(19) Europäisches Patentamt
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(11) **EP 2 722 467 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.04.2014 Bulletin 2014/17

(51) Int Cl.:
E04H 4/10 *(2006.01)*

(21) Application number: **13188104.7**

(22) Date of filing: **10.10.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **16.10.2012 IT PD20120301**

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(54) **Motorized tunnel canopy**

(57) A motorized tunnel canopy (10), of the type comprising a load-bearing quadrangular frame (11), on two opposite parallel longitudinal members (12, 13) of which the corresponding ends (15, 16, 17, 18, 19, 20, 21, 22) of a plurality of transverse ribs (23, 24, 25, 26) for supporting the awning (27) are coupled so that they can slide, supported by movement means (14), the awning (27) being fixed to each one of the ribs; the awning (27) having, on the inner face (28), i.e., the face directed downward in the configuration for use, a series of spaced tabs (29) for mating with a complementarily shaped portion (30) defined on each one of the ribs (23, 24, 25, 26), the ends of the ribs being coupled to the movement means, each by pivoting means (31).

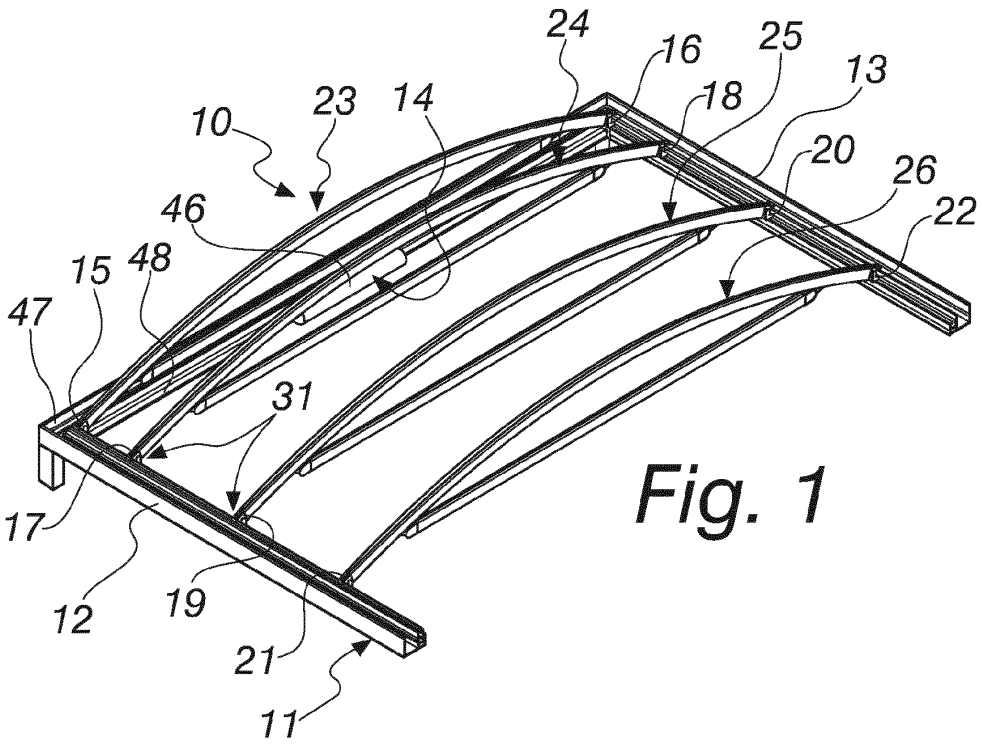


Fig. 1

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Description

[0001] The present invention relates to a motorized tunnel canopy.

[0002] Nowadays, "tunnel" canopies are increasingly widespread and appreciated for covering open spaces, both in public premises and spaces and in private use.

[0003] Particularly appreciated are motorized tunnel canopies, i.e. tunnel canopies with the ability to extend or retract the covering according to necessity and preference.

[0004] Such tunnel canopies are constituted by a frame fixed to the ground and supporting a plurality of ribs which are fixed by their ends to corresponding means for their translational movement in a direction for extending the covering of the canopy and for closing the canopy.

[0005] The covering awning is fixed to the ribs.

[0006] The motorized tunnel canopies known today, although appreciated, show some room for improvement.

[0007] A first area for improvement is the system of fixing the awning to the ribs.

[0008] Such fixing system involves using staples to clip the awning on the rib.

[0009] The use of staples involves perforation of the awning, with the generation of points where the passage of water is possible, and furthermore it is an irreversible method of fixing, i.e. it is impossible to remove the awning without breaking the staples and risking further tearing of the awning proper.

[0010] Furthermore, fixing with staples requires a considerable investment of time and labor, a major influence on overall production costs.

[0011] A second drawback is linked to the means for moving the ribs, which today is still complex to install and is relatively unreliable in terms of the necessary perfectly-synchronized movement between the two opposite ends of a rib.

[0012] Furthermore, usually the ends of the ribs are fixed rigidly to the sliding elements of the movement means; such a rigid joining, in the event of overloading of the awning, for example by snow or wind, can present a hindrance to the flexing of the rib so as to absorb the thrust of the load, with consequent risks of breakage for the rib proper and of damage for the sliding elements and the movement means that make them perform a translational motion, since the sliding elements are, as noted, rigidly fixed to the ends of the ribs.

[0013] The aim of the present invention is to provide a motorized tunnel canopy that is capable of overcoming the above mentioned drawbacks of the known art.

[0014] Within this aim, an object of the invention is to provide a tunnel canopy the awning of which can be fixed to the ribs more rapidly and economically with respect to the fixing with staples.

[0015] Another object of the invention is to provide a tunnel canopy with movement means that are more precise, stable and capable of transmitting a perfectly coordinated motion at the opposite ends of a rib with respect to conventional movement means, and which at the same time are easier to install.

[0016] A further object of the invention is to provide a tunnel canopy in which the regions for connecting with the sliding elements of the movement means are not subjected to stresses in the event of being overloaded by snow or wind.

[0017] Another object of the invention is to provide a motorized tunnel canopy that can be made using known systems and technologies.

[0018] This aim and these and other objects which will become better evident hereinafter are achieved by a motorized tunnel canopy, of the type comprising a load-bearing quadrangular frame, on two opposite parallel longitudinal members of which the corresponding ends of a plurality of transverse ribs for supporting the awning are coupled so that they can slide, supported by movement means, said awning being fixed to each one of said ribs, said tunnel canopy being **characterized in that** said awning has, on the inner face, i.e., the face directed downward in the configuration for use, a series of spaced tabs for mating with a complementarily shaped portion defined on each one of said ribs, the ends of said ribs being coupled to said movement means, each by pivoting means.

