction.

Although the hinges in the above examples are to some extent capable of providing the kinetic and kinematic performances aimed at, there is still room for improvement.

25 **Summary of Invention**

With this background it is an object of the present invention to improve a hinge of the kind mentioned in the introduction with respect to controlling the output forces of the linkage mechanism of the hinge.

This is achieved with a hinge as described in the appended claim 1, which is further characterised in that the guide track is provided in a link of the linkage mechanism, preferably in the sash link and/or the frame link, and the sliding joint is provided on a hinge part, preferably on the frame hinge part

and/or the sash hinge part.

By providing a force transmission device, the movement of the sash and the opening of the roof window may be facilitated, thus allowing for a safer window while modulating the opening movement.

According to the invention, the frame hinge part comprises a base plate defining a hinge plane substantially perpendicular to the hinge axis of the roof window and the sash hinge part comprises a base plate substantially parallel to the base plate of the frame hinge part. In this way, transverse movements perpendicular to the hinge plane are avoided and therefore, the durability of the hinge is enhanced.

Other presently preferred embodiments and further advantages will be apparent from the subsequent detailed description, claims and drawings.

15 **Brief Description of Drawings**

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

Fig. 1 is a perspective view of a roof window according to the invention;

Fig. 2 is a partial perspective view of details of a roof window, including frame and sash side members, in an embodiment of the invention;

Fig. 3 is a partial perspective view of the frame side member of Fig. 2 and shows a hinge in a first embodiment of the invention;

Figs 4 and 5 are perspective views of the hinge in the first embodiment of the invention;

Fig. 6 is a view of the hinge of Figs 4 and 5 seen from the above;

Figs 7, 8 and 9 are exploded perspective views of the details of Figs 4 and 5;

Figs 10 to 12 are partial side views showing a roof window in an embodiment of the invention with the hinge of the first embodiment, in three different positions of the sash relative to the frame;

Fig. 13 is a partial perspective view of details of a roof window, including frame and sash side members, in an open position of the sash relative

to the frame and with a hinge in a second embodiment of the invention;

Fig. 14 is a partial perspective view of the frame side member of Fig. 13, including the hinge of the second embodiment of the invention;

Figs 15 and 16 are perspective views of the hinge in the second
5 embodiment of the invention;

Figs 17 and 18 are perspective views of the hinge in a third embodiment of the invention;

Figs 19 and 20 are perspective views of the hinge in a further embodiment of the invention;

10 Fig. 21 is a perspective view of the hinge in an alternative embodiment of the invention;

Figs 22 and 23 are perspective views of the hinge in a still further embodiment of the invention; and

15 Fig. 24 is an exploded perspective view of the details of the hinge in the still further embodiment of the invention shown in Figs 22 and 23.

Description of Embodiments

In the following, embodiments of the inventive hinge and roof window will be described in further detail. When referring to the Figures, the terms up,
20 down, upwards, downwards, top and bottom are taken relative to how the figures are displayed. A front view is taken from the hinge and viewing towards the frame. A view from behind is therefore taken as viewed from the frame towards the hinge. A longitudinal direction is, if nothing else is mentioned, longitudinal along the length of a member. It is to be understood that the
25 arrangement shown in a horizontal orientation is not the normal orientation as the window is installed in an inclined roof.

Throughout the description of embodiments, reference will be made to a hinge carrying reference numerals 10; 110; 210; 310; 710; 810; 910. The hinge 10 shown in its mounted condition in a roof window is representative for
30 all embodiments, and any one of the hinges 110; 210; 310; 710; 810; 910 may thus be put in the place of the hinge 10 shown in Fig. 1. While there may be differences between the embodiments, elements having the same or

analogous function as generally are denoted by the same reference numerals to which 100, 200... has been added.

5 Fig. 1

Initially, reference is made to Fig. 1 in which a roof window according to the invention is shown, including a set of hinges of which one hinge 10 is indicated. The hinge 10 is representative of the hinges of the below embodiments.

10 In a manner known *per se*, the window comprises a sash 2 carrying a glazing in the form of a pane 3 and a stationary primary frame 1. The window is intended to be built into a surface, which is inclined with respect to the horizontal, typically a roof, and the window will in the following be referred to as roof window. At a position between the top and centre of the window, there is
15 a hinge connection between the frame 1 and the sash 2. The frame 1 and sash 2 is each formed by four members of which one frame side member 1a and one sash side member 2a are indicated. The sash 2 is openable with respect to the frame 1, as the sash 2 may be moved from a closed position, in which e.g. the sash side member 2a is substantially parallel with the frame side member 1a, to an open position, in which the sash side member 2a forms an
20 angle with the frame side member 1a. During this movement the sash 2 rotates about a hinge axis α situated at the hinge connection. As indicated in Fig. 1, the hinge axis α is located substantially at a centre axis of the roof window. Other positions of the hinge axis are of course conceivable, for instance further
25 upwards towards the top of the roof window. A corresponding operation of the window as described above and from here on is also true for the type of hinge described in the Applicant's international application published under WO 2017/076416 A1.

To protect the interior and the components of the window itself and to
30 ascertain weather-proof transition to the surrounding roofing, the roof window comprises a covering, including flashing members (not shown), cladding and covering elements of which a frame side covering element 1b and sash side

covering element 2b are shown.

From a closed position, the user operates the operating device of the window. The operating device typically comprises a handle (not shown) connected with the sash bottom member and/or, as here an operating and
5 locking assembly 4 including a ventilation flap at the sash top member with a lock mechanism to interact with a striking plate on the frame top member. The hinge 10 exerts a moment on the sash 2, and in combination with the force, and hence moment, exerted by the user operating the operating device, the moment resulting from the weight of the sash 2 and pane 3 is overcome, along
10 with any frictional forces present. All in all, the opening operation entails that the sash 2 is moved from a closed position to an open position as represented by Fig. 1, in which the sash plane forms an opening angle with the frame plane. Closing the window from the open position entails the opposite movement of the sash 2. It is possible to position the sash 2 in a number of arbitrary opening
15 positions, in which the sash 2 is held stable relative to the frame 1. The sash 2 is also able to be rotated to allow cleaning of the outside of the pane 3 from the inside of the building in which the roof window is installed. Depending on the position of the hinge axis in the window, the sash 2 may be rotated substantially through 180°.

20

Figs 2 to 12

Referring now first to Figs 2 to 9, a first embodiment of a hinge 110 according to the invention will be described in detail.

In Figs 2 and 3, the hinge 110 is shown in a position corresponding to
25 a closed position of the sash 2 relative to the frame 1. The hinge 110 comprises a frame hinge part 130 and a sash hinge part 140 configured to assume an angle relative to the frame hinge part 130. The hinge 110 forms part of a set of hinges, of which the frame hinge part 130 of each hinge 110 is configured to be connected to the frame side member 1a of the frame 1 of the roof window
30 in a mounted condition, at a location chosen to provide the desired position of the hinge axis α , and the sash hinge part 140 is correspondingly configured to be connected to the sash side member 2a. A base plate 131 of the frame hinge

part 130 defines a hinge plane substantially perpendicular to the hinge axis α of the window in the mounted condition of the hinge, and a base plate 141 of the sash hinge part 140 being is substantially parallel to the base plate 131 of the frame hinge part 130.

5 The frame hinge part 130 and the sash hinge part 140 comprises fastening means which can be for example pins or spigots 133, 143, or any type of threaded fastening means, for fastening to the frame side member 1a and sash side member 2a, respectively. The spigots 133, 143 are fixed on the receiver element 132 and the base plate 141 of the sash hinge part 140,
10 respectively, such that sash-side spigots 143 protrude through the distance piece 142. The receiver element 132 is fastened to the frame side member 1a either in the supply condition or in a first step of installation, and the remaining components of the hinge 110 including the base plate 131 of the frame hinge part 130 are all connected to the sash 2. Following correct positioning, the base
15 plate 131 is brought into connection with the receiver element 132 in that a base plate rivet 131a is brought into engagement with a receiver element slot 132a.

 The frame hinge part 130 and the sash hinge part 140 are furthermore provided with holding clips 134, 144 for connecting the covering elements 1b,
20 2b.

 It is noted that during the entire opening and closure movement, the respective planes of the base plates of the frame hinge part and the sash hinge part are at all times kept substantially parallel, thus avoiding transverse movements perpendicular to the hinge plane as defined by the base plates 131,
25 141.

 In order to render the necessary movement between the parts of the hinge possible, each hinge comprises a movement supporting assembly. The movement supporting assembly comprises guiding means configured to allow the sash hinge part to assume an angle relative to the frame hinge part
30 substantially around the hinge axis α during an opening movement from a closed position to an open position and during a closing movement from the open position to the closed position. In the type of hinge according to the

invention, the guiding means comprise a linkage mechanism including at least two links providing connection between the sash hinge part and the frame hinge part, and each link is connected to at least one of the frame hinge part and the sash hinge part at a joint and connected to each other as will be described in
5 the following for the first embodiment.

In the first embodiment, the linkage mechanism comprises two links, namely a sash link 150 and a frame link 160 providing connection between the sash hinge part 140 and the frame hinge part 130.

The frame link 160 is connected to the sash hinge part 140 in a sliding
10 joint 162. The sliding joint 162 cooperates with a guide track 145. Here, the guide track 145 is provided in the sash hinge part 140, more specifically in the base plate 141 of the sash hinge part 140. The sliding joint may in principle comprise a pin or an axle, but is here formed as a sliding block 163. The sliding block 163 is connected to an engagement part 164. Suitable materials of the
15 components of the sliding joint, and of other components of the hinge, are given in Applicant's above-mentioned WO 2017/076416 A1.

The sash link 150 is connected to the frame hinge part 130 by means of an additional link 165 via a hinged joint 153. In turn, the additional link 165 is connected to the frame hinge part 130 at a hinged joint 166 located
20 eccentrically relative to the hinged joint 153 forming the connection between the sash link 150 and the additional link 165.

The sash link 150 and the frame link 160 are connected to each other in a bearing axle 155.

Furthermore, the frame link 160 is connected to the frame hinge part
25 130 in a hinged joint 161, and the sash link 150 is connected to the sash hinge part 140 in a hinged joint 151.

A force transmission device 170 is provided for exerting lifting assistance to the movement of the sash 2 relative to the frame 1 during opening of the roof window in the mounted condition of the hinge 110. The force
30 transmission device 170 is provided with biasing means, which in general may be selected from the group comprising leaf springs, torsion springs and tension/compression springs. In the embodiment shown, the biasing means is

a tension spring 172. The tension spring 172 is connected to the base plate 141 of the sash hinge part 140 and acts on a pick-up 171 connected to the sash hinge part 140 in a hinged joint 173 such that the pick-up 171 acts on the sliding joint 162, at the engagement part 164 thereof.

5 Finally, the hinge 110 comprises a braking device 180 acting on an element of the movement supporting assembly over a part of the opening and/or closing movement. In its most simple form, the braking device comprises a friction element configured to provide a frictional force on a link of the linkage mechanism and/or at a joint between the linkage mechanism and the frame
10 hinge part.

In the shown first embodiment, the braking device 180 comprises a friction element in the form of a friction disc 181, biased by a plate spring 182 acting on the sash link 150 via a washer 183. The friction disc 181 is provided between the sash link 150 and the additional link 165. The friction disc 181 is
15 made of a suitable material which is able to apply a braking force on the sash link 150 and consequently on the entire linkage mechanism. The person skilled in the art is aware of materials which are able to withstand wear over long periods of time, for instance suitable plastic materials.

Turning now to Figs 10 to 12, a sequence of positions during the
20 opening movement of the hinge 110 and thus of the sash 2 relative to the frame 1 of the entire roof window is shown.

