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# (54) CORNER JOINT FOR PVC PROFILES WITHOUT WELDING

(57) A frame (100) for window frames comprises a first profile (2), a second profile (3) and a corner joint (1) for connecting said first profile (2) and said second profile (3); said corner joint (1) comprising a lowered surface (4) disposed on a front face and/or on a rear face (12, 13) of the corner joint (1), and a plurality of pegs (41) projecting outwardly from said lowered surface (4) and drowned in adhesive.

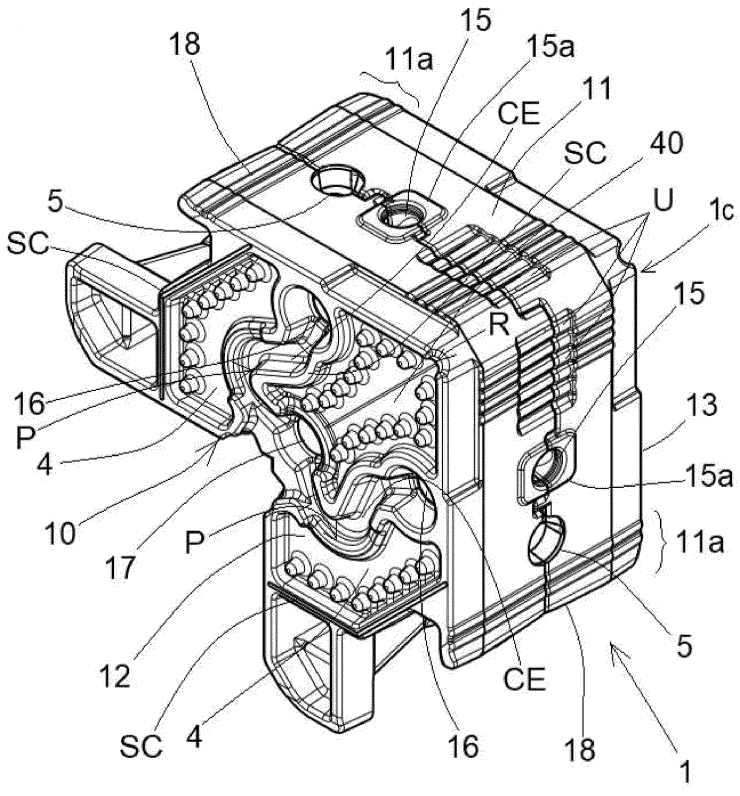


FIG. 3

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## Description

**[0001]** The present patent application for industrial invention relates to a corner joint used for connecting PVC profiles without welding. The field of reference is the production of window and door frames made of plastic materials, particularly PVC.

**[0002]** Such window and door frames consist of a set of plastic profiles, which are usually formed by extrusion or similar techniques and are welded together to obtain a frame structure wherein a glass pane or a central panel can be disposed.

**[0003]** The processes that are used for welding the PVC profiles according to the prior art provide for cutting the areas to be welded at 45° to ensure the perfect superimposition of the edges of the profiles and, consequently, an effective welding that is capable of firmly holding the profiles together.

**[0004]** When compared with windows and doors made of other materials, such as wood and aluminum, in spite of being simpler to fabricate and having a better performance, the windows and doors made of plastic are commonly considered inferior in terms of aesthetics. In fact, the welding of the plastic profiles generates welded beads at the corners of the window frame, which greatly impair the aesthetics of the frame and negatively affect the customer demand for plastic frames.

**[0005]** In addition, the need to weld the two PVC profiles means that the window/door manufacturer must be inevitably purchase machinery such as, for example, welding and burring machines, thus incurring in high costs.

**[0006]** EP0610675A1 describes a corner connection system of metal profiles that are arranged at right angle. The connection system comprises a corner joint comprising two wings disposed in orthogonal direction and suitable for being inserted into longitudinal channels of the two metal profiles. Spacers are provided on the outer surface of each wing, which are suitable for abutting against the inner surfaces of the metal profiles so as to form gaps between the corner joint and the profiles that are suitable for being filled with an adhesive. However, the adhesive that is injected in the gaps between the corner joint and the profiles may flow toward the ends of the wings of the corner joint, filling said gaps in a partial, inappropriate way. This results in an incorrect adhesion of the wings of the corner piece to the profiles. In order to avoid such reduced adhesion between the corner joint and the profiles, it is necessary to inject a large amount of adhesive, resulting in wastage of the same.

**[0007]** DE2307595A1 describes a corner piece for hollow plastic profiles. The corner piece comprises two wings and elastic spacers that protrude from two opposite faces of the wings and are suitable for being compressed when each wing of the corner piece is inserted inside the respective hollow profile. Adhesive is injected inside the profiles in such a way that the elastic spacers are immersed in said adhesive. Also in such a case, the injected adhesive can flow towards the ends and therefore the corner described in DE2307595A1 is impaired by the same problems as the corner joint described in EP0610675A1.

**[0008]** The purpose of the present invention is to overcome the drawbacks of the prior art by providing a plastic window frame that is effective, simple to fabricate, and aesthetically pleasing.

**[0009]** Another purpose of the present invention is to devise a plastic window frame in which the profiles are joined in a remarkably stable way without having to use a large amount of adhesive.

**[0010]** A further purpose of the present invention is to reduce the cost borne by the window and door manufacturer, allowing to fabricate a plastic window and door frame without the need to purchase expensive machinery for the welding of PVC profiles.

**[0011]** These purposes are achieved in accordance with the invention with the features listed in the attached independent claim 1.

**[0012]** Advantageous embodiments appear from the dependent claims.

**[0013]** The window frame according to the invention is defined by the independent claim 1.

**[0014]** For explanatory clarity, the description of the window frame according to the invention continues with reference to the attached drawings, which are for illustrative and non-limiting purposes only, wherein:

- Fig. 1 is an axonometric view of a frame according to the invention;
- Fig. 2 is a view of the frame of Fig. 1 sectioned according to a vertical plane passing through the hole of the frame that is used for injecting the adhesive;
- Fig. 3 is a perspective top view of a corner joint according to the invention,
- Fig. 4 is a perspective bottom view of the corner joint of Fig. 3,
- Fig. 5 is a top view of the corner join of Fig. 3;
- Fig. 6 is a perspective view of the corner joint according to the invention, provided with brackets;
- Fig. 7 is a sectional view of a portion of the corner joint that illustrates a peg and a retaining border

**[0015]** With reference to the attached Figures, the window or door frame according to the invention is described, which is generally indicated by reference numeral 100.

**[0016]** With reference to Figs. 1 and 2, said frame (100) comprises a first profile (2), a second profile (3), and a corner joint (1) connecting said first profile (2) and said second profile (3).