[0019] Further characteristics and advantages of the invention will become better apparent from the description of a preferred, but not exclusive, embodiment of the motorized tunnel canopy according to the invention, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

- Figure 1 is a perspective view of a tunnel canopy according to the invention, with the awning removed for clarity;
- Figure 2 is an enlarged detail of Figure 1;
- Figure 2a shows an example of a portion of awning for a canopy according to the invention;
- Figure 3 is a cross-sectional view of a rib with a portion of awning to be fixed to it;
- Figure 4 is a cross-sectional view of a rib with a portion of awning fixed to it;
- Figure 5 is a cross-sectional view of a variation of a rib;
- Figure 5a is a cross-sectional view of a variation of a rib with a plastic seal profile;
- Figure 6 shows a first variation of embodiment of a tunnel according to the invention;
- Figure 7 shows a second variation of embodiment of a tunnel according to the invention;
- Figure 8 shows a third variation of embodiment of a tunnel according to the invention;
- Figure 9 is a partially cross-sectional front elevation view of the movement means of a tunnel according to the invention;
- Figure 9a is a perspective view of the movement means;

- Figure 10 is a perspective view of a pivoting region of a tunnel according to the invention;
- Figure 11 is a perspective view of a further pivoting region of a tunnel according to the invention.

[0020] With reference to the figures, a motorized tunnel canopy according to the invention is generally designated with the reference numeral 10.

[0021] The tunnel 10 comprises a load-bearing quadrangular frame 11, on two opposite parallel longitudinal members 12 and 13 of which the corresponding ends 15, 16, 17, 18, 19, 20, 21 and 22 of a plurality of transverse ribs 23, 24, 25 and 26 in Figure 1 are coupled so that they can slide, supported by movement means 14.

[0022] The transverse ribs 23, 24, 25 and 26 support an awning 27, which forms the actual covering of the tunnel 10.

[0023] The awning 27 is fixed to each one of the transverse ribs 23, 24, 25 and 26.

[0024] The transverse ribs are shown as being four in number, obviously merely for the purposes of example.

[0025] The awning 27 is shown schematically for the purposes of example in Figures 3 and 4.

[0026] The awning 27 has, on the inner face 28, i.e., the face directed downward in the configuration for use, a series of spaced tabs 29 for snap mating with a complementarily shaped portion 30 defined on each one of the ribs 23, 24, 25 and 26.

[0027] The ends of the ribs are coupled to the movement means, each by pivoting means 31 which are better described hereinafter.

[0028] Each one of the mating tabs 29 is provided by a profile 32 made of elastically deformable plastic material, for example PVC, which is predominantly extended longitudinally and is shaped with a base portion 33, which is fixed to the awning 27, and a protruding portion 34 for coupling in a complementarity shaped engagement channel 35 defined on each rib 23, 24, 25 and 26.

[0029] The profile 32 is fixed to the awning 27 by welding, but it should be noted that it can also be fixed with other means that are similar and equivalent, for example by adhesive bonding.

[0030] In Figures 1 to 4 a rib, for example 23, has a single engagement channel 35 for the fixing of a profile 32.

[0031] In a variation of embodiment of the invention, shown for the purpose of example in Figure 5, the rib 123 has three engagement channels 135, 136 and 137.

[0032] The three engagement channels 135, 136 and 137 make it possible both to fix a single profile, in the central engagement channel 135, or to fix two profiles 132 and 132a, in the two lateral engagement channels 136 and 137, each profile 132 and 132a being fixed to the edge 138 and 138a respectively of a respective portion of awning 127 and 127a.

[0033] In this manner, the contiguous edges of two portions of awning 127 and 127a can be fixed on a rib 123 thus giving continuity and seal to the covering.

[0034] Figure 5a shows a sealing profile 280, made of elastically deformable plastic material, which has a base 281 from which protrudes a protruding portion 282 which defines a channel with a substantially V-shaped cross-section, the symmetrical side walls 283 and 284 of which are forced to deform elastically toward each other upon insertion in the engagement channel 235, to then widen so as to define the undercut coupling with the facing opposite longitudinal edges 241 and 242 of the engagement channel 235.

[0035] The sealing profile 280 is designed to be inserted in the central engagement channel 235 after, as in Figure 5, two contiguous portions of awning 227 and 227a have been fixed in the lateral engagement channels 236 and 237 by means of the respective profiles 232 and 232a, so as to cover both edges 238 and 238a of the two portions of awning 227 and 227a and prevent the passage of water between the two awning portions.

[0036] In a first variation of embodiment of the ribs 23, 24, 25 and 26, shown in Figure 6, each one of the ribs is constituted by a single arc-like profile.

[0037] Advantageously a stiffening profile 43 is fitted, pivoted at two opposite points of the same rib 23.

[0038] In a second embodiment of the invention, shown for the purpose of example in Figure 7, each one of the ribs 223 has a symmetrical truss-like shape, and is constituted by two symmetrical straight profiles 244 and 245.

[0039] In this case also there is a stiffening profile 243, which is adapted to provide a further connection between the two straight portions of profile 244 and 245.

[0040] In a third embodiment of the invention, shown for the purpose of example in Figure 8, each rib 323 has an asymmetrical truss-like shape, and is constituted by two asymmetrical straight profiles 344 and 345.

[0041] The movement means 14 comprise a motor drive 46 which is enclosed in a box-like body, which is fixed to a crossmember 47 of the frame 11 in a position that is substantially equidistant from the two longitudinal members 12 and 13 on which the ends 15, 16, 17, 18, 19, 20, 21 and 22 of the ribs 23, 24, 25 and 26 slide.

[0042] The driving torque is transmitted from the motor drive by two coaxial and opposite transmission shafts 48 and 49, each of which is adapted to rotate a pulley 50, clearly visible in Figure 9, for a toothed belt 51 the upper and lower portions of which are arranged, together with the pulleys, in a protective housing 52 that is part of the longitudinal members 12 and 13.

[0043] The toothed belt 51 is fixed to the sliding carriage 53 of a first, end rib 54, the movement of which, in the direction of extending the awning 27, by way of the traction effected by the awning 27 proper, results in the movement of the other, intermediate ribs as well.

[0044] The carriage 53 as with the other, identical trolleys which are not fixed to the belt 51, are arranged so as to slide within a complementarily shaped tubular guide 55, which also is part of a respective longitudinal member 12 and 13.

[0045] The pivoting means 31 comprise a first part 56 which is fixed to a corresponding carriage 53, and a second part 57 which defines the end of a rib 23, in the embodiment in Figures 9 and 9a, which are mutually coupled by a pivot 58 for rotation and connection.

[0046] In the embodiment in Figure 9 the carriage 53 and the first part 56 are provided by two separate elements, made of plastic material or metallic material, and are joined by threaded couplings 59 which is also for fixing to the belt 51, by way of a spacer body 54 which is fixed with systems that are conventional and not shown here for the sake of simplicity.

[0047] As can clearly be seen in Figures 10 and 11 the pivoting regions, either between two profiles 244 and 245 of a rib 223 as in Figure 10, or at the ends, for example 216, of the ribs, for example the rib 223 in Figure 11, have covering elements 260 and 261 which are provided with engagement channel portions 262, 263 and 264 for the first covering element 260, and 265, 266, and 267 for the second covering element 261, that correspond to the engagement channels 235, 236 and 237 provided on the ribs, so as to allow the continuous fixing of the awning also in such pivoting regions.