From the closed position shown in Fig. 10, the sash 2 is rotated relative to the frame 1 when the user operates the operating device. The particular movement pattern of the linkage mechanism of the guiding means ensures that
25 the sash side covering element 2b moves out of engagement with the frame side covering element 1b without conflict into an open position as represented by Fig. 11 or Fig. 12. The force transmission device 170 assists during the lifting operation, and the braking device 180 is configured such that it modulates the movement of the sash hinge part 140 relative to the frame hinge part 130, and
30 thus of the entire sash 2 relative to the frame 1 in order to keep any exaggerated movement in check.

Turning now to Figs 10 to 12, a sequence of positions during the

opening movement of the hinge 110 and thus of the sash 2 relative to the frame 1 of the entire roof window is shown.

Figs 13 to 16

5 Turning now to the remaining Figures of the drawings, it is again noted that elements having the same or analogous function are denoted by the same reference numerals as in the first embodiment, to which 100, 200... has been added. Only differences will be described in detail.

In a second embodiment, the force transmission device 270 of the
10 hinge 210 comprises a pick-up 271 connected to the sash hinge part 240 in a hinged joint 273 and configured to act on the sliding joint 262 via a separate pick-up link 274. This provides for an alternative set-up of the force transmission device 270.

15 Figs 17 to 18

In a third embodiment, the pick-up 371 of the force transmission device 370 of the hinge 310 is biased by a leaf spring 372. The leaf spring 372 is fixated by a fastening protrusion (375a) and a first abutment protrusion 375b and a second abutment protrusion 375c provide for the bias of the pick-up 371.
20 Leaf springs have suitable biasing properties and are easy to handle and mount.

Figs 19 to 20

In a further embodiment, a guide track 752 is provided in the sash link
25 750, and the sliding joint 735 is provided on the frame hinge part 730 of the hinge 710.

The friction element of the braking device 780 comprises two squeeze blocks 781, 782. The squeeze blocks 781, 782 are provided in connection with the sliding joint 735 and interact with the sash link 750 at the guide track 752
30 therein. Alternatively, a single squeeze block may be provided. The provision of squeeze blocks has proven to function well as an alternative braking solution.

A leaf spring 772 acts directly on the sliding joint 762. Specifically, the

leaf spring 772 acts on the engagement part 764 connected to the sliding block 763 of the sliding joint 762. The leaf spring 772 is formed substantially as an S-shaped hook.

The force transmission device 770 comprises an engagement portion
5 772a of the leaf spring, as well as a first fastening protrusion 775a and a second fastening protrusion 775 b. The leaf spring 772 attaches to the two protrusions 775a and 775b.

Fig. 21

10 In an alternative embodiment similar to the one shown in Fig. 20, the force transmission device 870 comprises a fastening protrusion 875, which a leaf spring 872 is attached to. The leaf spring 872 acts directly on a sliding joint 862.

The frame link 860 is connected to the sash hinge part 840 in the
15 sliding joint 862 and the sash link 850 is connected to the frame hinge part 830.

The sash link 850 provides connection between the bearing axle 855 and the frame hinge part 830, and the frame link 860 provides connection between the bearing axle and the sash hinge part 840. The two links of the linkage mechanism are connected to each other in the bearing axle 855.

20

Figs 22 to 24

In a still further embodiment shown in Figs 22-24, the force transmission device 970 is biased by two leaf springs 972a, 972b, positioned oppositely. A protrusion 975 is comprised at an end of each leaf spring 972a,
25 972b.

The frame link 960 is connected to the frame hinge part 930 in a hinged joint 961. The sash link 950 is connected to the sash hinge part 940 in a hinged joint 951.

A guide track 967, 952 is provided in the sash link 960 and the frame
30 link 950, respectively. A sliding joint 935 is provided on the frame hinge part 930 and the sash hinge part 940.

Non-shown embodiments

The hinge of the embodiments described in the above is also applicable in roof windows which are top-hinged during normal operation and which pivots for cleaning. It is understood that in such a roof window, the stationary frame 1 constitutes a primary frame, and the sash 2 functions as a first secondary frame and an intermediate frame functions as a second secondary frame. The intermediate frame is fastened to the stationary frame at a top mounting fitting and the sash is hinged at the top of the roof window, via the intermediate frame to the stationary frame, to render the roof window top-hinged during normal operation. The sash is also pivotally connected to the intermediate frame in order to be able to rotate the sash to provide access to the exterior of the pane, for instance for cleaning purposes. To that end, the intermediate frame is provided with a frame hinge part of the hinge and the sash with the counterpart sash hinge part.

The invention is not limited to the embodiments shown and described in the above, but various modifications and combinations may be carried out without departing from the scope of the appended claims.

List of reference numerals

- 1 frame
 - 1a frame side member
 - 1b frame covering element
- 2 sash
 - 2a sash side member
 - 2b sash covering element
- 3 pane
- 4 operating and locking assembly
- α hinge axis

- 10 hinge

- 110 hinge

- 130 frame hinge part
 - 131 base plate
 - 131a base plate rivet
 - 132 receiver element
 - 132a receiver element slot
 - 133 spigot
 - 134 holding clip

- 140 sash hinge part
 - 141 base plate
 - 142 distance piece
 - 143 spigot
 - 144 holding clip
 - 145 guide track

- 150 sash link
 - 151 hinged joint (to base plate 141)
 - 153 hinged joint (to additional link 165)

- 155 bearing axle

- 160 frame link
 - 161 hinged joint (to base plate 131)
 - 162 sliding joint (to guide track 145)
 - 163 sliding block
 - 164 engagement part

- 165 additional link
 - 166 hinged joint of friction link 165 (to base plate 131)

- 170 force transmission device
 - 171 pick-up

- 172 spring
- 173 hinged joint

- 180 braking device
 - 181 friction disc
 - 182 plate spring
 - 183 washer

- 210 hinge

- 230 frame hinge part

- 240 sash hinge part
 - 245 guide track

- 250 sash link
 - 251 hinged joint

- 255 bearing axle

- 260 frame link
 - 261 hinged joint (to base plate 231)
 - 262 sliding joint (to guide track 245)
 - 263 sliding block

- 270 force transmission device
 - 271 pick-up
 - 272 spring
 - 273 hinged joint
 - 274 pick-up link

- 280 braking device

- 310 hinge

- 330 frame hinge part

- 340 sash hinge part
 - 345 guide track

- 350 sash link
 - 351 hinged joint

- 355 bearing axle

- 360 frame link
 - 361 hinged joint
 - 362 sliding joint (to guide track 345)

- 363 sliding block
- 364 engagement part

- 370 force transmission device
 - 371 pick-up
 - 372 spring
 - 373 hinged joint

 - 375a fastening protrusion (for spring 372)
 - 375b first abutment protrusion
 - 375c second abutment protrusion

- 380 braking device

- 710 hinge

- 730 frame hinge part
 - 735 sliding joint

- 740 sash hinge part
 - 745 guide track

- 750 sash link
 - 751 hinged joint
 - 752 guide track (to sliding joint 735)

- 755 bearing axle

- 760 frame link
 - 761 hinged joint
 - 762 sliding joint (to guide track 745)
 - 763 sliding block
 - 764 engagement part

- 770 force transmission device
 - 772 leaf spring
 - 772a engagement portion of leaf spring
 - 775a first fastening protrusion
 - 775b second fastening protrusion

- 780 braking device
 - 781 first squeeze block
 - 782 second squeeze block

- 810 hinge

- 830 frame hinge part
- 840 sash hinge part
- 850 sash link
 - 855 bearing axle
- 860 frame link
 - 862 sliding joint
- 870 force transmission device
 - 872 leaf spring
 - 875 fastening protrusion
- 910 hinge
- 930 frame hinge part
 - 935 sliding joint
- 940 sash hinge part
 - 946 sliding joint
- 950 sash link
 - 951 hinged joint
 - 952 guide track
- 955 bearing axle
- 960 frame link
 - 961 hinged joint
 - 967 guide track
- 970 force transmission device
 - 972a leaf spring
 - 972b leaf spring
 - 975 protrusion

Patentkrav

1. Hængsel (110; 210; 310; 710; 810; 910) til et ovenlysvindue med en stationær primær karm (1) med en flerhed af karmstykker, der indbefatter mindst to modstående sidestykker (1a), og mindst én sekundær ramme, der
- 5 indbefatter en ramme (2) med en flerhed af rammestykker, der indbefatter mindst to modstående sidestykker (2a) og eventuelt en mellemramme, hvor nævnte hængsel er konfigureret til at blive forbundet med den primære karm (1) eller mellemrammen og med den sekundære vinduesramme (2) for at definere en hængselakse (α) af et ovenlysvindue,
- 10 hvor nævnte hængsel (110; 210; 310; 710; 810; 910) omfatter en karmhængseldel (130; 230; 330; 730; 830; 930), en rammehængseldel (140; 240; 340; 740; 840; 940) og et bevægelsesunderstøttende arrangement, som omfatter føringsmidler konfigureret til at tillade rammehængseldelen at antage en vinkel relativt til karmhængseldelen i det væsentlige omkring nævnte
- 15 hængselakse (α) under en åbningsbevægelse fra en lukket position til en åben position, og under en lukkebevægelse fra den åbne position til den lukkede position, hvor føringsmidlerne omfatter en forbindelsesmekanisme, der indbefatter mindst to led (150, 160; 250, 260; 350, 360; 750, 760; 850, 860; 950, 960), som tilvejebringer forbindelse mellem rammehængseldelen og
- 20 karmhængseldelen, hvor hvert led er forbundet med mindst én af karmhængseldelen og rammehængseldelen ved en forbindelse og er forbundet med hinanden, hvor karmhængseldelen (130; 230; 330; 730; 830; 930) omfatter en grundplade (131), som definerer et hængselplan i det væsentlige vinkelret på hængselaksen (α) af ovenlysvinduet, og
- 25 rammehængseldelen (140; 240; 340; 740; 840; 940) omfatter en grundplade (141) i det væsentlige parallel til grundpladen (131) af karmhængseldelen,
- hvor nævnte hængsel omfatter en kraftoverførselsanordning (170; 270; 370; 770; 870; 970), hvor kraftoverførselsanordningen er tilvejebragt for at udøve løfteassistance til bevægelsen af rammen (2) relativt til karmen (1)
- 30 under åbningen af ovenlysvinduet i den monterede tilstand af hængslet (110; 210; 310; 710; 810; 910), og hvor kraftoverførselsanordningen er forsynet med forspændingsmidler udvalgt fra gruppen omfattende bladfjedre, torsionsfjedre, og spændings-/kompressionsfjedre,

hvor én kraftoverførselsanordning er forbundet med en respektiv karmhængseldel og rammehængseldel,

hvor de mindst to led af forbindelsesmekanismen er forbundet med hinanden i en lejeaksel (155; 255; 355; 755; 855; 955),

5 hvor de mindst to led omfatter et rammeled (150; 250; 350; 750; 850; 950), som tilvejebringer forbindelse mellem lejeakslen (155; 255; 355; 755; 855; 955) og karmhængseldelen (130; 230; 330; 730; 830; 930), og et karmled (160; 260; 340; 760; 860; 960), som tilvejebringer forbindelse mellem lejeakslen og rammehængseldelen (140; 240; 340; 740; 840; 940),

10 hvor karmleddet (160; 260; 360; 760; 860; 960) er forbundet med rammehængseldelen (140; 240; 340; 740; 840; 940) i en glideforbindelse (162; 262; 362; 762; 862; 962) og/eller rammeleddet (750; 850) er forbundet med karmhængseldelen (739; 830) i en glideforbindelse (735),

15 hvor hver glideforbindelse samvirker med et føringsspor (145; 245; 345; 745, 752),

k e n d e t e g n e t ved at

føringssporet (752; 952, 967) er tilvejebragt i et led i forbindelsesmekanismen, fortrinsvis i rammeleddet (750; 960) og/eller karmleddet (950), og glideforbindelsen (735; 935, 946) er tilvejebragt på en
20 hængseldel, fortrinsvis på karmhængseldelen (730; 930) og/eller rammehængseldelen (940).

