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EPC.

FIG. 1

Description

TECHNICAL FIELD

[0001] This description relates to the field of the construction of rooms or buildings with prefabricated modular panels. More particularly, this description relates to device, for securing insulated panels together.

BACKGROUND

[0002] Insulated rooms and refrigeration units are generally constructed using prefabricated insulated modular panels each fabricated either manually or using a continuous manufacturing process.

[0003] Modular panels are generally joined together via male and female type joints to form walls, ceilings or floors, for example, of a walk-in cooler structure. These joints are generally secured together using screws and trims or adhesives or cam-lock fasteners which do not provide the most efficient and strong junctions.

[0004] There is therefore a need for a solution which efficiently secures modular panels together while also addressing issues associated with the prior art in assembling panels which are substantially perpendicular to one another.

SUMMARY

[0005] According to an embodiment, there is provided a clip for securing a tight connection between two modular panels. The connection comprising a male portion on a first one of the two modular panels and a female portion on a second one of the two modular panels. The male portion for insertion into the female portion upon assembly of the two modular panels. The clip comprises: a first flat member having a first pressure edge; and a second flat member fixedly joined to the first flat member. Once the panels are assembled in an assembly direction and upon introduction of the first flat member into either one of the male portion and the female portion and of the second flat member into the other one of the male portion and the female portion, the introduction being perpendicularly to the assembly direction, the first pressure edge of the first flat member forces the male portion toward the female portion thereby securing the tight connection between the two modular panels.

[0006] Further in accordance with the above embodiment, there is optionally provided a second pressure edge for forcing the male portion toward the female portion upon assembly of the two modular panels.

[0007] Further in accordance with the above embodiment, there is optionally provided a third flat member and a fourth flat member respectively aligned with the first and the second flat members to prevent twisting of the clip in the assembly direction upon assembly of the two modular panels.

[0008] According to another aspect of the invention,

there is provided a fastening guide for use with the clip described above. The fastening guide comprises a central member forming an angle with a guiding member. The central member for being placed in alignment with an edge of the third modular panel. The guiding member for guiding a user in aligning the fastening means through the third modular panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

15 [0010] Fig. 1 is a perspective, partially exploded view of an assembly of two wall panels with two perpendicular ceiling panels and finishing moldings in accordance with an embodiment;

20 [0011] Fig. 2a is a cross-sectional view of an assembly of a wall panel to ceiling or floor panel in accordance with the prior art;

[0012] Fig. 2b is another cross-sectional view of an assembly of a wall panel to ceiling or floor panel in accordance with the prior art;

25 [0013] Fig. 2c is a cross-sectional view of an assembly of an end-to-end wall arrangement in accordance with the prior art;

30 [0014] Fig. 3a is a top unfolded plan view of a first piece of material for forming a clip in accordance with an embodiment;

[0015] Fig. 3b is a perspective view of the first piece of material of Fig. 3a, once folded;

35 [0016] Fig. 4a is a top unfolded plan view of a second piece of material for forming a clip in accordance with an embodiment;

[0017] Fig. 4b is a perspective view of the second piece of material of Fig. 4a, once folded;

[0018] Fig. 5a is a perspective view of a clip in accordance with an embodiment;

40 [0019] Fig. 5b is a side elevation view of the clip of Fig. 5a;

[0020] Fig. 5c is a top plan view of the clip of Fig. 5a;

[0021] Fig. 5d is a front elevation view of the clip of Fig. 5a;

45 [0022] Fig. 6a is a top unfolded plan view of a clip in accordance with another embodiment;

[0023] Fig. 6b is a perspective view of the clip of Fig. 6a, once folded;

[0024] Fig. 6c is a top plan view of the clip of Fig. 6b;

50 [0025] Fig. 6d is a front elevation view of the clip of Fig. 6b;

[0026] Fig. 6e is a side elevation view of the clip of Fig. 6b;

55 [0027] Fig. 7 is a top plan view of two modular panels secured together with the clip of Fig. 5a in accordance with an embodiment;

[0028] Fig. 8 is a cross-sectional view of an assembly of two wall panels with a perpendicular ceiling panel, tak-

en across a connection between the two wall panels, in accordance with an embodiment;

[0029] Fig. 9a is a perspective view of a fastening guide in accordance with an embodiment;

[0030] Fig. 9b is a side elevation view of the fastening guide of Fig. 9a;

[0031] Fig. 9c is a top elevation view of the fastening guide of Fig. 9a;

[0032] Fig. 9d is an unfolded top plan view of the fastening guide of Fig. 9a;

[0033] Fig. 10 is a perspective view of the fastening guide of Fig. 9a in use with the clip of Fig. 5a or Fig. 6b for assembling two modular panels in accordance with an embodiment;

[0034] Fig. 11 is a perspective view of the fastening guide of Fig. 9a in use with the clip of Fig. 5a or Fig. 6b for assembling two modular panels with a perpendicular ceiling panel using a fastening screw in accordance with an embodiment;

[0035] Fig. 12 is a close-up view detailing the assembly of the two wall panels with the two ceiling panels of Fig. 1; and

[0036] Fig. 13 is a close-up view detailing the assembly of the two wall panels with one of the finishing moldings.

[0037] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION

[0038] Referring now to the drawings, and more particularly to Fig. 1, there is illustrated an assembly 20 of two wall panels 22a and 22b with two perpendicular ceiling panels 24a and 24b in accordance with an embodiment.

[0039] The wall panels 22a and 22b and the ceiling panels 24a and 24b are each made of a foam material 26 enclosed between two exterior sheets of material 27 and 28 which are made of any sheet material such as any kind of steel or aluminum. In accordance with one fabrication process, the foam material 26 is injected between the two exterior sheets of material 27 and 28 and let to harden, thereby forming a solid modular panel. The foam material 26 can be any type of insulating material such as Injected Polyurethane Foam (IPF) or any other laminated insulating material such as mineral wool or polyurethane.

[0040] Each one of the sheets 27 and 28 extends from one pair of opposite edges 30 and 32 to another pair of perpendicular opposite edges 33 and 34 of each panel. For description purposes, sheet 27 forms exterior sides of the panels in the assembly 20, while sheet 28 forms interior sides. Each of the sheets 27 and 28 has an exterior surface which lies in a plane substantially parallel to a direction of assembly 35 made by two (or more) modular panels assembled side by side to define a wall or a ceiling; i.e., 22a with 22b, and 24a with 24b.

[0041] The panels 22a, 22b, 24a and 24b each have

a male portion 36 and a female portion 38 extending longitudinally along each one of the pairs of opposite edges 30 and 32. The male portion 36 extends closest to an exterior surface or near a first one of the two sheets 27 or 28, while the female portion 38 extends closest to another opposite exterior surface or near a second one of the two sheets 27 or 28.

[0042] The male portion 36 forms a tongue (also referred to as a tenon) which is made to be inserted into a groove (also referred to as a mortise) formed by the female portion 38 to create a connection, 44a or 44b, with a neighboring modular panel extending along the same assembly direction 35. In Fig. 1 for example, panel 22a and panel 22b each have opposite male and female portions 36 and 38 at the connection 44a. These are not shown since they are inserted into one another to form the connection 44a. The same applies for panels 24a and 24b. Both the tongue and the groove can take variable shapes provided they form an interference fit upon assembly in direction 35.

[0043] The male and female portions 36 and 38 are each strengthened by an extension 27' or 28' of the closest one of the two sheets 27 or 28. These extensions 27' and 28' extend within or around either one of the groove or tongue made by the female portion 38 or the male portion 36. Of course, other embodiments for the male and female portions 36 and 38 are possible and are considered to fall within the scope of the present invention.

[0044] Still referring to Fig. 1, the assembly 20 is secured by way of clips 50 inserted upon assembly of the panels 22a with 22b and 24a with 24b, at the connections 44a and 44b. The clips 50 are inserted in the foam material 26 of either one of the pair of opposite edges 33 and 34, or in both opposite edges 33 and 34, of each panel forming a connection 44a and 44b (i.e., panels 22a and 22b or panels 24a and 24b). Upon assembly, the clips 50 are also secured to each one of the panels forming the connections 44a and 44b using fastening means such as screws or nails 52.

[0045] A second fastening means, such as a long screw or nail 54, secures panels 24a perpendicularly to the connection 44a made by panels 22a and 22b. The long screw 54 passes through the panel 24a until it is received in the clip 50. Since long screw 54 is not used for the clip 50 which holds panels 24a and 24b (i.e., ceiling panels) together, fastening means 52 are optional. The structure and features of the clip 50 is further detailed herein below.

[0046] The assembly 20 is completed by covering the bottom edges 33 of the wall panels 22a and 22b with a floor molding 56. The edges 33 of the panels 24a and 24b once assembled with the wall panels 22a and 22b are also finished with a covering cap 58 secured thereto using fastening means such as screws or nails 60. The floor molding 56 and the cap 58 are optional features and may take various shaped as desired.

[0047] The assembly 20 illustrated in Fig. 1 can be contrasted to the prior art assembly 62 illustrated in Figs.

2a, 2b and 2c.