[0048] Figure 9 shows the awning 27 also fixed to the second part 57 of the pivoting means 31, i.e. the end of the rib 54, and the pitch 68 of which descends well into the eave 69, the channel of which is also formed on the longitudinal member 12.

[0049] In practice it has been found that the invention fully achieves the intended aim and objects.

[0050] In particular, with the invention a tunnel canopy has been devised the awning of which can be fixed to the ribs more rapidly and economically with respect to fixing with staples, thanks to the profiles made of elastically deformable plastic material, which engage easily and quickly, owing to the protruding portion, in a corresponding engagement channel.

[0051] The engagement is just as easily reversible, the rapid substitution of the awning thus being made possible in the event of wear or breakage.

[0052] Moreover, with the invention a tunnel canopy has been devised with movement means that are more precise, stable and capable of transmitting a perfectly coordinated motion at the opposite ends of a rib with respect to conventional movement means, thanks to the centrally positioned motor drive and to the symmetrical toothed belts.

[0053] Furthermore, with the invention a tunnel canopy has been devised in which the regions for connecting with the sliding elements of the movement means are not subjected to stresses in the event of being overloaded by snow or wind, thanks to the pivoting means both at the ends, and between the two or more parts of a rib comprising two or more profiles.

[0054] In addition, with the invention a motorized tunnel canopy has been devised that can be made using conventional systems and technologies.

[0055] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0056] Moreover, all the details may be substituted by other, technically equivalent elements.

[0057] In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

[0058] The disclosures in Italian Patent Application No. PD2012A000301 from which this application claims priority are incorporated herein by reference.

[0059] Where technical features mentioned in any claim are followed by reference signs, such reference signs have been inserted for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A motorized tunnel canopy (10), of the type comprising a load-bearing quadrangular frame (11), on two opposite parallel longitudinal members (12, 13) of which the corresponding ends (15, 16, 17, 18, 19, 20, 21, 22) of a plurality of transverse ribs (23, 24, 25, 26;123;223) for supporting an awning (27; 127) are coupled so that they can slide, supported by movement means (14), said awning (27) being fixed to each one of said ribs, said tunnel canopy (10) being **characterized in that** said awning (27) has, on the inner face (28), i.e., the face directed downward in the configuration for use, a series of spaced tabs (29) for mating with a complementarily shaped portion (30) defined on each one of said ribs (23, 24, 25, 26; 123;223), the ends of said ribs being coupled to said movement means, each by pivoting means (31).

2. The canopy according to claim 1, **characterized in that** each one of said mating tabs (29) is provided by a profile made of elastically deformable plastic material (32) that is predominantly extended longitudinally and is shaped with a base portion (33), which is fixed to the awning (27), and a protruding portion (34) for coupling in a complementarity shaped engagement channel (35) defined on each rib.

3. The canopy according to claim 1, **characterized in that** said rib (123) comprises at least two laterally adjacent engagement channels (135, 136) for fixing edges (138, 138a) of two contiguous awning portions (127, 127a).

4. The canopy according to one or more of the preceding claims, **characterized in that** it comprises a seal-

ing profile (280), made of elastically deformable plastic material, which has a base (281) from which a protruding portion (282) protrudes which is adapted to deform elastically for insertion in an engagement channel (235), to then widen so as to define the undercut coupling with the facing opposite longitudinal edges (241, 242) of said engagement channel (235), said sealing profile (280) being designed to be inserted in the central engagement channel (235) after two contiguous portions of awning (127, 127a) have been fixed in the lateral engagement channels (136, 137) by means of the respective profiles (132, 132a), so as to cover both edges (138, 13 8a) of the two portions of awning (127, 127a) and prevent the passage of water between said two awning portions.

5. The canopy according to one or more of the preceding claims, **characterized in that** each one of said ribs (23, 24, 25, 26) is constituted by a single arc-like profile.

6. The canopy according to claims 1 to 3, **characterized in that** each one of said ribs (223) has a symmetrical truss-like shape and is constituted by two symmetrical straight profiles (244, 245).

7. The canopy according to claims 1 to 3, **characterized in that** each one of said ribs (323) has an asymmetrical truss-like shape and is constituted by two asymmetrical straight profiles (344, 345).

8. The canopy according to one or more of the preceding claims, **characterized in that** said movement means (14) comprise a motor drive (46) which is enclosed in a box-like body that is fixed to a crossmember (47) of said frame (11) in a position that is substantially equidistant from the two longitudinal members (12, 13) on which the ends of the ribs slide, the driving torque being transmitted from said motor drive (46) by two coaxial and opposite transmission shafts (48, 49), each of which is adapted to rotate a pulley (50) for a toothed belt (51) the upper and lower portions of which are arranged, together with the pulleys, in a protective housing (52) that is part of said longitudinal members, the sliding carriage (53) of an end of a first, end rib (54) being fixed to each belt, the carriages of the ends of the ribs being arranged so as to slide within a complementarily shaped tubular guide (55), which also is part of a respective longitudinal member (12, 13).

9. The canopy according to one or more of the preceding claims, **characterized in that** said pivoting means (31) comprise a first part (56), which is fixed to a corresponding carriage (53), and a second part (57), which defines the end of a rib, said parts being mutually coupled by a pivot (5 8) for rotation and connection.

10. The canopy according to one or more of the preceding claims, **characterized in that** the regions for pivoting, either between two profiles (244, 245) of a rib (223), or at the ends (216) of the ribs, have covering elements (260, 261) which are provided with engagement channel portions (262, 263, 264, 265, 266, 267) that correspond to the engagement channels (235, 236, 237) provided on the ribs, so as to allow the continuous fixing of the awning also in said pivoting regions.

