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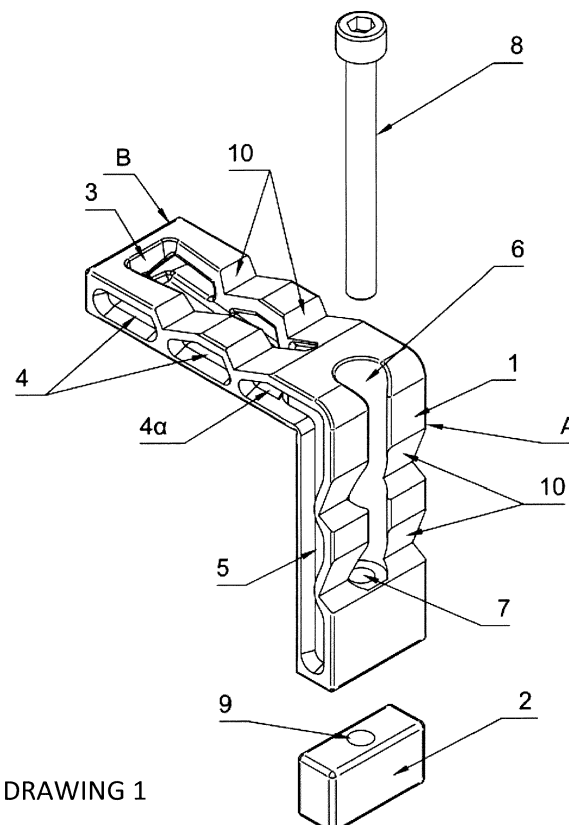
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(54) **INTERLOCK CORNER WITH PRETENSIONER FOR ALUMINIUM FRAMES**

(57) The sides of the frame are joined to each other by metal pre-tensioning angles (1) with pre-tensioning base (2), which have pre-tensioning mechanism inside them, at the same time, metal pre-tensioning blades (12) with spacer (13) are placed inside the inner chambers of the sides which make up the frame. The metal angles (1)

are screwed and the pre-tensioning bases (2) compress the metal blades (12), which, by means of the spacer (13), curve in opposite direction to the deformation of the side of the frame, thus forcing the frame to return to its original position, thereby balancing the deformation.



DRAWING 1

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Description

[0001] The invention belongs to the field of mechanics, namely to the sector of aluminium frames for doors, windows and shading systems (pergolas).

[0002] The problem encountered in aluminium frames, and in particular in the sections constituting it, is that when they are of small cross-section and/or of long length, the load they carry causes their limit of plastic deformation to be exceeded. This causes them to bend thereby creating an issue of instability to the entire mechanism of the frame. For example, in an autonomous shading system (pergola) with blinds, which has a side length of 6 metres supported (on each side) on 2 support columns, the 6 metre side features a deflection to the ground, resulting in the blinds not being able to rotate among them and the entire system is malfunctioning. Another example is the sliding frames of mosquito screens intended to be placed in doors, which frames are usually of small cross-section. Due to the elasticity of the plastic fibres from which they are made, the screens exert tension which pulls and deforms the vertical profiles of the frame.

[0003] The current state of the art solves today the problem of deformation of aluminium frames in various ways. A sturdy metal core of any cross-section is placed inside frames with a cross-section that allow it. Another solution is to place an external pre-tensioning system with wire ropes.

[0004] A solution to the problem is indicated in EP 0837213 A2, wherein a rigid core (Figure 4) is placed inside the frame and a pulley interlock angle is also used (Figures 1-3). Document CN102434080 also proposes a solution with an angle-locking spring and inner core.

[0005] Moreover, the currently used technique often involves gluing metallic corners to the connection points of the sides of the frame. However, these corners do not solve the problem of deformation of the sides, because their function is to simply achieve a correct angular connection without enhancing the cross-section of the sides of the frame. The corners in the currently used technique bear grooves in which the glue is placed and flows. The grooves diffuse the glue into all the gaps between the angle and aluminium profile, the glue dries and the system is thus stabilised. No interference between the angle and profile is subsequently possible.

