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(71) Applicant: **L.M. dei F.lli Monticelli S.r.l.**
60027 Osimo (AN) (IT)

(72) Inventor: **MONTICELLI, Vladimiro**
60024 Filottrano (AN) (IT)

(74) Representative: **Baldi, Claudio**
Ing. Claudio Baldi S.r.l.
Viale Cavallotti, 13
60035 Jesi (Ancona) (IT)

(54) **IMPROVED FIXING DEVICE**

(57) A fixing device (1) comprises: a first wing (10) inserted in a first profile (2), a second wing (11) inserted in a second profile (3); a threaded hole (5) obtained on each wing (10, 11); a screw (4) comprising a stem (40) screwed in the threaded hole (5), and a head (41) that tightens an upper edge (23, 33) of a profile (2, 3), a removable spacer (6) forming a space (G) between the head (41) of the screw (4) and the wind (10, 11); the space (G) receives the upper edge (23, 33) of the profile, without having to remove the screw (4) from the threaded hole (5) of the fixing device (1); the removable spacer (6) is removed by rubbing the head (41) of the screw (4) against the removable spacer (6) when screwing the screw (4) in the threaded hole (5).

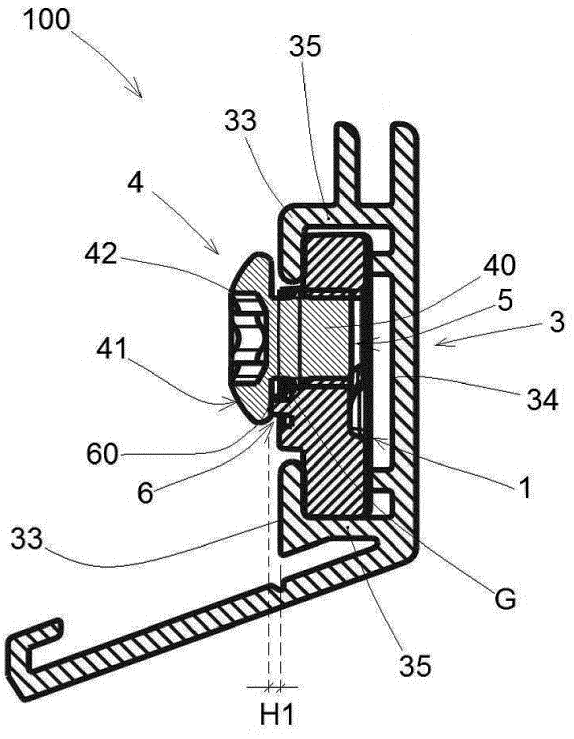

FIG. 6

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Description

[0001] The present patent application for industrial invention relates to a fixing device intended to be disposed inside the channels of two profiles in order to join the profiles. The reference sector is the one of window frames, and especially the assembly of window frames obtained by joining profiles in a frame-like configuration.

[0002] The profiles of known type that are used to make window frames are usually provided with a "C"-shaped cross-section that defines a longitudinal channel. Said profiles comprise a base wall, two side walls protruding from the base wall and two upper edges perpendicularly protruding from the side walls, one facing the other, in such manner to define a longitudinal opening between the two upper edges. In view of the above, the longitudinal channel of the profile can be accessed by means of an axial opening and by means of the longitudinal opening defined by the two upper edges.

[0003] It is known that the fixing devices comprise a first wing shaped as a rectangular plate, which is intended to be inserted in the channel of a first profile, and a second wing shaped as a rectangular plate, which is intended to be inserted in the channel of a second profile in order to join the two profiles. The two wings of the fixing device are normally inclined in such manner to form an angle of 90°.

[0004] The fixing device is fixed to the profiles with screws. In particular, the fixing device comprises one screw for each wing. Each screw comprises a stem that is screwed in a threaded hole of a wing of the fixing device, and a head intended to stop against the profile, outside the channel of the profile.

[0005] Advantageously, a first screw of the fixing device is screwed in the first wing anticlockwise and a second screw of the fixing device is screwed in the second wing clockwise, so that, when screwing the screws, the first screw pushes the first wing towards the second wing, and the second screw pushes the second wing towards the first wing, making it easier for the two profiles to move closer.

[0006] The threaded hole of the fixing device is spaced from the longitudinal axis of the wing of the fixing device. In view of the above, when the wing of the fixing device is inserted in the longitudinal channel of the profile and the stem of the screw is screwed in the threaded hole of the fixing device, the head of the screw tightens one of the two upper edges of the profile.

[0007] Generally, the fixing device is supplied with the screws screwed in the threaded holes in order to avoid losing the screws.

[0008] Therefore, the following operations are necessary to fix the two profiles:

- unscrewing and removing the screws from the holes of the fixing device;
- inserting the first wing in the longitudinal channel of the first profile through the axial opening of the first profile;
- inserting the second wing in the longitudinal channel of the second profile through the axial opening of the second profile;
- inserting and screwing the stems of the screws in the holes of the fixing device, passing the stems of the screws through the longitudinal opening of the profile, in such manner that one of the upper edges of the profile is tightened between the wing of the fixing device and the head of the screw.

[0009] Although it allows for joining the two profiles, such a fixing device of known type is impaired by the fact that the joining of two profiles is a long, complicated and difficult process because it requires to unscrew and remove the screws from the holes of the fixing screws, and then insert and screw the screws in the holes of the fixing device.