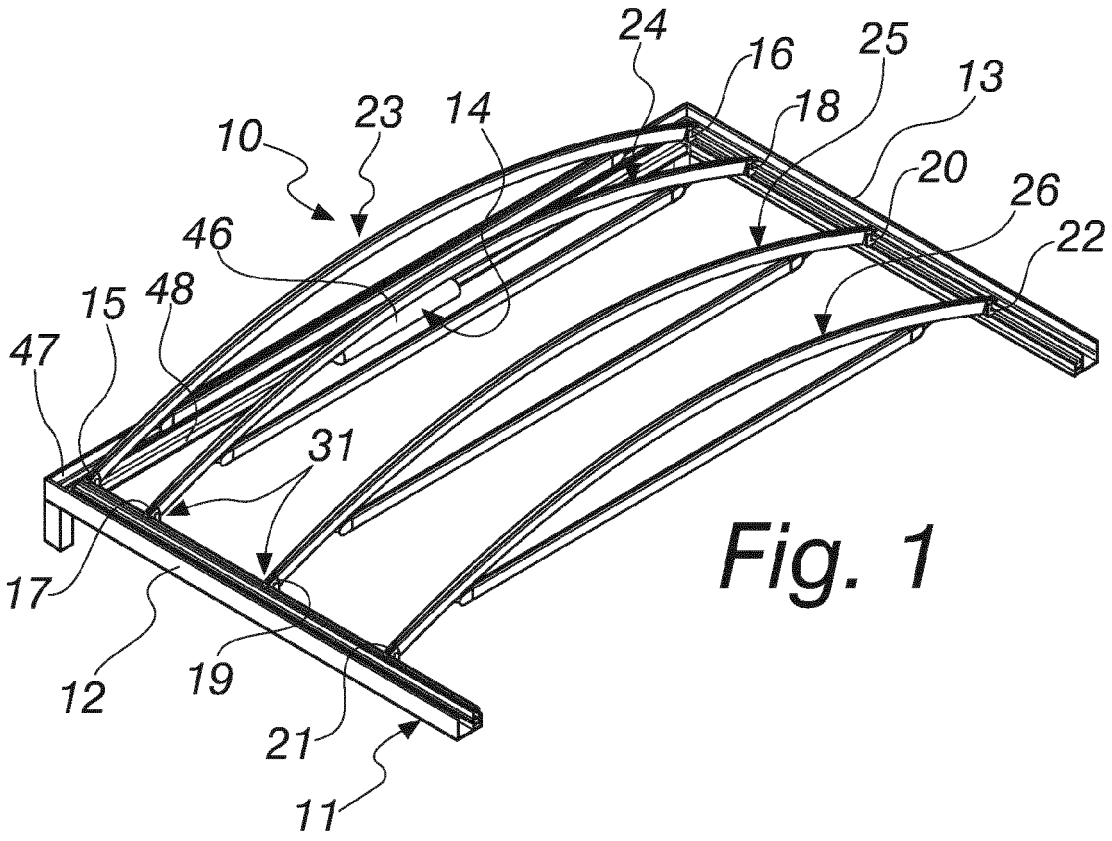

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Fig. 1

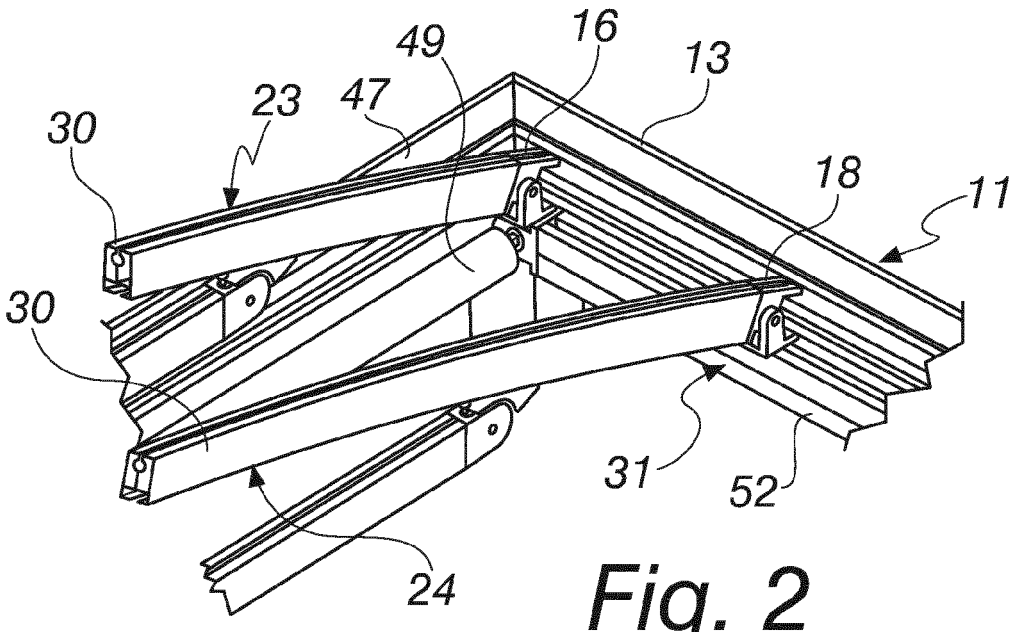

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Fig. 2

