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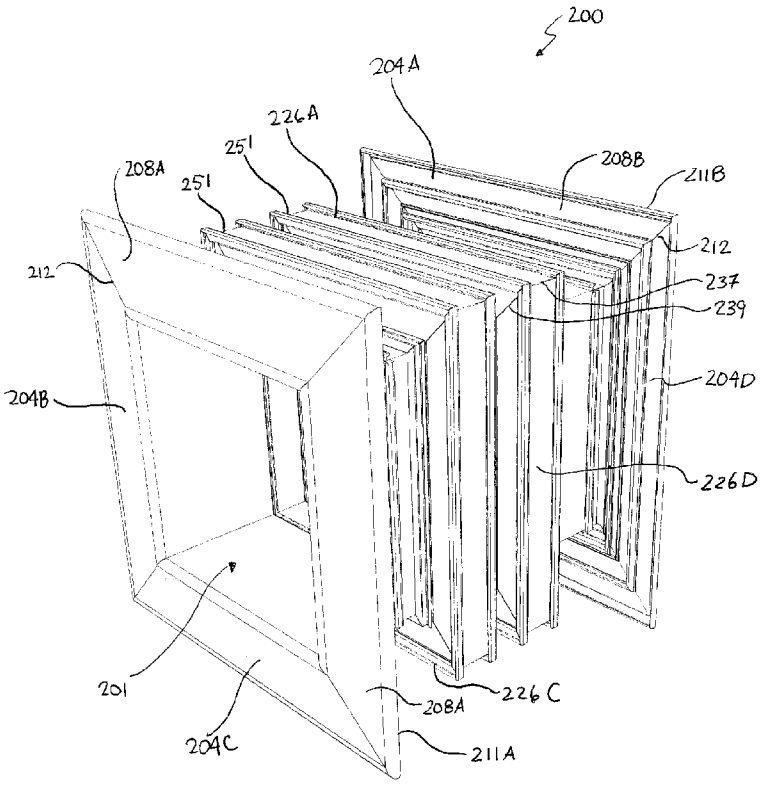

FIGURE 3

(57) Abstract: A stay-in-place buck for defining an opening in a cast concrete structure has a plurality of frame members arrangeable in an abutting relationship. Each of the frame members has a panel extending transversely between outer opposed panels of a stay-in-place formwork. Flanges extend from opposed edges of the frame member panel for abutment against outer surfaces of the outer opposed panels. Each flange has opposed mitered end edges for abutment against adjacent mitered end edges of flanges of adjacent frame members. The buck also includes fastener-receivers connectable to the panels of the frame members to form one or more fastener-receiving frames extending at least partially about a perimeter of the buck. Each fastener-receiver has mitered edge portions for abutment against adjacent mitered edge portions of adjacent fastener-receivers.

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STAY-IN-PLACE FORM SYSTEMS FOR WINDOWS AND OTHER BUILDING OPENINGS

Reference to Related Application

[0001] This application claims priority from United States patent application No. 61/022,503 filed 21 January 2008 and entitled STAY-IN-PLACE FORM SYSTEMS FOR WINDOWS AND OTHER BUILDING OPENINGS which is hereby incorporated herein by reference. For the purposes of the United States of America, this application claims the benefit under 35 U.S.C. §119 of United States patent application No. 60/022,503 filed 21 January 2008 and entitled STAY-IN-PLACE FORM SYSTEMS FOR WINDOWS AND OTHER BUILDING OPENINGS which is hereby incorporated herein by reference.

Technical Field

[0002] The invention disclosed herein relates to stay-in-place forms for fabricating structures out of concrete or other similarly curable construction materials. Particular embodiments of the invention provide stay-in-place form systems for forming openings in building structures which may permit the installation of windows, doors, ventilation or other building component.

Background

[0003] A window buck may be positioned in a building form-work (also referred to as a form) and secured to the form to block out (i.e. define) an opening in the form for the installation of windows, doors, or the like. Liquid concrete is subsequently placed in the form and around the buck. The concrete cures to form a building structure (e.g. wall, floor, ceiling, etc.) having an opening defined by the buck.

[0004] Some bucks are designed to be reusable and are removed from the building structure after the concrete has cured, leaving behind a surface for mounting a window, door or other building component to be placed in the opening. Other stay-in-place bucks are designed to be left in the concrete after the concrete cures and may provide a frame for mounting the window or door, for example. Conventional bucks are typically made of wood or metal.

[0005] In more recent years, some building structures have been fabricated from concrete using modular stay-in-place forms typically made of plastic. Examples of such modular stay-in-place forms include those described in US patent publication No. 2005/0016103 (Piccone) and PCT publication No. WO96/07799 (Sterling). The forms typically include a plurality of wall panels joined edge to edge to form wall segments,

and a plurality of support panels which extend between and connect to each of the wall segments at transversely spaced apart locations. Liquid concrete is placed in the form between the wall segments and fills the interior portion of the form. When the concrete cures, the concrete (together with the form) provide a structural component (e.g. wall, floor, ceiling, etc.) for a building.

[0006] There are problems with using conventional stay-in-place window bucks, made of wood or metal, in modular stay-in-place forms. For example, stay-in-place wood bucks may be subject to warping, shrinkage or other problems which may be caused by temperature and/or humidity conditions. Stay-in-place wood bucks are also prone to infestation by insects or other pests. Stay-in-place metal bucks may be subject to corrosion and warping, due to expansion and contraction caused by varying temperature conditions.

[0007] US6,530,185 (Scott *et al.*) discloses a plastic window buck for use with insulated concrete forms having high-density foam wall side panels. Each buck piece includes a top wall having a surface for supporting a building component to be mounted within the wall opening, and outer flanges depending downwardly from the top wall. The inner surfaces of the flanges engage outer surfaces of the wall side panels. A multi-chambered section is disposed between the outer flanges on the interior side of the top wall. The Scott *et al.* buck has a number of limitations including without limitation the following:

- The chambered section, which extends along a length of the top wall, is generally much wider than the component to be mounted within the opening; therefore the chambered section requires an unnecessarily large amount of plastic to provide a frame for mounting the component.
- The chambered section is not reconfigurable to accommodate different fastener lengths or window widths, or variations in wall thicknesses.
- The buck is fixed in position only by means of frictionally fitting the wall side panels between the inner surfaces of the flanges and the outer side surfaces of the chambered section, and by means of anchoring fins which extend from the chambered section into the poured concrete. When the concrete is wet, additional support may be required to stabilize the buck, as the friction fit of the wall side panels to the buck may be insufficient to secure the buck to the form. Also, when the concrete is cured, the fins may break and air may be trapped under the fins.

- The buck must be installed piece-wise within an insulated concrete form; it cannot be pre-assembled prior to placement within the form.
- The shape of each buck piece, and in particular, the spacing between the flanges and the chambered section for receiving the wall side panels, is dependent on a predetermined wall side panel thickness. Any change to the insulation in the wall side panels would require a corresponding change to the buck.

[0008] There is a general desire to provide modular stay-in-place form systems for forming building openings which may receive windows, doors, ventilation or other building components.

Brief Description of the Drawings

[0009] In drawings which depict non-limiting embodiments of the invention:

Figure 1 is a perspective view of a buck according to one embodiment of the invention mounted in a cell of a modular stay-in-place form;

Figure 2 is a top plan view of the Figure 1 buck mounted in a cell of the Figure 1 form;

Figure 3 is a perspective view of the Figure 1 buck;

Figure 4A is a perspective view of a frame member (shown with fastener-receivers connected thereto) which may be assembled with other like frame members to create the buck shown in Figures 1, 2 and 3;

Figure 4B is a side elevation view of the Figure 4A frame member (shown without fastener-receivers connected thereto);

Figures 5A and 5B are partial perspective views of fastener-receivers shown joined together at a miter joint, and in a vertically stacked configuration, respectively, which may be used with the Figure 1 buck;

Figure 5C is a perspective view of two locking members each having one arm portion inserted in a fastener-receiver;

Figure 5D is a perspective view of a locking member according to another embodiment of the invention, shown connecting two fastener-receivers together;

Figure 6A is a perspective view of a buck according to another embodiment of the invention;

Figures 6B and 6C are perspective and side elevation views respectively of a frame member which may be assembled with other like frame members to create the Figure 6A buck;

Figure 7A is a perspective view of a form having only the lower parts of the panels and support members positioned in a cell;

Figure 7B is a perspective view of the Figure 7A form with the Figure 6A buck mounted in the cell:

Figure 7C is a perspective view of the Figure 7A form with the Figure 6A buck mounted in the cell, the form having both the lower and upper parts of the panels and support members positioned in the cell:

Figure 8A is a partial perspective view of a frame member (shown with fastener-receivers connected thereto) which may be assembled with other like frame members to create a buck according to another embodiment of the invention:

Figure 8B is a side elevation view of the Figure 8A frame member (shown without fastener-receivers connected thereto);

Figure 8C is a side elevation view of the Figure 8A frame member (shown with fastener-receivers connected thereto);

Figure 8D is a side elevation view of the Figure 8A frame member (shown with fastener-receivers connected thereto) arranged according to another embodiment of the invention;

Figure 9A is a perspective view of a buck according to another embodiment of the invention:

Figure 9B is a perspective view of a corner frame component of the Figure 9A buck;

Figure 9C is a perspective view of a central frame component of the Figure 9A buck;

Figure 10A is a partial perspective view of a buck according to another embodiment of the invention; and

Figure 10B is a perspective view of a corner piece shown with a locking member attached thereto, which may be used in the Figure 10A buck.

Detailed Description

[0010] Throughout the following description, specific details are set forth in order to provide a more thorough understanding of the invention. However, the invention may be practiced without these particulars. In other instances, well known elements have not been shown or described in detail to avoid unnecessarily obscuring the invention. Accordingly, the specification and drawings are to be regarded in an illustrative, rather than a restrictive sense.

[0011] Figures 1 and 2 show a modular stay-in-place form **128** having a buck **200** mounted therein. Form **128**, including buck **200**, may be used to fabricate a portion of a building or other structure having an opening **201** therethrough. Form **128** includes panels **130** and support members **136** which extend transversely between opposing panels **130**. Support members **136** may brace opposing panels **130** and may, in some embodiments, also connect panels **130** to one another in edge-adjacent relationship. Form **128** may also optionally include tensioning members **140A**, **140B** (collectively, tensioning members **140**) which extend angularly between panels **130** and support members **136** at various locations within form **128**.

[0012] A buck **200** may be positioned between panels **130** of form **128** to block out (i.e. define) a building opening **201** in which windows, doors, ventilation or other components may be installed after fabrication of the structure. In the illustrated embodiment, buck **200** is mounted in association with a cell **202** of form **128** defined by a pair of opposed panels **130A**, **130B** and opposed support members **136A**, **136B**. Buck **200** my be constructed or assembled from its various components, prior to positioning buck **200** in cell **202** of form **128**. Buck **200** may be connected to various components of form **128**, as described in further detail below.

[0013] In the illustrated embodiment, as best seen in Figure 3, buck **200** comprises top and bottom frame members **204A**, **204C** and a pair of opposed side frame members **204B**, **204D** (collectively, frame members **204**) which may be arranged in abutting relationship such that adjacent frame members **204** extend at right angles to one another to define a substantially rectangular opening **201** in form **128**. The rectangular shape defined by frame members **204** is not necessary. In other embodiments, frame members **204** may be arranged in abutting relationship, with appropriate miter joints, to define an polygonal openings **201**, for example. In some embodiments, frame members **204** may be curved to provide corresponding curved openings **201**.

[0014] As best seen in Figures 4A and 4B, each frame member **204** of the illustrated embodiment includes a rectangular panel **206** and a pair of panel flanges **208A**, **208B** (collectively, flanges **208**) extending from opposed longitudinally extending edges **207A**, **207B** (collectively, edges **207**) of panel **206**. Each flange **208** may be fabricated with, or cut to provide, a pair of mitered end edges **210**, each of which abuts against, and forms a miter joint **212** with, a corresponding mitered end edge **210** of flange **208** of an adjacent frame member **204**.

[0015] The length of opposed edges **207** of panel **206** defines a longitudinal dimension **L** of panel **206** (Figure 4A), and the distance between opposed edges **207** of panel **206** defines a transverse dimension **W** of panel **206** (Figure 4B). Dimension **W** of panel **206** is sized such that panel **206** spans a transverse distance (i.e. in the direction of the double-headed arrow **15** of Figure 2) between opposed panels **130A**, **130B** of form **128**. In the illustrated embodiment, dimension **L** of panel **206** is the same for all four frame members **204** to form a buck **200** defining a square opening **201**. However, this is not necessary. Dimension **L** of panels **206** of frame members **204A**, **204C** may be different than dimension **L** of panels **206** of frame members **204B**, **204D**, so as to provide a rectangular opening **201**. Dimensions **L** and **W** of panels **206** may be sized to define an opening **201** of the desired size, shape and configuration.

[0016] The components of form **128** (i.e. panels **130**, support members **136** and tensioning members **140**) and buck **200** (including fastener-receivers **226** and locking members **238** which are described below) may be fabricated from a lightweight and resiliently deformable material (e.g. a suitable plastic) using an extrusion process. By way of non-limiting example, suitable plastics include: poly-vinyl chloride (PVC), acrylonitrile butadiene styrene (ABS) or the like. In other embodiments, the components of form **128** may be fabricated from other suitable materials, such as steel or other suitable alloys, or wood composites, for example. Although extrusion is the currently preferred technique for fabricating the components of form **128**, other suitable fabrication techniques, such as injection molding, stamping, sheet metal fabrication techniques or the like may additionally or alternatively be used.

[0017] Form **128** comprises a plurality of panels **130** which are elongated in the vertical direction (i.e. the direction into and out of the page of Figure 2 and the direction of double-headed arrow **19** of Figure 1). Panels **130** comprise inward facing surfaces **131A** and outward facing surfaces **131B**. In the illustrated embodiment of Figures 1 and 2, panels **130** are identical to one another, but this is not necessary. In general, panels **130** may have a number of features which differ from one another. In the illustrated embodiment, panels **130** have a substantially similar cross-section along their entire vertical length, although this also is not necessary and portions of panels **130** (e.g. connector components **133**) may differ in shape along the length thereof.

[0018] Support members **136** comprise connector components **134** at their edges for connecting to corresponding connector components **133** on panels **130**. In the illustrated embodiment, connector components **134** at the edges of support members

136 are male T-shaped connector components **134** which slide into the receptacles of female C-shaped connector components **133** on inward surfaces **131A** of panels **130**.

[0019] In the illustrated embodiment, each panel **130** has vertically extending edges **116**, **118** having terminal connector components **133** projecting transversely from inward-facing surface **131A** of panel **130** (Figure 2). A pair of edge-adjacent panels **130** may be joined together by connecting terminal connector components **133** at edges **116**, **118** with connector components **134** of a support member **136** positioned between the edge-adjacent panels. In the illustrated embodiment, edge-adjacent panels **130** are joined together by sliding male T-shaped connector components **134** on support member **136** into the receptacles of female C-shaped terminal connector components **133** at edges **116, 118** of edge-adjacent panels **130**, to form a connection **150** between edge-adjacent panels **130**. Panels **130** may thereby be connected in edge-adjacent relationship to form first and second opposed form segments **124**, **125** (Figure 2).

[0020] In the illustrated embodiment of Figure 2, each panel **130** comprises a terminal female C-shaped connector component **133** at each of edges **116**, **118** and an additional pair of female interior connector components **133** at a location between edges **116**, **118**. Each pair of interior female connector components **133** on panels **130** is shaped to receive a corresponding pair of male connector components **134** from support members **136**. Terminal and interior connector components **133** on panels **130** facilitate the connection of up to three support members **136** to each panel **130** (one support member **136** at each edge **116**, **118**, and an additional optional support member **136** between edges **116**, **118**). In other embodiments, panels **130** may be provided with any suitable number of connector components **133** to enable the connection of a corresponding number of support members **136**, as may be necessary for the particular strength requirements of a given application. In addition, the mere presence of connector components **133** on panels **130** does not necessitate that support members **136** are connected to each such connector component **133**. In general, the spacing of support members **136** may be determined as necessary for the particular strength requirements of a given application and to minimize undesirably excessive use of material.

[0021] Support members **136** are preferably apertured, as best seen in Figure 1 (showing apertures **119** in support members **136**), to allow liquid concrete to flow between support members **136** in order to fill the spaces between form segments **124**,

125. Although not explicitly shown in the illustrated views, reinforcement bars (commonly referred to as rebar) may also be inserted into form **128** prior to introducing the liquid concrete in form **128**. Where required or otherwise desired, transversely extending rebar can be inserted so as to extend through apertures **119** in support members **136**. If desired, vertically extending rebar can then be coupled to the transversely extending rebar.

[0022] Form **128** of the illustrated embodiment also includes optional tensioning members **140** which extend angularly between support members **136** and panels **130** (Figure 2). Tensioning members **140** comprise connector components **141A**, **141B** at their opposing edges. Connector components **141A** on tensioning members **140** are complementary to connector components **138** on inward surfaces **131A** of panels **130**. In the illustrated embodiment, connector components **138** on panels **130** are male T-shaped connector components which slide into the receptacles of female C-shaped connector components **141A** on tensioning members **140**. Connector components **141B** on tensioning members **140** are complementary to connector components **143** on support members **136**. In the illustrated embodiment, connector components **143** on support members **136** are male T-shaped connector components which slide into the receptacles of female C-shaped connector components **141B** on tensioning members **140**.

[0023] Tensioning members **140** may comprise apertures **171** which allow concrete flow and the extension of rebar therethrough (see Figure 1).

[0024] Tensioning members **140** may add to the strength of connections **150** between panels **130** and help to mitigate against so-called "unzipping" of connections **150** under the pressure of liquid concrete. More particularly, a pair of tensioning members **140A**, **140B** may extend at angles from a support member **136** to the panels **130** on either side of a connection **150** to reinforce the strength of the connection **150**.

[0025] In some embodiments, tensioning members **140** are not necessary. Tensioning members **140** need not generally be used in pairs. In some embodiments, support members **136** and/or tensioning members **140** may be employed at different spacings within a particular form.

[0026] In other embodiments which are not illustrated, panels **130**, support members **136** and optionally tensioning members **140** may be connected in alternate

configurations while still providing forms **128**, having a cell **202** (defined by opposed support members **136A**, **136B** and opposed panels **130A**, **130B**) in which a buck **200** may be mounted. For example, in one embodiment, panels **130** may be connected in edge-adjacent relationship by means of a connection **150** between a male connector component at one of edges **116**, **118** of a panel **130**, inserted into a female connector component at the other one of edges **116**, **118** of an adjacent panel **130**. In such embodiments, support members **136** are not required to connect edge-adjacent panels **130** together. However, support members **136** may be connected to interior connector components **133** on panels **130** at spaced apart locations from edges **116**, **118** to provide support to form **128**.

[0027] Buck **200** may be connected to or engaged with components of form **128** so that buck **200** is secured to form **128** as concrete is introduced into form **128** and is subsequently cured. Panel **206** of each frame member **204** has a first side **220** facing away from opening **201** and toward an interior of form **128**, and a second side **222** facing toward opening **201** (Figure 4A). Each flange **208** extends away from opening **201**, and has an inward surface **213** (facing toward outward surfaces **131B** of panels **130**) and an outward surface **214** (facing toward an exterior of form **128**). When buck **200** is installed in form **128**, inward surfaces **213** of flanges **208A**, **208B** abut against outward surfaces **131B** of panels **130**.

[0028] Flanges **208A**, **208B** may be angled slightly toward one other as they extend away from panel **206** (as best seen in Figure 4B) so that flanges **208A**, **208B** may be pushed apart as they engage with outward surfaces **131B** of panels **130**. The incline of flanges **208A**, **208B** allows buck **200** to accommodate a range in the transverse dimension of form **128**. Also, as flanges **208A**, **208B** are pushed apart by engagement with outward surfaces **131B** of panels **130**, restoration forces associated with the deformation of flanges **208A**, **208B**, combined with the frictional forces between flanges **208A**, **208B** and outward surfaces **131B** of panels **130**, act to retain buck **200** in position within form **128**.

[0029] In certain embodiments, buck **200** may be secured to form **128** only by means of the interaction of panel flanges **208** with panels **130** as described above. In other embodiments, panel flanges **208** may be coextruded or otherwise coated with a suitable soft deformable material on at least a portion of inward surfaces **213** of panel flanges **208**. The coextrusion material may comprise, for example, one or more soft deformable tongues projecting from inward surfaces **213** of panel flanges **208**, between

terminal edge portions **255** and locking flanges **278A**. The coextruded material abuts against, and assists in gripping, outward surfaces **131B** of panels **130**.

