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(54) **POLYMER-BASED BRACKET SYSTEM FOR EXTERIOR CLADDING**

POLYMERBASIERTES HALTERUNGSSYSTEM FÜR AUSSENVERKLEIDUNG

SYSTÈME DE SUPPORT À BASE DE POLYMÈRE POUR HABILLAGE EXTÉRIEUR

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Description

BACKGROUND OF THE DISCLOSURE

[0001] In the past, in order to provide a highly thermally efficient (metal) wall or (metal) roof assembly for a building enclosure, it has been necessary for metal materials, typically an exterior and interior metal skin, to be bonded to either side of an insulated panel core inside a factory thereby creating a foam panel. These metal skins are typically profiled and have offsets in them to prevent the exterior metal skin from contacting the interior metal skin. This is done in an effort to prevent metal to metal contact thereby reducing thermal conductivity from the outside of the building. Heat travels in the path of least resistance such that heat can invade a system and affect an interior atmosphere through relatively finite pathways such as fasteners and the like that have metal to metal contact with exterior conditions. Similarly, exterior exposure to cold temperatures can allow for infusion of cold temperatures into a wall construction along highly thermally conductive components. Most applications of metal roof and wall assemblies retain at least some form of metal to metal contact through metal anchors, fasteners, or sill, transition, and window trim. Products of this type are subject to shorter warranties and life cycles due to the fact that the product is glued or otherwise bonded and is subject to damage and shortened life spans from thermal cycling which causes varying rates of contraction and expansion of the different materials and therefore wears significantly on any given system. Furthermore, these systems often require like materials to be in contact with each other which can lead to reactions such as oxidation which can corrode these materials over time. A metal wall, roof or deck system that creates a thermal break in the heat conductivity path thereby effectively eliminating or greatly reducing thermal bridging from exterior conditions to interior conditions that keeps like materials separate is desired.

[0002] Document EP 2354368 A describes a mounting bracket for building a wall according to the preamble of claim 1. It teaches a mounting bracket for mounting wall insulation to an exterior wall. This mounting bracket is constructed with a vertical wall plate, a horizontal support plate that extends orthogonal to the wall plate, and a vertical reinforcing plate that extends orthogonal to the vertical wall plate and the horizontal support plate. This bracket is arranged to be fastening to an exterior wall by a fixation means perforating the wall plate, while the ends of the reinforcing plate is adapted to be fastened to.

SUMMARY OF THE DISCLOSURE

[0003] One aspect of the present invention includes a building wall construction comprising:

- a building substrate;
- a layer of insulation disposed within an interior cavity

of the wall construction adjacent to the building substrate;

- a plurality of polymeric brackets coupled to the building substrate;
- one or more exterior cladding units coupled to the polymeric brackets;

and wherein, the polymeric brackets have a low thermal conductivity, and further wherein the wall construction is free of thermal bridges between the one or more exterior cladding units and the building substrate, such that condensation formed on the wall construction is realized only on the one or more exterior cladding units, such that the interior cavity of the wall construction is free from condensation, wherein each polymeric bracket of the plurality of polymeric brackets comprises:

- an anchor section adapted to couple to the building substrate;
- a support section adapted to couple to the one or more exterior cladding units;
- a web section connecting the anchor section to the support section.

[0004] This building wall construction of the invention includes additional features as detailed in main claim 1.

[0005] Additional embodiments of the present invention are further detailed according to the technical features of the subclaims depending on claim 1. These features and their advantages of the present invention will be further understood and appreciated by those skilled in the art by reference to the following specification and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a perspective view of a building having an exterior wall construction system;

FIG. 2 is a perspective view of a bracket system and exterior cladding unit;

FIG. 2A is a perspective view of a bracket system and exterior cladding unit;

FIG. 3 is a perspective view of a bracket system and exterior cladding unit attached to a building substrate;

FIG. 3A is a fragmentary perspective view of a bracket system and exterior cladding unit attached to a building substrate;

FIG. 4 is a fragmentary side elevational view of a bracket member and exterior cladding unit attached to a substrate;

FIG. 5 is a side elevational view of a bracket member;

FIG. 5A is a side elevational view of a bracket member;

FIG. 6 is a fragmentary perspective view of a bracket member receiving an insert;

FIG. 7 is a fragmentary perspective view of a bracket member receiving an insert;
 FIG. 8 is a perspective view of another bracket system and exterior cladding unit;
 FIG. 8A is an exploded fragmentary perspective view of a bracket system;
 FIG. 9 is a side elevational view of a bracket system;
 FIG. 10 is a fragmentary side elevational view of a bracket system attached to a building substrate and exterior panel;
 FIG. 11 is an exploded perspective view of a bracket system and exterior panel;
 FIG. 12 is a perspective view of a bracket system attached to a building substrate and exterior panel;
 FIG. 12A is a fragmentary perspective view of a bracket system attached to a building substrate and exterior panel taken at location XIIA of FIG. 12;
 FIG. 13 is a side elevational view of a bracket system;
 FIG. 13A is a fragmentary side elevational view of a bracket system attached to a substrate and exterior panel;
 FIG. 14 is a fragmentary perspective view of a bracket member receiving inserts;
 FIG. 15 is a fragmentary perspective view of a bracket member receiving inserts;
 FIG. 16 is an exploded perspective view of an adjustable bracket system;
 FIG. 17 is a perspective view of an exterior cladding unit attached to a substrate using the bracket system of FIG. 16;
 FIG. 18 is a side elevational view of the embodiment shown in FIG. 17;
 FIG. 19 is a perspective view of another embodiment of an adjustable bracket system;
 FIG. 20 is a perspective view of a polymeric bracket system;
 FIG. 21 is a side elevational view of a polymeric bracket;
 FIG. 22 is a perspective view of a polymeric bracket system;
 FIG. 23 is a side elevational view of a polymeric bracket system;
 FIG. 24 is a side elevational view of a polymeric bracket system;
 FIG. 25 is a side elevational view of a polymeric bracket;
 FIG. 26 is a side elevational view of a polymeric bracket system using the bracket of FIG. 25;
 FIG. 27 is a perspective view of a polymeric bracket of an embodiment of the present invention;
 FIG. 28 is a perspective view of a connecting insert; and
 FIG. 29 is a perspective view of the polymeric bracket of FIG. 27 having received multiple connecting inserts.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0007] For the purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the invention as oriented in FIG. 1. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in following specification, are simply exemplary embodiments. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be construed as limiting, unless expressly stated otherwise.

[0008] The reference numeral 2 (FIG. 1) generally designates a construction wherein a building structure includes a roof 4 with sides 5, 6, a front wall 8, and a side wall 10. The side wall or building substrate 10 is covered by exterior cladding units 12 which, in this embodiment, are depicted as ribbed panels made of a substrate generally known in the industry for use in an exterior surface of a building structure 2 such as steel, aluminum, zinc, and other such substrates. The front wall 8 is shown with a polymeric bracket system having rows 14 made up of polymeric bracket members or girts 16 which exhibit low thermal conductivity and are used to connect the exterior cladding units 12 to the building structure 2. Disposed between rows 14, are channels that are formed between the building substrate 10 and the exterior cladding units 12 when the exterior cladding units 12 are mounted to the bracket members 16. As shown in the embodiment in FIG. 1, insulating material 18 is housed in the channels disposed between the rows 14 of bracket members 16, wherein the insulating material 18, as shown in this embodiment, are modular insulation panels that serve to insulate the building structure 2 in assembly. The insulating material 18 can also be fire retardant panels, sound dampening panels or any other type of insulating material or panel known in the art for providing an interior or exterior wall with a quality for which the panel is known. Other such insulating materials or panels include materials having additives like insecticides, fungicides or colorants for example. Though many types of insulating materials are known in the art, for the purposes of the description below, insulating materials 18, as depicted in the accompanying figures, are exemplified as panels, which may be sealed or unsealed, designed to insulate the building structure. Sealed panels provide a vapor barrier in the wall construction of the present invention. Other insulating materials suitable for use with the present invention include, foam, fiberglass insulation, rigid insulation, semi rigid insulation, blanket insulation, loose fill insulation, spray foam in either fiberglass, rock wool, cellulose based, polystyrene, polyisocyanurate, polyurethane or other polymeric insulation formulations. Further, for the purposes of the description below, the exterior cladding units 12, as depicted in the figures, are ex-

emplified as modular exterior panels made of a metal substrate. The present invention is for use in many different applications such as wall systems, roof systems, decking systems and the like. For purposes of this application, an embodiment of the present invention will be exemplified as a metal wall panel system for description purposes, but is no way designed to limit the scope of the invention to an exterior wall panel system.

[0009] As shown in FIG. 2, fasteners 20, as known in the art, are used to connect bracket members 16 to a building substrate such as the front wall 8 of the building structure 2. As shown in FIG. 2A, fasteners 22 are used to connect the panels 12 to the bracket member 16 as indicated by the dotted lines in assembly thereby rigidly connecting the panels 12 to the substrate or front wall 8 of the building structure 2. As shown in FIG. 2, insulating panels 18 are disposed between the bracket members 16 in the channels formed between rows 14.

[0010] As shown in FIG. 3, an exterior panel 12 is secured to the bracket member 16 by fasteners 22 and the bracket member 16 are further coupled to the front wall 8 of the building structure 2 by fasteners 20. As shown in FIG. 3A, the bracket members 16 further comprise retention pins 24, or panel retention pins, in this embodiment, which are used to hold insulation panels 18 in place during assembly.

[0011] As shown in FIG. 4, the bracket member 16 is shown operably coupled to a substrate 8 and operably coupled to an exterior panel 12 in a lateral relationship, and has insulation panels 18 vertically disposed on either side of the bracket member 16. In this configuration, the bracket member 16, having low thermal conductivity, creates a thermal break in the path of heat conductivity from the exterior panel 12 to the building substrate 8 in such a way that there is no metal to metal contact. As used herein, the term "thermal break" refers to a break in like materials wherein the material disposed between like materials is comprised of a material having low thermal conductivity such as a polymeric material having a high R-value as further described below. R-values are measurements of the thermal resistance of different materials. R-values are well known by those skilled in the art of the construction and insulation industries. A high R-value indicates a highly insulative material, such as an R-value of R.2 per inch and higher. Conductive materials have a very low R-value, such as steel which exhibits a negligible or nearly non-existent R-value. In the configuration of the present invention, there are no like materials in contact with another, nor is there any metal to metal contact creating a pathway for heat to transfer from the exterior to the interior and vice versa.

[0012] As shown in FIG. 4, a ventilation system is comprised in part by vents 26 and 28 disposed above and below the bracket member 16 such that vents 26 are formed between the insulation panel 18 and the exterior panel 12 and vents 28 are formed between the insulation panel 18 and the building substrate 8.

[0013] FIG. 5 generally depicts a side elevational view

of a bracket member 16 which, in this embodiment, has a generally Z-shaped configuration with a support section 32, adapted to connect to and support an exterior cladding unit. In this embodiment, the support section 32 of the bracket member 16 includes an exterior surface 34 and interior surface 36 wherein the interior surface 36 further comprises a T-shaped channel 38. The support section 32 has a planar thickness "A" which correlates to the size of the vents 26 which are disposed between the insulation panels 18 and the exterior panels 12, as shown in FIG. 4.

[0014] As shown in FIG. 5, the bracket member 16 further comprises a web or body section 40 which has a first side 42 and a second side 44, wherein an aperture 49 is disposed on the body section 40 of the bracket member 16 and is configured to house pins 24 which help to hold the insulation panels 18 in place in assembly. The web or body section 40 connects the support section 32 to the anchor section 48 described below. As shown in FIG. 5, the aperture 49 further comprises a beveled side 56 disposed on the second side 44 of the body section 40 of the bracket member 16. It is also contemplated that the beveled section 56 of aperture 49 can be disposed on the first side 42, the second side 44, or both the first and second sides 42, 44 of the body section 40 of the bracket member 16 for positively capturing a pin 24 (not shown) with a beveled head that corresponds to the counter sunk beveled edge or edges of aperture 49. The body portion 40 further comprises retention fins or panel piercing airlock ribs 46 which, in this embodiment help to hold insulation panels 18 in place. It is further contemplated that the insulation panels 18 (not shown) can be manufactured with a channel that corresponds to the fins or ribs 46 of the bracket member 16 to retain the insulation panels 18 in place in assembly. The body section 40 of the bracket member 16 has a length "C" which generally corresponds to the width of the insulation panels 18. The bracket member 16 further comprises an anchor section 48 having an exterior side 50 and an interior side 52 which is used to anchor the bracket member 16 to a substrate 8 with fasteners 20 such as shown in FIG. 4. The anchor section 48 of the bracket member 16 has a planar thickness "B" which corresponds to the width of the vents 28 as shown in FIG. 4 in a similar fashion as vents 26 correspond to planar thickness "A" of the support section 32.

[0015] In the embodiment shown in FIG. 5, the bracket member 16 further comprises channels 58 disposed on both the support section 32 and anchor section 48 which are used to guide fasteners 20 and 22 in assembly. In the embodiment shown in FIG. 5, the support section 32 of the bracket member 16 further comprises a T-shaped channel 38 which is adapted to accept an insert (not shown) which is used to help retain fasteners in assembly as described in more detail below.

[0016] In the embodiment shown in FIG. 5A, a bracket member 30 generally has similar features as the bracket shown in FIG. 5 with exception of the exterior side 50 of

the anchor section 48 having a T-shaped channel 54 for use in accepting an insert (not shown) which is used to help retain fasteners 20 in assembly.

[0017] As shown in FIG. 6, the bracket member 16 further comprises a slideable, insert 60 which can be inserted into T-shaped channel 38 and moved laterally along T-shaped channel 38 by sliding the insert 60 along the length of the T-shaped channel 38 to facilitate fastener retention when fasteners 22 (not shown) are used to secure exterior panels 12 to the bracket member 16. The insert 60 can be an insert which can be made of a rigid polymer, metal or other like reinforcing material adapted to rigidity the bracket members 16 and retain fasteners in assembly. The insert 60 can also be made from recycled materials such as recycled metal or other like material. The T-shaped channel 38 disposed on the interior surface 36 of support section 32 further comprises channel tabs 39 which positively capture the insert 60 in the T-shaped channel 38 while allowing the insert to slide along the length of the T-shaped channel 38.

[0018] In the embodiment shown in FIGS. 6 and 7, the anchor section 48 of the bracket member 16 further comprises channels 62 disposed along the interior side 52 of the anchor section 48 wherein the channels 62 vertically span the length of the interior side 52 of the anchor section 48. The channels 62 make up, in part, the ventilation system of this embodiment by providing a cross ventilation air groove for rear ventilating and rain screening of the bracket and panel system.

[0019] The bracket members 16 are developed from an anticorrosive polymeric material that exhibits high insulative qualities or rather, demonstrates high R-value properties such as an R-value in the range of about R.2 to about R8 per inch. Polymeric materials suitable for the present invention include thermoplastics or thermoset resin materials including for example: acrylonitrile-butadiene-styrene (ABS) copolymers, vinylesters epoxies, phenolic resins, polyvinyl chlorides (PVC), polyesters, polyurethanes, polyphenylsufone resin, polyarylsulfones, polyphthalimide, polyamides, aliphatic polyketones, acrylics, polyxylenes, polypropylenes, polycarbonates, polyphthalamides, polystyrenes, polyphenylsulfones, polyethersulfones, polyfluorocarbons, bio-resins and blends thereof. Other such thermoplastics and thermoplastic resins suitable for the present invention are known in the art which demonstrate high R-values and are thereby heat resistant as well as anticorrosive. Thermoplastics of the present invention are also contemplated using a recyclable polymer or are made of a polymeric material which is partially comprised of a renewable resource such as vegetable oil or the like in its composition when an eco-friendly or "green" bracket member is desired. The polymeric material of the present invention can also be reinforced with a reinforcing fiber as detailed below. Bracket members composed of the materials discussed above form a thermal break between exterior panels and building substrates in an effort to control the temperature within a building structure by reducing

or eliminating thermal conductivity from the exterior panel to the building substrate and vice versa. In assembly, the R-value of an exterior wall panel system of the present invention can typically exhibit a R-value from about R.2 to about R30 per inch depending on the thickness of the overall system, the insulation materials used and the composition of the bracket members. Further, microspheres, such as polymeric or glass nanospheres, can be added to the makeup of the brackets to provide further insulative properties and increased R-value expression.

