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(54) **A device used to tighten and align corner sections in coplanarity condition.**

(57) A device (1) used to tighten and align corner sections in coplanarity condition is disclosed, comprising a main body (2) composed of two plate portions disposed

at right angle, and two trolleys (4) removably connected to said main body (2) by means of bridges (5) of breakable material.

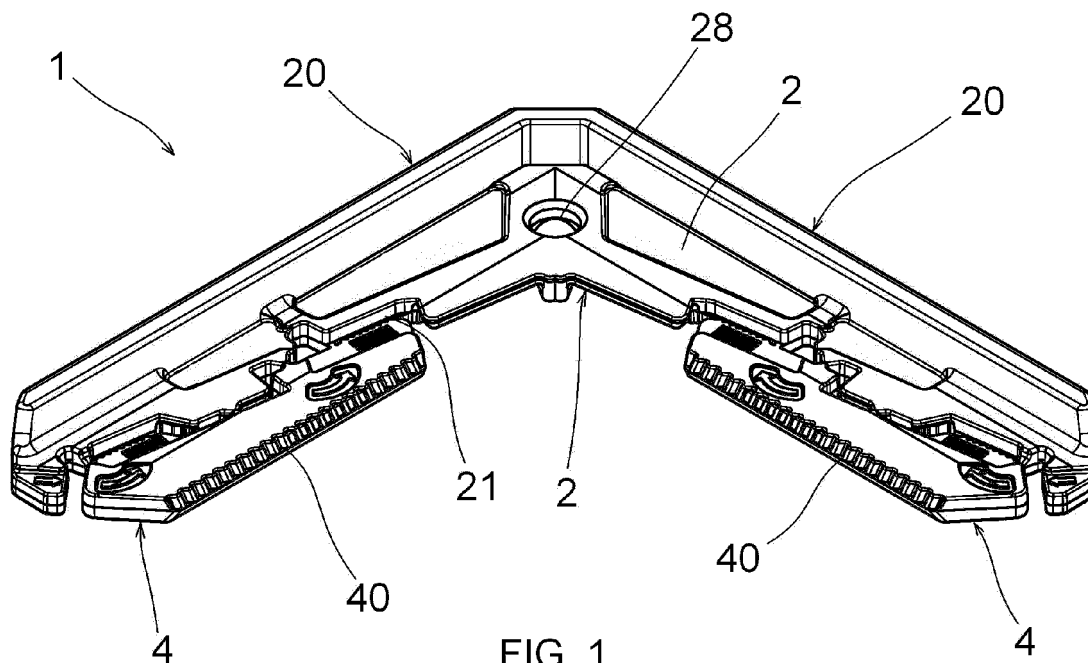


FIG. 1

Description

[0001] The present patent application for industrial invention relates to the technical sector concerning the fabrication of frames by interconnecting prefabricated sections, in particular to manufacture windows and doors.

[0002] In the manufacturing technology of frames for windows and doors, frames are manufactured by connecting several section elements in angular position. Nevertheless, in the angular junction areas it is difficult to respect the continuity and coplanarity of the external surfaces of the sections.

[0003] To solve such inconvenience, tightening and aligning apparatuses are known in the form of squares inserted in the angular junction area of the sections and forced against the borders of the sections, in such manner to restore coplanarity of the external surfaces of the sections.

[0004] Such a tightening and aligning apparatus is disclosed in patent EP 1 048 816 in the name of the same applicant. Said apparatus comprises a square and two eccentric rotors acting as cams that are revolvingly engaged in the body of the square. Pressure is exerted on the borders of the profiled elements by rotating the rotors with a tool. However, said apparatus is impaired by the fact that it is made of three pieces that require proper assembly. Moreover, the contact surface between the cams of the rotors and the borders of the profiled elements is very limited.

[0005] Patent BE 1018055 discloses an apparatus comprising a main body composed of two plate portions at right angle associated with two wedges sliding with respect to said main body and adapted to determine said tightening and aligning action.

[0006] Said sliding wedges are associated with the main body by means of coupling means of mortise and tenon joint type, adapted to let said wedges slide with respect to the main body.

[0007] Also patent BE 1018055 discloses an apparatus made of three pieces that are molded separately and then assembled and connected by means of said coupling means of mortise and tenon joint type.

[0008] Only after such assembly operation, the apparatus can be positioned in correspondence of the angle formed by the profiled elements used to manufacture the window frame.

[0009] The purpose of the present invention is to eliminate the drawbacks of the prior art, by devising a tightening and aligning device that is practical, versatile and simple to install and use.

[0010] Another purpose of the present invention is to devise such a tightening and aligning device that is effective, efficacious and reliable.

[0011] A further purpose of the present invention is to devise such a tightening and aligning device with reduced thickness.

[0012] These purposes have been achieved according to the invention, with characteristics claimed in independent claim 1.

ent claim 1.

[0013] Advantageous embodiments appear from the dependent claims.

[0014] The tightening and aligning device according to the invention comprises a main body composed of two plate portions disposed at right angle, and two trolleys removably connected to said main body by means of bridges of breakable material.

[0015] Each plate portion of the main body comprises an external border adapted to rest against a first longitudinal rib of a section and an internal border facing towards a second rib of the section.

[0016] Each trolley is composed of a plate provided with an internal border facing towards the internal border of the body in order to slide on it, and an external border facing towards said second rib of the section.

[0017] The internal border of the body is tilted by an angle with respect to the external border and the internal border of the trolley is tilted by the same angle with respect to the external border of the trolley. So, during the sliding of the trolley, the external border of the trolley moves away from the external border of the body, remaining parallel to the external border of the body and exerting pressure on the second rib of the section, in such manner to restore coplanarity of the two joined sections.

[0018] The advantages of the device of the invention are evident. In fact, said device is initially made of a single piece that can be easily and rapidly assembled in angularly connected sections.

[0019] The breakage of the bridges is easily and rapidly obtained with the tip of a tool, such as a screwdriver, positioned between trolley and body, pushing the trolley.

[0020] The external border of the trolley is sufficiently long to provide a large contact surface between the trolley and the second longitudinal rib of the section.