[0030] As seen in Figure 3, flanges **208A** (when connected to one another at miter joints **212**) collectively form a frame **211A** for abutting against outer surfaces **131B** of panels **130A**, and flanges **208B** (when connected to one another at miter joints **212**) collectively form a frame **211B** for abutting against outer surfaces **131B** of panels **130B**.

[0031] As shown in Figures 4A and 4B, panel **206** has a plurality of connector components on first side **220**. These connector components may include:

- connector components **230** for connecting to complementary connector components **245** on fastener-receivers **226**;
- connector components **270** for connecting to complementary connector components **141B** on optional tensioning members **140**; and
- connector components **280** for connecting to complementary connector components **143** on support members **136**.

[0032] Frame members **204** may include at least one set of connector components **230** for connecting to connector components **245** on fastener-receivers **226**. However, if fastener-receivers **226** are not used with buck **200**, connector components **230** are not necessary on frame members **204**. Also, it is not necessary for all frame members **204** to have connector components **270** and **280** if frame members **204** are not connected to tensioning components **140** or to support members **136**. For example, in some embodiments, top and bottom frame members **204A**, **204C** do not have connector components **270**, **280**. On the other hand, side frame members **204B**, **204D** have connector components **270**, **280** on panel **206** for connecting such frame members to complementary connector components on specific components of form **128** (e.g. tensioning members **140** and support members **136**). Connector components **270** and **280** may still be present on frame members **204** even if they are not used to make corresponding connections, as connector components **270**, **280** may assist in anchoring frame members **204** to the concrete which is introduced into form **128**. Each of these connector components will be explained in further detail below.

[0033] Buck **200** of the illustrated embodiment includes a plurality of fastener-receivers **226** which are mounted to first sides **220** of panels **206** by the connection of connector components **245** on fastener-receivers **226** with complementary connector

components **230** on first sides **220** of panels **206** of frame members **204**. Fastener-receivers **226** extend along a longitudinal dimension **L** of each panel **206** and may be connected to panels **206** to form one or more fastener-receiving frames **251** around buck **200**. In the illustrated embodiment of Figures 1, 2 and 3, buck **200** has two fastener-receiving frames **251** mounted in parallel to panels **206** of frame members **204**. Each fastener-receiving frame **251** may comprise one fastener-receiver **226** corresponding to each of frame members **204** (e.g. top and bottom fastener-receivers **226A**, **226C** and side fastener-receivers **226B**, **226D**, or collectively, fastener-receivers **226**). In the illustrated embodiment, each fastener-receiver **226** is fabricated with, or cut to provide, a pair of mitered edge portions **237** for abutting against, and forming a miter joint **239** with, corresponding mitered edge portions **237** of adjacent fastener-receivers **226**.

[0034] Fastener-receiving frame **251** may have several functions, including:

- holding adjacent frame members **204** together and providing structural reinforcement (e.g. rigidity, stability) to buck **200**;
- providing structural reinforcement to form **128**;
- providing a thermally insulating barrier around a window, door or other component installed within opening **201** (as described in further detail below); and
- providing a structure in buck **200** to which a window, door or other component may be mounted within opening **201** after the concrete cures in form **128**.

[0035] It is not necessary for fastener-receiving frame **251** to extend completely around the perimeter of buck **200**. In some embodiments, fastener-receiving frame **251** extends partially around particular sections of buck **200** and is absent in other sections of buck **200**.

[0036] As best seen in Figures 5A and 5B, fastener-receivers **226** have opposed longitudinally extending locking sides **234** oriented extending away from panel **206**. Each locking side **234** has a longitudinally extending channel **236** for slidably receiving a locking member **238** (Figure 5C) to connect adjacent fastener-receivers **226**. In the illustrated embodiment, channel **236** is defined by a surface of locking side **234** and a pair of opposed locking flanges **233A**, **233B** (collectively, locking flanges **233**). In the illustrated embodiment, locking flanges **233** extend transversely from locking side **234** (at locations proximate the longitudinally extending edges of locking side **234**) and toward one another.

[0037] Locking member **238** may be generally L-shaped as shown in Figure 5C. As shown in Figure 5A, locking member **238** having a first arm portion **242** for insertion in channel **236** of a fastener-receiver **226** (fastener-receiver **226A**, for example) and a second arm portion **243** for insertion in channel **236** of an adjacent fastener-receiver **226** (fastener-receiver **226D**, for example). Arm portions **242**, **243** meet at arm intersection portion **284**. Arm portions **242, 243** may be sized so that when arm portions **242**, **243** are in their fully inserted positions in their respective channels **236**, edge portions **237** of fastener-receivers **226A**, **226D** meet to form miter joint **239** and locking member **238** retains fastener-receivers **226A**, **226D** in a locked position as a result of frictional and/or restorative deformation forces acting between the abutting surfaces of fastener-receiver **226** and locking member **238**. Four or eight L-shaped locking members **238** (one or two locking members **238** for each miter joint **239**) may be used to connect together four fastener-receivers **226A**, **226B**, **226C**, **226D** to form fastener-receiving frame **251**.

[0038] A plurality of notches **283** (which define a plurality of teeth **282**) may optionally be provided along longitudinally extending edges **285**, **286** of each of arm portions **242**, **243** of locking member **238**. In the illustrated embodiment, notches **283** are arranged as pairs of opposed offset notches **283A**, **283B**, **283C**, **283D** (collectively, notches **283**). For example, notch **283A** along edge **285** of arm portion **243** may be offset from notch **283A** along edge **286** of arm portion **243** by a longitudinal distance **d** (Figure 5C) such that as arm portion **243** is slid into channel **236** starting from mitered edge portion **237**, each offset pair of notches **283A**, **283B**, **283C**, **283D** reaches mitered edge **237** at approximately the same time. One or more apertures **287** may also optionally be defined in each arm portion **242**, **243** at a location spaced apart from arm intersection portion **284**. When locking member **238** is lockingly positioned in channels **236** of adjacent fastener-receivers **226**, screws or other fasteners may be received through apertures **287** and project into locking sides **234** for securely fastening locking member **238** to fastener-receivers **226**.

[0039] One or more indentations **289** may also be optionally defined in arm portions **242**, **243** of locking member **238**, at a location on arm portions **242**, **243** spaced apart from arm intersection portion **284**. In the illustrated embodiment (Figure 5C), indentations **289** comprise elongate grooves extending from outer ends **242a**, **243a** of arm portions **242**, **243** along a partial length of arm portions **242**, **243**.

[0040] Notches **283**, apertures **287** and indentations **289** may provide the following functions, for example:

- reducing the frictional contact between the surfaces of locking member **238** and fastener-receivers **226** to facilitate the initial part of the sliding of locking member **238** into channels **236**;
- reducing the rigidity of arm portions **242**, **243** to make it easier to deform arms **242**, **243** and thereby easier to insert locking member **238** into channels **236**; and
- providing cavities which may be filled by some concrete, thereby facilitating the adhesion of concrete to buck **200**.

[0041] Locking member **238** may also have grippers **288** protruding transversely from arm portions **242**, **243** to engage with locking sides **234** of adjacent fastener-receivers **226**. In the illustrated embodiment of Figure 5C, each gripper **288** has a gripping arm **290** extending longitudinally along arm portion **242** and a gripping arm **291** extending longitudinally along arm portion **243**. Gripping arms **290**, **291** meet at arm intersection portion **284** of locking member **238**. Gripping arms **290**, **291** may be transversely wider in sections closer to arm intersection portion **284** and narrower in sections closer to the ends of arm portions **242**, **243**. For example, gripping arms **290**, **291** may have beveled (i.e. ramping) edges as shown best in Figure 5C. Thus, as arm portions **242**, **243** are slid into their respective channels **236** of adjacent fastener-receivers **226**, the transverse protrusion of gripper **288** increases frictional and deformation forces acting between abutting surfaces of locking member **238** and fastener-receivers **226** and causes arm portions **242**, **243** to be wedged more snugly in channels **236** of fastener-receivers **226**. In the illustrated embodiment, gripping arms **290**, **291** extend along a partial length of arm portions **242**, **243**, stopping short of outer ends **242a**, **243a** of arm portions **242**, **243**, so that initially, as arm portions **242**, **243** are slid into channels **236**, arm portions **242**, **243** are met with no resistance from gripping arms **290**, **291**. The "wedging" of arm portions **242**, **243** in channels **236** may begin when arm portions **242**, **243** are inserted a sufficient distance into channels **236** so that gripping arms **290**, **291** begin to contact locking sides **234**. The transverse protrusion of gripping arms **290**, **291** may increase toward arm intersection portion **284** to increase the frictional and deformation forces as arm portions **242**, **243** approach their fully inserted positions in channels **236**.

[0042] In some embodiments, a gripper **288** is provided on only one surface of arm portions **242**, **243** (i.e. the surface facing toward fastener-receiver **226**). However, in

the illustrated embodiment, a gripper **288** is provided on each of the opposed surfaces of arm portions **242**, **243** so that one of grippers **288** engages with locking side **234** regardless of which of the surfaces of arm portions **242**, **243** is facing fastener-receiver **226** as locking member **238** is inserted in channel **236**.

[0043] In other embodiments, gripper **288** may have a different shape. For example, gripper **288** may generally comprise a plurality of transversely extending protrusions on arm portions **242**, **243** for engaging with locking sides **234** of adjacent fastener-receivers **226**. To increase the frictional and deformation forces as arm portions **242**, **243** approach their fully inserted positions in respective channels **236** of adjacent fastener-receivers **226**, there may be more and/or larger protrusions of gripper **288** at locations closer to arm intersection portion **284**. Likewise, to facilitate the initial part of the insertion of arm portions **242**, **243** into channels **236** of adjacent fastener-receivers **226**, there may be less and/or smaller protrusions of gripper **288** at locations away from arm intersection portion **284**. In still other embodiments, instead of or in addition to gripper **288**, arm portions **242**, **243** may be shaped to have an increased transverse dimension toward arm intersection portion **284** to increase the frictional and deformation forces as arm portions **242**, **243** approach their fully inserted positions in respective channels **236** of adjacent fastener-receivers **226**.

[0044] In some embodiments, two or more fastener-receivers **226** may be longitudinally connected together to form one fastener-receiver **226** for connecting to panels **206** of frame members **204**. Figure 5D shows two fastener-receivers **226G**, **226H** longitudinally connected together to form one fastener-receiver **226**. An end edge portion **263** of fastener-receiver **226G** abuts against an end edge portion **264** of fastener-receiver **226H**. In the illustrated embodiment, fastener-receivers **226G**, **226H** may be retained in an abutting relationship by a locking member **238'**. Locking member **238'** may be inserted in channels **236** at one or both of sides **234** of adjacent fastener-receivers **226G**, **226H** to span the connection between edge portions **263**, **264**. Locking member **238'** includes similar features to those of locking member **238**, except that locking member **238'** is generally shaped as an elongate piece having opposed arms **242'**, **243'**.

[0045] Fastener-receiver **226** has a longitudinally extending first mounting side **244** (oriented generally perpendicularly to sides **234** and facing toward panel **206**). First mounting side **244** comprises connector components **245** that are complementary to connector components **230** on panels **206** of frame members **204**. In the illustrated

embodiment of Figures 4A and 4B, frame member **204** has four spaced apart of connector components **230** (i.e. **230A-B; 230C-D; 230E-F; 230G-H**). The spacing between pairs of connector components **230A-B; 230C-D; 230E-F; 230G-H** may be equal to accommodate the mounting of either a single fastener-receiving frame **251** or two parallel fastener-receiving frames **251**. If two fastener-receiving frames **251** are to be mounted, female C-shaped connector components **245** of fastener-receivers **226** comprising the first fastener-receiving frame **251** may be connected to male T-shaped connector components **230E-F** and **230A-B** on frame member **204** and female C-shaped connector components **245** of fastener-receivers **226** comprising the second fastener-receiving frame **251** may be connected to male T-shaped connector components **230C-D** and **230G-H** on frame member **204** (Figure 4A). If only a single fastener-receiving frame **251** is to be mounted (not shown), female C-shaped connector components **245** of fastener-receivers **226** may be connected to male T-shaped connector components **230A-B** and **230C-D** on frame member **204** (for a centrally located fastener receiver **226**) or to either of the pairs of connector components **230E-F** and **230A-B** or **230C-D** and **230G-H** (for a fastener receiver **226** located relatively close to one side of buck **200**).

[0046] In the illustrated embodiment of Figure 4A, two fastener-receivers **226'**, **226"** (forming two fastener-receiving frames **251** mounted in parallel around buck **200**) are connected to connector components **230** on panels **206** of frame members **204**. A male T-shaped connector component **230E-F** on first side **220** of frame member **204** slides into a corresponding receptacle of female C-shaped connector components **245** at edge **246A** of first mounting side **244** of fastener-receiver **226'**. Another male T-shaped connector component **230A-B** on first side **220** of frame member **204** slides into a corresponding receptacle of another female C-shaped connector components **245** at edge **246B** of first mounting side **244** of fastener-receiver **226'**. Similarly, a male T-shaped connector component **230C-D** on first side **220** of frame member **204** slides into a corresponding receptacle of female C-shaped connector component **245** at edge **246A** of first mounting side **244** of fastener-receiver **226"**. Another male T-shaped connector component **230G-H** on first side **220** of frame member **204** slides into a corresponding receptacle of another female C-shaped connector component **245** at edge **246B** of first mounting side **244** of fastener-receiver **226"**.

[0047] As seen in Figure 4A, a longitudinally extending ridge **294** protruding from first side **220** of panel **206** may be located midway between adjacent connector components **230** on panel **206**. Each ridge **294** is shaped for sliding into a corresponding

longitudinally extending groove **295** on first mounting side **244** of fastener-receiver **226**. Ridges **294** may have several functions, including, for example:

- acting as an additional connection component to connect fastener-receiver **226** to frame member **204**;
- increasing the contacting surface area between first side **220** of panel **206** and first mounting side **244** of fastener-receiver **226** (thereby helping fastener-receiver **226** to be more securely retained on panel **206**); and
- serving as an indicator of the position of fastener-receivers **226** on panel **206**. The indicators may be used to guide the proper alignment of the window, door or other component mounted within opening **201** and the locations at which fasteners may be inserted. For example, in the illustrated embodiment of Figure 4A, to ensure that a fastener is inserted into fastener-receivers **226'**, **226"**, one or more fasteners may be inserted perpendicularly to panel **206** and into ridge **294** located between connector components **230E-F** and **230A-B**. Other fastener(s) may be inserted perpendicularly to panel **206** and into ridge **294** located between connector components **230C-D** and **230G-H**.

[0048] In some embodiments, first mounting side **244** of fastener-receiver **226** may have ridges, bumps or other outward protrusions, or have a convex curved surface, for more securely retaining fastener-receiver **226** to panel **206** of frame member **204**. When fastener-receiver **226** is slidably connected to connector components **230** on panel **206** of frame member **204**, the protrusions or curvature on first mounting side **244** of fastener-receiver **226** may result in deformation of first mounting side **244** and corresponding restorative and frictional forces acting between first mounting side **244** of fastener-receiver **226** and first side **220** of panel **206**.

[0049] In the illustrated embodiment, fastener-receivers **226** may be connected to panels **206** of buck **200** and to one another by way of connector components **230**, **245** and locking members **238** described above, to form one or more fastener-receiving frames **251** mounted at least partially around a perimeter of buck **200**. In other embodiments, fastener-receivers **226** may be connected to panels **206** of buck **200** in other suitable ways to form one or more fastener-receiving frames **251** around buck **200**.

[0050] Fastener-receiving frame **251** provides stability and rigidity to buck **200**, and also to frame **128**. Fastener-receiving frame **251** also provides a structure for receiving and anchoring fasteners (e.g. screws, nails, etc.) used to mount a window, door or

other building component within the opening **201** defined by buck **200**. To avoid the difficulties associated with anchoring fasteners into cured concrete, fastener-receiving frame **251** preferably has a sufficient depth **D** (Figure 5A) to accommodate the length of the fasteners used, so that the fasteners do not extend past fastener-receiving frame **251** into the concrete surrounding buck **200**. The depth **D** of fastener-receivers **226** may be relatively deep for larger openings **201** and for mounting correspondingly larger windows, doors, or the like.

[0051] Fastener-receivers **226** may comprise one or more longitudinally extruded internal fastener-retaining members **231**, which along with outer mounting sides **244**, **248** define a plurality of chambers **235** therebetween (Figures 4A and 5A). Chambers **235** may act as a thermally insulating barrier between the concrete and the window, door or other component mounted within buck **200**. Fastener-retaining members **231** add to the structural strength of fastener-receivers **226**. Fastener-retaining members **231** also provide additional mounting walls for more securely anchoring fasteners which are received in fastener-receivers **226**. For example, a fastener may project through, and thereby be anchored to, first mounting side **244** and one or more fastener-retaining members **231**. The end of the fastener may project into one of chambers **235**.

[0052] If desired, two or more fastener-receivers **226** may be stacked and coupled together to form a fastener-receiving frame **251** having a greater total depth **D'** (Figure 5B). This may be desirable where the fasteners used to mount the window or door within buck **200** are longer than a depth **D** of a single fastener-receiver **226** (for example, as may be desirable to mount heavier doors and windows). To enable fastener-receivers **226** to be stacked and coupled together, each fastener-receiver **226** incorporates a longitudinally extending second mounting side **248** (oriented perpendicularly to sides **234** and facing away from panel **206**) which may be provided with connector components **250**. Connector components **250** are complementary to connector components **245** on first mounting side **244** of another fastener-receiver **226**. As shown in Figure 5B, two fastener-receivers **226C**, **226E** may be coupled together by slidably connecting connector components **250** of one fastener-receiver **226C** to connector components **245** of the other fastener-receiver **226E**, forming a fastener-receiving unit **252** having a total depth **D'**. In the illustrated embodiment, male T-shaped connector component **250A-B** at edge **253A** of second mounting side **248** of fastener-receiver **226C** slides into the corresponding receptacle of female C-shaped connector components **245** at edge **246A** of first mounting side **244** of fastener-

receiver **226E**. Likewise, male T-shaped connector component **250C-D** at edge **253B** of second mounting side **248** of fastener-receiver **226C** slides into the corresponding receptacle of another female C-shaped connector component **245** at edge **246B** of first mounting side **244** of fastener-receiver **226E**.

[0053] In some embodiments, fastener-receivers **226** may be adapted to act as a holder or receiver of suitable insulating and/or reinforcing material for providing insulation and/or structural reinforcement to buck **200** and form **128**. For example, fastener-receivers **226** may have a space between opposed sides **234** for receiving a foam insulating material. Additionally or alternately, a reinforcing strip may be secured between opposed sides **234** or to second mounting side **248** of fastener-receiver **226**.

[0054] Buck **200** may incorporate a locking means for connecting edge-adjacent panel flanges **208** of adjacent frame members **204**. In the illustrated embodiment, as seen in Figure 4A, a channel **276** is provided on each of panel flanges **208A**, **208B**. Channel **276** may be similar to channel **236** of fastener-receiver **226** and may receive a locking member **238**. Channel **276** is defined by inward surface **213** of flange **208** and locking flanges **278A**, **278B** (collectively, locking flanges **278**) which project transversely from inward surface **213** and toward one another. A optional ridge **254**, projecting transversely from inward surface **213** may extend longitudinally between locking flanges **278A**, **278B**. Locking member **238** (as shown in Figure 5C) may be inserted in channels **276** to connect edge-adjacent panel flanges **208** in a similar fashion as described above with respect to insertion of locking member **238** into channels **236** to connect adjacent fastener-receivers **226**. In particular, arm portions **242**, **243** of locking member **238** may be inserted into respective channels **276** of edge-adjacent panel flanges **208**. As arm portions **242**, **243** are slid into channels **276**, the transverse protrusion of gripper **288** on arm portions **242**, **243**, combined with the transverse protrusion of ridge **254** on inward surface **213** of panel flanges **208**, results in frictional and restorative deformation forces acting between the surfaces of locking member **238** and panel flanges **208**. Locking member **238** is thereby wedged snugly in channels **276** of edge-adjacent panel flanges **208**, and retains edge-adjacent panel flanges **208** in an abutting relationship.

[0055] Locking flanges **278** may also provide a drainage conduit for collecting and carrying away moisture that is received in channel **276** between the surfaces of channel **276** and locking member **238**. For example, moisture received in channel **276** of panel flange **208A** of frame member **204D** may be collected by locking flange **278B** and

allowed to drain out a lower end of locking flange **278B**, at miter joint **212** between frame members **204C** and **204D** (Figure 3).