[0020] There are several different types of measurements that relate to a materials ability to insulate, resist, transmit or conduct heat across a material. Particularly, a material's K-value relates to a specific material's thermal conductivity, a material's C-value correlates to the material's thermal conductance, a material's R-value relates to a material's thermal resistance, and a U-value relates to the thermal transmittance of an overall system. In designing a wall, roof or deck bracket and panel system providing adequate insulative properties for a building structure, materials with low K-values and C-values are desired while materials with high R-values are desired. When this set of conditions is met, the overall thermal transmittance, or U-value, of the system is low. Thus, the lower the U-value, the lower the rate heat thermally bridges from one material to another. A building structure having a well insulated system will have a much lower U-value than an uninsulated or poorly insulated system exhibiting high thermal transmittance.

[0021] Regarding the R-value of the bracket members of the present invention, a relatively high R-value is desired to ensure adequate insulation of a building structure from outside elements by making a bracket that creates a thermal break in a wall panel system. A range of R-values for the polymeric materials used to construct the bracket members described above would be a range of about R.2 to about R8 per inch in order to create a thermal break that effectively reduces or eliminates thermal bridging. The thermal conductivity, or K-value, is the reciprocal of the material's R-value, such that for a polymeric material exhibiting an R-value of about R.2 to R8 per inch, the correlating K-value for that material would be from about K5 to about K0.125 per inch. Thus, in comparison to present day metal brackets used in other bracket and panel systems made of iron or steel, a polymeric bracket member of the present invention will exhibit a K-value of approximately about K.5 to about K0.125 per inch at a given set of conditions as compared to a bracket made from a metallic material such as iron or steel which would have an approximate K-value as high as K32 to K60 per inch at the same conditions. This is because metallic materials, such as iron and steel, have low or negligible R-values and are well known conductors of heat. Steel is known to have an R-value of about 0.003R per inch. Thus, for example, a steel bracket compared to a polymeric bracket of the present invention having an R-value of R.55 would be 183 times more thermally conductive.

[0022] The bracket members of the present invention

are typically molded members which are formed from the materials noted above and generally used in molding processes such as injection molding, extrusion molding, pultrusion molding and other such molding techniques known in the art. In order to provide a polymeric bracket having comparable strength to the metal brackets known in the art, a reinforcing fiber may be introduced into the polymeric mix to increase the strength of the polymeric bracket member. For example, glass fibers (fiberglass), carbon fibers, cellulose fibers, nylon fibers, aramid fibers, and other such reinforcing fibers can be introduced into the overall polymeric composition before or during the molding process, thereby resulting in a bracket member which has a sufficiently high R-value to create a thermal break in a metal wall system of a building structure, while also having the requisite strength to adequately support exterior panels of a metal panel wall system on a building substrate.

[0023] In building construction, condensation is a very undesirable phenomenon as condensation in building construction can cause dampness, rotting, corrosion, mold and energy loss due to increase heat transfer. Condensation which occurs within a substructure, such as an exterior cladding system, can be caused by thermal bridges which exist within the substructure. As noted above, the present invention creates a thermal break between the external environment and a building substrate. As such, the present invention helps to reduce condensation or eliminates condensation all together within in the wall construction. Condensation occurs on hard surfaces during the formation of dew. For example, water condensing on a glass of ice water or on the inside of a window, is the result of the glass surfaces cooling to a temperature below the dew point of the air which is in contact with the glass surfaces. The present invention serves to move the dew point to the outside of a building substrate by eliminating all thermal linear point bridges to the interior cavity of the wall system, and thereby moving the dew point entirely from the interior of the wall construction to the exterior of the wall construction. Thus, with reference to FIG. 3, the exterior cladding unit 12 does not allow for thermal bridging to occur between the external environment which is in contact with the external cladding unit 12, to the building substrate 8. The space in between the building substrate 8 provides an interior cavity in which insulating members 18 are disposed. As noted above, the polymeric brackets 16 have a low thermal conductivity and therefore create a wall construction which is free of thermal bridges between the exterior cladding unit 12 and the building substrate 8, such that cold points do not develop from a cold outside exposure which can lead to condensation formation. Thus, condensation will be formed only on the exterior of the wall construction, or exterior cladding unit 12, such that the interior cavity, having the insulating members 18 disposed therein, is free from condensation.

[0024] In the embodiment shown in FIG. 8, dotted lines indicate the mounting of an exterior cladding unit 70,

shown in FIG. 8 as an exterior panel, to a building structure 72. The building structure has walls 74, 76 which can be any substrate normally found on a building structure such as a sheathed stud wall, a concrete wall, a masonry wall, or a steel roof deck. The exterior panel 70 attaches to the building structure via a bracketing system 80 (FIG. 8A) which comprises a grooved stud 82 generally made of a polymeric material having a significantly high R-value (as described above for bracket member 16) and clips 84, 86 which are generally made of a metallic material. As shown in FIG. 8A, the stud 82 has a first end 88 and a second end 89 which further comprise channels 92 giving the first end 88 and second end 89 a general T-shaped configuration. Channels 92 are U-shaped channels disposed on first and second sides 90 and 91 of the grooved stud 82. Clips 84 and 86 comprise flanges 94 which coordinate to form a T-shaped channel 96 which generally correlates to the T-shaped first and second ends 88 and 89 of the stud 82. The clips 84 and 86 further comprise U-shaped channels 98 which correlate with U-shaped channels 92 of the grooved stud 82. Thus, the configuration of the stud 82 and the clips 84 and 86 coincide such that the clips 86 and 84 can slide on to the ends 88 and 89 of the stud 82 as shown in FIG. 9. The clips 84 and 86 further comprise attachment surfaces 100 which are used to attach the clips to either a building substrate or an exterior panel. The stud 82 further comprises retention fins, or in this embodiment, panel retention fins 102 used to keep insulating materials, such as panels 104, in place in assembly as shown in FIG. 10. The panel retention fins 102 are disposed on both first and second sides 90, 91 of the stud 82. As shown in FIG. 11, a plurality of bracketing systems 80 are attached to a building structure 72 on the building structures exterior walls 74 or 76. The bracketing systems 80 are attached to the wall 76 as shown in FIG. 11, in a vertical stud-like fashion. In this fashion, clip 84 is attached to the building structure substrate or wall 76 at the attachment surface 100 of the clip 84. The stud 82 is then disposed between clip 84 and clip 86 and the clips are attached to stud 82 in the manner shown in FIG. 9 such that attachment surface 100 of clip 86 is exposed for the attaching of an exterior panel 70.

[0025] As shown in FIG. 12, the exterior panel 70 is attached to a plurality of bracketing systems 80 by fasteners 106. Between bracketing systems 80, a panel 104 is disposed wherein the panel 104 is made of a material similar to the panels 12 as described above. In this configuration, the stud 82 creates a thermal break between the exterior panel 70 and the building substrate 76. Further, in this configuration, there are no like materials in contact with another, nor is there any metal to metal contact creating a pathway for heat to transfer from the exterior to the interior and vice versa.

[0026] As shown in FIG. 12A, a bracketing system 80 is shown attached to a substrate 76 via a clip 84 through fasteners (not shown) and further attached to an exterior panel 70 via clip 86 using fasteners 106. The panel re-

tention fins 102 are shown fitting into grooved channels 108 formed in the panel 104 to help align the panel 104 in assembly. A ventilation system includes vents 110 and 112, which correlate to the thickness of attachment surfaces 100 of clips 84 and 86, wherein the vent 110 is disposed between panel 104 and the substrate 76 and vent 112 is disposed between panel 104 and exterior panel 70.

[0027] A polymeric bracket member 114 is shown as a hat-shaped bracket member, or girt (FIG. 13). This bracket member 114 comprises first and second bottom anchor flanges or sections 116 and 118 having exterior sides 120 and 122 respectively, and interior sides 124 and 126 respectively. T-shaped channels 128 are disposed on the interior sides 124, 126 of anchor flanges 116, 118, and the T-shaped channels 128 have channel tabs 129 which are used to positively capture an insert 130 in assembly. Fastener guide channels 132 are disposed on the exterior and interior sides 120, 122, 124, 126 of the bottom anchor flanges 116, 118 for use in guiding fasteners through a bracket member into a substrate. The bracket member 114 further comprises first and second webs or side walls 134, 136 which have insulation panel retention fins 138 disposed on either side of side walls 134, 136 to facilitate the retention of insulation panels in assembly. The bracket member 114 further comprises a top support section 140 which has an exterior side 142 and an interior side 144. Both the exterior side and the interior side have fastener guide channels 132 and the interior side 144 further comprises a T-shaped channel 146 having tabs 148 for positively capturing a variable gauge insert (not shown) in assembly.

[0028] As shown in FIG. 13A, bracket member 114 is shown in a wall assembly wherein the bracket member 114 is attached to a building substrate 154 at bottom anchor flanges 116, 118. This attachment is made by fasteners known in the art (not shown). Panels 150 and 152 are shown in the assembly wherein panels 150 span between bracket member 114 and another like bracket member 114 (not shown). Panel 152 is disposed in a channel formed between side walls 134 and 136 of bracket member 114. An exterior panel 156 is attached to top support section 140 of bracket member 114 via fasteners 158. A ventilation system further includes vents 160, which are formed between panels 150 and exterior panels 156, for ventilation and rain sheeting of the system. Vents 164 are formed between the panels 150 and the building substrate 154 for cross-ventilation and moisture sheeting purposes and vent 162 is formed between panel 152 and the building substrate 154 for ventilation within the interior space of bracket member 114. In this configuration, bracket member 114, formed from a polymeric material having a high R-value, forms a thermal break between the exterior panel 156 and the building substrate 154. Further, in this configuration, there are no like materials in contact with another, nor is there any metal to metal contact creating a pathway for heat to transfer from the exterior to the interior and vice versa.

[0029] As shown in FIGS. 14 and 15, the bracket member 114 is shown with inserts 160 to be inserted in the T-shaped channels 128 disposed on the interior sides 124, 126 of the bottom anchor flanges 116, 118 where they will be held in place by channel tabs 129. The inserts 160 are made of a rigid material, such as a rigid polymer or metallic material and are slideable along the length of the T-shaped channels 128. Further, it is contemplated that a similar insert (not shown) can be inserted in the T-shaped channel 146 disposed on the interior side 144 of the top support 140 of bracket member 114. As with the bottom anchor flanges 116, 118, the top support 140 has channel tabs 148 disposed on the interior side 146 of the top support 140, which hold an insert (not shown) in place in assembly. An insert used in the T-shaped channel 146 is slidable along the length of the channel 146 to a desired location where fasteners (not shown) will be used to hold an exterior panel (not shown) in place on top support 140. The inserts 160, as well as the insert used in T-shaped channel 146, are used to retain the fasteners in place in assembly.

[0030] Referring to FIG. 16, a bracket system 200 is generally shown for supporting an exterior cladding unit 210 to a substrate 212 of a building structure. In the embodiment shown in FIG. 16, the substrate of the building structure 212 is depicted as a wall substrate, however, it is contemplated that the building substrate can be a roof, a deck, a landing, or any other surface disposed on a building structure. As shown in FIG. 16, the exterior cladding unit 210 is a grooved exterior cladding unit similar to exterior cladding unit 12 shown in FIG. 1. The bracket system 200, as shown in FIG. 16, comprises, in this embodiment, a two-part bracket structure made up of multiple anchor members 214 and multiple support members 220. Each anchor member comprises a generally L-shaped configuration having a vertical wall 216 and a horizontal connection landing section 218. The vertical wall 216 forms an anchor section which is adapted to couple to the substrate 212 of a building structure via apertures 217. Thus, the anchor section 216 provides a vertical contact surface for attaching the anchor member 214 to the substrate 212 of the building structure.

[0031] Each support member 220 comprises a generally L-shaped configuration having a vertical support section 222 and a horizontal connection landing section 224. In assembly, the vertical support section 222 is adapted to couple to the exterior cladding unit 210, as shown in FIG. 17. The horizontal connection section 224 of the support member 220 provides a support connection landing adapted to couple to the anchor connection landing 218 of the anchor member 214. The bracket system 200 shown in FIG. 16 is an adjustable bracket system which provides for a slidable connection between anchor member 214 and support member 220. This adjustable connection is made possible by apertures 225 disposed on the support connection landing 224 of the support member 220 being aligned with apertures 227 disposed on the anchor connection landing 218 of the anchor member

214. The connection between anchor member 214 and support member 220 is slidably adjustable by the oblong shape of the apertures 227 disposed on the anchor connection landing 218. While the apertures 227 of the anchor connection landing 218 are horizontally disposed oblong apertures, it is contemplated that apertures 225, which appear as fixed round-shaped apertures in FIG. 16 disposed on the support connection landing 224 of the support member 220, can also be horizontally disposed oblong-shaped apertures. Thus, the bracket system 200 is designed to have the connection landing of either the anchor member 214 or the support member 220 having oblong-shaped apertures that align with fixed apertures disposed on the other member to provide a slidably adjustable relationship between the anchor member 214 and the support member 220 which is slidably adjustable along the length of the oblong-shaped apertures 227 in FIG. 16, such that the bracket system 200 can accommodate for variations in the substrate 212 of the building structure to provide a plumb and level exterior surface made up of exterior cladding units 210. As better shown in FIGS. 17 and 18, the substrate 212 of the building structure is not perfectly level or plumb, such that the bracket system 200 can be used to connect an exterior cladding unit 210 in a manner that is level due to the slidable adjustment features of the anchor members 214 with respect to the support members 220. Specifically, as shown in FIGS. 17 and 18, three sets of anchor members and support members 214, 220 are indicated as sets X, Y, and Z. The building substrate 212 is an inclined substrate which extends outwardly from the top portion 212a of the substrate 212 to a bottom portion 212b of the substrate 212. Thus, in order to provide a level and plumb exterior cladding unit 210, the anchor member and support member 214, 220 making up set X are extended to a larger degree as compared to sets Y and Z. As shown in FIGS. 17 and 18, set X appears to have the maximum extension possible as dictated by the length of the oblong apertures 227 disposed on the connection landing 218 of the anchor section 214, while set Z appears to have the support member 220 disposed in a close relationship with anchor member 214 to provide a minimal degree of extension. As further shown in FIG. 18, set Y is set at an extension level somewhere between that of set X and set Z. Thus, the exterior cladding unit 210, shown in FIGS. 17 and 18, appears plumb and level while the building substrate 212 is inclined. In this way, the construction provides a bracket system 200 adapted to retrofit a building structure having variations disposed thereon such that the bracket system 200 can accommodate for these variations to provide a plumb and level exterior surface.

[0032] The bracket system 200 is further contemplated to provide a thermal break from the exterior cladding unit 210 to the substrate 212 of a building structure. The thermal break of bracket system 200 operates in much the same way as the thermal break described in relation to the polymeric bracket system described in FIGS. 1-7.

While the bracket structure 16 described in FIGS. 1-7 is made of a polymeric material as noted above, it is contemplated that the bracket support system 200 needs only one of either the anchor member 214 and support member 220 to be made up of a polymeric material in order to provide a sufficient thermal break between the exterior cladding unit 210 and the substrate 212 of the building structure. Thus, either the anchor member 214 or the support member 220 can be made of a heat-conducting material, so long as the reciprocal member is comprised of a polymeric material capable of providing a thermal break from the exterior cladding unit 210 to the substrate 212 of a building structure.

[0033] Referring now to FIG. 19, the anchor member 214 further comprises channels 262 disposed along the interior side 260 of the anchor section 216 wherein the channels 262 vertically span the length of the interior side 260 of the anchor section 216. The channels 262 make up, in part, a ventilation system by providing a cross ventilation air groove for rear ventilating and rain screening of the bracket system 200. The body portion of the connection landing 218 of the anchor member 214 further comprises retention fins or panel piercing airlock ribs 246 which, in this embodiment help to hold insulation panels in place between sets of anchor members and support members 214, 220, such as in the space 240 provided between bracket sets X, Y and Z as shown in FIGS. 17 and 18. It is further contemplated that the insulation panels (not shown) can be manufactured with a channel that corresponds to the fins or ribs 246 of the anchor member 214 to retain the insulation panels in place in assembly, much like insulation panels 104 described above with reference to FIG. 10. In the embodiment shown in FIG. 19, the horizontal connection landing 224 of the support member 220 also comprises a downwardly facing fin or rib 246 for retaining insulation panels in assembly. It is contemplated that both the anchor member 214 and the support member 220 can have retention ribs 246 disposed on the anchor section 216 or support section 222 or the horizontal connection landings 218, 224 as necessary to retain insulation panels in place. In FIG. 19, anchor member 214 and support member 220 are slidably adjustable in their connection in a direction indicated by arrow C along a length of the oblong apertures 227 disposed on horizontal connection landing 218 of anchor member 214.