2. Hængsel ifølge krav 1, hvor føringssporet (145; 245; 345; 745) er tilvejebragt i den respektive rammehængseldel (140; 240; 340; 740) eller karmhængseldel.

25 3. Hængsel ifølge krav 1 og 2, hvor føringssporet (145; 245; 345; 745) er tilvejebragt i grundplade (131) af den respektive rammehængseldel (140; 240; 340; 740) eller karmhængseldel.

4. Hængsel ifølge et hvilket som helst af kravene 1 til 3, hvor glideforbindelsen omfatter en split, aksel og/eller en glideklods (163; 263; 363; 763), hvor nævnte glideklods fortrinsvis er forbundet med en indgrebsdel (164; 364; 764).

30 5. Hængsel ifølge et hvilket som helst af kravene 1 til 4, hvor

karmleddet (160; 260; 360; 760; 960) er forbundet med karmhængseldelen (130; 230; 330; 730; 930) i en drejeforbindelse (161; 261; 361; 761; 961) og/eller rammeleddet (150; 250; 350; 750; 950) er forbundet med rammehængseldelen (140; 240; 340; 740; 940) i en drejeforbindelse (151; 251; 5 351; 751; 951).

6. Hængsel ifølge et hvilket som helst af kravene 1 til 5, hvor kraftoverførselsanordningen (170; 270; 370) omfatter mindst én pick-up (171) forbundet med karmhængseldelen og/eller rammehængseldelen (140) i en drejeforbindelse (173) og konfigureret til at virke på glideforbindelsen (162; 262; 10 362), enten direkte eller via et separat pick-up led (274).

7. Hængsel ifølge et hvilket som helst af de foregående krav, hvor forspændingsmidlet af kraftoverførselsanordningen (370; 770; 870; 970) omfatter mindst én bladfjeder.

8. Hængsel ifølge krav 6 og 7, hvor nævnte pick-up er forspændt af en 15 bladfjeder (372), hvor nævnte bladfjeder (372) er forbundet med karmhængseldelen eller rammehængseldelen (340) ved hjælp af et fastgørelsesfremspring (375a) og/eller et første anslagsfremspring (375b) og/eller et andet anslagsfremspring (375c).

9. Hængsel ifølge krav 4 til 7, hvor bladfjedrene (772, 872; 972a, 972b) 20 virker direkte på glideforbindelsen (762, 862; 951), eventuelt på indgrebsdelen (764) forbundet med glideklodsen (763) af glideforbindelsen (762).

10. Hængsel ifølge et hvilket som helst af de foregående krav, hvor hængslet omfatter en bremseanordning (180; 280; 380; 780), som virker på mindst ét element af det bevægelsesunderstøttende arrangement over i det 25 mindste en del af åbnings- og/eller lukkebevægelsen, og at bremseanordningen (180; 280; 380; 780) omfatter mindst ét friktionselement (181; 782).

11. Ovenlysvindue omfattende en stationær primær karm (1) med en flerhed af karmstykker 30 indbefattende mindst to modstående sidestykker (1a),

mindst én sekundær ramme, der indbefatter en ramme (2) med en flerhed af rammestykker indbefattende i det mindste to modstående

sidestykker (2a) og eventuelt en mellemramme, og

et sæt af hængsler ifølge et hvilket som helst af kravene 1 til 10 forbundet med den primære karm (1) eller mellemrammen og med rammen (2) for at definere en hængselakse (α) af ovenlysvinduet, hvor karmhængseldelen af hvert hængsel er forbundet med en af nævnte karmsidestykker (1a) af den stationære karm (1) eller sidestykker af mellemrammen, og hvor rammehængseldelen af hvert hængsel er forbundet med en af nævnte rammesidestykker (2a).

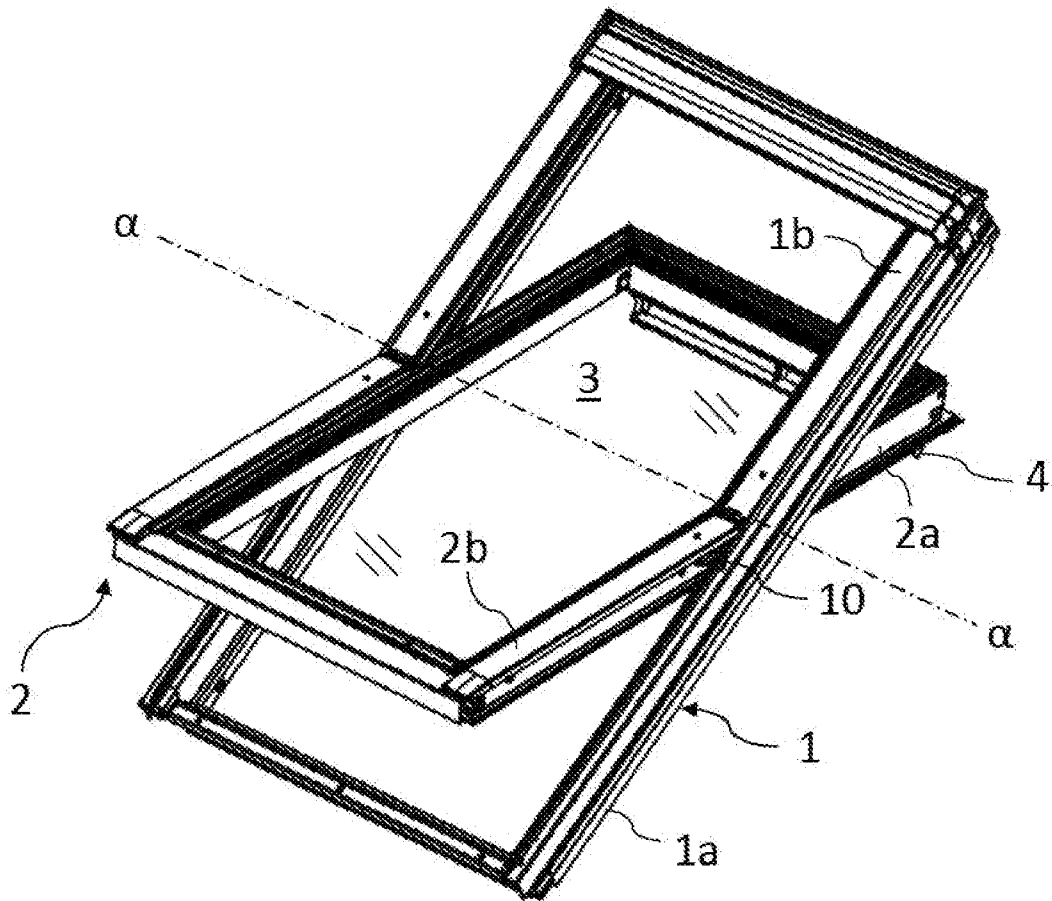


Fig. 1

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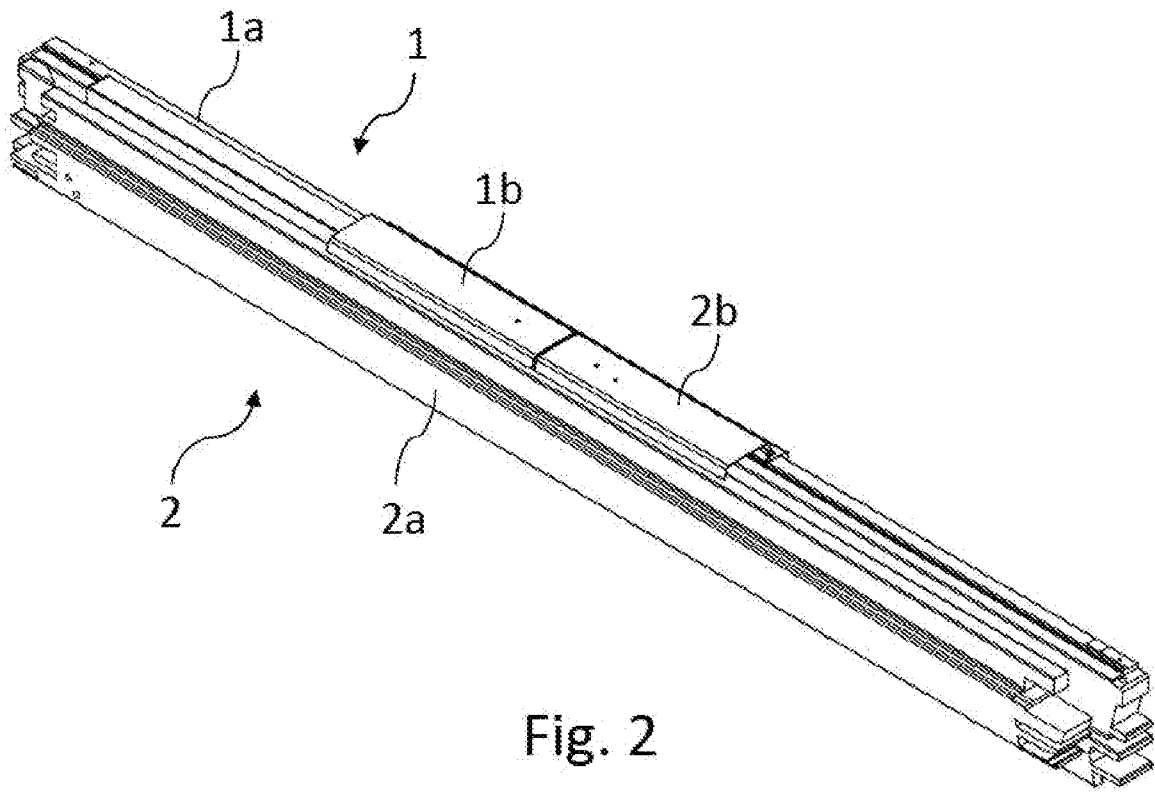