[0056] In the illustrated embodiment, as seen in Figures 4A and 4B, frame members **204** include drainage channels **209A, 209B** (collectively drainage channels **209**) between panel **206** and flanges **208**. Drainage channels **209A**, **209B** extend along edges **207A**, **207B** respectively, for collecting and carrying away moisture which may be received on first sides **220** of panels **206**, or between inward surfaces **213** of flanges **208** and outward surfaces **131B** of panels **130**. In the illustrated embodiment, drainage channels **209** protrude generally outwardly toward an exterior of form **128** to help collect moisture and transport it away from flanges **208** and panels **206**. When buck **200** is assembled, drainage channels **209A** are in communication with one another to provide a continuous drainage circuit extending around frame **211A** formed by flanges **208A** and similarly, drainage channels **209B** are in communication with one another to provide a continuous drainage circuit extending around frame **211B** formed by flanges **208B**. As a result, water which collects in drainage channel **209A** of top frame member **204A**, for example, may be carried toward either of drainage channels **209A** of side frame members **204B**, **204D**, and subsequently drained at a lower end of drainage channels **209A** of frame members **204B** or **204D**.

[0057] In the illustrated embodiment, as best seen in Figure 4B, the terminal longitudinal edge portions **255A**, **255B** of flanges **208** may curl toward each other. The shape of edge portions **255A**, **255B** may have one or more of the following functions:

- providing a drainage gap between flanges **208** and outer surfaces **131B** of panels **130**; and
- providing a repository for the placement of sealant, caulk and/or other soft materials between flanges **208** and outer surfaces **131B** of panels **130**, for forming a seal which is impermeable to water, debris, dust, etc.

[0058] In operation, form **128** may be used to fabricate a building structure by slidably connecting connector components **133** of edge-adjacent panels **130** to connector components **134** on support members **136** to make connections **150** between edge-adjacent panels **130**. If it is desired to include tensioning members **140**, tensioning members **140** may be attached between connector components **143** on support members **136** and connector components **138** on panels **130**. Panels **130** and support members **136** may generally be connected to one another in any orientation. Panels

130, connector components **138** and optional tensioning members **140** may be assembled in place or may be pre-assembled and placed in a desired orientation (e.g. vertical) after such assembly.

[0059] Buck **200** may be completely assembled from its various components (frame members **204**, fastener-receivers **226** and locking members **238**) while positioning buck **200** in cell **202** of form **128** or prior to positioning buck **200** in cell **202** of form **128**. Buck **200** may be assembled by slidably connecting connector components **245** on fastener-receivers **226** to connector components **230** on frame members **204**. One of arm portions **242**, **243** of a locking member **238** may be inserted in a channel **236** of a fastener-receiver **226**. The other one of arm portions **242** and **243** of locking member **238** may be inserted in a channel **236** of an edge-adjacent fastener-receiver **226**, thereby connecting together edge-adjacent fastener-receivers **226**. Similarly, one of arm portions **242, 243** of a locking member **238** may be inserted in a channel **276** of a panel flange **208** of a frame member **204**. The other one of arm portions **242, 243** of locking member **238** may be inserted in a channel **276** of an edge-adjacent panel flange **208** of an adjacent frame member **204**, thereby connecting together edge-adjacent panel flanges **208** of adjacent frame members **204**.

[0060] In the illustrated embodiment of Figures 1 and 2, panels **130**, support members **136** and tensioning members **140** within cell **202** have upper and lower parts, the upper parts of which extend downwardly to meet panel **206** of top frame member **204A** and the lower parts of which extend upwardly to meet panel **206** of bottom frame member **204C**. The upper parts are referenced as panels **130'**, support members **136'**, and tensioning members **140'**, and the lower parts (not all of which are visible in the illustrated views) are referenced as panels **130"**, support members **136"** and tensioning members **140"**. As seen in Figure 7A, prior to inserting buck **200** in cell **202**, lower panels **130"**, lower support members **136"** lower tensioning members **140"** may be assembled and positioned in cell **202** (i.e. connector components **133** on panels **130"** may be slidably connected to connector components **134** on support members **136"** and tensioning members **140** may be attached between connector components **143** on support members **136"** and connector components **138** on panels **130"**).

[0061] Buck **200** may then be slid downwardly into cell **202** so that inward surfaces **213** of flanges **208** of bottom frame member **204C** abut outside surfaces **131B** of lower panels **130"**, and panel **206** of bottom frame member **204C** abuts the upper edges of lower panels **130"**, lower support members **136"** and lower tensioning

members **140"** (Figure 7B). As buck **200** is placed into cell **202**, flanges **208** of side frame members **204B**, **204D** may slide over the panels **130** adjacent (e.g. on the sides of) cell **202** and panels **206** of side frame members **204B**, **204D** may abut against the inside edges of the panels **130** adjacent cell **202**. In the illustrated embodiment, male T-shaped connector components **280** on panels **206** of side frame members **204B**, **204D** (Figure 4B) are slidably received within the receptacles of female C-shaped terminal connector components **133** on the panels **130** adjacent cell **202** (see Figure 7B). That is, male T-shaped connector components **280** of side frame members **204B**, **204D** take the place of male T-shaped connector components **134** of support members **136** which would otherwise connect to female C-shaped terminal connector components **133** on the panels **130** adjacent cell **202** (see Figure 7A). In this manner, buck **200** (via side frame members **204B**, **204D**) is securely coupled to form **128**.

[0062] In some embodiments, optional tensioning members **140** are also used to couple buck **200** to form **128**. If optional tensioning members **140** are used, male T-shaped connector components **270** on panels **206** of side frame members **204B**, **204D** (see Figure 4B) may be slidably received within the receptacles of female C-shaped connector components **141B** on tensioning members **140** (see Figures 2 and 7C). That is, male T-shaped connector components **270** of side frame members **204B**, **204D** take the place of male T-shaped connector components **143** of support members **136** which would otherwise connect to female C-shaped connector components **141B** of tensioning members **140** (see Figure 2). In this manner, optional tensioning members **140** help to secure buck **200** to form **128**.

[0063] Once buck **200** has been positioned in cell **202** as described above, form **128** may be completed by placing upper panels **130'**, upper support members **136'** and optional upper tensioning members **140'** into their positions above buck **200** (Figure 7C). Upper panels **130'**, upper support members **136'** and upper tensioning members **140'** may be connected with the components of cell **202** in a similar fashion as for lower panels **130"**, lower support members **136"** and lower tensioning members **140"**. When upper panels **130'**, upper support members **136'** and upper tensioning members **140'** are installed, inward surfaces **213** of flanges **208** of top frame member **204A** abut outside surfaces **131B** of upper panels **130'**, and panel **206** of top frame member **204A** may abut against the lower edges of upper panels **130'**, upper support members **136'** and upper tensioning members **140'**.

[0064] If necessary or otherwise desired, transversely extending rebar and/or vertically extending rebar may be inserted in form **128**, before and/or after the coupling of buck **200** to form **128**. Where form **128** and buck **200** are oriented as shown in the illustrated embodiment, rebar (not shown) may extend horizontally through apertures in support members **136** and optional tensioning members **140**. Vertically extending rebar can then be coupled to the horizontally extending rebar, if desired. After the optional insertion of rebar, liquid concrete is introduced into form **128**. When the liquid concrete cures, the result is a structure that has two of its surfaces covered by panels **130** of form **128**, and that has an opening **201** therethrough defined by buck **200**. Any "extraneous" connector components within the form which are not connected with other connector components (e.g. connector components **270** and **280** on top and bottom frame members **204A**, **204C**, and additional connector components **230** which are not being used for connecting to fastener-receivers **226**) may serve as anchoring means to help secure the concrete to buck **200**.

[0065] Figure 6A illustrates a buck **300** according to another embodiment of the invention. Buck **300** includes frame members **304** (Figures 6B and 6C) which, as in buck **200**, may be arranged in an abutting relationship to define a substantially rectangular opening **301**. Frame members **304** are similar in many respects to frame members **204** of buck **200**, and similar reference numerals are used to refer to the similar features of frame members **304**, except that features of frame members **304** are preceded by the leading digit "3" and features of frame members **204** are preceded by the leading digit "2".

[0066] As can be seed by comparing Figures 4B and 6C, frame member **304** has a lower number of connector components **330** on first side **320** of panel **306**. Frame member **304** may also have a smaller transverse dimension **W** relative to frame member **204**, although this is not necessary. In the illustrated embodiment, frame member **304** has a set of connector components **330** (comprising connector components **330A**, **330B**, **330C** and **330D**) for slidable mounting of a fastener-receiver **326** (Figure 6A) to form a single fastener-receiving frame **351**. By contrast, frame member **204** has a sufficient number of connector components **230** for mounting two fastener-receivers **226** side-by-side to form two fastener-receiving frames **251** in parallel. Like frame member **204**, however, frame member **304** has a set of connector components **370** for slidable connection to connector components **141B** on optional tensioning members **140**, and a set of connector components **380** for slidable connection to connector components **133** on panels **130**.

[0067] Figures 8A and 8B illustrate a frame member **404** according to another embodiment of the invention. Figure 8A is a partial perspective view of frame member **404** with fastener-receivers **426** mounted thereto, and Figure 8B is a side plan view of frame member **404** without fastener-receivers **426** mounted thereto. Frame members **404** and fastener-receivers **426** are similar in many respects to frame members **204** and fastener-receivers **226** of buck **200**, and similar reference numerals are used to refer to the similar features, except that features of frame members **404** and fastener-receivers **426** are preceded by the leading digit "4" and features of frame members **204** and fastener-receivers **226** are preceded by the leading digit "2".

[0068] Frame member **404** has a similar shape to frame member **204**, and includes similar features such as panel flanges **408A**, **408B** (collectively, panel flanges **408**), connector components **430**, **470** and **480**. However, unlike frame member **204** which may be formed as one integral piece, frame member **404** is formed of a plurality of interconnected components. In the illustrated embodiment of Figures 8A and 8B, frame member **404** comprises a central component **415** and opposed L-shaped components **416A**, **416B** (collectively, L-shaped components **416**) respectively abutting opposing edges **418** of central component **415**.

[0069] As seen in Figure 8A, a fastener-receiver **426'** may be used to connect central component **415** to L-shaped component **416A**, and another fastener-receiver **426"** may be used to connect central component **415** to L-shaped component **416B**. Each fastener-receiver **426'**, **426"** spans an abutment between an edge **418** of central component **415** and an adjacent edge **419** of L-shaped component **416**. A male T-shaped connector component **430E-F** on first side **420** of L-shaped component **416A** slides into a corresponding receptacle of female C-shaped connector component **445** at edge **446A** of first mounting side **444** of a fastener-receiver **426'**. A male T-shaped connector components **430A-B** on first side **420** of central component **415** slides into a corresponding receptacle of another female C-shaped connector component **445** at edge **446B** of first mounting side **444** of fastener-receiver **426'**. Similarly, a male T-shaped connector component **430C-D** on first side **420** of central component **415** slides into a corresponding receptacle of female C-shaped connector component **445** at edge **446A** of first mounting side **444** of fastener-receiver **426"**, and a male T-shaped connector component **430G-H** on first side **420** of L-shaped component **416B** slides into a corresponding receptacle of another female C-shaped connector component **445** at edge **446B** of first mounting side **444** of fastener-receiver **426"**. Connector

components **430A-B**, **430C-D**, **430E-F** and **430G-H** may be referred to collectively as connector components **430**. When central component **415** and L-shaped components **416** are arranged in an abutting relationship, adjacent J-shaped connector components **461** along each of edges **418**, **419** meet to form a T-shaped portion at connection **417** (Figure 8C). Fastener-receivers **426** comprise foot portions **462** which abut against first side **420** of panel **406** in the regions between T-shaped connector components **430** and J-shaped connector components **461**.

[0070] Central component **415** and L-shaped components **416** may be connected as described above to form a frame member **404** having a multi-component panel **406** with a total transverse dimension **W** (Figure 8B). As with frame members **204**, frame member **404** may be arranged with other like frame members **404** to form a buck **400** for mounting in cell **202** of a form **128**.

[0071] The spacing between central component **415** and L-shaped components **416** may be adjusted to accommodate finer variations in the transverse dimension of form **128**. For example, frame member **404** of the illustrated Figure 8D embodiment has a slightly greater transverse dimension **W** than that of frame member **404** of the illustrated Figure 8C embodiment. In the Figure 8C embodiment, central component **415** and L-shaped components **416** are arranged so that J-shaped components **461** along each of edges **418**, **419** abut one another. By contrast, in the Figure 8D embodiment, L-shaped component **416A** is spaced apart from central component **415** in the transverse dimension, leaving a gap **421** between J-shaped connector component **461** at edge **419** of L-shaped component **416A** and J-shaped connector component **461** at adjacent edge **418** of central component **415**. To connect L-shaped component **416A** with central component **415**, J-shaped connector component **461** at edge **419** of L-shaped component **416A** slides into female C-shaped connector components **445** at edge **446A** of first mounting side **444** of fastener-receiver **426'**. Male T-shaped connector component **430A-B** on first side **420** of central component **415** slides into a corresponding receptacle of female C-shaped connector component **445** at edge **446B** of first mounting side **444** of fastener-receiver **426'**. Male T-shaped connector component **430E-F** remains unconnected. Fastener-receiver **426'** has a foot portion **462** proximate to edge **446A** which is positioned in the gap **421** between J-shaped components **461** of L-shaped component **416** and central component **415**.

[0072] If desired, the spacing between central component **415** and L-shaped component **416B** may be adjusted in a similar fashion as described above for central component **415** and L-shaped component **416A**. If desired, central component **415**

may additionally or alternatively be offset in a similar manner. For example, J-shaped connector component **461** on edge **418** of central component **415** may be connected to female C-shaped connector component **445** at edge **446B** of first mounting side **444** of fastener-receiver **426'**.

[0073] An advantage provided by the Figure 8 embodiment is increased flexibility in adapting frame member **404** for use with forms **128** of various transverse dimensions. For example, central component **415** and/or L-shaped components **416** may be formed or cut to have a certain transverse dimension such that the overall transverse dimension **W** of the assembled frame member **404** corresponds with a transverse distance between opposed panels **130A**, **130B** of cell **202** of form **128**. In other embodiments, two or more central components **415** may be arranged in an edge to edge relationship between L-shaped components **416** to form a frame member **404** having an increased transverse dimension **W**. In still other embodiments, the spacing between central component **415** and L-shaped components **416** may be adjusted, such as in the manner described above with reference to Figure 8D, to adjust the transverse dimension **W** of frame member **404** in smaller increments. Frame member **404** may thereby be adapted for use with a form **128** of any suitable transverse dimension. In some embodiments, frame member **404** may be adjusted in the field to accommodate a form **128** having a transverse dimension between 4" and 24", for example. Moreover, the assembly of frame member **404** from central component **415** and L-shaped components **416** allows for more compact nesting or stacking of the components of buck **400**, which facilitates packaging and delivery of the components of buck **400**.

[0074] It is not necessary that fastener-receivers **426** be used to connect central component **415** with L-shaped components **416** as shown in Figure 8A. Other suitable means of connecting the components may be used. For example, clips or other fastening devices may be used to connect central component **415** with L-shaped components **416**. Such clips or other fastening devices may (but need not) have a profile similar to the lower (in the illustrated views) profile of fastener receivers **426** – i.e. incorporating features such as connector components **445** and foot portions **462**. In other embodiments, central components **415** and L-shaped components **416** may be provided or formed with interconnecting components at adjacent edges **418**, **419** – i.e. such that central components **415** and L-shaped components **416** connect directly to one another without the assistance of a third component. It is also not necessary that L-shaped components **416** be connected to a central component **415** to form frame member **404**. In some embodiments, central component **415** may be omitted, and L-shaped components **416** may be connected together to form frame member **404**.

[0075] Figure 9A illustrates a buck **500** according to another embodiment of the invention. Buck **500** is similar in many respects to buck **200**, and similar reference numerals are used to refer to the similar features, except that features and components of buck **500** are preceded by the leading digit "5" and features and components of buck **200** are preceded by the leading digit "2". Frame members **504** of buck **500** have a similar shape to frame members **204** of buck **200**, and include similar features such as panel flanges **508A**, **508B** (collectively, panel flanges **508**), and connector components **530**. Also, frame members **504** may include connector components **570**, **580**, ridges **594**, drainage channels **509**, and other features similar to those of frame members **204**. As with frame members **204**, frame members **504** may be arranged to form a buck **500** for mounting in cell **202** of a form **128**. However, unlike frame members **204** which may be formed as one integral piece, each frame member **504** is formed of a plurality of components which are connected in an edge to edge relationship. In the illustrated embodiment, each frame member **504** comprises a central frame component **523** (Figure 9C) and a pair of opposed corner frame components **521** (Figure 9B) arranged at opposing edges of central frame component **523**. Each of corner frame components **521** and central frame component **523** has a transverse dimension **W** sized to span a transverse distance between opposed panels **130A**, **130B** of form **128**.

[0076] As seen in Figure 9B, each corner frame component **521** comprises a panel **506'** and a pair of panel flanges **508A'**, **508B'** (collectively, panel flanges **508'**) extending from opposed longitudinally extending edges **507A'**, **507B'** (collectively, edges **507'**) of panel **506'**. Each flange **508'** may be fabricated with, or cut to provide, a pair of mitered end edges **510**, each of which abuts against, and forms a miter joint **512** with, a corresponding mitered end edge **510** of flange **508'** of an adjacent corner frame component **521** of an adjacent frame member **504**.

[0077] As best seen in Figure 9C, central frame component **523** comprises a panel **506"** and a pair of panel flanges **508A"**, **508B"** (collectively, panel flanges **508"**) extending from opposed longitudinally extending edges **507A"**, **507B"** (collectively, edges **507"**) of panel **506"**. When central frame component **523** is arranged between a pair of opposed corner frame components **521** as shown in Figure 9A, panel **506"** and panel flanges **508"** of central frame component **523** align with, and provide a longitudinal extension of, corresponding panel **506'** and panel flanges **508'** of opposed corner frame components **521**.

[0078] Central frame component **523** and a pair of opposed corner frame components **521** collectively form each of frame members **504**. Panels **506'** and **506"** collectively form panel **506** of frame member **504**. Panel flanges **508A'**, **508B'** and **508A"**, **508B"** collectively form panel flanges **508A**, **508B**, respectively, of frame member **504.**

[0079] Corner frame components **521** and central frame component **523** may be connected together by one or more fastener-receivers **526** which are connected to connector components **530'** on corner frame components **521** and connector components **530"** on central frame component **523**. When central frame component **523** is arranged between a pair of opposed corner frame components **521** as shown in Figure 9A, connector components **530"** on central frame component **523** are aligned with corresponding connector components **530'** on opposed corner frame components **521**. Connector components **530'** and **530"** collectively form connector components **530** on frame member **504**. Connector components **530** on frame member **504** are complementary to connector components **545** on fastener-receivers **526**.

[0080] As shown in Figures 9B and 9C, corner frame components **521** and central frame component **523** may have additional connector components. These may include:

- connector components **570'** on corner frame components **521** and connector components **570"** on central frame component **523** (collectively forming connector components **570** on frame member **504**) for connecting to complementary connector components **141B** on optional tensioning members **140**; and
- connector components **580'** on corner frame components **521** and connector components **580"** on central frame component **523** (collectively forming connector components **580** on frame member **504**) for connecting to complementary connector components **143** on support members **136**.

[0081] Corner frame components **521** and central frame component **523** may also be connected together by locking means provided on panel flanges **508'**, **508"**. Such locking means may be similar to those described for buck **200**. A channel **576'**, **576"** may be provided on panel flanges **508'**, **508"**, respectively, for receiving one leg of a locking member **538**. On panel flanges **508'**, channel **576'** is defined by side **513'** and locking flanges **578A'**, **578B'** (collectively, locking flanges **578'**) which project transversely from side **513'** and toward one another. Similarly, on panel flanges **508"**, channel **576"** is defined by side **513"** and locking flanges **578A"**, **578B"** (collectively, locking flanges **578"**) which project transversely from side **513"** and toward one another. When central frame component **523** is arranged between a pair of opposed

corner frame components **521** as shown in Figure 9A, channel **576"** on central frame component **523** is aligned with each channel **576'** on opposed corner frame components **521**. Channels **576'** and **576"** collectively form channel **576** on frame member **504**. The legs of L-shaped locking member **538** may be inserted in channels **576** of adjacent panel flanges **508** of adjacent frame members **504** (Figure 9A) to connect together edge-adjacent corner frame components **521** and central frame components **523** at each corner of buck **500**.

[0082] An advantage provided by the Figure 9 embodiment is increased flexibility in adapting frame member **504** for use to define openings **201** of various dimensions. For example, central frame component **523** and/or corner frame components **521** may be formed or cut to have a certain longitudinal dimension such that the overall longitudinal dimension **L** of frame member **504** is of the desired dimension for the corresponding side of opening **201**. Cutting central frame component **523** at right angles may be easier than cutting a miter joint. Corner frame components **521** may be provided as standard components which are prefabricated with their miter surfaces and need not be cut. Moreover, the assembly of frame member **504** from its various components as described herein allows for more compact nesting or stacking of the components of buck **500**, which facilitates packaging and delivery of the components of buck **500**.