[0048] In the prior art of Fig. 2a, two modular panels 63 and 64 are assembled perpendicularly to one another by way of a trim 65 secured on the inner edge 67 formed by the junction of the panels 63 and 64 using fastening means such as screws 68. Trim 69 is installed around outer edge 66 for finishing purposes. This arrangement does not provide a tight fit between the panels. In the prior art of Figs. 2b and 2c, there is shown 63 and 64 assembled using a cam lock fastener 61. Fig. 2b shows a perpendicular wall arrangement while Fig. 2c shows an end-to-end wall arrangement. The cam lock themselves are expensive and their installation in the panels fabrication requires manipulation which could otherwise be avoided.

[0049] Unlike with the prior art, the assembly 20 provided by Fig. 1 can be performed and secured without the need of the metal sheets 65. In the prior art, the presence of joining elements such as the metal sheet 65 on the inner edge 67 generally requires that finishing trim be installed there over for fastening purposes. In the assembly 20 of Fig. 1, finishing trims are optional. In fact, in the assembly of Fig. 1, an inside wall/ceiling trim such as trim 65 of Fig. 2a is not required thereby offering a cleaner look, less joints and a strong junction.

[0050] Now referring to Figures 3a, 3b, 4a, 4b and 5a, 5b, 5c and 5d, there is shown an embodiment of the clip 50 of Fig. 1.

[0051] Referring to Figures 3a and 3b, the clip 50 is made by die-cutting a first piece of metal 69 as shown in Fig. 3a. The piece of metal 69 is folded at a substantially right angle along folding line 81 to form a first flat member 71, a third flat member 73, and a top plate 75.

[0052] Referring to Fig. 4a and 4b, a second piece of metal 70 is similarly die-cut and folded along folding line 82 to form a second and a fourth flat member 72 and 74 as well as a bottom plate 76.

[0053] As seen in Fig. 5a, the lower surface of the bottom plate 76 of the second piece of metal 70 and the upper surface of the top plate 75 of the first piece of metal 69 are joined together and welded or riveted to form the clip 50. The top plate 75 joins the first, second, third and fourth flat member, 71 to 74 respectively, of the clip 50.

[0054] The flat members 71 to 74 each have a pressure edge, 77 to 80 respectively, which is angled in shape.

[0055] In this embodiment, the edges 83 to 86 opposite with respect to the pressure edges 77 to 80 are also angled. The junction of both edges 77 to 80 with respective edges 83 to 86 form a tip which eases the insertion of the clip 50 into a modular panel's foam material, in an insertion direction 87 which is intended to be perpendicular to the assembly direction 35 as seen in Fig. 1. Once the clip is inserted, the top plate 75 remains exterior to the panel.

[0056] The clip 50 has a gap 89 provided by the fact that the top plate 75 is wider than the bottom plate 76, to separate the first and second flat members 71 and 72, and the third and fourth flat members 73 and 74 by a

given distance, as seen in Fig. 5b. The given distance of the gap 89 is intended to be approximately equivalent to about a maximal distance between the male portion 36 on a first modular panel and the female portion 38 on a second modular panel, once inserted into each other upon the panels being assembled along the assembly direction 35 (refer to Fig. 1).

[0057] As seen in Fig. 5c, the third flat member 73 and the fourth flat member 74 are respectively aligned with the first and the second flat members 71 and 72. The third and fourth flat members 73 and 74 also form a mirror image of the first and second flat members 71 and 72 with respect to an axis 88 perpendicular to the insertion direction and passing in the middle of the clip 50. This therefore makes the clip 50 entirely reversible.

[0058] Referring more particularly to Fig. 5a and 5d, each one of the second and fourth flat members 72 and 74 has an opening 90 to let through a screw or a nail (not shown). The screw or the nail (not shown) pierces through the first and third flat members 71 and 73 to arrive substantially perpendicularly to the second and fourth flat members 72 and 74.

[0059] Several modifications of the clip 50 as described above are possible. For example, in reference to Fig. 5a, the third and fourth flat members 73 and 74 can be removed, leaving the first and second flat members 71 and 72. However, stability when inserting clip 50 is not as good in this case.

[0060] The clip 50 can substantially form a U-shaped body defining co-planar parts joined together via a connecting part. Though this alternative is not illustrated, the body of the clip 50 can be conceptualized by taking the first and the second flat members 71 and 72 as comprising one of the co-planar parts of the U-shaped body. The top plate 75 then forms the connecting part and joins the first and the second co-planar parts.

[0061] In addition, the second flat member 72 may also have any type of edge in place of the pressure edge 78 (refer to Fig. 5a). In this case, only one of the flat members, such as flat member 71, has the pressure edge 77 and performs the forcing of the male portion 36 of a first panel into the female portion 38 of a second panel upon assembly in the direction of assembly 35 (refer to Fig. 1).

[0062] Any one of the pressure edges 77 to 80 can be curved, as long as one of the pressure edges 77 to 80 provides a force towards a joining male or female portion of two modular panels upon assembly. Note that upon insertion of clip 50, the pressure edges 77 to 80 provide a similar effect as the cam in the cam-lock fastener of the prior art.

[0063] In addition, the opposite edges 83 to 86 of each one of the flat members 71 to 74 can be shaped in any differing fashion, although a sharp angle such as illustrated in Figures 3a to 5d enables facilitate insertion of the clip 50 into the panels in the insertion direction 87.

[0064] Another variation of the clip 50 as previously described is illustrated in Figures 6a to 6e. According to this embodiment, the first and second pieces of metal

(69 and 70 in Figures 3a to 4b) are replaced by a unitary single piece of material 91 having the four flat members 71 to 74 at opposite ends of the piece 91 as seen in Fig. 6a.

[0065] In this embodiment, the clip 50 is fabricated by die-cutting the single piece of material 91. The four flat members 71 to 74 are then folded. The flat members 71 and 73 are folded along folding line 81, at an angle opposite a folding angle of the flat members 72 and 74 along the folding line 82. The plane formed by the flat members 71 and 73 is kept substantially parallel to a plane formed by the flat members 72 and 74.

[0066] The single piece 91 is once again folded over itself along a folding line 92 located substantially at a center region thereof. An opening 93 is practiced along the folding line 92 of the single piece of metal 91 to ease the folding.

[0067] This final folding forms the clip 50 of Fig. 6b. The top plate 75 linking the first and the second flat members 71 and 72, and the third and the fourth flat members 73 and 74 is unitary with the bottom plate 76.

[0068] Fig. 6c to 6e each respectively illustrate a top, front and side elevation view of the clip 50 as illustrated in Fig. 6b.

[0069] It is noted that in Figures 6a to 6e, the opening 93 is optional, but facilitates the folding.

[0070] Now referring to Fig. 7, once the panels 22a and 22b are assembled in the assembly direction 35, the female portion 38a of the panel 22a receives the male portion 36b of the other panel 22b and the male portion 36a of the panel 22a inserts in the female portion 38b of the panel 22b. The clip 50 is inserted partly into panel 22a and partly into panel 22b, the top plate 75 remaining over the edge 33 of the panels. Again note that other embodiments for the male and female portions 36 and 38 are possible and are considered to fall within the scope of the present invention (e.g., the two male portions could be on the one side of a junction while the two female portions would be on the other side of the junction).

[0071] More specifically, the first flat member 71 is introduced into the female portion 38a of the panel 22a, and the second flat member 72 is introduced into the male portion 36b of the panel 22b, along the insertion direction perpendicular to the assembly direction 35. In this way, the first pressure edge 77 (refer to Fig. 5d or 6d) of the first flat member 71 forces the female portion 38a toward the male portion 36b, while the second pressure edge 78 of the second flat member 72 forces the male portion 36b toward the female portion 38a, thereby securing and tightening the connection 44a between the two modular panels 22a and 22b. The third and fourth flat members 73 and 74 are both inserted into the panel 22b, beside the male portion 36b. The clip 50 is finally secured to both panels 22a and 22b using the screws or nails 52.

[0072] The reversible structure of the clip 50 provides a stability mechanism in the assembly direction (35 in Fig. 1) upon assembly of two modular panels. When the

first and second flat members 71 and 72 are inserted into the female portion 38a and the male portion 36b as illustrated, the third member 73 provides the stability by securing into the panel 22b. The third flat member 73 prevents the clip from twisting as it abuts against sheet 27. The third flat member 73 is also used to fasten to panel 22b by using fastening means 52. The third and fourth flat members 73 and 74 do not perform the actual junction between the male and female portions of each panel.

[0073] The mirror structure of the clip 50 also allows the clip 50 to be inserted along either one of the exterior sheets 27 or 28 of the panels 22a and 22b. For example, although the clip 50 is illustrated in Fig. 7 as being inserted closest to sheets 27, it may be inserted on the opposite side, closest to sheets 28. In such a case, the above description is reversed. According to another embodiment, clips 50 are inserted on both sides of the modular panel.

[0074] Still referring to Fig. 7, in the reversed case, the third and fourth flat members 73 and 74 are inserted in one of the female portion 38b and the male portion 36a. The first and second members 71 and 72 provide the stability mechanism by both being inserted in the panel 22a. In this configuration, the first and second flat members 71 and 72 do not perform the actual junction between the male and female portions 36a and 38b of each panel. According to another embodiment, clip 50 can be inserted near sheet 27 (or sheet 28), but not at a junction. This can be useful in the assembly of panels perpendicularly.