[0006] This problem of non-deformation of the sides of the frame is solved by the present invention, which constitutes an interlock angle with a pretensioner, and briefly consists of: The sides that make up the frame are joined together by metallic angles. All angles or some of them have a pre-tensioning mechanism inside, while pre-tensioning metal blades are placed in the interior chambers of the sides that make up the frame. The metal angles with their pre-tensioning mechanism compress the metal blades, which, by means of a spacer, curve in a direction opposite to the deformation of the side of the frame, forcing it to return to its original position, thereby balancing the deformation.

[0007] The present invention of a pre-tensioning-interlock angle has grooves which spread the glue over and around the surface of the angle so that the angle is glued to the profile, but the grooves are such that the adhesive does not enter the part of the angle bearing the pre-tensioning mechanism. This allows the pre-tensioning mechanism to be inspected and screwed after the glue has dried.

[0008] An advantage of the present invention is that it is placed in small narrow cross-sections, which are reinforced and gain stiffness, even without the need for additional space, since the invention adapts inside them.

[0009] An advantage of the present invention is also that the incorporation inside the profile protects the mechanism from wear, rust, etc.

[0010] A further advantage is that thanks to the stability it offers in the aluminium frame, it allows the possibility to reduce the required support columns, especially to the autonomous shading systems (pergolas).

[0011] The drawings accompanying this invention briefly present the following: Drawing 1 illustrates the interlock angle with pretensioner, disassembled. Drawing 2 illustrates the interlock angle with pretensioner (Figure 2a), two internal side views (Figures 2b and 2c), plan view (Figure 2d) and isometric view (Figure 2e).

[0012] Drawing 3 illustrates a stable, autonomous screen frame, in which the interlock angle with pretensioner and the pre-tensioning blade mounted is placed. In detail, a broken-out section view depicts the inside of the chamber with the interlock angle and pre-tensioning blade.

[0013] Drawing 4 illustrates the metal blade with the spacer member in its middle and two support-angles with pretensioner at its two ends, in the side of the frame, with the spacer positioned towards the outside (Figure 4a) and the inside (Figure 4b) of the frame. It also illustrates the case of mounting a single angle with pretensioner at the lower end of the side with a classic metal angle at the upper edge of the side (Figure 4c).

[0014] As illustrated in Drawings 1 and 2, the interlock corner with pretensioner comprises a pre-tensioning angle (1) and a pre-tensioning base (2).

[0015] The pre-tensioning angle (1) on the surface of one side, side A, has a formed recess (6) which ends in a through-hole (7) with an internal thread. A pre-tensioning screw (8) is screwed into the hole (7), the end of which is screwed into the hole (7) and exits it and cooperates with the pre-tensioning base member (2), seating on a blind cylindrical recess (9) provided with the base (2). Thus, the angle (1) cooperates with the base (2) in such a way that the rotary movement of the pre-tensioning screw (8) is converted into linear movement of the pre-tensioning base (2) longitudinally (Figures 2a, 2b, 2c, 2a).

[0016] The angle (1), on the surface of the other side, side B, has a formed cavity (3) into which the glue is placed. The cavity (3) does not communicate with the formed recess (6) of side A. On both sides of the cavity (3) there are sequential openings (4); the last opening

(4a) leads to a groove (5) which runs along the angle (1) at its sides externally along the remainder of side B and continues and runs externally along the entire side A. With this configuration of openings, it suffices for the glue to be placed only in the cavity (3) and then through the side openings (4) it flows and covers the entire surface of side B. At the same time, through the last side opening (4a) the glue is fed in the groove (5) which runs along the entire angle (1) at its outer sides and does not enter the formed recess (6) in which the screw (8) moves.

[0017] Then, as illustrated in Drawings 3 and 4, the aluminium profiles (11a and 11b) are "slidably" inserted in both sides of the angle (1). The angle has triangular section notches (10) on both sides A and B. The aluminium profiles (11a and 11b) are pressed onto the notches (10) of the angle (1) using correspondingly formed blades. On the sides of the profile in which a large reinforcement is needed, the angle (1) is inserted from both ends, with the side A together with the pre-tensioning base (2) (Figures 4a and 4b). On the sides of the profile where no great reinforcement is needed, a combination of angles may be used so that from one end of the profile side the angle (1) with the side A and the pre-tensioning base (2) is inserted, while from the other end of the profile side the angle with side B is inserted, or a classic metal angle is inserted without the pretensioner (Figure 4c).