[0010] Moreover, the screws may be lost when they are unscrewed from the holes of the fixing device to insert the wings in the channels of the profiles.

[0011] Since the stem of the screw needs to be very short in order not to interfere with the base of the profile when the screw is screwed, it is impossible to avoid removing the screw, unscrewing the screw only partially. In fact, if the screw is loosened, by partially unscrewing it, the stem comes out of the threaded hole and the screw is lost.

[0012] EP2716852 discloses a device for connecting two profile elements and comprising a first leg for insertion into a first profile element and a second leg for insertion into a second profile element.

[0013] EP0748920 discloses a corner or T-connection for fixing profiles.

[0014] The purpose of the present invention is to overcome the drawbacks of the prior art, by disclosing a fixing device that can be inserted in the profiles without having to remove the screws from the holes.

[0015] Another purpose is to disclose a fixing device that is reliable and easy to make and install rapidly.

[0016] A fixing device according to the invention is intended to be disposed inside longitudinal channels of two profiles for joining the profiles. The fixing device comprises a first wing and a second wing shaped as a rectangular plate. The first wing is intended to be inserted in the longitudinal channel of the first profile. The second wing is intended to be inserted in the longitudinal channel of the second profile.

[0017] The fixing device comprises a threaded hole obtained in each wing of the fixing device.

[0018] The fixing device comprises a screw provided with a stem screwed in the threaded hole of the fixing device and a head intended to tighten one of the upper edges of a profile.

[0019] The peculiarity of the fixing device according to the invention consists in the fact that it comprises a removable and/or malleable spacer protruding from the wing near the hole in contact with the head of the screw.

In view of the above, a space is formed between the head of the screw and the wing, which is intended to receive the upper edge of the profile, without having to remove the screw from the threaded hole of the fixing device.

[0020] The removable spacer is intended to be removed by rubbing the head of the screw against the removable spacer when screwing the screw in the threaded hole in such manner that the head of the screw tightens the upper edge of the profile.

[0021] The advantages of the fixing device of the invention are evident: because of the provision of the removable spacer, the wings of the fixing device can be inserted in the profile without having to remove the screws.

[0022] In fact, the space allows for passing the upper edge of the profile between the head of the screw and the wing, without unscrewing and removing the screw.

[0023] For the sake of clarity, the description of the fixing device of the invention continues with reference to the attached drawings, which have a merely illustrative, not limiting value, wherein:

Fig. 1 is an axonometric view of a portion of a frame comprising the fixing device according to the invention;
Fig. 2 is an axonometric view of the fixing device of Fig. 1;
Fig. 3 is an axonometric view of the fixing device of Fig. 2, seen from a different angle;
Fig. 4 is a side view of the fixing device of Fig. 1;
Fig. 4A is an enlarged view of the detail contained in the circle (A) of Fig. 4;
Fig. 5 is a front view of the fixing device of Fig. 1;
Fig. 5A is an enlarged view of the detail contained in the circle (A) of Fig. 5;
Fig. 6 is a sectional view of the frame and of the fixing device according to the invention, cut along the plane VI-VI di Fig. 1;
Fig. 7 is the same sectional view as Fig. 6, wherein a screw of the fixing device tightens an upper edge of a profile of the frame;
Fig. 8 is a bottom view of the screw of the fixing device of Fig. 1.

[0024] With reference to Fig. 1 and 2, a window frame is disclosed, being generally indicated with reference numeral (100).

[0025] The frame (100) comprises profiles (2, 3) with edges inclined by 45° with respect to the longitudinal axis of the profiles (2, 3), in such manner to form a frame.

[0026] In particular, the frame (100) comprises a first profile (2) and a second profile (3). The profiles (2, 3) have a "C"-shaped cross-section that defines a longitudinal channel (20); Said profiles (2, 3) comprise a base wall (24, 34), two side walls (25, 35) perpendicularly protruding from the base wall (24, 34) and two upper edges (23, 33) parallel to the base wall (24, 34) and perpendicularly protruding from the side walls (25, 35).

[0027] The upper edges (23, 33) of each profile (2, 3) face each other in such a way to define a longitudinal opening (21, 31) between the two upper edges (23, 33).

[0028] The longitudinal channel (20, 30) of each profile (2, 3) can be accessed by means of an axial opening (22, 32) and by means of the longitudinal opening (21, 31) defined by the two upper edges (23, 33) of the profile (2, 3).

[0029] The frame (100) comprises a fixing device (1) according to the invention, disposed in the longitudinal channels (20, 30) of the two profiles (2, 3);

[0030] As shown in Figs. 2 to 5, the fixing device (1) comprises a first wing (10) and a second wing (11) shaped as a rectangular plate. The first wing (10) is intended to be inserted in the longitudinal channel (20) of the first profile (2), as shown in Fig. 1. The second wing (11) is intended to be inserted in the longitudinal channel (30) of the second profile (3), as shown in Fig. 1. In this way, the fixing device (1) joins the two profiles (2, 3).

[0031] The first wing (10) and the second wing (11) of the fixing device (1) are inclined by the same angle as the profiles (2, 3). In particular, the wings (10, 11) are inclined by an angle of 90°.

[0032] The fixing device (1) comprises a threaded hole (5) obtained in each wing (10, 11) of the fixing device (1), The fixing device (1) also comprises a screw (4) provided with a stem (40) screwed in the threaded hole (5) of the fixing device and a head (41) intended to tighten one of the upper edges (23, 33) of the profile (2, 3); The head (41) protrudes from the longitudinal opening (21, 31) of the profiles (2, 3).

