Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 3109128 C 2023/01/17

(11)(21) 3 109 128

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2019/08/08
(87) Date publication PCT/PCT Publication Date: 2020/02/13
(45) Date de délivrance/Issue Date: 2023/01/17
(85) Entrée phase nationale/National Entry: 2021/02/08
(86) N° demande PCT/PCT Application No.: US 2019/045809
(87) N° publication PCT/PCT Publication No.: 2020/033771
(30) Priorités/Priorities: 2018/08/08 (US62/715,954); 2019/02/05 (US62/801,487)

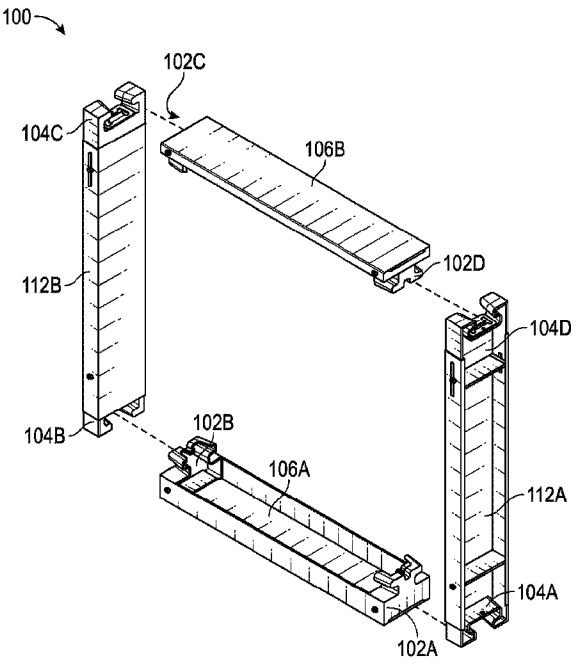
(51) Cl.Int./Int.Cl. *E04B 1/24* (2006.01), *E04B 1/343* (2006.01), *E04C 3/04* (2006.01)

(72) Inventeurs/Inventors:
SOBEL, KENNETH, US;
CADY, JAY, US

(73) Propriétaire/Owner:
HYPERFRAME INC., US

(74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : ENSEMBLE D'ENCADREMENT A CONNECTEURS MODULAIRES
(54) Title: FRAMING ASSEMBLY WITH MODULAR CONNECTORS



(57) Abrégé/Abstract:
Embodiments of a framing assembly including modular connectors for interconnecting components of the framing assembly are disclosed.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 February 2020 (13.02.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/033771 A1

(51) International Patent Classification:
E04B 1/24 (2006.01) *E04C 3/04* (2006.01)
E04B 1/343 (2006.01)

(21) International Application Number:
PCT/US2019/045809

(22) International Filing Date:
08 August 2019 (08.08.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/715,954 08 August 2018 (08.08.2018) US
62/801,487 05 February 2019 (05.02.2019) US

(71) Applicant: **HYPERFRAME INC.** [US/US]; 550 Innes Ave. #302, San Francisco, California 94124 (US).

(72) Inventors: **SOBEL, Kenneth**; 550 Innes Ave #302, San Francisco, California 94124 (US). **CADY, Jay**; 740 Newman Dr., South San Francisco, California 94080 (US).

(74) Agent: **DANIELS, Adam P.** et al.; Polsinelli LLP, 2049 Century Park East, Suite 2900, Los Angeles, California 90067 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) **Title:** FRAMING ASSEMBLY WITH MODULAR CONNECTORS

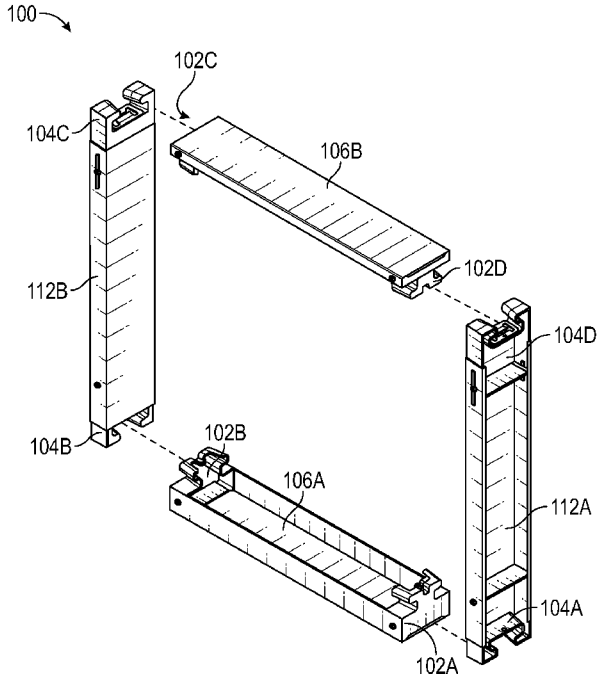


FIG. 1B

(57) **Abstract:** Embodiments of a framing assembly including modular connectors for interconnecting components of the framing assembly are disclosed.

