(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 703 039 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.09.2006 Bulletin 2006/38

(51) Int Cl.:
E04F 10/06 *(2006.01)*

(21) Application number: **05380047.0**

(22) Date of filing: **15.03.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR LV MK YU

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(54) Lead bar for retractable awning

(57) It consists of an extruded, hollow profile (1), with longitudinal grooves (2, 6) for securing the canvas and arms respectively. The transverse section of the profile (1) has a surrounding wall (8) that defines a wide region (A) with portions (8a, 8b, 8c, 8d) that moved away from a central axis (E); and a long region (B) with long front and rear sections (8e, 8f) close to a mid-plane (P) that is located between the two. The long region (B) projects in a downward direction from the lower portion (8b) of the said wide region (A) next to a front edge of the same. The securing grooves for the canvas and arms (2, 6) are arranged on the upper portion (8a) and the lower portion (8b) of wide region (A) respectively, substantially in directly opposite positions in relation to the said central axis (E).

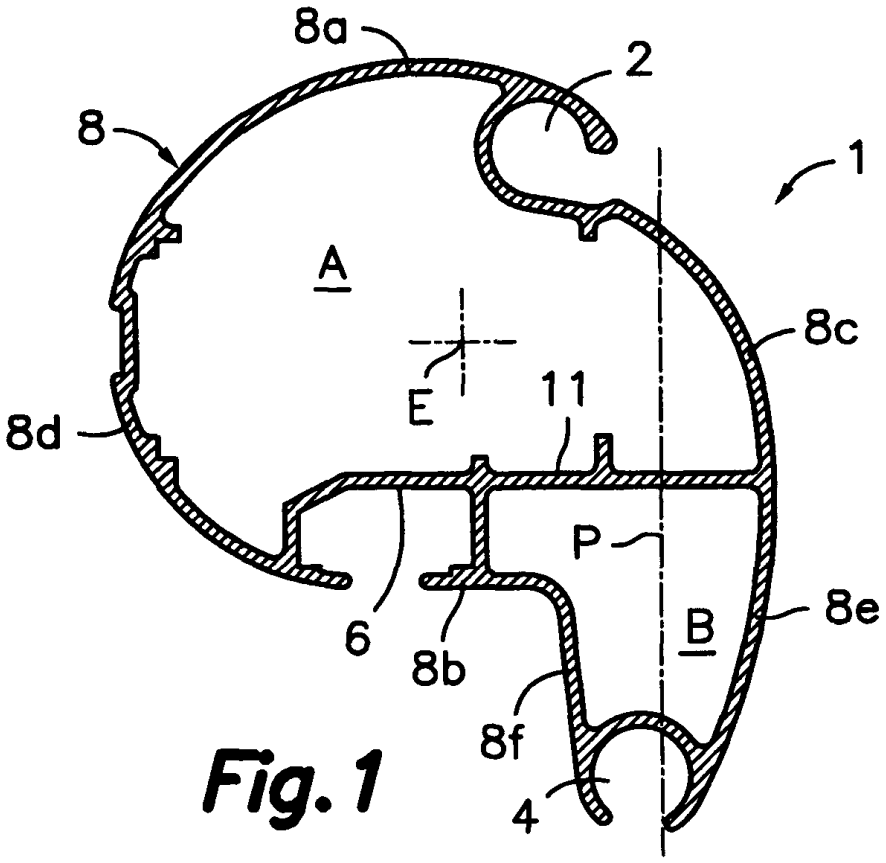

Fig. 1

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Description

Sector of the technique

[0001] This invention concerns a lead bar for retractable awning, of the type that comprises a hollow profile produced through the extrusion of a light metal alloy, such as aluminium.

Previous state of the art

[0002] Retractable awnings that consist of a canvas with a rear border joined to a tube, into which it can be rolled up, mounted at its ends so that it can rotate between ends secured to brackets fixed to a wall or other structure, and with a front edge joined to a rigid bar, known as the "lead bar", are well-known. There is a mechanism connected to the roll-up tube that can be manually or motor operated in order to rotate the tube in one or the other directions so that the canvas awning is opened or closed. A pair of elastically-loaded, retractable arms is connected by one end to the said wall or other structure and by the other end to the lead bar so that it supports the lead bar and applies tension to the canvas awning. There are two main variants of this type of awning: those with rigid arms that are articulated at one end to the wall and fixed at the other end to the lead bar, and which can fold by oscillation in respective vertical planes and which have arms, each of which is formed by two sections that are joined together and articulate with the wall at one of their ends and the lead bar at the other, and which can bend in the form of an elbow in a common plane that is substantially parallel to the plane in which the canvas awning extends.

