(19) Europäisches Patentamt
European Patent Office
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(11) **EP 4 339 412 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.03.2024 Bulletin 2024/12

(21) Application number: **23194166.7**

(22) Date of filing: **30.08.2023**

(51) International Patent Classification (IPC):
E06B 3/968 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E06B 3/9685

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **13.09.2022 IT 202200018729**

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(54) **ELASTIC CORNER JOINT FOR THE CONNECTION OF PROFILES**

(57) A corner joint (100) for the connection of two adjacent profiles (P1, P2); said corner joint (100) comprising a first wing (1) and a second wing (2) connected to each other so as to define a vertex of the corner joint (100); the peculiarity of the corner joint (100) is that said first wing (1) comprises a rigid portion (31) connected to the second wing (2), an elastically compressible portion (4) connected to said rigid portion (31), and a fixed peg (91) disposed on said elastically compressible portion (4) and suitable for being elastically fitted into the hole (F1) drilled in one of the two profiles (P1).

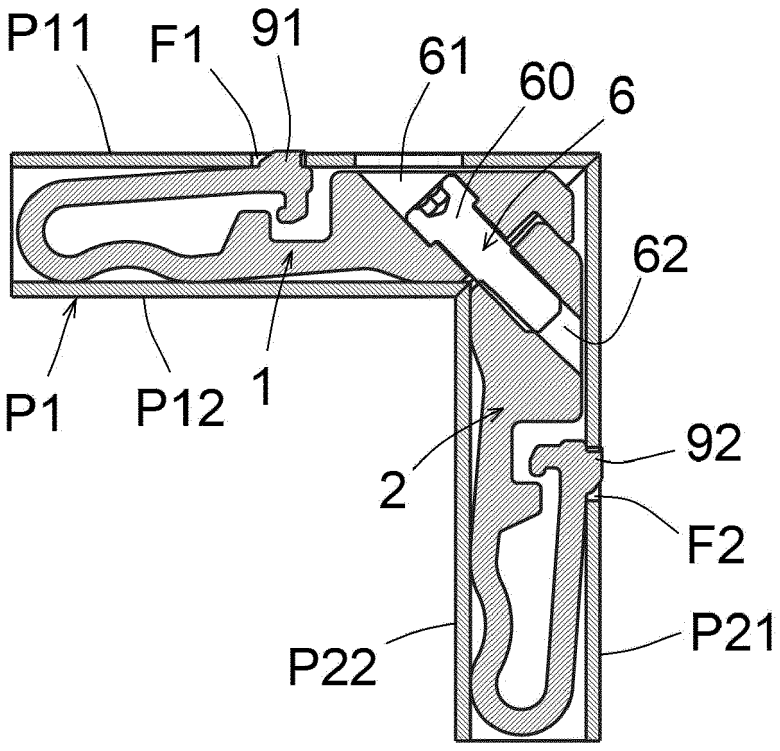

FIG. 3

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Description

[0001] The present patent application for industrial invention relates to an elastic corner joint for the connection of profiles.

[0002] The field of reference is that of window and door frames, particularly that of window and/or shutter frames made by connecting profiles in a frame-like manner.

[0003] Corner joints according to the prior art are known, having an L-shape and comprising two wings suitable for being arranged inside longitudinal cavities of two consecutive profiles arranged at 90°.

[0004] Each profile has a quadrangular cross-section and comprises an outer wall, an inner wall, and a pair of side walls that define said cavity. Preferably, the profiles have ends cut at 45° in such a way to coincide with the ends of the adjacent profiles.

[0005] Corner joints have undergone a variety of improvements over time, with particular reference to the way in which said corner joints connect the two profiles together.

[0006] A first type of corner joints, which are provided with movable pegs, have pushbuttons suitable for being housed inside holes provided on each one of the profiles.

[0007] More specifically, in such a first type, the two wings are made in one piece and each wing comprises a seat that houses a movable pushbutton and an elastic element connected to the movable pushbutton to push the movable pushbutton out of the seat. The wings provided with the movable pushbuttons are suitably dimensioned so that they can be exactly inserted inside the profile when the pushbutton is retracted. Otherwise said, the movable push buttons must be compressed in order to allow the relevant wing to be inserted inside the profile.

[0008] The insertion of the wing inside the longitudinal cavity ends when the movable pushbutton and the hole of the profile are aligned and the movable pushbutton is elastically inserted inside the relevant hole of the profile.

[0009] Such corner joints are impaired by the fact that they are complex to make and are prone to frequent malfunctions and failures of the movable pushbuttons.

[0010] A second type of corner joints is provided with fixed pegs and comprises two separate wings and an adjusting screw that adjusts the mutual position of the two wings.

[0011] The operator can spread apart or close the wings by acting on the adjusting screw with a special tool

[0012] The assembly of said second type of corner joint provides for inserting each wing into the cavity of the corresponding profile and then using the adjusting screw in order for said wings to spread apart or come together and the pegs to fit inside the holes provided in the profile.