**[0017]** Said first profile (2) and said second profile (3) are made of a plastic material, preferably PVC.

**[0018]** Each profile (2, 3) comprises a first side wall (21, 31) suitable for facing outwardly, and a second side wall (21a, 31a), opposite to said first side wall (21, 31) and

suitable for facing inwardly.

**[0019]** Moreover, each profile (2, 3) comprises an outer wall (22, 32), facing the outside of the frame (100), and an inner wall (23, 33) opposite to the outer wall (22, 32).

**[0020]** The first side wall (21, 31), the second side wall (21a, 31a), the outer wall (22, 32) and the inner wall (23, 33) of each profile (2, 3) define a longitudinal channel (20, 30) that can be axially accessed by means of an opening formed at one end of the profile (2, 3).

**[0021]** An injection hole (25) is formed on the outer wall (22) of the first profile (2) for the injection of adhesive through an injection nozzle (B) in order to join the two profiles (2, 3).

**[0022]** The corner joint (1) is housed in the longitudinal channels (20, 30) of said two profiles (2, 3) and comprises an inner surface (10) disposed in contact with the inner walls (23, 33) of the profiles (2, 3), and an outer surface (11) disposed in contact with the outer walls (22, 32) of the profiles (2, 3).

**[0023]** With reference to Fig. 3, the corner joint (1) additionally comprises a front face (12) disposed in contact with the second side walls (21a, 31a) of the two profiles (2, 3), and a rear face (13), opposite to the front face (12) and disposed in contact with the first side walls (21, 31) of the two profiles (2, 3).

**[0024]** Each one of the front and rear faces (12, 13) of the corner joint (1) according to the invention comprises one or more lowered surfaces (4) defining seats (40) suitable for accommodating the adhesive that is injected through the injection hole (25) formed on the first profile (2). Obviously, said lowered surfaces (4) can also be provided at only one of said two front and rear faces (12, 13) of the corner joint (1).

**[0025]** The corner joint (1) also comprises retaining borders (SC) rising from the lowered surfaces (4) and defining the seat (40) at least partially, so as to contain the adhesive in the seat (40). The retaining border (SC) has a free end (SC1) suitable for abutting against an interior surface of the first side wall or of the second side wall of the profile.

**[0026]** Each retaining border (SC) has a length equal to at least half the length of the perimeter of the respective lowered surface (4).

**[0027]** The retaining borders (SC) are configured in such a way to contain the adhesive toward the center of the corner joint. A lowered space (R) (shown in Fig. 3) is formed in the retaining borders (SC) to let the adhesive flow toward the outer surface (11).

**[0028]** As shown in Figs. 2 and 3, the corner joint (1) according to the invention comprises at least one inlet hole (15) formed on the outer surface (11) of the corner joint (1) in communication with the injection hole (25) of the first profile (2) to convey the adhesive toward the inside of the corner joint. Advantageously, said inlet hole (15) formed on the outer surface (11) of the corner joint (1) has an annular rib (15a) suitable for cooperating with the injection nozzle (B) in order to prevent the adhesive from spilling during the injection of the adhesive. The annular rib (15a) is in contact with the first profile (2), thus forming a gap between the first profile (2) and the outer surface (11) of the corner joint (1) which is suitable for accommodating the adhesive coming from the lowered surface (4) of the front and/or of the rear face (12, 13) and passing through said lowered space (R) of the retaining border (SC). As shown in Fig. 3, the outer surface (11) comprises ribs (U) suitable for being drowned in the adhesive.

**[0029]** The corner joint (1) according to the invention further comprises, at least one outlet hole (16) formed on the front face and/or on the rear face (12, 13) of the corner joint (1) in communication with the inlet hole (15) to let the adhesive flow from said inlet hole (15) toward the seats (40) of the corner joint.

**[0030]** Specifically, each one of said front and rear faces (12, 13) of the corner joint (1) advantageously comprises four lowered surfaces (4) and two outlet holes (16) formed near the outer surface (11) of the corner joint.

**[0031]** With reference to Figs. 3 and 5, the corner joint (1) comprises a plurality of pegs (41) protruding outwardly from each one of said lowered surfaces (4) and suitable for being drowned in the adhesive conveyed into the seats (40) of the corner joint (1). With reference to Fig. 7, the pegs (41) have a lower height (H41) than the height (HSC) of the retaining border (SC) and therefore they are not in contact with the inner surface of the side walls of the profiles.

**[0032]** With reference to Figs. 3 and 5, advantageously, said pegs (41) are distributed at regular intervals alongside the retaining border (SC) along a trajectory that exactly reproduces the trajectory of the retaining border (SC). Because of such a peculiarity, the adhesive can flow freely on the central portion of the lowered surfaces (4) and can be uniformly distributed in the seats (40), thus drowning the pegs (41) and adhering to the first side wall (21, 31) and to the second side wall (21a, 31a) of the profiles (2, 3).

**[0033]** In view of the above, due to the provision of said pegs (41) and to their peripheral distribution along the lowered surfaces (4) of the corner joint, it is possible to ensure an optimal joint between the corner joint (1) and the profiles (2, 3), which is mechanically equal to welding.

**[0034]** A channeling hole (17) is formed on said front face (12) and/or on said rear face (13) of the corner joint (1), ending into the inner surface (10) of the corner joint (1), in such a way that the adhesive flows from the lowered surfaces (4) toward the inner surface (10) of the corner joint (1). More precisely, the channeling hole (17) ends into a lowered portion (N) of the inner surface (10) of the corner joint whereon ribs (T) are provided. Said ribs (T) of the inner surface (10) are suitable for being drowned in the adhesive.

**[0035]** Advantageously, such a channeling hole (17) is formed on each one of the front and rear faces (12, 13) of the corner joint near the inner surface (10) of the corner joint.

**[0036]** An outer channel (EC) connecting the two holes (16, 17) is provided between the channeling hole (17) and

each outlet hole (16). Passages (P) are cut on the outer channel (EC) to let the adhesive flow out of the outer channel (EC) in order to be conveyed over the lowered surface (4) wherein the pegs (41) are provided.

**[0037]** The trajectory followed by the adhesive when it is injected from the injection hole (25) of the first profile (2) is described hereinafter.

**[0038]** Firstly, the adhesive injected from the injection hole (25) flows into the inlet hole (15) of the corner joint (1), ending into said outer channel (EC) through said outlet hole (16).

