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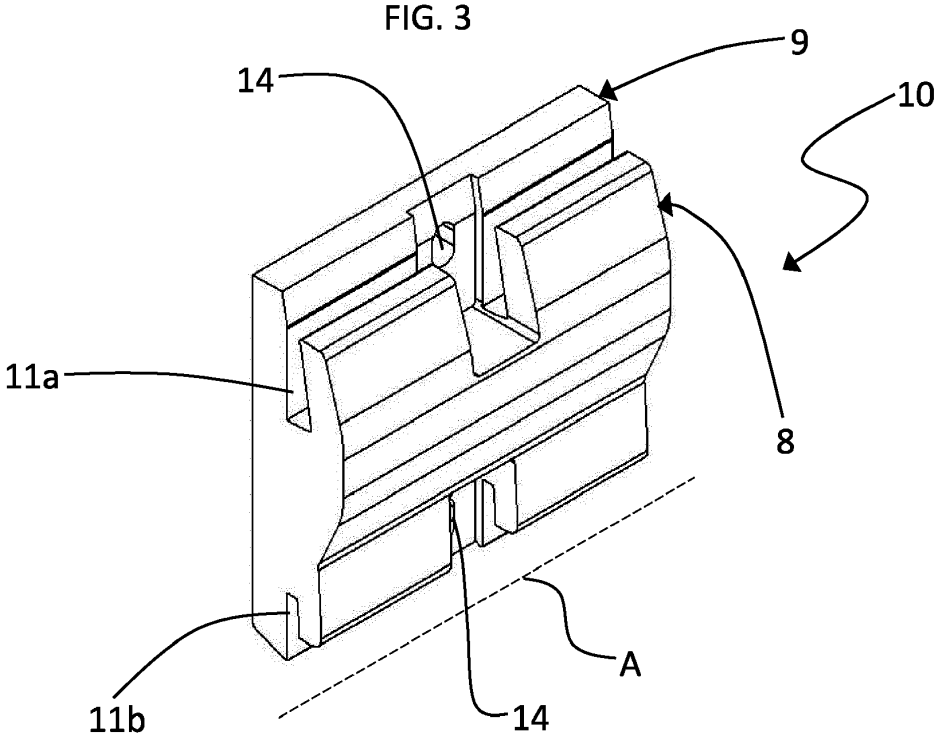
(54) **FIXING DEVICE AND METHOD OF A GLASS PANEL IN A SCAFFOLDING FOR ELEVATORS**

(57) Device (10) made of plastic material for fixing a glass panel (3) to a hollow crossbar (2) with bent edges (2a, 3b) of a scaffolding (1) for elevators, which comprises a first portion (8) with an asymmetrical front profile and a second portion (9) separated from the first portion (8) by two grooves (11a, 11 b) which house the bent edges (2a, 2b) of the crossbar (2), of which one of the grooves (11a) is deeper than the other so as to allow the first portion (8) to be inserted in the cavity (2c) of the tube (2), the second portion (9) having a support zone (9a) substantially planar to support the glass panel (3) and two abutment zones (9b) striking on the external walls of the crossbar (2) when the first portion (8) is inserted in the cavity (2c).

FIG. 3



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Description

[0001] The present invention relates to a fixing device of a glass panel to a hollow tube with bent edges and an installation method of the panel to the tube in a scaffolding for elevators.

[0002] In the elevator field, scaffolding means a self-supporting metal structure for the installation of elevators in buildings without an elevator shaft. Generally, scaffoldings are widely used in period buildings or buildings in which an elevator shaft is not provided or not possible to obtain.

[0003] For example, Italian utility model no. 266727 describes a self-supporting scaffolding for elevators adapted to be installed in pre-existing buildings or buildings subject to renovations.

[0004] The scaffolding is composed of metal bars (uprights and crossbars) joined together to form a reticular frame.

[0005] In the most common solutions, the scaffolding provides an infill system with glass panels.

[0006] The choice of glass combined with metal (for example steel) makes the scaffolding light, bright and aesthetically harmonic.

[0007] A known solution, illustrated in figure 1, envisages the use of shims and glass retainer profiles to keep the glass panels within the squares of the scaffolding.

[0008] Figure 1 illustrates a sectional side view of a portion of scaffolding for elevators, which comprises a metal crossbar 2 onto which an upper glass panel 3a and a lower glass panel 3b are fixed.

[0009] To keep the two glass panels 3a, 3b in place, i. e. to prevent their shifting outside the grid of the scaffolding 1, the following are provided:

- upper external profiles 4a and lower external profiles 4b (known as external glass retainers) and an internal profile 5 (known as internal glass retainer) fixed to the crossbar 2 so as to define housings 6a, 6b for corresponding corners 13a, 13b of the glass panels 3a, 3b;
- upper spacers (or shims) 7a and lower spacers (or shims) 7b fixed to the crossbar 2 and positioned within the housings 6a, 6b to prevent the corners 13a, 13b of the glass panels 3a, 3b coming into direct contact with the metal crossbar 2 which could compromise its integrity.