[0013] Such a second type of corner joints has the disadvantage of being complex to make and also difficult to be used and attached to the two profiles. In fact, it appears evident that the insertion of both wings into the two profiles and the successive operation of the adjustment screw is a slow and difficult process to carry out.

[0014] A third type of corner joints, which are known as "expansion" corner joints involves the use of an upper L-shaped element and a lower L-shaped element that can move away from or approach each other. The aforementioned moving away or bringing together of the two elements is done by means of adjusting means that are disposed between the upper element and the lower element and are operated by means of special tools.

[0015] In order to connect two adjacent profiles by means of the aforementioned expansion corner joints, first of all it is necessary to make sure that the two elements of the corner joint are close to each other and then insert the corner joint inside the two profiles. Then the operator can use the adjustment means to move apart the two elements; the corner joint expands, in such a way that the lower element abuts and pushes against the inner wall of the two profiles and the upper element abuts and pushes against the outer wall of the two profiles. In this way, the corner joint is connected to the two profiles.

[0016] Also this type of corner joint is impaired by drawbacks.

[0017] First of all, since the connection is done by pushing the wings against the walls of the profiles, plastic deformations of the profiles can be generated, resulting in protrusions, projections or bulging, in the worst case.

[0018] In addition, the thrust action of the wing exclusively on the upper wall and on the lower wall does not allow for a stable and reliable connection of the two profiles.

[0019] Additionally, such expansion corner joints are complex to use and attach to the two profiles.

[0020] The purpose of the present invention is to overcome the drawbacks of the corner joints of the prior art by devising a new corner joint that is extremely easy to attach to the profiles and simple to make.

[0021] Another purpose of the present invention is to devise a corner joint that does not involve the use of movable pegs coupled with springs and washers.

[0022] These purposes are achieved in accordance with the invention with the features listed in the attached independent claim 1.

[0023] Advantageous achievements appear from the dependent claims.

[0024] The corner joint according to the invention is defined by claim 1.

[0025] The advantages of the new elastic corner joint according to the invention are manifest because the elastically compressible portion makes it possible to greatly simplify and facilitate the attachment of a wing of the corner joint to a profile. In fact, in order to attach the corner joint according to the invention to a profile, it is simply necessary to forcedly insert a wing of the corner joint until the fixed peg mounted on the elastically compressible portion is aligned with the hole in the profile and is elastically fitted into the hole.

[0026] For the sake of explanatory clarity, the description of the elastic corner joint according to the invention continues with reference to the attached drawings, which

are for illustrative and non-limiting purposes only, wherein:

Fig. 1 is a side view of the corner joint according to the invention;
Fig. 1A is a side view of a wing of the corner joint;
Fig. 1B is an enlargement of an elastically compressible portion of the wing shown in Fig. 1A;
Fig. 2 is an axonometric view of the corner joint according to the invention;
Fig. 3 is a sectioned side view of the corner joint according to the invention attached to two adjacent profiles;
Fig. 4, 4A and 4B are three cross-sectional side views of the corner joint, illustrating three different moments in the attachment process of the corner joint to a profile.

[0027] With reference to the attached figures, an elastic corner joint according to the invention is described, which is indicated by reference numeral 100.

[0028] The elastic corner joint (100) is suitable for being used to connect two adjacent profiles (P1, P2) of a window frame.

[0029] Referring to Fig. 3, each profile (P1, P2) has a longitudinal cavity and a quadrangular cross-section and comprises an outer wall (P11, P21), an inner wall

[0030] (P12, P22) and two side walls (not shown in the attached figures). The walls laterally delimit the aforementioned longitudinal cavity of the profile.

[0031] It should be noted that the outer wall (P11, P21) is the wall of the profile (P1, P2) facing the outside of the frame, whereas the inner wall (P12, P22) is the wall of the profile (P1, P2) facing the inside of the frame.

[0032] Moreover, each profile (P1, P2) has end edges cut at 45° in such a way that each end edge matches and is abutting the end edge of the adjacent profile.

[0033] A hole (F1, F2) is cut on each profile (P1, P2) for attaching the corner joint (100).

[0034] The hole (F1, F2) is cut in the outer wall (P11, P21) of the profile (P1, P2).

[0035] Referring to Figs. 1 and 2, the corner joint (100) comprises a first wing (1) and a second wing (2) that are connected together to define a vertex of the corner joint (100).

[0036] The first wing (1) and the second wing (2) are preferably arranged at 90° so that the corner joint has an L-shape, when viewed from the side.

[0037] The first wing (1) is suitable for being fitted inside the longitudinal cavity of one of the two profiles (P1), whereas the second wing (2) is suitable for being fitted inside the longitudinal cavity of the other profile (P2).