[0021] Further characteristics of the invention will appear more evident from the detailed description below, which refers to a merely illustrative, not limitative embodiment, illustrated in the attached drawings, wherein:

Figs. 1 and 2 are respectively a perspective view and a top view of the aligning device of the invention;

Fig. 2A is a view of a detail of Fig. 2 showing an exploded trolley;

Fig. 2B is an enlarged view of a detail of Fig. 2A, showing the serrated or notched surfaces of the trolley;

Fig. 3 is a sectional view along plane III-III of Fig. 2;

Figs. 4 and 5 are respectively a perspective view and a bottom view of the aligning device of the invention;

Fig. 5A is a view of a detail of Fig. 5 showing an exploded trolley;

Fig. 5B is an enlarged view of a detail of Fig. 5A, showing the serrated or notched surfaces of the body;

Fig. 6 is a perspective view of the aligning device of Fig. 1 mounted on an angular junction of two sections of a frame;

Fig. 7 is a sectional view of a detail of Fig. 6 showing a section on which the aligning device is assembled; Figs. 8A, 8B and 8C are the same views as Fig. 6 showing three consecutive assembly operations of the device of the invention;

Figs. 9 and 10 are a top and a bottom view showing a portion of the aligning device of the invention, in tightened condition;

Fig. 11 is the same view as Fig. 7, except for the fact that it shows the device in tightened condition;

Figs. 12 - 15 are four views showing four tightening operations of the device.

[0022] Referring to the figures, the aligning device of the invention is disclosed, generally indicated with numeral (1). The aligning device (1) comprises a main body (2) and two trolleys (4) rigidly connected to the main body by means of bridges (5) that can be removed to let the trolleys (4) move with respect to the body (2). The main body (2) and trolleys (4) are made of the same material that, for example, can be a metal material. In such a case, the bridges (5) are thin weld spots made of the same material as body (2) and trolleys (4).

[0023] The main body (2) is shaped as a square comprising two plate portions disposed at right angle. The main body (2) comprises an external border (20) and an internal border (21). The external border (20) is made of rectilinear ribs disposed at right angle.

[0024] As shown in Figs. 2A and 5A, the internal border (21) is tilted with respect to the external border (20) by an angle (α) from 5° to 10°, preferably 8°.

[0025] The two trolleys (4) are identical and each trolley (4) is shaped as a basically rectangular plate having the same thickness as the main body. Each trolley (4) has a slightly higher length than half length of each portion of the main body (2).

[0026] Each trolley (4) comprises a rectilinear external border (40) and an internal border (41) adapted to face towards the internal border (21) of the main body. Advantageously, the external border (40) of the trolley is serrated or notched.

[0027] As shown in Figs. 2A and 5A, the internal border (41) of the trolley is tilted with respect to the external border (40) by the same angle (α) defined between external border (20) and internal border (21) of the main body. In such a way, when the internal border (41) of the trolley is in contact with the internal border (21) of the main body, the external borders (20, 40) of body and trolley are parallel.

[0028] The internal border (41) of each trolley (4) is connected with the internal border (21) of the main body by means of thin bridges (5) that can be broken easily, in such manner to separate the trolley (4) from the main body. Advantageously, four bridges (5) are provided for each trolley (4).

[0029] Fig. 6 shows two rectilinear sections (7) joined at right angle along a junction line (70). Also referring to Fig. 7, each section (7) is provided with a longitudinal

channel (71) defined between a first rib (72) and a second rib (73).

[0030] When the trolley (4) is fixed to the body (2) by means of bridges (5), the distance between the external border (20) of the body and the external border (40) of the trolley is lower than the width of the channel (71) of the sections. In such a way, the aligning device (1) can be disposed in the channels (71) of the sections in transversal direction to the plane of lay of the sections, after joining the sections.

[0031] Referring to Figs. 2A and 5A, each plate portion of the main body (2) comprises two retaining fins (22) that protrude from the internal border (21) according to a plane parallel to the plane of lay of the body (2). The retaining fins (22) are rectangular and spaced. The fins (22) have an upper surface flush with the upper surface of the body (2) (see Fig. 2A) and a lower thickness with respect to the thickness of the body (2), in such manner to form a step (23) (Fig. 5A), basically parallel to the internal border (21). Advantageously, the step (23) is provided with serrated or notched surface.

[0032] On the lower surface of the fins (22) notches (24) are obtained (Fig. 5B) along lines orthogonal to the internal border (21).

[0033] Referring to Fig. 5, in the proximity of the end of each plate portion (2), on the internal border (21) a first notch (25) is obtained, continuing with a groove (G1) defined between an oblique border (45) of the trolley (4) and an oblique border (35) of the body. The groove (G1) is adapted to receive the tip of a tool, such as a screw-driver (8) (as shown in Figs. 8A and 12).

[0034] Still referring to Fig. 5, in the central part of the internal border (21), between the two fins (22), a second notch (26) is obtained, in correspondence of a corresponding notch (46) obtained in the trolley, in such manner to generate a second groove (G2) extending from the notch (26) of the body to the notch (46) of the trolley.

[0035] Each trolley (4) comprises two retaining fins (42) that protrude from the internal border (41). The retaining fins (42) are rectangular and spaced. The fins (42) have a lower surface flush with the upper surface of the trolley (4) (see Fig. 5A) and a lower thickness with respect to the thickness of the trolley (4), in such manner to form a step (47) (Fig. 2A), basically parallel to the internal border (41).

[0036] So, the fins (42) of the trolley can slide under the fins (22) of the body, preventing the possible raising of the trolley with respect to the body.

[0037] On the border of the fins (42) a serrated surface (43) is obtained to cooperate with the serrated surface (23) of the body (2).

[0038] On the upper surface of the fins (42) notches (44) are obtained (see Fig. 2B) disposed along lines orthogonal to the internal border (41), adapted to cooperate with the notches (24) of the body (2).

[0039] On the border of a fin (42) of the trolley the notch (45) is provided and disposed in register with the notch (25) of the body, in such manner to form a stop surface

for the tip of a tool.

[0040] Referring to Figs. 1, 2, 4 and 5, the body (2) comprises a central through hole (28) disposed in the proximity of the corner between two plate portions, for injection and passage of glue or other waterproofing and/or sealing material. Referring to Fig. 5, on the lower surface of the body (2) channels (29) are obtained in communication with the central hole (28) to distribute glue in strategic points of the device, in such manner to obtain perfect sealing of the device to the section.

[0041] Referring to Figs. 8A, 8B, 8C and 12 - 15, the assembly of the device (1) is disclosed.

[0042] Referring to Figs. 8A and 12, after positioning the device (1) in the channels of the sections (7), the tip (8) of a screwdriver is inserted in the first groove (G1) between body and trolley and the screwdriver is rotated in the direction of the arrow (F1) (Fig. 13), in such manner to push the trolley (4) and break the bridges (5). So, the second groove (G2) is enlarged to insert the tip (8) of the screwdriver.