WO 2020/033771 A1

FRAMING ASSEMBLY WITH MODULAR CONNECTORS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit to U.S. provisional patent application serial number 62/715,954 filed on August 8, 2018; and U.S. provisional patent application serial number 62/801,487 filed on February 5, 2019.

FIELD

[0002] The present disclosure generally relates to construction framing; and in particular, relates to framing assemblies, systems, and/or methods of forming a framing assembly using modular connectors configured for snap-fit connections which may have integrated electrical components for, e.g., power distribution.

BACKGROUND

[0003] Traditional methods for constructing residential and commercial buildings remain, for the most part, unchanged. During construction of a building, it is common to frame walls using light gauge steel framing components. Most metal frame walls are built on-site by skilled carpenters and installation involves a labor-intensive process. For rough framing projects in the United States, it is common for labor costs to exceed three times the material cost. In addition, labor costs may increase with a reduction in workforce availability.

[0004] In a standard configuration, frame assemblies such as metal frame walls include “tracks” and “studs” (or “joists”) which may be fastened together to form a wall frame. In general, a pair of tracks may be horizontally aligned in parallel along opposite ends of the wall, and studs may be positioned vertically between the tracks, typically at regular intervals (e.g., 16-inches on center). Each of the studs may then be manually secured to the tracks by engaging fasteners through the flanges of the tracks and the stud. Other joining methods may be used, such as welding and riveting. This process generally forms the supporting structure of the wall frame.

[0005] Connecting the studs with the tracks at the job site or during manufacturing presents various technical challenges. For example, it is generally critical to fasten the studs to the tracks using a fastening process that is capable of limiting lateral movement of the studs relative to the corresponding tracks so as to

Date Reçue/Date Received 2022-05-18

protect the integrity of the wall during building movement caused by expansion and contraction, wind forces, and seismic events. In addition, the fastening process must be cost and labor efficient. In some cases, this fastening process may be achieved using specialized tracks such as a deflection track that contains vertical slots spaced at regular intervals (e.g. one-inch on center). In this case, the studs may be secured to the deflection track by fastening screws through the closest slot of the deflection track and into the flange of the stud. Other specialized tracks may include cross-sectional modifications to the track profile so that the studs can be engaged along predetermined positions of the track. However, investment in such specialized tracks may complicate the overall framing process and/or lead to excess cost. On the other hand, studs and tracks widely available in the marketplace and/or commonly deployed for installation are shipped in large bundles of "raw" material and have standard dimensions and shape configurations (e.g., U-shaped or C-shaped); yet, a cost-efficient and mechanically sound fastening process for these widely available components is lacking. Moreover, such conventional tracks and studs lack sufficient features for accommodating the deployment of building utilities such as electrical, plumbing, HVAC, and the like.

[0006] It is with these observations in mind, among others, that various aspects of the present disclosure were conceived and developed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1A** is a perspective view of one embodiment of a framing assembly comprising a plurality of connectors for interconnecting tracks and studs of the framing assembly.

[0008] FIG. **1B** is an exploded perspective view of the framing assembly of FIG. **1A**.

[0009] FIG. **1C** is an exploded perspective view of the framing assembly of FIG. **1A** equipped with electrical component sub features.

[0010] FIG. **2** is a perspective view of a stud and a track of the framing assembly of FIGS. **1A-1B**.

[0011] FIG. **3A** is a perspective view of a first connector taken from FIGS. **1A-1B**; including a cut-out portion of a track to indicate possible engagement of the first connector to the track.

[0012] FIG. **3B** is a perspective view of the first connector of FIG. **3A** without the cut-out portion of a track.

[0013] FIG. **3C** is a side view of the first connector of FIG. **3A** with portions in phantom to indicate a retention cavity.

[0014] FIG. **3D** is a front view of the first connector of FIG. **3A**.

[0015] FIG. **3E** is a back view of the first connector of FIG. **3A**.

[0016] FIG. **3F** is a top partial plan view of the first connector of FIG. **3A**.

[0017] FIG. **4A** is a perspective view of a second connector taken from FIGS. **1A-1B**; including a cut-out portion of a stud to indicate possible engagement of the second connector to the stud.

[0018] FIG. **4B** is a perspective view of the second connector of FIG. **4A** without the cut-out portion of a stud.

[0019] FIG. **4C** is a side view of the second connector of FIG. **4A**.

[0020] FIG. **4D** is a rear view of the second connector of FIG. **4A**.

[0021] FIG. **4E** is a front view of the second connector of FIG. **4A**.

[0022] FIGS. **5A-5C** are perspective views illustrating engagement between the first connector of FIGS. **3A-3F** and the second connector of FIGS. **4A-4E** to form a locked configuration in FIG. **5C** which accommodates construction of the framing assembly as described herein.