[0038] With particular reference to Figs. 1, 1A and 2, the first wing (1) comprises a rigid portion (31) connected to the second wing (2), an elastically compressible portion (4) that is connected to said rigid portion (31) and protrudes from said rigid portion (31), and a fixed peg (91) disposed on the elastically compressible portion (4) and suitable for being elastically fitted into the hole (F1) of one of the two profiles (P1).

[0039] The second wing (2) comprises a rigid portion (32) connected to the first wing (1), an elastically compressible portion (4) that is connected to said rigid portion (32) and protrudes from said rigid portion (32), and a fixed peg (92) disposed on said elastically compressible portion (4) and is suitable for being elastically fitted into said hole (F2) of one of said two profiles (P2).

[0040] Said first wing (1) and said second wing (2) are preferably made in separate pieces and are connected to each other by means of connection means (6).

[0041] The connection means (6) comprise:

- a hole (61) drilled on the first wing (1), specifically on the rigid portion (31) of the first wing (1);
- a threaded hole (62) drilled on the second wing (2), specifically on the rigid portion (32) of the second wing (2); and
- a screw (60) threaded into the hole (61) and engaged in the threaded hole (62).

[0042] In an alternative embodiment of the invention, said first wing (1) and said second wing (2) are made in one piece, defining a corner joint (100) of monolithic type.

[0043] Said first wing (1) and said second wing (2) of the corner joint are preferably made of steel or extruded or die-cast aluminum or zamac or plastic.

[0044] The rigid portion (31, 32) of the first wing (1) and of the second wing (2) has a maximum cross-sectional dimension such that said wing (1, 2) is perfectly accommodated inside the longitudinal cavity of the profile (P1, P2). Otherwise said, the rigid portion has a maximum cross-sectional dimension such that there is no clearance between the rigid portion (31, 32) and the profile (P1, P2) when the rigid portion (31, 32) is inserted into the longitudinal cavity of the profile (P1, P2).

[0045] With reference to Fig. 1A, the rigid portion (31, 32) has a longitudinal axis (X3) suitable for being aligned with the longitudinal center axis of the profile (P1, P2) when said wing (1, 2) is attached to the profile (P1, P2).

[0046] The rigid portion (31, 32) has an inner face (30a) suitable for abutting against the inner wall of the profile (P1, P2) when the wing (1, 2) is attached to the profile (P1, P2) and an outer face (30b) suitable for abutting against the outer wall of the profile (P1, P2) when the wing (1, 2) is attached to the profile (P1, P2).

[0047] A plane (V-V) is shown in Fig. 1A, on which said inner face (30a) lies and which is parallel to the longitudinal axis (X3).

[0048] Said rigid portion (31, 32) comprises an inclined face (33) which is adjacent to the inner face (30a) and defines an obtuse angle (β) between 130° and 170° with the plane (V-V).

[0049] With particular reference to Figs. 1A and 1B, the elastically compressible portion (4) comprises a U-folded plate (40), comprising:

- a first section (41) connected to the rigid portion (31; 32) and projecting from the rigid portion (31, 32);
- a second section (42) opposed to the first section (41) and comprising a free end (420); and
- an intermediate section (43) that connects the first section (41) and the second section (42) to each other.

[0050] As shown in Figs. 1A and 1B, said fixed peg (91, 92) is arranged on an outer surface (40b) of said second section (42) of the plate (40) and is positioned close to the free end (420) of the second section (42).

[0051] When the elastically compressible portion is at rest, the fixed peg (91, 92) protrudes with respect to the outer face (30b) of the respective rigid portion (31, 32).

[0052] The fixed peg (91, 92) comprises an inclined invitation surface (90) conformed in such a way that, when the wing (1, 2) is inserted into the profile (P1, P2), said invitation surface (90) intercepts the end edge of the profile (P1, P2) causing the second section (42) to flex toward the first section (41) and thus allowing the elastically compressible portion (4) to be engaged inside the longitudinal cavity of the profile (P1, P2).

[0053] So, during the insertion of the wing (1, 2) into the longitudinal cavity of the profile (P1, P2), the first section and the second section (41 and 42) come closer together, thus compressing the elastically compressible portion (4) with respect to its natural shape.

[0054] Preferably, the intermediate section (43) is curved and basically U-shaped with concavity facing the corresponding rigid portion (31, 32) of the wing (1, 2).

[0055] Referring to Fig. 1B, the second section (42) of the elastically compressible portion (4) extends along an extension axis (X4) that is inclined with respect to the longitudinal axis (X3) of the rigid portion (31, 32).

[0056] Specifically, the extension axis (X4) is inclined by an angle (α) comprised between 1° and 30° with respect to the longitudinal axis (X3) of the rigid portion (31,32).

[0057] Again with reference to Fig. 1B, the first section (41) of the plate (40) comprises a curved portion (411) with a convexity facing the second section (42) and a concavity facing the opposite direction.

[0058] The first section (41) also includes an inclined portion (410) interposed between said curved portion (411) of the first section (41) and the inclined face (33) of the rigid portion (31, 32).