[0043] Referring to Figs. 8B and 14, the tip (8) of a screwdriver is inserted in the second groove (G2) between body and trolley and the screwdriver is rotated in the direction of the arrow (F2) (Fig. 15), in such manner to make the internal border (41) of the trolley (4) slide on the internal border (21) of the body (2). Considering that the internal borders (21, 41) of body and trolley are tilted by an angle (α) with respect to the external borders (20, 40), the external border (40) of the trolley moves away from the external border (20) of the body, in parallel position.

[0044] Consequently, as shown in Fig. 11, the external border (20) of the body is engaged against the first longitudinal rib (72) of the section and the serrated or notched surface of the external border (40) of the trolley presses against the second rib (73) of the section, favoring planarity in the junction between the two sections (7).

[0045] As shown in Figs. 9 and 10, during the movement of the trolley (4), the fins (42) of the trolley go under the fins (22) of the body, preventing the trolley from raising and being overturned. Moreover, the serrated or notched surfaces (43, 44) of the trolley are engaged against the serrated or notched surfaces (23, 24) of the body, thus avoiding the backward travel of the trolleys (4) and consequently the loosening of the device after tightening.

[0046] Finally, when tightening is completed, as shown in Fig. 8C, glue is injected in the hole (28) of the body, in such manner to seal the device perfectly.

[0047] Numerous variations and modifications within the reach of an expert of the art can be made to the present embodiment of the invention while still falling within the scope of the invention described in the enclosed claims.

Claims

1. A device (1) used to tighten and align corner sections in coplanarity condition, comprising a main body (2) composed of two plate portions disposed at right angle, wherein each plate portion comprises an external border (20) adapted to rest against a first longitudinal rib (72) of section (7) and an internal border (21) facing towards a second rib (73) of the section, **characterized by** the fact that it comprises two trolleys (4) removably connected to said main body (2) by means of bridges (5) of breakable material, each trolley being composed of a plate provided with internal border (41), facing towards the internal border (21) of the body in order to slide on it, and external border (40) facing towards said second rib (73) of the section, wherein the internal border (21) of the body is tilted by an angle (α) with respect to the external border (20) and the internal border (41) of the trolley is tilted by the same angle (α) with respect to the external border (40) so that, during the sliding of the trolley (4), the external border of the trolley moves away from the external border (20) of the body, remaining parallel to the external border (20) of the body.
2. A device as claimed in claim 1, **characterized in that** said angle (α) is comprised between 5° and 10°.
3. A device as claimed in claim 1 or 2, **characterized in that** each plate portion of the body (2) comprises at least one retaining fin (22) that protrudes from the internal border (21) along a plane parallel to the plane where the body lies and each trolley (4) comprises at least one retaining fin (42) that protrudes from the internal border (41) in such a way to be disposed under said retaining fin (22) of the body during the sliding of the trolley.
4. A device as claimed in claim 3, **characterized in that** each plate portion of the body (2) comprises two spaced rectangular retaining fins (22) and each trolley (4) comprises two spaced rectangular fins (42).
5. A device as claimed in any one of the preceding claims, **characterized in that** said trolley (4) has serrated or notched surfaces (43, 44) that cooperate with corresponding serrated or notched surfaces (23, 24) provided in the body (2) to prevent the trolley (4) from loosening with respect to the body.
6. A device as claimed in claims 4 and 5, **characterized in that** said serrated or notched surfaces (43, 44) of the trolley are obtained on the border of the fins (42) and/or on the lower surface of the fins (42) and said serrated or notched surfaces (23, 24) of the body are obtained on the internal border of the body under the

fins (22) and/or on the lower surface of the fins (22).

7. A device as claimed in any one of the preceding claims, **characterized in that** the external border (40) of said trolley is provided with serrated or notched surface (40) to grip said second longitudinal rib (73) of the section. 5
8. A device as claimed in any one of the preceding claims, **characterized in that** each plate portion of said body (2) is provided with at least one notch (25, 26) obtained on the internal border (21) in such a way to define at least one groove (G1, G2) between body and trolley to receive the tip (8) of a tool. 10 15
9. A device as claimed in claim 8, **characterized in that** each plate portion of said body (2) is provided with two notches: a first notch (25) situated near the end, defining a first groove (G1) and a second notch (26) situated in a central part, defining a second groove (G2). 20
10. A device as claimed in any one of the preceding claims, **characterized in that** said body (2) comprises at least one through hole (28) in communication with channels (29) obtained on the lower surface of the body (2) to allow for injection and distribution of glue or other waterproofing and/or sealing material. 25 30