[0010] Typically, the external glass retainers 4a, 4b and the internal glass retainer 5 are screwed to the crossbar 2. The spacers 7a, 7b are, on the other hand, fixed with double-sided adhesive tape or glue.

[0011] The installation procedure, for example of the upper glass panel 3a, therefore involves the following steps:

- screwing three/four upper external profiles 4a to the crossbar 2 (in figure 1 only one upper external profile 4a is shown as it is a lateral sectional view);
- fixing three/four upper spacers 7a within the housings 6a;
- positioning the upper glass panel 3a on the upper spacers 7a and abutting on the upper external profiles 4a;
- positioning the internal profile 5 abutting on the upper glass panel 3 and screwing the internal profile 5 to the crossbar 2.

[0012] One of the disadvantages of the procedure just described is connected with the high number of components needed to position and fix the glass panels, leading to long installation times.

[0013] Furthermore, some components (e.g. external glass retainers) are visible, therefore they must have a suitable finish so as not to compromise the aesthetic impact of the scaffolding.

[0014] Another drawback is connected with the use of glue or double-sided adhesive tape for fixing the spacers, which makes their repositioning difficult in the event of alignment errors. Furthermore, fixing with glue or double-sided tape makes installation longer since hardening time of the adhesive is required to make the grip effective. Finally, fixing with adhesives is not reliable since it is subject to deterioration.

[0015] The procedure described also requires extreme precision in the alignment of the glass retainers, which is often difficult to perform on the building yard.

[0016] In this context, the technical task underpinning the present invention is to propose a fixing device of a glass panel to a hollow tube with bent edges and an installation method of the panel to the tube in a scaffolding for elevators, which overcomes the drawbacks of the prior art described above.

[0017] In particular, an aim of the present invention is to propose a fixing device of a glass panel to a hollow tube with bent edges of a scaffolding for elevators, which allows the positioning precision of the glass panel to be improved.

[0018] Another aim of the present invention is to propose a fixing device of a glass panel to a hollow tube with bent edges of a scaffolding for elevators, which allows effective and durable fixing.

[0019] Another aim of the present invention is to provide a fixing device of a glass panel to a hollow tube with bent edges of a scaffolding for elevators, which does not affect the aesthetics of the scaffolding.

[0020] A further aim of the present invention is to provide an installation method of a glass panel to a hollow tube in a scaffolding for elevators, which is simpler and quicker to perform with respect to the known solutions. Another aim of the present invention is to propose an installation method of a glass panel to a hollow tube in a scaffolding for elevators, which uses a lower number of total number of components than that required by methods known up to now.

[0021] The technical task set and the objects specified

are substantially attained by a fixing device of a glass panel to a hollow tube with bent edges and an installation method of the panel to the tube in a scaffolding for elevators, comprising the technical characteristics as set out in one or more of the accompanying claims.

[0022] The fixing device proposed can be used to fix a glass panel to a hollow tube with bent edges of a scaffolding for elevators, said fixing device being made of plastic material and having a prevalently longitudinal extension along a predefined direction, said fixing device comprising:

a first portion having a prevalent extension along said predefined direction and conformed so as to be inserted into the cavity of said tube;
a second portion having a prevalent extension along said predefined direction and separate from said first portion through two ruts or grooves which also have a prevalent extension along said predefined direction and being conformed to house the bent edges of the tube, said first portion having an asymmetrical front profile and one of said grooves being deeper than the other so as to allow the first portion to be inserted into the cavity of the tube, said second portion comprising a support zone substantially planar in order to support the glass panel and two abutment zones striking the external walls of the tube when said first portion is inserted into the cavity of the tube.

[0023] Further characteristics and advantages of the present invention will become more apparent from the indicative, and hence non-limiting, description of a preferred, but not exclusive, embodiment of a fixing device of a glass panel to a hollow tube with bent edges and an installation method of the panel to the tube in a scaffolding for elevators, as illustrated in the appended drawings, wherein:

- figure 1 illustrates a portion of scaffolding for elevators, in a sectional side view, according to the prior art;
- figure 2 illustrates a scaffolding for elevators;
- figure 3 illustrates a fixing device of a glass panel to a hollow tube, according to the present invention, in perspective view;
- figures 4 to 7 illustrate as many assembly steps of the device of figure 3 to a hollow tube with bent edges of a scaffolding for elevators, according to the present invention, in sectional side view;
- figure 8 illustrates the hollow tube of figures 4-7 with cage nuts, in sectional side view;
- figure 9 illustrates a portion of scaffolding for elevators using the device of figure 3, in sectional side view.