[0034] In the embodiment shown in FIG. 19, the anchor member 214 further comprises channels 258 disposed on the anchor section 216 which are used to guide fasteners in assembly for attaching the anchor member 214 to a substrate of a building structure. Guide channels 258 operate in much the same manner as channels 58 described in reference to FIGS. 5 and 6 above. In the embodiment shown in FIG. 19, the support member 220 also comprises guide channel 258 disposed on an exterior surface 221 of the support section 222 of the support member 220. Support member 220 further comprises a T-shaped channel 238 which is adapted to accept an

insert 250 which is used to help retain fasteners in the support section 222 of the support member 220 that are used to connect support member 220 to an exterior cladding unit. T-shaped channel 238 operates much like channel 38 described with reference to FIG. 6 above.

[0035] Referring now to FIGS. 20-22, reference numeral 300 generally indicates a bracket system, or wall construction, compatible with the present invention. The bracket system 300 includes a cladding unit 310 which is coupled to a building substrate 312 which is shown as a wall substrate, however, it is contemplated that the building substrate can be a roof, a deck, a landing or any other surface disposed on the building structure wherein an exterior cladding system is desired. The bracket system 300 includes a plurality of bracket members 314 which are polymeric bracket members similar to the polymeric bracket members 16 described above. In assembly, the bracket members 314 are used to couple the exterior cladding unit 310 to the building substrate 312. An interior cavity 316 is defined between the building substrate 312 and the exterior cladding unit 310. In the embodiment shown in FIG. 20, a grooved insulation member 318 is disposed within the interior cavity 316 of the bracket system 300. The insulating member 318 comprises grooves 319 which interact with the polymeric brackets 314 as described below. As shown in FIG. 20, the polymeric brackets 314 are separate brackets which are spaced apart along the building substrate 312. Each of the polymeric brackets 314 includes an anchor section 320 and a support section 322. A web portion 324 is disposed between and connects the anchor section 320 with the support section 322.

[0036] As best shown in FIG. 21, the polymeric brackets 314 further include retention fins or panel piercing air lock ribs 326 which engage and help retain the insulation panels 318 in assembly. Specifically, the retention fins 326 are adapted to correspond with the grooves 319 disposed on the surface of the insulation panel 318 which contacts the polymeric brackets 314. As further shown in FIG. 21, the polymeric brackets 314 further comprise a plurality of channels 328 disposed on the anchor section 320 and the support section 322 which are adapted to receive a rigidifying. As described above, the rigidifying inserts can be received in channels such as channels 328 which are adapted to retain the inserts therein. Further, it is contemplated that the inserts can be connected to the anchor section 320 or support section 322 by means other than a retaining channel. Other means for receiving a channel at the anchor section 320 or support section 322 include adhering an insert to either section using an adhesive or using a fastener to rigidly connect the insert to either section 320, 322. In assembly, the anchor section 320 is adapted to couple to a building substrate, such as building substrate 312 shown in FIGS. 20 and 22. The support section 322 is adapted to couple to an elongate support member 330 as shown in FIGS. 20 and 22. The elongate support member 330 couples to the support sections 322 of the polymeric brackets 314

which are generally aligned with one another such that the elongate support member 330 forms a surface to which the exterior cladding units 310 are coupled. Thus, the bracket system 300 as shown in FIGS. 20 and 22 does not require full length bracket members that are disposed on and run the entire length of the building substrate 312. In this way, bracket system 300 is a more economical solution and saves on building materials having the bracket members 314 separated and spaced apart along the building substrate 312 as needed to support exterior cladding units. As shown in FIG. 20, the polymeric bracket system 300 is disposed in a vertical manner, such that the elongate support member 330 is vertically configured relative to the building substrate 312. As shown in FIG. 22, the elongate support member 330 is coupled to polymeric bracket members 314 in a horizontal manner. Further, when an elongate member, such as elongate member 330, spans between serially aligned brackets in such a manner that the elongate member couples to the support section of each serially aligned bracket, the elongate member redirects force realized on a bracket by making such forces perpendicular to a corresponding building substrate. Specifically, when an elongate member is coupled to serially aligned polymeric brackets in such a manner that the elongate member is substantially parallel with the direction of the support section of the polymeric bracket, the elongate member eliminates rotational forces which can act on the support portion of a polymeric bracket relative to the web section of the polymeric bracket when such an elongate member is not incorporated into the wall construction. Similarly, as shown in FIGS. 16 and 17, the exterior cladding unit 20 acts in a similar manner to couple serially aligned polymeric brackets such that rotational forces are not realized on the support sections of the polymeric brackets and redirects the forces realized on the polymeric brackets in such a manner that the forces are realized in a perpendicular manner relative to the building substrate. With further reference to FIG. 22, an L-shaped bracket member 332 is coupled to the elongate support member 330 and the polymeric bracket member 314, such that the bracket member 332 can be used as a leveling system to ensure that the elongate support member 330 is equally spaced apart from the building substrate 312 in assembly. In this way, the bracket 332 accounts for variations in the building substrate 312.

[0037] Referring now to FIG. 23, the reference number 400 generally indicates a polymeric bracket system for use in conjunction with an exterior cladding unit 410 as coupled to a building substrate 412. In the embodiment depicted in FIG. 23, the polymeric bracket system 400 comprises a polymeric bracket 414 which has a low thermal conductivity that is similar in makeup to the polymeric brackets 16 as described above. The polymeric bracket 414 includes an anchor section 420 and a support section 422 with a web section 424 disposed there between. As shown in FIG. 23, the anchor section 420 and support section 422 further include channels 428 which are

adapted to receive rigidifying inserts, such as metal inserts or other inserts which serve to rigidity the polymeric bracket 414 at the anchor section 420 or support section 422. On one end of the web section 424, an insulation retention rib 426 is shown which is adapted to engage an insulating material, such as insulating material members 417 and 418 in assembly. An interior cavity 416 is formed between the exterior cladding unit 410 and the building substrate 412 by the spacing provided by the polymeric bracket 414. As shown in FIG. 23, the anchor section 420 is coupled to the building substrate 412 using a fastener 430 and the support section 422 is coupled to the exterior cladding unit 410 using another fastener 432. With the system 400 as provided in FIG. 23, the support section 422 is internally disposed within the interior cavity 416. As noted above, the polymeric bracket has a generally stepped formation, such that the insulating members 418 also have a generally stepped formation which provides for a more configured fit of the insulating members within the interior cavity 416 adjacent to the exterior building substrate 410 and further adjacent to the polymeric bracket 414. Given the low thermal conductivity of the polymeric bracket 414, a thermal bridge is created from the external environment which is in contact with the exterior cladding unit 410 to the building substrate 412 such that the system 400 is free from thermal bridges that could affect the wall construction or building substrate 412.

[0038] Referring now to FIG. 24, a polymeric bracket system 500 is shown wherein a polymeric bracket 314, similar to polymeric bracket 314 shown in FIG. 21, is coupled to an elongate support member 340. The elongate support member 340 includes a body portion 341 which is adapted to couple to a building substrate 312. The body portion 341 includes a channel 342 which is adapted to receive a rigidifying insert to aid in the fastening of the elongate support member 340 to the building substrate 312. The body portion 341 is a generally planar body portion as shown in FIG. 24. Extending from the generally planar body portion 341 is a hook shaped connecting portion 344 which in FIG. 24, is generally in the form of a finger extending from the generally planar body portion 341. The connecting portion 344 is adapted to couple to the bracket member 314 at a channel 328 disposed on the anchor portion 320 of the polymeric bracket 314. In this way, the connecting portion 344 is slidably received within the channel 328, such that the polymeric bracket 314 can slide along a length of the connecting portion 344 in assembly. Therefore, the elongate support member 340 is first fastened to a building substrate 312 in assembly. Once in place on the building substrate 312, the elongate support member 340 is adapted to receive a plurality of polymeric brackets 314 which can slide along a length of the connecting portion 344 of the elongate support member 340, such that the polymeric brackets 314 which are slidably coupled to the elongate support member 340 can be positioned as necessary for the coupling of an exterior cladding unit to the support portion

322 of the polymeric brackets 314. As shown in FIG. 24, the bracket system 500 includes an interior spacing 316 which is defined by the spacing between the anchor portion 320 and the support portion 322. It is contemplated that insulating material will be disposed in the interior space 316 in assembly. While the elongate support member 340 is shown having a finger 344 disposed in a channel 328 of the bracket 314, it is contemplated that the bracket 314 can connect to the elongate support member 340 by having a portion of the anchor section 320 overlap with the extending finger 344. Thus, once the bracket member 314 is in place along the elongate support member 340, the bracket member 314 can be rigidly attached thereto using a fastener.

[0039] Referring now to FIGS. 25 and 26, a polymeric bracket 414A is shown which has a low thermal conductivity similar to the polymeric bracket 16 described above. The polymeric bracket 414A includes an anchor section 420A and a support section 422A with a web section 424A disposed there between. As shown in FIG. 25, the anchor section 420A and support section 422A further include channels 428A which are adapted to receive rigidifying inserts. In assembly, the rigidifying inserts serve to rigidity the polymeric bracket 414A at the anchor section 420A or the support section 422A. The web section 424A includes an insulation retention rib 426A disposed on either side thereof, which are adapted to engage insulation material, such as insulating members 417A and 418A, shown in FIG. 26. An interior cavity 416A is formed between the exterior cladding (not shown) and the building substrate 412 by the spacing provided by the polymeric bracket 414A. A fastener 430A is used to fasten the anchor section 420A to the building substrate 412A, and a like fastener 431A is shown in FIG. 26 as coupled to the support section 422A which is used to couple the polymeric bracket 414A to an exterior cladding unit. Given the low thermal conductivity of the polymeric bracket 414A, a thermal bridge is created from the external environment which is in contact with the exterior cladding unit to the building substrate 412A such that the system 400 is free from thermal bridges that could affect the wall construction or building substrate 412A.

[0040] As shown in FIGS. 25 and 26, the support section 422A and the anchor section 420A both include relief portions 432A and 434A which, in assembly, are adapted to break water tension between the building substrate 412 and the exterior cladding unit such that water will gravitationally feed downward along the relief 434A or 432A. In this way, the relief sections 434A, 432A act as anti-capillary action grooves which break the water tension that may otherwise be trapped between an exterior cladding unit and the building substrate 412A, or may otherwise be drawn to joints between insulation members 417A and 418A and the bracket member 414A.

[0041] Referring now to FIG. 27, a polymeric bracket system is shown comprising a polymeric bracket 614 having an anchor section 620 and a support section 622 which are adapted to couple the polymeric bracket 614

to a building substrate and an exterior cladding unit in a similar manner as described above. Channels 628 are disposed on the anchor section 620 and support section 622 and are adapted to accommodate a rigidifying insert, such as rigidifying insert 640 shown in FIG. 28. Disposed near a terminal end of the polymeric bracket 614 insert apertures 630 and 632 are disposed on the anchor section 620 and support section 622, respectively. In assembly, the insert apertures 630, 632 are adapted to couple to insert engagement features as further described below with reference to FIGS. 28 and 29.

[0042] Referring now to FIGS. 28 and 29, an insert member 640 is shown having a first end 642 and a second end 644 with a central connecting section 646 disposed there between, wherein both the first end 642 and second end 644 are slightly tapered for easier engagement with a bracket member as further described below. As shown in FIG. 28, the first end 642 is longer than the second end 644 which, in assembly, provides a stabilizing configuration for the insert 640 as used with a second insert 640A shown in FIG. 29. As best shown in FIG. 28, the connecting section 646 includes first and second engagement tabs 648 and 650, which are resilient engagement tabs having engagement members 652, 654, respectively. In assembly, the rigidifying insert 640 is adapted to be inserted in either channel 628 of the anchor section 620 or support section 622 of the polymeric bracket 614. Thus, as shown in FIG. 29, the first end 642 of insert 640 has been inserted into channel 628 of the support section 622 of the polymer bracket 614. As the insert 640 is inserted into channel 628 of the support section 622, engagement tab 648 of the insert 640 is forced downward in a direction as indicated by arrow I until engagement member 652 connects with and engages insert aperture 632 thereby locking the insert member 640 in place. As further shown in FIG. 29, a second insert member 640A has been inserted into channel 628 of the anchor section 620 of the polymeric bracket 614, such that the first end 642 extends from the polymeric bracket 614 and the second end 644 is engaged with insert aperture 630 by engagement member 654. In this way, the polymeric bracket 614 shown in FIG. 29 has first and second inserts 640, 640A extending there from, wherein insert 640 has second end 644 extending outwardly while the second insert, 640A, has the first end 642 extending from the polymeric bracket 614. In this way, the first insert 640 has the shorter end 644 extending from the polymeric bracket 614 and the second insert 640A has the longer end 642 extending from the polymeric bracket 614. The differences in length of the extending sections of the inserts 640, 640A provide for a differentiated support structure such that polymeric bracket 614, as shown in FIG. 29, is now adapted to receive another polymeric bracket, similar in configuration to polymeric bracket 614, such that the inserts 640, 640A act as connecting members to connect adjacent polymeric brackets 614 in assembly. Thus, the differentiated lengths of the ends 642, 644 of the inserts 640, 640A allow for a user to first engage the

longer end 642 extending from the polymeric bracket 614 and then subsequently engage the shorter end 644 of insert 640. Thus, when a user is looking to connect adjacent polymeric brackets, the user need only align the connecting polymeric bracket with one of the inserts at a time. Thus, the configuration as shown in FIG. 29 makes it easier for a user to connect adjacent polymeric brackets by not making the user align the polymeric bracket with both inserts 640, 640A at the same time.

Claims

1. A building wall construction comprising:

- a building substrate (10);
 - a layer of insulation (18) disposed within an interior cavity of the wall construction adjacent to the building substrate (10);
 - a plurality of polymeric brackets (16, 614) coupled to the building substrate (10);
 - one or more exterior cladding units (12) coupled to the polymeric brackets (16, 614);
- and wherein, the polymeric brackets (16, 614) have a low thermal conductivity, and further wherein the wall construction is free of thermal bridges between the one or more exterior cladding units (12) and the building substrate (10), such that condensation formed on the wall construction is realized only on the one or more exterior cladding units (12), such that the interior cavity of the wall construction is free from condensation, wherein each polymeric bracket (16, 614) of the plurality of polymeric brackets comprises:

- an anchor section (48, 620) adapted to couple to the building substrate (10);
- a support section (32, 622) adapted to couple to the one or more exterior cladding units (12);
- a web section (40) connecting the anchor section (48, 620) to the support section (32, 622);

characterized in that each polymeric bracket (16, 614) of the plurality of polymeric brackets further comprises:

- at least one channel (54, 628) disposed on the anchor section (48, 620) and adapted to receive an insert (60, 640A); a channel aperture (630) being disposed on the at least one channel (54, 628) of the anchor section (48, 620), and
- at least one channel (38, 628) disposed on the support section (32, 622) and adapted to receive an insert (60, 640) ; a channel

aperture (632) being disposed on the at least one channel (38, 628) of the support section (32, 622),

the insert (640) adapted to be received in the anchor section (48, 620) includes first and second ends (642, 644) having a connection portion (646) disposed there between; first and second engagement tabs (648, 650) disposed within the connection portion (646), the first and second engagement tabs (648, 650) including engagement members (653, 654) disposed thereon; and wherein the engagement members (653) of the first engagement tabs (648) are adapted to engage the channel apertures (630) of the anchor section (48) when the insert (640) is received therein, and further wherein the engagement members (654) of the second engagement tabs (650) are adapted to engage an adjacent polymeric bracket, thereby connecting adjacent brackets.

2. The building wall construction of claim 1, wherein: the layer of insulation includes one or more insulation panels (18).
3. The building wall construction according to preceding claims, wherein: the first and second engagement tabs (648, 650) are resilient engagement tabs.
4. The building wall construction of claim 3, wherein: each polymeric bracket (16, 614) of the plurality of polymeric brackets is comprised of a polymeric material selected from the group consisting of thermoplastics, thermoset resins, acrylonitrile-butadiene-styrene (ABS) copolymers, vinylesters epoxies, phenolic resins, polyvinyl chlorides (PVC), polyesters, polyurethanes, polyphenylsufone resin, polyarylsulfones, polyphthalimide, polyamides, aliphatic polyketones, acrylics, polyxylenes, polypropylenes, polycarbonates, polyphthalamides, polystyrenes, polyphenylsulfones, polyethersulfones, polyfluorocarbons and blends thereof, wherein the polymeric material is reinforced with a reinforcing fiber selected from the group consisting of fiberglass, carbon fibers, cellulose fibers, nylon fibers, and aramid fibers.
5. The building wall construction of claim 4, wherein: each polymeric bracket (16, 614) of the plurality of polymeric brackets comprises an R-value in the range of about R.2 to about R8 per inch (i.e. an RSI value in the range of about 0.00139 per mm to about 0.0555 per mm).