[0075] Fig. 8 shows a cross-sectional view of an assembly of a third perpendicular ceiling panel 24a with a connection between wall panels 22a and 22b, taken across the connection (44a in Fig. 1). The long screw 54 is inserted through the third perpendicular ceiling panel 24a and secures into the top plate 75 of the clip 50. Experience has shown that it is useful to tighten screw 54 sufficiently to compress the foam between the wall panels. Similarly, long screw 54' opposite the long screw 54 is inserted through the third perpendicular ceiling panel 24a and secures into the top plate 75' of the clip 50' opposite the clip 50. It is understood that while Fig. 8 shows a wall/ceiling junction, the same description would be applicable to a wall-to-wall perpendicular junction.

[0076] It is noted that in Fig. 8, another pair of clips 50 and 50' are placed at the bottom of the wall panels 22a and 22b. In other embodiment, clips at the bottom of the wall panels 22a and 22b are not required.

[0077] It should also be noted that while both clips 50 and 50' are shown to be installed on Fig. 8, only one of them would be necessary; i.e., an exterior installation or interior installation.

[0078] Now referring to Figures 9a to 9d, there is described a fastening guide 100 in accordance with an embodiment.

[0079] The fastening guide 100 has two guiding members 102 and 104 distanced by a central member 106 which is of a length that is substantially equal to the thick-

ness of a panel such that the fastening guide 100 can be placed over an edge forming a connection between two modular panels, such as connections 44a and 44b in Fig. 1.

[0080] The first guiding member 102 has a number of indentations 108, here three; indentations 108a, 108b and 108c. Two of these indentations, 108a and 108c, are for guiding the alignment of two fastening means (not shown) which are used to secure the clip 50 to the two modular panels 22a and 22b; such as screws or nails 52 in Fig. 1 and thereby go through opening 90.

[0081] The third indentation 108b is used to provide adequate clearance for a third fastening means (not shown). This third fastening means is used to secure the third perpendicular modular panel 24a to the two modular panels 22a and 22b via the clip 50; such as long screws 54 or 54' of Fig. 8.

[0082] Still referring to Figures 9a to 9d, the second guiding member 104 has an elongated opening 110 extending from an end 112 of the fastening guide 100 toward the central member 106.

[0083] The elongated opening 110 acts as a guide, in conjunction with the middle one of the indentations 108b, for aligning the third fastening means (not shown), through the third perpendicular modular panel 24a until it reaches the clip 50 which joins the two modular panels 22a and 22b together. The elongated opening 110 permits removal of the guide 100 once the third fastening means is inserted. The elongated opening 110 has two markings 116 and rounded portion 115 for guiding the alignment of the long screws 54' and 54 respectively, as seen in Fig. 8. These are further described below.

[0084] Referring more particularly to Fig. 9d, the fastening guide 100 is made of a single piece of material which is folded to form the two guiding members 102 and 104. The fastening guide 100 has a shape permitting to enclose an entire edge (33 or 34 in Fig. 1) of a modular panel, as illustrated in Figures 10 and 11.

[0085] Referring to Fig. 10, the fastening guide 100 is first used with the clip 50 in aligning the screws 52 to secure the clip 50 into each one of the two modular panels 22a and 22b. In this case, the fastening guide is placed over the clip 50 and encloses the edge 33 (or 34) of each one of the modular panels 22a and 22b. The indentations 108a and 108c are used to align the screws 52 into each one of the panels 22a, 22b and clip 50. Hence, screws 52 are aligned in holes 90. Without holes 90, the clip 50 would deform and cause delaminating of the panel. According to an embodiment, guide 100 is the same width as the clip 50 thereby facilitating alignment thereof.

[0086] As seen in Fig. 11, the marking 115 of the fastening guide 100 can also be used with the clip 50 in aligning the long screw 54 through the third modular panel 24a (or 24b) for insertion into the top plate 75 of the clip 50. In this case, the fastening guide 100 is placed over the edge 33 of the third modular panel 24a, with the first guiding member 102 being aligned equally with the top plate 75 of the clip 50 or by aligning holes 117 with

screws 52 or by placing them at equal distance on either side of the joint between the panels. Holes 118 for their part would be used when guide 100 is used on top of a ceiling panel in a reverse fashion (i.e., with guiding member 104 on panel 24a and guiding member 102 above and away from panel 24a). The marking 116 of the fastening guide 100 is similarly used to align screw 54' into clip 50' located opposite to the clip 50.

[0087] Although not illustrated in Fig. 11, the fastening guide 100 can be placed differently than illustrated to guide a user in aligning the long screw 54 for securing with the clip 50. For example, in a first case, the first guiding member 102 is placed on top of the sheet 27 of the third panel 24a, abutting on the edge 33 of that panel 24a. In this position, the central member 106 is aligned with either one of the sheets 27 and 28 of each one of the panels 22a and 22b.

[0088] In an alternative second case, the second guiding member 104 is placed on top of the sheets 27 of the third panel 24a, abutting on the edge 33 of that panel 24a. The central member 106 is aligned with either one of the sheets 27 or 28 of the panels 22a and 22b, opposite from the location of the clip 50 or 50' to which it is intended to be fastened.

[0089] The first marking 115 of the elongated opening 110 is used for aligning the long screw 54 for attachment with the clip 50 when the first guiding member 102 is placed in contact with the top plate 75 of the clip 50, or whenever the central member 106 is aligned with the exterior sheet 27 of the panels 22a and 22b closest to the clip 50.

[0090] The second marking 116 of the elongated opening 110 is used for aligning the long screw 54' for attachment with the clip 50 when the central member 106 is in alignment with the exterior sheet 27 of the panels 22a and 22b which is opposite from the location of the clip 50, as also illustrated in Fig. 8 and Fig. 10.

[0091] Guide 100 further includes lips 112 to facilitate insertion of guide 100 and to avoid or prevent scratching or marking of the panels. It should also be noted that the U shape of the guide 100 helps in preventing delaminating of panels while inserting screw 54.

[0092] Alternative embodiments of the fastening guide 100 are considered. For example, the fastening guide 100 may be formed by multiple pieces of material instead of a single one as described hereinabove.

[0093] Fig. 12 shows the assembly 20 of Fig. 1, more specifically where the two wall panels 22a and 22b meet with the two ceiling panels 24a and 24b.

[0094] Fig. 13 shows the assembly 20 of Fig. 1, more specifically where the two wall panels 22a and 22b meet with a bottom finishing molding 56 used at the floor of a walk-in unit. Such a molding is optional and can be further secured to the wall panels using tightening screws or adhesives (not shown) for example. The assembly 20 of Fig. 13 is performed according to the following steps. First, a clip 50 is inserted in the bottom of panel 22b as shown in Fig. 13. Then, panel 22b is set down in molding

56. Finally, panel 22a is slid onto clip 50 and into molding 56 so that the panels 22a and 22b are forced toward each other.

[0095] While preferred embodiments of the invention have been described above and illustrated in the accompanying drawings, it will be evident to those skilled in the art that modifications may be made therein without departing from the essence of this invention. Such modifications are considered as possible variants comprised in the scope of the invention.

Claims

1. A clip for securing a tight connection between two modular panels, the connection comprising a male portion on a first one of the two modular panels and a female portion on a second one of the two modular panels, the male portion for insertion into the female portion upon assembly of the two modular panels, the clip comprising:

a first flat member having a first pressure edge;
and

a second flat member fixedly joined to the first flat member;

once the panels are assembled in an assembly direction and upon introduction of the first flat member into either one of the male portion and the female portion and of the second flat member into the other one of the male portion and the female portion, the introduction being perpendicularly to the assembly direction, the first pressure edge of the first flat member forces the male portion toward the female portion thereby securing the tight connection between the two modular panels.

2. The clip as in claim 1, wherein the second flat member comprises a second pressure edge for forcing the male portion toward the female portion upon assembly of the two modular panels.
3. The clip as in claim 2, wherein each one of the two modular panels comprises a foam layer partially enclosed by two exterior sheets of material each in a plane substantially parallel to the assembly direction, the male portion and the female portion each being formed in the foam layer, near one of the two exterior sheets of material, and each one of the male portion and the female portion comprising an extension of one of the two exterior sheets of material, wherein each one of the first and second pressure edges exert a force against a respective extension.
4. The clip as in claim 2 or 3, wherein at least one of the first and second flat members is adapted to receive a fastening means substantially perpendicu-

larly to the plane made by the first and the second flat members and through one of the two exterior sheets of material to thereby secure the clip into at least one of the two modular panels.