[0083] Figure 10A is a partial perspective view of a buck **600** according to another embodiment of the invention. Buck **600** is similar in many respects to buck **200**, and similar reference numerals are used to refer to the similar features, except that features and components of buck **600** are preceded by the leading digit "6" and features and components of buck **200** are preceded by the leading digit "2". Like frame member **204** of buck **200**, frame member **604** of buck **600** has a rectangular panel **606** and a pair of panel flanges **608A**, **608B** (collectively, panel flanges **608**) extending from opposed longitudinally extending edges **607A**, **607B** (collectively, edges **607**) of panel **606**. However, unlike panel flanges **208** of frame member **204** which have mitered end edges **210**, each panel flange **608** is fabricated to be generally rectangular in shape. A rectangular corner piece **649** is arranged at each corner of buck **600** between adjacent frame members **604**. Edges **656** of corner pieces **649** (Figure 10B) abut against edges **610** of adjacent panel flanges **608** (Figure 10A), so that corner pieces **649** and flanges **608** collectively form frames **611** for abutting against outer surfaces **131B** of panels **130A**, **130B** of form **128**.

[0084] A locking member **638** (having similar features to locking member **238**) may be used to connect corner piece **649** to adjacent panel flanges **608**. Locking member **638** may be fastened to a corner piece **649** by bolts, screws or other means (Figure 10B). In other embodiments, locking members **238** may be integrally formed with corner pieces **649**. Arm portions **642**, **643** of locking member **638**, which extend past edges **656** of corner pieces **649**, may be inserted into respective channels **676** of adjacent panel flanges **608**. Frame members **604** and corner pieces **649** may thereby be assembled to form a buck **600** as shown in Figure 10A.

[0085] Corner piece **649** may be injection molded as a single piece, or assembled from separate components. For example corner piece **649** may be fabricated as a single rectangularly shaped component. In the illustrated embodiment of Figures 10A and 10B, however, corner piece **649** comprises two triangular members **657**, arranged in abutting relationship. Each triangular member **657** has a mitered edge **658** for abutment against a corresponding mitered edge **658** of an adjacent triangular member **657**. A pair of abutting triangular members **657** may be connected together by way of locking member **638** which is fastened to both triangular members **657**.

[0086] In other embodiments, triangular members **657** may be provided with channels **676'** which are similar to channels **676** of panel flanges **608**. Locking member **638** may be fastened to triangular members **657** by insertion of arm portions **642**, **643** of locking member **638** into respective channels **676'** of adjacent triangular members **657**.

[0087] While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations thereof. For example:

- The buck embodiments described herein may be adapted for use with plastic form-works having an arrangement of components (e.g. panels, support members, tensioning members, etc.) different than those which are described herein. The buck embodiments described herein may also be used or adapted for use with other types of form-works, such as, for example, wood or wood composite forms, insulated concrete forms and metal forms.
- In the illustrated embodiments, the arrangement of slidable connector components comprise C-shaped female connector components for slidably receiving complementary T-shaped male connector components. This is not necessary. In general, the arrangement of male and female slidable connector components may comprise any suitable complementary pairs of connector components. Also, the connector components need not slidably engage one

another and may be coupled to one another by pivotal motion or by deformation of one or both connector components or by any other suitable coupling technique.

- In the illustrated embodiments, each frame member **204** includes panel flanges **208A**, **208B** extending from opposed edges **207A**, **207B** of panel **206**. However, panel flanges are not necessary. In some embodiments, frame members **204** are formed without panel flanges **208A**, **208B**, and may be assembled to form a buck which does not have frames **211A**, **211B** for abutting against outer surfaces **131B** of panels **130A**, **130B**. If desired, panel flanges **208A**, **208B** of suitable dimensions may be provided as supplementary components which may later be connected in some suitable fashion to the buck or to the underlying concrete structure once it is formed.
- A plurality of bucks according to the embodiments described herein may be positioned in cell **202** of form **128** to define a plurality of building openings **201**. For example, a plurality of bucks **200** may be arranged at longitudinally spaced apart locations in cell **202** of form **128**. One or more fastener-receiving frames **251** may extend around all of the arranged bucks **200**. Alternately, each buck **200** may have a separate fastener-receiving frame **251** mounted thereto.
- In some embodiments, locking member **238** may be adjustable to accommodate different miter joints between adjacent fastener-receivers **226**, as may be necessary for connecting different polygonally-shaped bucks **200** (e.g. triangular, pentagonal, hexagonal, or octagonal-shaped bucks). For example, arm portions **242**, **243** of locking member **238** may be pivotally connected at arm intersection portion **284** so that an interior angle between arm portions **242**, **243** is adjustable.
- In some embodiments, it may be desirable to provide walls which incorporate insulation. Insulation may be provided in the form of rigid foam insulation or other suitable forms of insulation. Non-limiting examples of suitable materials for rigid foam insulation include: expanded poly-styrene, poly-urethane, poly-isocyanurate or any other suitable moisture resistant material. Insulation layers may be provided in any of the forms described herein. Such insulation layers may extend in the vertical direction and in the transverse direction. Such insulation layers may be located centrally within the wall (e.g. between adjacent connector components **143**) or at one side of the wall (e.g. between connector components **143** and one of form segments **124**, **125**). It will be appreciated that when fabricating walls using two-sided form **128**, such insulation may be added before the liquid concrete is placed in the form.

- In the embodiments described herein, the structural material used to fabricate the form segments is concrete. This is not necessary. In some applications, it may be desirable to use other structural materials (e.g. curable materials) which may initially be poured, sprayed or otherwise placed in the forms and may subsequently be cured to form structural building components.
- In the embodiments described above, the various features of panels **130** (e.g. connector components **133**), support members **136** (e.g. connector components **134, 143**) and tensioning members **140** (e.g. connector components **141A, 141B**) are substantially co-extensive with panels **130**, support members **136** and tensioning members **140** in the vertical dimension. This is not necessary. In some embodiments, such features may be located at various locations on the vertical (in the illustrated views) dimension of panels **130**, support members **136** and tensioning members **140** and may be absent at other locations on the vertical (in the illustrated views) dimension of panels **130**, support members **136** and tensioning members **140**. Forms incorporating any of the other panels described herein may comprise similarly dimensioned support members and/or tensioning members.
- In some embodiments, sound-proofing materials may be layered into the form-works described above or may be connected to attachment units.
- In some embodiments, the form-works described herein may be used to fabricate ceilings or floors of buildings or a variety of other structures. In general, the form-works described above are not limited to building structures and may be used to construct any suitable structures formed from concrete or similar materials. Non-limiting examples of such structures include transportation structures (e.g. bridge supports and freeway supports), beams, foundations, sidewalks, pipes, tanks, beams or the like.
- Structures (e.g. walls) fabricated according to the invention may have curvature. Where it is desired to provide a structure with a certain radius of curvature, panels on the inside of the curve may be provided with a shorter length than corresponding panels on the outside of the curve. This length difference will accommodate for the differences in the radii of curvature between the inside and outside of the curve. It will be appreciated that this length difference will depend on the thickness of the structure.
- In some embodiments, the frame members of the buck may have curved panels and panel flanges for forming building openings having curved sides. For example, curved frame members may be arranged with other like curved frame members to form a round building opening.

- In some embodiments, locking members are not required to connect adjacent fastener-receivers **226** to one another. Suitable fasteners (e.g. screws or the like extending through the miter joints) may be used to connect adjacent fastener-receivers **226**.
- Many embodiments and variations are described above. Those skilled in the art will appreciate that various aspects of any of the above-described embodiments may be incorporated into any of the other ones of the above-described embodiments by suitable modification.

While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations thereof. It is therefore intended that the following appended claims and claims hereafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations as are within their true spirit and scope.

WHAT IS CLAIMED IS:

1. A stay-in-place buck for placement in a form-work to define an opening in a cast structure of concrete or similar curable construction material, the buck comprising:

a plurality of frame members arrangeable in an edge abutting relationship to define the opening, each frame member comprising a panel shaped to extend transversely between outer opposed surfaces of the structure, the panel having opposed first and second sides respectively facing away from and toward the opening, opposed first and second longitudinal edges, and a transverse dimension between the first and second longitudinal edges which is substantially equal to a transverse distance between the outer opposed surfaces of the structure; and

a plurality of fastener-receivers connectable to the first sides of the panels to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck, the fastener-receiving frame comprising one or more fastener-retaining members for retaining fasteners which penetrate therethrough.

2. A buck according to claim 1 wherein each fastener-receiver extends along a longitudinal dimension of a first side of a panel of a corresponding frame member and comprises longitudinally opposed edge portions, each edge portion adapted for abutment against an adjacent edge portion of an adjacent fastener-receiver.

3. A buck according to claim 2 wherein the edge portions of each fastener-receiver are mitered.

4. A buck according to any one of claims 2 and 3 wherein each fastener-receiver comprises at least one longitudinally extending locking member-receiving channel.

5. A buck according to claim 4 wherein each fastener-receiver comprises:

opposed longitudinally extending locking sides oriented substantially perpendicularly to the first side of the panel of the corresponding frame member; and

a pair of opposed longitudinally extending locking flanges extending transversely from each locking side and toward one another to define the locking member-retaining channel.

6. A buck according to any one of claims 4 and 5 comprising one or more locking members, each locking member comprising: a first arm portion for insertion into a first locking member-retaining channel of a first fastener-receiver; and a second arm portion for insertion into a second locking member-retaining channel of a second fastener-receiver, the second fastener-receiver adjacent the first fastener-receiver.

7. A buck according to claim 6 wherein each locking member comprises a plurality of notches defined along opposed edges of the first arm portion and a plurality of notches defined along opposed edges of the second arm portion.

8. A buck according to any one of claims 6 and 7 wherein each locking member comprises one or more first apertures defined in the first arm portion for permitting one or more fasteners to extend therethrough and into the first fastener-receiver and one or more second apertures defined in the second arm portion for permitting one or more fasteners to extend therethrough and into the second fastener-receiver.

9. A buck according to any one of claims 6 to 8 wherein each locking member comprises:

one or more first grippers which extend away from the first arm portion for securing the first arm portion in the first locking member-retaining channel, the extension of the one or more first grippers away from the first arm portion being relatively small in a distal region extending relatively large distance into the first locking member-retaining channel and being relatively large in a proximate region extending a relatively small distance into the first locking member-retaining channel;

one or more second grippers which extend away from the second arm portion for securing the second arm portion in the second locking member-retaining channel, the extension of the one or more second grippers away from the second arm portion being relatively small in a distal region extending relatively large distance into the second locking member-retaining channel and being relatively large in a proximate region extending a relatively small distance into the second locking member-retaining channel.

10. A buck according to claim 5 comprising one or more locking members, each locking member comprising: a first arm portion for insertion into a first locking member-retaining channel of a first fastener-receiver; and a second arm portion for insertion into a second locking member-retaining channel of a second fastener-receiver, the second fastener-receiver adjacent the first fastener-receiver and wherein the first arm portion comprises one or more transversely extending grippers shaped for engagement with a locking side of the first fastener-receiver and the second arm portion comprises one or more transversely extending grippers shaped for engagement with a locking side of the second fastener-receiver.

11. A buck according to claim 10 wherein the first arm portion of each locking member comprises a first transversely extending gripper having a transverse dimension which decreases toward a distal end of the first arm portion, the distal end of the first arm portion extending relatively far into the first locking member-retaining channel, and the second arm portion of each locking member comprises a second transversely extending gripper having a transverse dimension which decreases toward a distal end of the second arm portion, the distal end of the second arm portion extending relatively far into the second locking member-retaining channel.

12. A buck according to any one of claims 2 to 11 wherein each fastener-receiver comprises a longitudinally extending first mounting side oriented substantially parallel to the first side of the panel of the corresponding frame member, the first mounting side comprising a first set of one or more connector components complementary to one or more connector components on the first side of the panel of the corresponding frame member for connection of the fastener-receiver to the frame member.

13. A buck according to claim 12 wherein each fastener-receiver comprises a longitudinally extending second mounting side opposing the first mounting side, the second mounting side comprising a second set of one or more connector components complementary to one or more connector components on the first mounting sides of other fastener-receivers for stackably coupling two or more fastener-receivers together.

14. A buck according to any one of claims 12 to 13 wherein the first set of connector components on the first mounting side of each fastener-receiver and

the complementary connector components on the first side of the panel of each frame member comprise one or more of: male connector components which are slidably receivable in corresponding female connector components; and male connector components which are receivable in corresponding female connector components after deformation of one or both of the male and female connector components and which are lockable in a connected configuration by restorative deformation forces.

15. A buck according to claim 2 wherein the first side of the panel of each frame member has two or more transversely spaced apart sets of connector components for connection thereto of two or more transversely spaced apart fastener-receivers, for forming two or more parallel fastener-receiving frames extending at least partially about a perimeter of the buck.

16. A buck according to any one of claims 1 to 15 wherein the one or more fastener-retaining members of each fastener-receiver define one or more chambers within the fastener-receiver.

17. A buck according to any one of claims 1 to 16 wherein the frame members comprise opposing top and bottom frame members and a pair of opposing side frame members.

18. A buck according to claim 17 wherein the form-work is a stay-in-place form-work and wherein the first side of the panel of each of the side frame members comprises a set of one or more form-work-connecting connector components for connection to one or more complementary connector components on outer panels of the stay-in-place form-work.

19. A buck according to claim 18 wherein the first side of the panel of each of the side frame members comprises a set of one or more tensioning-member-connecting connector components for connection to one or more complementary connector components on tensioning members extending angularly between the outer panels and transversely extending support members of the stay-in-place form-work.

20. A buck according to any one of claims 18 to 19 wherein the set of form-work-connecting connector components are located proximate each of the longitudinally extending edges of the first side of the panel of each side frame

member for connection with the complementary connector components on the outer panels at vertically extending edges of the outer panels of the stay-in-place form-work, the vertically extending edge proximate to the opening.

21. A buck according to claim 20 wherein the set of form-work-connecting connector components and the complementary connector components on the outer panels comprise one or more of: male connector components which are slidably receivable in corresponding female connector components; and male connector components which are receivable in corresponding female connector components after deformation of one or both of the male and female connector components and which are lockable in a connected configuration by restorative deformation forces.

22. A buck according to claim 19 wherein the set of tensioning-member-connecting connector components spaced apart transversely from the set of form-work-connecting connector components for connection with the complementary connector components on tensioning members at vertically extending edges of the tensioning members of the stay-in-place form-work.

23. A buck according to claim 22 wherein the set of tensioning-member-connecting connector components and the complementary connector components on the tensioning members comprise one or more of: male connector components which are slidably receivable in corresponding female connector components; and male connector components which are receivable in corresponding female connector components after deformation of one or both of the male and female connector components and which are lockable in a connected configuration by restorative deformation forces.

24. A buck according to any one of claims 1 to 23 wherein each frame member comprises opposed panel flanges extending from the opposed first and second longitudinal edges of the panel and oriented to extend away from the panel on outer sides of the outer opposed surfaces of the structure.

25. A buck according to claim 24 wherein each panel flange of each frame member has a pair of longitudinally opposed end edges, each end edge adapted for abutment against an adjacent end edge of a panel flange of an adjacent frame member.

26. A buck according to claim 25 wherein the end edges of each panel flange are mitered.

27. A buck according to any one of claims 24 to 26 wherein the opposed panel flanges are inclined toward one another as they extend away from the panel.

28. A buck according to any one of claims 24 to 27 wherein each frame member has a longitudinally extending drainage channel formed at each of the opposed first and second longitudinal edges of the panel.

29. A buck according to any one of claims 24 to 28 wherein each of the opposed panel flanges comprises at least one longitudinally extending locking member-receiving panel flange channel.

30. A buck according to claim 29 wherein each of the opposed panel flanges comprises a pair of opposed longitudinally extending locking flanges extending transversely from its inward surface and toward one another to define the locking member-retaining panel flange channel.

31. A buck according to any one of claims 29 and 30 comprising one or more locking members, each locking member comprising: a first arm portion for insertion into a first locking member-retaining panel flange channel of a first panel flange; and a second arm portion for insertion into a second locking member-retaining panel flange channel of a second panel flange, the second panel flange adjacent the first panel flange.

32. A stay-in-place buck for placement in a stay-in-place form-work having outer opposed panels, the buck comprising:

a plurality of frame members shaped to extend transversely between the outer opposed panels and arrangeable in an edge abutting relationship to define a building opening,

wherein at least two of the frame members have connector components engageable with complementary connector components on the outer opposed panels.

33. A buck according to claim 32 wherein each frame member comprises a panel shaped to extend transversely between the outer opposed panels, the panel having opposed first and second sides respectively facing away from and

toward the opening, opposed first and second longitudinal edges, and a transverse dimension between the first and second longitudinal edges which is substantially equal to a transverse distance between the outer opposed panels.

34. A buck according to claim 33 comprising a plurality of fastener-receivers connectable to the first sides of the panels to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck, the fastener-receiving frame comprising one or more fastener-retaining members for retaining fasteners which penetrate therethrough.

35. A buck according to claim 33 wherein each fastener-receiver extends along a longitudinal dimension of a first side of a panel of a corresponding frame member and comprises longitudinally opposed edge portions, the edge portions mitered such that each edge portion abuts against an adjacent edge portion of an adjacent fastener-receiver to form a miter joint.

36. A buck according to any one of claims 33 to 35 wherein the each frame member comprises opposed panel flanges extending from the opposed first and second longitudinal edges of the panel and oriented substantially perpendicularly to the panel for abutment against outer surfaces of the outer opposed panels.

37. A buck according to claim 36 wherein each panel flange comprises a pair of longitudinally opposed end edges, the end edges mitered such that each end edge abuts against an adjacent end edge of a panel flange of an adjacent frame member to form a miter joint.

38. A stay-in-place buck for placement in a stay-in-place form-work to define an opening in a cast concrete structure, the buck comprising:

a plurality of frame members arrangeable in an abutting relationship to define the opening, each frame member comprising:

a panel shaped to extend transversely between outer opposed panels of the stay-in-place form-work, the panel having opposed first and second sides respectively facing away from and toward the opening, opposed first and second longitudinal edges, and a transverse dimension between the first and second longitudinal edges which is substantially equal to a transverse distance between the outer opposed panels; and

opposed panel flanges extending from the opposed first and second longitudinal edges of the panel and oriented substantially perpendicularly to the panel for abutment against outer surfaces of the outer opposed panels: and

a plurality of fastener-receivers connectable to the first sides of the panels of the frame members to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck.

39. A stay-in-place buck for placement in a form-work to define an opening in a cast structure of concrete or similar curable construction material. the buck comprising:

a plurality of frame members arrangeable in an edge abutting relationship to define the opening. each frame member comprising a panel shaped to extend transversely between outer opposed surfaces of the structure. the panel having opposed first and second sides respectively facing away from and toward the opening. opposed first and second longitudinal edges. and a transverse dimension between the first and second longitudinal edges which is substantially equal to a transverse distance between the outer opposed surfaces of the structure; and

a plurality of fastener-receivers connectable to the first sides of the panels to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck wherein each fastener-receiver comprises at least one longitudinally extending locking member-receiving channel; and

one or more locking members. each locking member comprising: a first arm portion for insertion into a first locking member-retaining channel of a first fastener-receiver; and a second arm portion for insertion into a second locking member-retaining channel of a second fastener-receiver. the second fastener-receiver adjacent the first fastener-receiver.