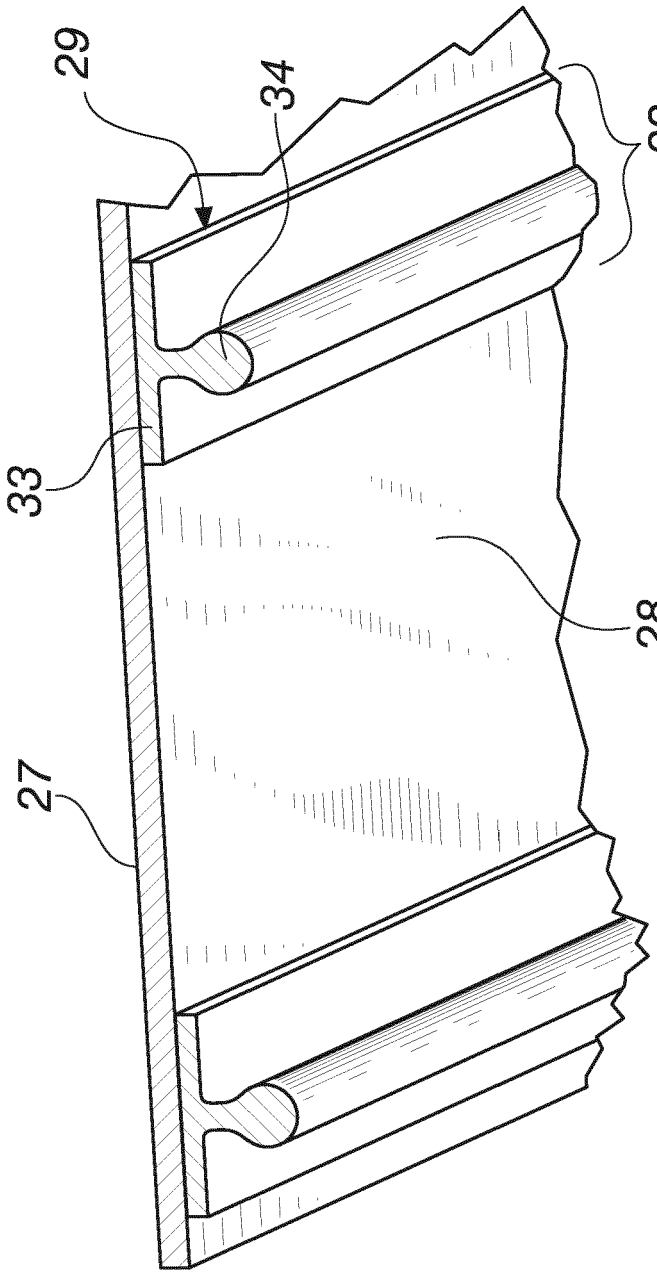


Fig. 2a

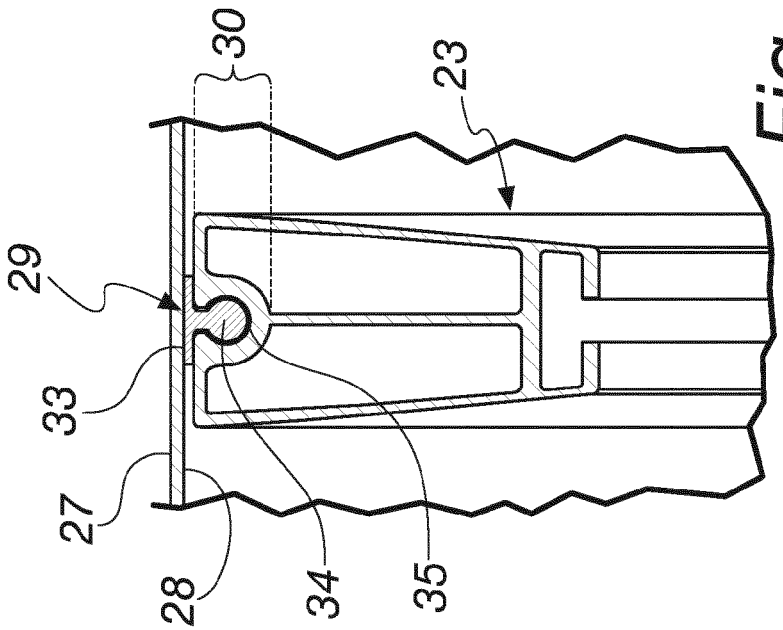


Fig. 4

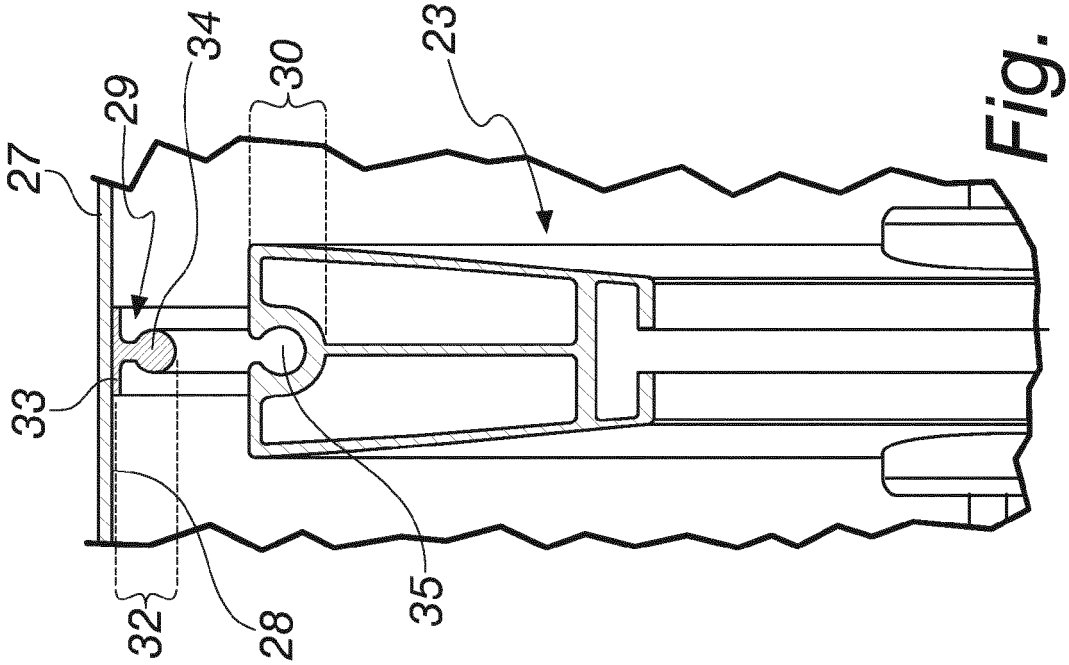


Fig. 3

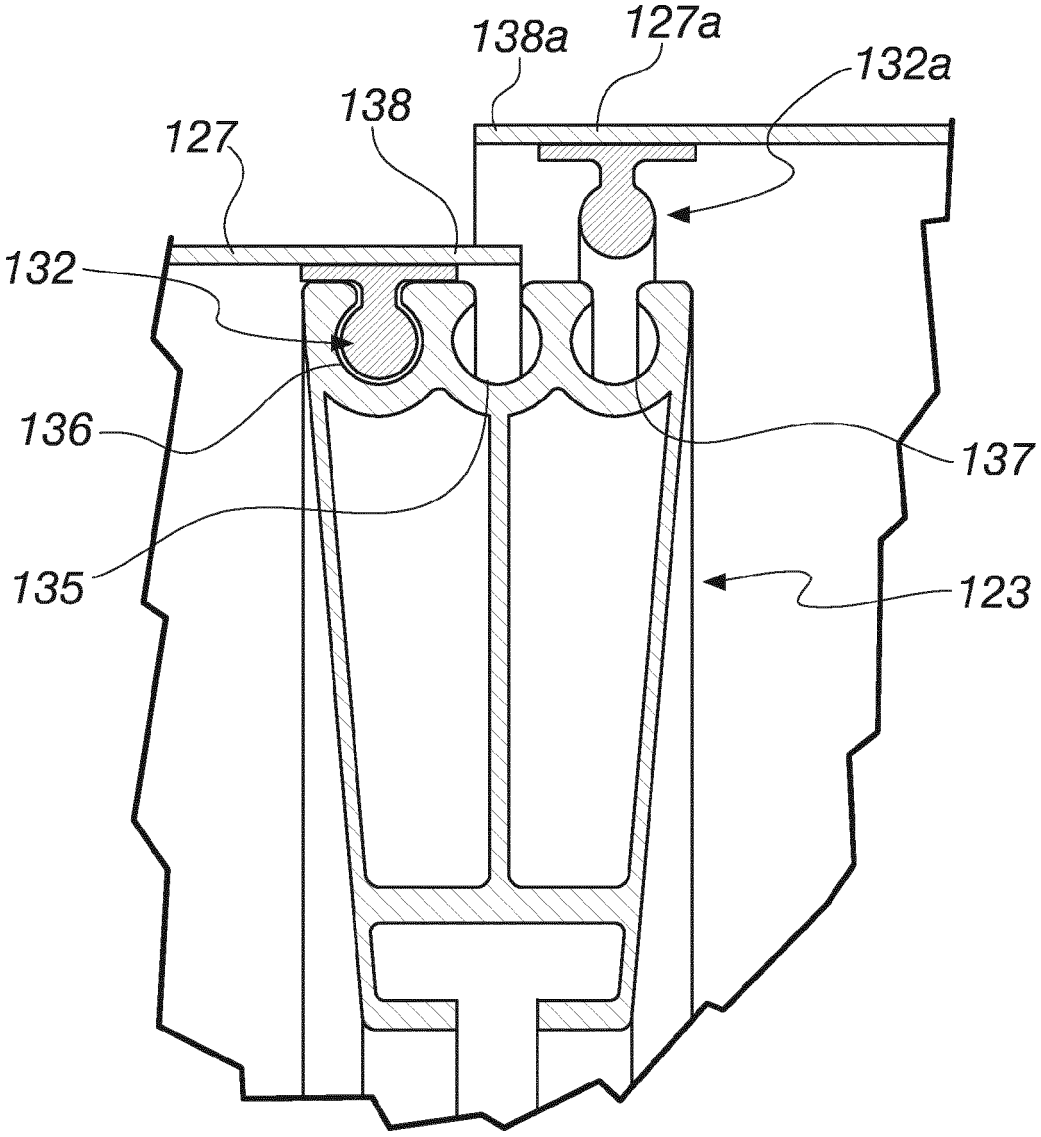


Fig. 5