[0018] In the inner chamber of these profiles and between the two angles (1) of its ends, a metal blade (12) is placed with a spacer (13) in its middle. The blade (12) is slidably inserted into the interior of the frame, with the spacer (13) facing towards that side of the frame, which in the future will undergo the force that will cause undesirable curvature of the profile (Figure 4). The spacer member (13) fixed to the middle of the blade (12) will prevent the blade from curving towards the side where the deforming force will be exerted, and once, whilst the frame is placed in the space of use, the force will be exerted, the spacer member (13) thereby will lead the blade (12) to curve in a direction opposite to the curvature obtained by the profile due to the load. Thus, if, for example, one side of the frame is to be curved outwardly, the spacer (13) of the blade (12) is positioned towards the outside of the frame (Figure 4a), while if one side is to curve inwardly, the spacer (13) of the blade (12) is positioned inwardly of the frame (Figures 4b and 4c). In this way, the blade (12), thanks to the spacer (13), already at the stage of construction of the frame, creates a curvature predisposition to the profile that is opposed to the curvature that the profile will acquire when it becomes loaded.

[0019] The length of the blade (12) is equal to the length of the side, after removing the lengths of the sides A and the bases (2) of the two angles (1) inserted from the two ends of the side. If only one angle with pre-tensioning base (2) is used at one end of the side while the other uses a simple metal angle, the length of the blade (12) shall be equal to the length of the side minus the two angles and the pre-tensioning base (2) which is present

in only one of them.

[0020] The frame is immobilised to dry and stabilise the glue. As the cavity (3) of side B of the angle (1), the cavity (3) into which the glue is placed, does not communicate with the formed recess (6) of side A of the angle (1) wherein the screw (8) is placed and moves, the glue applied to the cavity (3) of side B cannot enter the cavity (6) of the screw (8) of side A. Thus, the screw (8) is free to move. Nonetheless, the glue spreads and covers all voids and cavities between the sides of the angle (1) on both sides and the profiles thanks to the side openings (4 and 4a) and thanks to the groove (5) running through the entire angle (1) along its outer sides.

[0021] Then, once the glue dries, the frame is placed in the space. Depending on the load to be received, the side needing reinforcement may be deformed and lose the desired straightness. For this reason, by drilling the frame, it is easy to access the screw (8) of the angle (1). The screw is screwed, the rotary movement of the pre-tensioning screw (8) is transformed into a linear movement of the pre-tensioning base (2), longitudinally. The pre-tensioning base (2) compresses the metal blade (12) which is curved. The spacer member (13) fixed to the middle of the blade (12) prevents the blade from curving towards the side where the deforming force is already exerted and causes the blade (12) to curve in a direction opposite to the curvature obtained by the profile due to the load.

[0022] The pre-tensioning exerted depends every time on the deformation of the frame side. The pre-tensioning screw (8) of the pre-tensioning angle (1) at the end of the frame side is screwed until the side or sides of the frame return to their original rectilinear shape. The sides of the frame, where great deformation can occur, have angles with pretensioners at both ends, whereby both pre-tensioning screws (8) are screwed to cause even greater compression of the blade (12) and correction of the deformation.

[0023] The invention is applicable to all aluminium frames which, due to the length of the metal frames, in combination with their cross-section and weight, curve, as for example in automatic shading systems (pergolas with blinds), or curve due to another cause, such as the sliding frames of mosquito screens, which curve due to the intensity of the plastic elastic screen, etc.