[0059] With reference to Fig. 1B, the inclined portion (410) defines an acute angle (γ) comprised between 1° and 30° with the plane (V-V) on which the inner face (30a) of the rigid portion lies.

[0060] Moreover, as shown in Fig. 1B, the plane (V-V) is tangent to the outer surface of the first section (41) at two points, namely:

- a first connection point (r1) that connects the inclined portion (410) of the first section (41) with the curved portion (411);
- a second connection point (r2) that connects the curved portion (411) of the first section (41) with the intermediate section (43).

[0061] The configuration of the first section (41) was especially designed to make it easier and simpler to insert the elastically compressible portion (4) inside the longitudinal cavity of the profile (P1, P2).

[0062] Referring to Figs. 1A and 1B, the elastically compressible portion (4) also comprises stop means (51, 52) located on the first section (41) and/or the second section (42) to prevent an excessive approach of the first section (41) to the second section (42) and a plastic deformation of the elastically compressible portion (4).

[0063] In fact, it is evident that a plastic deformation of the elastically compressible portion (4) would result in a malfunction of the elastically compressible portion with an ineffective attachment of the wing to the profile.

[0064] The stop means (51, 52) comprise:

- a tooth (52) formed on an inner face of the second section (42); and/or
- a block (51) formed on an inner face of the first section (41).

[0065] With reference to Figs. 4, 4A and 4B, the way in which a wing (1) of the corner joint (100) is attached to the respective profile (P1) is described below.

[0066] With reference to Fig. 4, during the insertion of the wing (1) into the longitudinal cavity of the profile (P1), the lower section (41) of the elastically compressible portion (4) and the fixed peg (91) intercept the edges, resulting in the first section and the second section approaching each other. So there is an elastic compression of the elastically compressible portion (4) that allows said elastic portion to penetrate the longitudinal cavity of the profile (P1).

[0067] Referring to Fig. 4A, by pushing the wing (1) further inside the profile (P1), the fixed peg and the first section slide against the outer wall and the inner wall of the profile (P1), respectively.

[0068] The wing (1) is pushed inside the profile until the fixed peg (91) is aligned with the hole (F1) and is elastically fitted inside the hole (F1).

[0069] Once the first wing (1) is attached to the hole (F1) of the profile (P1), the aforementioned operations are repeated for the second wing (2) in order to attach the second wing (2) to the hole (F2) of the other profile (P2). This results in an assembly comprising two profiles disposed at right angle and connected by the corner joint (100) according to the invention.

[0070] As a result of the foregoing description, it is apparent how the corner joint (100) according to the invention can play a key role in the field of window and door frames and in the connection of profiles in general.

[0071] In fact, the provision of the elastically compressible portion (4) greatly facilitates and accelerates the connection of two adjacent profiles.

[0072] It should also be noted that although the two wings (1, 2) shown in the attached figures have both the rigid portion and the flexible portion, it is also possible to provide that only one of the two wings has the rigid portion and the flexible portion and that the other wing is made like a wing of a commercially known corner joint.

[0073] Additionally, although the attached figures show that the hole (F1, F2) is made in the outer wall (P11, P21) of the profile (P1, P2) and that consequently the fixed peg (91, 92) is directed toward the outer wall (P11, P21) to be engaged in the hole (F1, F2), in an alternative embodiment of the invention said hole (F1, F2) can be made in the inner wall of the profile and consequently the fixed peg (91, 92) is directed toward said inner wall.

[0074] Numerous variations and modifications of detail may be made to the present embodiment of the invention, within the scope of a person skilled in the art, but still within the scope of the invention as expressed by the appended claims.

Claims

1. Corner joint (100) for the connection of two adjacent profiles (P1, P2); a hole (F1, F2) being drilled on each profile (P1, P2) for the attachment of the corner joint (100); said corner joint (100) comprising a first wing (1) and a second wing (2) connected to each other so as to define a vertex of the corner joint (100); wherein said first wing (1) comprises a rigid portion (31) connected to the second wing (2), an elastically compressible portion (4) connected to said rigid portion (31), and a fixed peg (91) disposed on said elastically compressible portion (4) and suitable for being elastically fitted into the hole (F1) drilled in one of the two profiles (P1);
characterized in that said elastically compressible portion (4) comprises a U-shaped plate (40) comprising:

   - a first section (41) connected to the rigid portion (31; 32);
   - a second section (42) opposite to the first section (41) and comprising a free end (420); wherein said fixed peg (91, 92) is arranged on an outer surface (40b) of said second section (42) of the plate (40);
   - an intermediate section (43) connecting the first section (41) and the second section (42).

2. The corner joint (100) according to claim 1, wherein the second wing (2) comprises a rigid portion (32) connected to the first wing (1), an elastically compressible portion (4) connected to said rigid portion (32), and a fixed peg (92) disposed on said elastically compressible portion (4) and suitable for being elastically fitted into said hole (F2) drilled in one of the two profiles (P2).