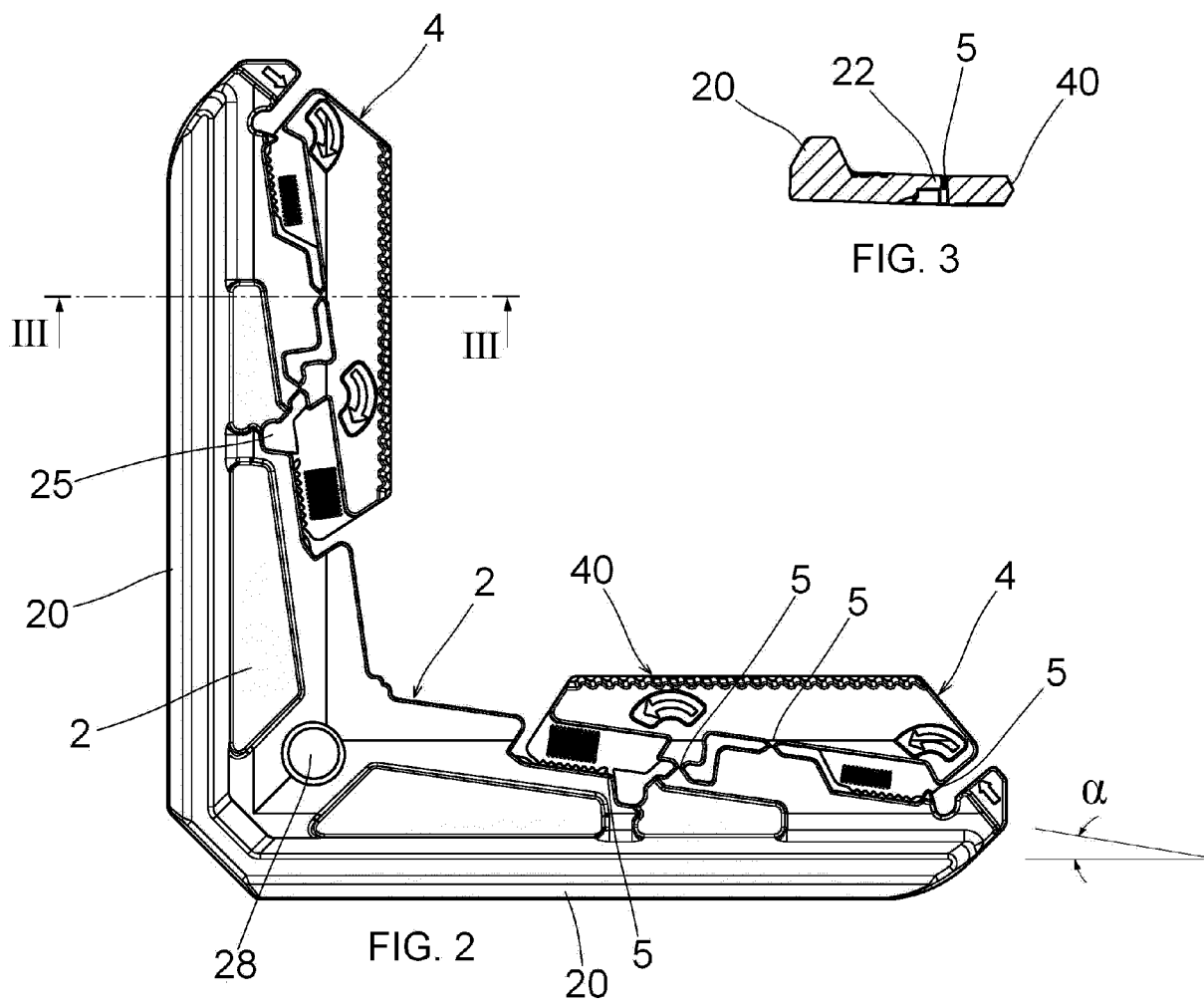
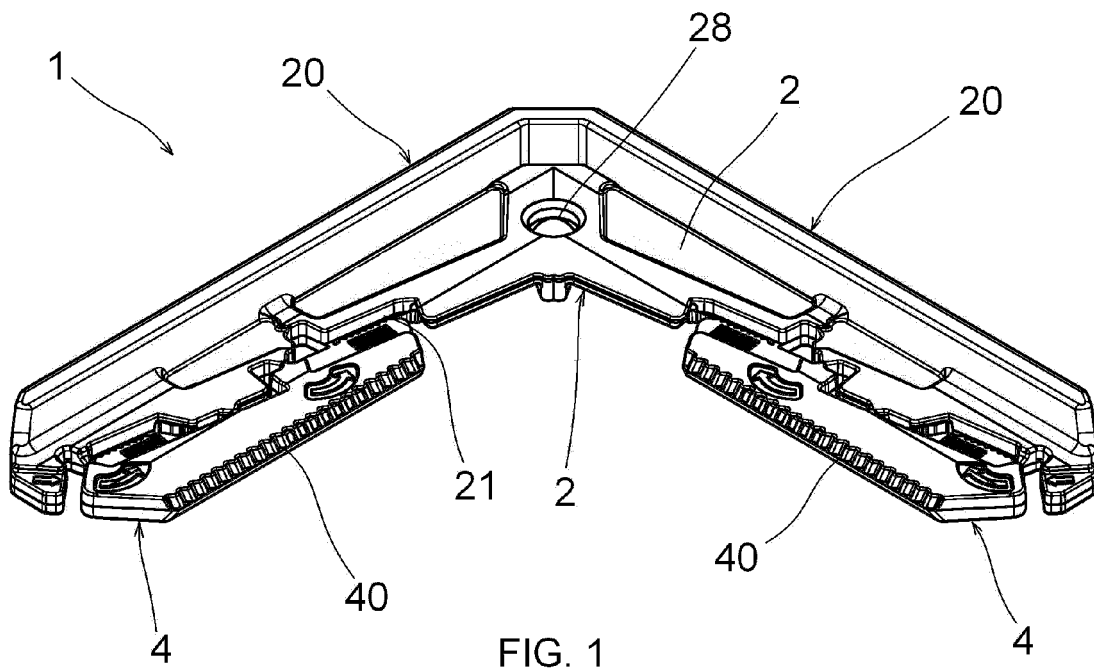
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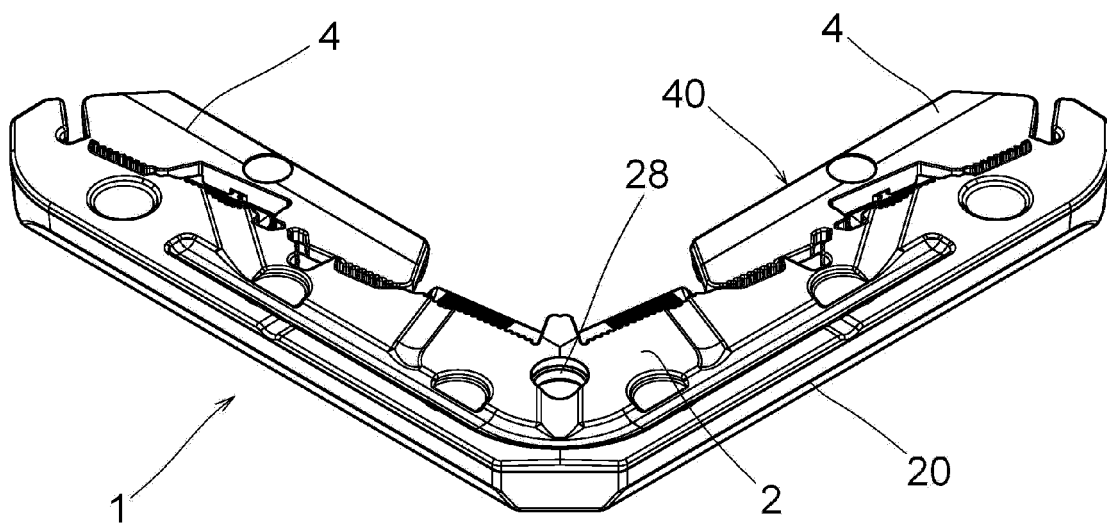