[0003] Throughout this document, the term "rear" is used to designate those parts that are closest to the wall or other structure on which the awning roll-up tube is mounted, and the term "front" is used to designate those parts that are furthest away from the wall or the roll-up tube. The terms "upper" and "lower" are used in its conventional sense referred to the lead bar when same is in a substantially horizontal position of the arms. The terms "vertical" and "horizontal" in reference to the lead bar are also based on its position when the arms are in a substantially horizontal position.

[0004] The lead bar, especially when it has significant length, for example, four metres or more, is subjected to significant combined flexion and torsion forces. The directions in which the forces are produced depends on several factors, some variable, such as the arm and awning inclinations, the amount the canvas awning is extended, wind force and direction etc, together with others that are constant, such as arm type and layout, arm elastic load factor, together with the arm's own weight and that of the awning, among others. There is a main flexion force in a vertical plane due to the bar's own weight and the arm support force. In addition to this, there is a main combined flexion force in the plane in which the canvas is extended, and of torsion along the bar's longitudinal axis, respectively, due to the tension in the canvas and the arm thrust. The tension forces due to variable factors are produced in variable planes or axes and are added to the previously mentioned main tensions. Consequently, there is a need for a lead bar adapted to adequately withstand the tension produced by the combined main and variable forces.

[0005] Document ES-A-1031627, belonging to the applicant, describes a lead bar consisting of a hollow profile made by aluminium extrusion, and which consists of longitudinal grooves designed for the securing of a front edge of the canvas awning and a front skirt, together with further longitudinal grooves for the securing of the front ends of the arms. The mentioned profile presents an angular configuration formed by a long horizontal region and a long vertical region. A large number of the said horizontal grooves enable the profile to be installed with the horizontal region in both the upper and lower positions, maintaining the vertical region in a front position. This profile also allows different options for securing the arms, whether these are rigid oscillating or elbow articulated. The mentioned long horizontal and vertical regions provide a good level of resistance to the flexion forces in the vertical and horizontal planes, but are not so efficient against torsion forces along the longitudinal axis of the bar and against combined flexion and torsion in other variable and unpredictable planes.

[0006] Patent FR-A-2335686 concerns an awning leading bar made up of two or more extruded hollow profiles joined together by means of sections of cylindrical piping that are plugged into the respective adjacent ends. To this end, the profile has a surrounding wall that defines three coaxial cylindrical portions, at least one of which, along the generatrices, links up with a pair of substantially straight sections that form a very open "V" transverse section that provides a certain amount of elasticity that is necessary to permit the said piece of cylindrical connection piping to be plugged in. However, this same elasticity is an inconvenience with respect to withstanding the torsion forces in the longitudinal axis of the bar, as well as the combined flexion and torsion, since it facilitates the elastic deformation of the profile.

[0007] Patent ES-A-2029203 describes an awning that consists of a lead bar made from an extruded hollow profile with grooves designed for the securing of a front edge of the canvas awning and a front skirt, together with further longitudinal grooves for the securing of the front ends of the awning arms located at a rear section of the profile. The relative layout of the longitudinal grooves for securing the canvas, skirt and arms allows the profile to be installed in two mutually inverted positions that are respectively suitable for rigid oscillating or elbow articulated arms. In each case, the awning securing grooves are in the upper section and as close as possible to the lead bar when the arms are completely

folded. This profile includes a wide region and a long region, but the longitudinal grooves for securing the canvas and arms are not located on the said wide portion, in relative opposite positions with respect to its central axis.

[0008] The purpose of this invention is to reduce the inconveniences of the profiles in the state of the art by providing a lead bar for retractable awning designed to withstand the combined flexion and torsion forces acting in certain planes and main axes and in other multiple variable planes.

Description of the invention

[0009] This invention contributes to obtaining the previous and other objectives by providing a lead bar for retractable awning, of the type that is made up of a hollow profile manufactured through the extrusion of a light metal alloy, and which comprises a longitudinal groove for securing the canvas for fixing the front edge of a canvas awning and a longitudinal arm securing groove for securing the front end of at least one arm. The lead arm of this invention is characterised because the said profile has a transverse section with a surrounding wall that defines a wide region, in which the said surrounding wall consists of upper, lower, front and rear portions located away from a central geometric axis, and a long region, in which the said surrounding wall consists of front and rear sections facing each other and located close to a mid geometric plane between the two. The mentioned long region overhangs downwards from the said lower portion of the wide region next to the front edge of the same. The cited longitudinal groove for securing the canvas and the said longitudinal groove for securing the arm are arranged on the said upper portion and on the lower portion of the substantially wide portion respectively in directly opposite positions in relation to the said central axis.