3. The corner joint (100) according to any one of the preceding claims, wherein said first section (41) of the plate (40) comprises a curved portion (411) with a convexity facing the second section (42) and a concavity facing the opposite direction.

4. The corner joint (100) according to any one of the preceding claims, wherein said elastically compressible portion (4) comprises stop means (51, 52) disposed on the first section (41) and/or on the second section (42) to prevent the first section (41) from excessively approaching the second section (42) in order to prevent a plastic deformation of the elastically compressible portion (4).

5. The corner joint (100) according to claim 4, wherein said stop means (51, 52) comprise:

   - a tooth (52) formed on an inner face of the second section (42); and/or
   - a block (51) formed on an inner face of the first section (41).

6. The corner joint (100) according to any one of the preceding claims, wherein said wings (1, 2) are made in two separate pieces and are connected by means of connecting means (6) comprising:

   - a hole (61) drilled on the first wing (1);
   - a threaded hole (62) drilled on the second wing (2);
   - a screw (60) inserted into the hole (61) and engaged in the threaded hole (62).

7. The corner joint (100) according to any one of claims 3 to 6, wherein the rigid portion (31, 32) comprises an inner stop face (30a) that lies on a plane (V-V) and an inclined face (33) that is adjacent to the inner stop face (30a) and defines an obtuse angle (β) comprised between 130° and 170° with the plane (V-V); wherein said first section (41) of the plate (40) includes an inclined portion (410) disposed between said curved portion (411) of the first section (41) and the inclined face (33) of the rigid portion (31, 32); said inclined portion (410) defining an acute angle (γ) comprised between 1° and 30° with said plane (V-V).

8. The corner joint (100) according to any one of the preceding claims, wherein the rigid portion (31, 32) has a longitudinal axis (X3); wherein said second section (42) of the elastically compressible portion (4) extends along an axis of extension (X4) that is inclined with respect to the longitudinal axis (X3) of the rigid portion (31, 32) by an angle (α) comprised between 1° and 30°.

9. Kit comprising:

- a first profile (P1) and a second profile (P2), each one comprising a hole (F1, F2);
- a corner joint (100) according to any one of the preceding claims; wherein the first wing (1) of the corner joint is suitable for being inserted into the first profile (P1) and engaged into the hole (F1) of the first profile (P1); wherein the second wing (2) of the corner joint is suitable for being inserted into the second profile (P2) and engaged into the hole (F2) of the second profile.

10. Assembly comprising:

- a first profile (P1) and a second profile (P2) adjacent to each other and preferably arranged at right angle;
- a corner joint (100) according to any one of claims 1 to 8; wherein the first wing (1) of the corner joint (100) is inserted into the first profile (P1) and is attached to the hole (F1) of the first profile (P1), and wherein the second wing (2) of the corner joint (100) is inserted into the second profile (P2) and is attached to the hole (F2) of the second profile (P2).