40. A stay-in-place buck for placement in a form-work to define an opening in a cast structure of concrete or similar curable construction material. the buck comprising:

a plurality of frame members arrangeable in an edge abutting relationship to define the opening. each frame member comprising:

a panel shaped to extend transversely between outer opposed surfaces of the structure. the panel having opposed first and second sides respectively facing away from and toward the opening. opposed first and second longitudinal edges. and a transverse dimension between

the first and second longitudinal edges which is substantially equal to a transverse distance between the outer opposed surfaces of the structure; and

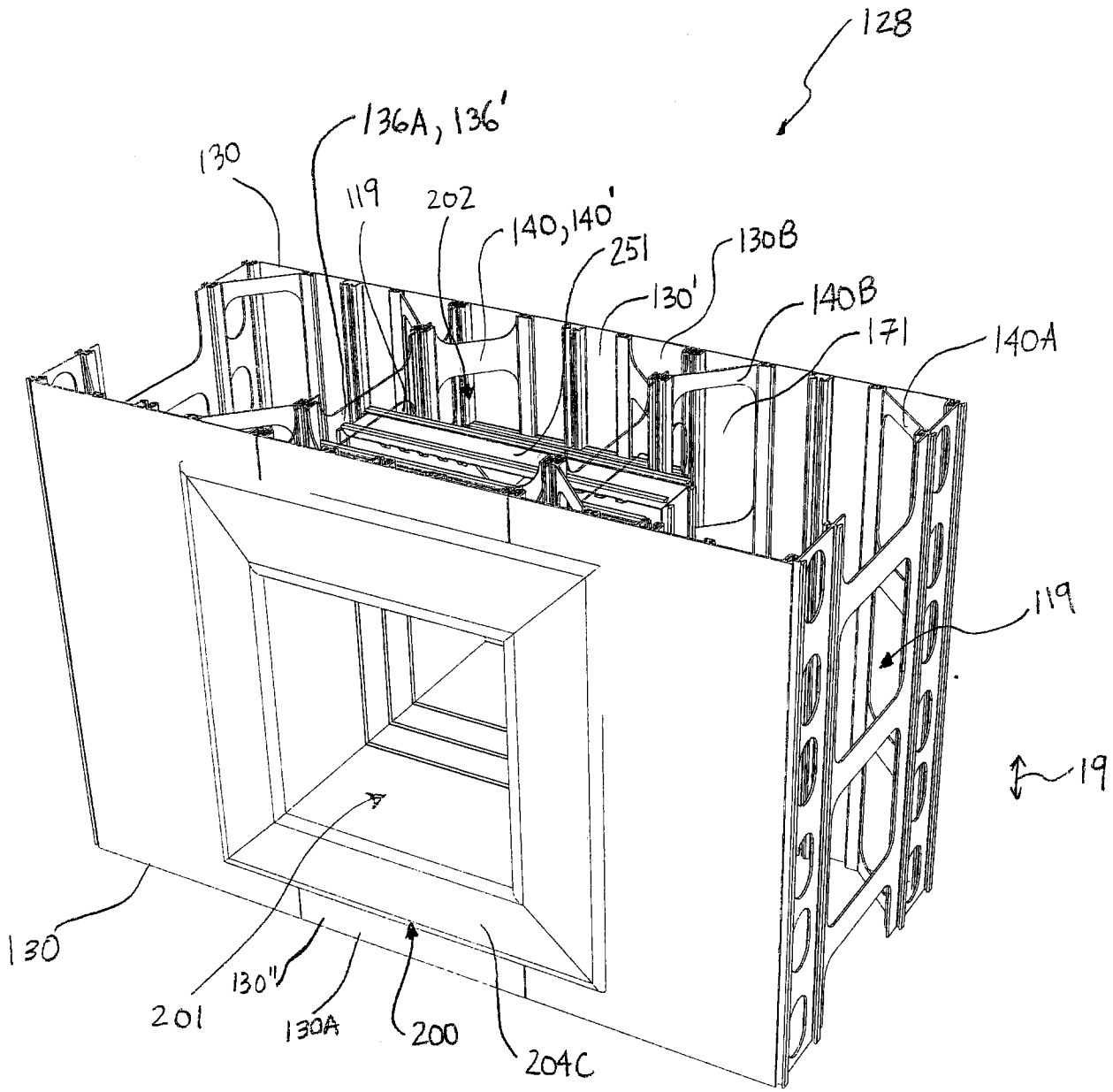
opposed panel flanges extending from the opposed first and second longitudinal edges of the panel and oriented to extend away from the panel on outer sides of the outer opposed surfaces of the structure wherein each of the opposed panel flanges comprises at least one longitudinally extending locking member-receiving panel flange channel;

a plurality of fastener-receivers connectable to the first sides of the panels to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck; and

one or more locking members, each locking member comprising: a first arm portion for insertion into a first locking member-retaining panel flange channel of a first panel flange; and a second arm portion for insertion into a second locking member-retaining panel flange channel of a second panel flange, the second panel flange adjacent the first panel flange.

41. Apparatus comprising any features, combinations of features and sub-combinations of features described herein.

42. Methods of using apparatus comprising any features, combinations of features and sub-combinations of features described herein.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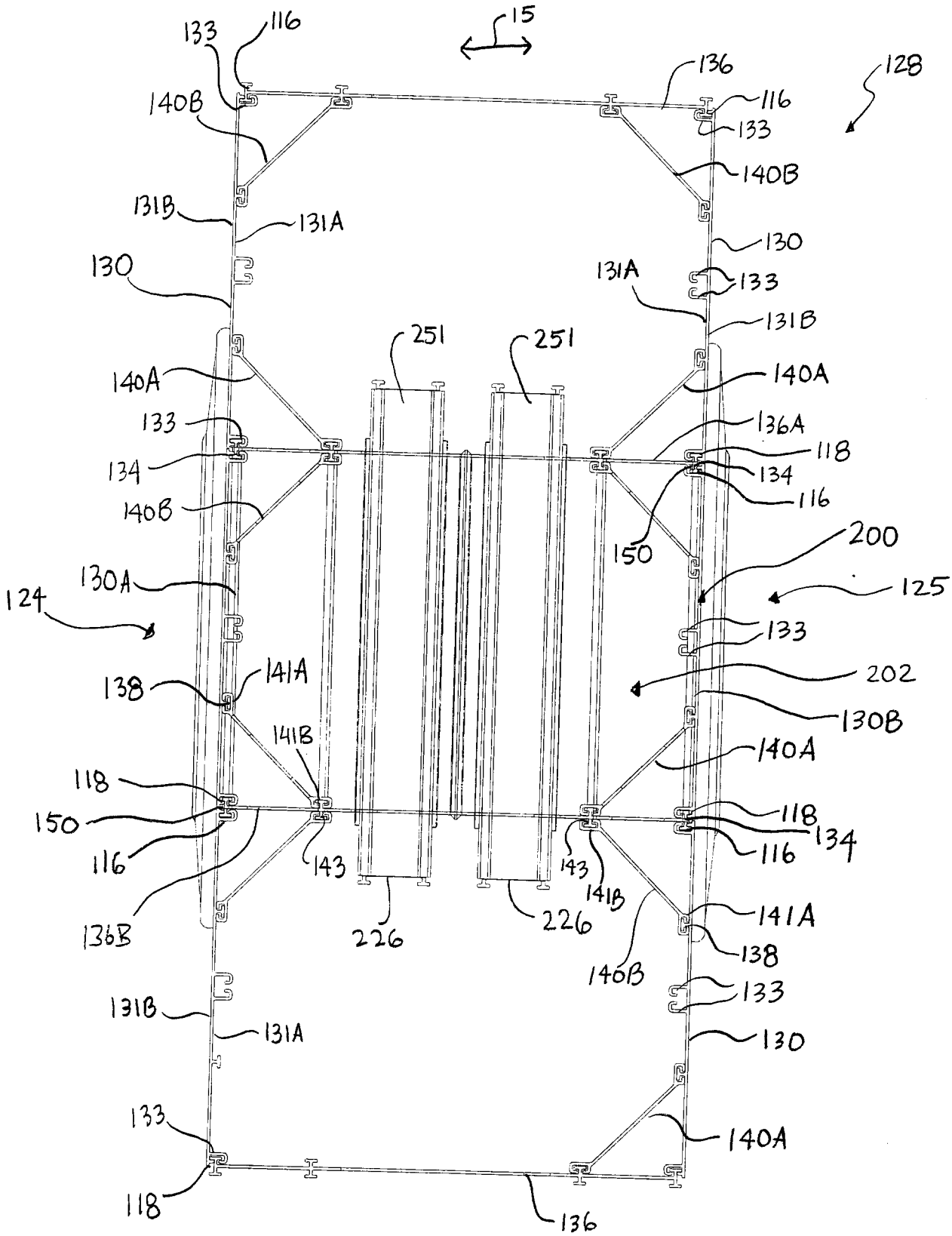
136A, 136'
130
119
202
140, 140'
251
130B
130'
140B
171
140A
119
19
130
130"
201
130A
200
204C

FIGURE 1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134
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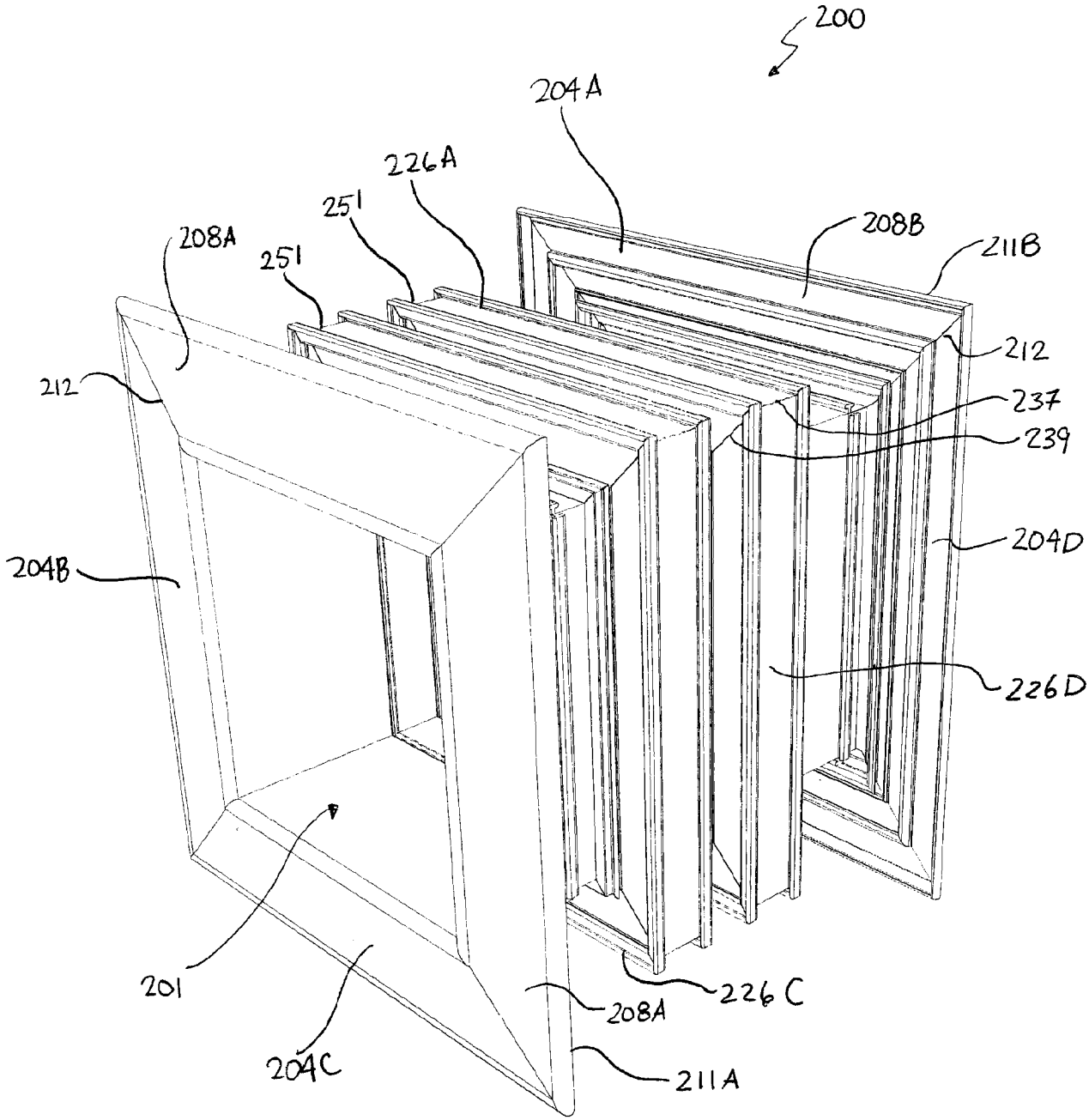
138
202
130B
141B
143
226
136B
136A
140B
136

FIGURE 2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204A
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208A
208B
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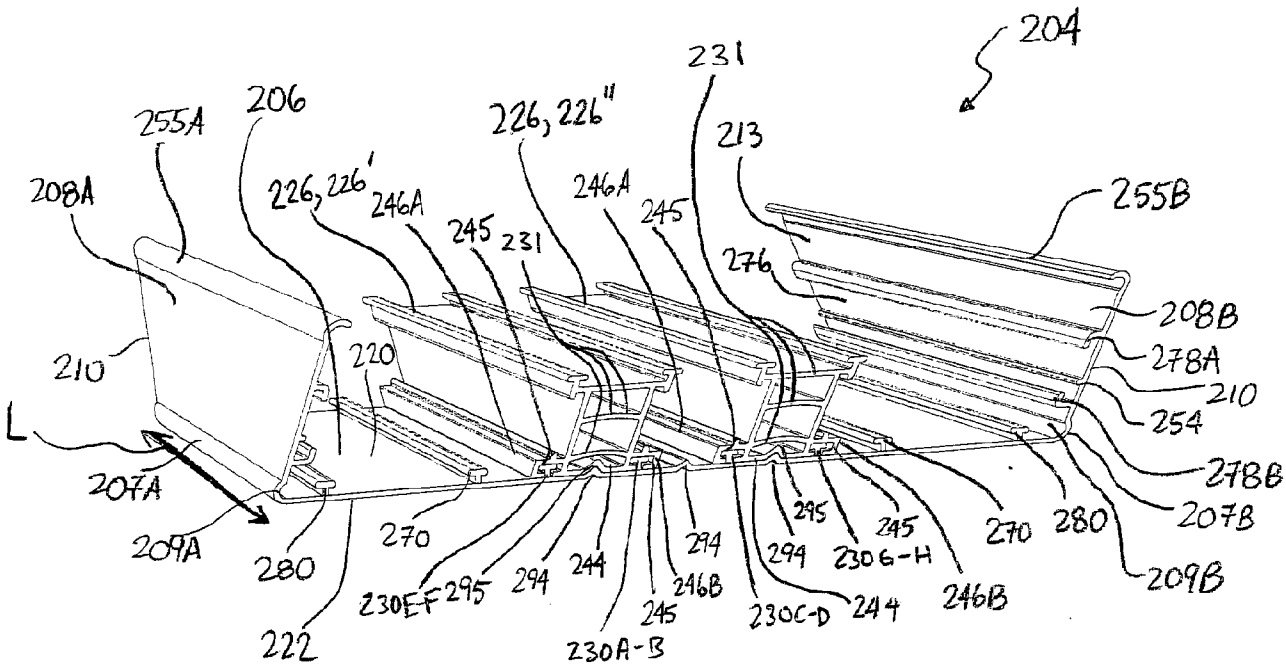
204D
204B
226D
201
208A
226C
204C
211A

FIGURE 3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231
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226, 226"
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208A
226, 226'
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208B
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220
278A
210
254
L
278B
207A
207B
209A
280
270
295
294
244
246B
245
294
295
245
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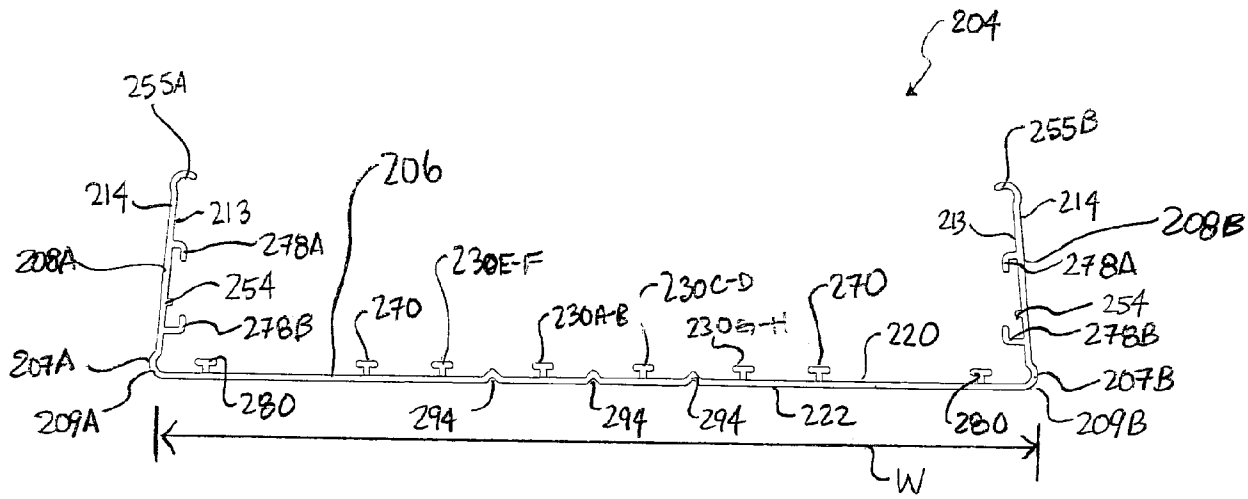
280
230E-F
230A-B
230C-D
230G-H
244
246B
209B
222

FIGURE 4A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255A
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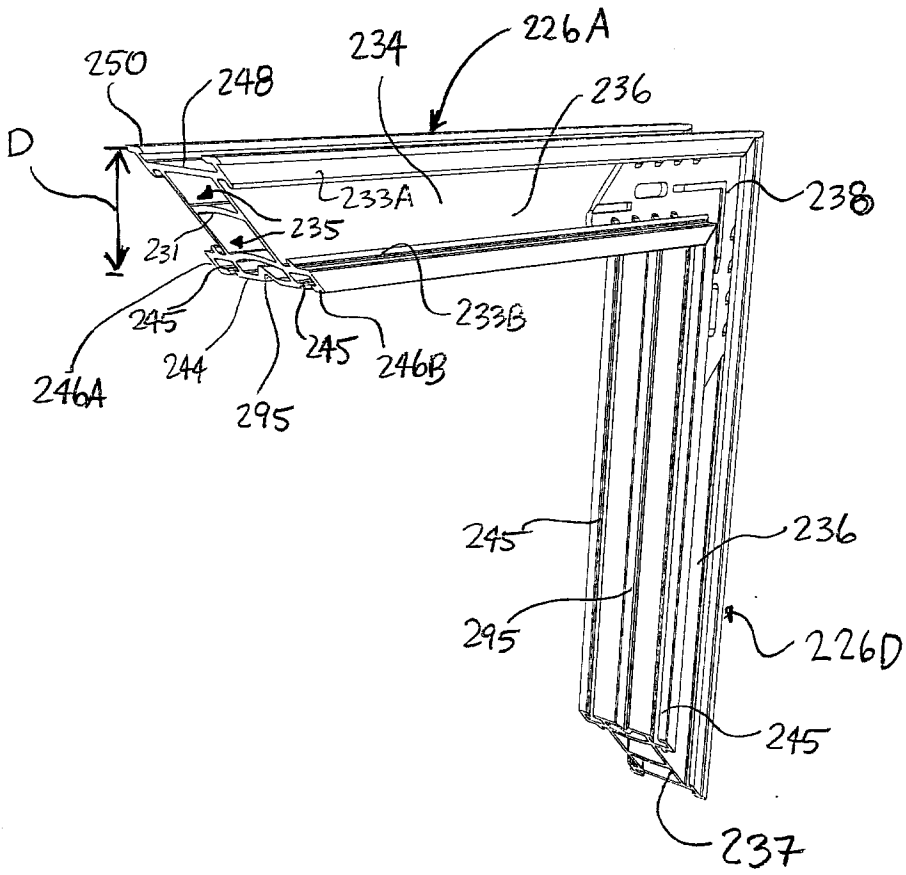
278A
208A
254
230E-F
278B
270
230A-B
230C-D
230G-H
270
220
255B
213
214
208B
278A
254
278B
207A
209A
280
294
294
294
222
280
207B
209B
W