Patentansprüche

1. Gebäudewandkonstruktion, umfassend:

- ein Gebäudesubstrat (10);
- eine Isolierschicht (18), die in einem Innenhohlraum der Wandkonstruktion angrenzend an das Gebäudesubstrat (10) angeordnet ist;
- eine Vielzahl von Polymerhalterungen (16, 614), die mit dem Gebäudesubstrat (10) gekoppelt sind;
- eine oder mehrere Außenverkleidungseinheiten (12), die mit den Polymerhalterungen (16, 614) gekoppelt sind;

und wobei die Polymerhalterungen (16, 614) eine niedrige Wärmeleitfähigkeit aufweisen, und ferner wobei die Wandkonstruktion frei von Wärmebrücken zwischen der einen oder den mehreren äußeren Verkleidungseinheiten (12) und dem Gebäudesubstrat (10) ist, sodass die auf der Wandkonstruktion gebildete Kondensation nur auf der einen oder mehreren äußeren Verkleidungseinheiten (12) erfolgt, sodass der Innenhohlraum der Wandkonstruktion frei von Kondensation ist,

wobei jede Polymerhalterung (16, 614) der Vielzahl von Polymerhalterungen umfasst:

- einen Verankerungsabschnitt (48, 620), der zum Koppeln mit dem Gebäudesubstrat (10) eingerichtet ist;
- einen Trägerabschnitt (32, 622), der zum Koppeln mit einer oder mehreren äußeren Verkleidungseinheiten (12) eingerichtet ist;
- einen Stegabschnitt (40), der den Verankerungsabschnitt (48, 620) mit dem Trägerabschnitt (32, 622) verbindet;

dadurch gekennzeichnet, dass jede Polymerhalterung (16, 614) der Vielzahl von Polymerhalterungen ferner umfasst:

- mindestens einen Kanal (54, 628), der auf dem Verankerungsabschnitt (48, 620) angeordnet und zur Aufnahme eines Einsatzes (60, 640A) eingerichtet ist; wobei eine Kanalöffnung (630) auf dem mindestens einen Kanal (54, 628) des Verankerungsabschnitts (48, 620) angeordnet ist; und
- mindestens einen Kanal (38, 628), der auf dem Trägerabschnitt (32, 622) angeordnet und zur Aufnahme eines Einsatzes (60, 640) eingerichtet ist, wobei eine Kanalöffnung (632) auf dem mindestens einen Kanal (38, 628) des Verankerungsabschnitts (32, 622) angeordnet ist,

wobei der Einsatz (640), der dazu eingerichtet ist, im Verankerungsabschnitt (48, 620) aufgenommen zu werden, ein erstes und ein zweites Ende (642, 644) mit einem dazwischen angeordneten Verbindungsabschnitt (646) umfasst;

- eine erste und eine zweite Eingriffsflasche (648, 650) umfasst, die innerhalb des Verbindungsabschnitts (646) angeordnet sind, wobei die erste und die zweite Eingriffsflasche (648, 650) darauf angeordnete Eingriffselemente (653, 654) umfassen; und wobei die Eingriffselemente (650) der ersten Eingriffsflaschen (648) dazu eingerichtet sind, in die Kanalöffnungen (630) des Verankerungsabschnitts (48) einzugreifen, wenn der Einsatz (640) darin aufgenommen wird, und ferner, wobei die Eingriffselemente (654) der zweiten Eingriffsflaschen (650) dazu eingerichtet sind, in eine benachbarte Polymerhalterung einzugreifen, wodurch benachbarte Halterungen verbunden werden.
2. Gebäudewandkonstruktion nach Anspruch 1, wobei: die Isolierschicht eine oder mehrere Dämmplatten (18) umfasst.
3. Gebäudewandkonstruktion nach den vorhergehenden Ansprüchen, wobei: die erste und die zweite Eingriffsflasche (648, 650) elastische Eingriffsflaschen sind.
4. Gebäudewandkonstruktion nach Anspruch 3, wobei: jede Polymerhalterung (16) der Vielzahl von Polymerhalterungen aus einem Polymermaterial besteht, das aus der Gruppe bestehend aus Thermoplasten, duroplastischen Harzen, Acrylnitril-Butadien-Styrol (ABS)-Copolymeren, Vinylester-Epoxyde, Phenolharzen, Polyvinylchloriden (PVC), Polyester, Polyurethanen, Polyphenylsulfonharz, Polyarylsulfonen, Polyphthalamid, Polyamide, aliphatische Polyketone, Acryle, Polyxylene, Polypropylene, Polycarbonate, Polyphthalamide, Polystyrole, Polyphenylsulfone, Polyethersulfone, Polyfluorkohlenwasserstoffe und Mischungen daraus ausgewählt ist, wobei das Polymermaterial mit einer Verstärkungsfasern verstärkt ist, die aus der Gruppe bestehend aus Glasfasern, Kohlenstofffasern, Cellulosefasern, Nylonfasern und Aramidfasern ausgewählt ist.
5. Gebäudewandkonstruktion nach Anspruch 4, wobei: jede Polymerhalterung (16, 614) der Vielzahl von Polymerhalterungen einen R-Wert im Bereich von etwa R.2 bis etwa R8 pro Zoll (d. h. einen RSI-Wert im Bereich von etwa 0,00139 pro mm bis etwa 0,0555 pro mm) umfasst.

Revendications

1. Construction de murs de bâtiment comprenant :
- un substrat de bâtiment (10) ;
 - une couche d'isolation (18) disposée dans une

cavité intérieure de la construction de murs au voisinage du substrat de bâtiment (10) ;

- une pluralité de fixations polymères (16, 614) couplées au substrat de bâtiment (10) ;
- une ou plusieurs unités de parement extérieur (12) couplées aux fixations polymères (16, 614) ;

et dans laquelle les fixations polymères (16, 614) ont une faible conductivité thermique, et la construction de murs étant en outre dépourvue de ponts thermiques entre l'unité ou les unités de parement extérieur (12) et le substrat de bâtiment (10), de telle sorte que de la condensation formée sur la construction de murs apparaît uniquement sur l'unité ou les unités de parement extérieur (12), de telle sorte que la cavité intérieure de la construction de murs est dépourvue de condensation,

dans laquelle chaque fixation polymère (16, 614) de la pluralité de fixations polymères comprend :

- une section d'ancrage (48, 620) adaptée pour se coupler au substrat de bâtiment (10) ;
- une section de support (32, 622) adaptée pour se coupler à l'unité ou aux unités de parement extérieur (12) ;
- une section de bande (40) raccordant la section d'ancrage (48, 620) à la section de support (32, 622) ;

caractérisée en ce que chaque fixation polymère (16, 614) de la pluralité de fixations polymères comprend en outre :

- au moins un canal (54, 628) disposé sur la section d'ancrage (48, 620) et adapté pour recevoir une pièce rapportée (60, 640A) ; une ouverture de canal (630) étant disposée sur l'au moins un canal (54, 628) de la section d'ancrage (48, 620), et
- au moins un canal (38, 628) disposé sur la section de support (32, 622) et adapté pour recevoir une pièce rapportée (60, 640) ; une ouverture de canal (632) étant disposée sur l'au moins un canal (38, 628) de la section de support (32, 622),

la pièce rapportée (640) adaptée pour être reçue dans la section d'ancrage (48, 620) comporte des première et deuxième extrémités (642, 644) ayant une partie de raccordement (646) disposée entre elles ; des première et deuxième languettes d'enclenchement (648, 650) disposées à l'intérieur de la partie de raccordement (646), les première et deuxième languettes d'enclenchement (648, 650) comportant des éléments

- d'enclenchement (653, 654) disposés par-dessus ; et les éléments d'enclenchement (653) des premières languettes d'enclenchement (648) étant adaptés pour s'enclencher dans les ouvertures de canal (630) de la section d'ancrage (48) quand la pièce rapportée (640) y est reçue, et en outre, les éléments d'enclenchement (654) des deuxièmes languettes d'enclenchement (650) étant adaptés pour s'enclencher sur une fixation polymère adjacente, raccordant ainsi des fixations adjacentes. 5 10
2. Construction de murs de bâtiment de la revendication 1, dans laquelle : la couche d'isolation comporte un ou plusieurs panneaux d'isolation (18). 15
3. Construction de murs de bâtiment des revendications précédentes, dans laquelle : les première et deuxième languettes d'enclenchement (648, 650) sont des languettes d'enclenchement élastiques. 20
4. Construction de murs de bâtiment de la revendication 3, dans laquelle : chaque fixation polymère (16, 614) de la pluralité de fixations polymères est composée d'un matériau polymère choisi dans le groupe constitué par les thermoplastiques, les résines thermodurcies, les copolymères acrylonitrile-butadiène-styrène (ABS), les époxyds à base d'esters vinyliques, les résines phénoliques, les poly(chlorure de vinyle) (PVC), les polyesters, les polyuréthanes, la résine de polyphénylsulfone, les polyarylsulfones, le polyphthalimide, les polyamides, les polycétones aliphatiques, les acryliques, les polyxylènes, les polypropylènes, les polycarbonates, les polyphthalamides, les polystyrènes, les polyphénylsulfones, les polyéthersulfones, les polyfluorurocarbures et les mélanges de ceux-ci, le matériau polymère étant renforcé par une fibre de renforcement choisie dans le groupe constitué par la fibre de verre, les fibres de carbone, les fibres de cellulose, les fibres de nylon, et les fibres d'aramide. 25 30 35 40
5. Construction de murs de bâtiment de la revendication 4, dans laquelle : chaque fixation polymère (16, 614) de la pluralité de fixations polymères présente une valeur R dans la gamme d'environ R.2 à environ R8 par pouce (c'est-à-dire une valeur RSI dans la gamme d'environ 0,00139 par mm à environ 0,0555 par mm). 45 50