**[0039]** Once the adhesive has reached the outer channel (EC):

- a portion of the adhesive is poured into the lowered surfaces (4) formed on the front and/or on the rear face (12, 13) of the corner joint (1), passing through the passages (P) and ensuring a perfect adhesion between the front and/or the rear face (12, 13) of the corner joint (1) and the first side wall (21, 31) and the second side wall (21a, 31a) of the profiles (2, 3); and
- another portion of the adhesive passes through the channeling hole (17) and is poured into the lowered portion (N) of the inner surface (10) of the corner joint (1), ensuring a perfect adhesion between the inner surface (10) of the corner joint (1) and the inner wall (23, 33) of each profile.

**[0040]** Successively, the adhesive is propagated and distributed over the lowered surfaces (4) of the front and/or of the rear face (12, 13) and is finally conveyed toward the outer surface (11) of the corner joint (1) by passing through the lowered space (R) of the retaining border (SC).

**[0041]** Thus, therefore, the corner joint (1) is completely covered and drowned in the adhesive.

**[0042]** The ribs (T, U) formed on the inner surface (10) and on the outer surface (11), as well as the pegs (41) formed on the lowered surface (4) of the front and rear faces (12, 13) of the corner joint (1) are suitable for distributing the adhesive uniformly, thus ensuring the optimal stability of the joint.

**[0043]** With reference to Fig. 5, in a preferred embodiment of the invention, the corner joint (1) of monolithic type comprises a first wing (1a) arranged in the longitudinal channel (20) of the first profile (2), and a second wing (1b) arranged in the longitudinal channel (30) of the second profile (3). The two wings (1a, 1b) are joined together to form an edge (1c) at the outer surface (11) of the corner joint. Specifically, the two wings (1a, 1b) are specular with respect to a plane passing through the edge (1c) and through the axis of the channeling hole (17) of the corner joint. Thus, the front face (12) and the rear face (13) of each of said two wings (1a, 1b) is provided with an outlet hole (16) and two lowered surfaces (4).

**[0044]** In order to verify the completion of the gluing operation between the two profiles (2, 3), the first profile (2) is provided with an outlet hole (26) (Fig. 1) formed on the relevant outer wall (22) and ending into the longitudinal channel (20) of the first profile. In particular, said outlet hole (26) is obtained in the vicinity of said injection hole (25) in order to be crossed by the adhesive when the profiles (2, 3) are completely adhered. More precisely, the adhesive is suitable for flowing out of the outlet hole (26) of the first profile (2) when the sealing of the two profiles (2, 3) has been completed.

**[0045]** With reference to Figs. 2, 3 and 4, in order to ensure the optimal joint of the profiles (2, 3), each profile (2, 3) comprises at least one transverse opening (24, 34) in communication with the corresponding longitudinal channel (20, 30), and the corner joint (1) comprises threaded holes (5) formed on the inner surface (10) and/or on the outer surface (11) of the corner joint and aligned with said transverse openings (24, 34) of the profiles. Thus, fixing screws (50) can be threaded into said transverse openings (24, 34) of the profiles (2, 3) and screwed into said threaded holes (5) of the corner joint, so as to firmly join the two profiles (2, 3).

**[0046]** In particular, said transverse openings (24, 34) are formed on both the outer wall (22, 32) and the inner wall (23, 33) of each profile, so that the profiles (2, 3) can be tightened either from the inside or from the outside, depending on the aesthetic requirements of the window frame. Similarly, said threaded holes (5) are advantageously formed on both the inner (10) and outer (11) surfaces of the corner joint.

**[0047]** With reference to Fig. 3, the corner joint (1) further comprises end ribs (18) formed at end portions (11a) of the outer surface (11) of the corner joint (1) to eliminate any clearance between said corner joint (1) and the profiles (2, 3), so that the adhesive is contained between the outer surface (11) of the corner joint (1) and the outer walls (22, 32) of the profiles (2, 3), without flowing beyond the end portions (11a) of the outer surface (11) of the corner joint (1).

**[0048]** Finally, with reference to Fig. 6, the corner joint (1) can be provided with brackets (6a, 6b) protruding from the front and/or rear faces (12, 13) of the corner joint for the attachment of accessories. such as, for example, a hinge or a stiffening profile, generally disposed in the longitudinal channels of the PVC profiles to impart greater strength to the window or door frame.

**[0049]** More specifically, the corner joint (1) advantageously comprises two front brackets (6a) that protrude from the front face (13) of the corner joint in an L-shaped conformation and are inserted into the longitudinal channels (20, 30) of the profiles, and two rear brackets (6b) that protrude from the rear face (12) of the bracket, in an L-shaped configuration, and are inserted into longitudinal channels (20, 30) of the profiles.

**[0050]** The brackets (6a, 6b) can be made in one piece with the corner joint (1) or they can be separated from the corner joint (1) and connected to the latter in a removable or immovable manner.

**[0051]** In view of the above description, the advantages of the present invention appear obvious.

**[0052]** In fact, thanks to the presence of the retaining borders (SC) that define the seats (40) at least partially, the adhesive is confined to the most useful points for fixing the profiles with the corner joint. The pegs (41) protruding from the lowered surfaces and completely drowned in the adhesive reduce the elastic behavior between profiles, corner joint and adhesive and the relative sliding between corner joint and profiles.

**[0053]** Such an elastic behavior of the adhesive is also limited by the presence of the ribs (T, U) formed on the inner surface (10) and on the outer surface (11) of the corner joint (1).

**[0054]** In fact, it should be pointed out that the plastic profiles (especially PVC profiles) do not have the same structural tightness as aluminum profiles. However, thanks to the provision of the retaining borders, of the pegs (41) and of the ribs (T, U) that limit the sliding between the profiles and the corner joint, the connection of the PVC profiles can be as stable and firm as the connection of the aluminum profiles.

**[0055]** Numerous variations and modifications can be made to the present embodiment of the invention, within the reach of a person skilled in the art, but still falling in the scope of the invention as expressed by the appended claims.

## Claims

**1.** Frame (100) for window frames comprising a first profile (2), a second profile (3), and a corner joint (1) connecting said first profile (2) and said second profile (3);

each profile (2, 3) comprising:

- a longitudinal channel (20, 30) and an opening that provides access to said longitudinal channel (20, 30) formed at one end of the profile (2, 3);
- a first side wall (21, 31),
- a second side wall (21a, 31a) opposite to the first side wall (21, 31),
- an outer wall (22, 32) facing the outside of the frame (100), and
- an inner wall (23, 33) opposite to the outer wall (22, 32);

said corner joint (1) being housed inside the longitudinal channels (20, 30) of said two profiles (2, 3) and comprising:

- an inner surface (10) disposed in contact with the inner walls (23, 33) of the profiles (2, 3)
- an outer surface (11) disposed in contact with the outer walls (22, 32) of the profiles (2, 3);
- a front face (12) disposed in contact with the second side walls (21a, 31a) of the two profiles (2, 3); and
- a rear face (13) opposite to the front face (12) and disposed in contact with the rear walls (21, 31) of the two profiles (2, 3);
- at least a lowered surface (4) defining a seat (40) and disposed on the front face and/or on the rear face (12, 13) of the corner joint of the corner joint (1), and a plurality of pegs (41) projecting outwardly from said lowered surface (4);

wherein said frame (100) comprises an adhesive that drowns said pegs (41) and is in contact with said lowered surface (4) of the corner joint (1) and with said first side wall (21, 31) and/or said second side wall (21a, 31a) of the profiles (2, 3);

**characterized by** the fact that said corner joint (1) comprises at least one retaining border (SC) rising from the lowered surface (4) and defining the seat (40) at least partially in such a way to contain the adhesive inside the seat (40); wherein said retaining border (SC) has an end (SC1) suitable for abutting against an inner surface of the first side wall or of the second side wall of the profile.