Claims

1. An interlock corner with pretensioner (1) having on the surface of both sides A and B, triangular section notches (10), a formed cavity (3) on the surface of side B and at the sides of the cavity (3) openings (4), **characterised by** the fact that on side A of the angle

- there is a formed recess (6) which ends in a through-hole (7) with an internal thread,

- a pre-tensioning screw (8) is screwed and exits through the through-hole (7)
- the pre-tensioning screw (8) cooperates with a pre-tensioning base member (2) with a blind cylindrical recess (9),

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on side B of the angle

- there is at the side of the cavity (3) a last opening (4a) leads to a groove (5) which runs along the angle (1) at its sides externally along the remainder of side B and continues and runs externally along the entire side A of the angle (1),

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by the fact that the cavity (3) of side B does not communicate with the formed recess (6) of side A, and by the fact that the rotational movement of the pre-tensioning screw (8) is converted into a linear movement of the pre-tensioning base (2) along its length, and the pre-tensioning base (2) presses a metallic blade (12) bearing at its middle a spacer (13).

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2. Interlock angle with a pretensioner (1) according to claim 1, **characterised by** the fact that the spacer (13) is placed on the blade (12), to the side of the frame in which the force which will cause curvature of the profile is exerted.

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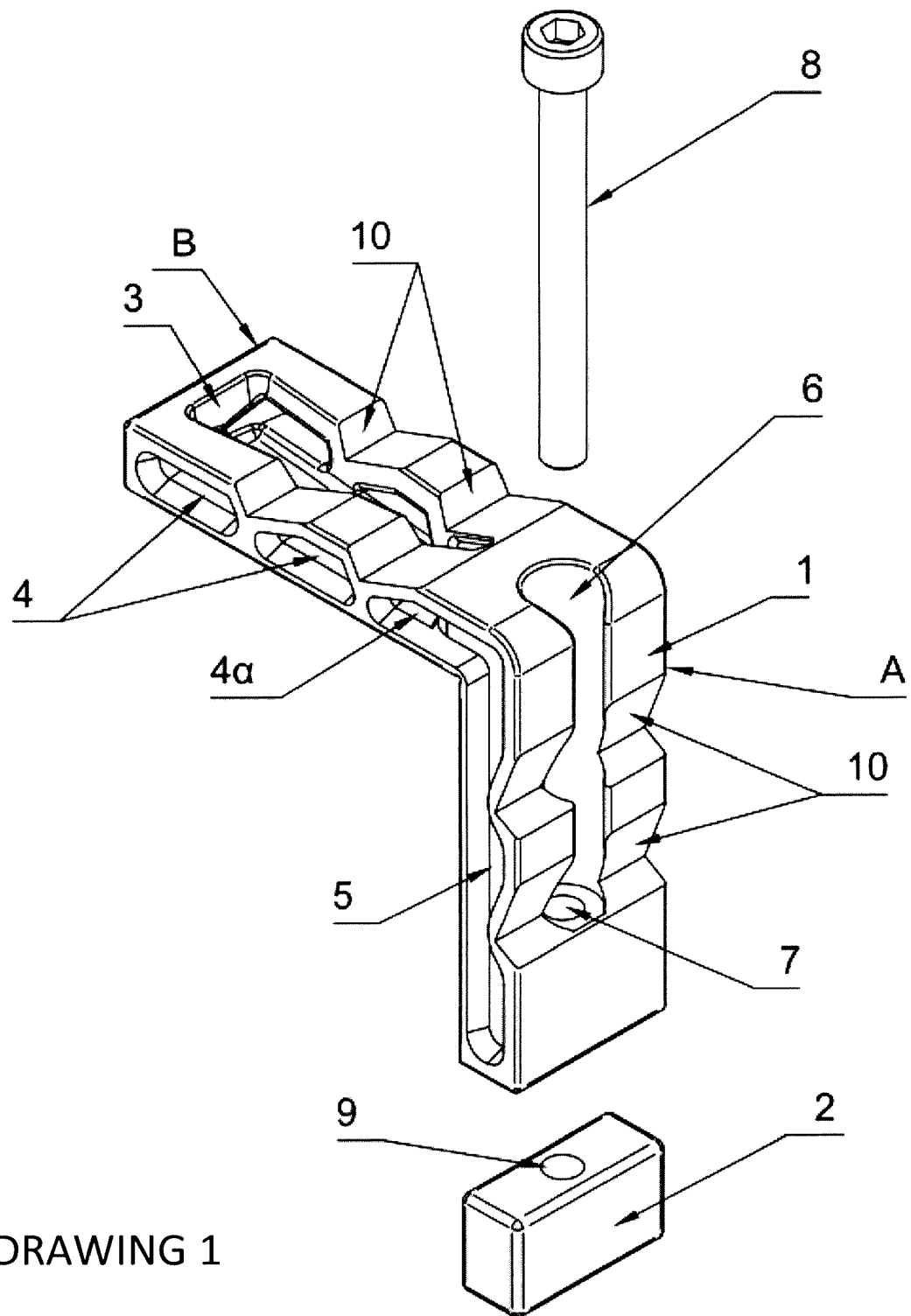
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DRAWING 1