5. The clip as in any one of claims 2 to 4, further comprising a top plate joining the first flat member to the second flat member.
6. The clip as in claim 5, further for securing a third modular panel perpendicularly to the first and the second modular panels, wherein the top plate is adapted to receive, through the third modular panel, a fastening means substantially perpendicularly to the plane made by the top plate.
7. The clip as in any one of claims 1 to 6, wherein at least one of the first and the second pressure edges comprises at least one of an angled edge and a curved edge.
8. The clip as in any one of claims 1 to 7, further comprising a third flat member and a fourth flat member respectively aligned with the first and the second flat members to prevent twisting of the clip in the assembly direction upon assembly of the two modular panels.
9. The clip as in claim 8, wherein the third and fourth flat members form a mirror image of the first and second flat members with respect to an insertion direction perpendicular to the assembly direction, thereby ensuring a reversibility of the clip.
10. The clip as in claim 9, wherein each one of the two modular panels comprises:

a foam layer partially enclosed by a first and a second exterior sheet of material each in a plane substantially parallel to the assembly direction;

a first female portion formed in the foam layer, near the first exterior sheet of material and comprising a first extension of the first exterior sheet of material; and

a second male portion formed in the foam layer, near the second exterior sheet of material and comprising a second extension of the exterior sheet of material,

wherein the second male portion of the first one of the two modular panels is inserted into the first female portion of the second one of the two modular panels upon assembly of the two modular panels in the assembly direction.
11. The clip as in claim 10, wherein a pair of flat members formed by any one of the first and second flat members, and the third and fourth flat members, are respectively introduced into the second male portion

on the first modular panel and the first female portion on the first modular panel near any one of the first and second exterior sheets of material of any one of the two modular panels.

12. The clip as in any one of claims 1 to 11, wherein a single piece of metal which is die-cut and folded forms both the first and the second flat members.
13. The clip as in claim 12, wherein the single piece of metal is folded again over itself to form a top plate linking the first and the second flat members.
14. The clip as in any one of claims 1 to 11, two pieces of metal which are each die-cut and folded to respectively form the first and the second flat members.
15. The clip as in claim 14, wherein the two pieces of metal are fixed together by at least one of welding, riveting, gluing to form a top plate which joins the first flat member to the second flat member.

Amended claims in accordance with Rule 137(2) EPC.

1. A clip (50, 50') for securing a tight connection between two modular panels (22a, 22b; 24a, 24b), the connection comprising portions of the two modular panels arranged close to each other upon assembly of the two modular panels, the clip comprising:

a first flat member (71) having a first pressure edge (77) within a first plane; and
a third flat member (73), fixedly joined to the first flat member (71);
once the panels are assembled in an assembly direction (35) and upon introduction of the first flat member (71), the introduction being perpendicularly to the assembly direction, the first flat member (71) secures the tight connection between the two modular panels;

characterized in that

a male portion (36, 36a, 36b) on a first one of the two modular panels and a female portion (38, 38a, 38b) on a second one of the two modular panels is provided, the male portion for insertion into the female portion upon assembly of the two modular panels;
the third flat member (73) being arranged along a second plane parallel to the first plane;
once the panels are assembled and upon introduction of the first flat member (71) into either one of the male portion and the female portion and of the third flat member (73) into the other one of the male portion and the female portion, the introduction being perpendicularly to the assembly direction, along the

first and the second plane, the first pressure edge (77) of the first flat member (71) forces the male portion (36, 36a, 36b) toward the female portion (38, 38a, 38b).

2. The clip as in claim 1, wherein the third flat member (73) comprises a third pressure edge (79) for forcing the male portion (36, 36a, 36b) toward the female portion (38, 38a, 38b) upon assembly of the two modular panels (22a, 22b; 24a, 24b).

3. The clip as in claim 2, wherein each one of the first and third pressure edges (77, 79) of the clip exert a force against an extension (27', 28') of one of two exterior sheets of material, wherein each one of the two modular panels comprises a foam layer partially enclosed by the two exterior sheets (27, 28) of material each in a plane substantially parallel to the assembly direction (35), the male portion (36, 36a, 36b) and the female portion (38, 38a, 38b) each being formed in the foam layer (26), near one of the two exterior sheets (27, 28) of material, and each one of the male portion and the female portion comprising the extension (27', 28').

4. The clip as in claim 2 or 3, wherein at least one of the first and third flat members (71, 73) is adapted to receive a fastening means substantially perpendicularly to the plane made by the first and the third flat members and through one of the two exterior sheets (27, 28) of material to thereby secure the clip (50, 50') into at least one of the two modular panels (22a, 22b; 24a, 24b).

5. The clip as in any one of claims 2 to 4, further comprising a top plate (75, 75') joining the first flat member to the third flat member (71, 73).

6. The clip as in claim 5, further for securing a third modular panel perpendicularly to the first and the second modular panels, wherein the top plate (75, 75') is adapted to receive, through the third modular panel, a fastening means substantially perpendicularly to the plane made by the top plate.

7. The clip as in any one of claims 1 to 6, wherein at least one of the first and the third pressure edges (77, 79) comprises at least one of an angled edge and a curved edge.

8. The clip as in any one of claims 1 to 7, further comprising a second flat member (72) and a fourth flat member (74) respectively aligned with the first and the third flat members (71, 73) to prevent twisting of the clip in the assembly direction (35) upon assembly of the two modular panels (22a, 22b; 24a, 24b).

9. The clip as in claim 8, wherein the second and fourth flat members (72, 74) form a mirror image of the first and third flat members (71, 73) with respect to an insertion direction (87) perpendicular to the assembly direction (35), thereby ensuring a reversibility of the clip. 5

10. The clip as in claim 9, wherein a pair of flat members formed by any one of the first and third flat members (71, 73), and the second and fourth flat members (72, 74), are respectively introduced into a second male portion on the first modular panel and a first female portion on the first modular panel near any one of first and second exterior sheets (27, 28) of material of any one of the two modular panels. 10
Wherein each one of the two modular panels (22a, 22b; 24a, 24b) comprises: 15

a foam layer (26) partially enclosed by the first and a second exterior sheet (27, 28) of material each in a plane substantially parallel to the assembly direction (35); 20
the first female portion formed in the foam layer (26), near the first exterior sheet of material and comprising a first extension of the first exterior sheet of material; and 25
the second male portion formed in the foam layer, near the second exterior sheet of material and comprising a second extension of the exterior sheet of material, 30

wherein the second male portion of the first one of the two modular panels is inserted into the first female portion of the second one of the two modular panels upon assembly of the two modular panels in the assembly direction. 35

11. The clip as in any one of claims 1 to 10, wherein a single piece of metal (69) which is die-cut and folded forms both the first and the third flat members (71, 73). 40

12. The clip as in claim 11, wherein the single piece of metal (69) is folded again over itself to form a top plate (75, 75') linking the first and the third flat members (71, 73). 45

13. The clip as in any one of claims 1 to 10, two pieces of metal (69, 70) which are each die-cut and folded to respectively form the first and the third flat members (71, 73). 50

14. The clip as in claim 13, wherein the two pieces of metal (69, 70) are fixed together by at least one of welding, riveting, gluing to form a top plate which joins the first flat member to the third flat member (71,73). 55