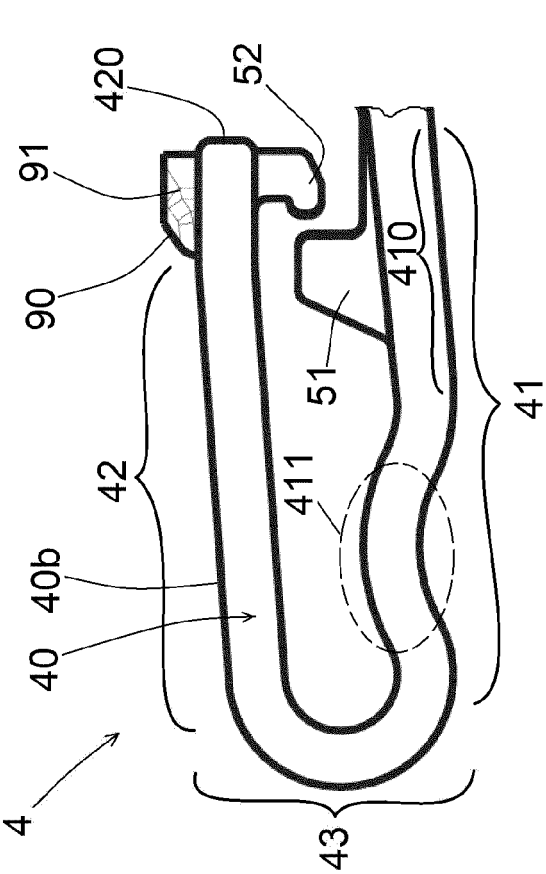

FIG. 1B

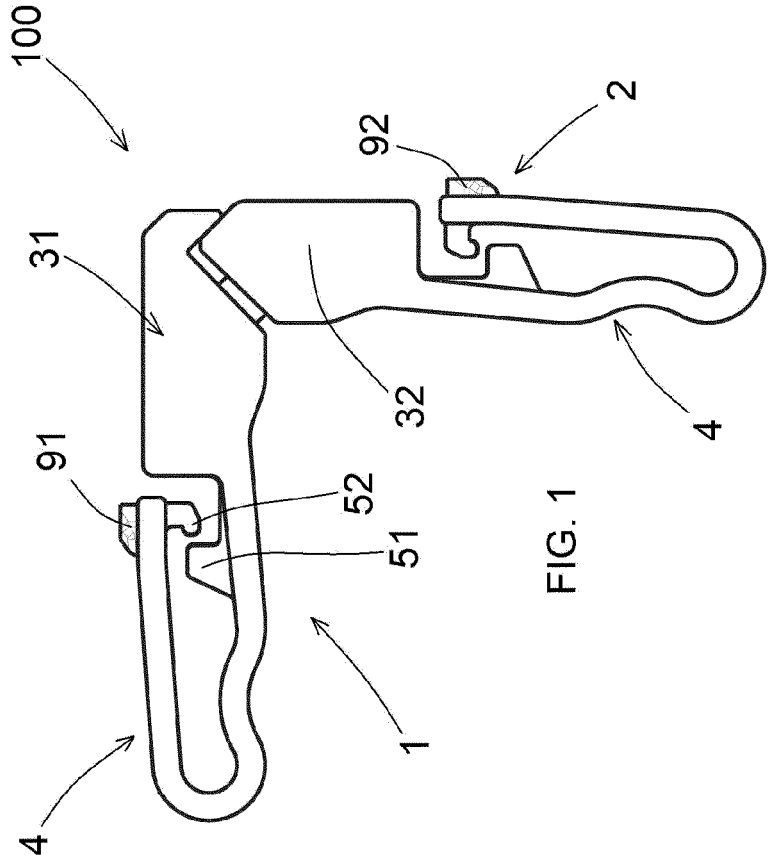

FIG. 1

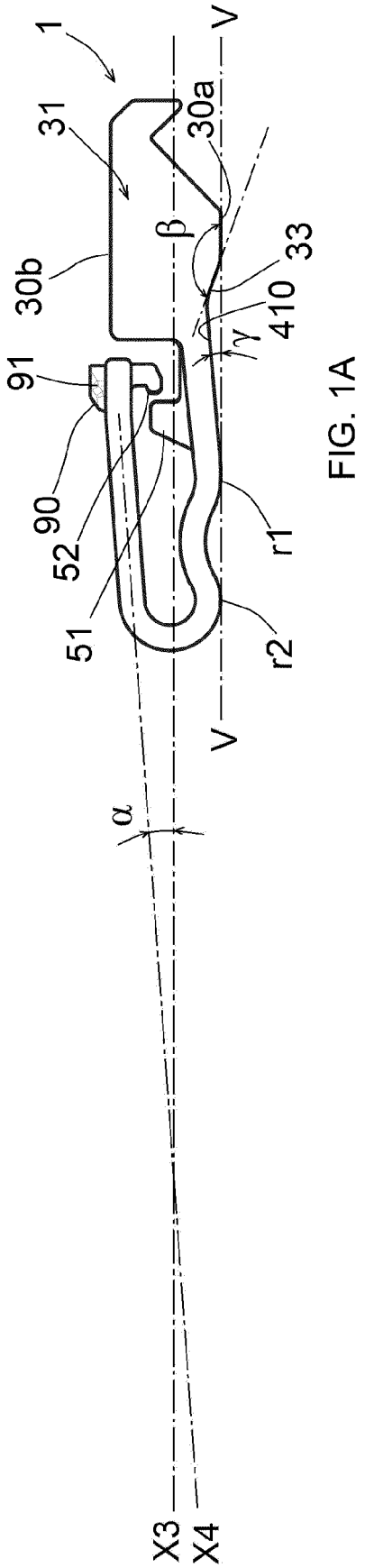

FIG. 1A