**2.** The frame (100) according to claim 1, wherein said pegs (41) have a lower height (H41) than the height (HSC) of the retaining border (SC).

**3.** The frame (100) according to claim 1 or 2, wherein said first profile (2) and said second profile (3) are made of plastic material.

**4.** The frame (100) according to claim 3, wherein said first profile (2) and said second profile (3) are made of PVC.

**5.** The frame (100) according to any one of the preceding claims, wherein said retaining border (SC) has a length equal to at least half the length of the perimeter of the lowered surface (4).

**6.** The frame (100) according to any one of the preceding claims, wherein said pegs (41) are distributed at regular intervals side by side with the retaining border (SC) along a trajectory that reproduces the trajectory of the retaining border (SC).

**7.** The frame (100) according to any one of the preceding claims, wherein said first profile (2) comprises an injection hole (25) formed in the outer wall (22) of said first profile (2) for injection of adhesive;

said corner joint (1) comprising:

- an inlet hole (15) formed on the outer surface (11) of the corner joint (1) in communication with said injection hole (25) of the first profile (1);
- at least one outlet hole (16) formed on said front face (12) and/or on said rear face (13) of the corner joint (1) in communication with the inlet hole (15) and disposed at the lowered surface (4) of the corner joint for the passage of adhesive toward said lowered surface (4) of the corner joint; and
- a channeling hole (17) formed in said front face (12) and/or said rear face (13) of the corner joint (1) and ending at the inner surface (10) of the corner joint (1) in such a way to let the adhesive flow from said lowered surface (4) toward the inner surface (10) of the corner joint (1);

wherein said first profile (2) comprises an outlet hole (26) formed on the outer wall (22) of the first profile (2) and ending into said longitudinal channel (20) of the first profile; said outlet hole (26) being formed in the vicinity of said injection hole (25) and being traversed by the adhesive that surrounds the corner joint when the profiles (2, 3) are fully adhered.

**8.** The frame (100) according to claim 7, wherein said corner joint (1) has at least one outer channel (EC) that connects said outlet hole (16) with said channeling hole (17); wherein said outer channel (EC) comprises passages (P) that allow the adhesive to flow out of the outer channel (EC) and be poured onto the lowered surface (4) wherein the pegs (41) are provided.

**9.** The frame (100) according to any one of the preceding claims, wherein ribs (T, U) suitable for being drowned in the adhesive are formed on said inner surface (10) and on said outer surface (11).

**10.** The frame (100) according to any one of the preceding claims, wherein said corner joint (1) comprises end ribs (18) formed at the end portions (11a) of the outer surface (11) of the corner joint (1) to eliminate any clearance between said corner joint (1) and the profiles (2, 3).

**11.** The frame (100) according to any one of the preceding claims, wherein said inlet hole (15) of the corner joint (1) has an annular rib (15a) suitable for cooperating with an injection nozzle (B) in order to prevent the adhesive from spilling during the injection of the adhesive.

**12.** The frame (100) according to any one of the preceding claims, wherein

each profile (2, 3) comprises at least one transverse opening (24, 34) formed on the inner wall (23, 33) and/or on the outer wall (22, 32) of the profile and communicating with said longitudinal channel (20, 30) of the profile;
for said at least one transverse opening (24, 34), said corner joint (1) comprises a threaded hole (5) formed on the inner surface (10) or on the outer surface (11) of the corner joint and aligned with said at least one transverse opening (24, 34) of the profiles; and
for said at least one transverse opening (24, 34), said frame comprises a fixing screw (50) threaded into said at least one transverse opening (24, 34) of the profiles (2, 3) and screwed into said threaded hole (5) of the corner joint.

**13.** The frame (100) according to any one of the preceding claims, wherein said corner joint (1) comprises:

- two front brackets (6a) protruding from the front face (12) of the corner joint in an L-shaped configuration and inserted into the longitudinal channels (20, 30) of the profiles, and/or
- two rear brackets (6b) protruding from the rear face (13) of the corner joint in an L-shaped configuration and inserted into the longitudinal channels (20, 30) of the profiles.

**14.** The frame (100) according to claim 13, further comprising:

a stiffening profile arranged in the longitudinal channel (20, 30) of one of the two profiles and attached to said brackets (6a, 6b) of the corner joint, and/or
a hinge attached to the frame by means of screws passing through one of the two profiles and screwed into holes drilled in one of said brackets (6a, 6b) of the corner joint.

**15.** Corner joint (1) suitable for being placed inside longitudinal channels (20, 30) of two profiles (2, 3) to connect said profiles (2, 3); each profile (2, 3) comprising a first side wall (21, 31), a second side wall (21a, 31a), opposite to the first side wall (21, 31), an outer wall (22, 32) suitable for facing outward, and an inner wall (23, 33) opposite to the outer wall (22, 32);

said corner joint (1) comprising:

- an inner surface (10) arranged in contact with the inner walls (23, 33) of the profiles (2, 3)
- an outer face (11) arranged in contact with the outer walls (22, 32) of the profiles (2, 3);
- a front face (12) arranged in contact with the second side walls (21a, 31a) of the two

profiles (2, 3); and
- a rear face (13) opposite to the front face (12) and arranged in contact with the rear walls (21, 31) of the two profiles (2, 3);
- at least one lowered surface (4), defining a seat (40), disposed on the front face and/or on the rear face (12, 13) of the corner joint (1), and a plurality of pegs (41) projecting outwardly from said lowered surface (4); said pegs (41) being suitable for being drown in an adhesive;

**characterized in that** it comprises at least one retaining border (SC) rising outwardly from said lowered surface (4) and defining said seat (40) at least partially so as to contain the adhesive in said seat (40); wherein said retaining border (SC) has an end (SC1) suitable for abutting against an interior surface of the said first side wall or of the second side wall of said profile.