55

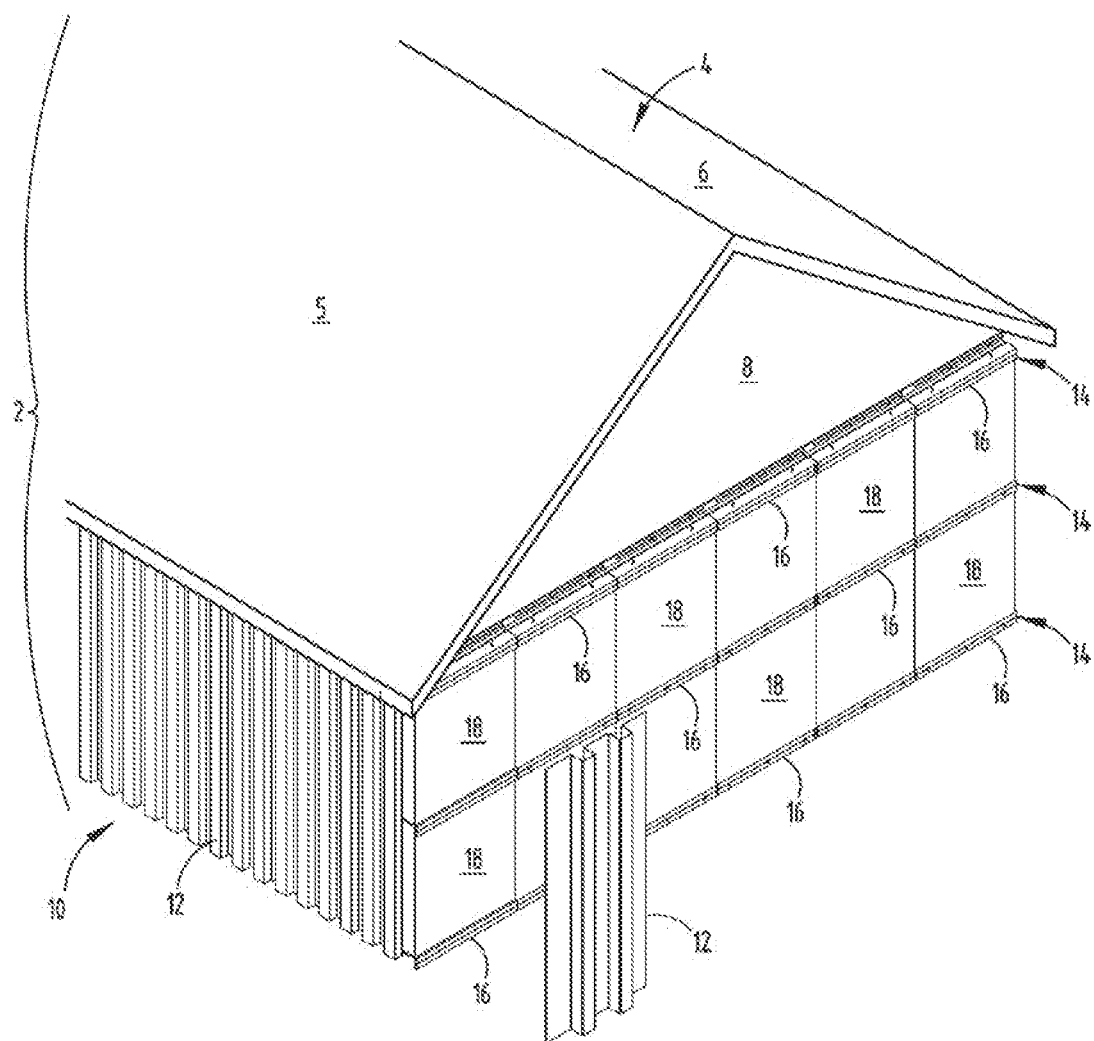


FIG. 1

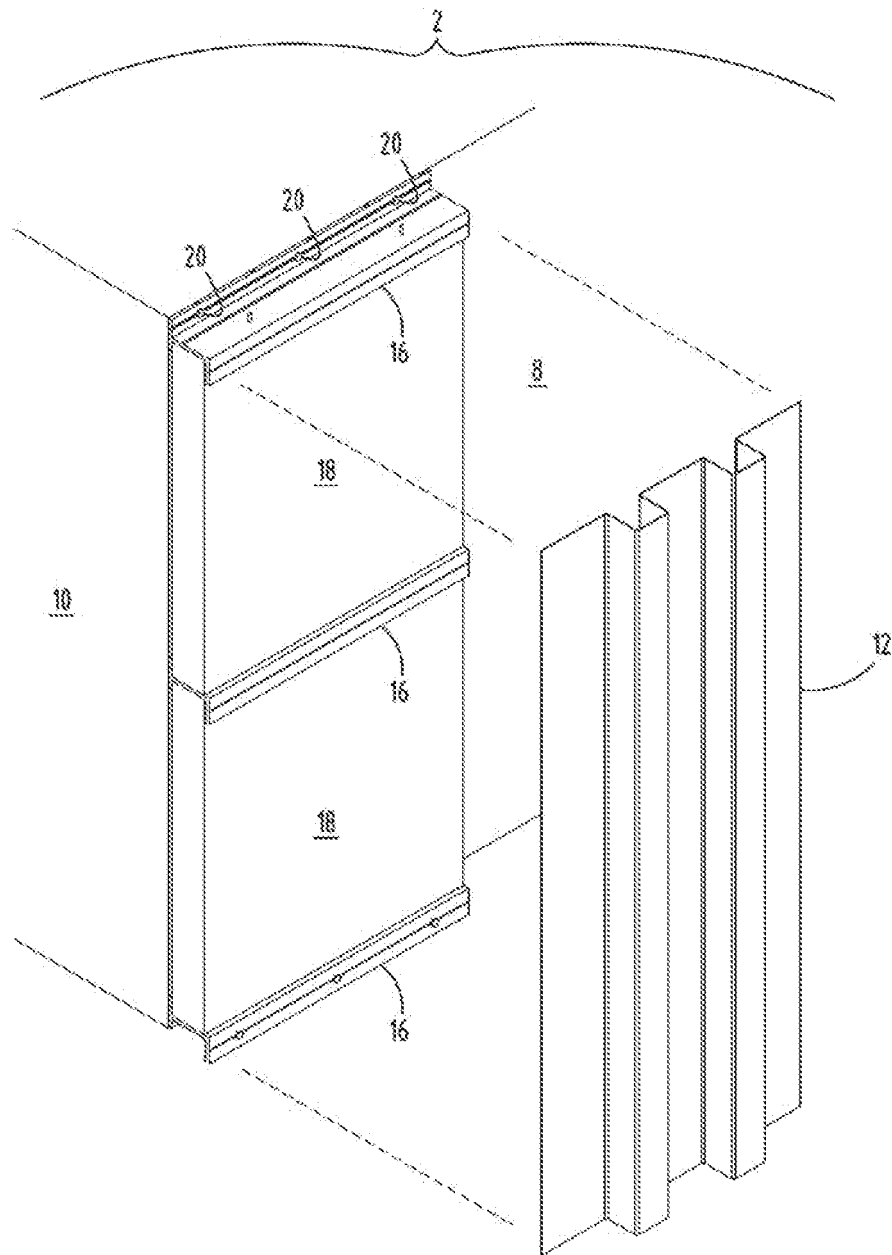


FIG. 2

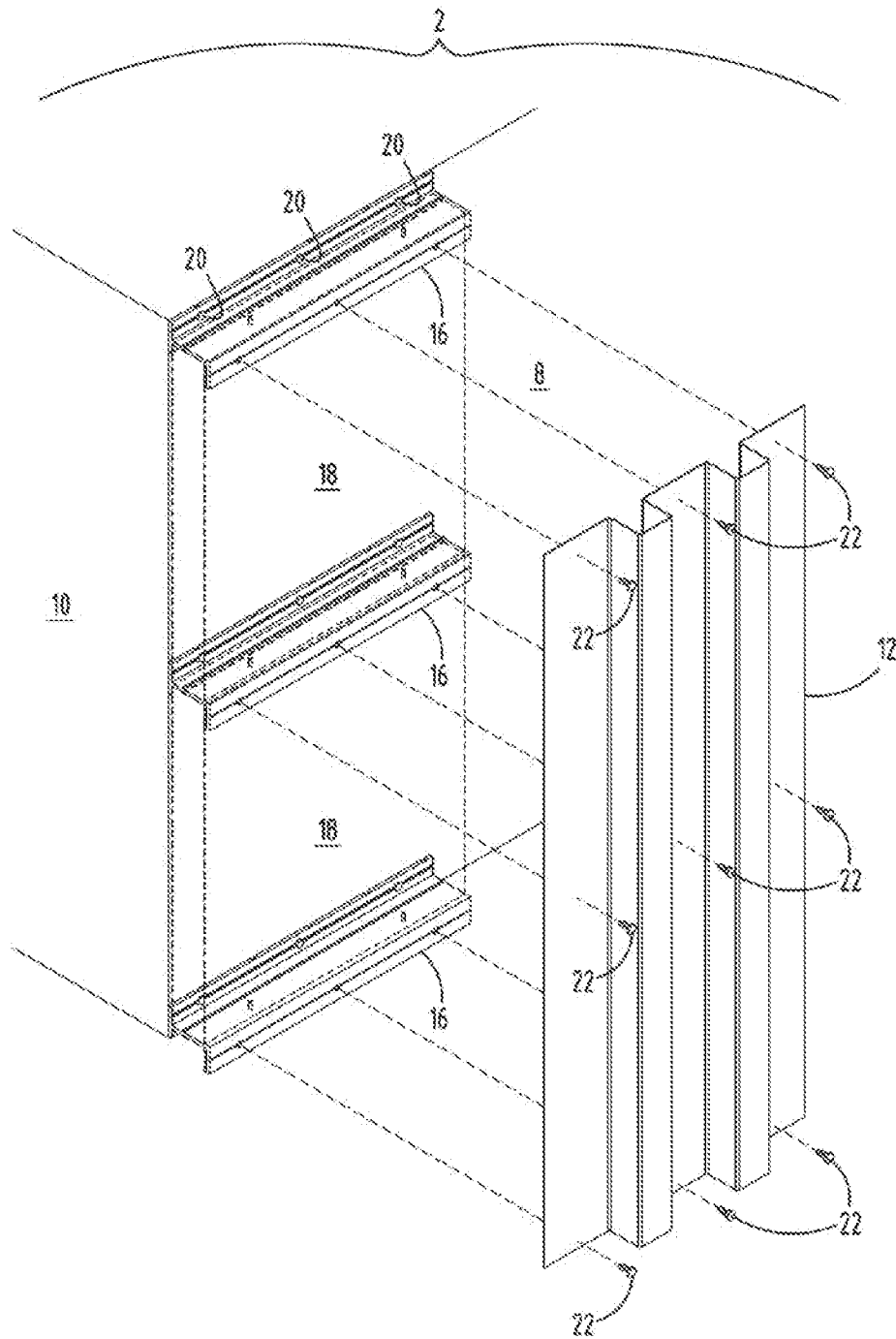


FIG. 2A

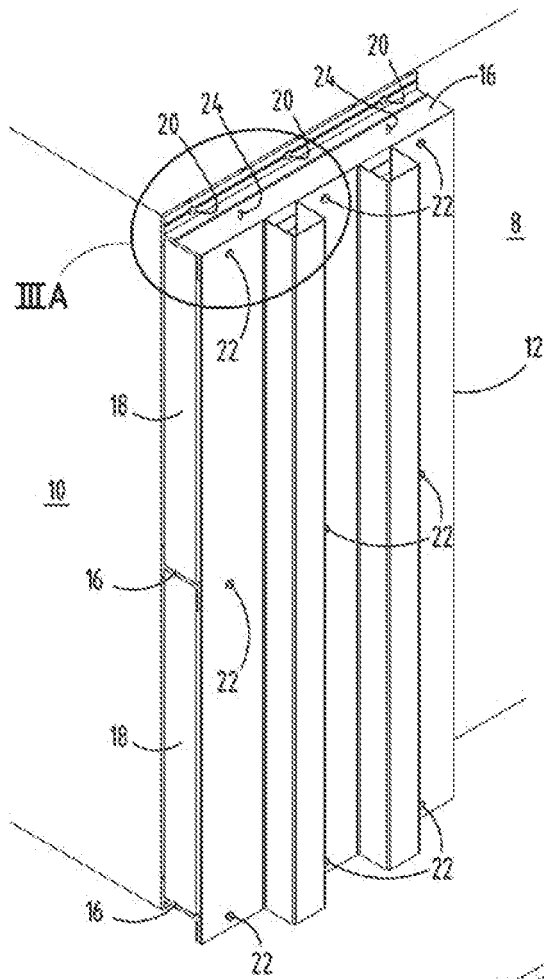


FIG. 3

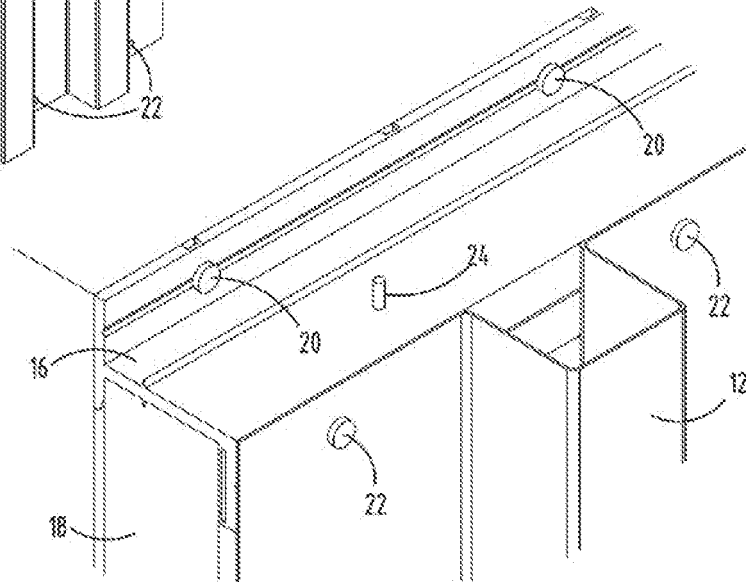


FIG. 3A

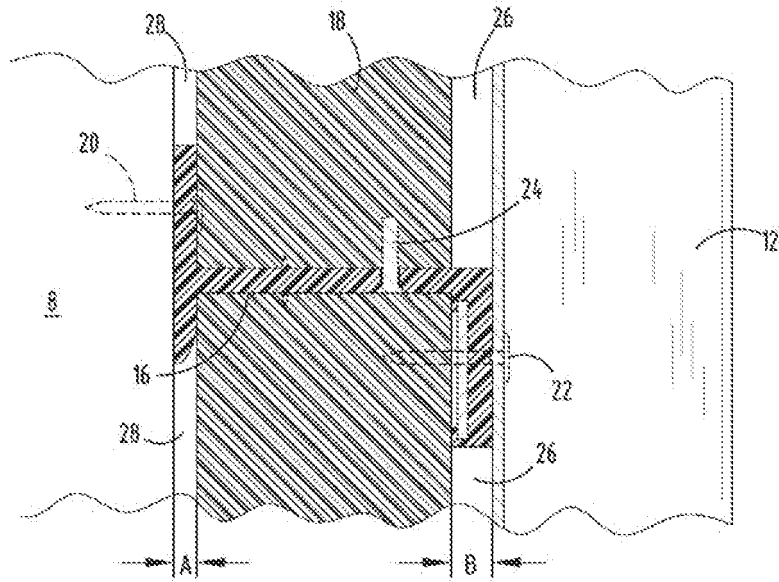


FIG. 4

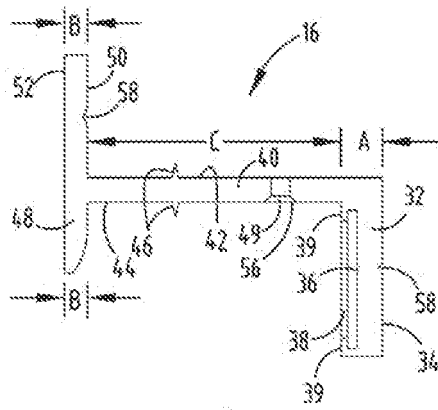


FIG. 5

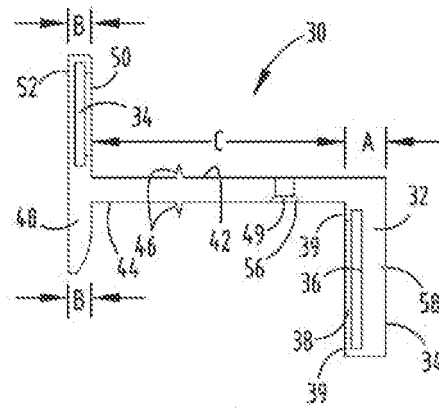
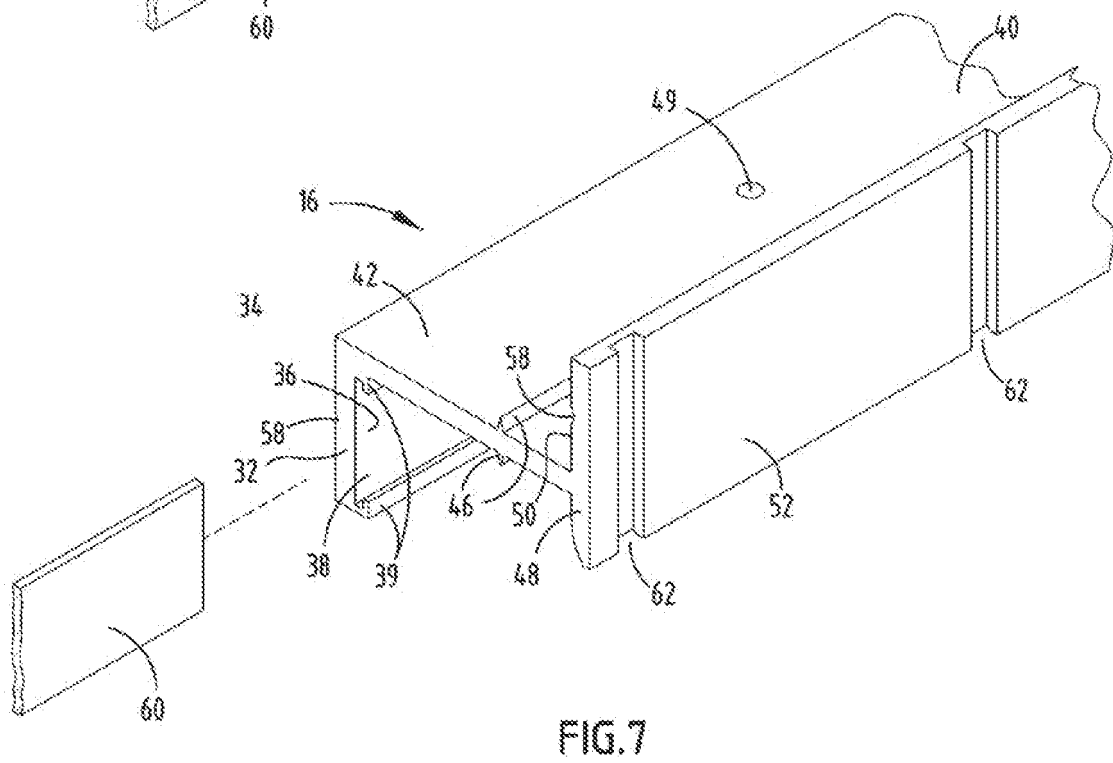
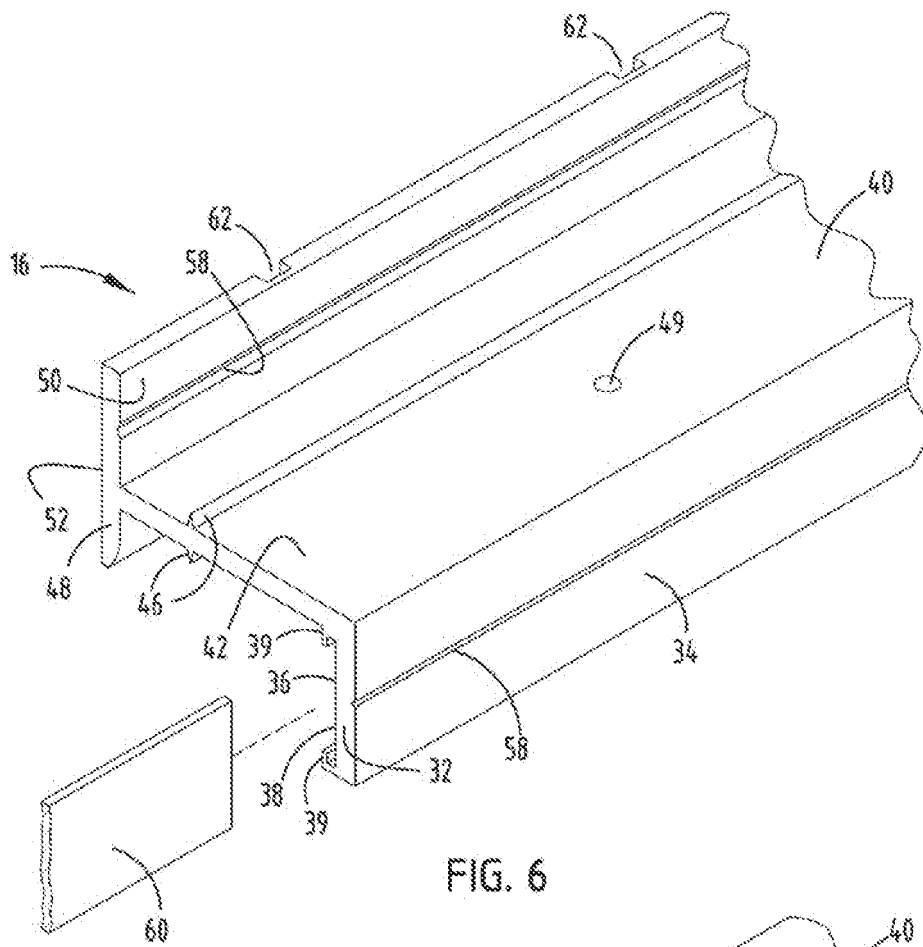