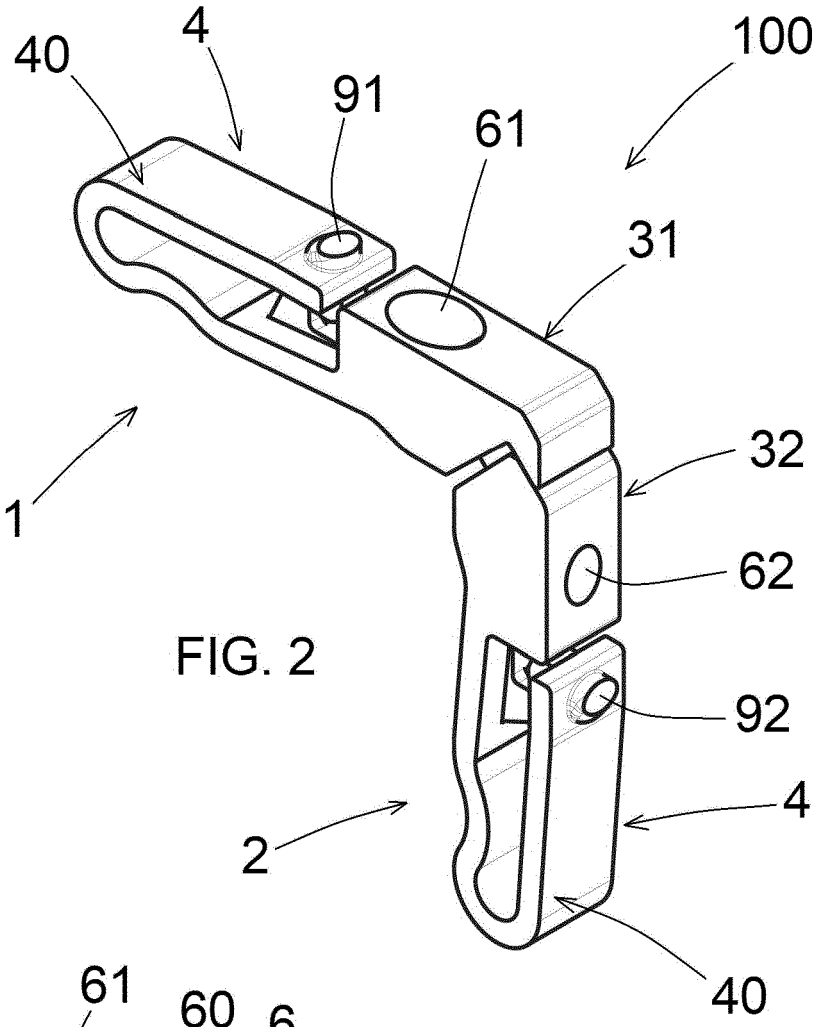
40
4
91
61
100
31
1
32
62
92
2
4
40

FIG. 2

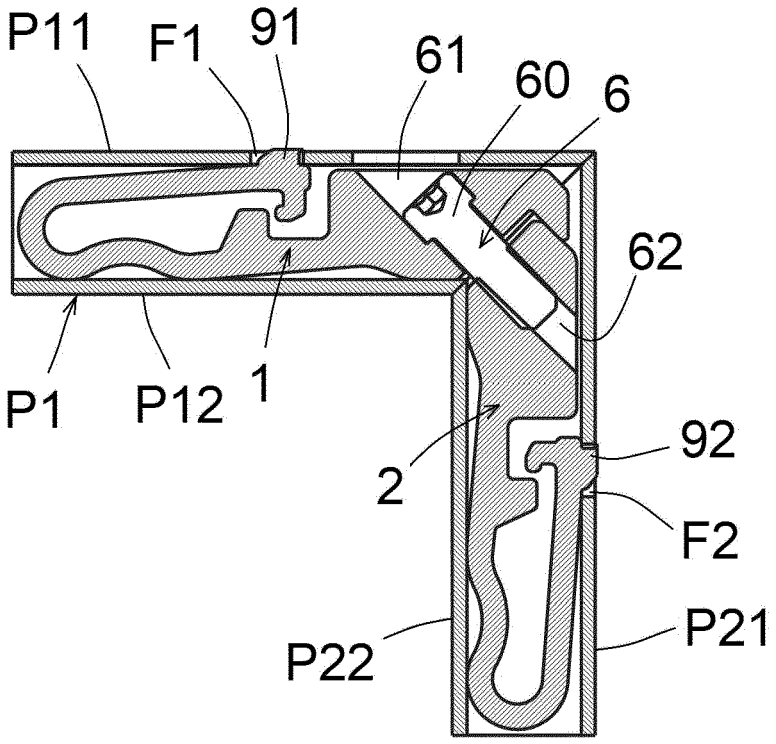
P11
F1
91
61
60
6
62
P1
P12
1
2
92
F2
P22
P21