[0023] FIG. **6A** is a rear view of the first connector and the second connector of FIG. **5C** fully engaged and forming the locked configuration of FIG. **5C**.

[0024] FIG. **6B** is a cross-sectional view taken along section line **I-I'** of FIG. **6A** illustrating one phase of the engagement between the first connector and the second connector of the framing assembly.

[0025] FIG. **6C** is a cross-sectional view taken along section line **I-I'** of FIG. **6A** illustrating another phase of the engagement between the first connector and the second connector.

[0026] FIG. **6D** is a detail view taken from the area indicated in FIG. **6C**.

[0027] FIG. **6E** is a cross-sectional view taken along section line **I-I'** of FIG. **6A** illustrating a final phase or final engagement between the first connector and the second connector such that the connectors form the locked configuration described herein.

[0028] FIG. **7** is a side view of an illustration associated with another embodiment of a framing assembly as described herein.

[0029] FIG. **8** is a side view of an illustration associated with another embodiment of a framing assembly configured for electromechanical connections, as described herein.

[0030] FIG. **9A** is a perspective view illustrating a portion of another embodiment of a framing assembly which may be configured for electromechanical connections using another embodiment of a first connector and another embodiment of a second connector described herein.

[0031] FIG. **9B** is a perspective view illustrating the framing assembly embodiment of FIG. **9A** from a different angle.

[0032] FIG. **10A** is a perspective view of a portion of another embodiment of a first connector adapted with a first electrical enclosure of the framing assembly of FIGS. **9A-9B**.

[0033] FIG. **10B** is a perspective view of a portion of the first connector and the first electrical enclosure of FIG. **10A** with a cover of the first electrical enclosure removed to reveal additional detail regarding the electrical characteristics of the first electrical enclosure and socket housing described herein.

[0034] FIG. **11** is a perspective view of a portion of another embodiment of a second connector with a second electrical enclosure of the framing assembly of FIGS. **9A-9B** and configured for forming electromechanical connection with the first connector and first electrical enclosure of FIGS. **10A-10B**.

[0035] FIG. **12** is a detail view showing of aspects of the second connector of FIG. **11**.

[0036] FIGS. **13A-13C** are perspective views with portions cut-away that illustrate different phases of engaging the first connector and first electrical enclosure of FIGS. **10A-10B** with the second connector and second electrical enclosure of FIG. **11**.

[0037] FIG. **14** is a perspective view of another embodiment of a first connector for use with any of the framing assembly embodiments described herein.

[0038] FIG. **15** is an exploded perspective view of another embodiment of a framing assembly.

[0039] FIG. **16** is a perspective view of a portion of the framing assembly embodiment of FIG. **15**.

[0040] Corresponding reference characters indicate corresponding elements among the view of the drawings. The headings used in the figures do not limit the scope of the claims.

DETAILED DESCRIPTION

[0041] Overview:

[0042] Aspects of the present disclosure relate to a framing assembly formed using a plurality of modular connectors. The framing assembly may be implemented as part of a structural or load-bearing frame, such as a wall frame (or non-structural or non-load bearing frame), leveraging snap-fit connections between the modular connectors that e.g., may facilitate engagement of studs to a track. In addition, embodiments of the wall frame system may include integrated utility services (e.g., power distribution). For example, embodiments of the modular connectors may include general male and female structural components with integrated electrical enclosures such that mechanical and electrical connections can be established simultaneously. Engagement of the integrated electrical enclosures forms a circuit which can deliver power to receptacles, switches, lights, and any other electrical devices associated with the framing assembly.

[0043] The embodiments described herein improve upon the fastening process associated with construction framing by leveraging modular connectors to provide suitable mechanical and/or electromechanical interconnections between the studs and tracks of a framing assembly; and in some embodiments, require no costly modifications to existing conventional framing studs and tracks commonly deployed.

[0044] Referring now to the Drawings, FIG. **1A** and FIG. **1B** illustrate a framing assembly **100**. In general, the framing assembly **100** may be formed using any number of first connectors **102** and second connectors **104** configured for snap-fit engagement with one another which accommodates the efficient formation of mechanical and/or electrical interconnections between various components of the framing assembly **100**, as further described herein. The framing assembly **100** may generally define a wall frame or portions thereof, a ceiling frame, or may be leveraged for any framing application requiring a framing structure. The framing assembly **100** is not limited to the general rectangular-shape configuration depicted, and variations of the framing assembly **100** are contemplated such that the components depicted may be arranged in any predetermined configuration to

assemble an overall frame for a building structure or otherwise. Further, while the first connectors **102** and the second connectors **104** are described herein generally as defining discrete components separate from each other and other components of the framing assembly **100**, it is contemplated that in some embodiments the first connector **102** and/or the second connector **104** may be manufactured integrally with either of the studs or tracks of the framing assembly **100** by way of a robotic assembly process or otherwise.