[0024] With reference to the figures, number 1 indicates a scaffolding for elevators (lifts or elevator platforms).

[0025] The scaffolding 1 comprises a plurality of metal crossbars 2 and uprights 20 joined together to form squares that produce a reticular frame, as can be seen in figure 2.

[0026] In particular, each crossbar 2 consists of a hollow tube with bent edges 2a, 2b. In the embodiment described and illustrated herein, the crossbar 2 has a C-shaped section with bent edges.

[0027] Each square of the scaffolding 1 is filled in by means of a glass panel 3, which is fixed to the underlying crossbar 2 of the square by means of a plurality of fixing devices 10 made of plastic material, for example, polyamide PA66.

[0028] As can be seen in figure 3, each fixing device 10 has a prevalently longitudinal extension along a predefined direction A.

[0029] The fixing device 10 comprises a first portion 8 and a second portion 9, both having a prevalent extension along the predefined direction A. The first portion 8 is separated from the second portion 9 by two ruts or grooves 11 a, 11 b, also having a prevalent extension along the predefined direction A.

[0030] The first portion 8 is conformed so as to be inserted into the cavity 2c of the crossbar 2.

[0031] In particular, the insertion of the first portion 8 into the cavity 2c of the crossbar 2 is made possible by the fact that the first portion 8 has an asymmetrical front profile and one of the grooves 11 a, 11 b is deeper than the other.

[0032] Preferably, the front asymmetrical profile is such that, when seen in an orthogonal section with respect to the predefined direction A, the first portion 8 projects further outwards in proximity to the deepest groove 11 a and attenuates its projection going towards the less deep groove 11 b. The grooves 11 a, 11 b are conformed to house the bent edges 2a, 2b of the crossbar 2, as illustrated in figure 7.

[0033] The second portion 9 comprises a support zone 9a substantially planar in order to support a corner of the glass panel 3 and two abutment zones 9b striking the external walls of the crossbar 2 when the first portion 8 is inserted into the cavity 2c of the crossbar 2 itself.

[0034] With reference to figure 9, it is to be noted that the fixing device 10 is used to fix the upper glass panel 3a to the crossbar 2.

[0035] In particular, the support zone 9a of the second portion 9 supports the lower corner 13a of the upper panel 3a.

[0036] The installation method of a glass panel to a hollow tube with bent edges in a scaffolding for elevators is described below. In particular, in the following disclosure, reference is made to a crossbar on which the upper glass panel is installed.

[0037] The installation of the upper glass panel 3a to the crossbar 2 takes place through a plurality of fixing devices 10, for example three or more.

[0038] Before fitting such fixing devices 10 to the crossbar 2, cage nuts 21 are assembled, having the aim of

performing a solid and removable fixing of a plate 16 acting as an internal glass retainer (see following disclosure). Subsequently, the first portions 8 of such fixing devices 10 are inserted into the cavity 2c of the crossbar 2.

[0039] For each fixing device 10, the insertion of the first portion 8 into the cavity 2c of the crossbar 2 takes place by introducing the asymmetrical front profile into the cavity 2c so that the deepest groove 11 a houses one of the bent edges 2a, 2b of the crossbar 2. In the embodiment described and illustrated herein, the deepest groove 11 a is the upper one, which therefore houses the upper bent edge 2a of the crossbar 2 (see figure 5). For this reason, the upper part of the first portion 8 must be introduced first into the cavity 2c of the tube 2, as illustrated in figure 5.

[0040] Gradually raising the fixing device 10 upwards makes the upper bent edge 2a of the crossbar 2 penetrate into the upper groove 11 a until it touches the bottom. This configuration therefore also allows the lower part of the first portion 8 to be introduced, hence completing the insertion of the latter (see figure 6).

[0041] Subsequently, the fixing device 10 is lowered so that the lower bent edge 2b of the crossbar 2 penetrates into the lower groove 11 b until it touches the bottom of it, as illustrated in figure 7.

[0042] As can be seen in figure 7, the abutment zones 9b of the second portion 9 of the fixing device 10 strike the external walls of the crossbar 2.

[0043] The steps described up to here are repeated in the same way for all the fixing devices 10 (for example three).

[0044] At this point, the lower corner 13a of the upper panel 3a rests on the support zones 9a of the second portions 9 of the fixing devices 10 so as to abut on the external walls of the crossbar 2 (see figure 9).

[0045] Onto the back of the second portion 9 of each fixing device 10 a plate 16 is screwed having an extension such as to abut on the lower corner 13a of the upper panel 3a to keep it assembled to the crossbar 2. As already mentioned above, such plate 16 acts as the internal glass retainer. Preferably, the plate 16 extends so as to also abut on the upper corner 13b of the lower panel 3b (already assembled with a similar method) to keep it in a substantially vertical position.