Fig. 2

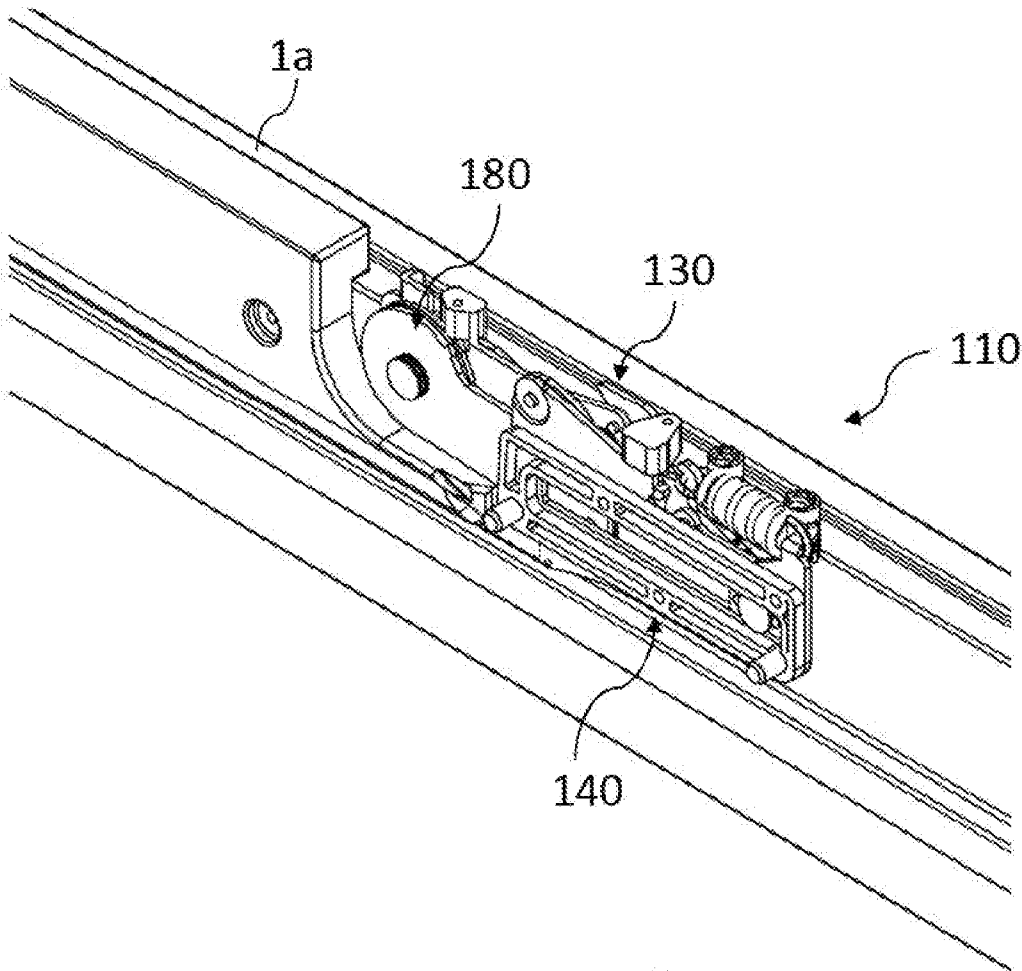


Fig. 3

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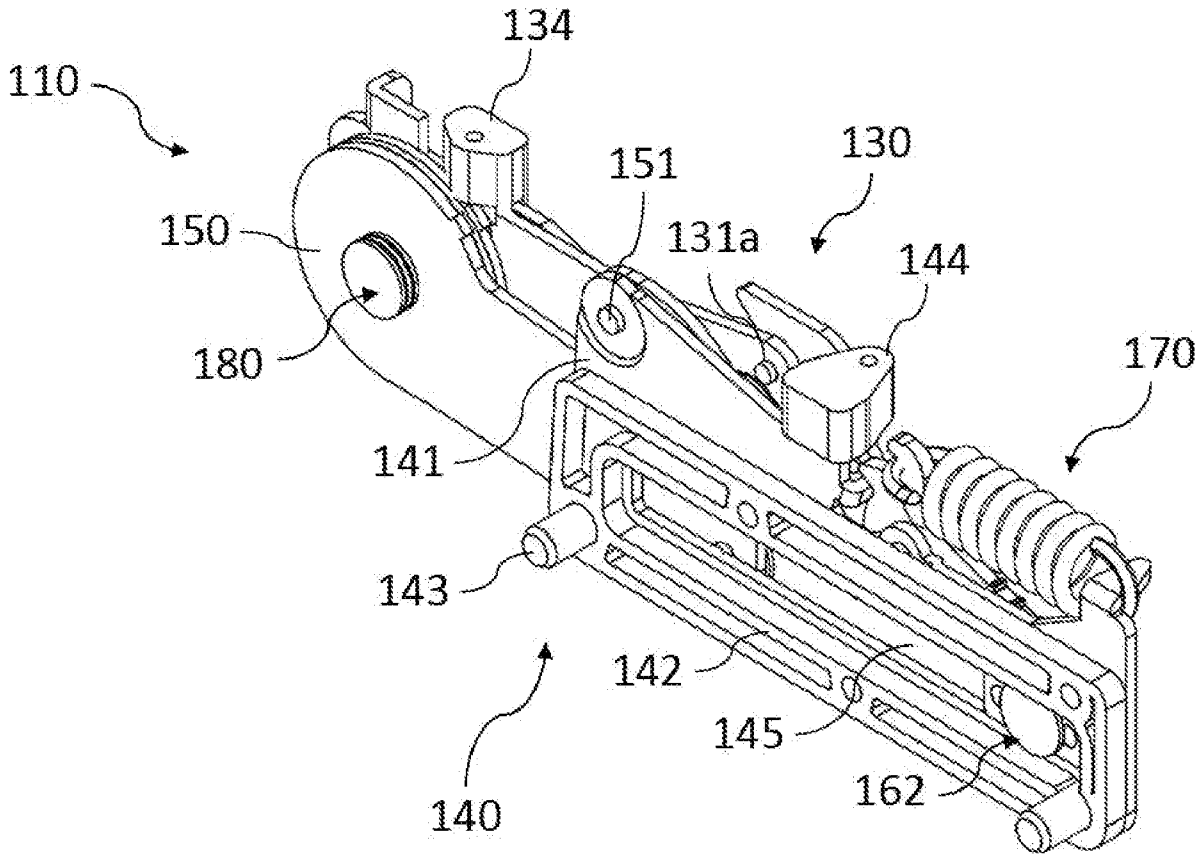


Fig. 4

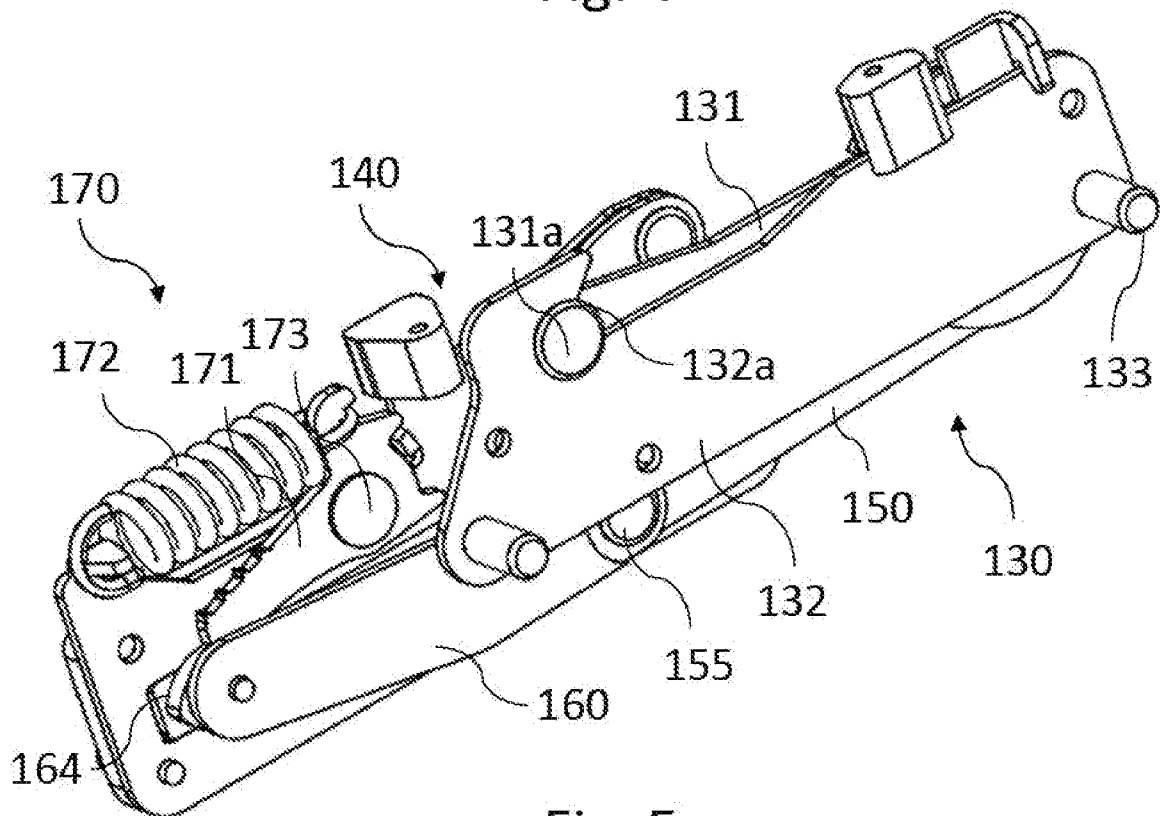


Fig. 5

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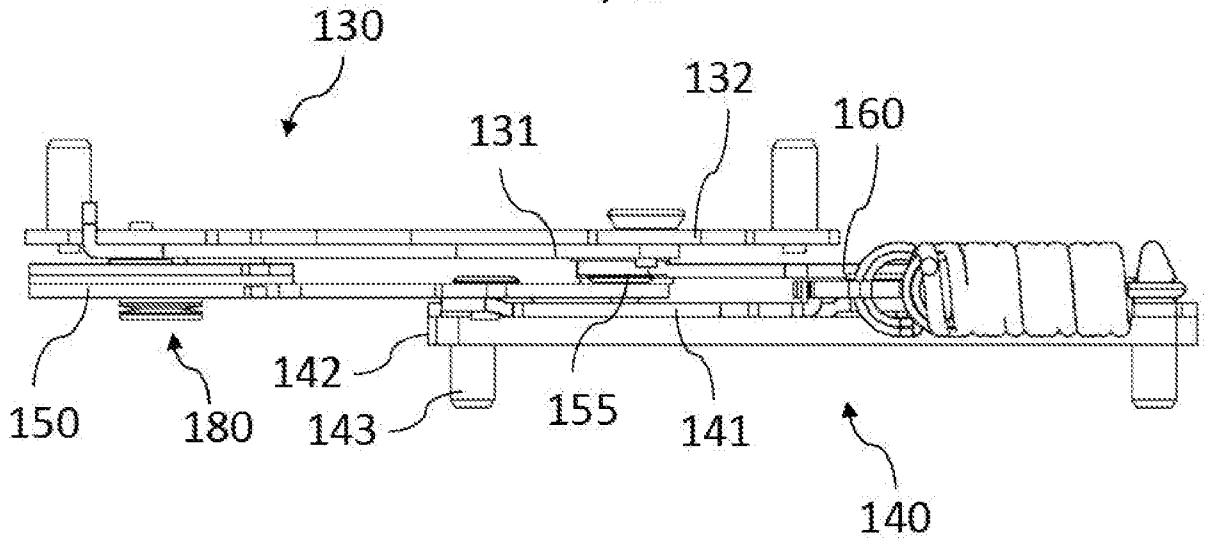