[0045] In the example shown, the framing assembly **100** may generally include a plurality of tracks **106**, represented as track **106A** and track **106B**. As indicated, the track **106A** and the track **106B** may be aligned in parallel to define a top end **108** of the framing assembly **100** and a bottom end **110** of the framing assembly **100** opposite the top end **108**. In addition, a plurality of studs **112**, represented as stud **112A** and stud **112B**, may be positioned vertically between the tracks **106** at any number of predetermined locations, such that the interconnections between the studs **112** and the tracks **106**, made possible by the first connectors **102** and second connectors **104**, collectively forms the framing assembly **100**.

[0046] Referring to FIG. **2**, the track **106A** and the stud **112A** of FIGS. **1A-1B** are depicted to illustrate further aspects of each of the tracks **106** and the studs **112**. As indicated, the track **106A** includes a track web **114**, a first track flange **116A**, and a second track flange **116B**. The first track flange **116A** is defined along a first lateral edge **118A** of the track web **114**, and the second track flange **116B** is defined along a second lateral edge **118B** of the track web **114** opposite the first lateral edge **118A**. The track **106A** further defines a track channel **120** formed collectively by the track web **114**, the first track flange **116A**, and the second track flange **116B**. In general, the track **106A** is identical in form and shape with respect to any one of the tracks **106** (e.g., track **106B**), such that each of the tracks **106** generally share a common or uniform profile configuration. In some cases, the track **106A** may be referred to as a U-shaped track (or U-shaped joist) widely available and often deployed in framing applications.

[0047] Similarly, the stud **112A** includes a stud web **122**, a first stud flange **124A**, and a second stud flange **124B**. The first stud flange **124A** is defined along a first lateral edge **126A** of the stud web **122**, and the second stud flange **124B** is defined along a second lateral edge **126B** of the stud web **122** opposite the first lateral edge **126A**. The stud **112A** further defines a stud channel **130** formed

collectively by the stud web **122**, the first stud flange **124A**, and the second stud flange **124B**. In general, the stud **112A** is identical in form and shape with respect to any one of the studs **112** (e.g., stud **112B**), such that each of the studs **112** generally share a common or uniform profile configuration. In some embodiments, the stud **112A** may be C-shaped, such that the stud **112A** further includes a third stud flange **127A** extending orthogonally from the first stud flange **124A**, and a fourth stud flange **127B** extending orthogonally from the second stud flange **124B**. In other cases, the stud **112A** may be a U-shaped stud (or U-shaped joist). C-shaped and U-shaped studs and tracks are often deployed in framing applications; yet, more efficient technical methods of interconnecting these components are desired.

[0048] Referring back to FIGS. **1A-1B**, in general, the first connectors **102** (represented as first connector **102A**, first connector **102B**, first connector **102C**, and first connector **102D**) may be mounted to or otherwise engaged along the tracks **106**, and the second connectors **104** (represented as second connector **104A**, second connector **104B**, second connector **104C**, and second connector **104D**) may be mounted to or otherwise engaged along the studs **112**, as shown and further described herein. In some embodiments, the first connectors **102** may be pre-fastened or manufactured along any longitudinal position of the tracks **106**, and arrangement and engagement of the first connectors **102** relative to the tracks **106** may predetermined to increase efficiency of forming the framing assembly **100**. As further described herein, the first connectors **102** and the second connectors **104** may be implemented as indicated in FIGS. **1-2** to mechanically and/or electromechanically interconnect the tracks **106** with the studs **112**.

[0049] Referring to FIG. **1C**, it should be appreciated that in some embodiments the components of the framing assembly **100** may be equipped with one or more sub-features to form electromechanical connections as the first connectors **102** and the second connectors **104** are engaged to interconnect the studs **112** and the tracks **106**. In some embodiments, the framing assembly **100** includes a bus **109** comprising one or more conductive layers extending along the track **106A**. The bus **109** may be electrically connected to an electrical enclosure **111A** positioned along the first connector **102A** adjacent one end of the bus **109** and an electrical enclosure **113B** positioned along the first connector **102B** adjacent another end of the bus **109** opposite the electrical enclosure **11A** as shown (and may further be connected to a power supply (not shown). In addition, respective electrical

enclosures **113B** may be defined along the second conductor **104B** and the second connector **104B** configured to electrically connect with the electrical enclosure **111A** and the electrical enclosure **111B** during formation of the framing assembly **100** or otherwise. Implementing these features, a circuit may be formed along the track **106A**, as the stud **112B**, the stud **112A** and the track **106A** are mechanically interconnected by way of the first connectors **102** and second connectors **104**. For example, as the first connector **102B** is mechanically engaged to the second connector **104B**, the electrical enclosure **111B** may be electrically connected to the electrical enclosure **113B** (to, e.g., extend electrical power traversing the bus **109** to the stud **112B**). The electrical enclosures of FIG. **1C** may include contact pads, plugs and sockets, or any number or type of connection mechanisms for forming an electrical circuit. Accordingly, the framing assembly **100** may be configured for mechanical interconnection as well as simultaneous electrical connection, as desired.