FIG. 4

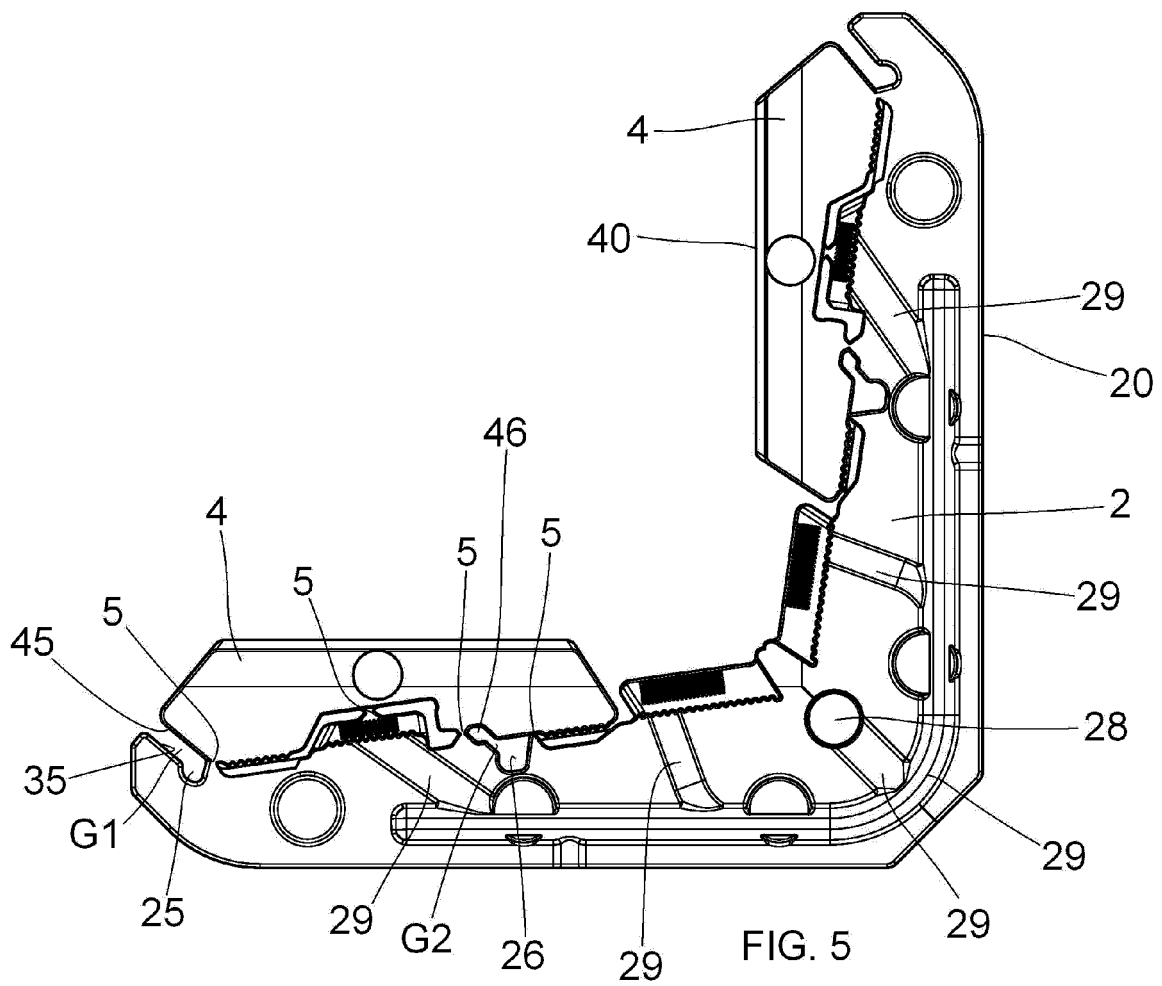
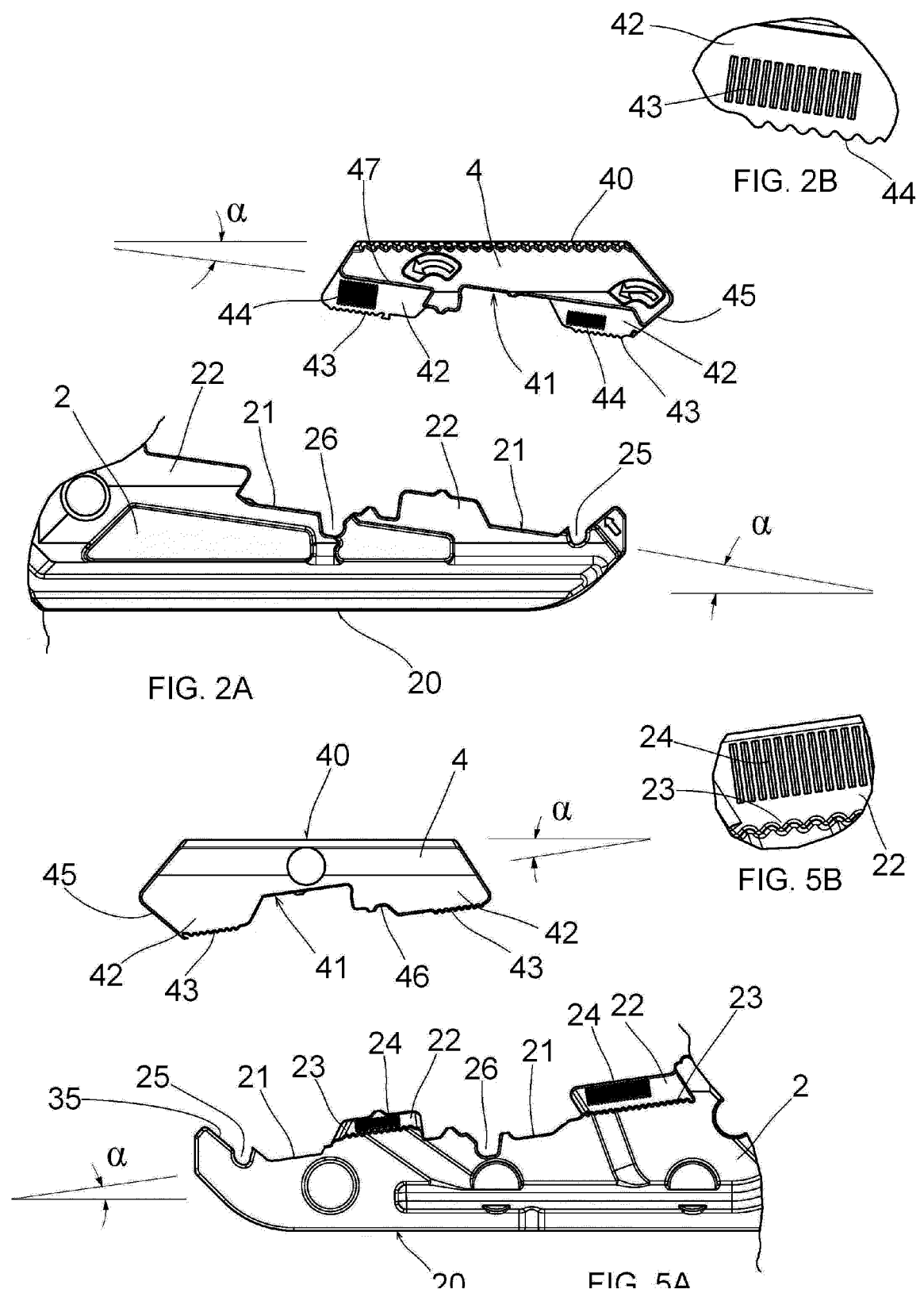
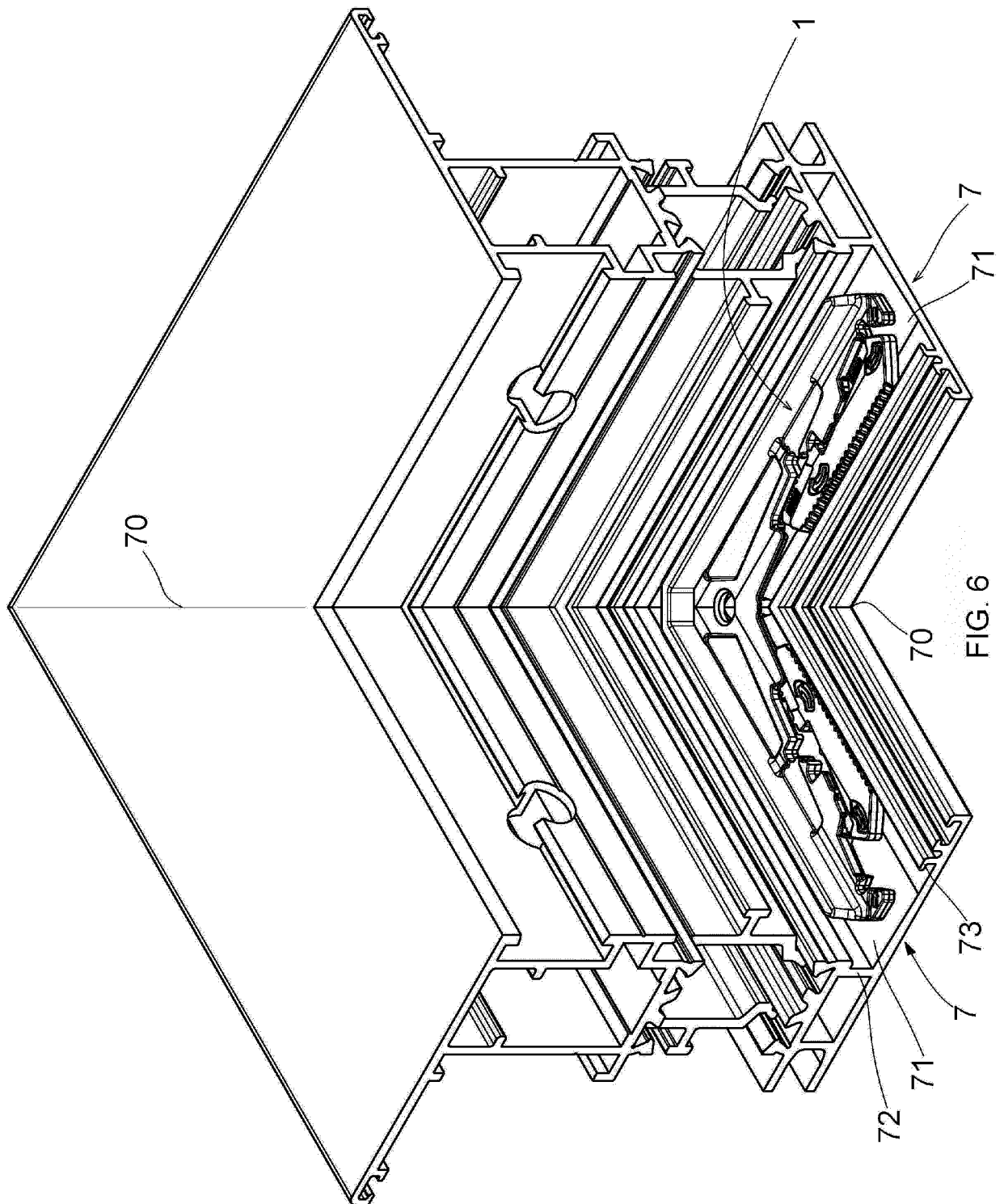
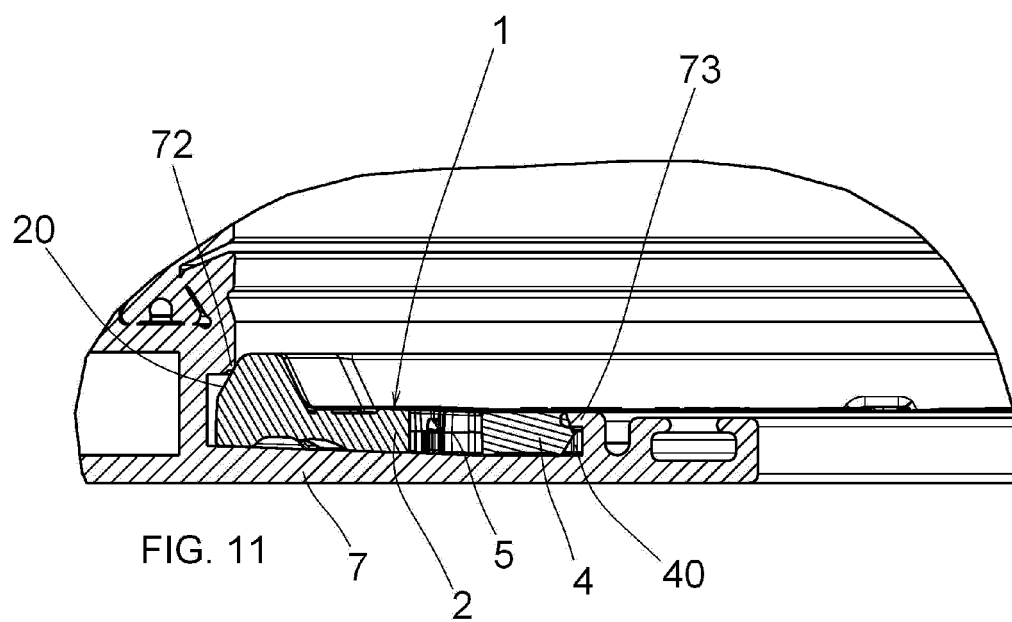