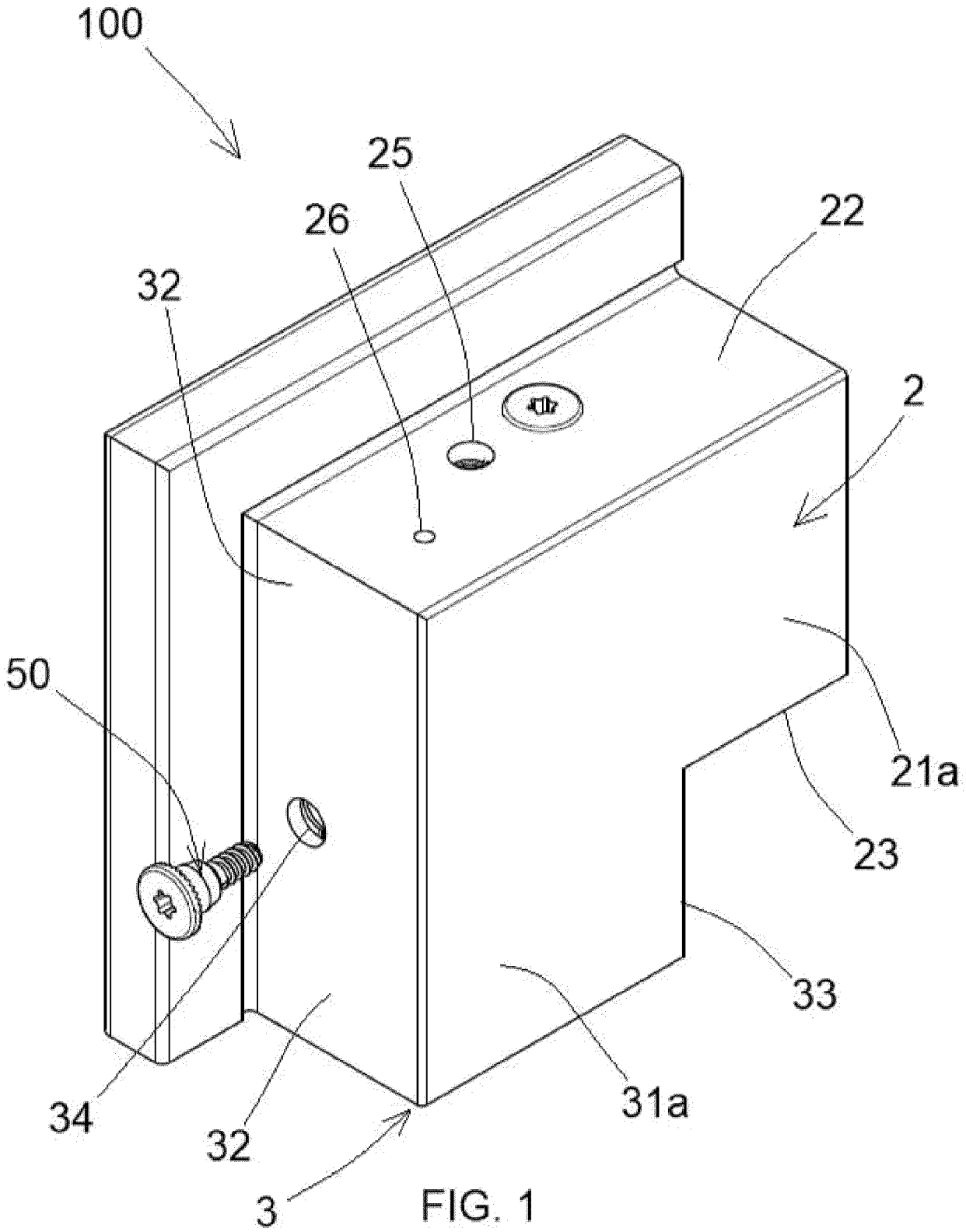



FIG. 1