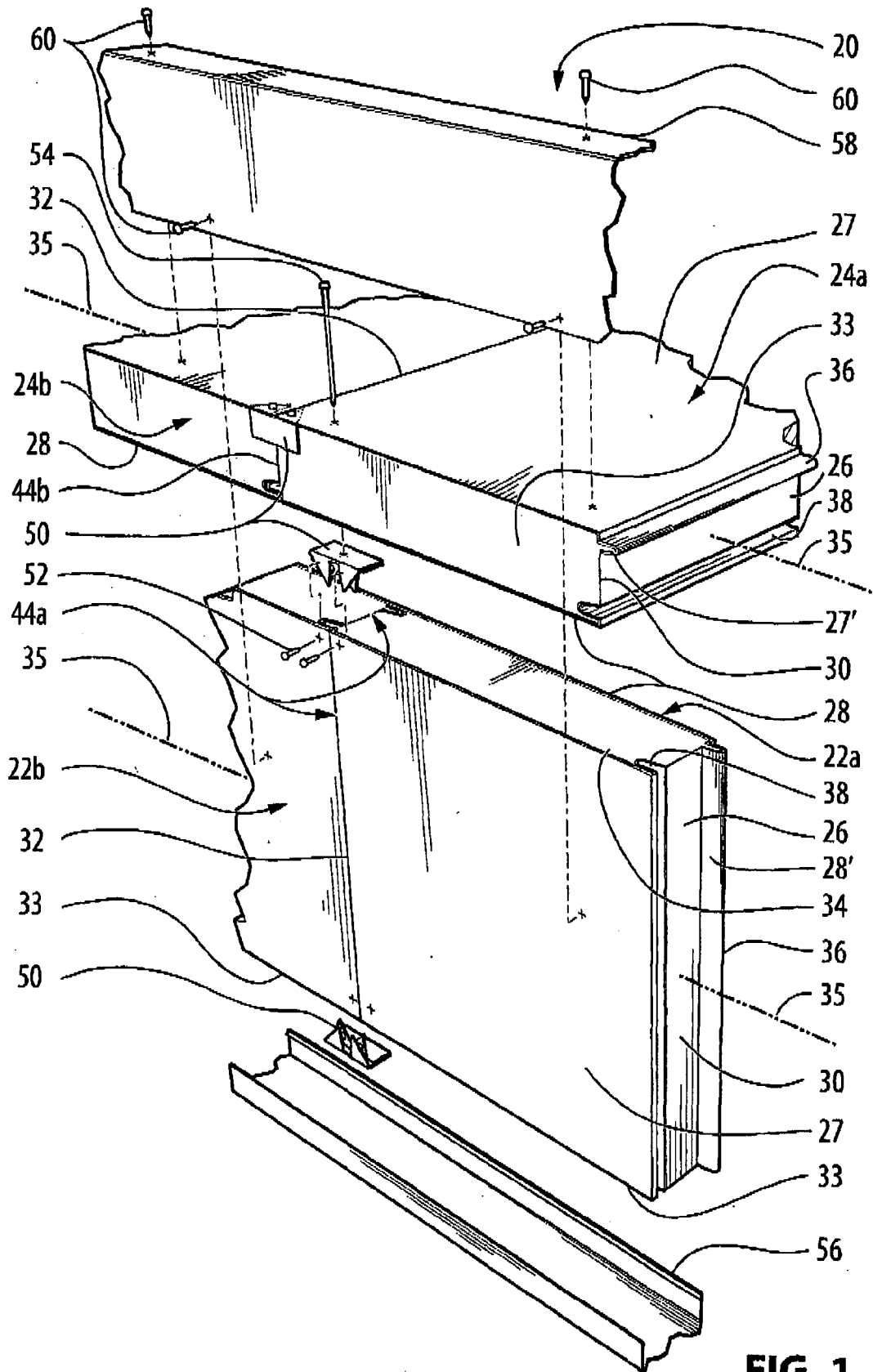


FIG. 1

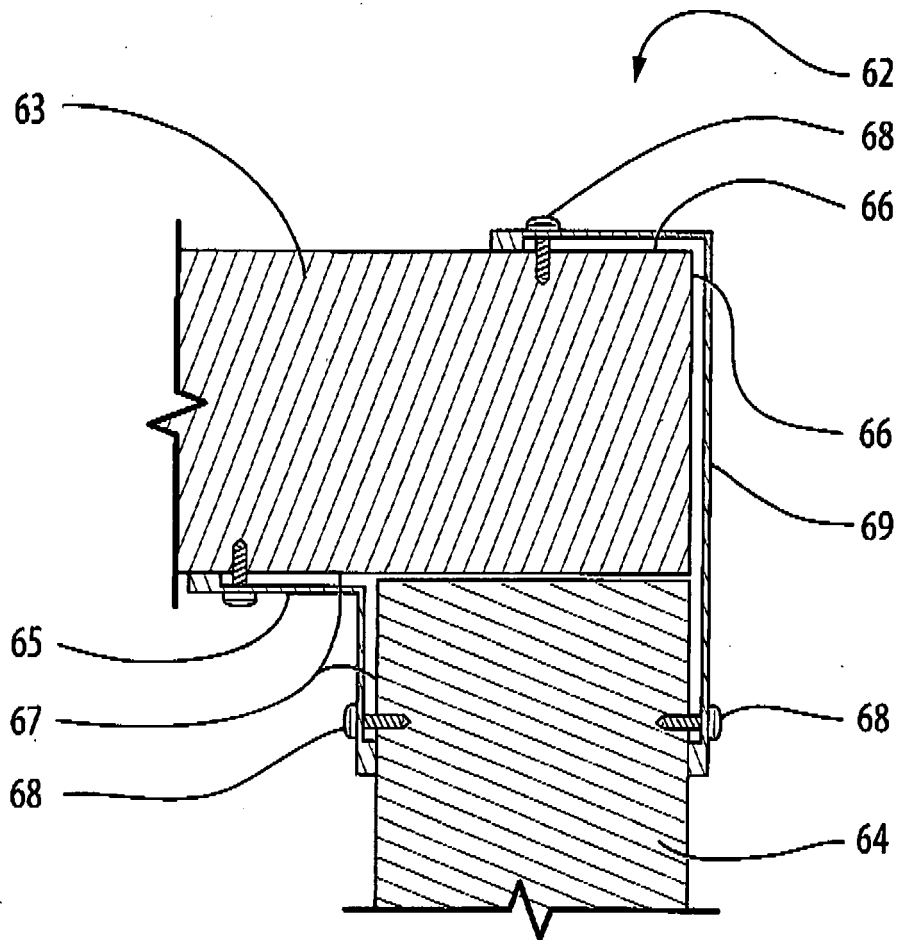
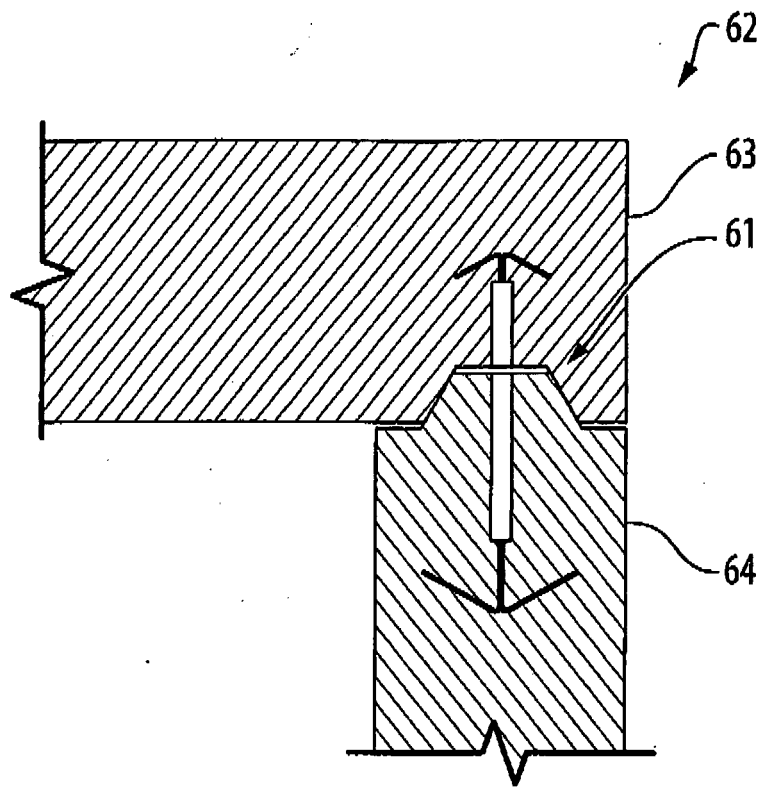