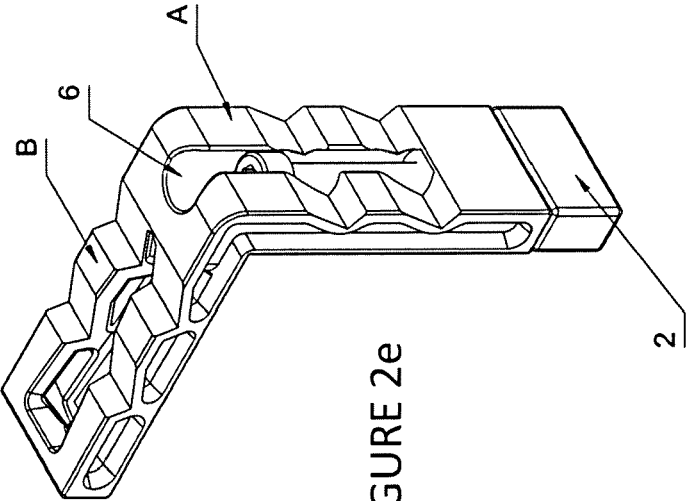


FIGURE 2e

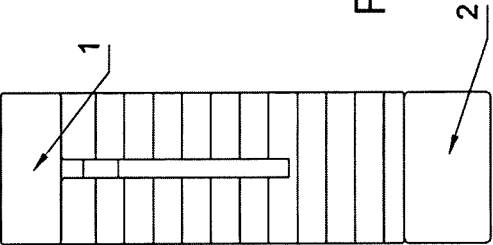


FIGURE 2b

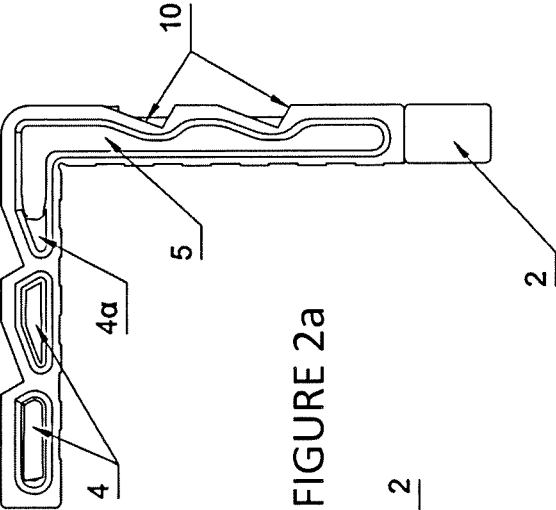