[0046] Preferably, each fixing device 10 has at least one slot 14 obtained in the second portion 9 for passing fixing screws 15 through the plate 16.

[0047] In particular, in the embodiment described and illustrated herein, each fixing device 10 has two slots 14 for passing two fixing screws 15 through the plate 16 (see figure 3).

[0048] For example, the fixing screws 15 are self-tapping. Alternatively, screws with nuts can be used.

[0049] From the description provided the characteristics of the fixing device of a glass panel to a tube with bent edges and an installation method of the panel to the tube in a scaffolding for elevators, according to the present invention, are clear, as are the advantages.

[0050] In particular, the conformation of the fixing device, which has an asymmetrical front profile and a deeper groove, makes installation *in situ* possible without first having to insert the crossbar and slide it into the cavity. In this way, the positioning precision of the device with respect to the crossbar is certainly improved.

[0051] Furthermore, the fixing device proposed avoids the use of external glass retainer profiles since the corner of the panel is directly housed on the fixing devices (in a planar support zone) and abuts on the external walls of the crossbar. In this way, the glass is given a direct, safe and durable support, avoiding the use of spacers or shims. The glass does not risk getting broken since it rests directly on the fixing device, which is made of plastic, and not on the metal crossbar.

[0052] Furthermore, the fixing device proposed fits mechanically onto the crossbar and remains on the back of it. Since it is not visible, its finish does not affect the overall aesthetics of the scaffolding and can therefore be left untreated.

[0053] Furthermore, the installation of infill glass panels only requires fitting the devices onto the crossbars and fixing them through plates and screws, hence reducing the number of components with respect to known solutions (which also envisage external glass retainers and spacers). This leads to a consequent reduction in installation times.

[0054] The method described does not make use of glue and/or double-sided tape, therefore it is quicker, ecological and reliable.

Claims

1. Fixing device (10) of a glass panel (3) to a hollow tube (2) with bent edges (2a, 2b) of a scaffolding (1) for elevators, said fixing device (10) being made of plastic material and having a prevalently longitudinal extension along a predefined direction (A), said fixing device (10) comprising:

   a first portion (8) having a prevalent extension along said predefined direction (A) and conformed so as to be inserted into the cavity (2c) of said tube (2);
   a second portion (9) having a prevalent extension along said predefined direction (A) and separate from said first portion (8) through two ruts or
   grooves (11 a, 11 b) which also have a prevalent extension along said predefined direction (A) and being conformed to house the bent edges (2a, 2b) of the tube (2), said first portion (8) having an asymmetrical front profile and one of said grooves (11 a) being deeper than the other so as to allow the first portion (8) to be inserted into the cavity (2c) of the tube (2),

said second portion (9) comprising a support zone (9a) substantially planar in order to support the glass panel (3) and two abutment zones (9b) striking the external walls of the tube (2) when said first portion (8) is inserted into the cavity (2c) of the tube (2).

2. Fixing device (10) according to claim 1, wherein said first portion (8) projects further outwards in proximity to the deepest groove (11a) and projects to a lesser extent in proximity to the less deep groove (11 b).

3. Fixing device (10) according to claim 1 or 2, made of polyamide PA66.

4. Installation method for a glass panel (3a) to a hollow tube (2) with bent edges (2a, 2b) of a scaffolding (1) for elevators through a plurality of fixing devices (10) according to any one of the preceding claims, comprising the following steps:

inserting the first portions (8) of the fixing devices (10) into the cavity (2c) of said tube (2) so that the two grooves (11 a, 11 b) of each fixing device (10) house the bent edges (2a, 2b) of the tube (2) and the abutment zones (9b) of the second portions (9) of the fixing devices (10) strike the external walls of the tube (2);
resting a corner (13a) of the glass panel (3a) on the support zones (9a) of the second portions (9) of the fixing devices (10) so that said glass panel (3a) abuts on the external walls 5 of the tube (2);
screwing onto the second portions (9) of the fixing devices (10) a plurality of plates (16) having an extension such as to abut on the glass panel (3a) so as to keep it assembled to the tube (2).

5. Method according to claim 4, wherein the step of inserting the first portions (8) of the fixing devices (10) into the cavity (2c) of said tube (2) comprises, for each fixing device (10), performing the following sub-steps in order:

introducing into the cavity (2c) of the tube (2) the most projecting part of each first portion (8) so that the deepest groove (11 a) houses one of the bent edges (2a) of the tube (2);
making penetrate into the deepest groove (11 a) the corresponding bent edge (2a) of the tube (2) until it touches the bottom of the groove (11 a) itself;
introducing the less projecting part of the first portion (8) into the cavity (2c) of the tube so that the less deep groove (11 b) houses the other bent edge (2b);
making penetrate into the less deep groove (11 b) the corresponding bent edge (2b) of the tube (2) until it touches the bottom of the groove (11 b) itself.