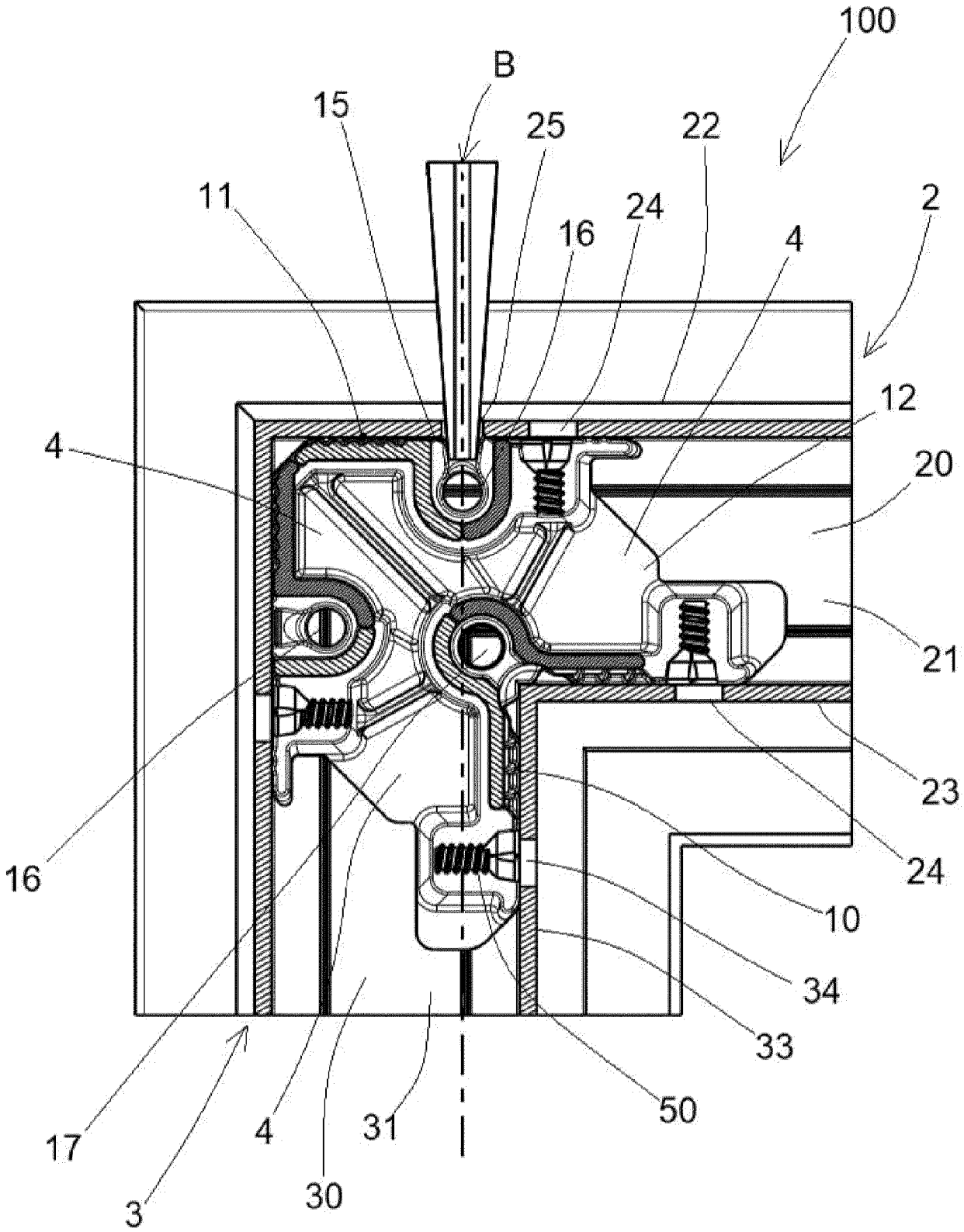
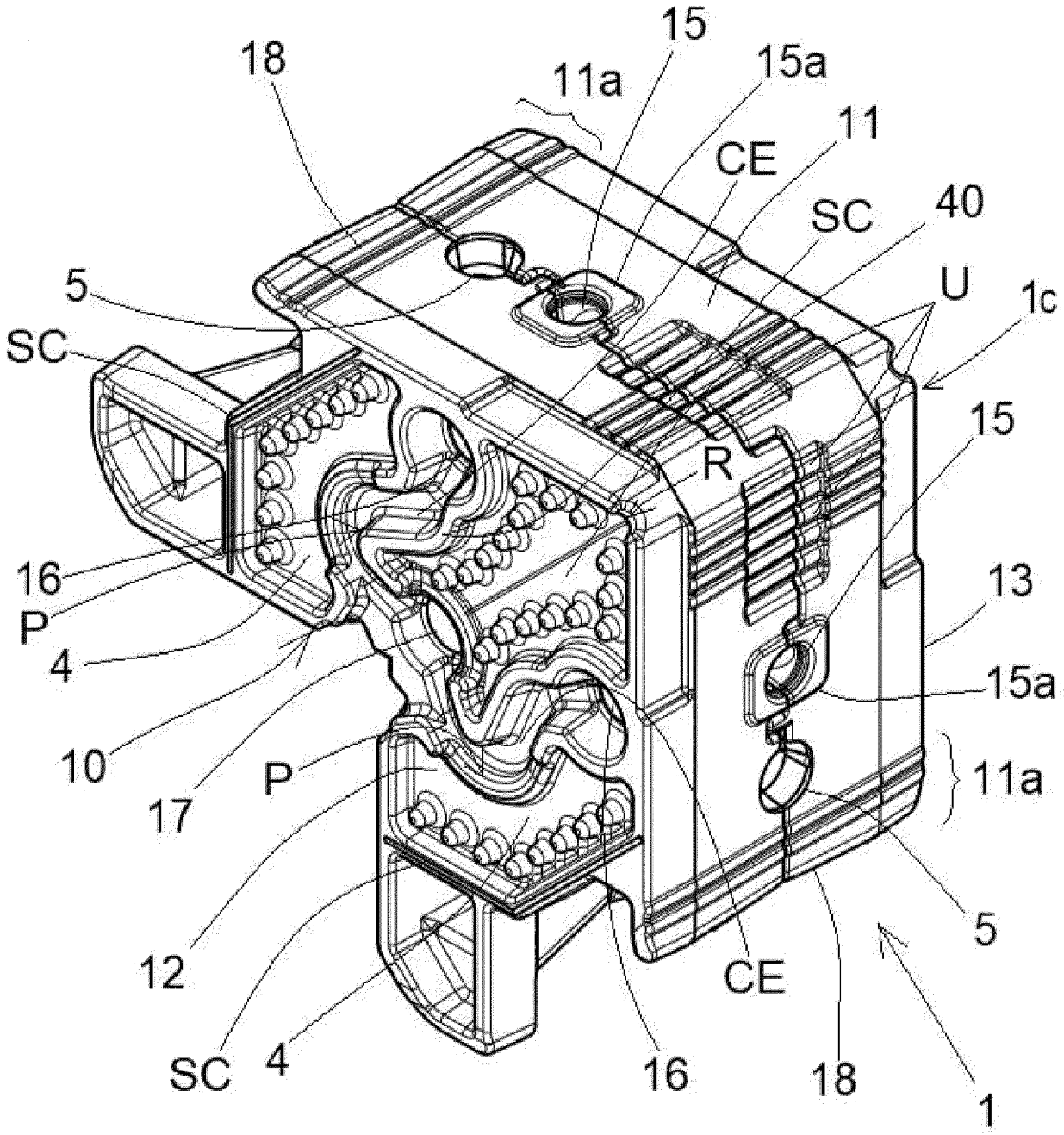