[0010] In certain embodiment examples, the lower portion of the wide region is connected to the said rear long section forming a concavity with respect to the outside of the bar at a right, or almost right, angle, and the longitudinal arm securing groove is formed in the said concavity.

[0011] In certain embodiment examples, the edge of the wide region resembles a circle, or preferably, an ellipse that has a horizontal axis that is slightly longer than a vertical axis when the said arm is substantially horizontal, which provides the profile with excellent resistance to torsion with respect to the central axis of the wide region and increased resistance to flexion in a horizontal plane that passes through this central axis. Similarly, the mentioned mid-plane in the long region is substantially vertical when the arms are substantially horizontal, which provides the profile with excellent resistance to flexion in a vertical plane.

[0012] Optionally, the profile seen in the transverse section presents a dividing wall that separates the wide region from the long region. For example the said dividing wall connects an interior part of the said longitudinal arm securing groove and an area of the surrounding wall where there is a front portion of the wide region and the front long section of the long region. This dividing wall reinforces the profile and endows additional rigidity in the wide region against any eventual strain caused by combined torsion and flexion forces.

[0013] The lead bar, in accordance with this invention, therefore achieves excellent resistance to torsion along its longitudinal axis and also to flexion in the horizontal and vertical planes, with a minimum of weight and without giving up any attractive aesthetic appearance.

A brief description of the drawings

[0014] The previous and other advantages will be more fully understood by means of the following detailed description of embodiment examples with reference to the included drawings, in which:

Figure 1 is a transverse section view of a lead bar for retractable awning in accordance with an embodiment example of this invention;
Figure 2 is a lateral view of the installation of the lead bar shown in Figure 1;
Figure 3 is a diagram that shows the torsion moment to which the lead bar is subjected during use and the resulting forces;
Figure 4 is a diagram that illustrates the flexion moment in the horizontal plane to which the lead bar is subjected during use and the resulting forces;
Figure 5 is a diagram that illustrates the flexion moment in the vertical plane to which the lead bar is subjected during use and the resulting forces;
Figure 6 is a transverse section view of a lead bar for retractable awning in accordance with another embodiment example of this invention; and
Figure 7 is a lateral view of the installation of the lead bar of Figure 6.

A detailed description of an embodiment example

[0015] First with reference to Figure 1, which shows a transverse section of a hollow profile 1 produced by the extrusion

of a light metal alloy, such as aluminium, from which the lead bar is produced in accordance with an embodiment example of this invention. Profile 1 has a surrounding wall 8 that defines a wide region A, in which the upper, lower, front and rear portions 8a, 8b, 8c, 8d of the said surrounding wall 8 are located away from a central axis E. Surrounding wall 8 of profile 1 also defines a long region B, in which the said surrounding wall 8 includes front and rear long sections 8e, 8f, that face each other and are close to a mid-plane P that is located between the two.

[0016] The mentioned long region B of the transverse section of profile 1 projects out from under the wide region A, next to a front side of profile 1. The mentioned lower portion 8b of the surrounding wall 8, which forms part of the wide region A, is connected to the said long rear section 8f of long region B forming a concavity with respect to the exterior in a right, or almost right, angle. The lower portion 8b of the wide region A in the said concavity, consists of a longitudinal arm securing groove 6 intended to secure the front ends of arms 7 (Fig. 2) by means of conventional known securing elements. The lower portion 8b connects to the said rear portion 8d of the surrounding wall 8 that forms part of the wide region A, and both are jointly shaped to mate with a support surface 9 on an articulated connection piece 10, which is installed on the end of arm 7, just as shown in Fig. 2. Long region B partially hides the connection of arm 7 with profile 1, thus contributing to improve the aesthetic appearance of the assembly.