FIGURE 2a

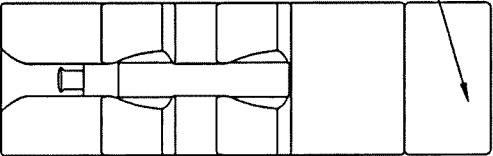


FIGURE 2c

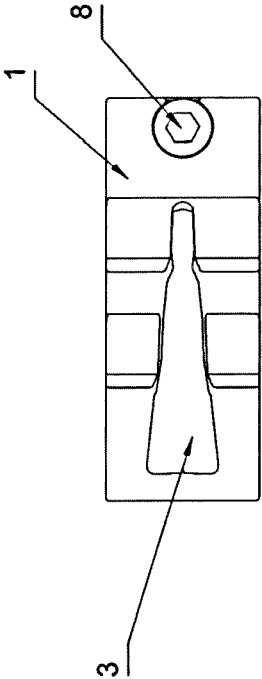
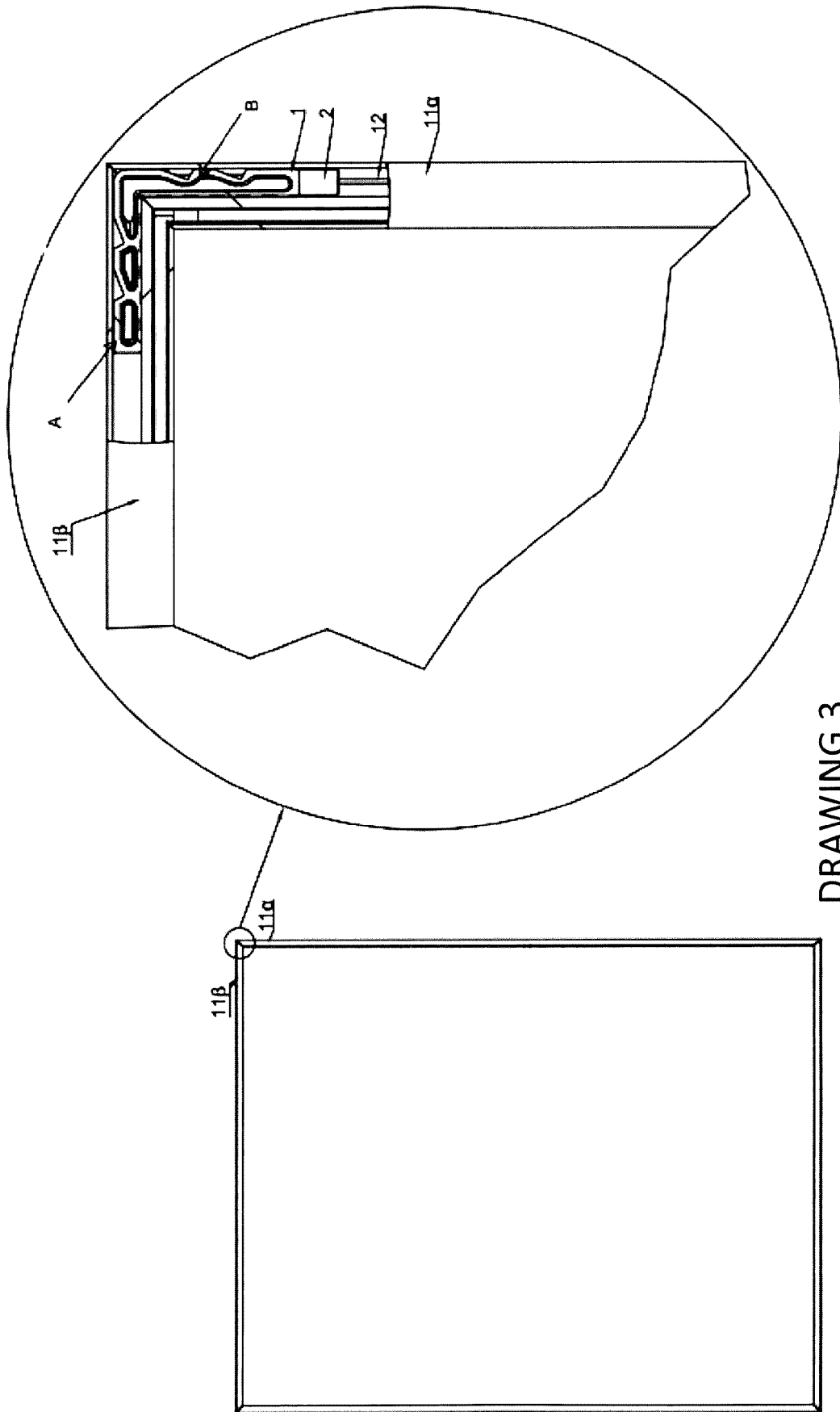