FIG. 2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1

FIG. 3

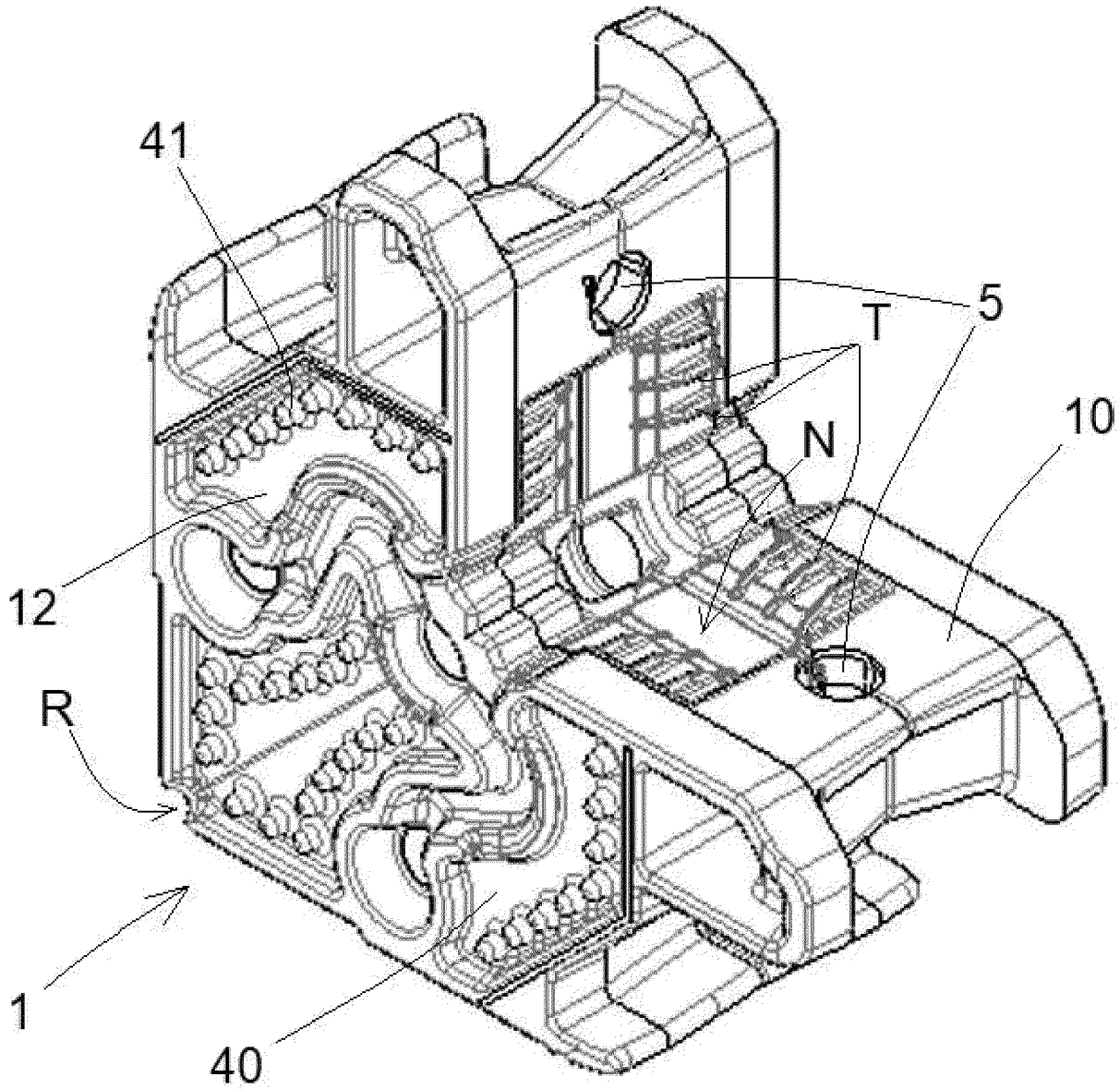


FIG. 4

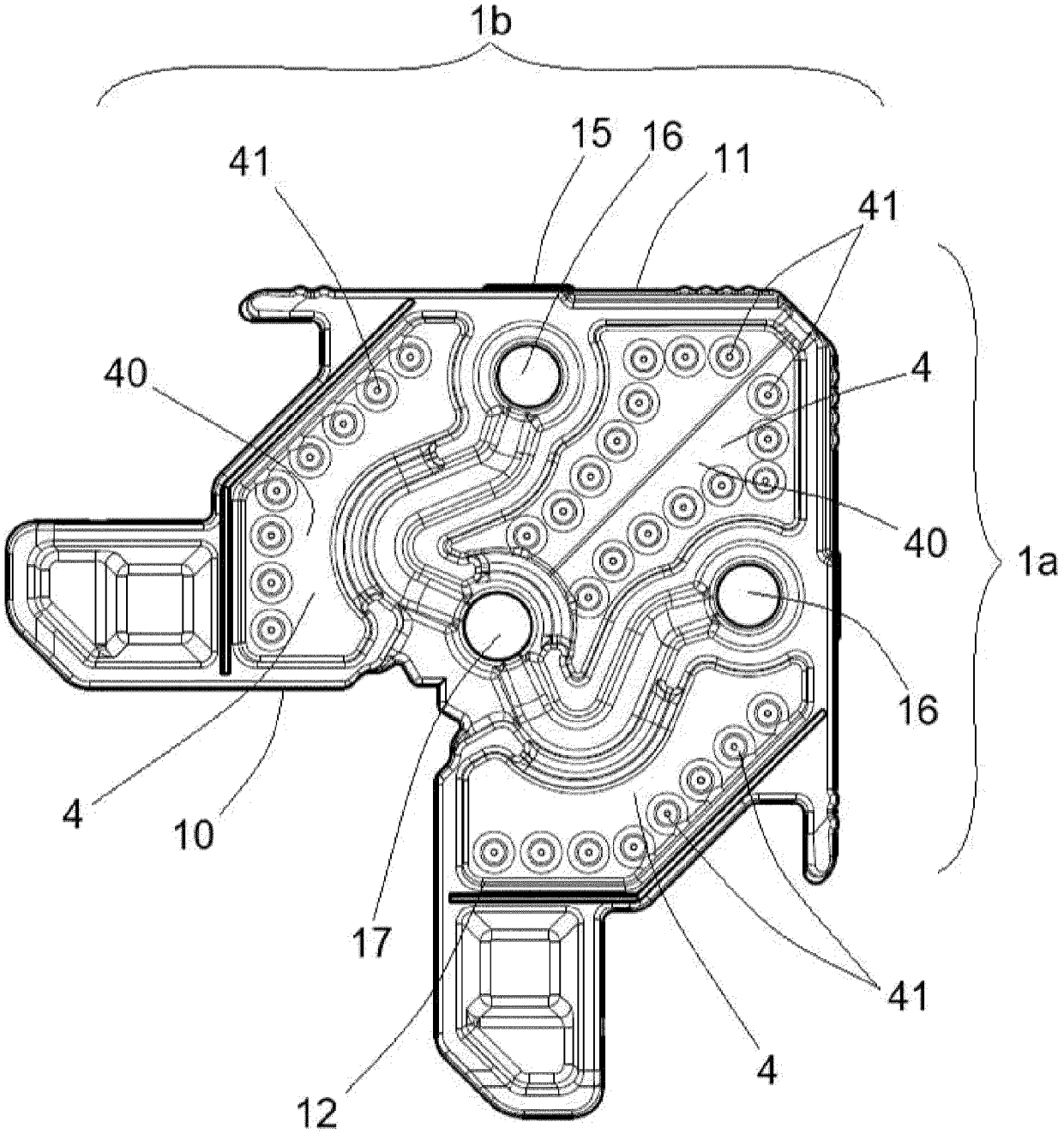


FIG. 5

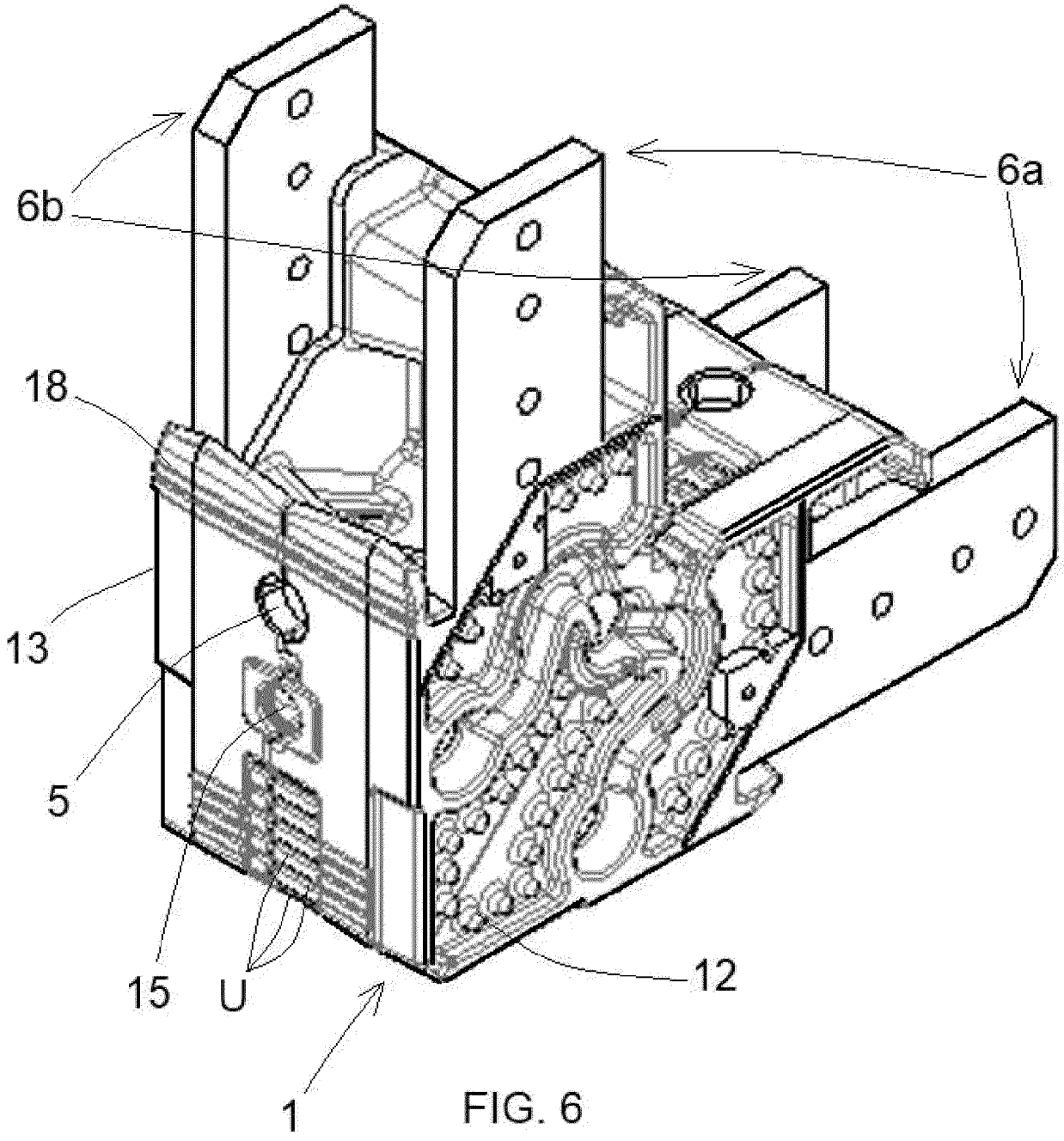