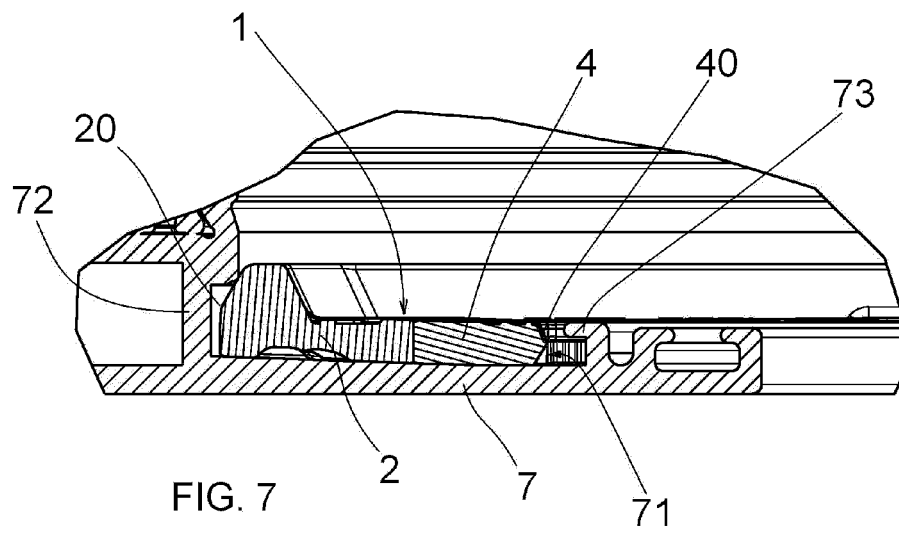
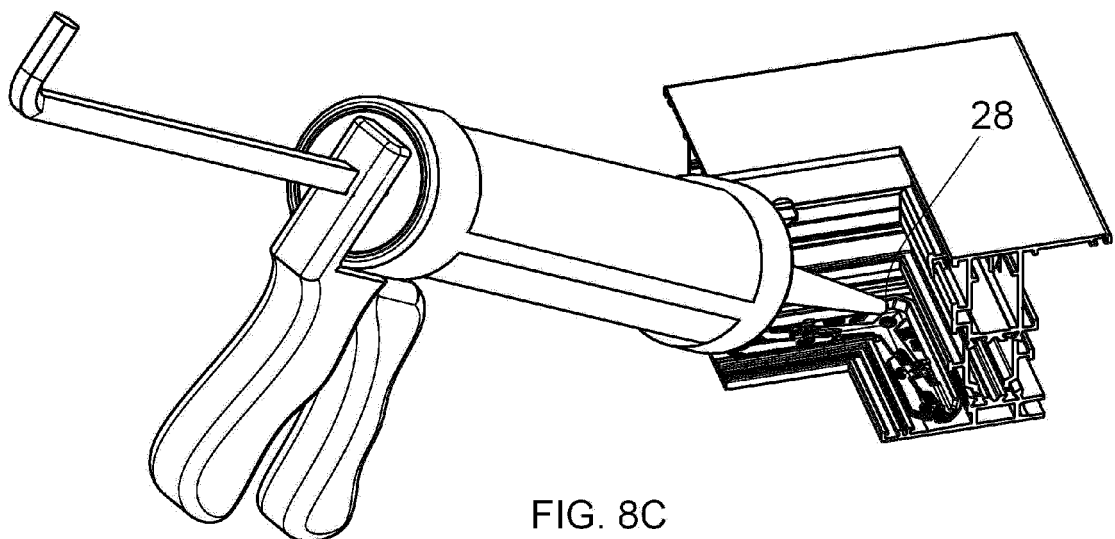
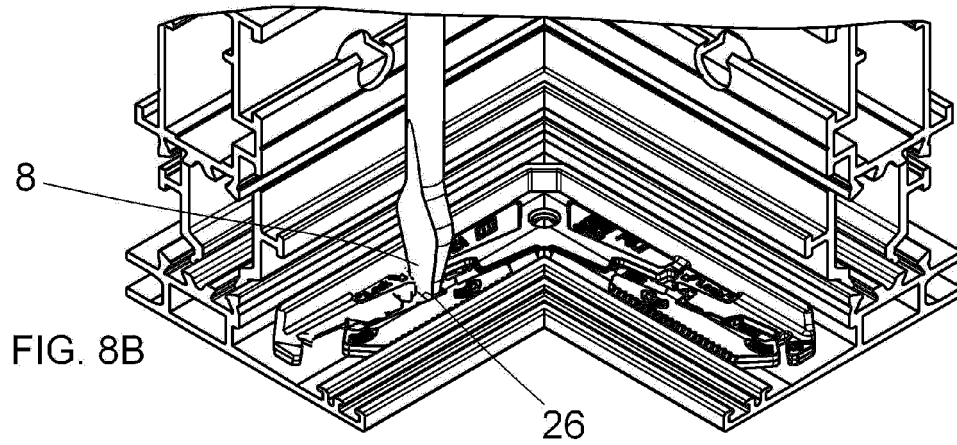
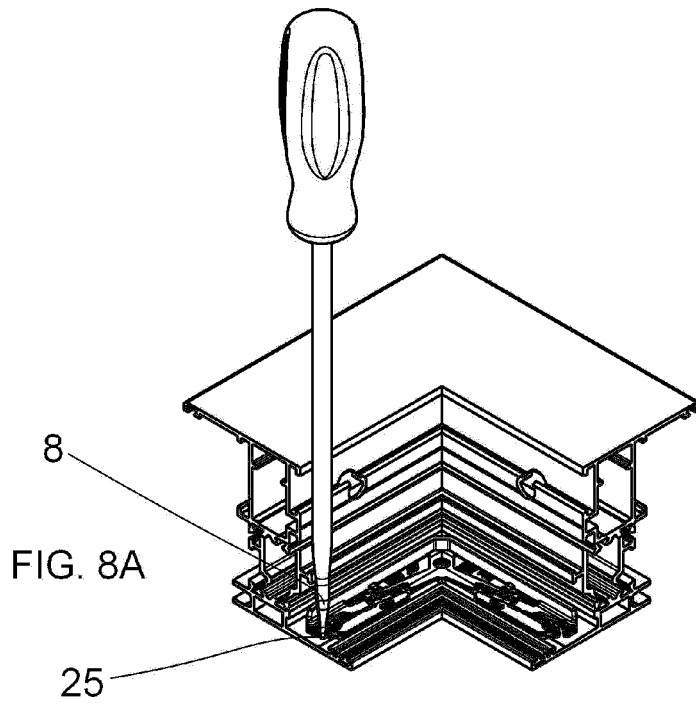