[0017] In the mentioned upper portion 8a of the wide region A, the profile that makes up the lead bar includes a longitudinal groove for fixing canvas 2 in place, which is intended to secure the front edge of canvas awning 3 (Fig. 2) by conventional means that would be well-known to an expert in the sector technique. The mentioned longitudinal groove for fixing canvas 2 has a longitudinal opening facing forward and downward for facilitating the expulsion of water, for example, rainwater, that might have penetrated into the longitudinal groove for fixing canvas 2. The mentioned front portion 8c of surrounding wall 8 that forms part of the wide region A connects, without a continuation solution, to the said long front section 8e of long region B, forming a continuous curved section from the longitudinal groove for fixing canvas 2 to the longitudinal groove for fixing canvas for securing skirt 4. In this embodiment example, the profile 1 seen in transverse section also includes a dividing wall 11 that separates the wide region A from the long region B. More specifically, the mentioned dividing wall 11 connects an interior part of the longitudinal groove for securing arm 6 to an area of the surrounding wall 8 where the mentioned front portion 8c of the wide region A and the long front region 8e of long region B are located.

[0018] Next, in relation to figures 3 to 5, the forces that intervene in the creation of torsion and flexion forces in the profile are described. In order to facilitate this explanation, a system of orthogonal coordinated axes have been established in which the X axis is parallel to the longitudinal direction of the profile and therefore parallel to the central axis E, the Y axis is horizontal and the Z axis is vertical.

[0019] Figure 3 is a diagram that illustrates the forces that intervene in the creation of a torsion force in the profile in plane Y, Z. Arms 7 are elastically loaded to push profile 1 in a direction that takes the lead bar away from the wall or structure on which the awning is installed, and the thrust of arms 7 is balanced by canvas 3 tension that is retained by the roll-up tube. A tension T is applied to the longitudinal groove for securing canvas 2, and this corresponds to the tension in canvas 3, which can be broken down into vertical tension component Tv and a horizontal tension component Th. A force F is applied to the longitudinal groove for securing arm 6, which corresponds to the thrust of arms 7, which can be broken down into vertical force component Fv and a horizontal force component Fh. The horizontal tension and force components Th and Fh constitute a pair of forces that produce torsion moment Mt.

[0020] The longitudinal grooves for securing the arm and canvas 2, 6 are arranged in the wide region A so that an imaginary line from one or the other would approximately pass through the central axis E or close to it. In a similar fashion, the distances from the longitudinal grooves for securing the arm and canvas 2, 6 to the central axis E are substantially equal. In other words, longitudinal grooves for securing the arm and canvas 2, 6 are substantially in directly opposite positions in relation to the said central axis E. In wide region A, the surrounding wall 8 defines an outline similar to a circle, or an ellipse that has two axes of similar, or not very different, lengths. This circular or elliptical outline of the mentioned wide region A is the most suitable for providing good resistance to torsion with respect to the central axis E, and it was selected for this very reason. Dividing wall 11, mentioned above, reinforces profile 1 and provides additional rigidity against any eventual strain in the wide region A produced by torsion force with respect to the central axis E.

[0021] Figure 4 is a diagram that illustrates the forces that intervene in the creation of a flexion force in the horizontal plane of profile in plane X, Y. The tension T of canvas 3 is applied in an approximately uniform fashion along the entire length of profile 1, although for greater simplicity in Figure 4, the horizontal tension component Th is shown concentrated at a central point of profile 1. On the other hand, the horizontal force components Fh of the two arms 7 are applied at the ends of profile 1. This combination of horizontal tension and force components Th and Fh produce a flexion moment in a horizontal plane Mfh in profile 1. In order to increase the resistance to flexion of the profile in the horizontal plane without losing any capacity to withstand the torsion with respect to the central axis E, the outline of the wide region A is preferable similar to an ellipse that has a horizontal axis that is slightly longer than the vertical axis. The dividing wall 11 also contributes to the reinforcement of profile 1 against flexion forces in the horizontal plane.

[0022] Figure 5 illustrates the forces that intervene in the creation of a flexion force in a vertical plane in the profile in plane X, Z. Profile 1 has its own weight Pp that is applied in an approximately uniform fashion along the entire length of

profile 1, although for greater simplicity in Figure 5, own weight Pp, which obviously acts in a vertical direction, is shown concentrated at a central point of profile 1. Own weight Pp also includes part of the weight of canvas 3. This own weight is balanced by a support resistance produced by the two arms 7. Therefore, certain vertical support resistance components Rv are applied to the ends of profile 1. This combination of own weight Pp and vertical support resistance components Rv produce a flexion moment in a vertical plane Mfv in profile 1. In order to increase the flexion resistance of profile 1 in the vertical plane without negatively affecting the torsion resistance with respect to the central axis E and to the flexion in the horizontal plane, profile 1 includes the long region B described above, which is arranged so that the mentioned mid-plane P is substantially vertical. Moreover, at the end of the long region B furthest away from wide region A, where the ends of the long front and rear sections 8e, 8f meet up, profile 1 includes a longitudinal groove for securing skirt 4 intended to secure skirt 5 (Fig. 2) by conventional means similar to the means of securing canvas 3. The mentioned longitudinal groove for securing skirt 4 has a longitudinal opening facing downwards. With this arrangement, the longitudinal groove for securing skirt 4 and the longitudinal groove for securing canvas 2 add mass to profile 1 at locations that are separated as much as possible from each other in the vertical direction and relatively close to mid-plane P in order to contribute to improve the moment of inertia of the profile against flexion in the vertical plane.