[0050] Referring to FIG. **3A**, a first connector **102A** taken from the first connectors **102** is shown in order to set out further detail regarding aspects of the first connectors **102**. In some embodiments, the first connector **102A** is identical in form and shape with respect to the first connector **102B**, the first connector **102C**, and the first connector **102D**, such that the first connectors **102** generally define a common or uniform profile configuration. As indicated, the first connector **102A** generally comprises a base **131**, and a first connector body **132** defining a mounting portion **134** extending over the base **131**. The base **131** generally defines a three-dimensional (3D) rectangular shape configuration or substrate which may be configured in size and dimensions suitable for insertion within the track channel **120** or the stud channel **130**. For example, as shown in FIG. **3A**, the base **131** of the first connector **102A** may be positioned along any predetermined longitudinal position of the track web **114** and wedged between the first track flange **116A** and second track flange **116B** in the manner shown such that the base **131** is substantially housed within a portion of the track channel **120**.

[0051] Referring to FIG. **3B**, the first connector **102A** defines a first side **136A** and a second side **136B** opposite the first side **136A**. The mounting portion **134** generally includes a deflection portion **138** defining a deflection surface **140** extending at least partially between the first side **136A** and the second side **136B**, a retention cavity **142** defined between the first side **136A** and the second side **136B**

of the first connector **102A**, and an edge portion **144** abutting the deflection portion **138**. In some embodiments, the mounting portion **134** may be in communication with the base **131** via a middle portion **145**. In some embodiments, the edge portion **144** defines a pair of edges **144A** and **144B** in parallel alignment on opposite lateral sides of the mounting portion **134**.

[0052] As indicated in FIG. **3C**, the deflecting portion **138** may comprise any number of sections to facilitate engagement with any one of the second connectors **104** as further described herein. Specifically, the deflecting portion **138** may define a first section **146** and a second section **148** in communication with the first section **146** at an apex **150**, such that the first section **146** is generally defined between the terminal end of the first side **136A** and the apex **150**, and the second section **148** is generally defined between the apex **150** and extends to the edge portion **144** and the retention cavity **142** (represented in phantom in FIG. **3C**). As indicated, the first section **146** may slope downwardly from the apex **150** to the first side **136A** along a first longitudinal axis **152**, and the second section **148** may generally extend horizontally along a second longitudinal axis **154** from the apex **150** to the edge portion **144**.

[0053] Further, as indicated in FIGS. **3B-3D**, the mounting portion **134** may define an access recess **156** along the first side **136A** in communication with the first section **146** of the deflection portion **138**. As shown, the access recess **156** may define a general semi-circular shape with the access recess **156** formed concavely along the first side **136A**. The access recess **156** accommodates disengagement of the first connector **102A** from any one of the second connectors **104** after the initial engagement, as further described herein.

[0054] In some embodiments as shown in FIG. **3B**, along opposite lateral sides of the deflecting portion **138**, the mounting portion **134** may further define a first chamfered arm **158** and a second chamfered arm **160** positioned in parallel arrangement relative to one another over opposite lateral ends of the base **131**. In this manner, the mounting portion **134** may generally define a T-shape configuration when viewed directly from the front side **136A** as indicated in FIG. **3D**. As further described herein, structural aspects of any of the second connectors **104** may be configured to receive or otherwise correspond to this embodiment of the mounting portion **134** to facilitate engagement.

[0055] Referring to FIG. **4A**, a second connector **104A** taken from the second connectors **104** is shown in order to set out further detail regarding aspects of the second connectors **104**. In some embodiments, the second connector **104A** is identical in form and shape with respect to any one of the second connectors **104**; such that each of the second connectors **104** generally defines a common or uniform profile configuration. As indicated, the second connector **104A** includes a second connector body **162** defining a first side **164A** and a second side **164B**. The second connector body **162** generally defines a 3D rectangular shape configuration which may be configured in size and dimensions suitable for insertion within the stud channel **130** (or the track channel **120**). For example, as shown in FIG. **4A**, the second connector body **162** may be telescopically received within the stud channel **130** of the stud **112A** of FIG. **2**, and positioned along a predetermined longitudinal position of the stud **112A**. In some embodiments as shown, portions of the stud **112A**, such as the third stud flange **127A** and the fourth stud flange **127B**, may at least partially wrap around the second connector **104A** to facilitate engagement of the second connector **104A** to the stud **112A**.