FIG. 1 (PRIOR ART)

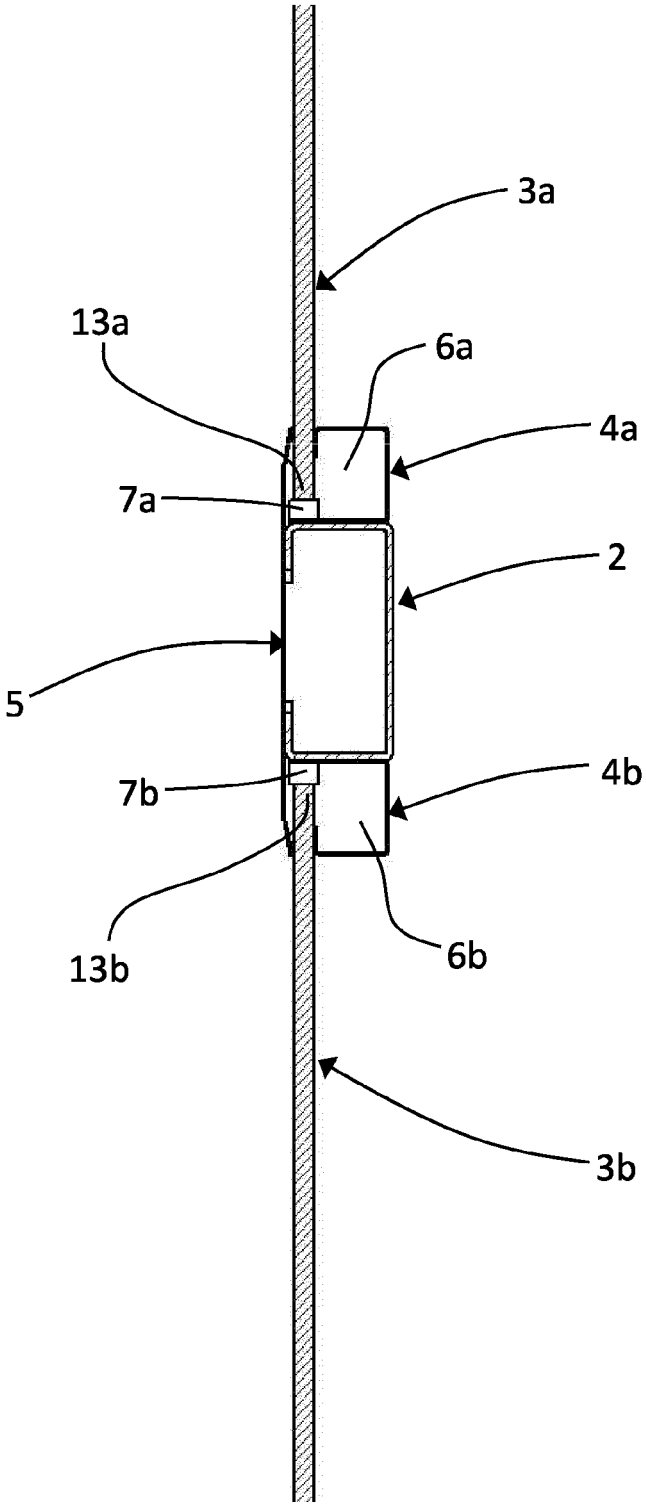


FIG. 2

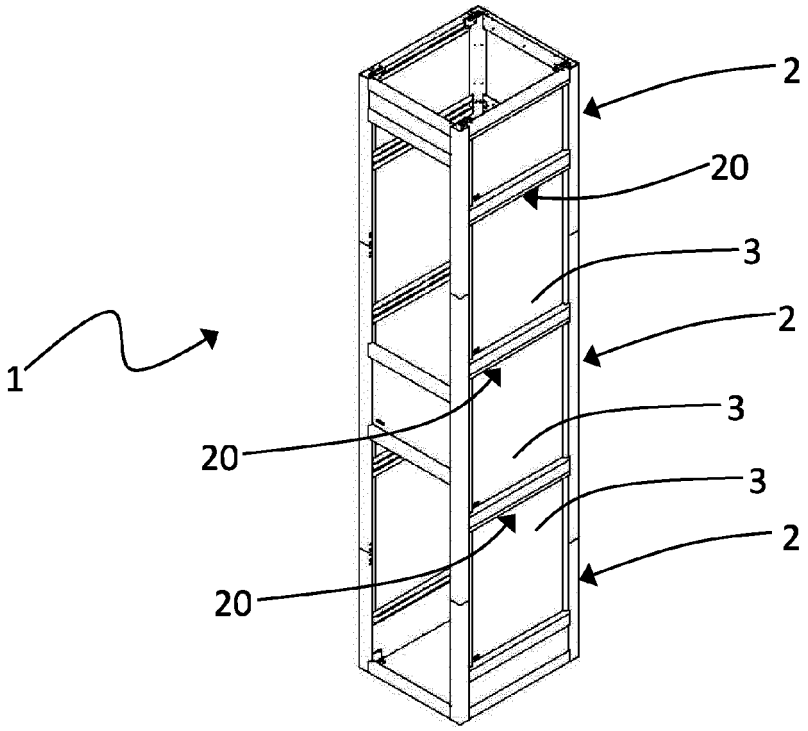


FIG. 3

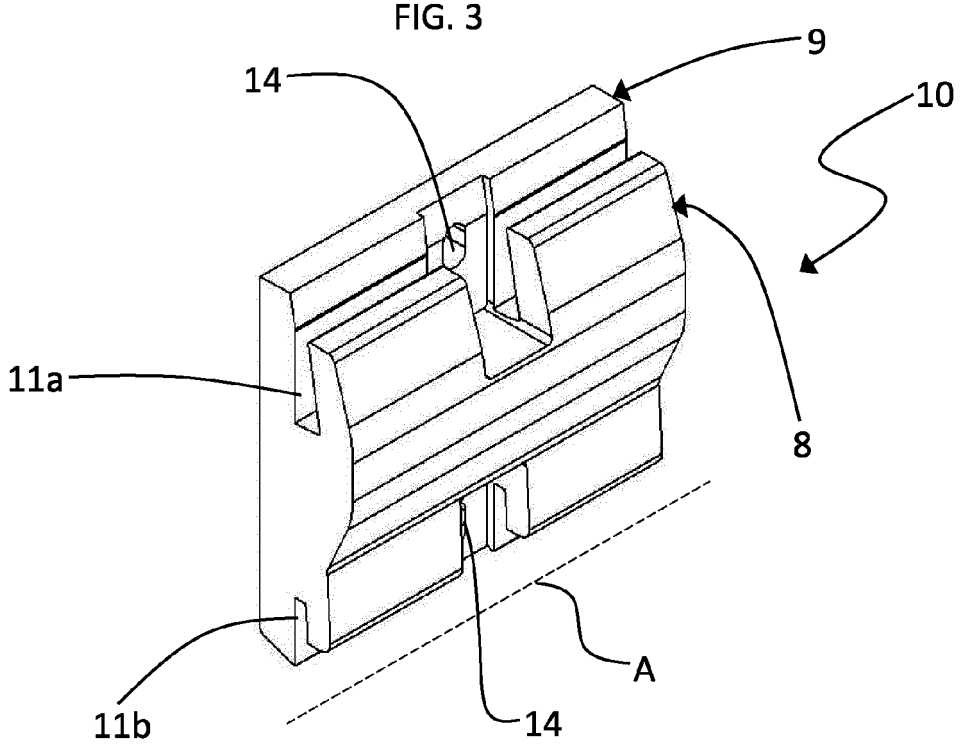


FIG. 4