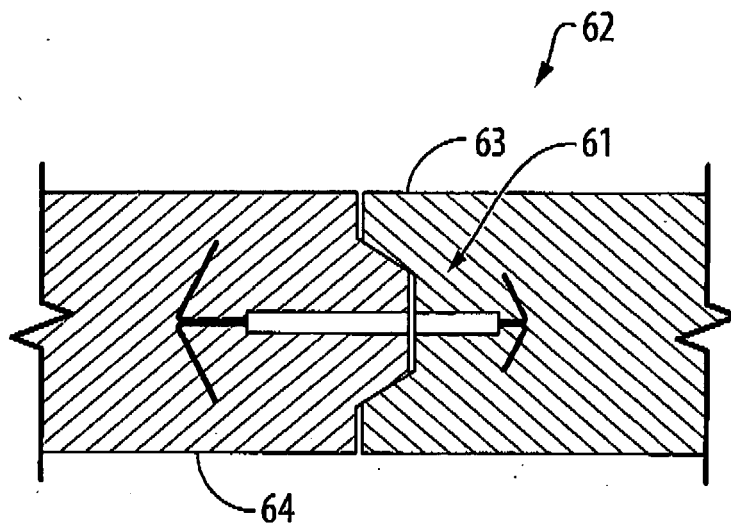
FIG. 2a

PRIOR ART



PRIOR ART

FIG. 2b



PRIOR ART

FIG. 2c

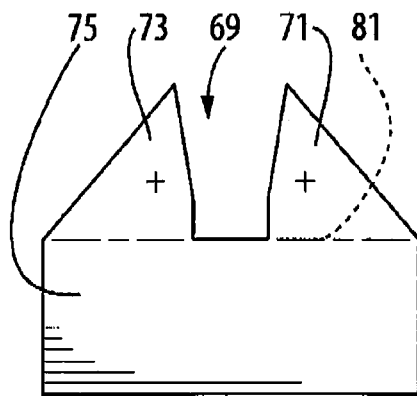


FIG. 3a

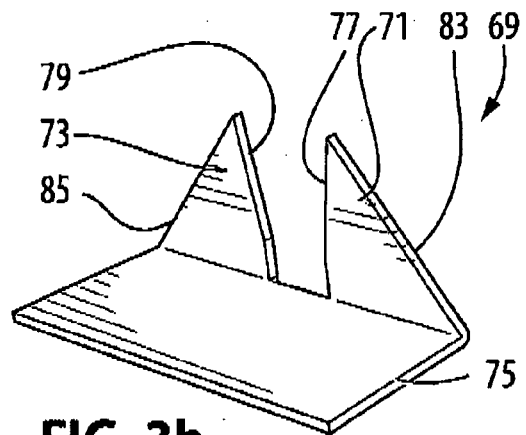


FIG. 3b

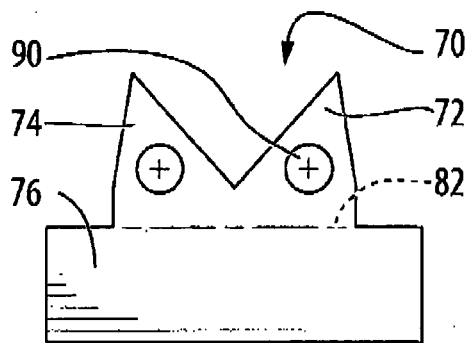


FIG. 4a

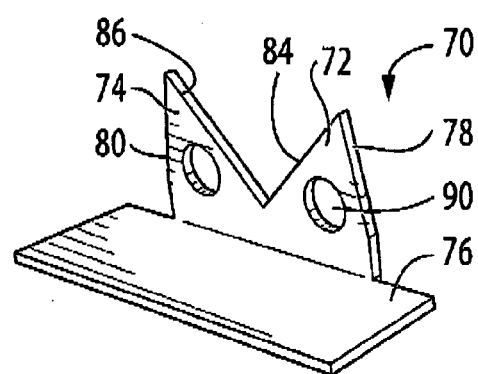


FIG. 4b

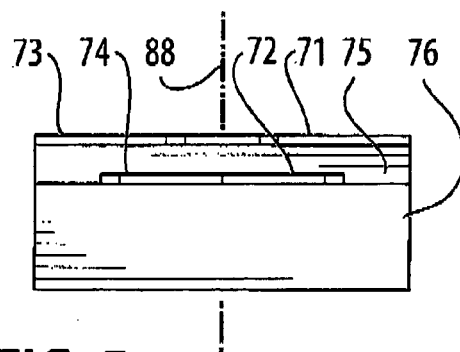


FIG. 5c

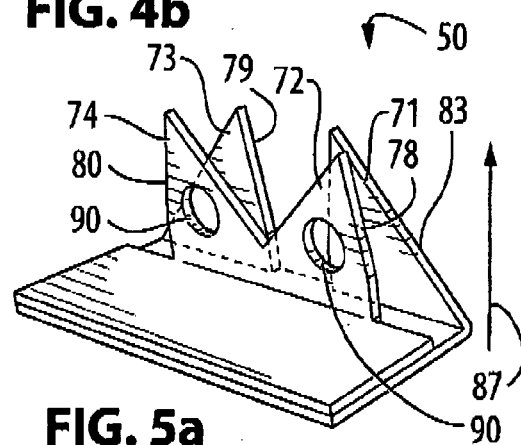


FIG. 5a

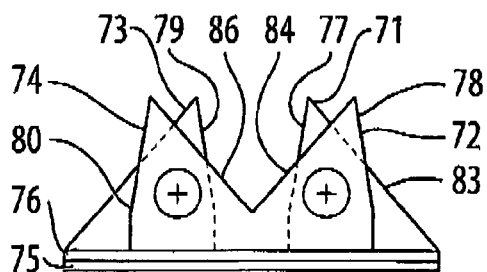


FIG. 5d

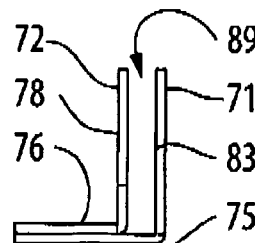


FIG. 5b

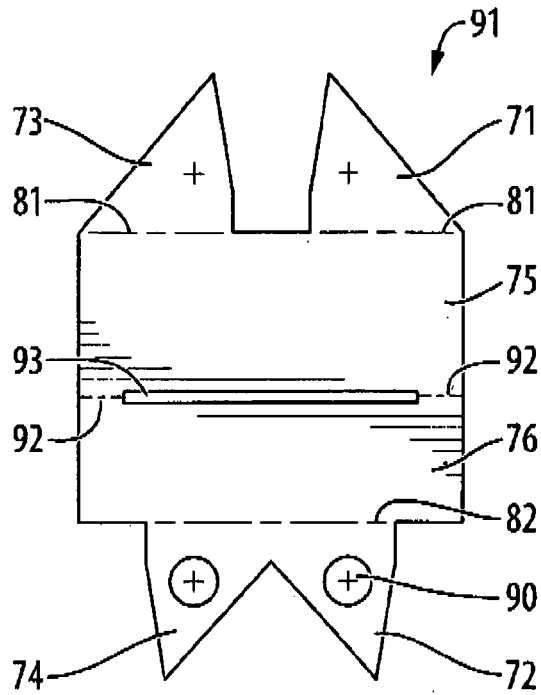


FIG. 6a

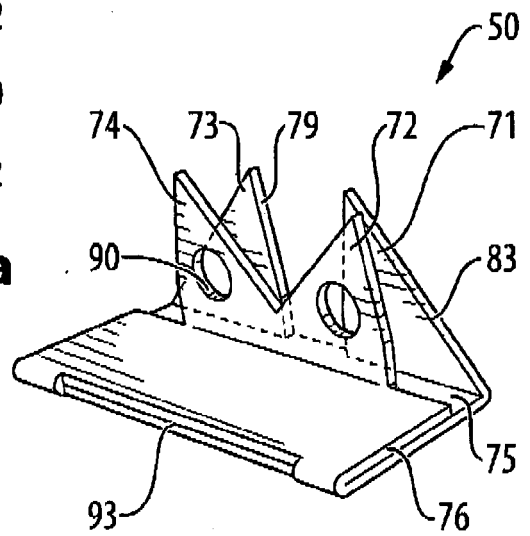


FIG. 6b

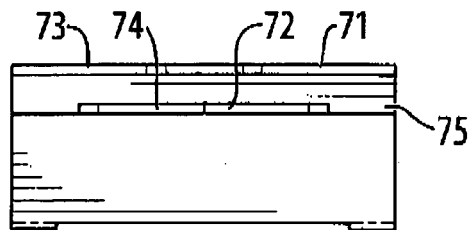


FIG. 6c