[0033] The threaded hole (5) of the fixing device (1) is spaced from the longitudinal axis of the wing (10, 11) of the fixing device (1). In view of the above, when the wing (10, 11) of the fixing device (1) is inserted in the longitudinal channel (20, 30) of the profile (2, 3) and the stem (40) of the screw (4) is screwed in the threaded hole (5) of the fixing device (1), the head (41) of the screw (4) tightens one of the two upper edges (23, 33) of the profile (2, 3).

[0034] The head (41) of the screw (4) comprises an external surface (42) facing the exterior of the profile (2, 3), and a knurled surface (43), which is shown in Fig. 8, disposed in opposite position to the external surface (42) and intended to face the interior of the profile (2, 3). The knurled surface (43) is intended to come in contact with the wing (10, 11) of the fixing device (1). In particular, the wings (10, 11) of the fixing device (1) have a knurled surface (50), around the threaded holes (5), which is intended to interfere with the knurled surface (43) of the head of the screw, in such a way to prevent the screw (4) from being accidentally unscrewed.

[0035] The fixing device (1) comprises a removable spacer (6) that protrudes from the knurled surface (50) of the wing (10, 11) of the fixing device (19) in proximal position to the hole (5).

[0036] The removable spacer (6) is shaped as an arc of circle, subtended by a central angle of approximately

20-40°. Moreover, the removable spacer (6) has a thickness (H1) comprised between 0.2 and 2 mm.

[0037] The removable spacer (6) comprises a knurled surface (60), shown in Figs. 4A and 5A, which cooperates with the knurled surface (43) of the head (41) of the screw (4), in such a way to prevent the screw (4) from being accidentally unscrewed. In particular, the removable spacer (6) is disposed in contact with the head (41) of the screw (4) in such manner to form a space (G) between the head (41) of the screw (4) and the wing (10, 11). Such a space (G) is intended to receive the upper edge (23, 33) of the profile, without having to remove the screw (4) from the threaded hole (5) of the fixing device (1).

[0038] The removable spacer (6) is intended to be removed by rubbing against the knurled surface (43) of the head (41) of the screw (4) when the screw (4) is screwed in the threaded hole in such manner that the head (41) of the screw (4) tightens the upper edge (23, 33) of the profile (2, 3) to join the fixing device (1) with the profile (2, 3).

[0039] The process for joining the first profile (2) with the second profile (3) by means of the fixing device (1) provides for axially inserting the first wing (10) of the fixing device (1) in the longitudinal channel (20) of the first profile (2) through the axial opening (22) of the first profile (2), in such manner that one of the upper edges (23) of the first profile (2) is disposed in the space (G) between the first wing (10) and the head (41) of the screw (4).

[0040] The second wing (11) of the fixing device (1) is inserted in the longitudinal channel (30) of the second profile (3) through the axial opening (32) of the second profile (3), in such manner that one of the upper edges (33) of the second profile (3) is disposed in the space (G) between the second wing (11) and the head (41) of the screw (4), as shown in Fig. 6.

[0041] The screws (4) are screwed in the threaded holes (5) of each wing (10, 11), in such manner that the knurled surface (43) of the head (41) of the screw (4) rubs against the removable spacer (6), thus removing the removable spacer (6).

[0042] While screwing the screws (4) in the threaded holes (5), also an upper surface of the upper edge (23, 33) of the profiles (2, 3) is partially removed by rubbing the knurled surface (43) of the head (41) of the screw (4) against the upper surface of the upper edge (33), as shown in Fig. 7. The screws (4) are screwed in such a way that the knurled surface (43) of the head (41) of the screw cooperates with the knurled surface (50) of the wings (10, 11) in order to lock the screw (4) in working position, preventing it from unscrewing easily.

[0043] In this way, the fixing device (1) is joined with the two profiles (2, 3).

Claims

1. Fixing device (1) intended to be disposed inside longitudinal channels (20, 30) of two profiles (2, 3) to join said profiles (2, 3); said fixing device (1) comprising:

   - a first wing (10) shaped as a rectangular plate intended to be inserted in the longitudinal channel (20) of a first profile (2);
   - a second wing (11) shaped as a rectangular plate intended to be inserted in the longitudinal channel (30) of a second profile (3);
   - a threaded hole (5) obtained on each wing (10, 11) of the fixing device (1);
   - a screw (4) comprising a stem (40) screwed in said threaded hole (5) of the fixing device and a head (41) intended to tighten an upper edge (23, 33) of a profile (2, 3);

   characterized in that it comprises

   - a removable spacer (6) that protrudes from the wing (10, 11) in proximal position to the hole (5), disposed in contact with the head (41) of the screw (4); said removable spacer (6) forming a space (G) between the head (41) of the screw (4) and the wing (10, 11); said space (G) being intended to receive said upper edge (23, 33) of the profile, without having to remove the screw (4) from the threaded hole (5) of the fixing device (1);

   said removable spacer (6) being intended to be removed by rubbing the head (41) of the screw (4) against the removable spacer (6) when screwing the screw (4) in the threaded hole in such manner that the head (41) of the screw (4) tightens said upper edge (23, 33) of the profile (2, 3).