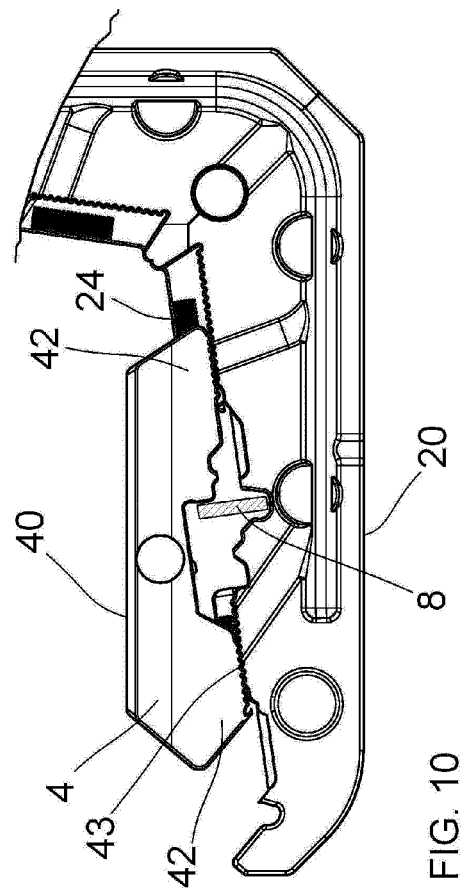
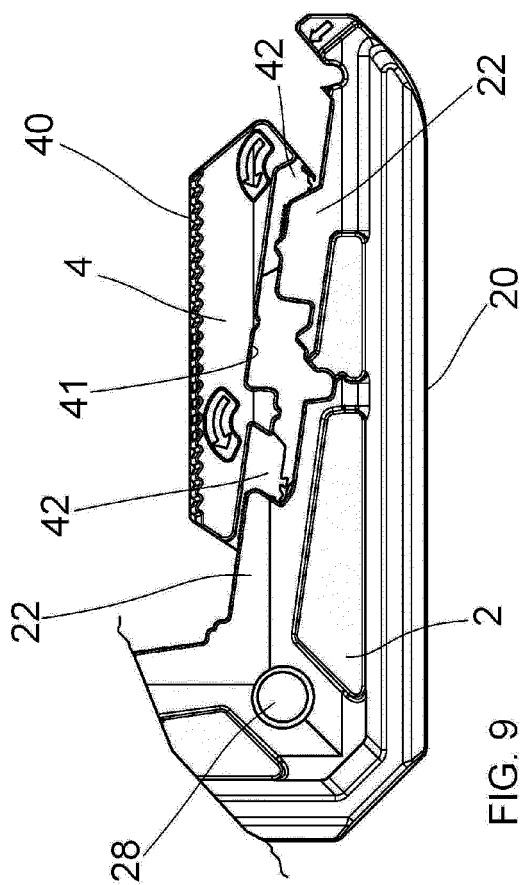
FIG. 5