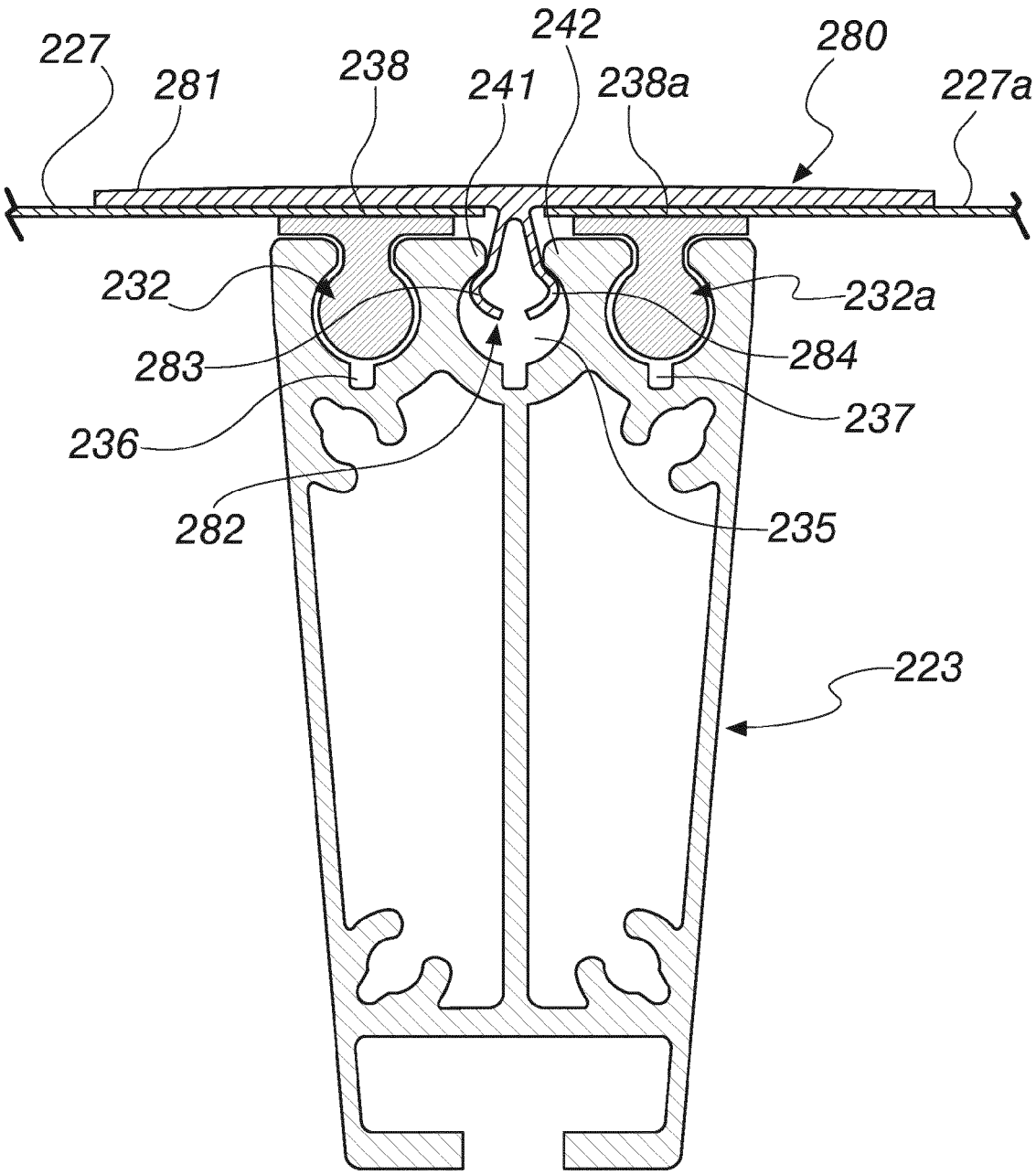

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Fig. 5a

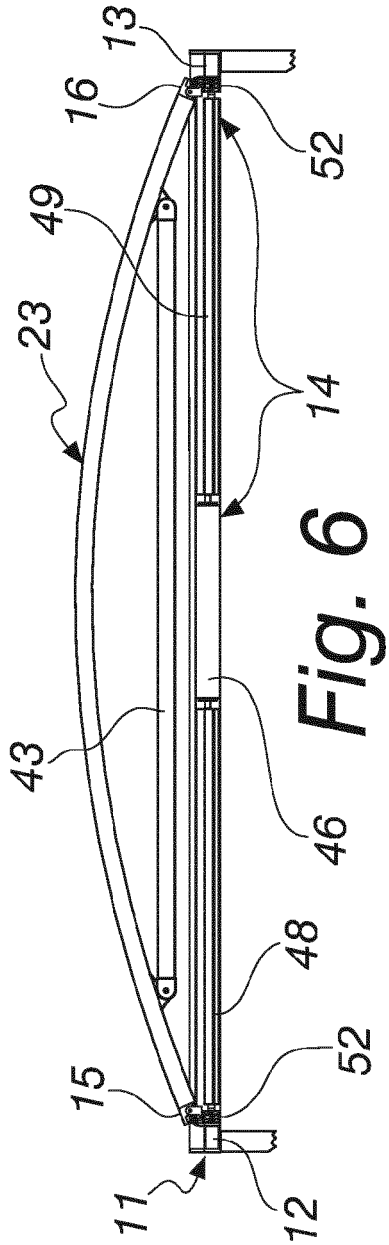


Fig. 6

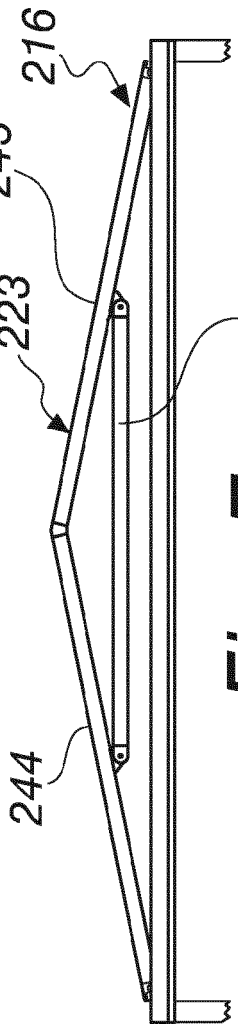


Fig. 7

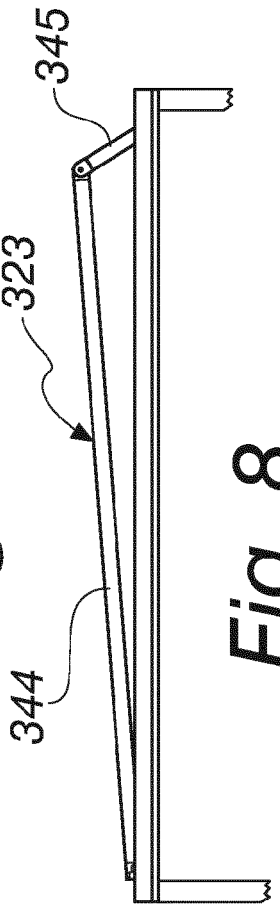