[0023] Figures 6 and 7 show another embodiment example of the lead bar of this invention, which is very similar to the embodiment example described above in relation to Figures 1 and 2, for which reason it will not be described in full. The main difference lies in the fact that long region B is longer, which makes it more appropriate for very wide awnings with a significantly longer lead bar, because it possesses greater resistance to flexion in the vertical plane. In all the embodiment examples, as is the norm, the lead bar is completed by plastic end pieces (not shown) that are fitted to the ends of the profile 1 to close off the internal cavities of the hollow profile 1 in order to prevent the accumulation of dust and other dirt and also to improve its appearance.

[0024] An expert in the material would be able to introduce variations and modifications in the described and illustrated production examples without leaving the scope of this invention as defined in the attached claims.

Claims

1. A lead bar for retractable awning of the type that is made up of a hollow profile (1) manufactured through the extrusion of a light metal alloy, and which comprises a longitudinal groove for securing the canvas (2) for fixing the front edge of a canvas (3) awning and a longitudinal arm (6) securing groove for securing the front end of at least one arm (7), **characterised in that** the said profile (1) has a transverse section with a surrounding wall (8) that defines:

    a wide region (A), in which the said surrounding wall (8) consists of upper, lower, front and rear portions (8a, 8b, 8c, 8d) located away from a central geometric axis (E); and
    a long region (B), in which the said surrounding wall (8) consists of long front and rear sections (8e, 8f), facing each other and located close to a mid geometric plane (P) between the two, with the said long region (B) projecting downwards from the said lower potion (8b) of the wide region (A) next to the front edge of the same;

    and **in that** the said longitudinal groove for securing the canvas (2) and the said longitudinal groove for securing the arm (6) are arranged respectively on the said upper portion (8a) and on the lower portion (8b) of the wide region (A) in substantially directly opposite positions in relation to the said central axis (E).

2. A lead bar, in accordance with claim 1, **characterised in that** the lower portion (8b) of the wide region (A) and the said long rear section (8f) of the long region (B) are connected together at a right, or almost right, angle forming a concavity, with the longitudinal arm securing groove (6) being formed in the said concavity.

3. A lead bar, in accordance with claim 2, **characterised in that** at least parts of the lower portion (8b) and of the said rear portion (8d) of the wide region (A) are shaped to fit with a support surface (9) of an articulated connection piece (10) that is mounted on the end of the arm (7).

4. A lead bar, in accordance with claim 1, **characterised in that** the longitudinal groove for securing the canvas (2) has a longitudinal opening facing forward and downward for facilitating the evacuation of water from the same.

5. A lead bar in accordance with any of the previous claims, **characterised in that** it comprises a longitudinal groove for fixing the canvas for securing skirt (4), for fixing skirt (5) in place, formed at one end of the long region (B) that is furthest away from the wide region (A), where the lower ends of the long front and rear sections (8e, 8f) meet up.

6. A lead bar in accordance with claim 1, **characterised in that** the said front portion (8c) of the wide region (A) is

connected without a continuation solution to the said long front section (8e) of long region (B).

7. A lead bar in accordance with any of the previous claims, **characterised in that** the outline of the wide region (A) is similar to a circle or an ellipse.

8. A lead bar in accordance with any of the previous claims 1 to 6, **characterised** because the outline of the wide region (A) is similar to an ellipse that has the horizontal axis slightly longer the vertical axis, when the said arm (7) is substantially horizontal.

9. A lead bar in accordance with any of the previous claims 1 to 6, **characterised in that** the said mid-plane (P) is substantially vertical or close to vertical when the said arm (7) is substantially horizontal.

10. A lead bar in accordance with any of the previous claims, **characterised in that** the transverse section of profile (1) also consists of a dividing wall (11) that separates the wide region (A) from the long region (B).

11. A lead bar in accordance with claim 10, **characterised in that** the said dividing wall (11) connects an interior part of the said longitudinal groove for securing arm (6) and an area of the surrounding wall (8) where there is a front portion (8c) of the wide region (A) and a front long section (8e) of the long region (B).