FIGURE 4B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D
233A
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233B
245
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246B
244
246A
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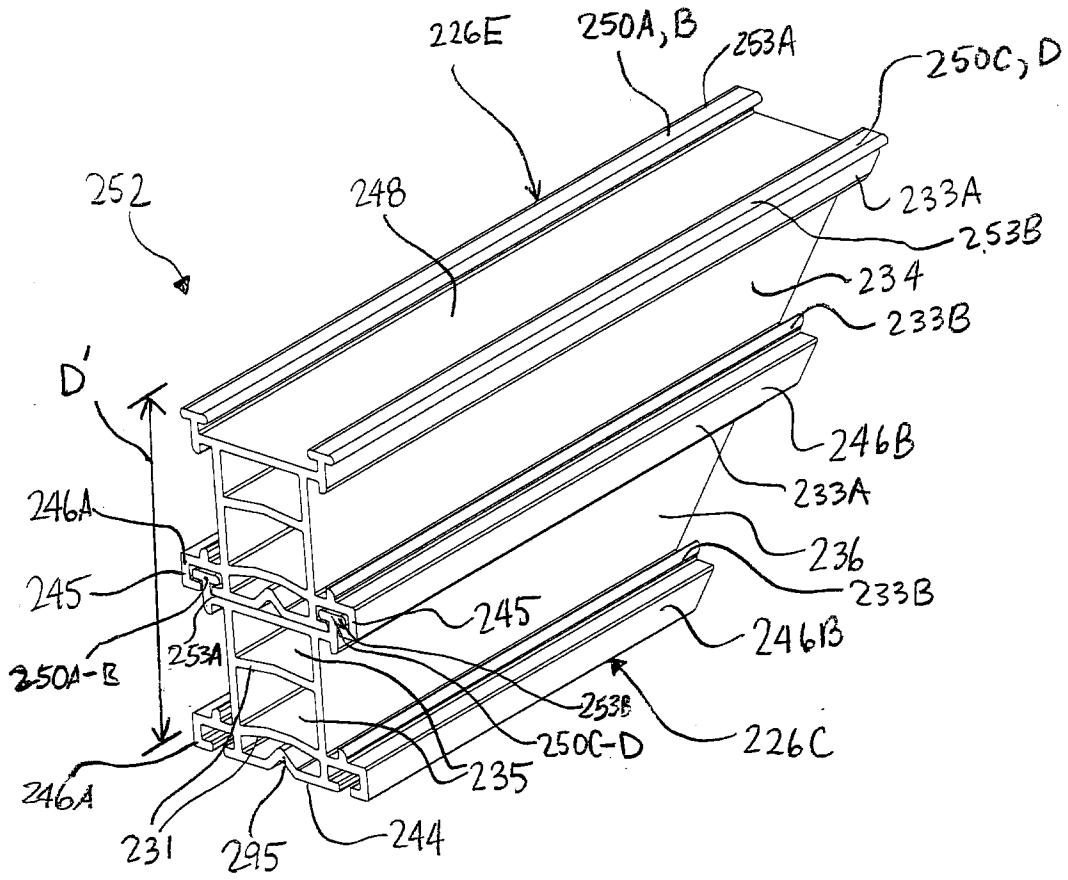
245
236
295
226D
245
237

FIGURE 5A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233A
253B
234
233B
D'
246B
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233A
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246B
253A
250A-B
253B
250C-D
226C
235
246A
231
295
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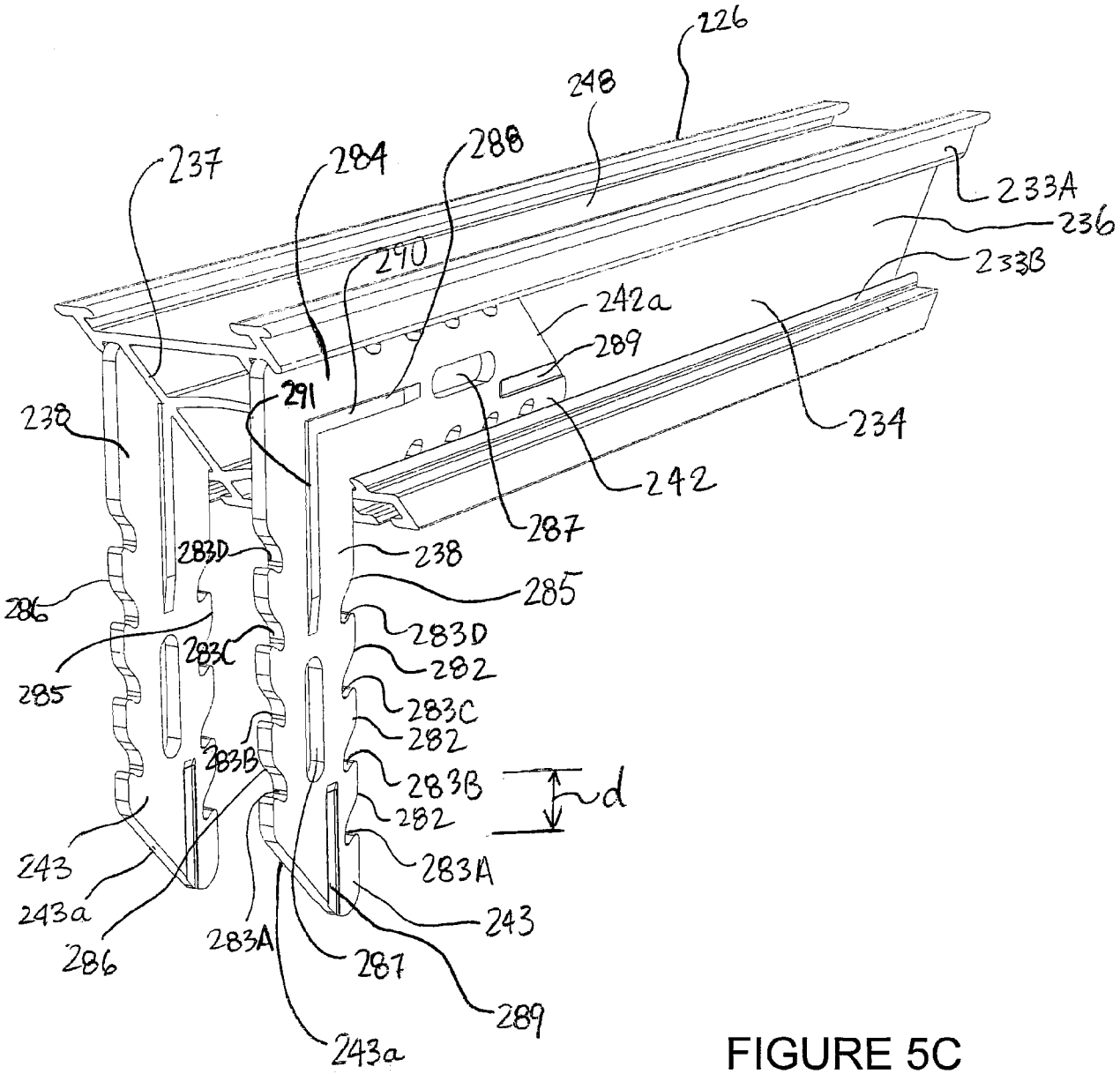
FIGURE 5B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286
283D
283C
285
282
283C
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283B
283B
d
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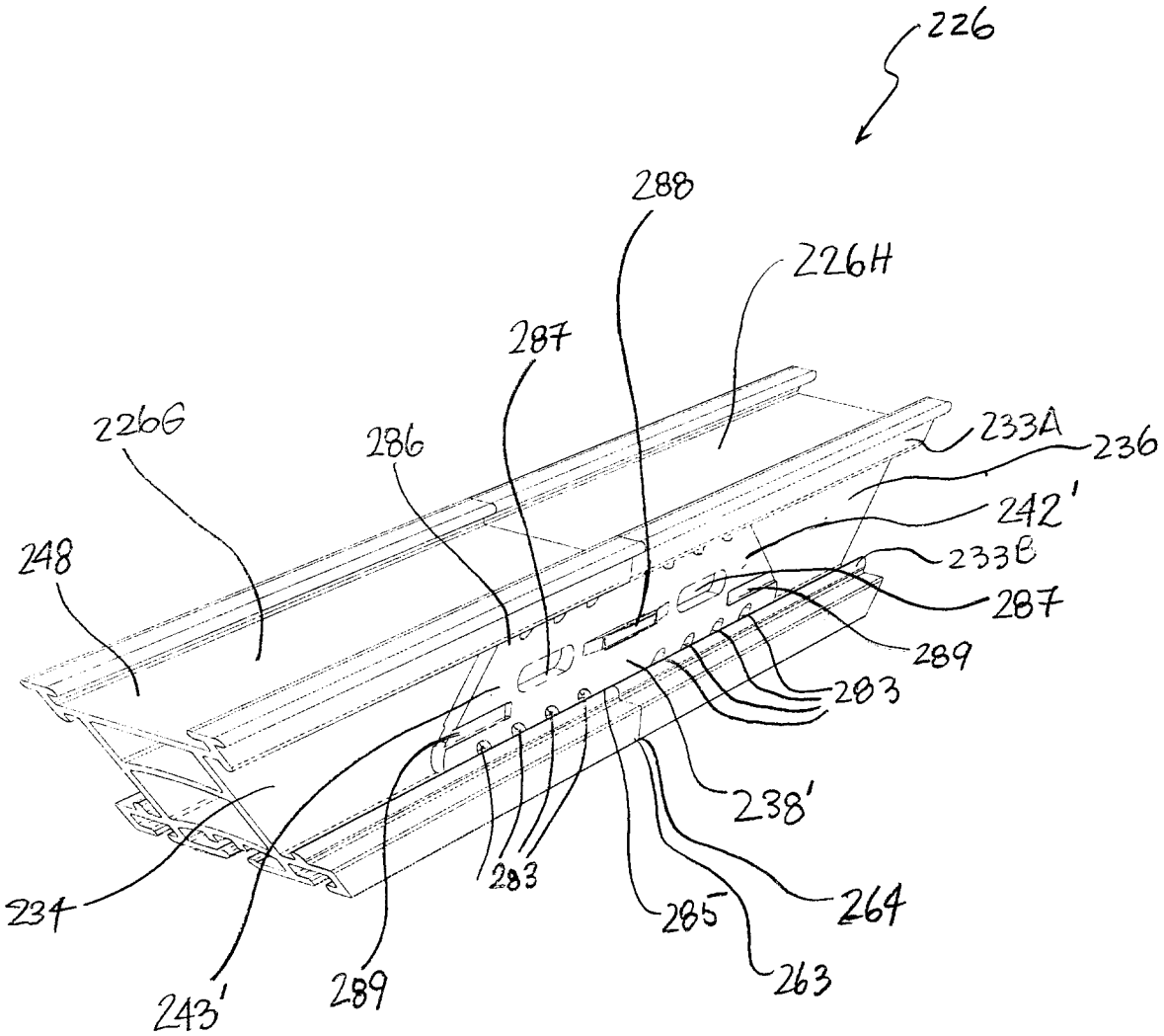
243
283A
243a
243
286
283A
287
289
243a

FIGURE 5C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226H
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226G
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242'
248
233B
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289
283
238'
234
283
264
285
263
243'
289

FIGURE 5D

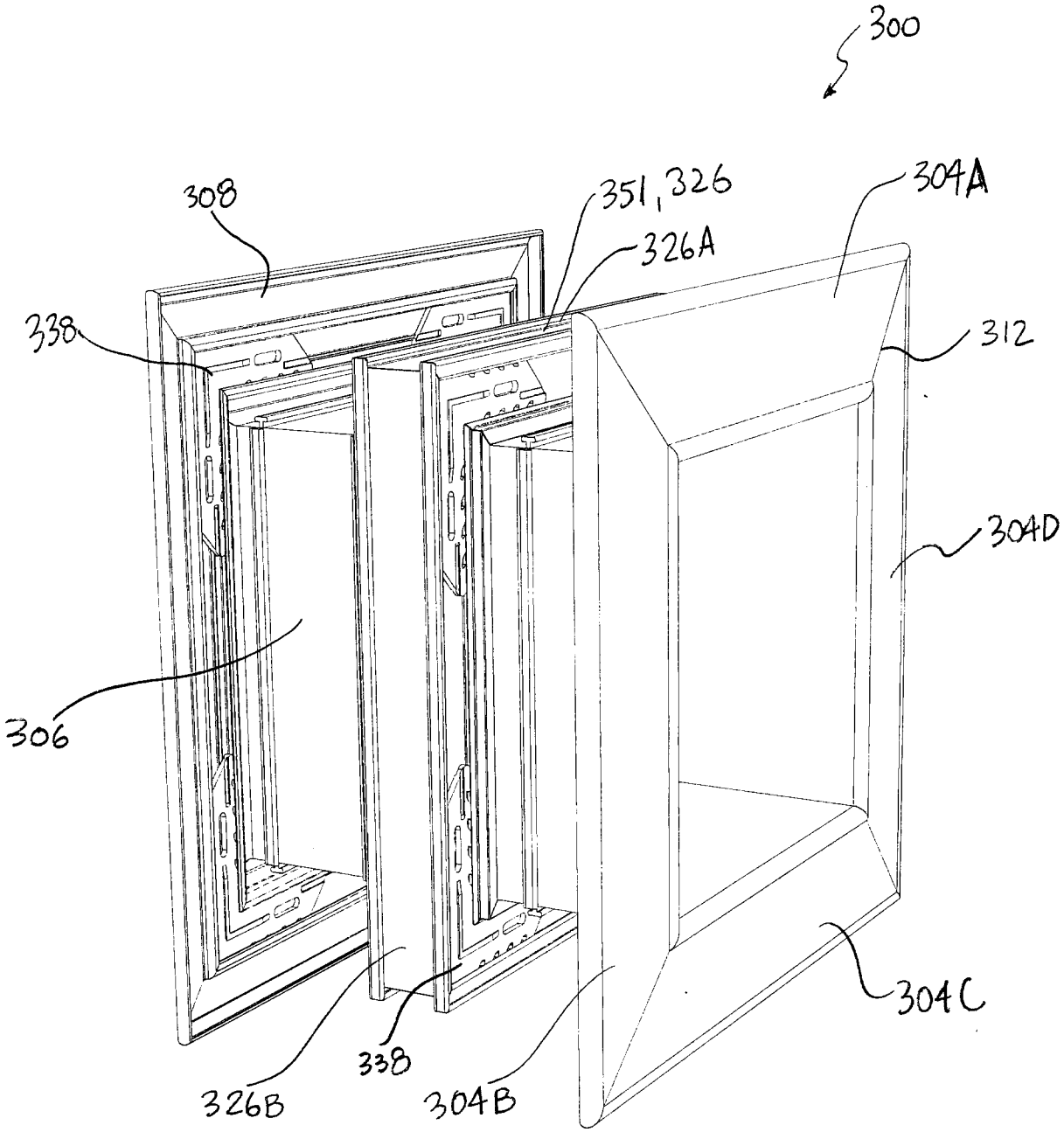
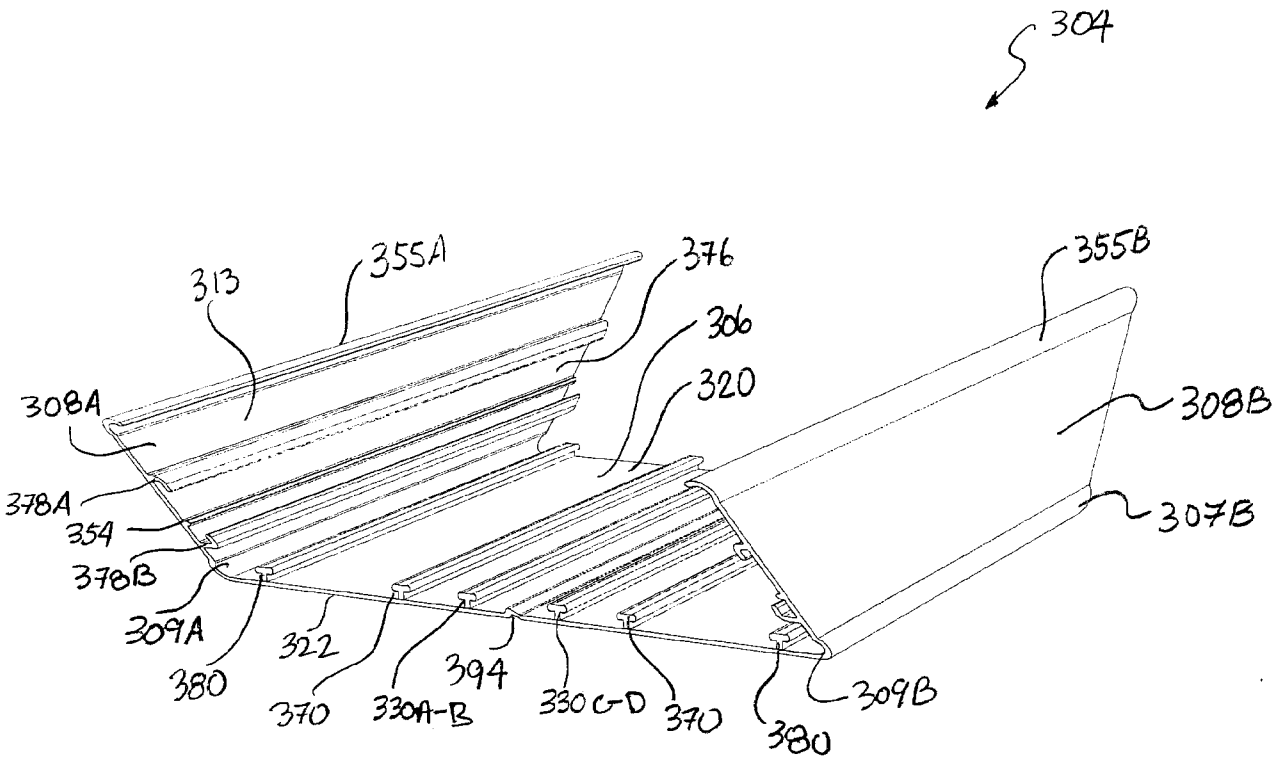


FIGURE 6A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355A
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355B
306
320
308A
308B
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307B
378B
309A
322
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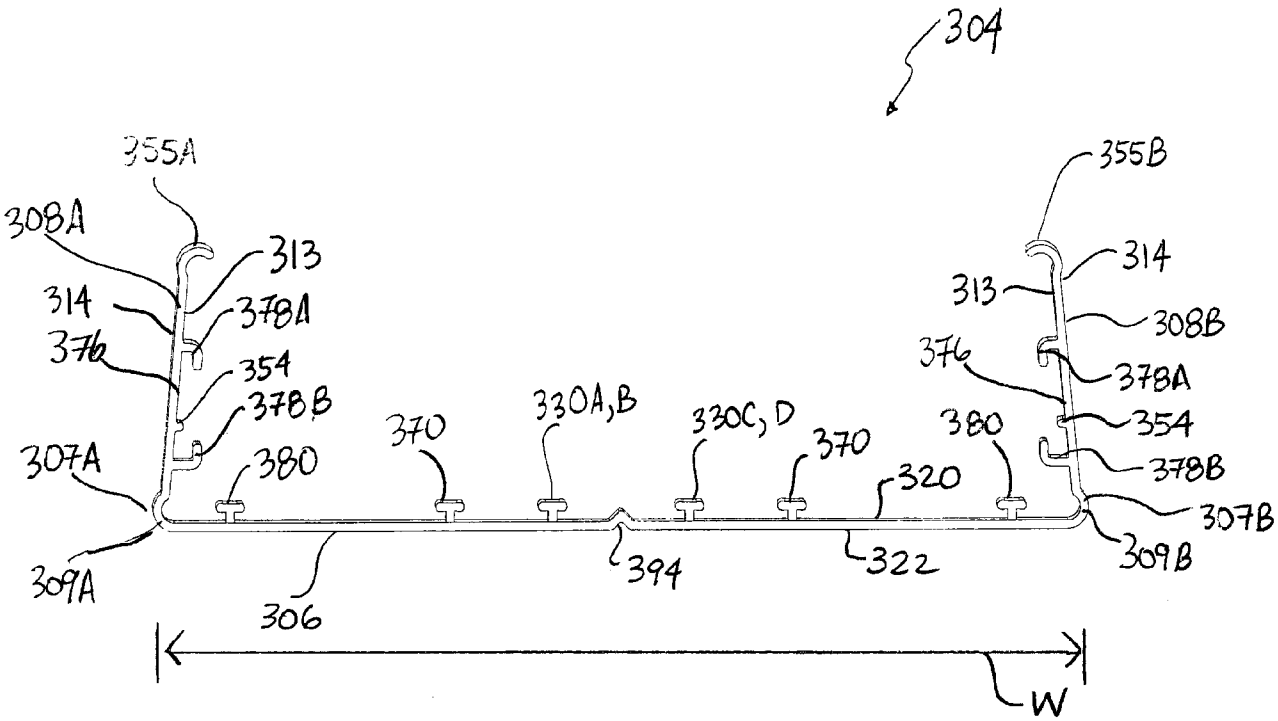
330A-B
394
330C-D
370
380
309B