FIG. 3

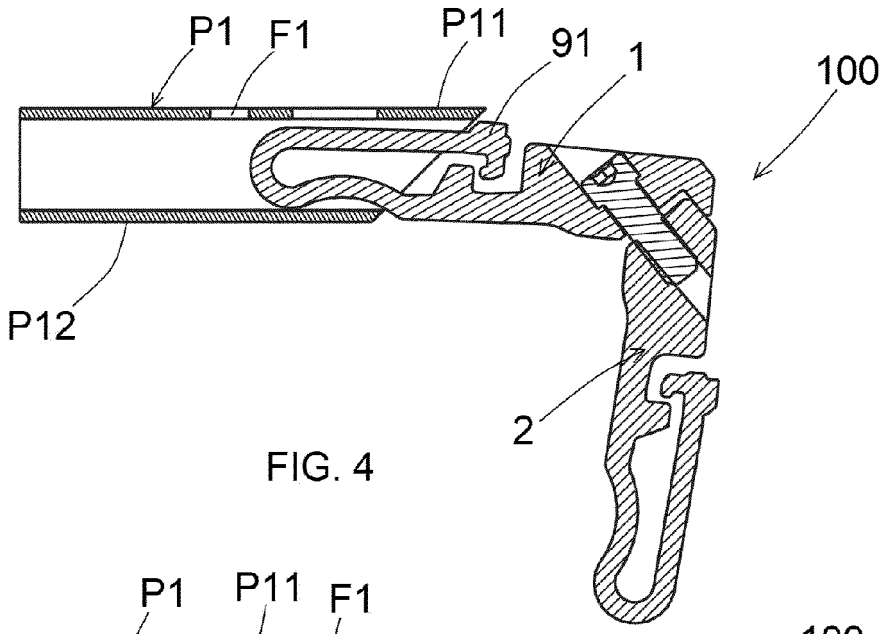

FIG. 4

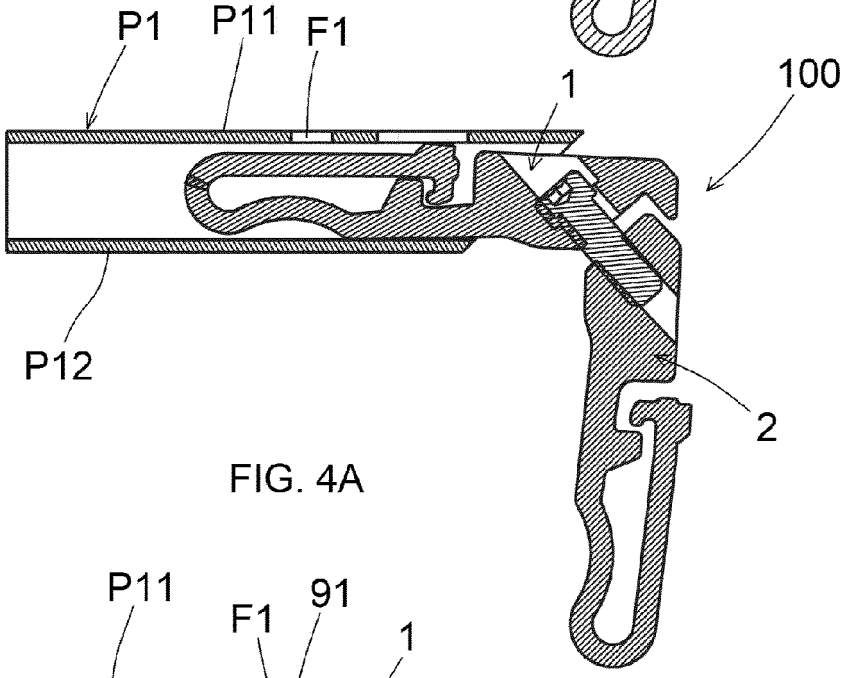

FIG. 4A

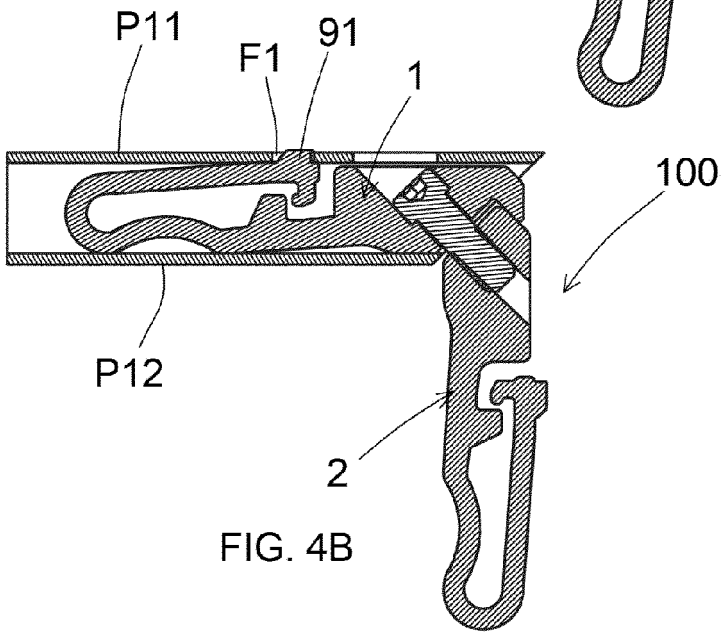

FIG. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 4166

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/064600 A1 (TSENG HUANG-CHI [TW] ET AL) 14 March 2013 (2013-03-14)	1,2,8-10	INV. E06B3/968
A	* figures 4-6 *	3-7	
A	WO 2014/102558 A1 (VARGAS OSORNO MARIELA [CO]; VARGAS OSORNO CAMILO ANTONIO [CO] ET AL.) 3 July 2014 (2014-07-03) * figure 10 *	1-10	

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	4 February 2024	Verdonck, Benoit

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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