Fig. 6

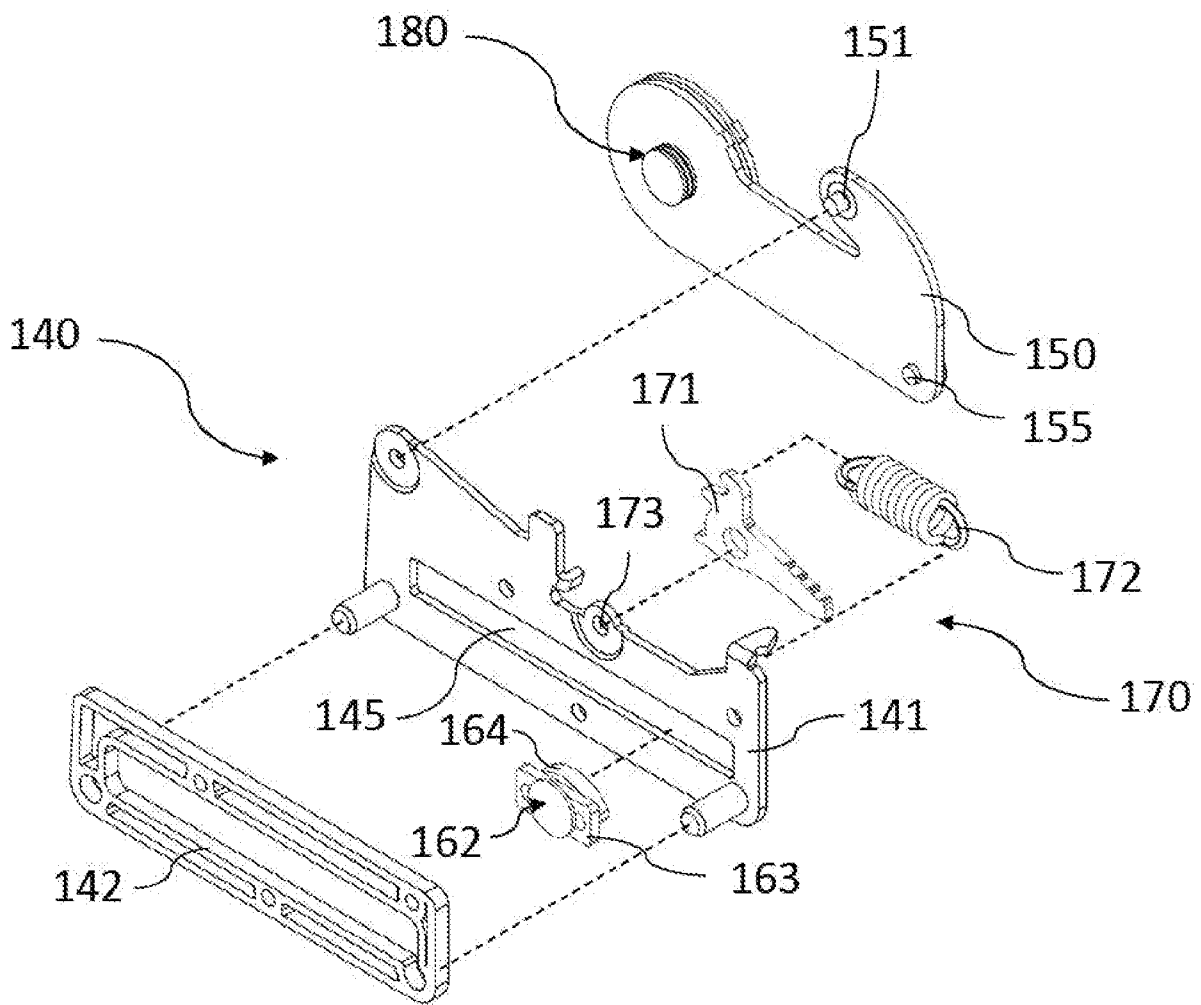


Fig. 7

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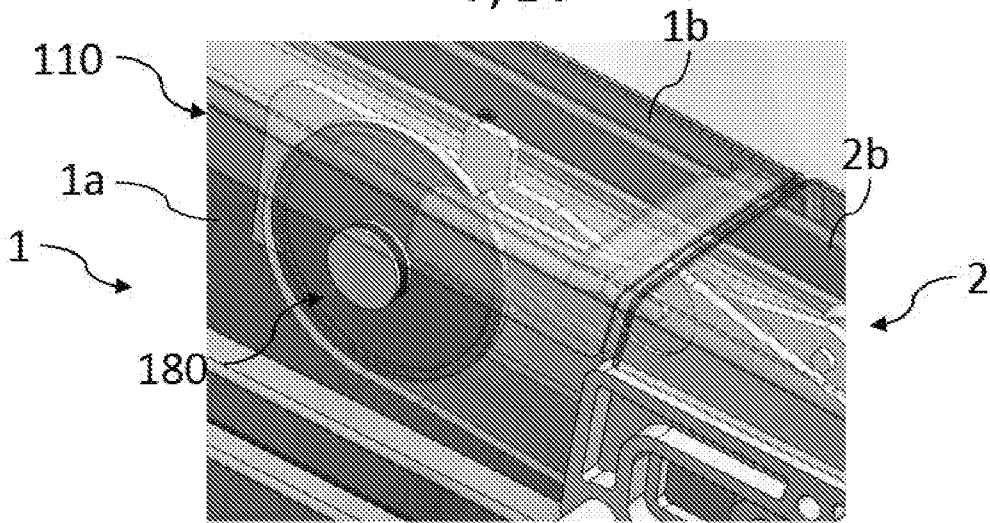


Fig. 10

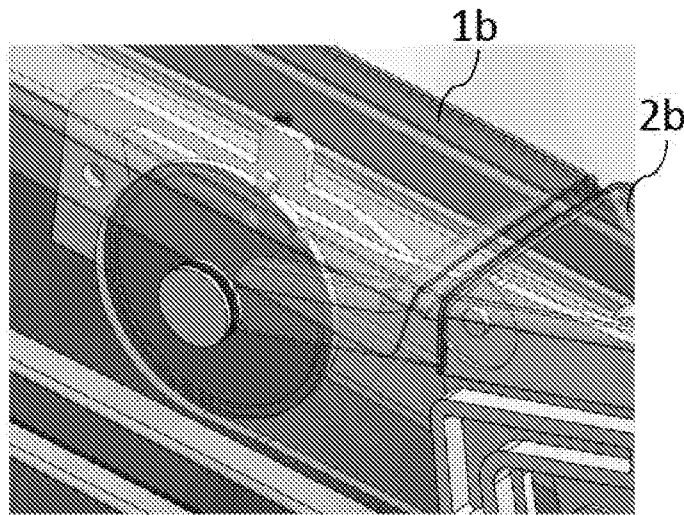


Fig. 11

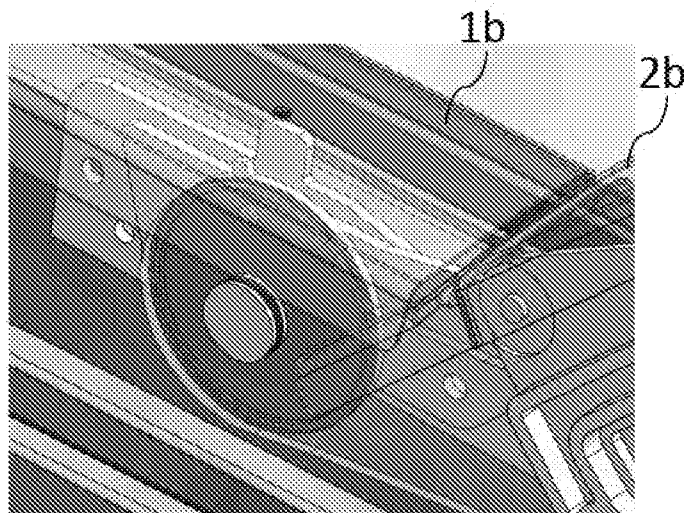


Fig. 12

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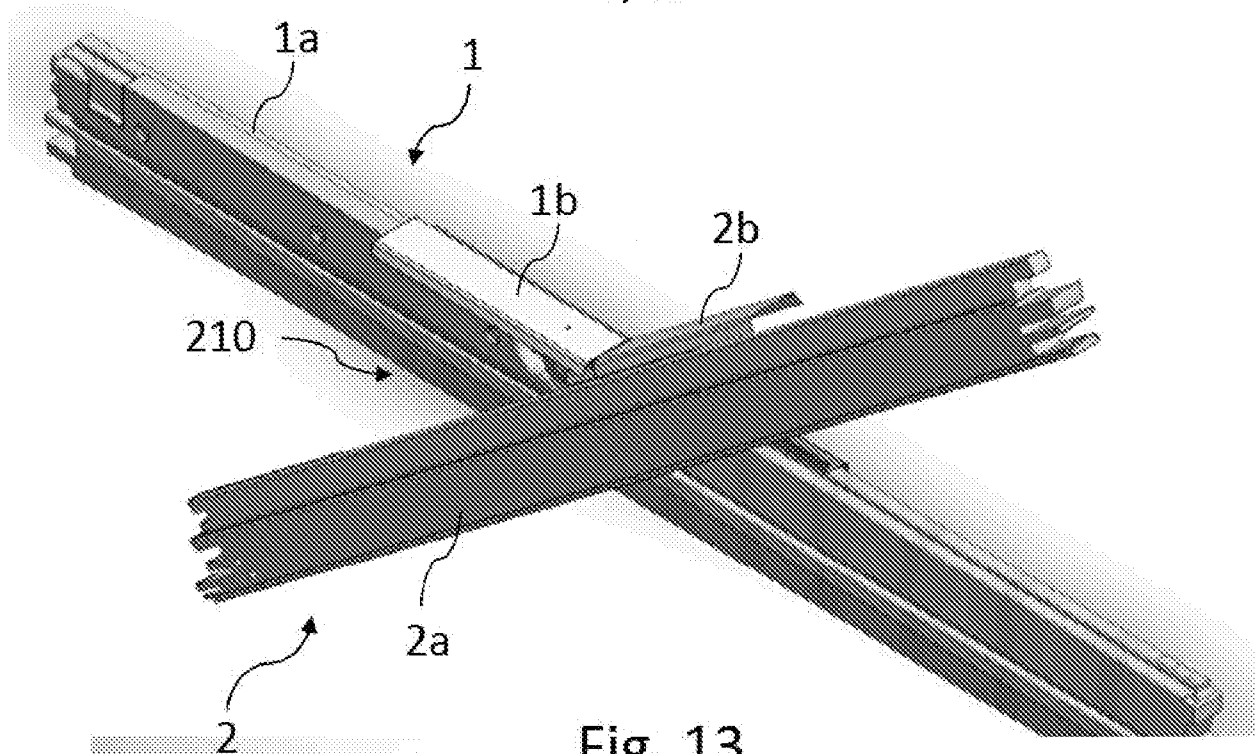