FIGURE 6B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330A,B
330C,D
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308B
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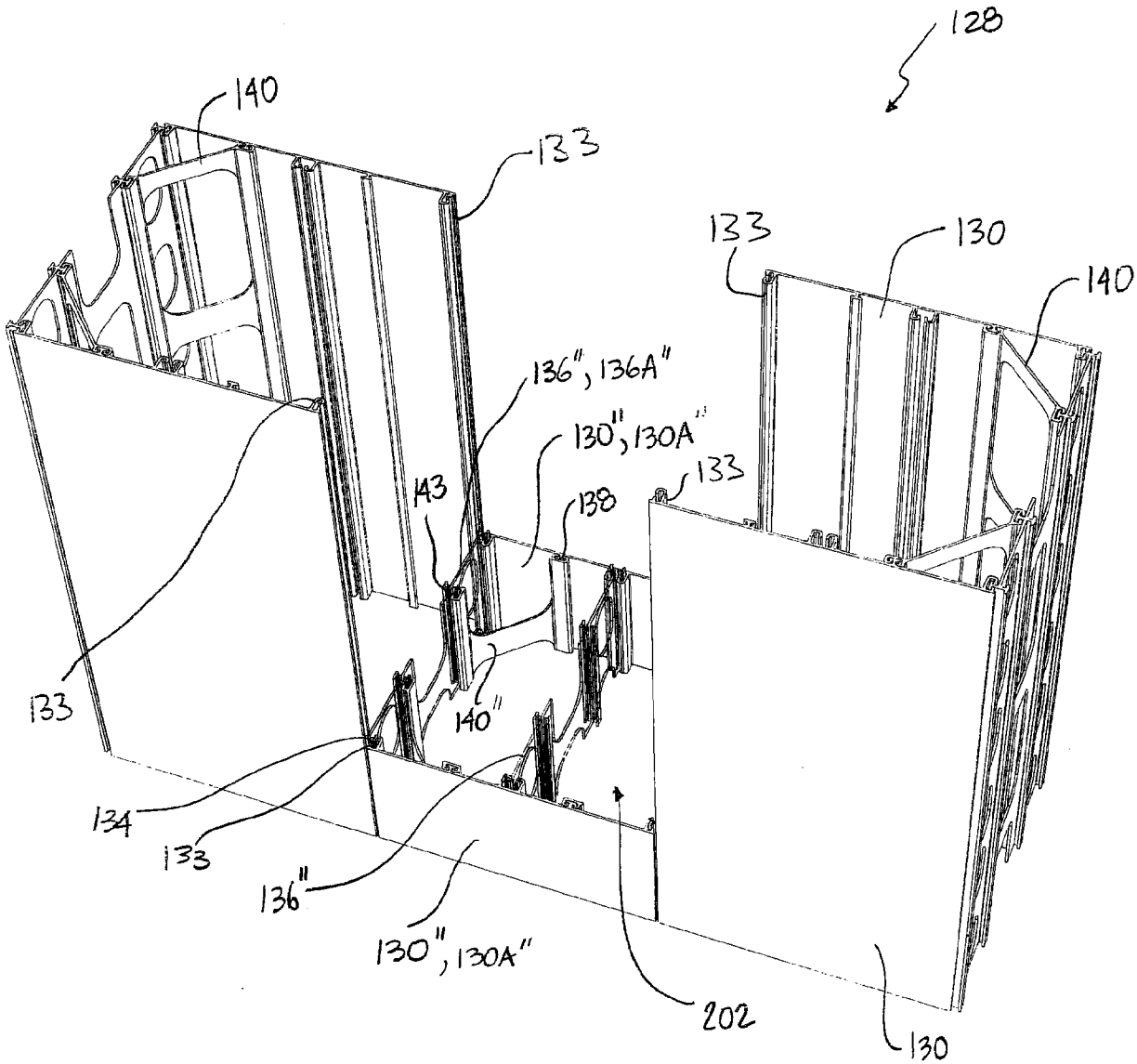
378B
307B
309A
306
394
322
309B
W

FIGURE 6C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136"
130", 130A"
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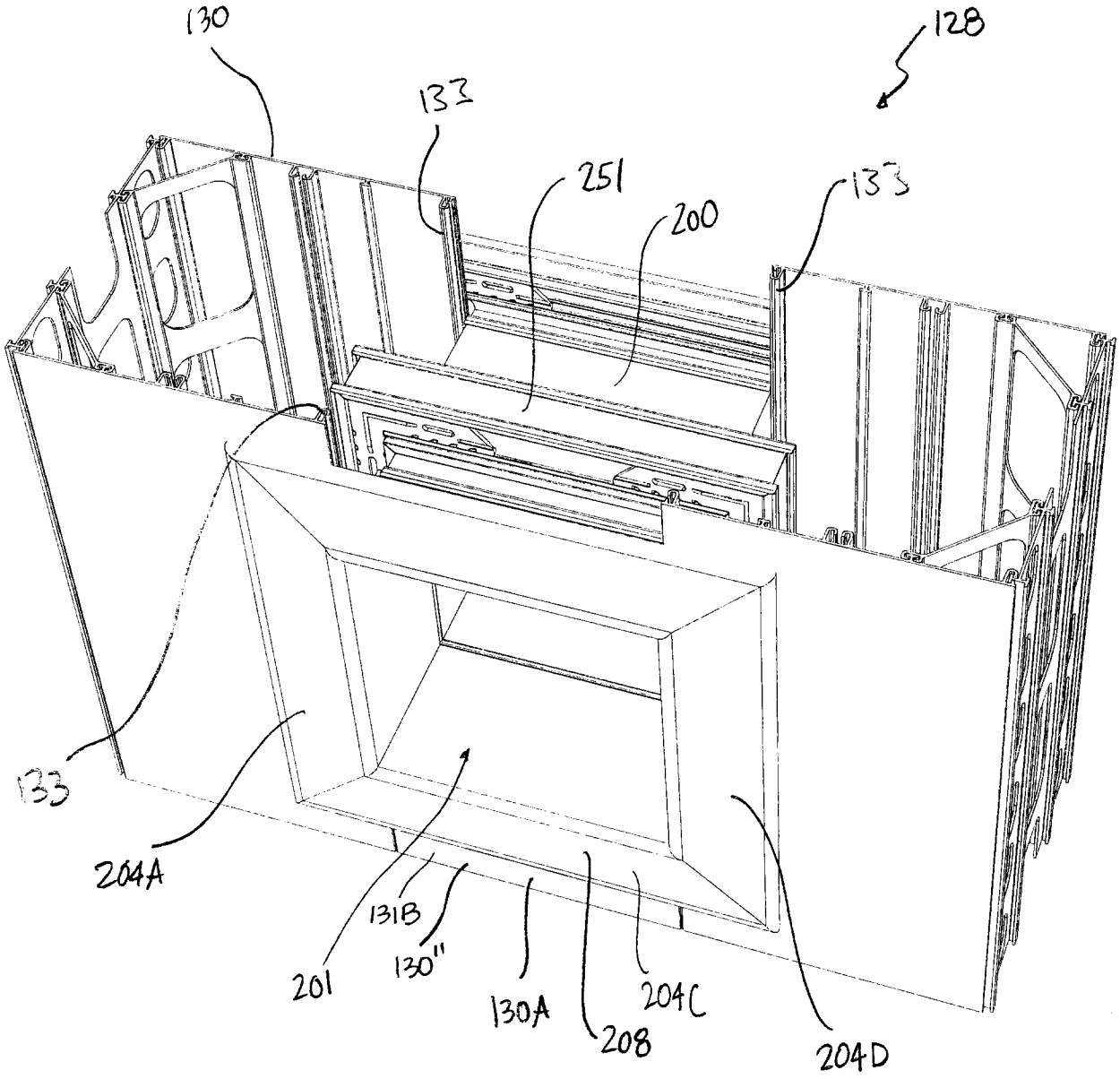
FIGURE 7A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130A
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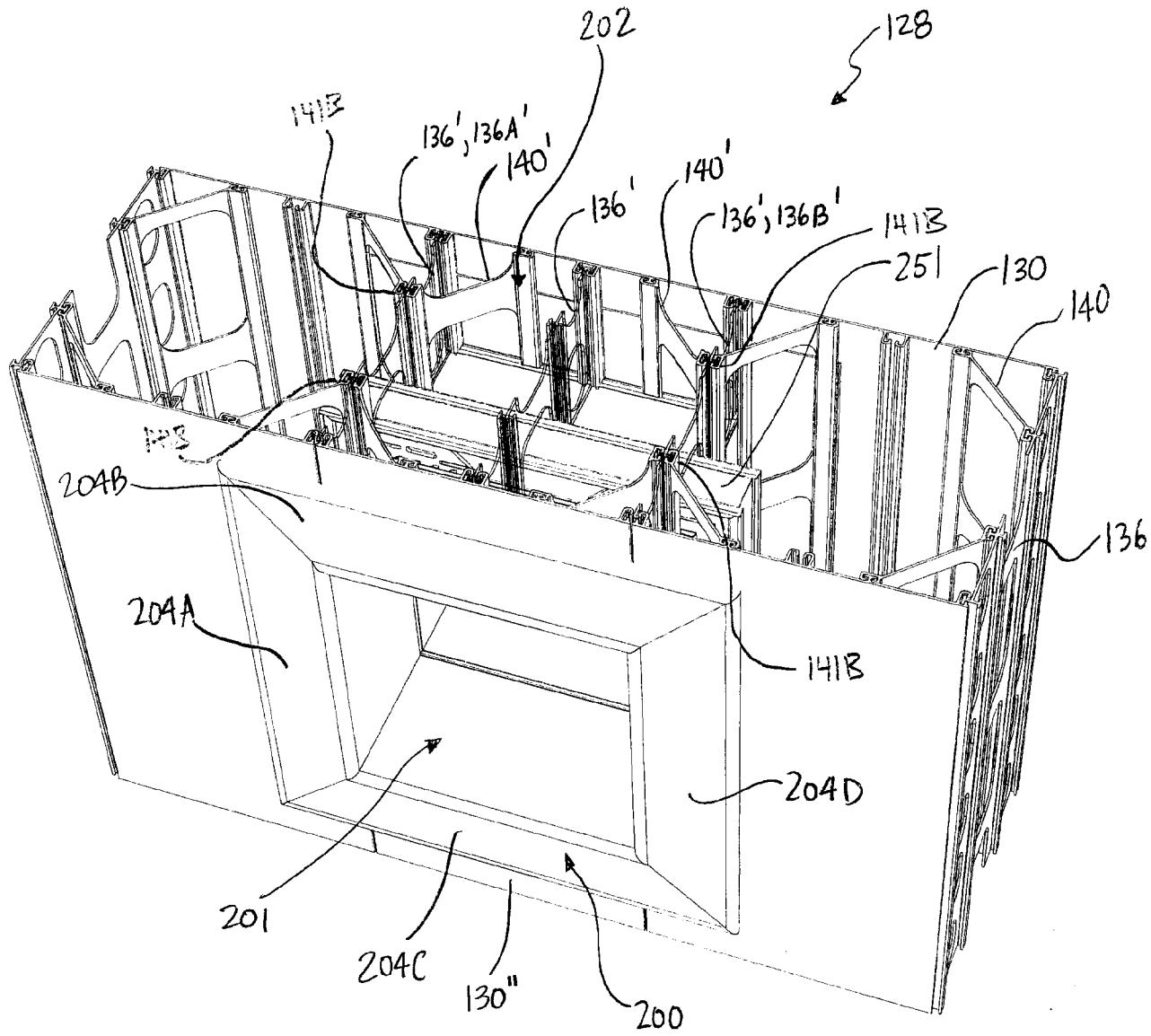
204C
204D

FIGURE 7B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136', 136A'
140'
140'
136'
136', 136B'
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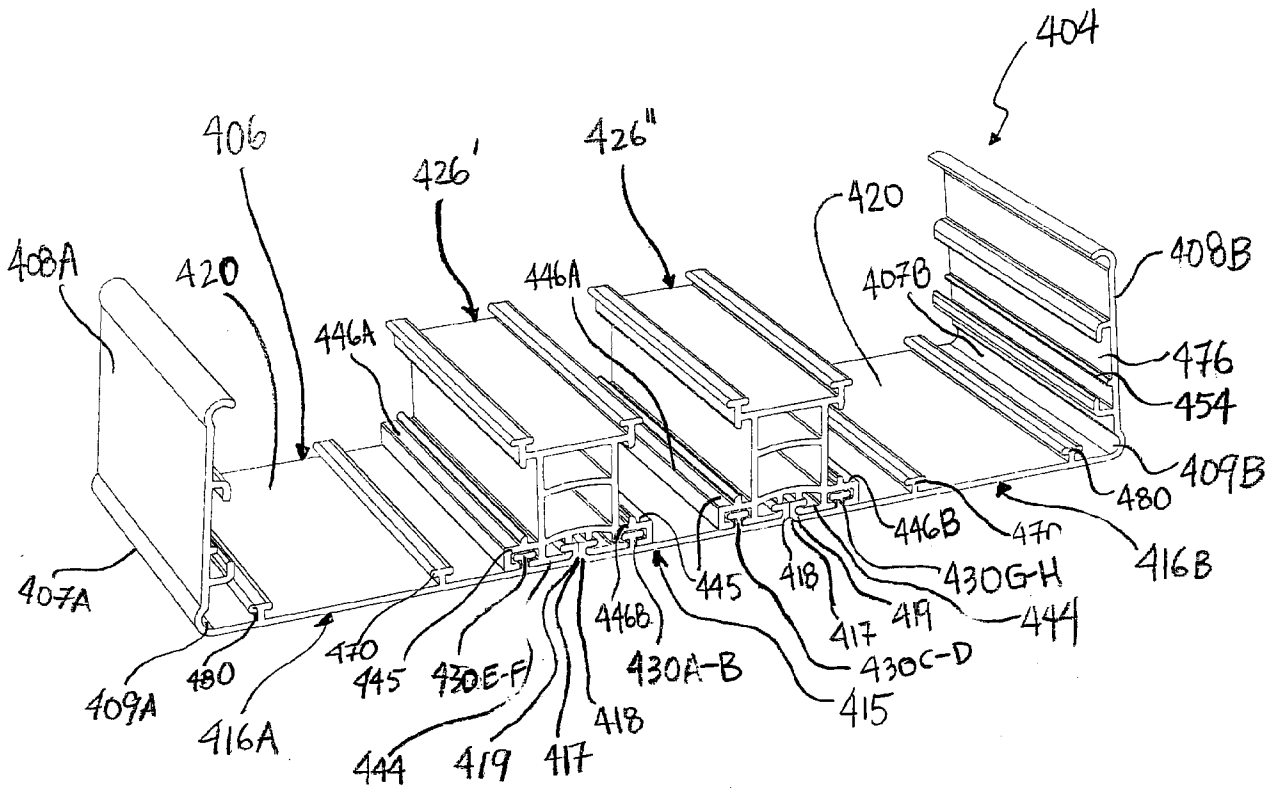
204A
141B
204D
201
204C
130"
200

FIGURE 7C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430G-H
444
419
417
418
445
430C-D
415
430A-B
446B
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419
444
416A
409A
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407A
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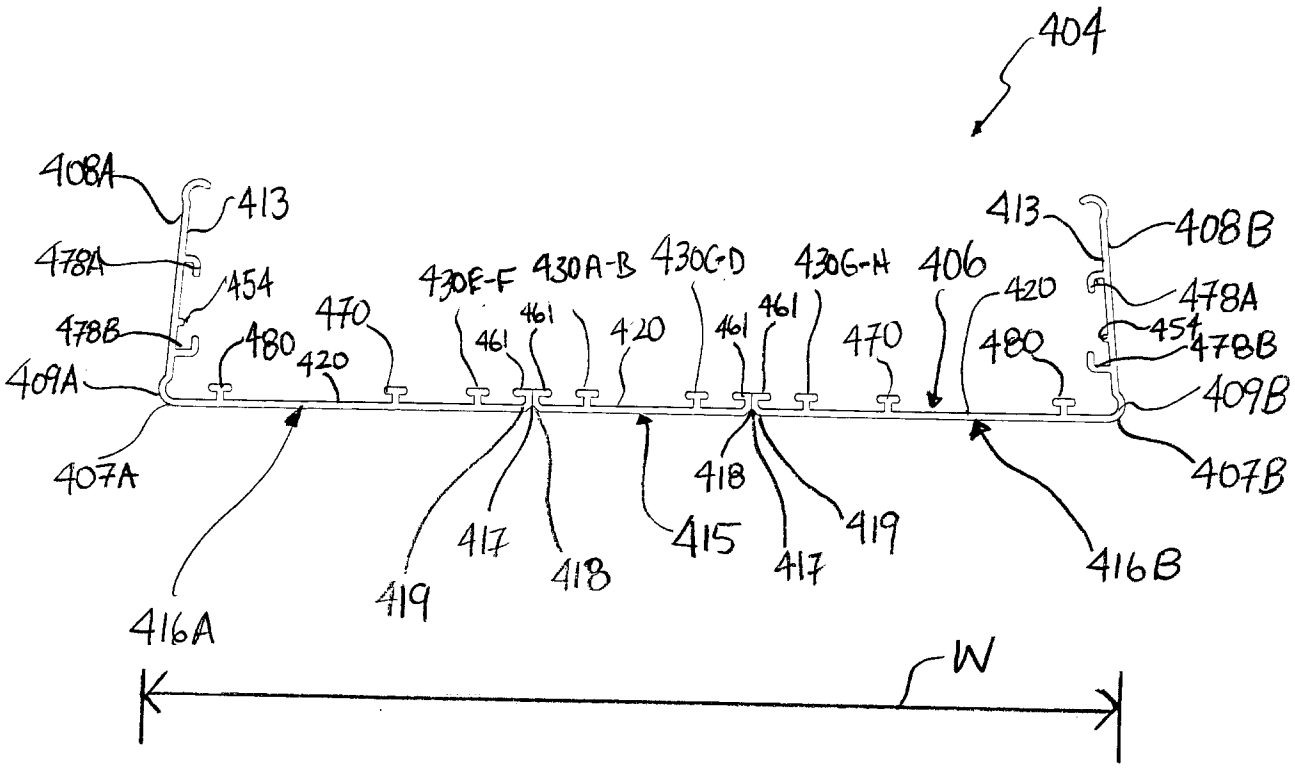
430E-F

FIGURE 8A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461
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419
W