FIG. 5A



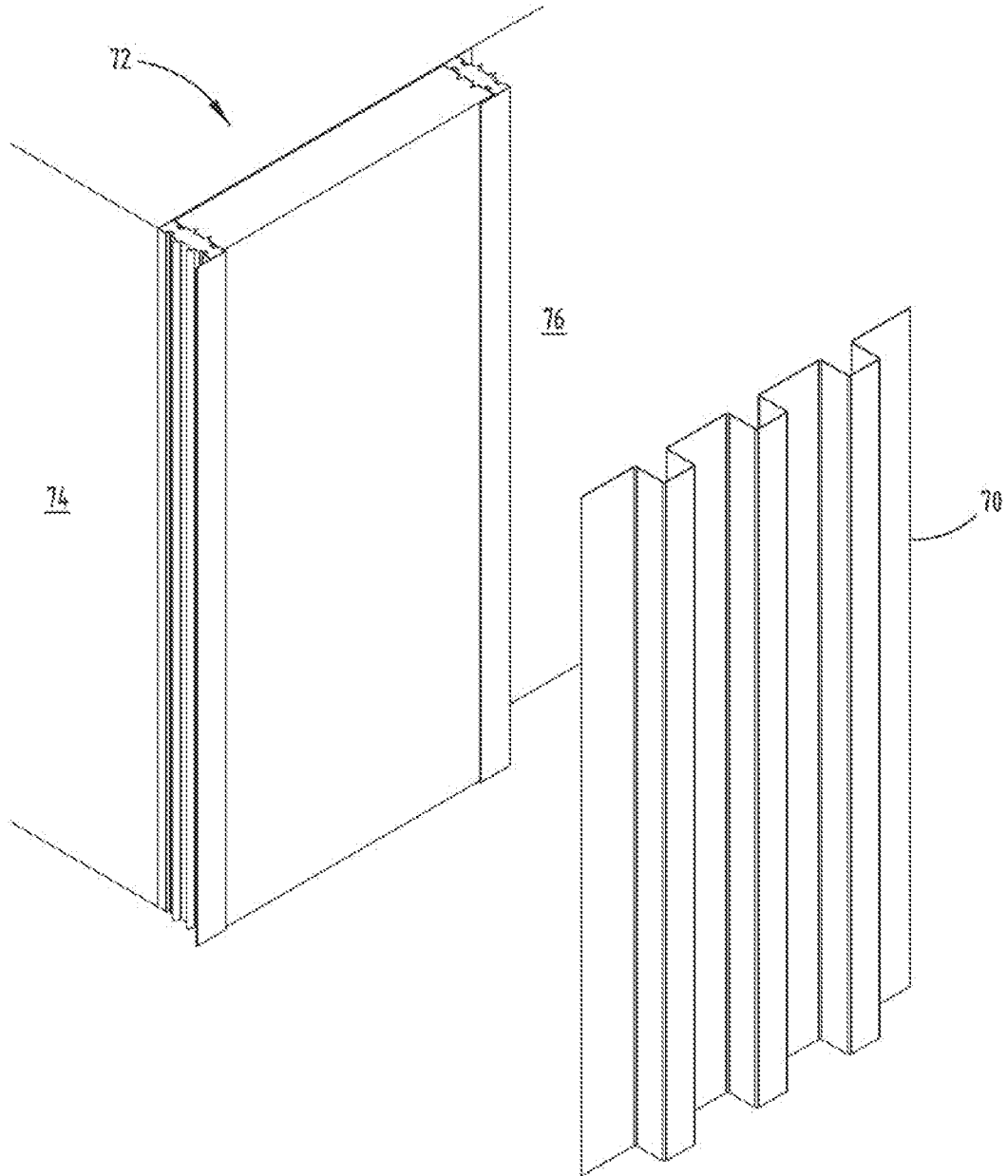


FIG. 8

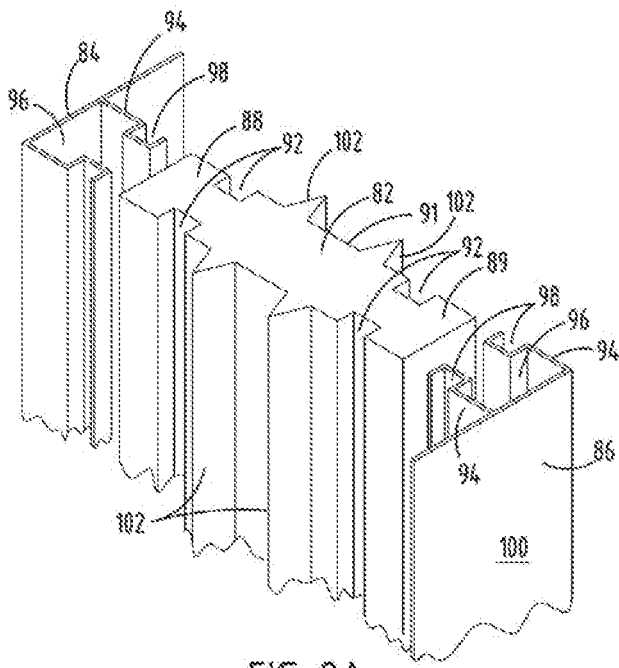


FIG. 8A

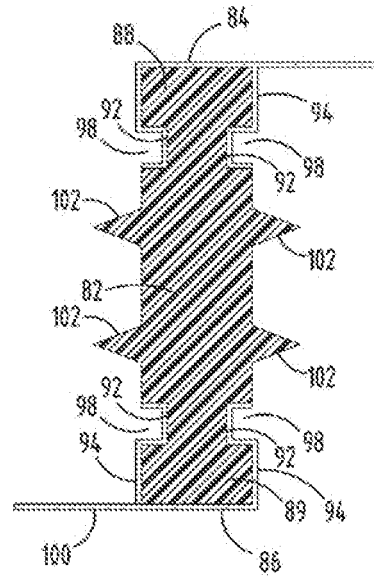


FIG. 9

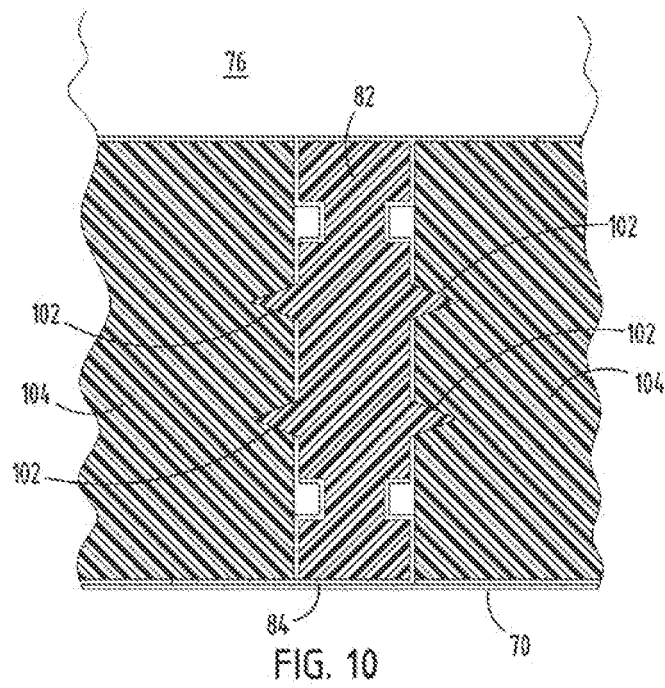


FIG. 10

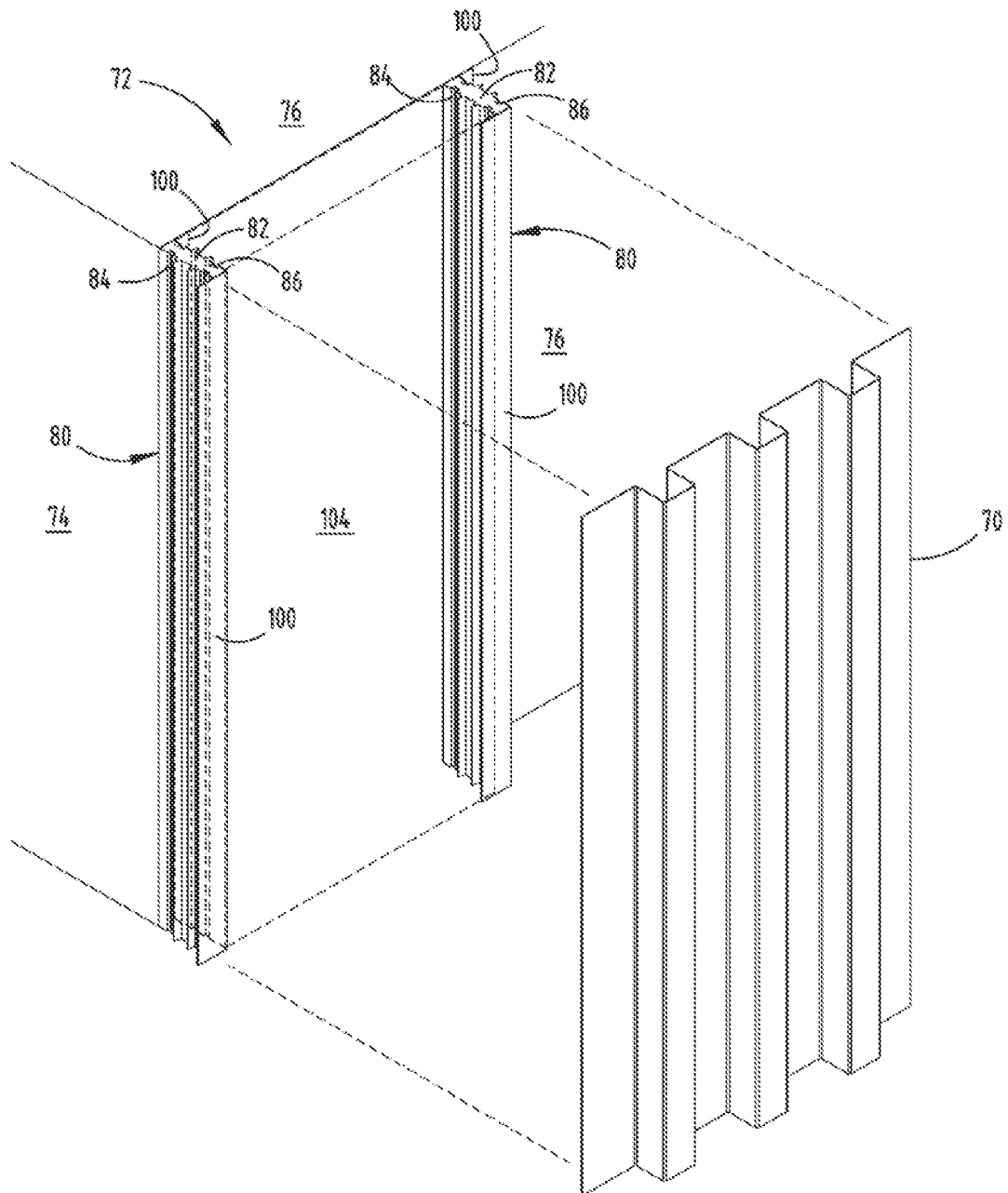


FIG. 11

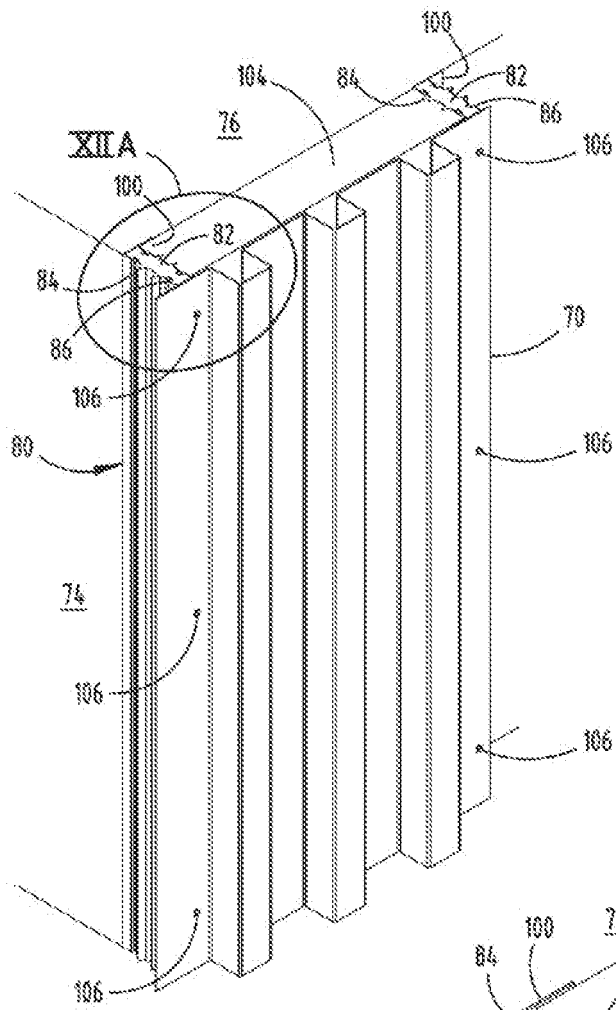