FIG. 6

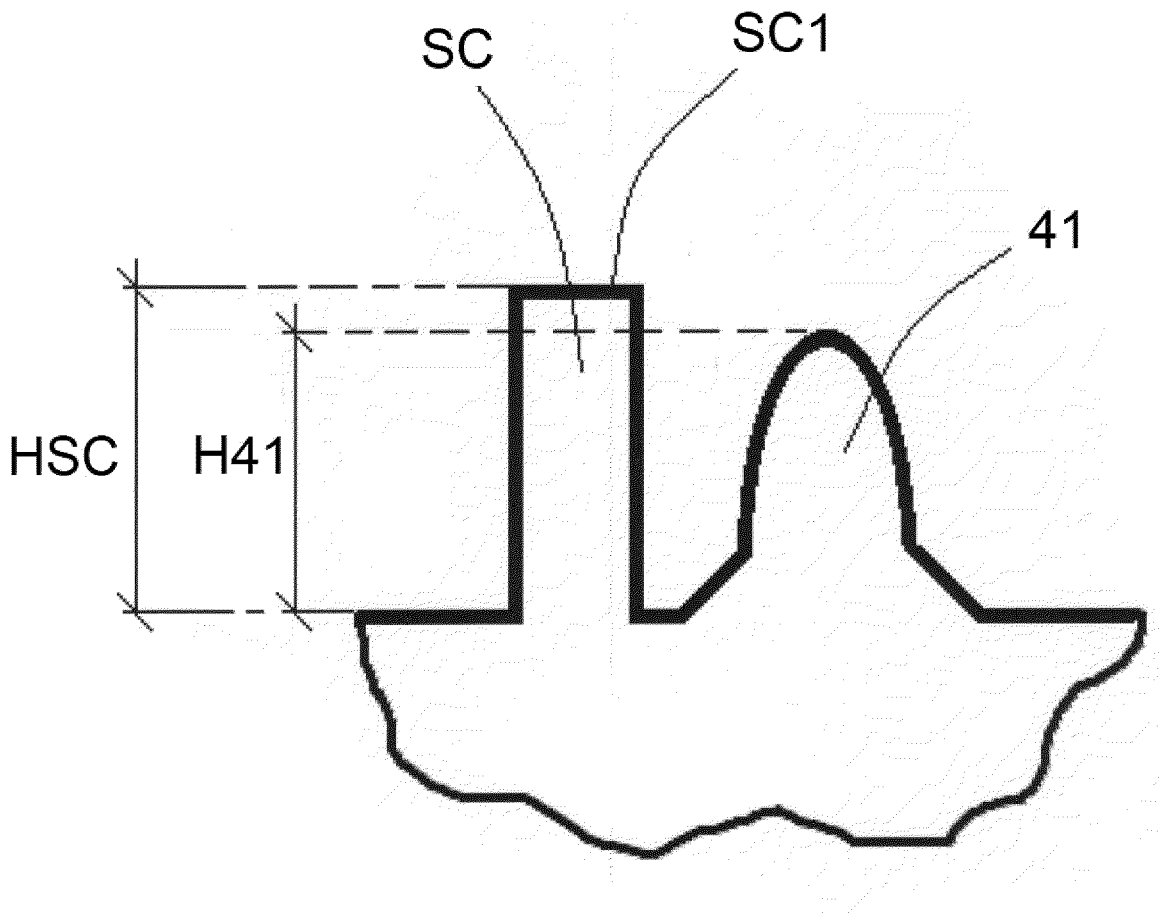


FIG. 7

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Application Number
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