[0056] Referring to FIG. **4B**, the second connector body **162** generally includes a mounting recess **166**, a channel **168** defined by the mounting recess **166**, and a retention clip **170**. The mounting recess **166** is generally formed along a bottom side **172A** of the second connector body **162**, and extends concavely within the second connector body **162** from the bottom side **172A** to a predetermined depth **173** between the bottom side **172A** and a top side **172B** of the second connector body **162** opposite the bottom side **172A**. In some embodiments, the mounting recess **166** includes a first side portion **174**, a second side portion **176**, and a bottom portion **178** positioned between the first side portion **174** and the second side portion **176** as indicated. The bottom portion **178** of the mounting recess **166** defines a surface **180** that is substantially planar such that the retention clip **170** can be mounted thereto. In some embodiments, the first side portion **174** and the second side portion **176** of the mounting recess each define a chamfered shape such that the mounting recess **166** is configured to securely receive the first chamfered arm **158** and the second chamfered arm **160** of the first connector **102A**, respectively, as described herein.

[0057] In some embodiments, the mounting recess **166** naturally defines an opening **182** over the bottom portion **178** between the first side portion

174 and the second side portion **176** such that the channel **168** is in communication with the opening **182** and extends from the first side **164A** to the second side **164B** of the second connector body **162**. The opening **182** and the channel **168** collectively receive structure of the first connector **102A** including the mounting portion **134** when the first connector **102A** is engaged to the second connector **104A**. It is contemplated that the opening **182** and the channel **168** may take the form of any shape configuration suitable for engaging with the first connector **102A** as further described herein.

[0058] The retention clip **170** may be mounted to or otherwise positioned along the surface **180** of the bottom portion **178** of the mounting recess **166**. In some embodiments, the retention clip **170** includes a base portion **186** that may be mounted along the surface **180**. The retention clip **170** may further include a flange **188** extending from the base portion **186** and defining a contact end **191**. In some embodiments, the contact end **191**, which generally defines an outermost or free end of the flange **188**, is curved or angled away from the top side **172B** and the bottom portion **178** of the retention clip **170** (as shown in FIG. **4B**). In some embodiments, the retention clip **170** is comprised of a rigid or semi-rigid material such as a metal or steel that generally maintains an original shape configuration shown unless a deflecting force is applied to the flange **188** as further described herein. In general, for example, the flange **188** of the retention clip **170** temporarily deflects along the deflection surface **140** of the first connector **102A** and snaps or otherwise engages to within the retention cavity **142** of the first connector body, as further described herein.

[0059] Referring to FIGS. **5A-5C**, and FIGS. **6A-6E**, an exemplary snap engagement between the first connector **102A** and second connector **104A** is shown which may facilitate the interconnection of components and generally accommodate the efficient and secure formation of the framing assembly **100**. As indicated in a first phase of the engagement shown in FIG. **5A** and FIG. **6B**, the first side **136A** of the first connector **102A** may be oriented towards the first side **164A** of the second connector **104A**, such that the retention clip **170** of the second connector **104A** is in general horizontal alignment with a top side **192B** of the first connector **102A**, opposite a bottom side **192A** of the first connector **102A**. In addition, the mounting portion **134** of the first connector **102A** may be oriented towards the mounting recess **166** of the second connector **104A**.

[0060] Referencing a second phase of the engagement shown in FIG. **5B**, FIG. **6C**, and FIG. **6D**, the mounting portion **134** of the first connector **102A** may be inserted within the channel **168** of the second connector **104A** and urged in the direction **D1** shown in FIG. **6B** towards the second side **164B** of the second connector **104A**. As indicated in FIG. **6B**, as the mounting portion **134** traverses the channel **168**, the deflecting portion **138** ultimately engages with the contact end **191** of the flange **188** of the retention clip **170**, causing the contact end **191** and the flange **188** to temporarily deflect away from the bottom side **172A** of the second connector **104A**. Specifically, the contact end **191** initially contacts the first section **146** of the deflecting portion **138** and drags along the first section **146** and along the second section **148**, while temporarily deflected as described, until the contact end **191** traverses the entire deflection portion **138**. The angled surface of the first section **146** of the deflection portion **138** may facilitate the initial deflection of the flange **188**. In other words, as the flange **188** and the contact end **191** temporarily deflect or compress along the deflection portion **138** as described, the flange **188** may temporarily shift to a flattened configuration, temporarily reducing the curvature of the flange **188** relative to the bottom portion **178** of the retention clip **170**.

[0061] Referencing a third phase of the engagement and a locked configuration **194** shown in FIG. **5C** and FIG. **6E**, the mounting portion **134** of the first connector **102A** may continue to be urged in the direction **D1** shown in FIG. **6C** towards the second side **164B** of the second connector **104A** until the first connector **102A** and the second connector **104A** form the locked configuration **194** shown such that the first connector **102A** and the second connector **104A** are oriented in total vertical alignment; i.e., the first connector **102A** and the second connector **104A** share a common footprint. In this locked configuration **194**, the first side **164A** of the second connector **104A** may be flush vertically with the second side **136B** of the first connector **102A**, and the second side **164B** of the second connector **104A** may be flush vertically with the first side **136A** of the first connector **102A**.