Fig. 13

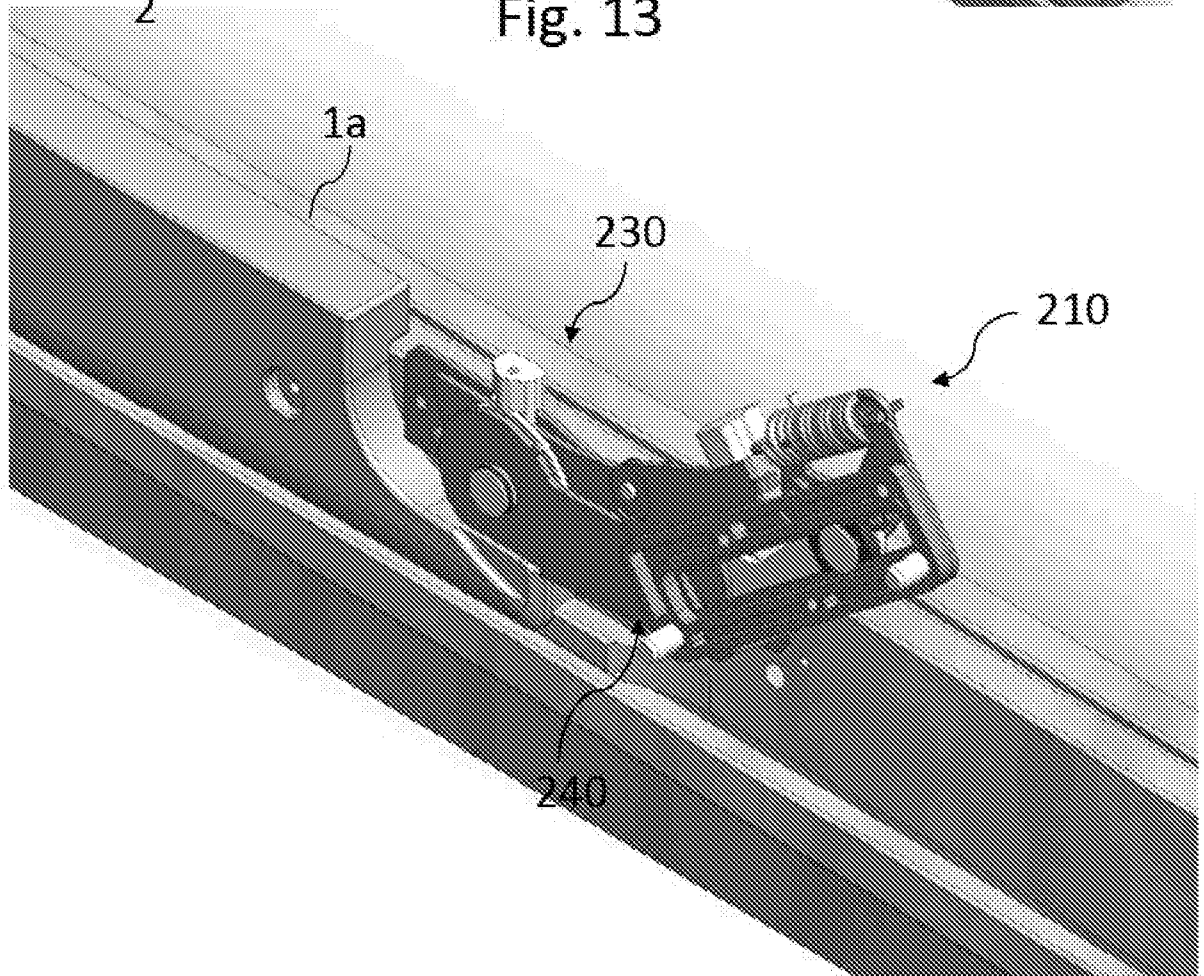


Fig. 14

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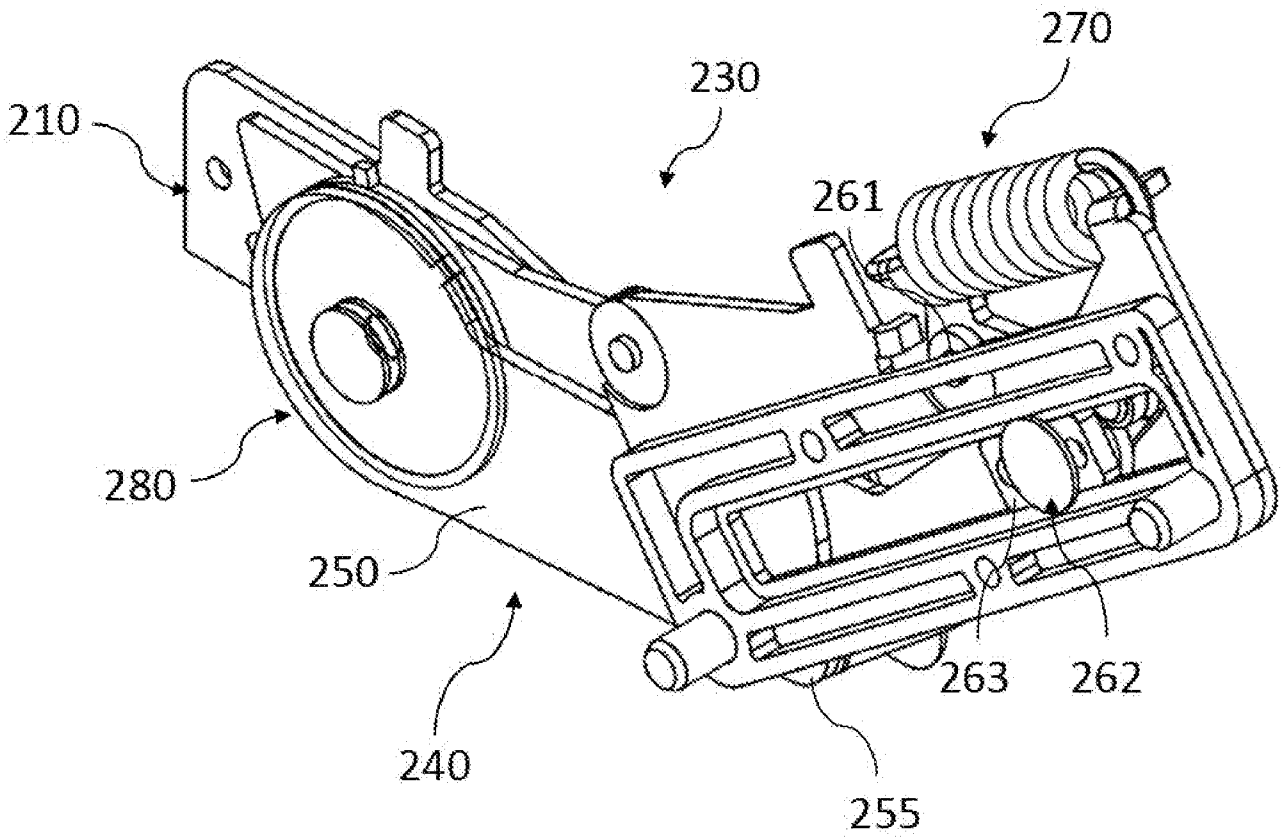