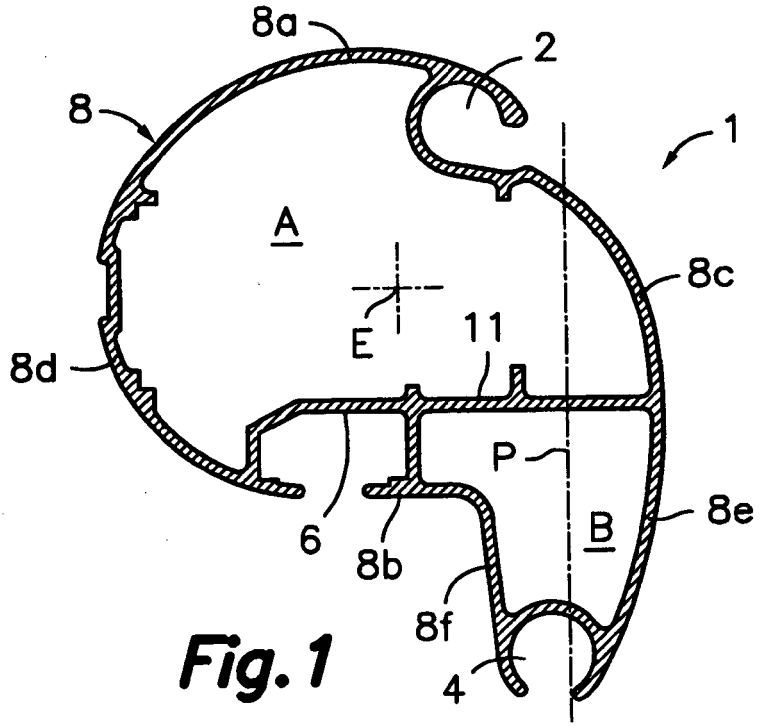

Fig.1

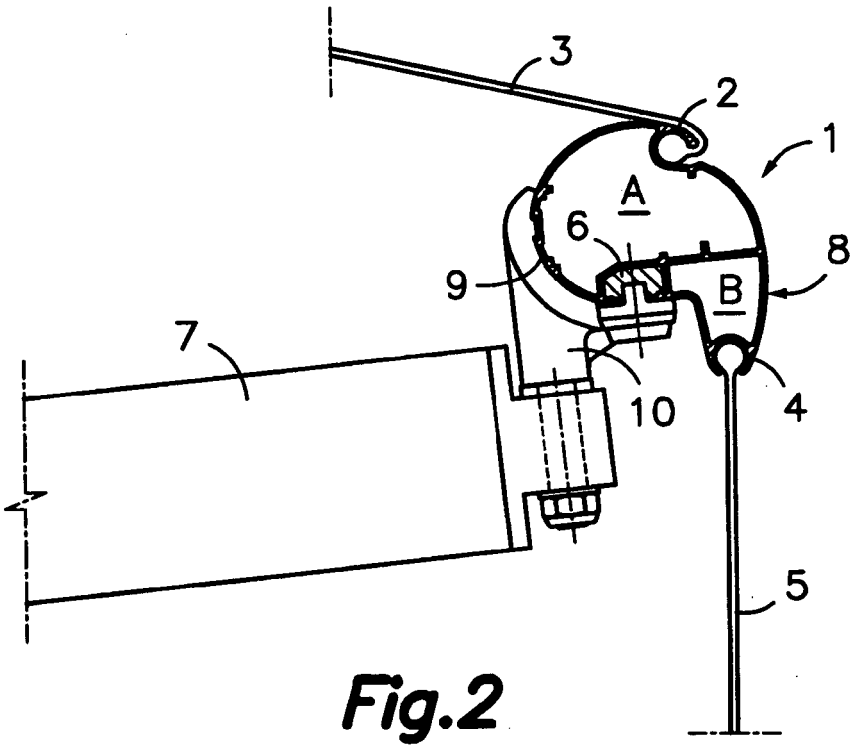

Fig.2

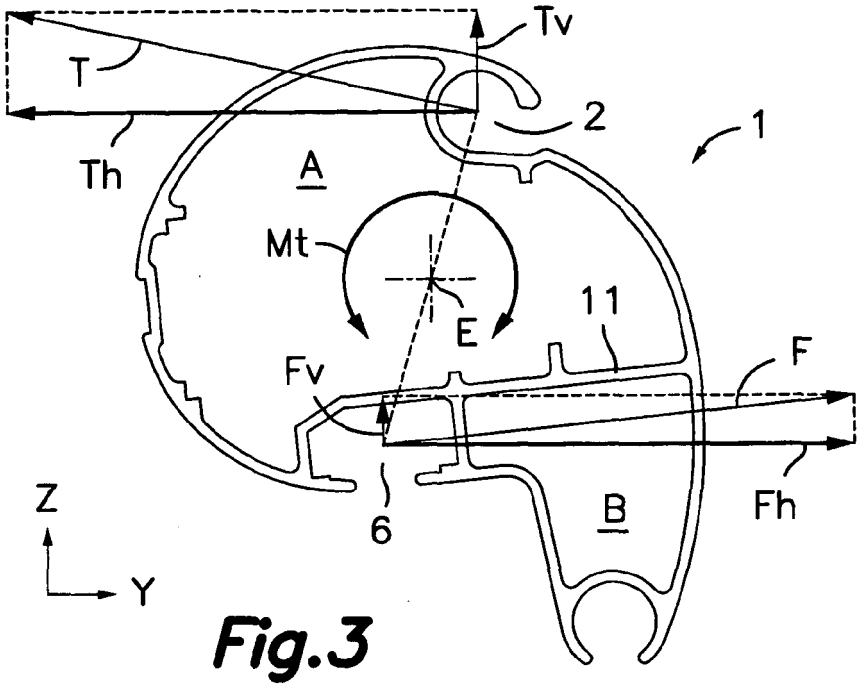

Fig.3

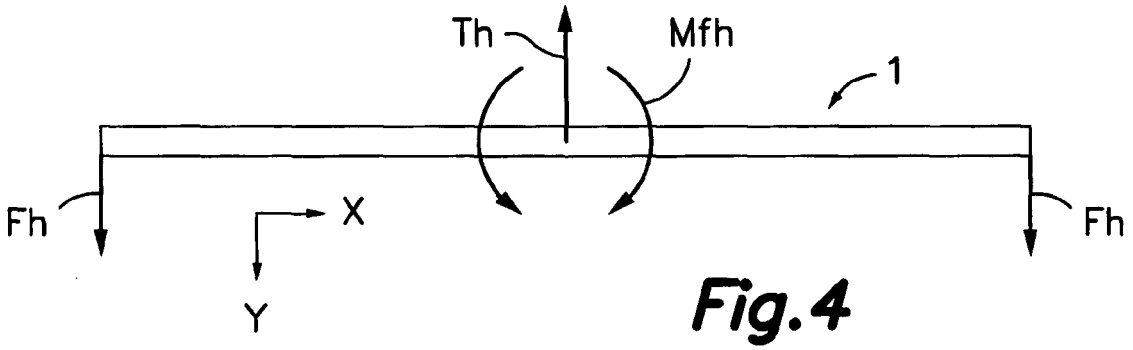

Fig.4

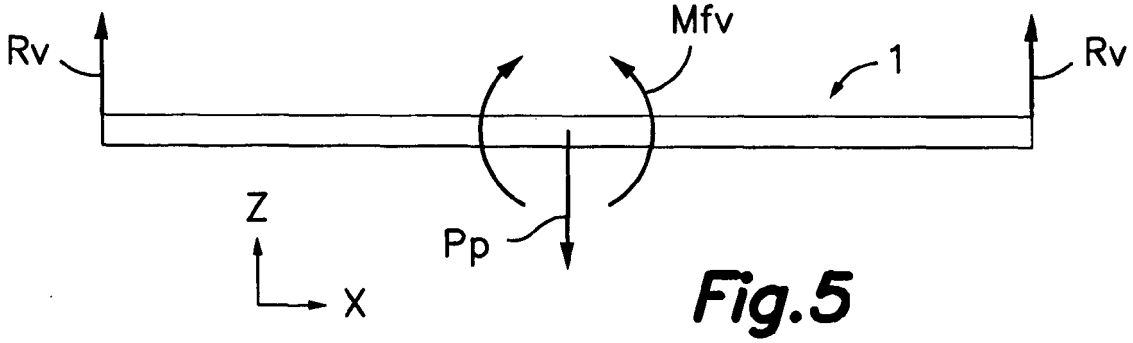

Fig.5

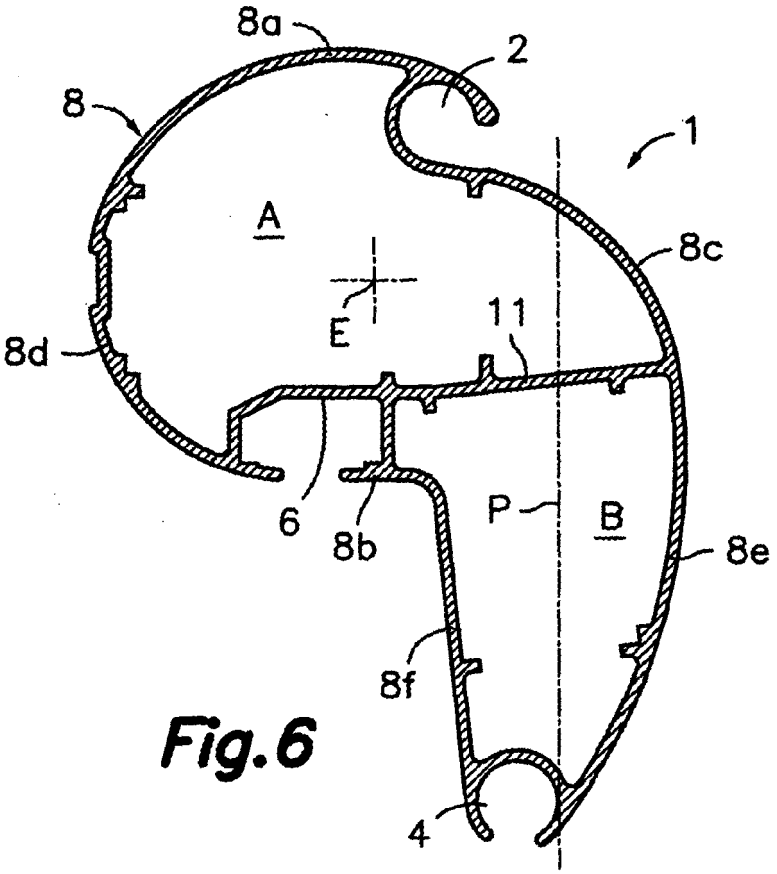

Fig.6

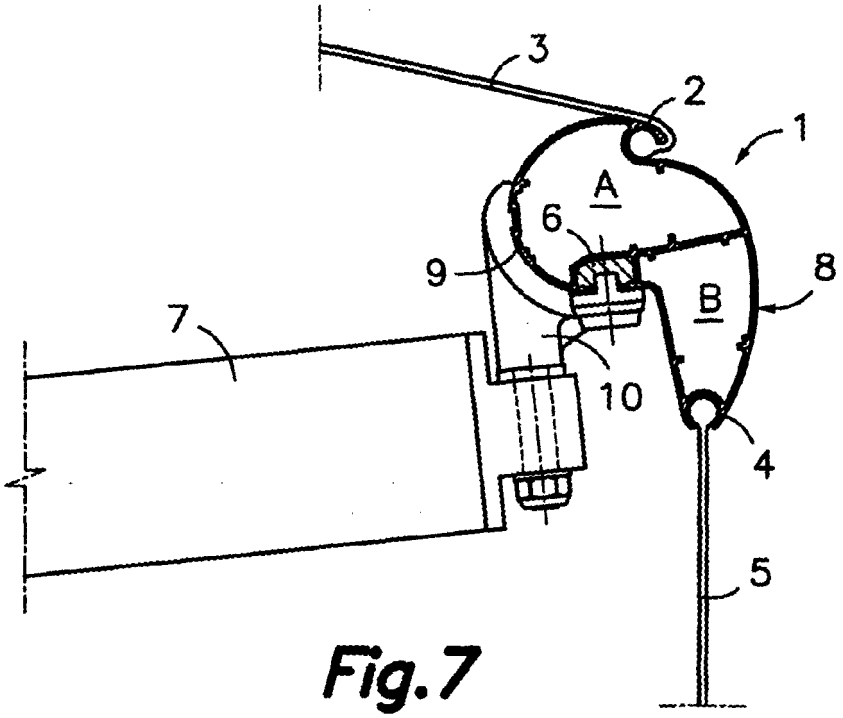

Fig.7

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EUROPEAN SEARCH REPORT

Application Number
EP 05 38 0047

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 94 03 139 U1 (STOBAG AG, MERENSCHWAND) 9 June 1994 (1994-06-09) * page 6, line 22 - line 32 * * figure 1 * -----	1-11	E04F10/06

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 July 2005	Geivaerts, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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27-07-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9403139 U1	09-06-1994	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 1031627 A **[0005]**
- FR 2335686 A **[0006]**
- ES 2029203 A **[0007]**