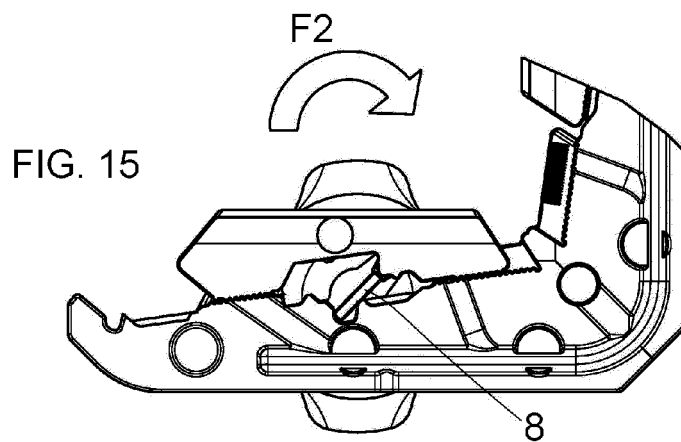
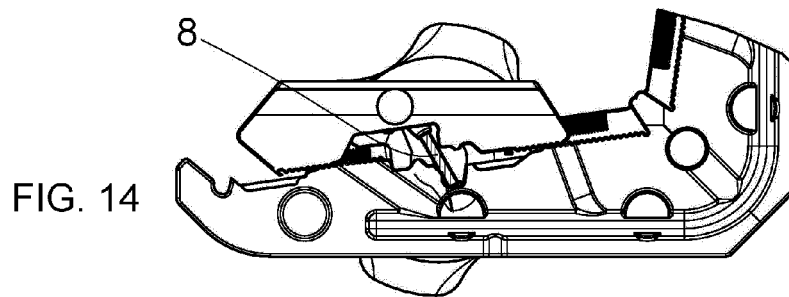
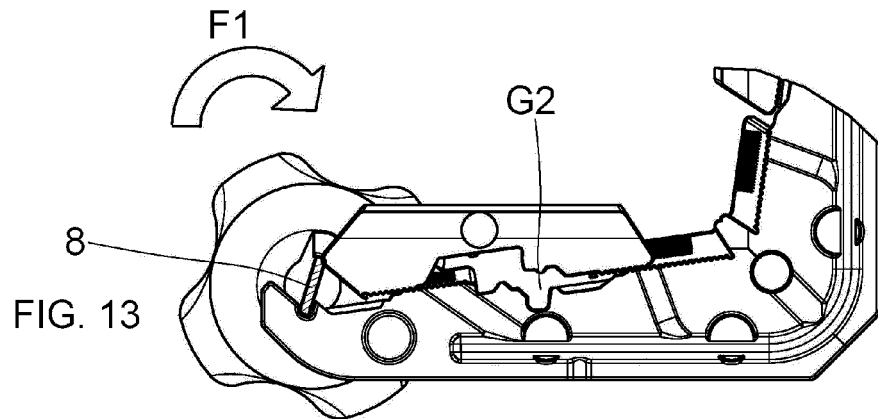
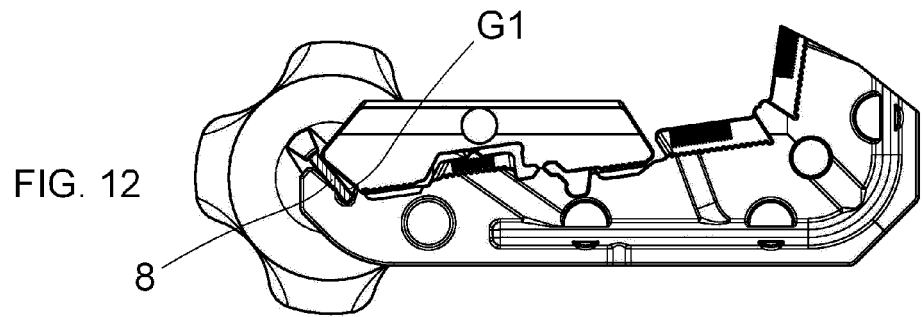












REFERENCES CITED IN THE DESCRIPTION

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