FIG. 12

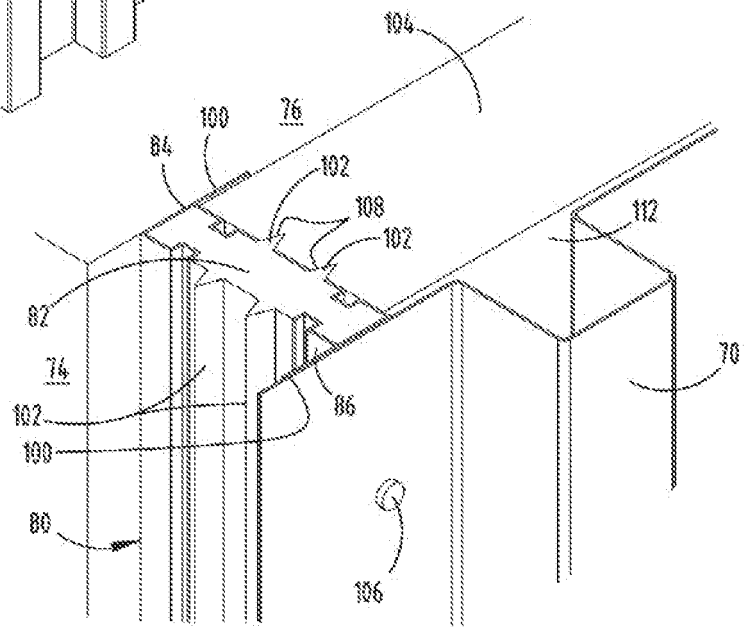


FIG. 12A

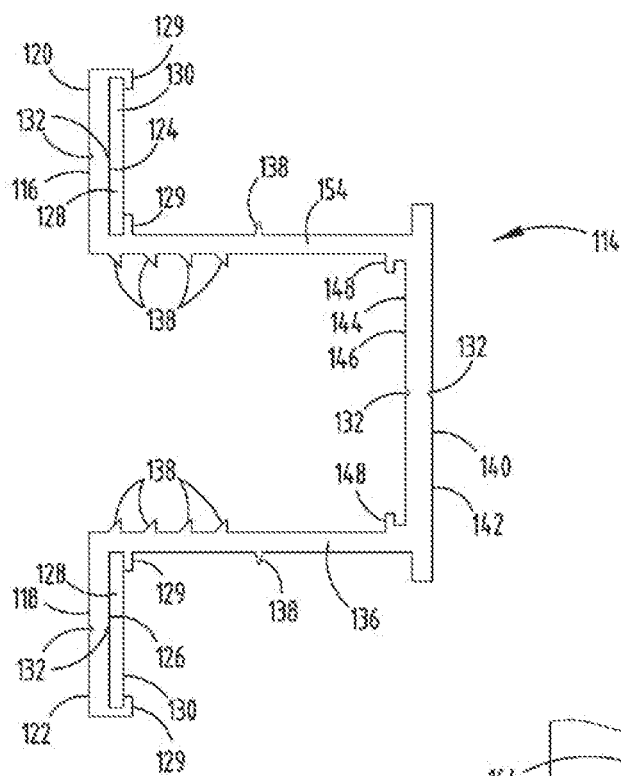


FIG. 13

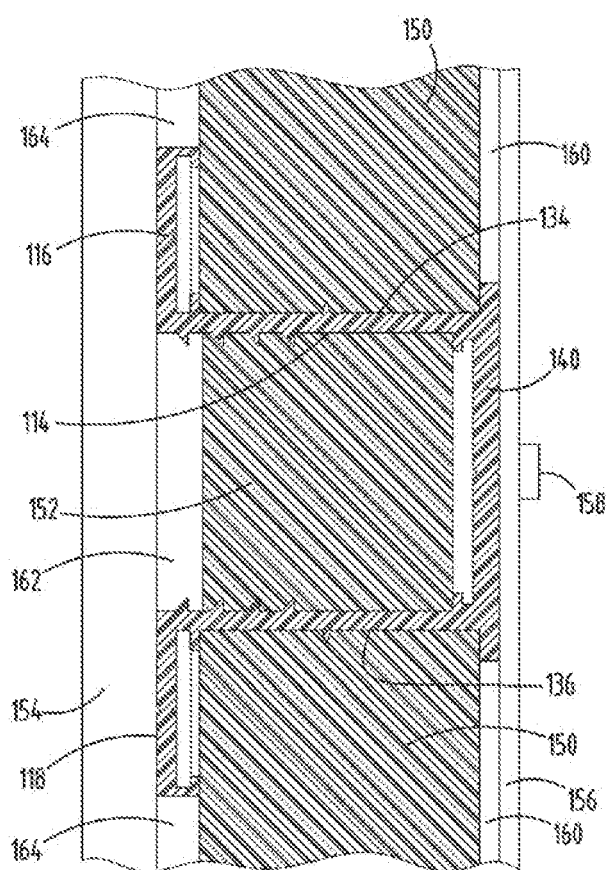


FIG. 13A

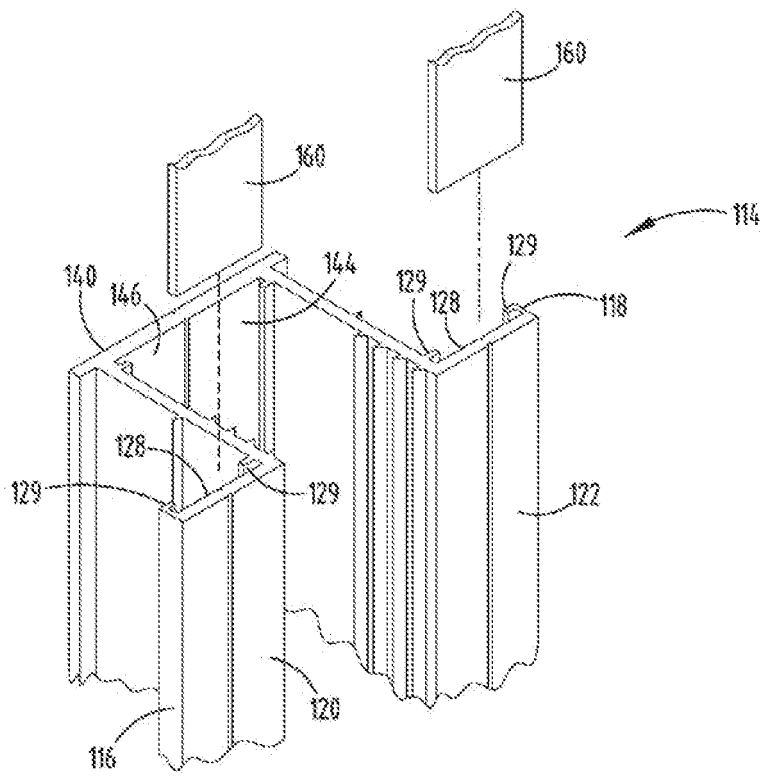


FIG. 14

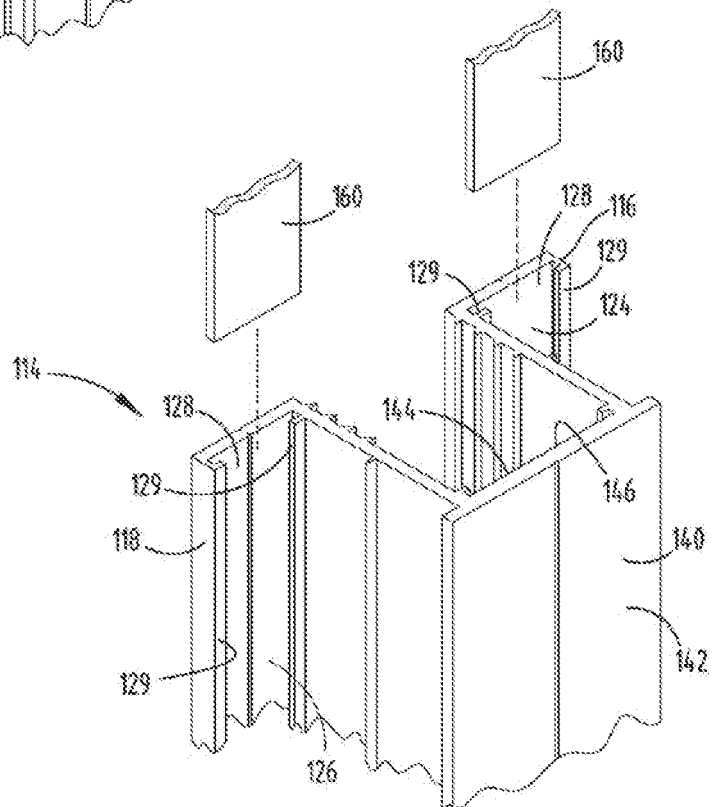
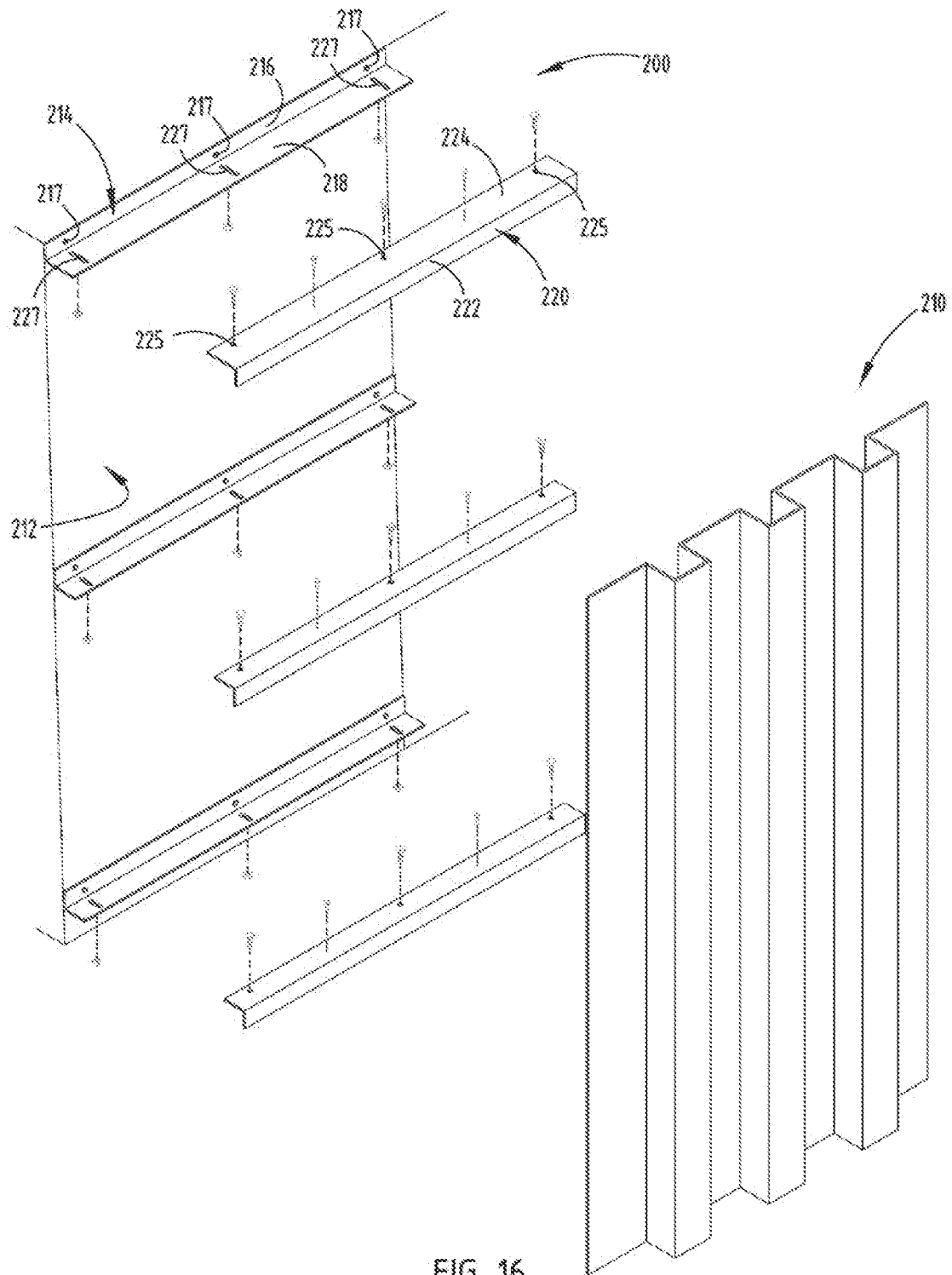