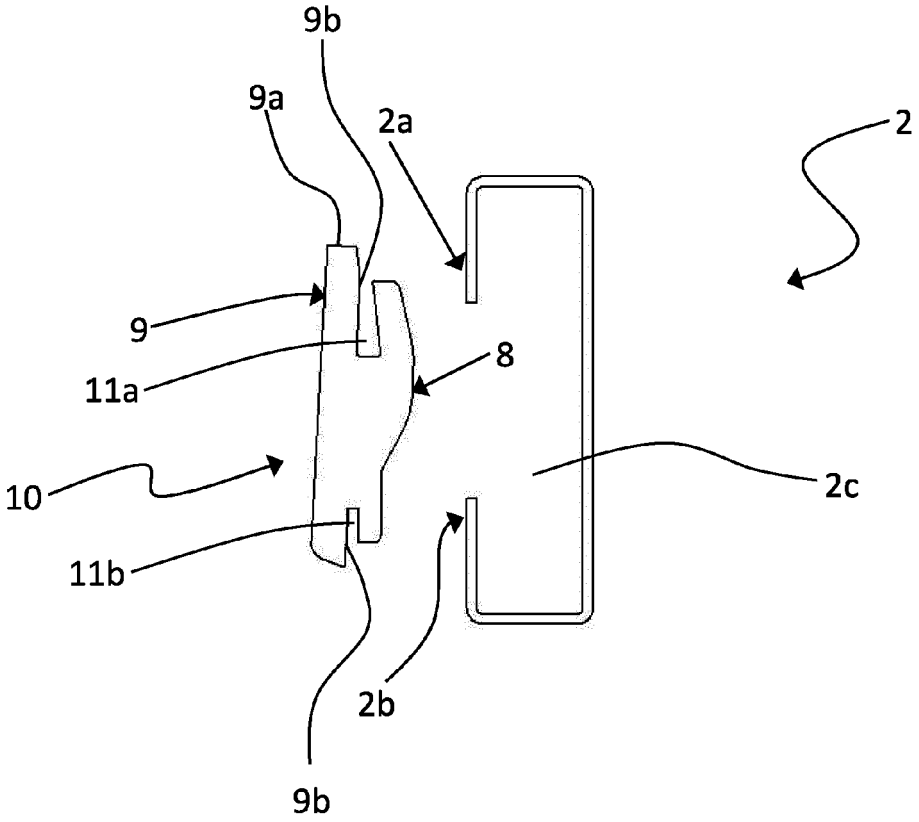


FIG. 5

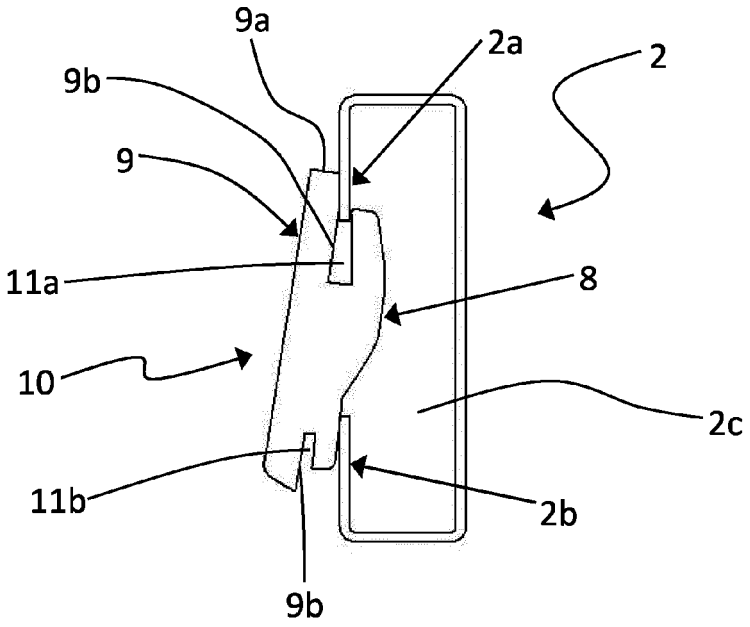


FIG. 6

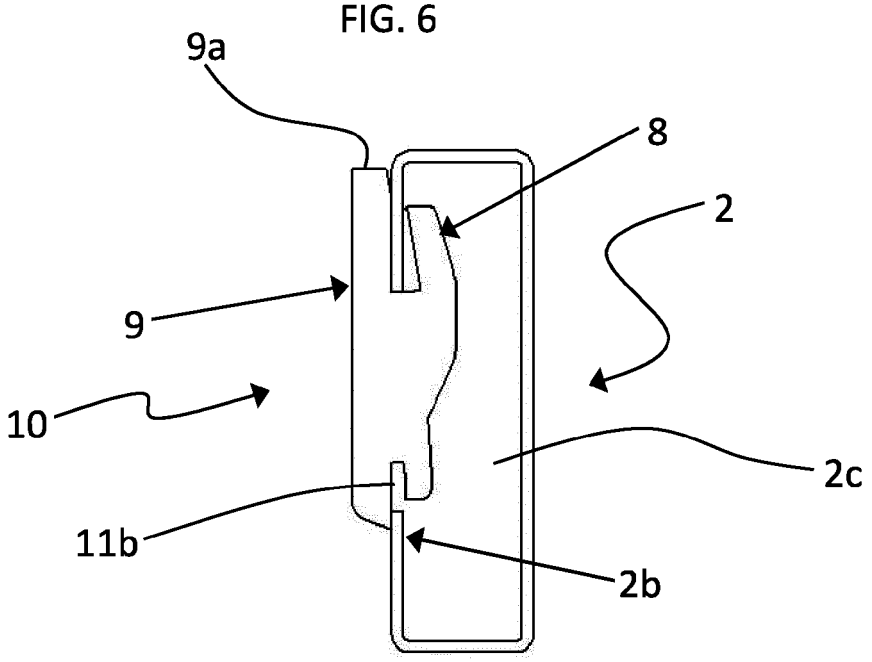


FIG. 7

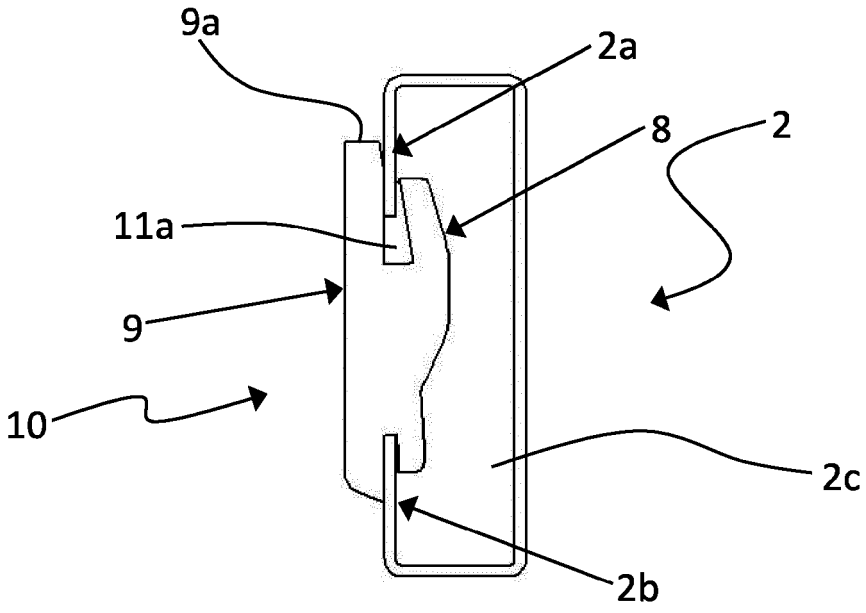