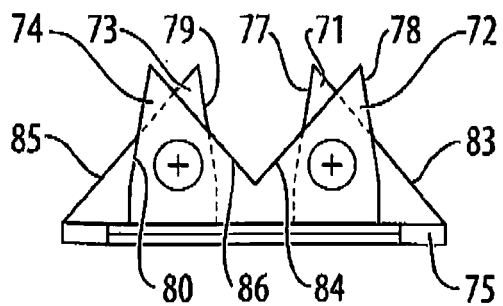


FIG. 6d

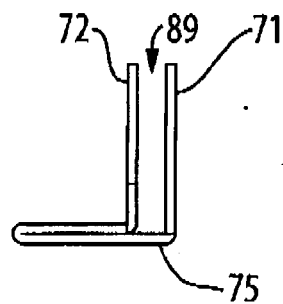


FIG. 6e

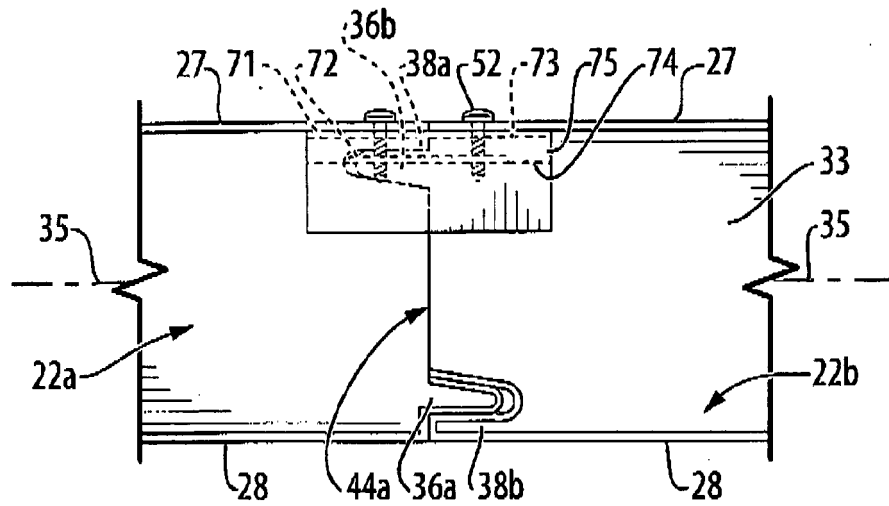


FIG. 7

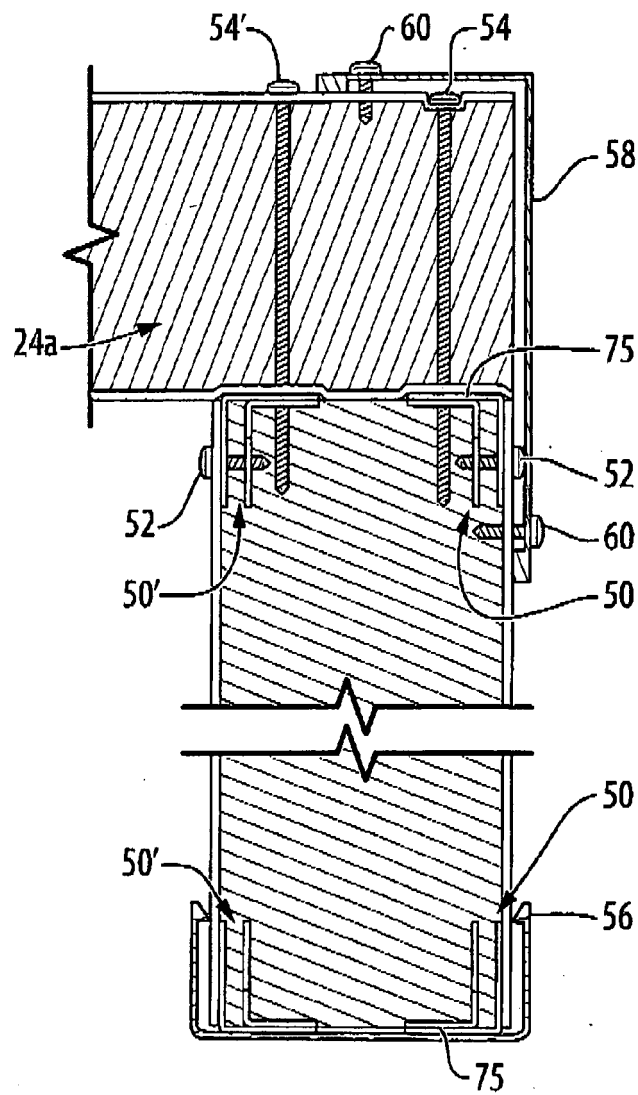


FIG. 8

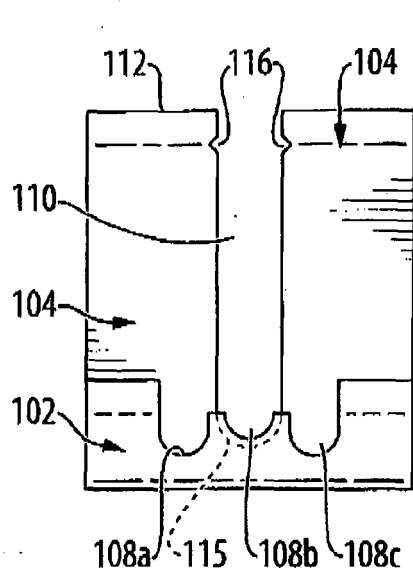


FIG. 9c

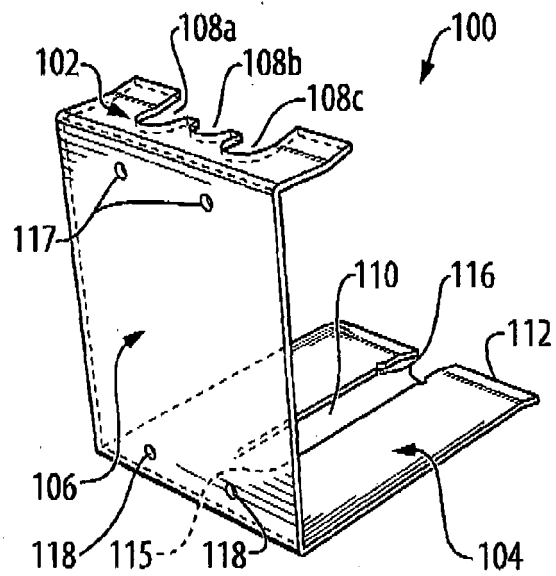


FIG. 9a

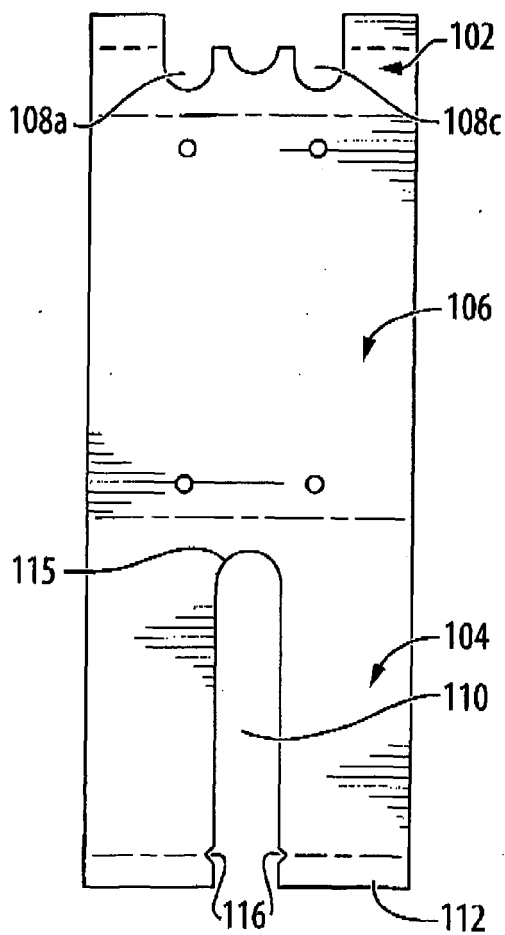


FIG. 9d

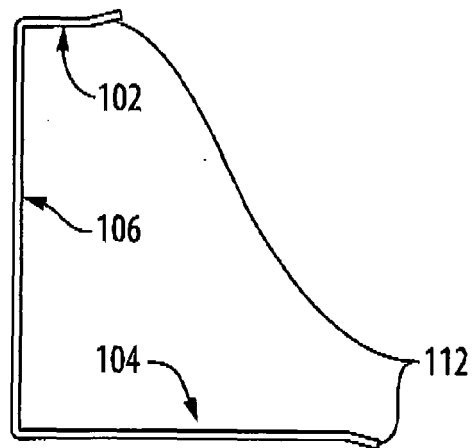


FIG. 9b

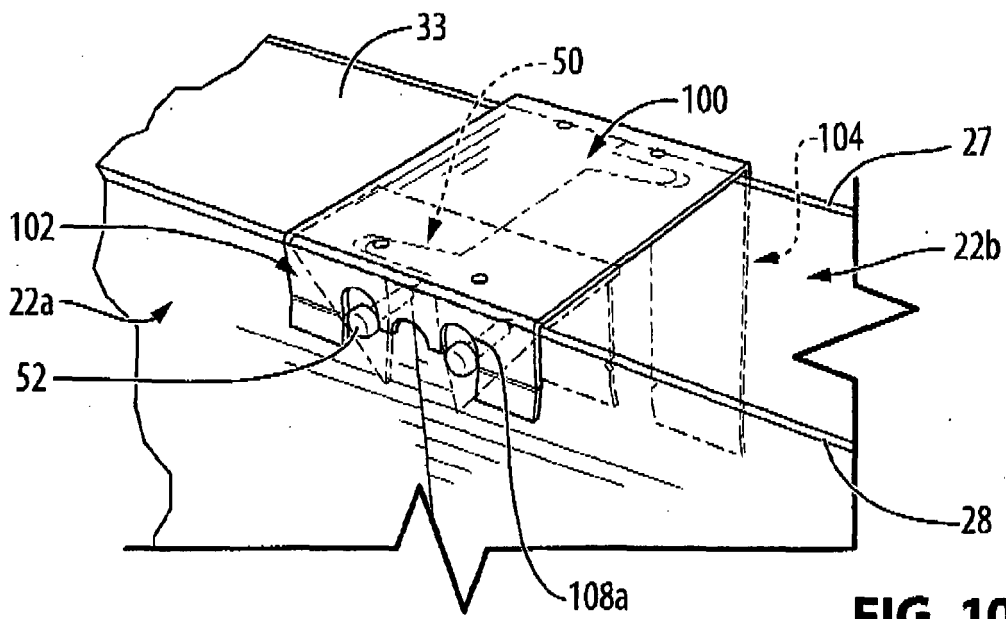


FIG. 10

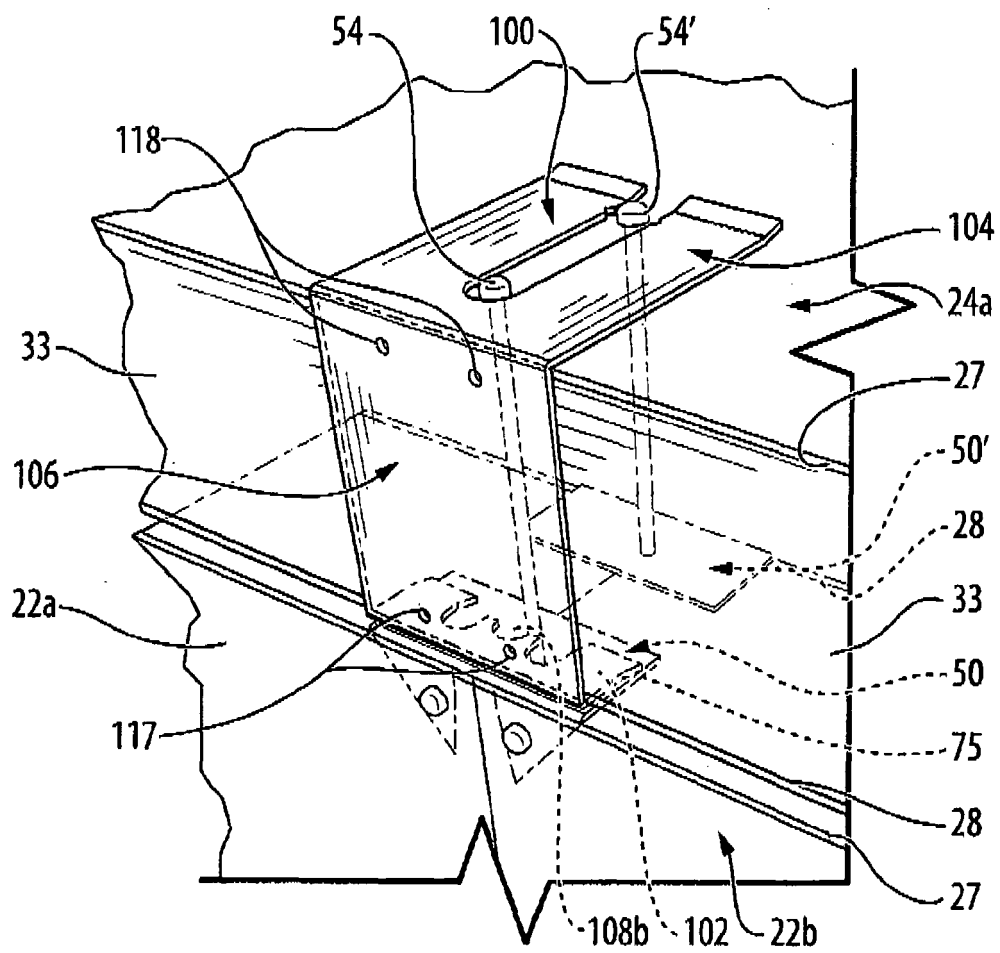


FIG. 11

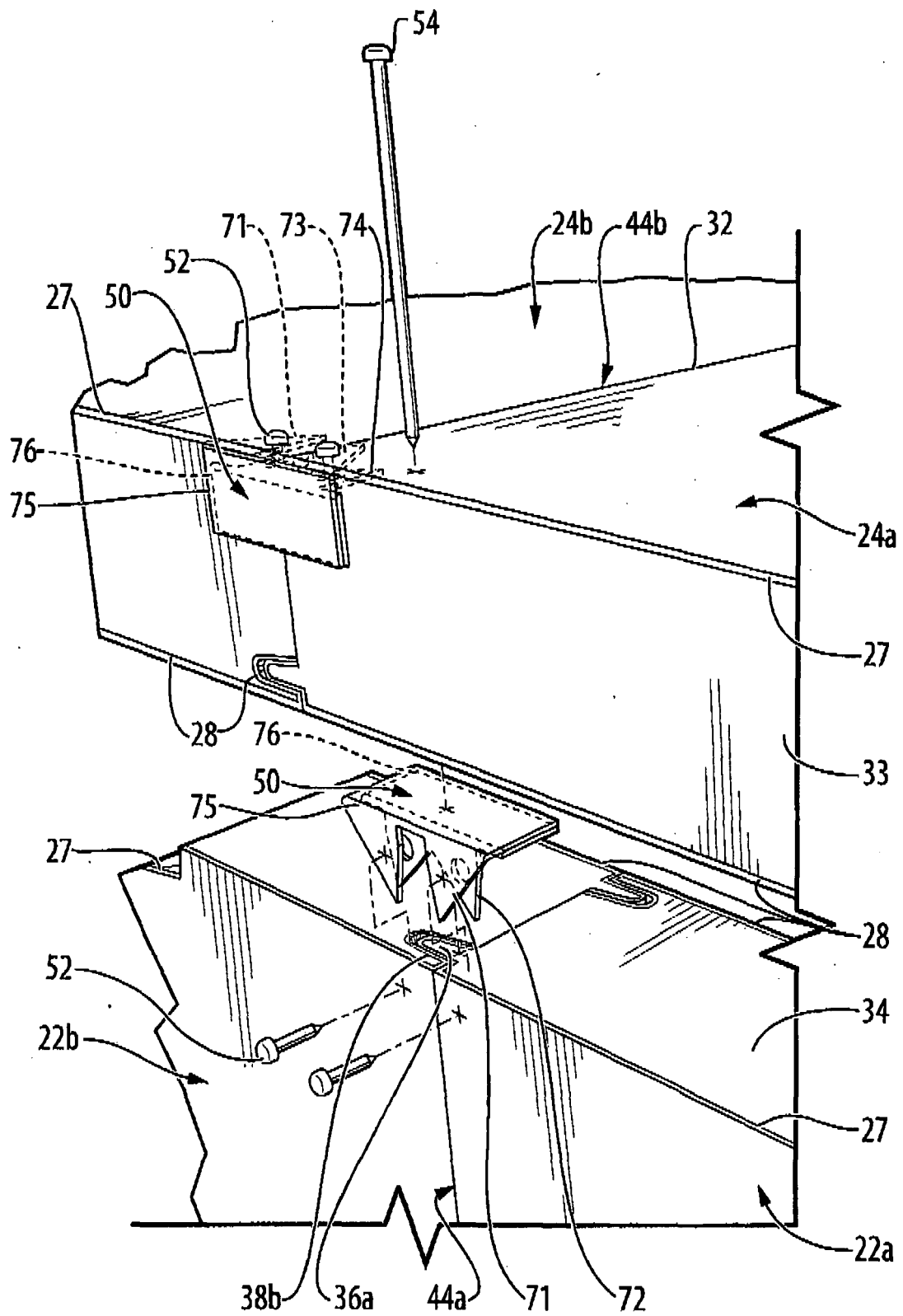


FIG. 12

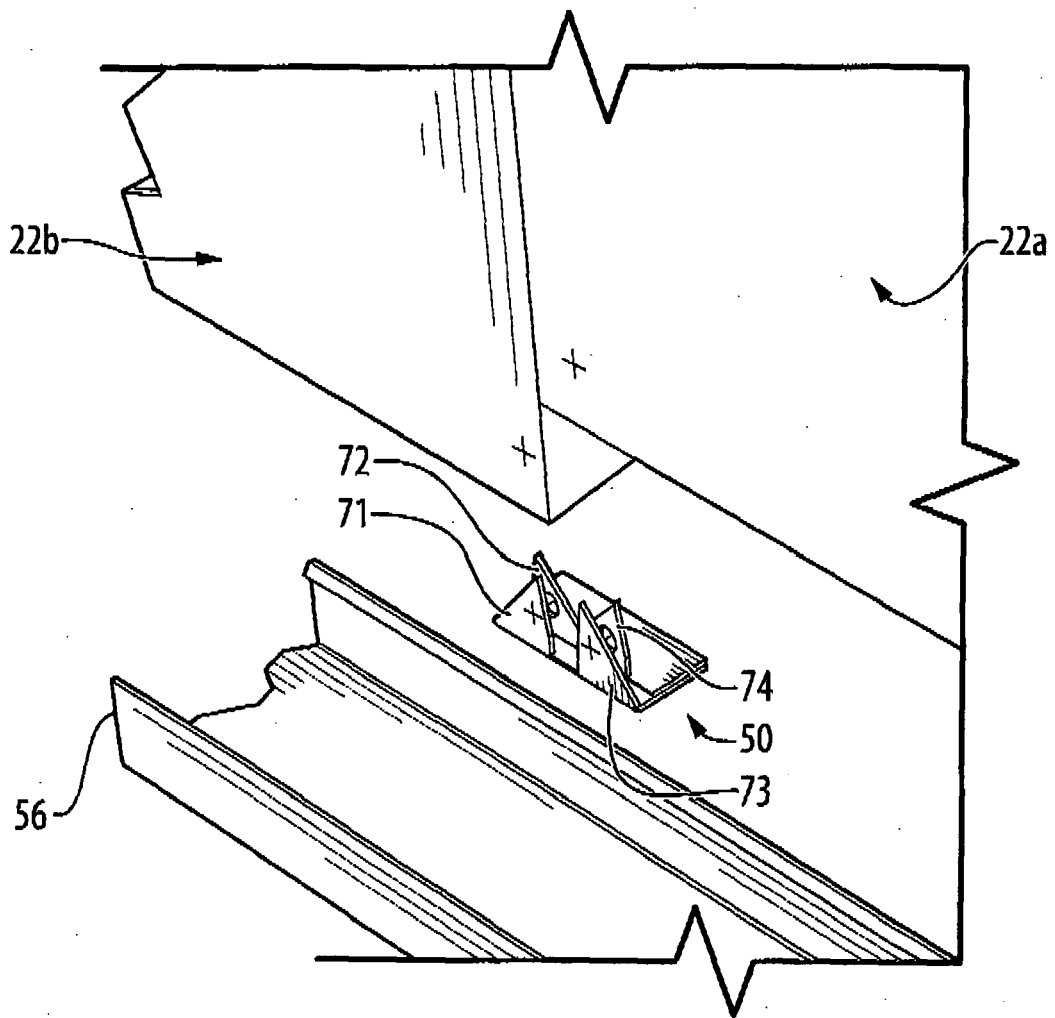


FIG. 13



EUROPEAN SEARCH REPORT

Application Number
EP 08 01 6958

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 299 19 825 U1 (LETHE METALLBAU GMBH [DE]) 27 January 2000 (2000-01-27) * figure 1 *	1-6,8-15	INV. E04B1/61 E04B1/76 E04C2/292
X	EP 0 887 482 A (ARTHA BNS S R L [IT]) 30 December 1998 (1998-12-30) * figure 1 *	1-5,7	
A	US 5 509 242 A (RECHSTEINER STEVEN A [US] ET AL) 23 April 1996 (1996-04-23) * figures 6,7 *	3,10	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E04C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 March 2009	Examiner Rosborough, John
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 01 6958

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02-03-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82