2. The fixing device (1) of claim 1, wherein said removable spacer (6) is shaped as an arc of circle.

3. The fixing device (1) of claim 2, wherein said removable spacer (6) is shaped as an arc of circle subtended by a central angle of approximately 20-40°

4. The fixing device (1) of any one of the preceding claims, wherein said removable spacer (6) has a thickness (H1) comprised between 0.2 and 2 mm.

5. The fixing device (1) of any one of the preceding claims, wherein the head (41) of the screw (4) comprises a knurled surface (43) intended to be faced towards the removable spacer (6); and
said removable spacer (6) comprises a knurled surface (60) that cooperates with the knurled surface (43) of the head (41) of the screw (4).

6. The fixing device (1) of claim 5, wherein said wings (10, 11) of the fixing device (1) have a knurled surface (50) around said threaded holes (5), which is intend-

ed to interfere with the knurled surface (43) of the head (41) of the screw (4).

7. The fixing device (1) of claim 6, wherein said removable spacer (6) is disposed on said knurled surface (50) of the wing (10, 11) of the fixing device (1).

8. Process for joining two profiles (2, 3) having a longitudinal channel (20, 30) by means of a fixing device (1) according to any one of the preceding claims; said process comprising the following steps:

- axially inserting the first wing (10) of the fixing device (1) in the longitudinal channel (20) of a first profile (2) in such manner that one of the upper edges (23) of the first profile (2) is disposed in the space (G) between the first wing (10) and the head (41) of the screw (4);
- inserting the second wing (11) of the fixing device (1) in the longitudinal channel (30) of a second profile (3) in such manner that one of the upper edges (33) of the second profile (3) is disposed in the space (G) between the second wing (11) and the head (41) of the screw (4);
- screwing the screws (4) in the threaded holes (5) of each wing (10, 11) in such manner to remove the removable spacer (6);
- tightening the screws (4) in such manner to fix the fixing device (1) to the profiles (2, 3).

9. Frame (100) comprising:

- a first profile (2) with a "C"-shaped cross-section comprising a longitudinal channel (20);
- a second profile (3) with a "C"-shaped cross-section comprising a longitudinal channel (30);
- a fixing device (1) according to any one of claims 1 to 7.