[0062] In addition, in the locked configuration **194**, the contact end **191** completely traverses the deflection portion **138** from the first section **146** to the second section **148** of the deflecting portion **138**, such that the contact end **191** clears the deflection portion **138** enabling the flange **188** and the retention clip **170** to return to its original configuration. Once the contact end **191** fully traverses the deflecting portion **138** and the retention clip **170** snaps back or otherwise returns to

its original configuration as described, at least a portion of the flange **188** passes to within the retention cavity **142** of the first connector body **132**, and the contact end **191** is oriented towards and/or contacts the edge portion **144**, thereby restricting movement of the first connector **102A** away from the second connector **104A** (in a direction opposite **D1**).

[0063] In addition, in some embodiments, physical structure of the second connector **104A** or the first connector **102A** may restrict movement of the first connector **102A** away from the second connector **104A** (further in the direction **D1**) beyond the locked configuration **194**. In other words, once the mounting portion **134** of the first connector **102A** is entirely disposed within the mounting recess **166** such that the first connector **102A** and the second connector **104A** are at least positioned in general vertical alignment and the contact end **191** of the retention clip **170** abuts the edge portion **144**, portions of the second connector **104A** restrict horizontal movement of the first connector **102A** relative to the second connector **104A** in the direction **D1** beyond the locked configuration **194**. For example, the mounting recess **166** and/or the opening **182** of the second connector **104A** may include a shape configuration and suitable dimensions such that the mounting portion **134** frictionally engages within the mounting recess **166** as the mounting portion **134** is received by the mounting recess **166** to align the first connector **102A** and the second connector **104A** in the locked configuration **194**. More specifically, in some embodiments, the width of the channel **168** along the first side portion **174** and second side portion **176** and/or the opening **182** may gradually decrease in size from the first side **164A** to the second side **164B** of the second connector **104A** to facilitate this frictional engagement and limit movement of the mounting portion **134** through the channel **168** as described beyond the locked configuration **194**.

[0064] Further, the contact end **191** of the retention clip **170** abutting the edge portion **144** of the first connector **102A** restricts horizontal movement of the first connector **102A** relative to the second connector **104A** in a direction opposite direction **D1**. Accordingly, in the locked configuration **194** shown and described, the first connector **102A** is at least temporarily locked in place relative to the second connector **104A** in the x, y, and z-directions, which provides a secure engagement for interconnecting tracks and studs further engaged to each of the connectors. As indicated in FIGS. **6C-6E**, the retention clip **170**, the deflection portion **138**, the edge

portion **144**, and the retention cavity **142** may collectively define a locking mechanism **196** that assists to form the locked configuration **194**.

[0065] In addition, the locked configuration **194** may be disengaged by inserting a pair of pliers or other similar tool through the access recess **156** to again temporarily deflect the flange **188** of the retention clip **170** (not shown). Deflecting the flange **188** of the retention clip **170** again in this fashion may release the contact end **191** of the flange **188** from the retention cavity **142** to enable horizontal movement of the first connector **102A** away from the second connector **104A** to free the first connector **102A** from the second connector **104A**. In some embodiments, the flange **188** and the access recess **156** may be formed with dimensions suitable for accommodating a human finger to be inserted within the access recess **156** to release the flange **188** manually in this fashion.

[0066] The engagement illustrated in FIGS. **5A-5D** and FIGS. **6A-6E** may be employed to form the framing assembly of FIGS. **1A-1B**. In some embodiments, the engagement of the second connectors **104** to the studs **112** accommodates head-of-wall deflection. For example, in applications of the framing assembly **100** intended for non-load bearing walls, the second connector **104A** may be fixed relative to the stud **112A** in the position shown, but the second connector **104D** may merely be telescopically received within the stud channel (not shown) of the stud **112A** in the position shown without being fixed relative to the stud **112A**. As such, the second connector **104D** may be engaged to the first connector **102D** of the top track **106B** as indicated, but is capable at least some movement longitudinally along the stud **112A** even after engagement to the first connector **102D**. This movement may accommodate head-of-wall deflection as any force or form of stress is imposed upon the track **106B**.

[0067] The components of the framing assembly **100** described herein may be formed using any rigid or semi-rigid material such as a metal, steel, wood, plastic, or the like. Various modifications and variations to the framing assembly **100** are contemplated. For example, it should be appreciated that aspects of the first connectors **102** may be swapped with aspects of the second connectors **104**, such that features of the first connectors **102** and second connectors **104** may be interchangeable in design, such as the retention clip **170**. Further, the first connectors **102** may be manufactured integrally with the tracks **106** and the second

connectors **104** may be manufactured integrally with the studs **112**, or each of the aforementioned may be formed independently or discretely and later assembled.