FIG. 8

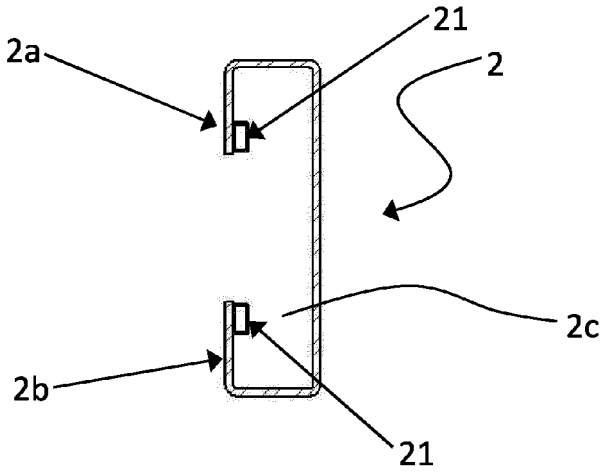
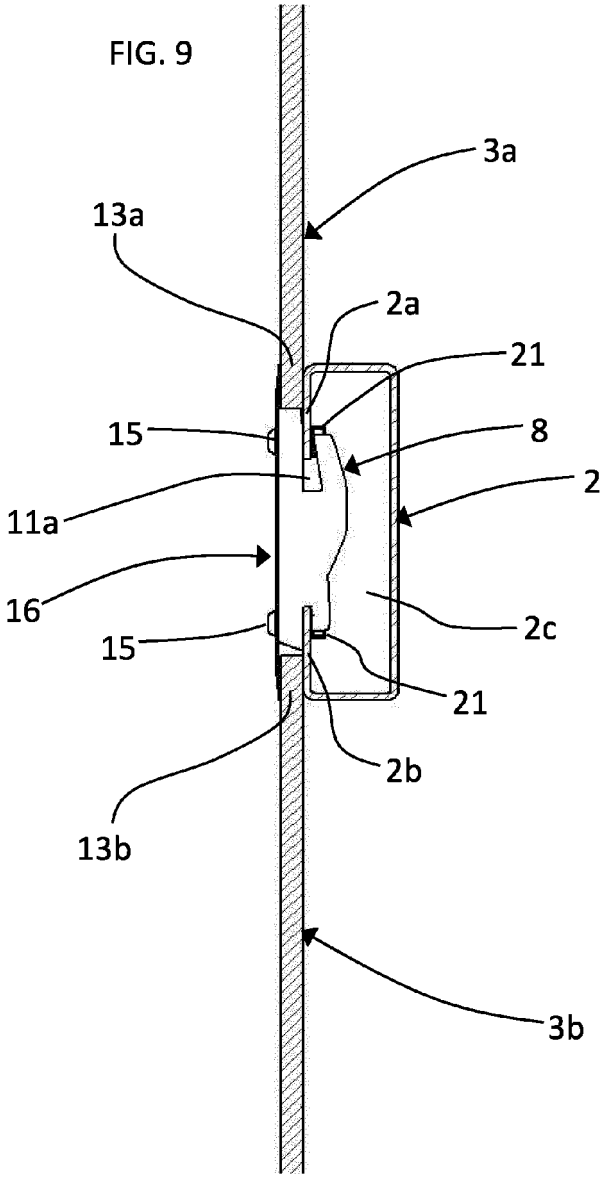


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 6092

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)
B66B
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 September 2015	Miklos, Zoltan

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