Fig. 8

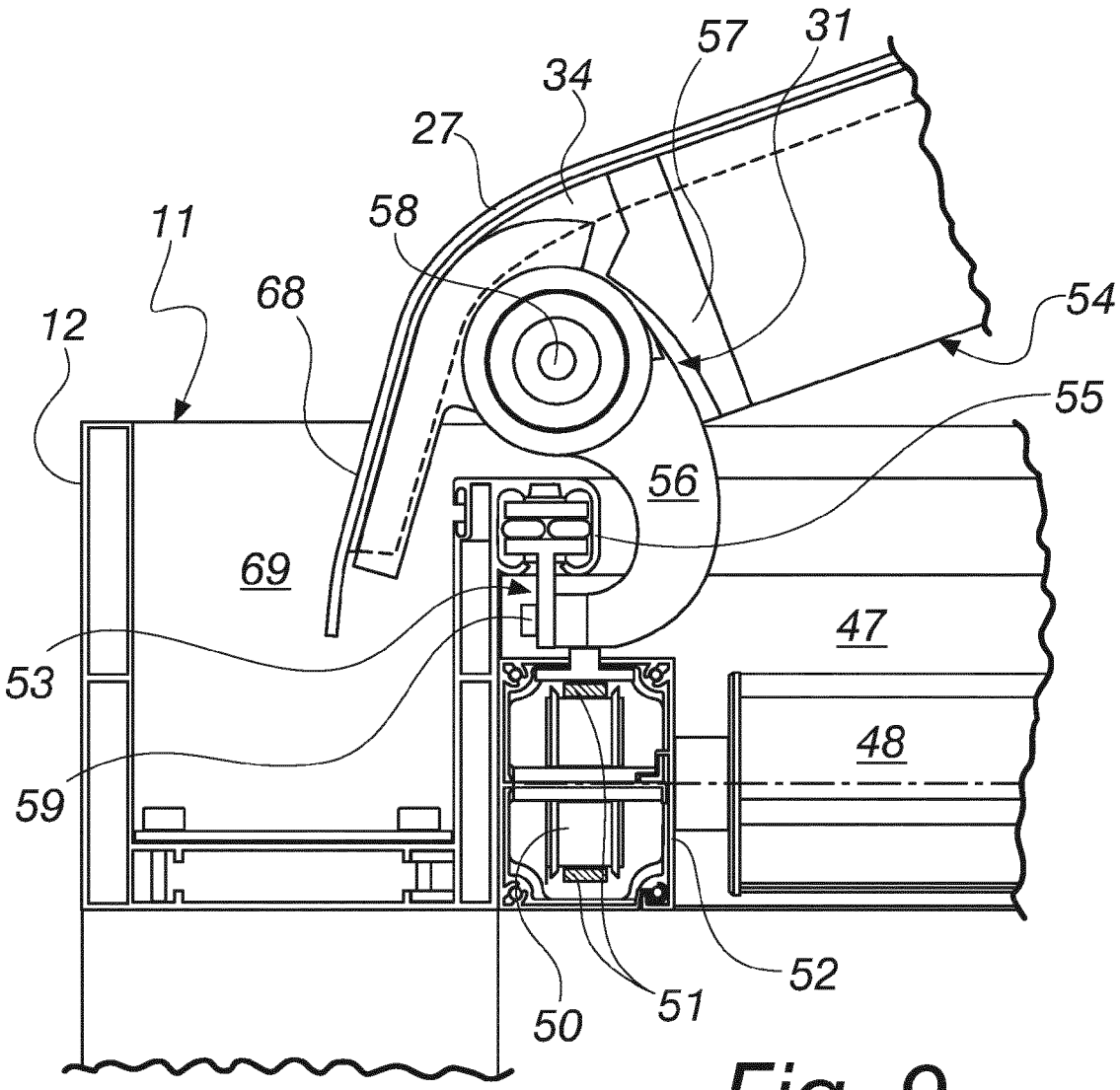


Fig. 9

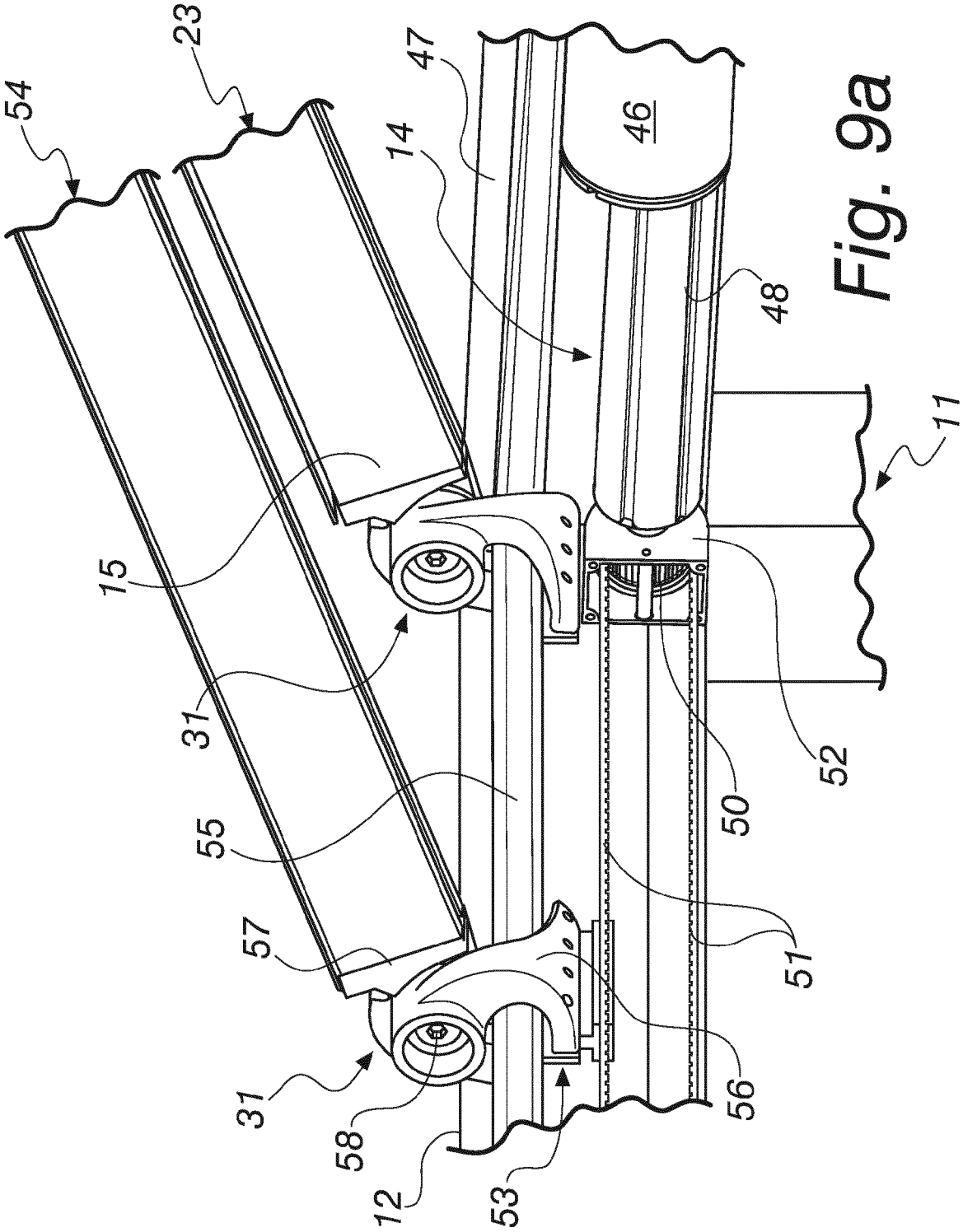


Fig. 9a

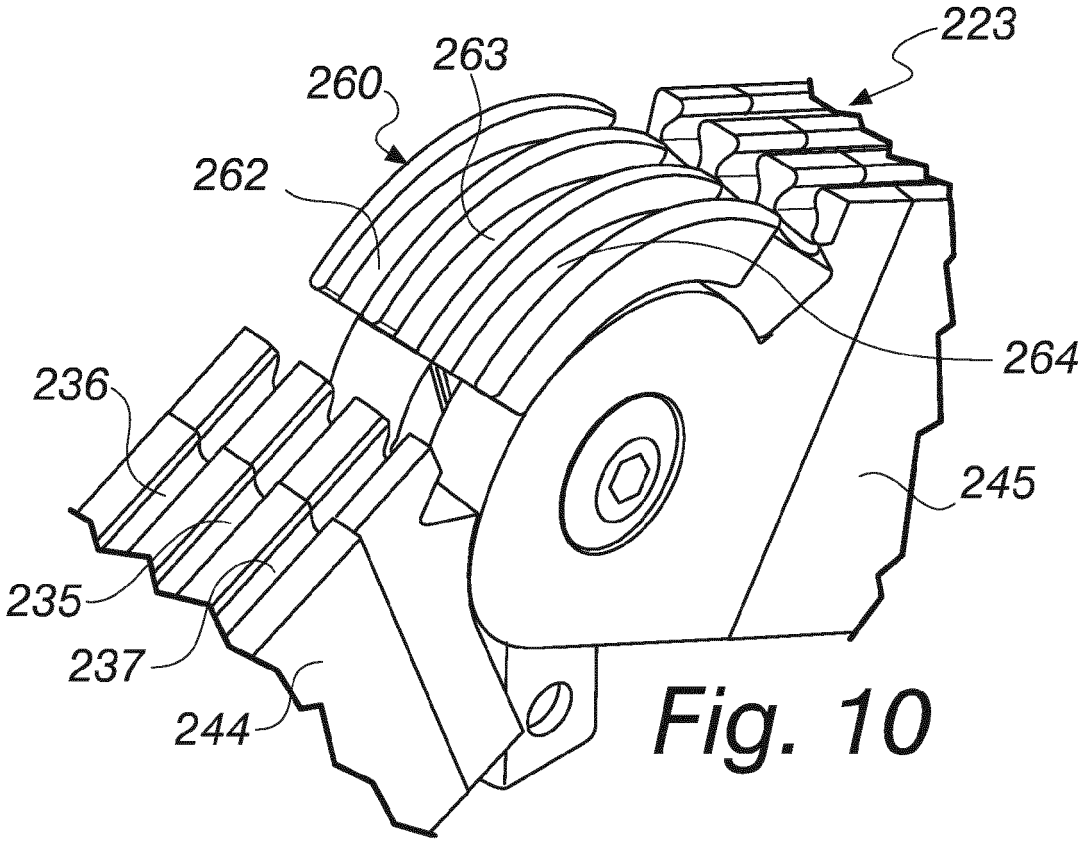

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Fig. 10