FIGURE 8B

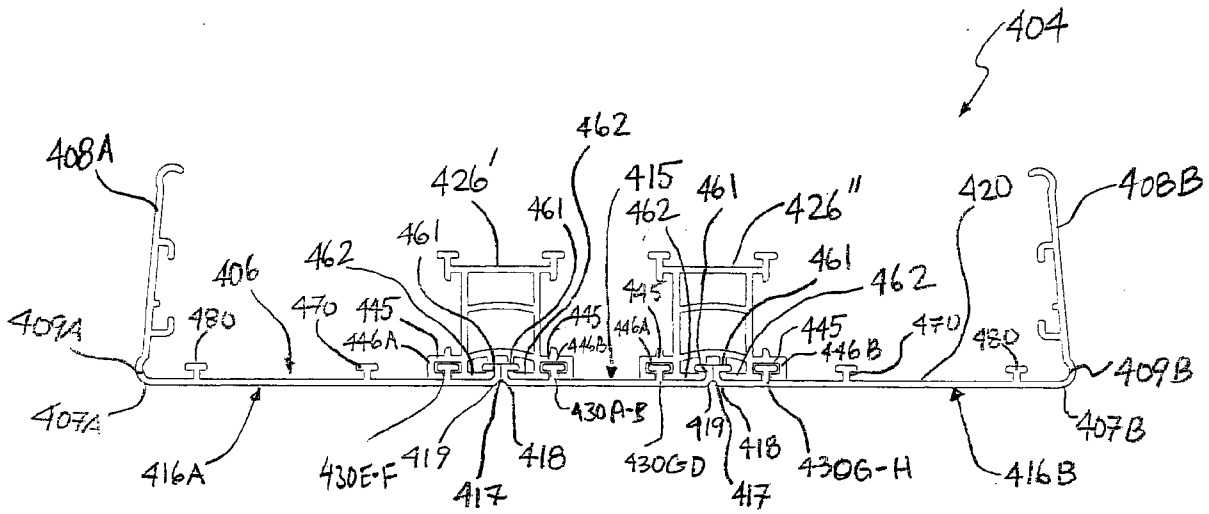


FIGURE 8C

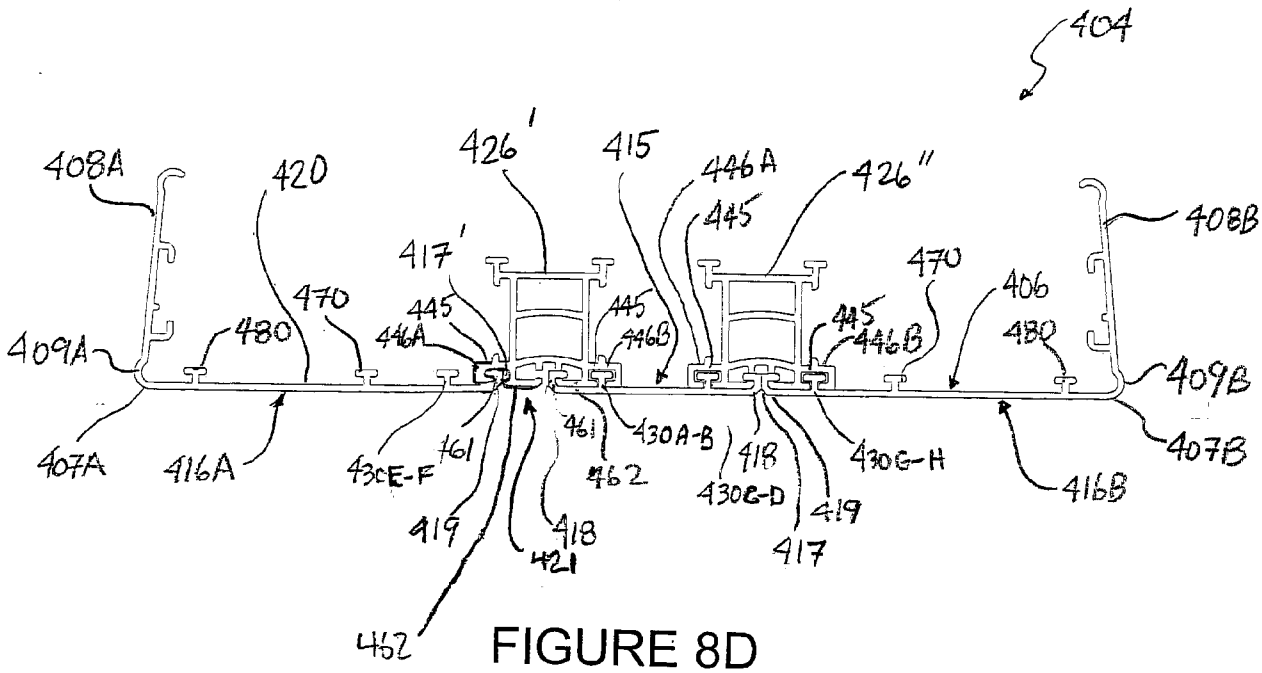
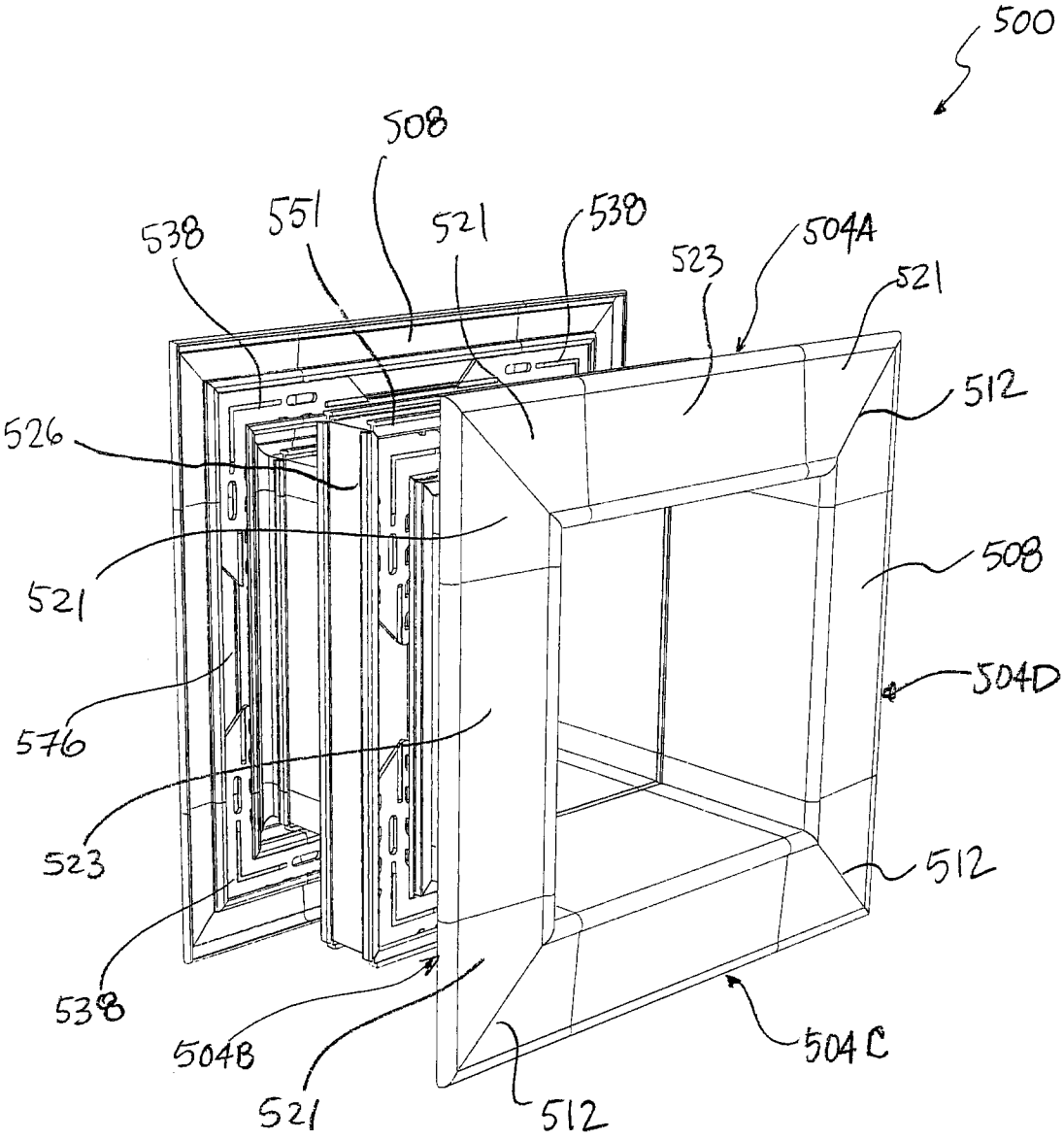


FIGURE 8D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523
504A
521
512
526
521
508
504D
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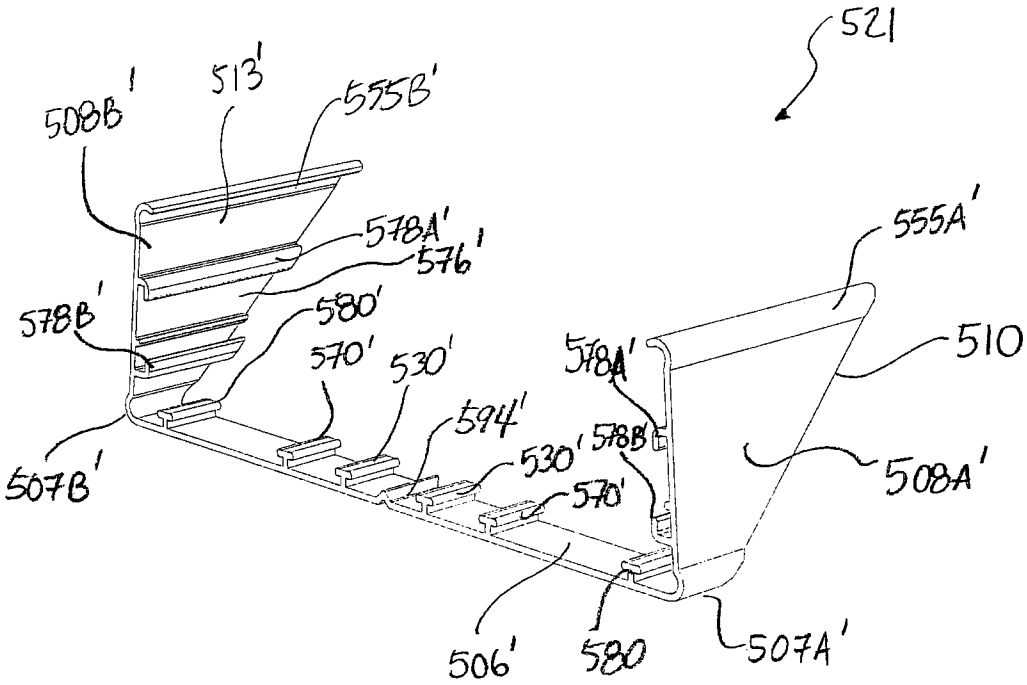
523
512
538
504B
521
512
504C

FIGURE 9A


521
508B'
513'
555B'
578A'
576'
578B'
580'
570'
530'
555A'
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578A'
594'
578B'
530'
570'
508A'
507B'
506'
580
507A'

FIGURE 9B

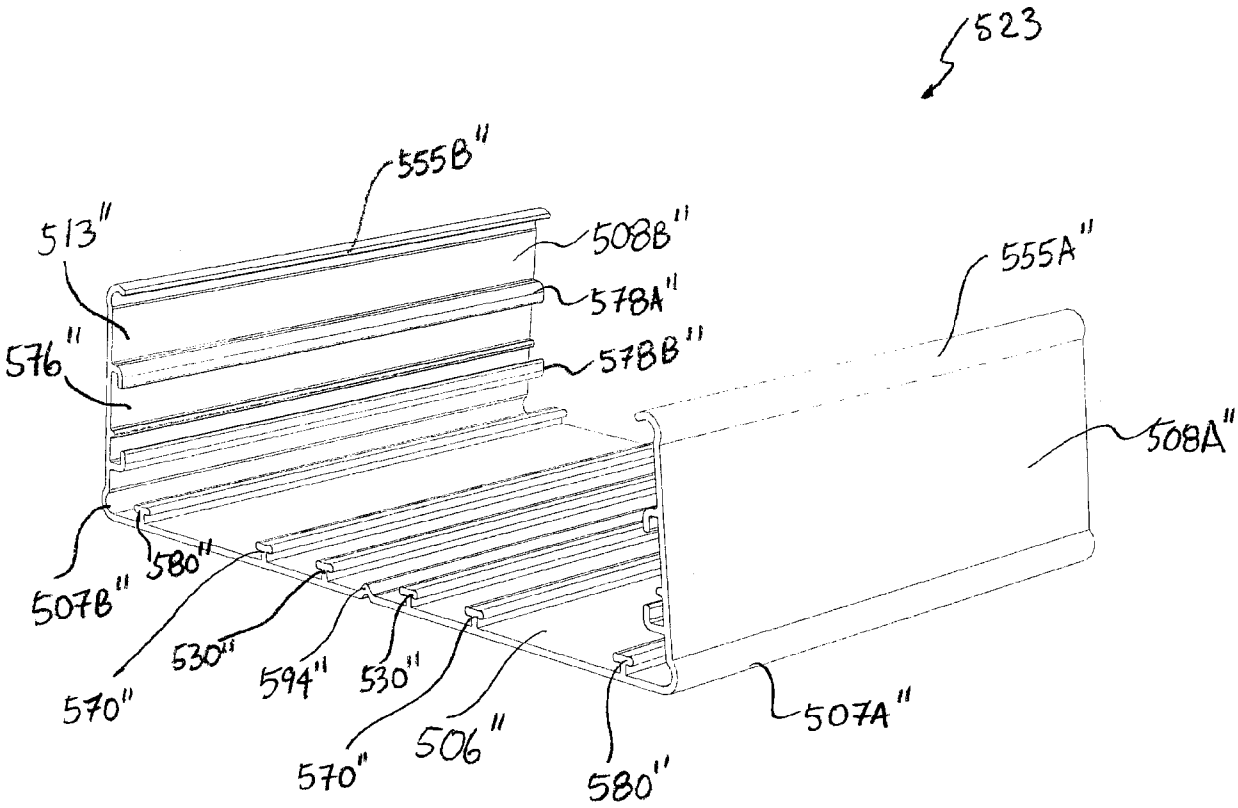
523
555B"
513"
508B"
555A"
578A"
576"
578B"
508A"
580"
507B"
530"
570"
594"
530"
506"
570"
580"
507A"

FIGURE 9C

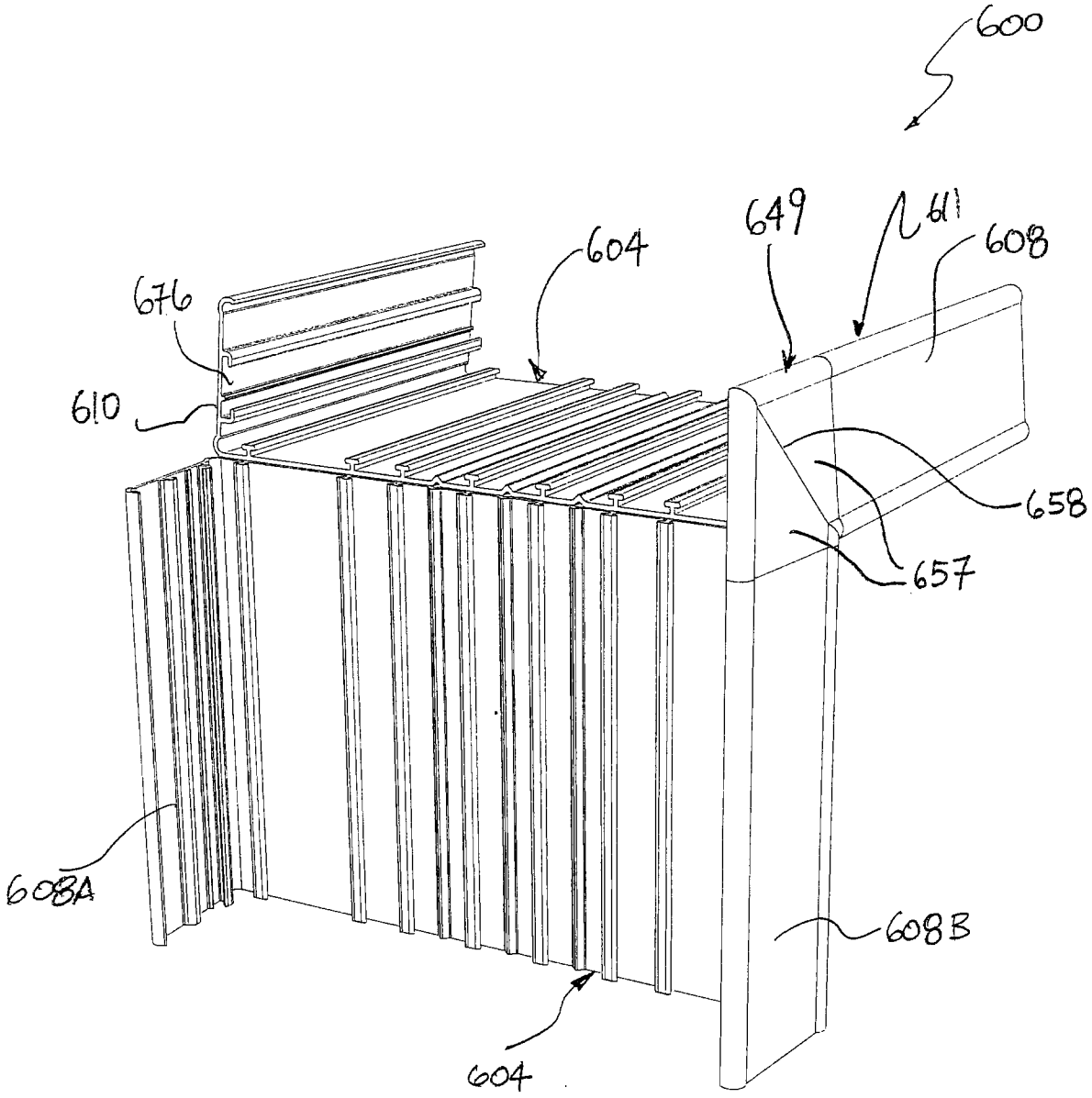

FIGURE 10A

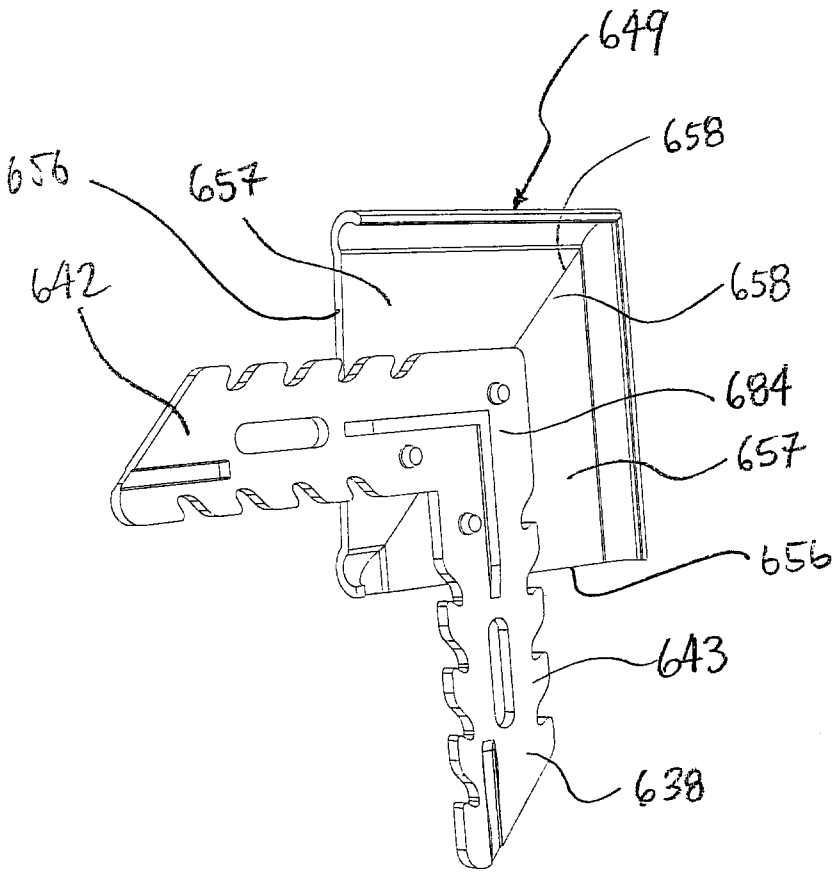

FIGURE 10B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2009/000052

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***E04B 2/86*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: E04B 2/86 (2006.01), E04G 15/02 (2006.01), E06B 1/all (2006.01), E06B 3/all (2006.01)
USPC: 52/215, 204.55, 214

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion, WEST, Canadian Patents Database
Keywords: sash, buck, frame, window, door, opening, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	CA 2244537A1 (SCOTT et al., G.R.) 3 February 2000 (03-02-2000) - The whole document -	1-5, 16, 17, 24-28, 38, 41, 42 18-23, 29-31, 40
Y	CA 2577217A1 (PICCONE, F.) 27 January 2006 (27-01-2006) - The whole document -	18-23
Y	US 5791103A (COOLMAN et al., D.W.) 11 August 1998 (11-08-1998) - The whole document -	29-31, 40
A	CA 2502343A1 (FOELL et al., D. S.) 6 May 2004 (06-05-2004) - Figures 21 to 24 -	1, 38-42
A, P	CA 2629202A1 (KUSTERMANN, H.M.) 24 April 2008 (24-04-2008) - The whole document -	1, 38-42
A	CA 2255256A1 (ANDERSON et al.) 23 January 2000 (23-01-2000) - The whole document -	1, 38-42

[ ] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2009 (12-05-2009)	22 May 2009 (22-05-2009)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Jean-François Desrosiers 819- 934-6358

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2009/000052

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons :

1. [ ] Claim Nos. :
because they relate to subject matter not required to be searched by this Authority, namely :

2. [ ] Claim Nos. :
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically :

3. [ ] Claim Nos. :
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows :

see extra sheet

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos. :

4. [X] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos. : 1-31 and 38-42

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2009/000052

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA 2244537A1	03-02-2000	CA 2244537C	23-10-2007
		US 6530185B1	11-03-2003
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The claims are directed to 2 inventions:

Group A: Claims 1-31 and 38-42 are directed to a stay-in-place buck for placement in a form-work, the buck comprising fastener-receivers connectable to panels to form at least one fastener-receiving frame extending at least partially about a perimeter of the buck.

Group B: Claims 32-37 are directed to a stay-in-place buck for placement in a stay-in-place form-work having outer opposed panels, the buck comprising connector components engageable with complementary connector components on the outer opposed panels.

The independent claims of Groups A and B presently in the application are not so linked as to form a single general inventive concept. This inventive concept must find expression in special technical features which define the inventive contribution that the claimed invention makes over the prior art. It is noted, however, that the feature linking the present claims, namely a stay-in-place buck comprising a plurality of frame members extending transversely between outer opposed panels and defining a building opening, is known in the art as taught, for example, by Bollinger et al. (CA 2538828A1, published 05 November 2006), and is thus a prior art feature that cannot form an inventive link for the claims.

The claims of Groups A and B do not share a common inventive concept. The claims must be limited to one invention only as set out in PCT Rule 13.