Fig. 15

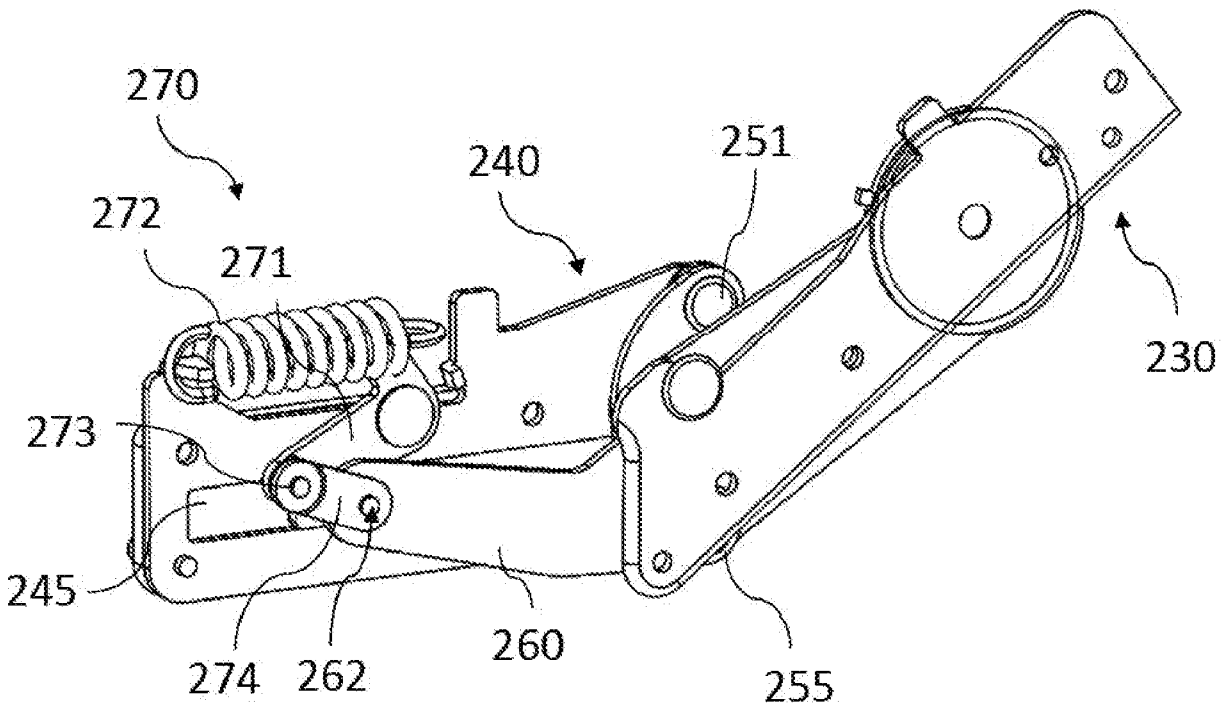


Fig. 16

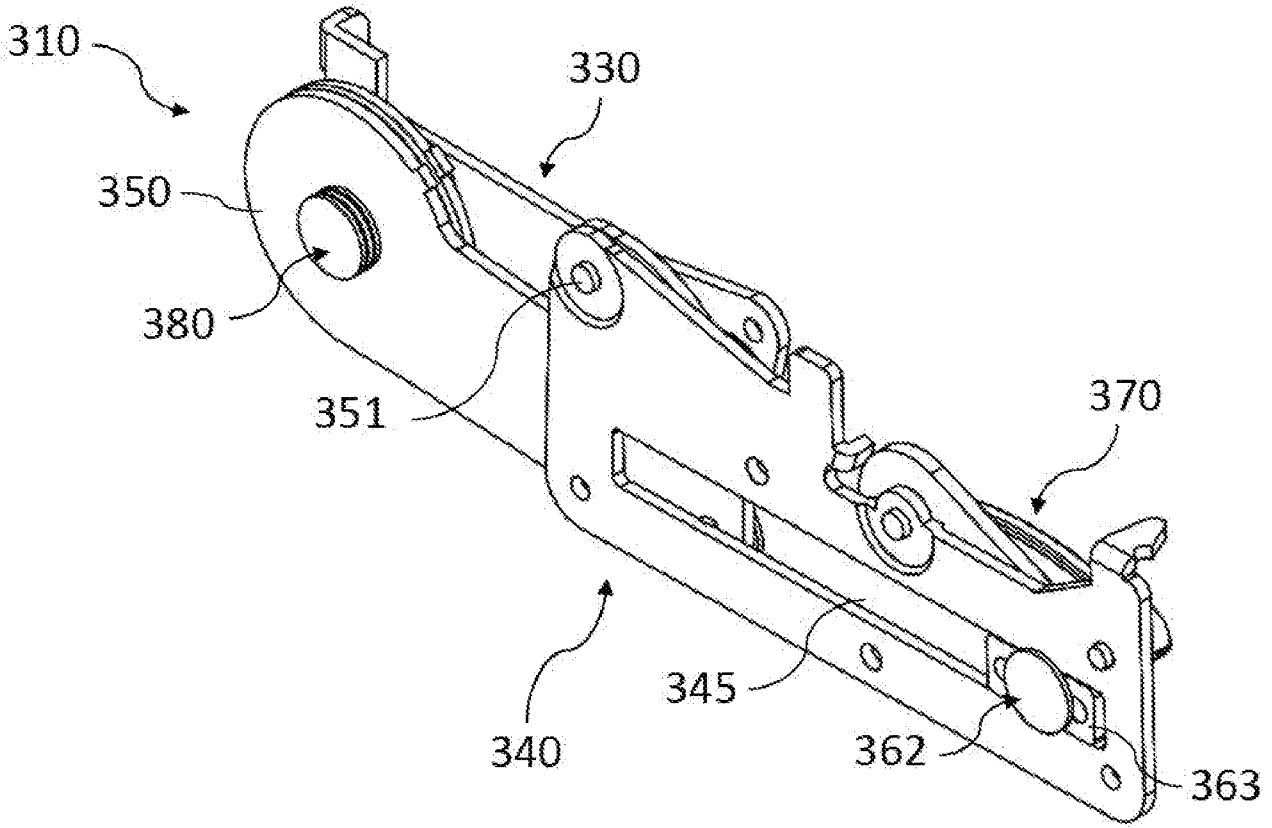


Fig. 17

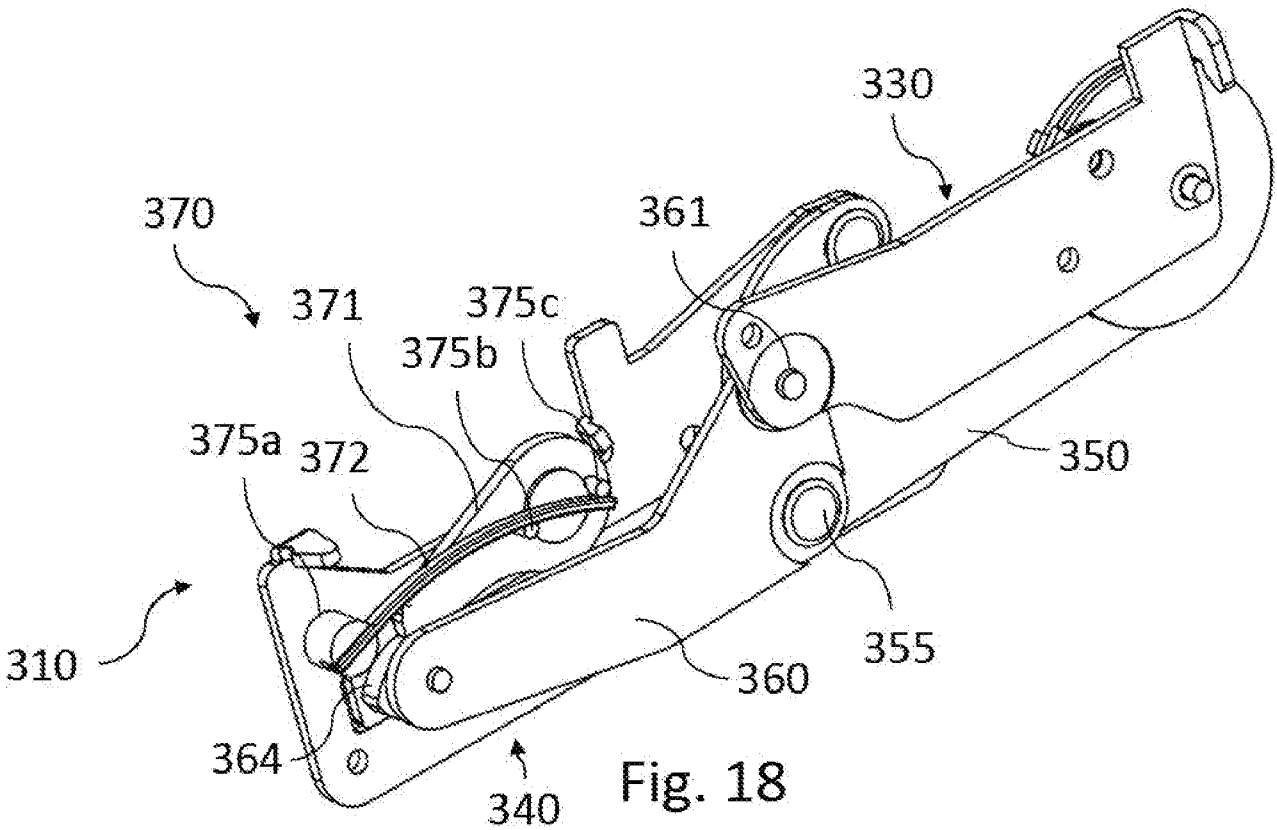


Fig. 18

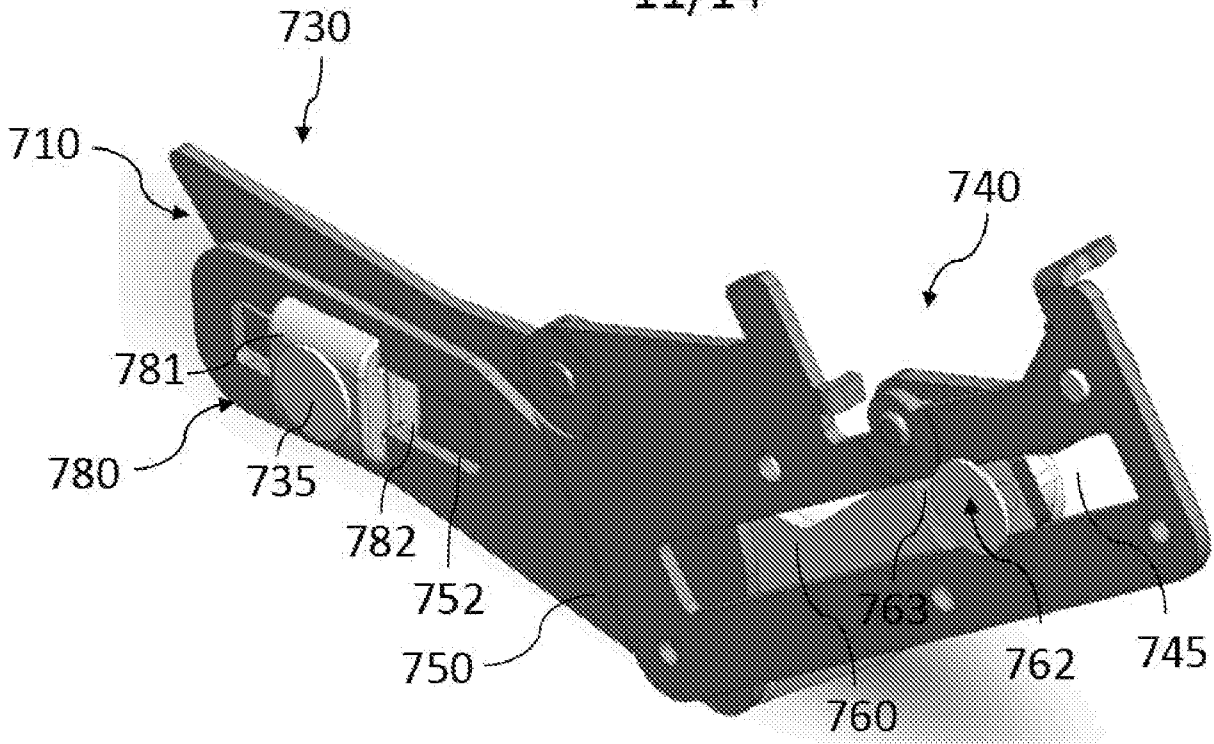


Fig. 19

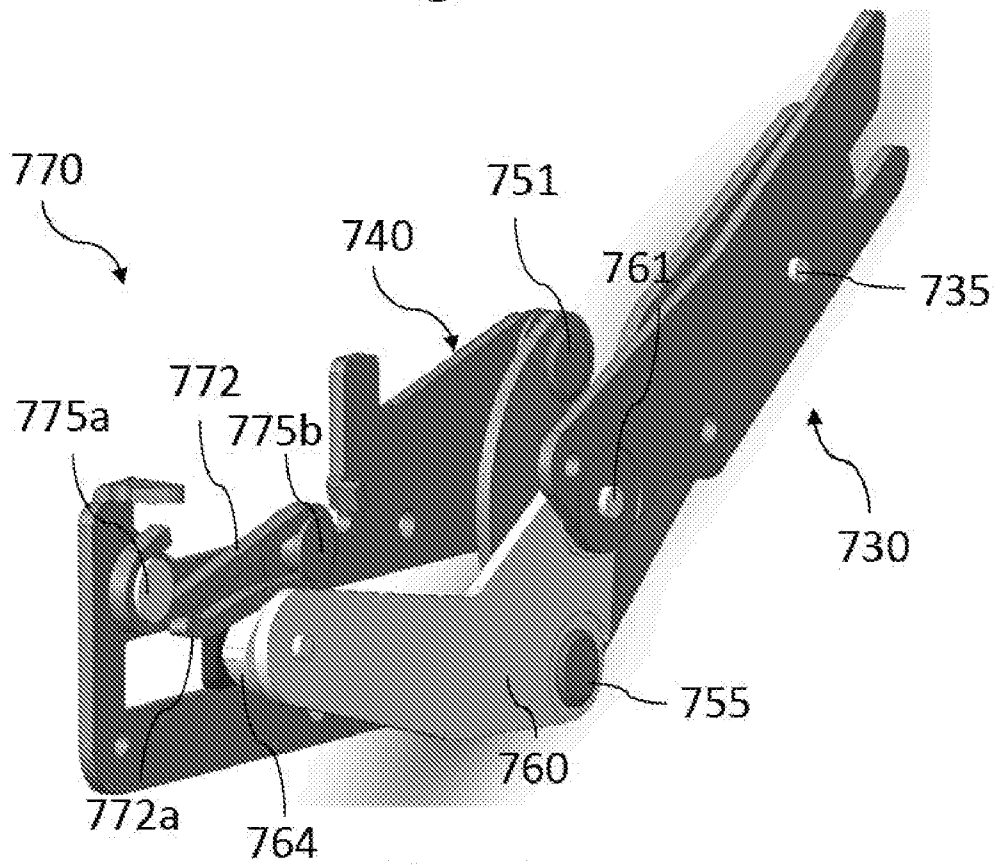


Fig. 20

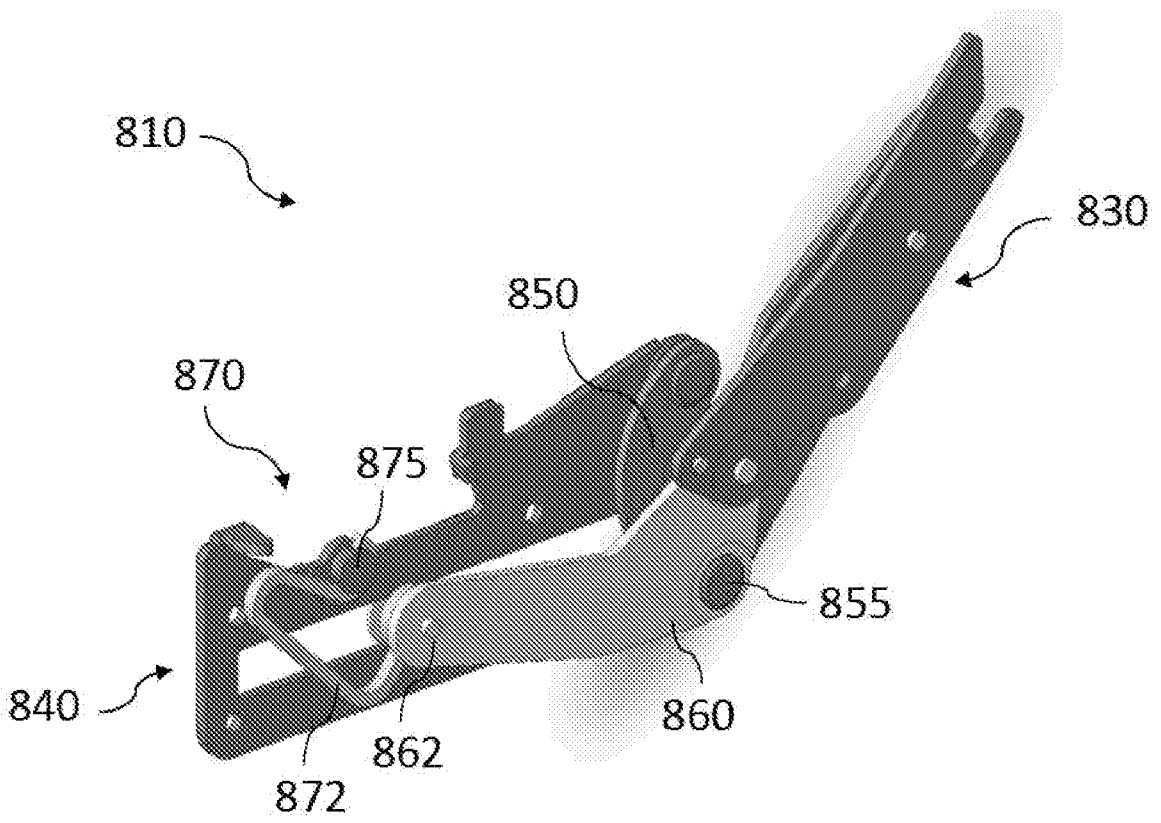


Fig. 21

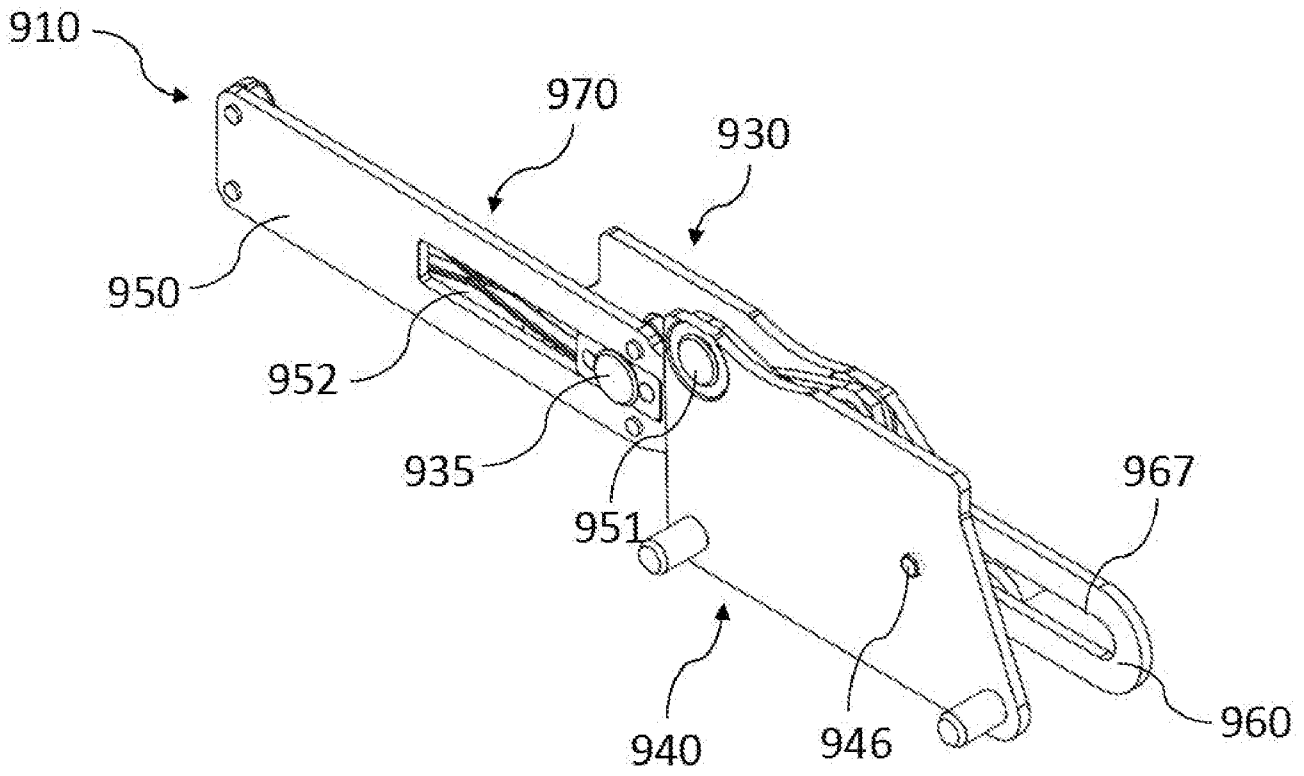


Fig. 22

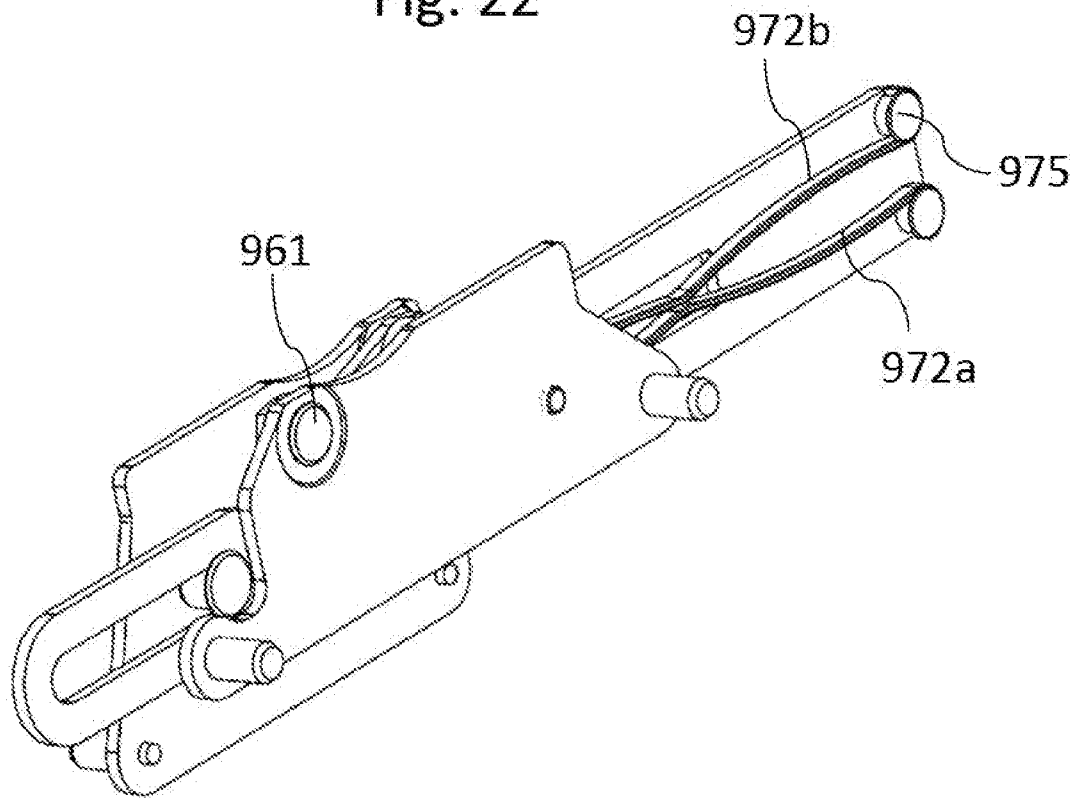


Fig. 23

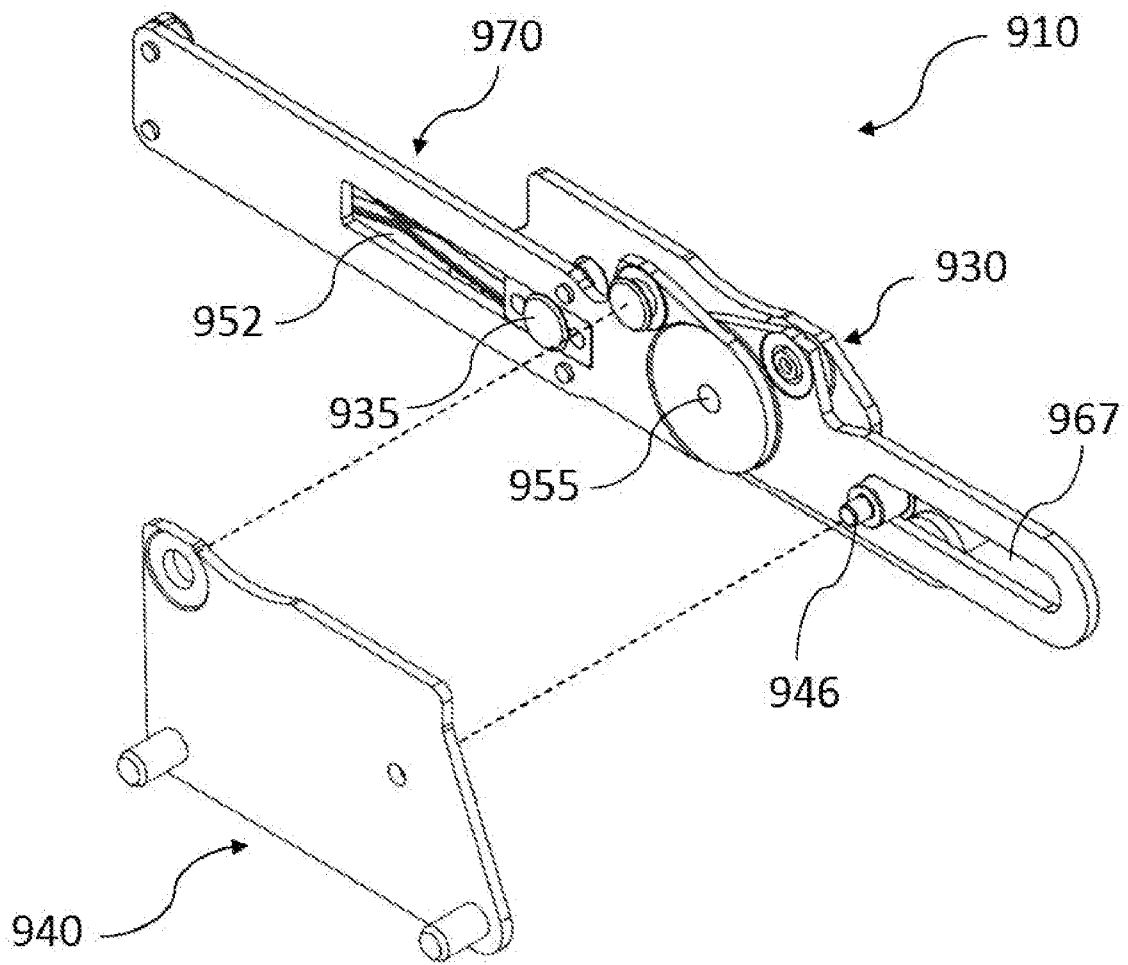


Fig. 24

SEARCH REPORT - PATENT		Application No. PA 2021 70197
1. <input type="checkbox"/> Certain claims were found unsearchable (See Box No. I).		
2. <input type="checkbox"/> Unity of invention is lacking prior to search (See Box No. II).		
A. CLASSIFICATION OF SUBJECT MATTER E05F 1/12 (2006.01), E05D 7/08 (2006.01), E05D 7/085 (2006.01), E05D 7/086(2006.01), E05D 3/18 (2006.01), E04D 13/035 (2006.01). According to International Patent Classification (IPC)		
B. FIELDS SEARCHED		
PCT-minimum documentation searched (classification system followed by classification symbols) CPC & IPC: E05F, E05D & E04D.		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched DK, NO, SE, FI: IPC-classes as above.		
Electronic database consulted during the search (name of database and, where practicable, search terms used) EPODOC, WPI, FULL TEXT: English, German and French.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.
D, X D, A	(D1) <u>WO 2017/076416</u> A1 (VKR HOLDING A/S) 2017.05.11, see page 7, lines 24-28; page 9, line 29 to page 10, line 13, claims 1, 15, 20, 22 and 23 and figures 1-19.	1-9, 11-18 10
D, A	(D2) <u>DK 114321</u> B (BIERLICH, JOHANNES HARALD) 1969.06.16, see page 5, lines 22-29; the claim and figures 1-4.	1-18
D, A	(D3) <u>EP 0089813</u> A2 (V. KANN RASMUSSEN HOLDING A/S) 1983.09.28, see page 4, line 21 to page 5, line 30; claims 1-2 and figures 1-3.	1-18
A	(D4) <u>US 3979791</u> A (COLLIN, ROBERT FREDERICK DURA) 1976.09.14, see the abstract; column 1, line 56 to column 2, line 17 and figures 1-4.	1-18