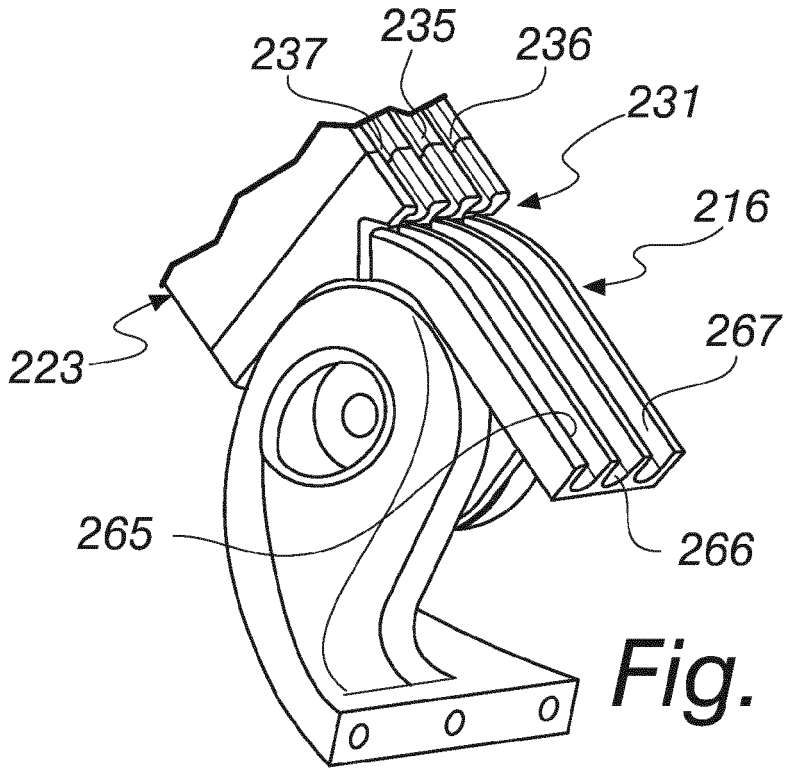

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Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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