FIGURE 2d

DRAWING 2



DRAWING 3

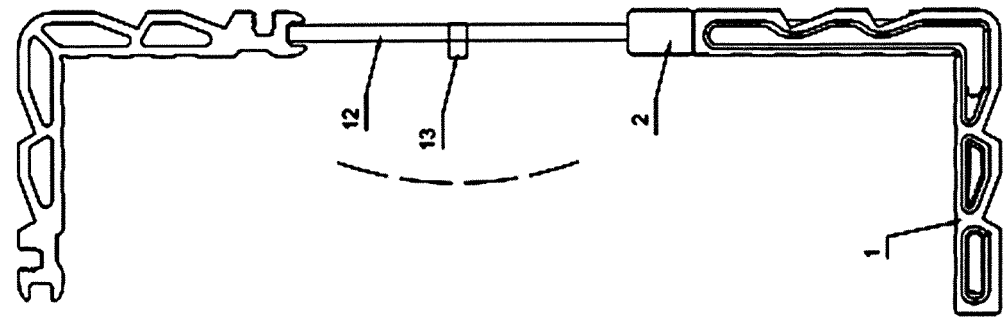


FIGURE 4c

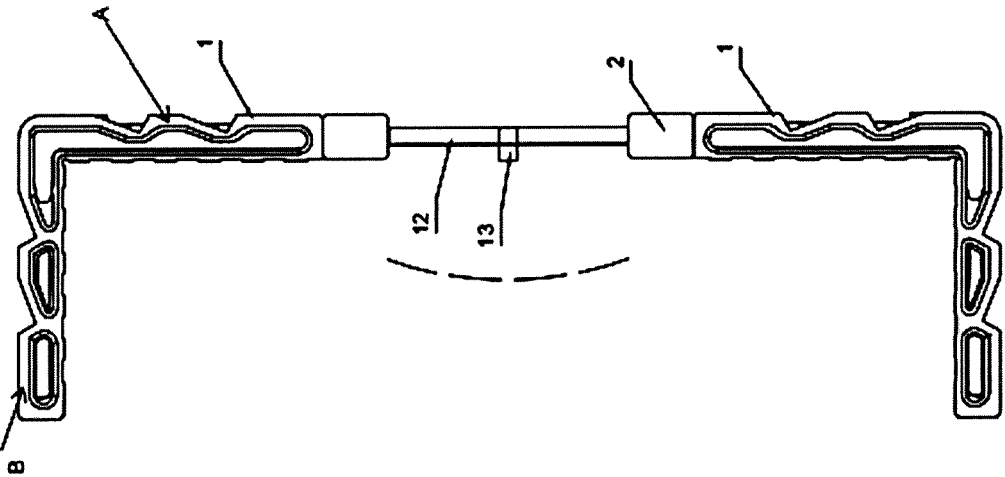


FIGURE 4b

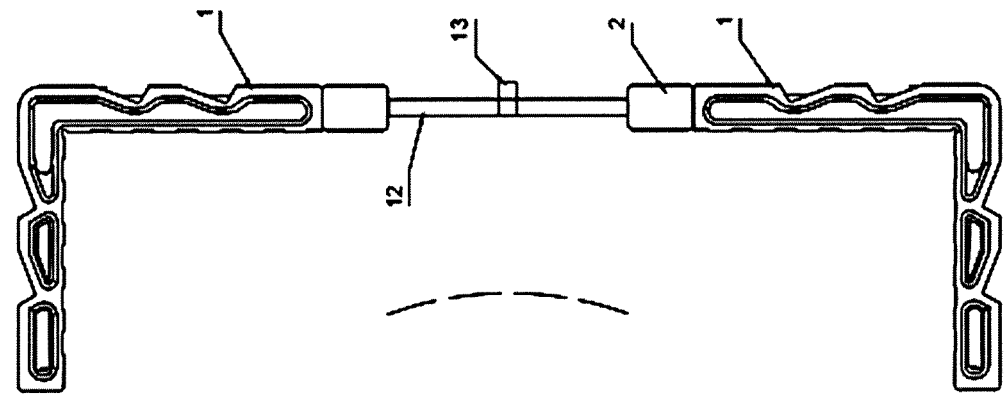


FIGURE 4a

DRAWING 4



EUROPEAN SEARCH REPORT

Application Number
EP 19 38 6012

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Place of search The Hague		Date of completion of the search 8 August 2019	Examiner Blancquaert, Katleen
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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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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