FIG. 15



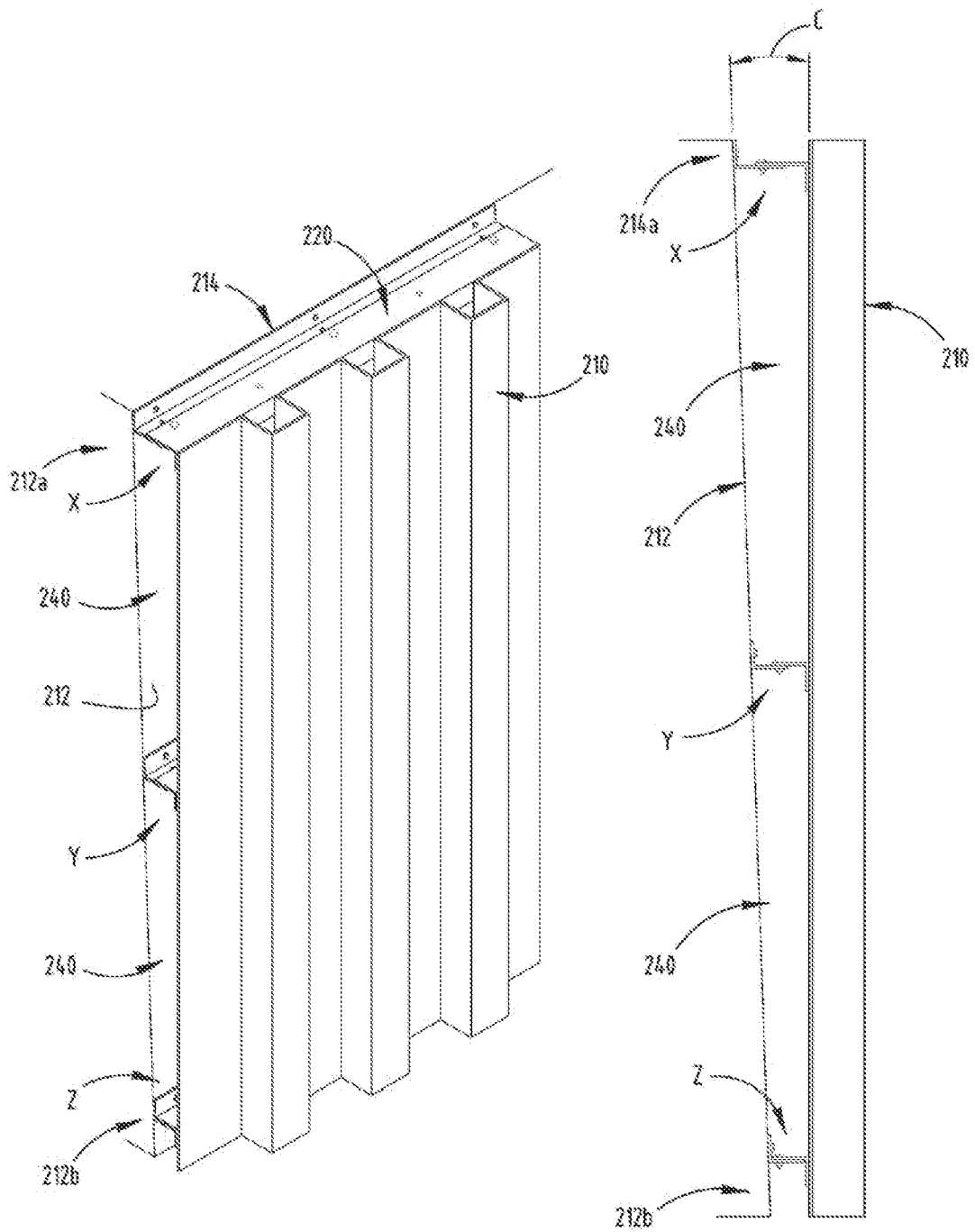


FIG. 17

FIG. 18

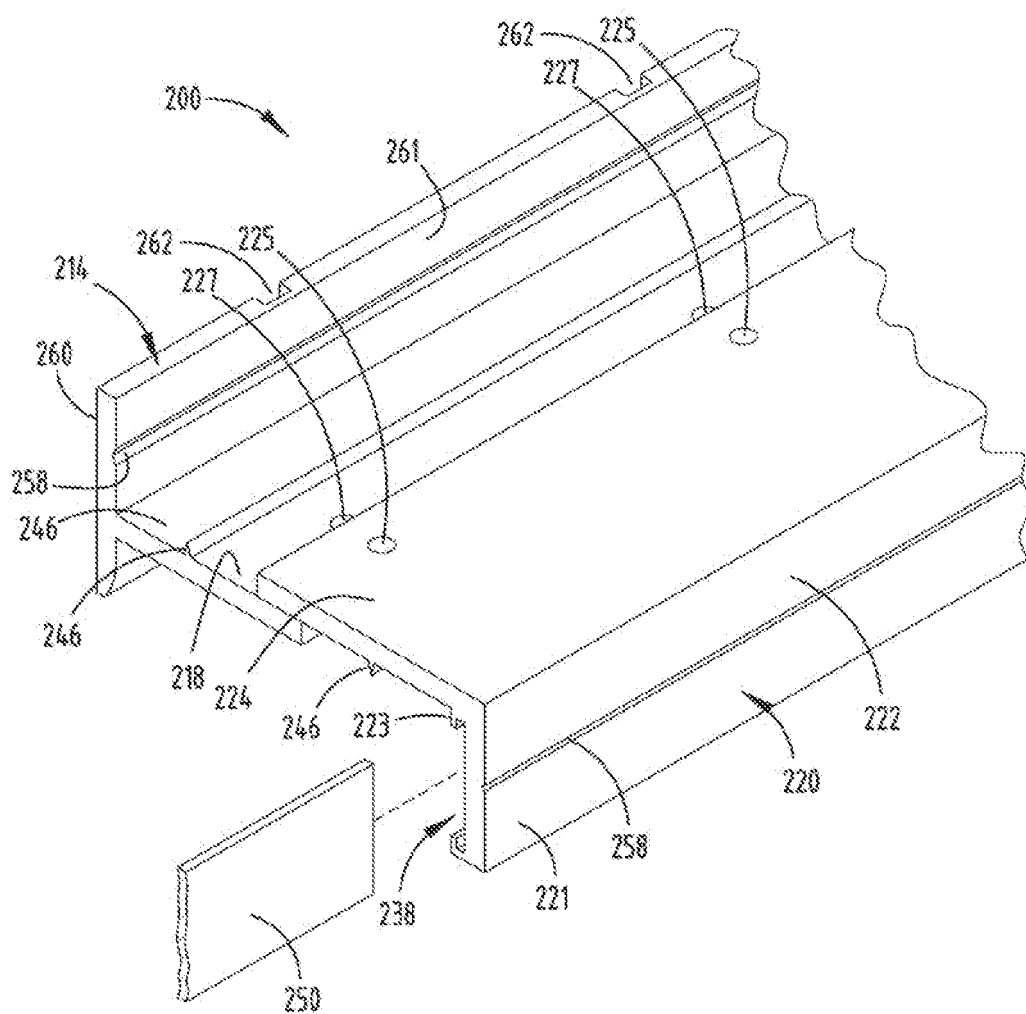


FIG. 19

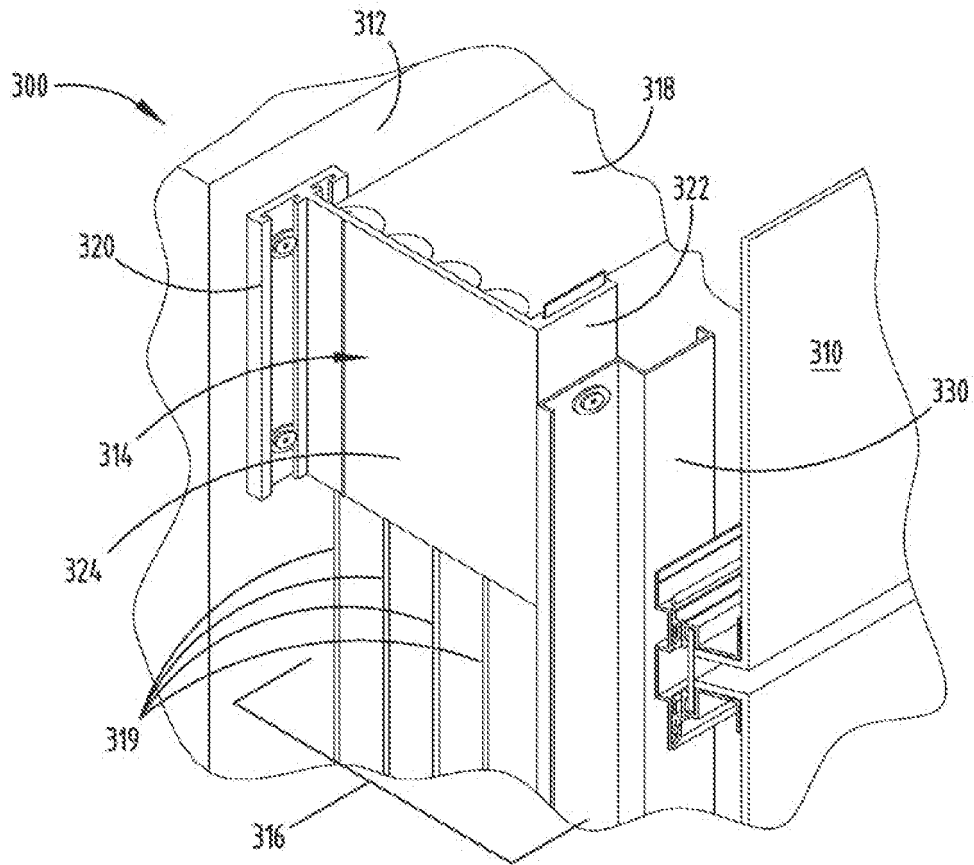


FIG. 20

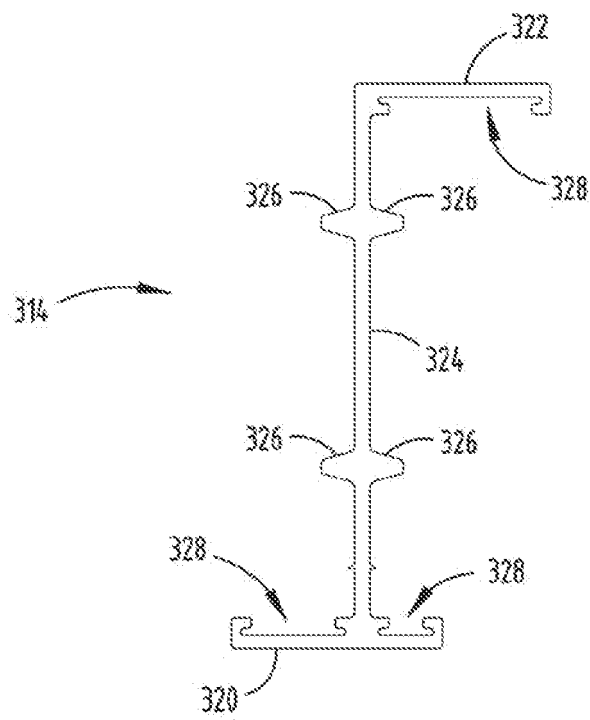


FIG. 21

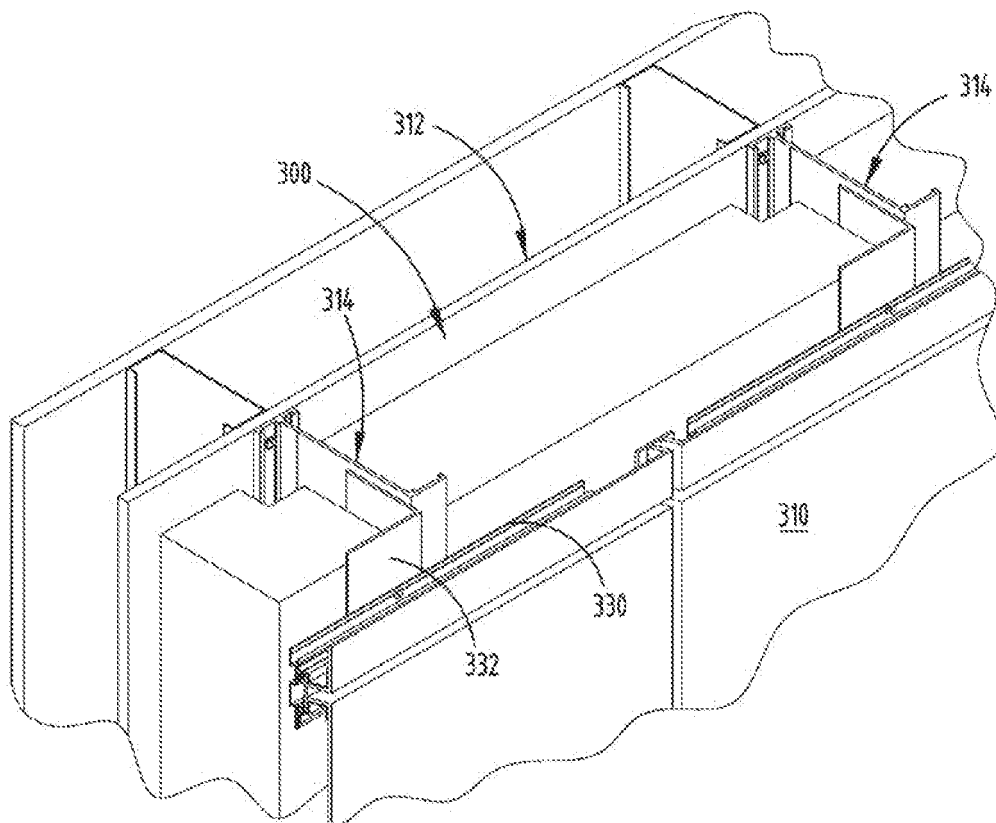


FIG. 22

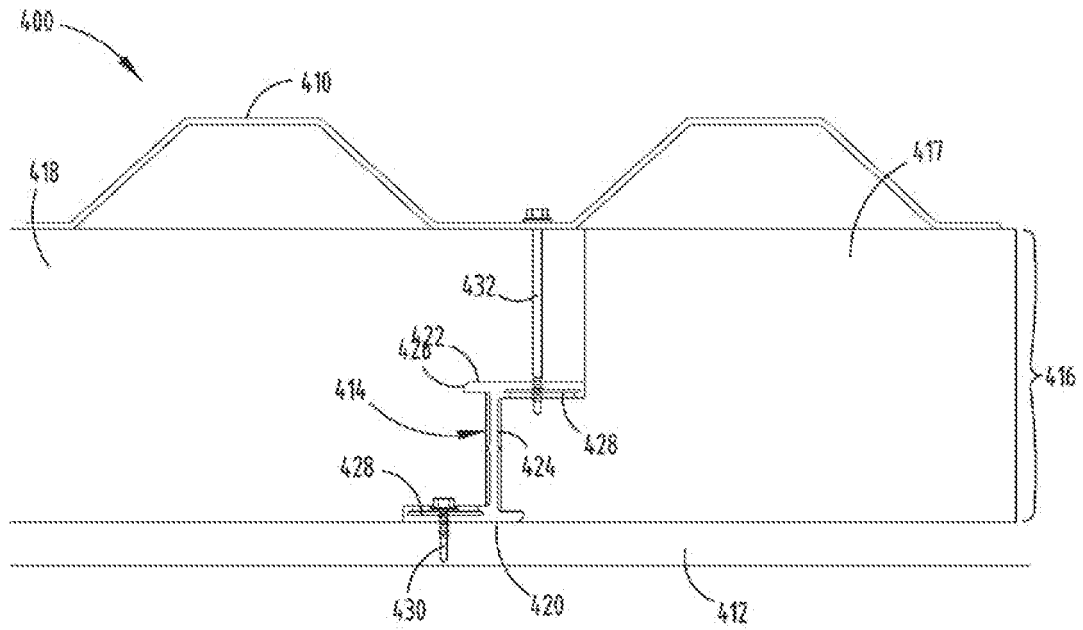


FIG. 23

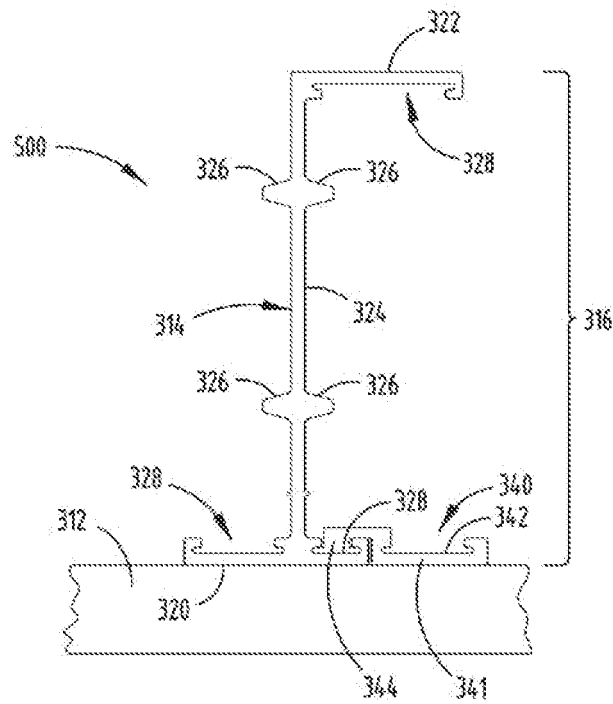


FIG. 24

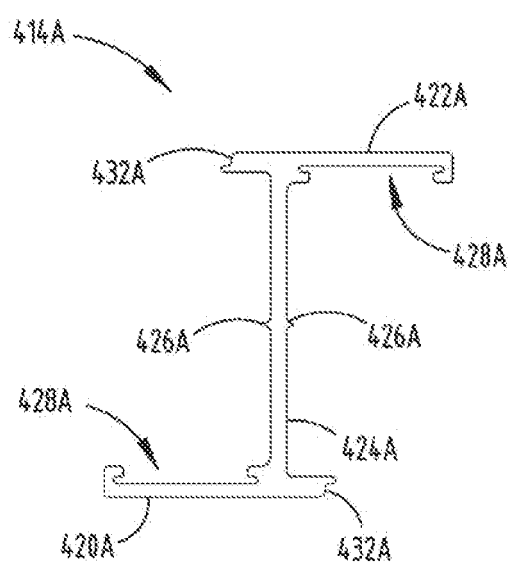


FIG. 25

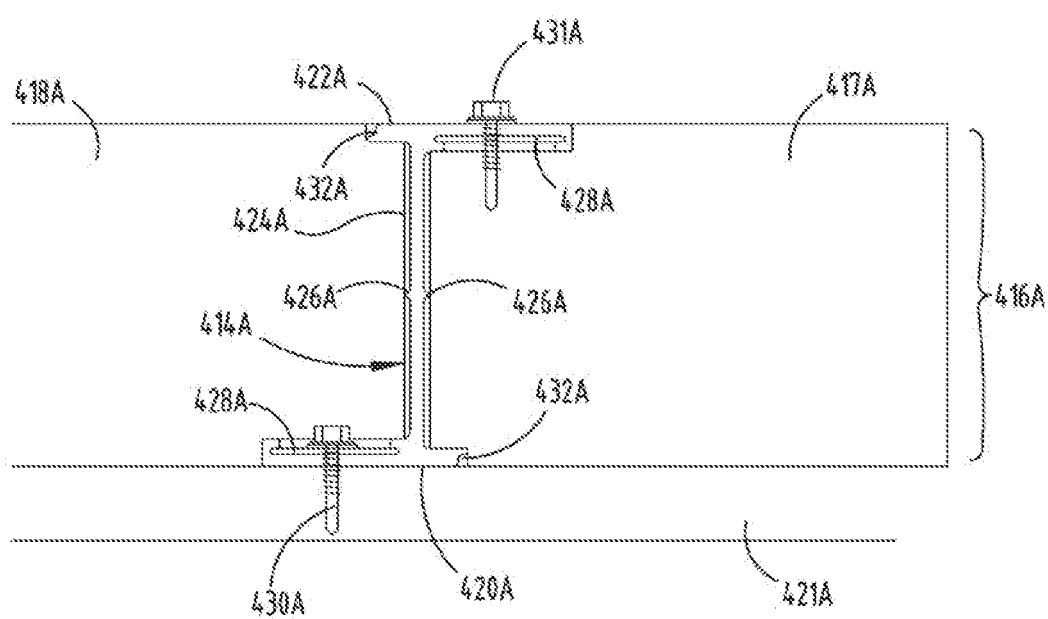
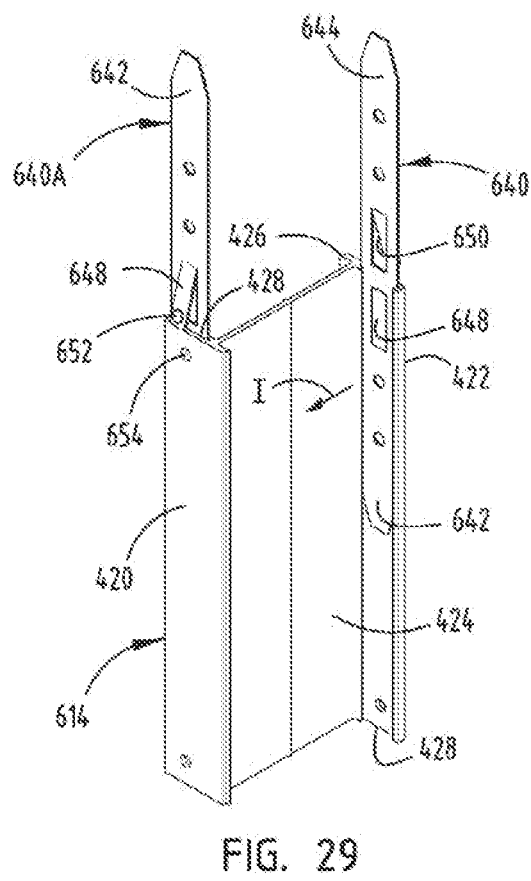
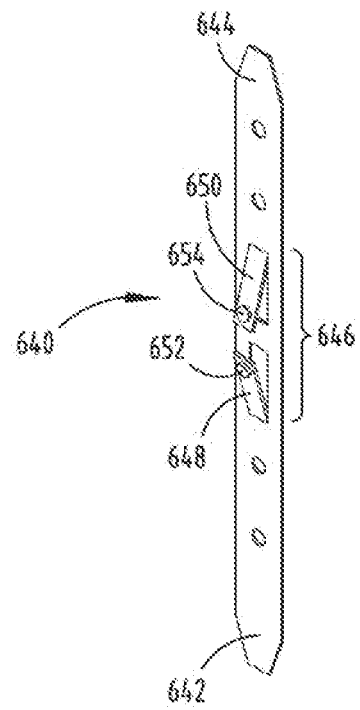
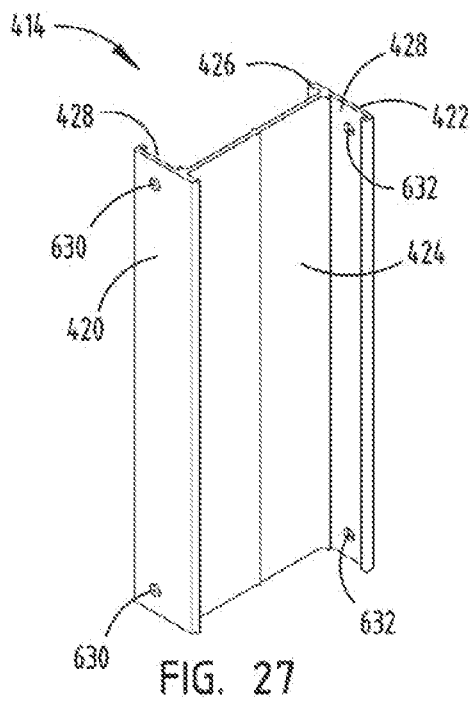


FIG. 26



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2354368 A [0002]