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		
* Special categories of cited documents: "A" Document defining the general state of the art which is not considered to be of particular relevance. "D" Document cited in the application. "E" Earlier application or patent but published on or after the filing date. "L" Document which may throw doubt 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 filing date but later than the priority date claimed. "T" Document 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. "&" Document member of the same patent family.	
Danish Patent and Trademark Office Helgeshøj Allé 81 DK-2630 Taastrup Denmark Telephone No. +45 4350 8000 Facsimile No. +45 4350 8001	Date of completion of the search report 22 October 2021	
	Authorized officer Henrik Mensing Telephone No. +45 43 50 85 47	

SEARCH REPORT - PATENT		Application No. PA 2021 70197
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.
A	(D5) <u>US 4796331</u> A (GKN CROMPTON) 1989.01.10, see column 3, lines 4-11; column 4, lines 12-25; column 4, line 60 to column 5, line 11 and figures 1-15.	1-18
D, A	(D6) <u>US 4446597</u> A (DANTZER-SØRENSEN, BENDT et al.) 1984.05.08, see column 2, line 65 to column 3, line 20; claim 1 and figures 1-3.	1-18

Box No. I Observations where certain claims were found unsearchable

This search report has not been established in respect of certain claims for the following reasons:

1. Claims Nos.:

because they relate to subject matter not required to be searched, namely:

2. Claims Nos.:

because they relate to parts of the patent application that do not comply with the prescribed requirements to such an extent that no meaningful search can be carried out, specifically:

3. Claims Nos.:

because of other matters.

Box No. II Observations where unity of invention is lacking prior to the search

The Danish Patent and Trademark Office found multiple inventions in this patent application, as follows:

SUPPLEMENTAL BOX

Continuation of Box [.]