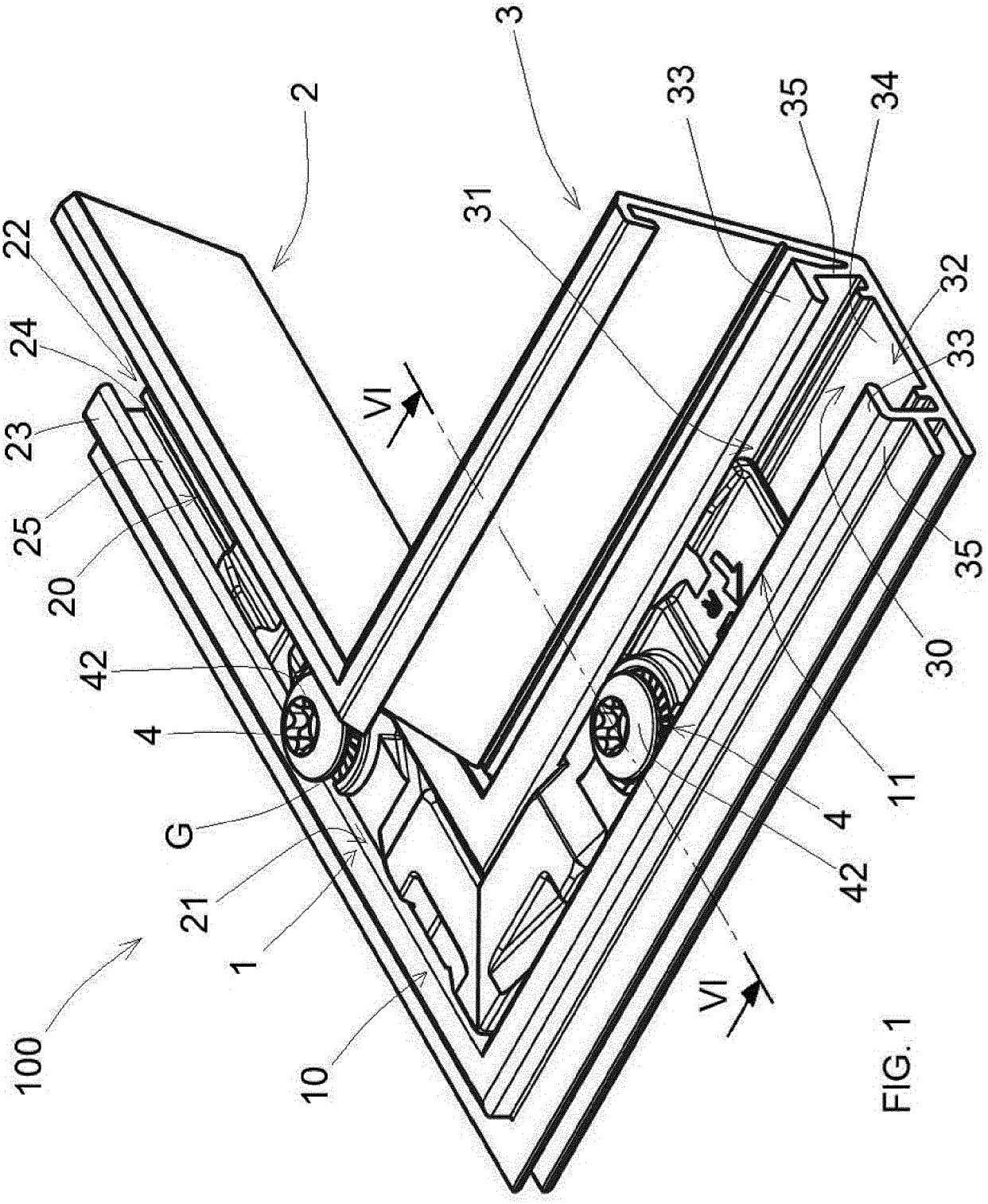

FIG. 1

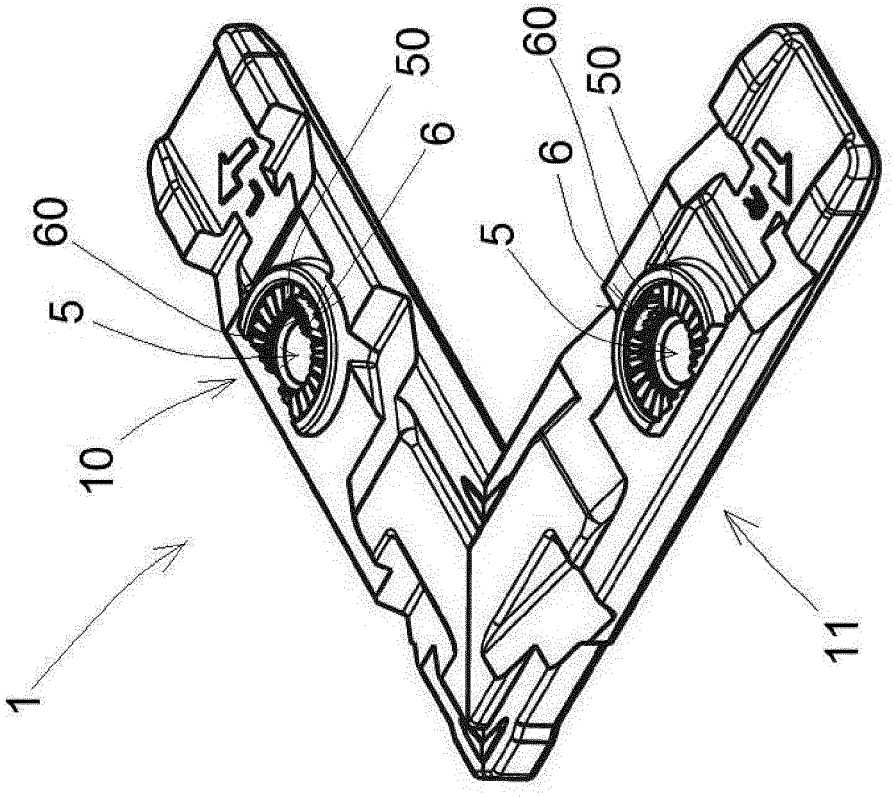

FIG. 3

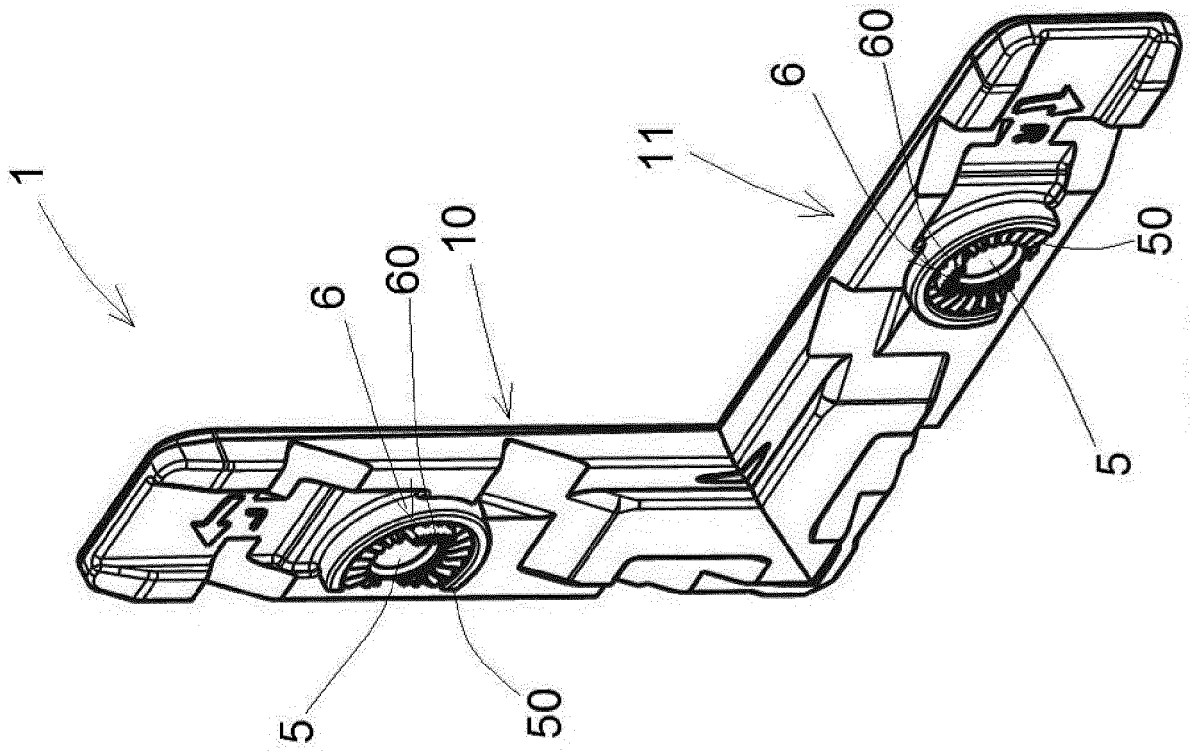

FIG. 2

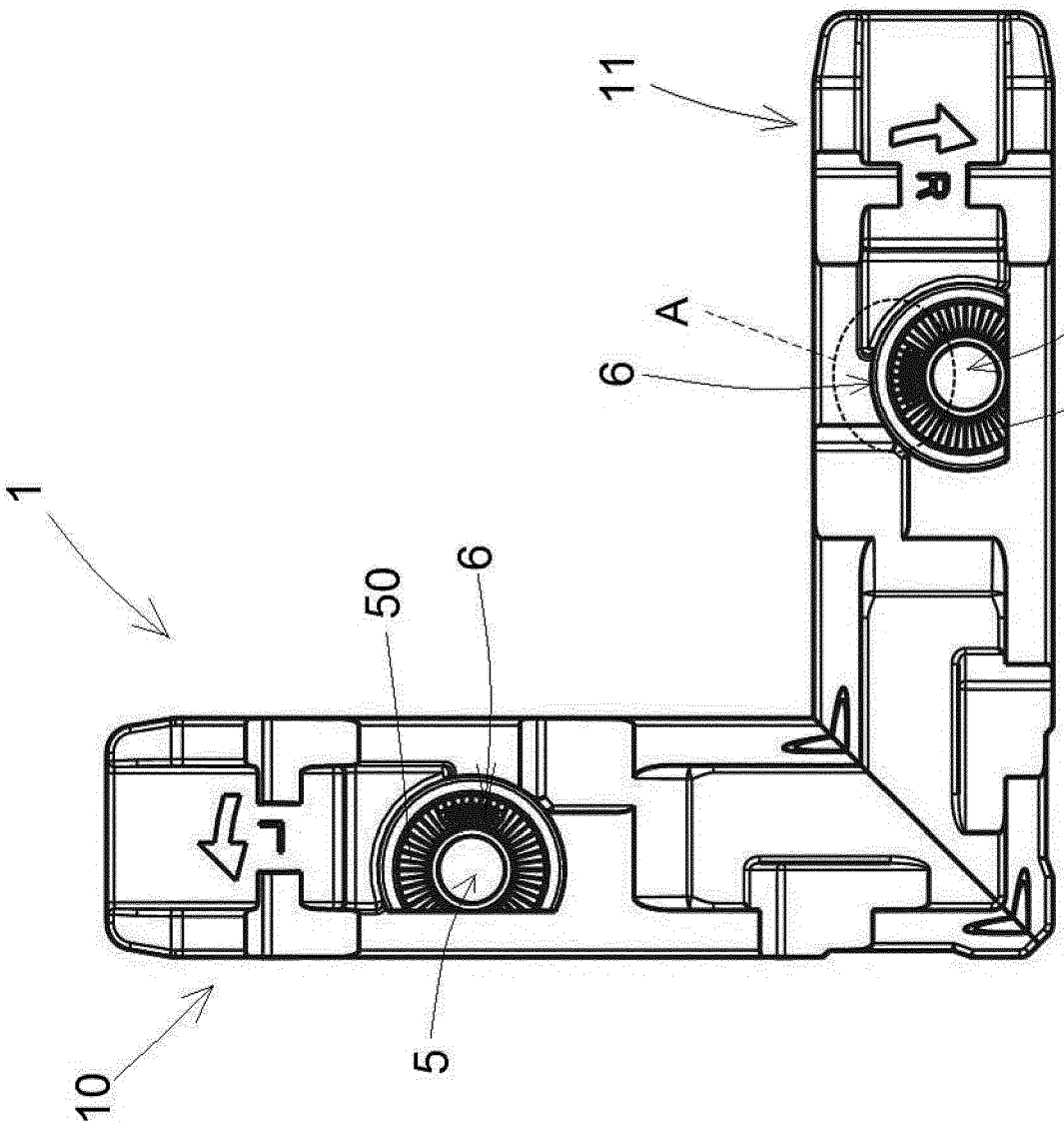

FIG. 5

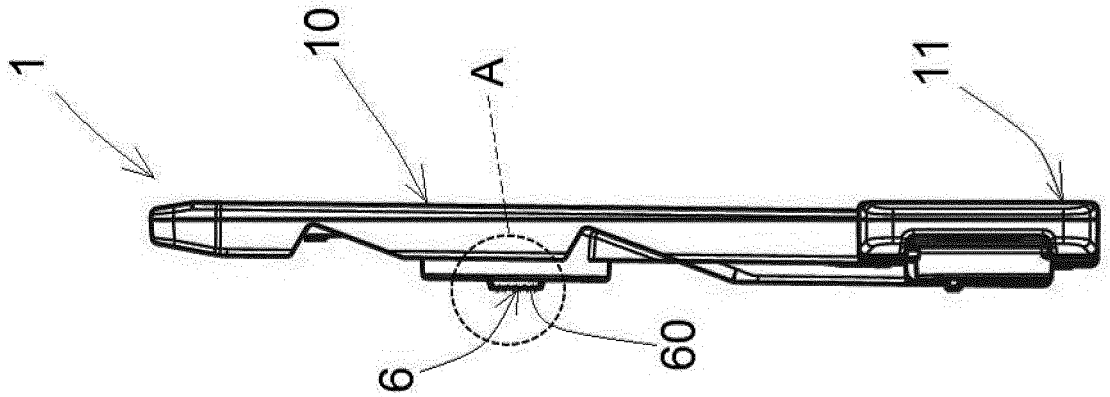

FIG. 4

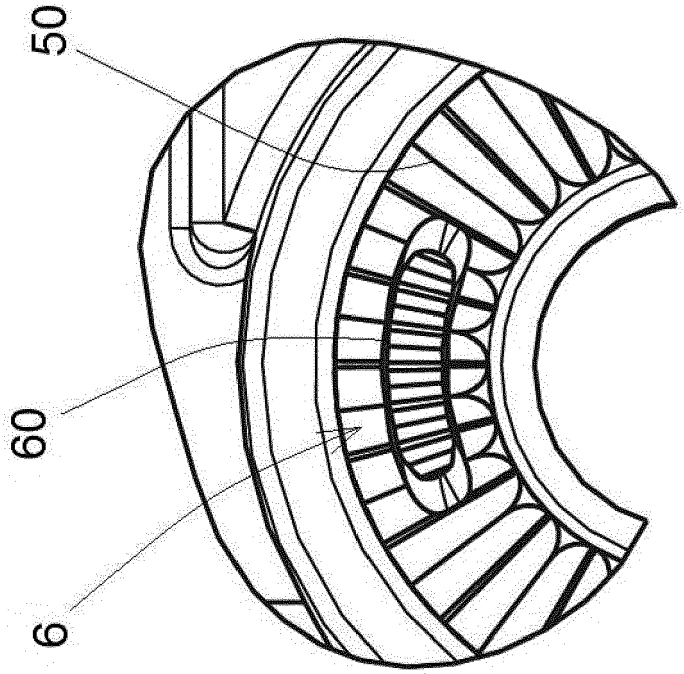

FIG. 5A

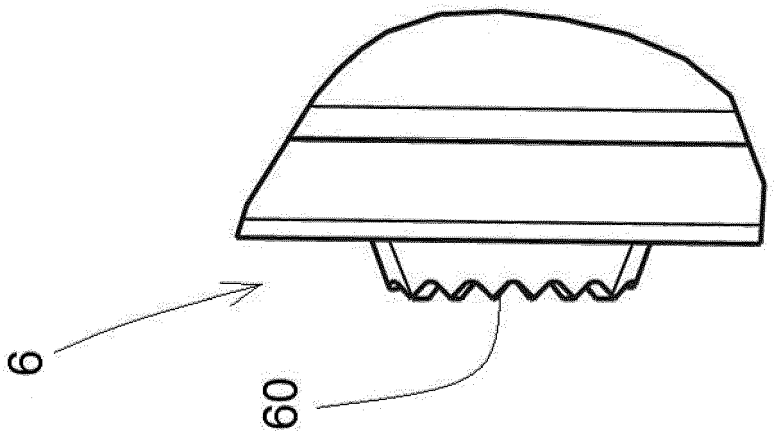

FIG. 4A

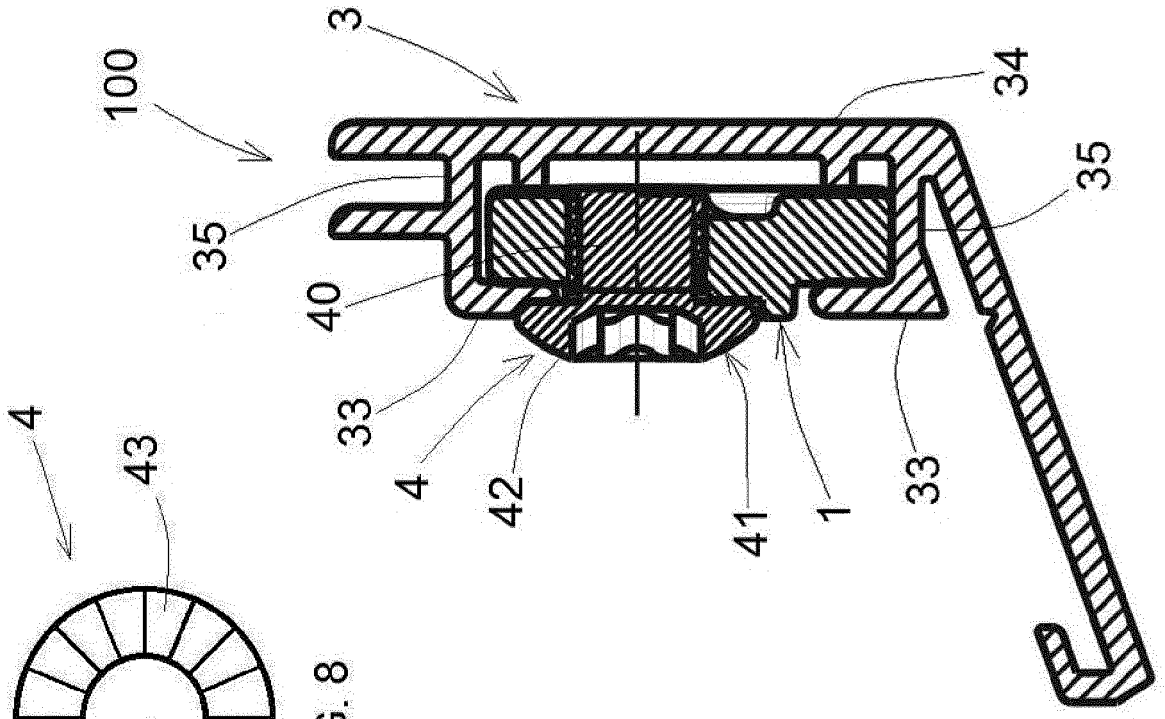

FIG. 7

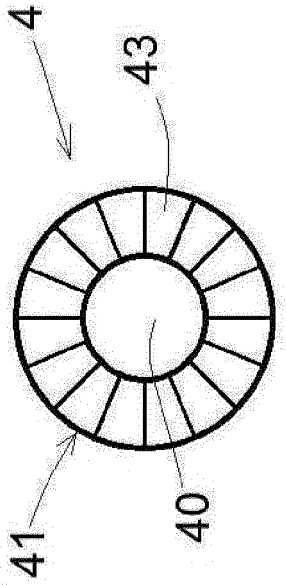

FIG. 8

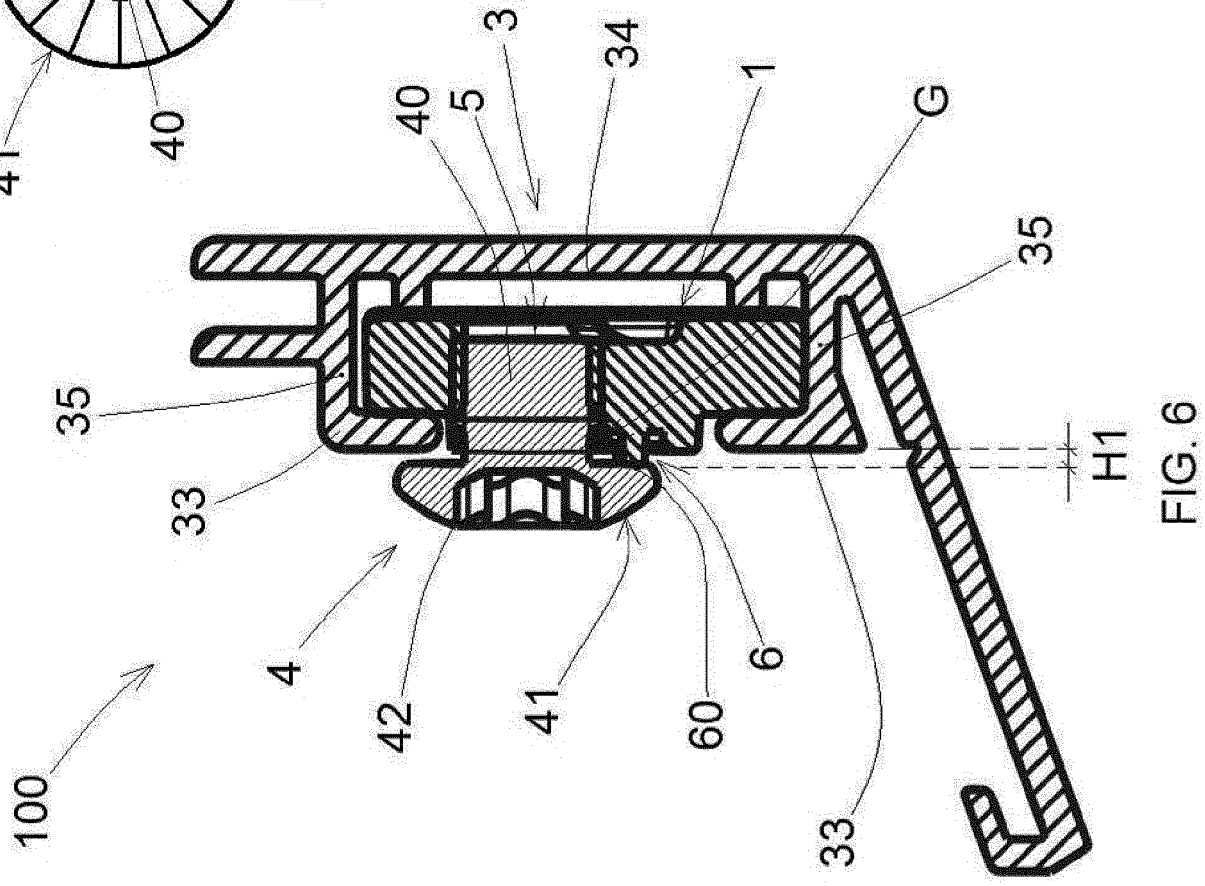

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 5685

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 716 852 A1 (ALCOA ALUMINIUM DEUTSCHLAND [DE]) 9 April 2014 (2014-04-09) * paragraph [0026] - paragraph [0027]; figures 2a, 2b *	1-9	INV. E06B3/968 E06B3/988 E06B3/98
A	EP 0 748 920 A1 (SCHUECO INT KG [DE]) 18 December 1996 (1996-12-18) * column 1, line 29 - line 40; figure 4 * * column 2, line 14 - line 18 *	1-9	

TECHNICAL FIELDS SEARCHED (IPC)
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 December 2017	Jülich, Saskia

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- EP 0748920 A **[0013]**