[0068] Referring to FIG. **7**, another embodiment of a framing assembly, designated framing assembly **200**, is shown. The framing assembly **200** demonstrates that aspects of the framing assembly **100** may apply to more general embodiments of first connector and second connectors configured for temporary snap engagement. In this embodiment, the framing assembly **200** includes tracks **210** that may be interconnected with one or more studs **240** by engaging first connectors **230** arranged along the tracks **210** with second connectors **250** arranged along the studs **240**; similar to the first connector **102A** and second connector **104A** described above. The first connectors **230** and second connectors **250** are adapted to snap together without any screws, rivets, welds, or the like, as further described herein. In some embodiments, the first connectors **230** may be fixed in place relative to the tracks **210** or adjustable along the length of the tracks **210**, and at least some of the second connectors **250** may be fixed relative to the studs **240**.

[0069] As indicated in FIG. **7**, each of the first connectors **230** may generally comprise a body **232** including a channel **234** formed through the body **232** between a first opening **235A** defined along a first side, and a second opening **235B** defined along a second side opposite the first side. In addition, each of the first connectors **230** may include an edge portion **236** proximate to the second opening **235B** of the body **232**. As further shown, the second connectors **250** may generally include a body **252** defining a base **254**, and a flange **256** extending from the base **254**. As indicated, at least a portion of the flange **256** may be curved or angled away from the base **254**, and may define an engagement portion **258**. In general, the second connectors **250** may be engaged to the first connectors **230** by orienting the flange **256** towards the first opening **235A**, and passing the flange **256** and at least a portion of the base **254** through the channel **234**, such that the engagement portion **258** locks in place along the edge portion **236**. In some embodiments, to pass the flange **256** and at least a portion of the base **254** through the channel **234** as described, the flange **256** may be configured to temporarily deflect relative to the base **254** to accommodate the aforementioned engagement. The base **254**, the flange **256**, and the edge portion **236** may collectively define a locking mechanism **298**, which is implemented to form a locked configuration **299** between the first connectors **230** and the second connectors **250**.

[0070] To assemble the framing assembly **200**, the studs **240** may be engaged to one or more of the second connectors **250** (e.g., at both ends - top and bottom) of each stud, and the first connectors **230** may be mounted to or otherwise arrange along predetermined positions of the tracks **210**. To commence assembly, one end of each of the studs **240** slides along one of the tracks **210** until a respective one of the second connectors **250** connects or engages with a corresponding one of the first connectors **230** as shown. The same process may be repeated for the opposite end of each of the studs **240** and respective tracks **210**.

[0071] Referring to FIG. **8**, another embodiment of a framing assembly, designated framing assembly **300**, is shown. The framing assembly **300** is similar to the framing assembly **200** but includes integrated power distribution. For example, the framing assembly may utilize first connectors **330** and second connectors **370** to provide integrated power distribution across one or more studs **350** and tracks **310** in order to reduce manual electrical wiring and associated labor costs.

[0072] Similar to the framing assembly **200,** at least some of the first connectors **330** may generally comprise a body **332** including a channel **334** formed through the body **332** between a first opening **335A** defined along a first side, and a second opening **335B** defined along a second side. In addition, each of the first connectors **330** may include an edge portion **336** proximate to the second opening **335B** of the body. As further shown, the second connectors **370** may generally include a body **372** defining a base **374**, and a flange **376** extending from the base **374**. As indicated, at least a portion of the second connectors **370** may be curved or angled away from the base **374**, and may define an engagement portion **378** adjacent the flange **376**. In general, the second connectors **370** may be engaged to the first connectors **330** by orienting the flange **376** towards the first opening **335A**, and passing the flange **376** and at least a portion of the base **354** through the channel **334**, such that the engagement portion **378** locks in place along the edge portion **336** as indicated. In some embodiments, to pass the flange **376** and at least a portion of the base **354** through the channel **334** as described, the flange **376** may be configured to temporarily deflect relative to the base **374** to accommodate the aforementioned engagement. The base **374**, the flange **376**, and the edge portion **336** may collectively define a locking mechanism **398**, which is implemented to form a locked configuration **399** between the first connectors **330** and the second connectors **370**.

[0073] In some embodiments, the tracks **310** may include one or more of an integrated electrical bus **320** which may span longitudinally along portions of (or the length of) tracks **310**. The bus **320** may include insulating material and three electrical conductors for hot, neutral, and ground connections. Further, the tracks **310** can be engaged to (or manufactured/formed with) the first connectors **330** capable of electromechanically engaging with the second connectors **370** arranged along the studs **350** to form electrical connections with the second connectors **370** and between the studs **350** and tracks **310** by virtue of these connections. As further shown, each of the first connectors **330** may further include an electrical enclosure **340**, which electrically engages with the bus **320** to close a circuit and receive power. The electrical enclosure **340** can include three conductors corresponding to the three electrical conductors of the bus **320** (e.g., hot, neutral, and ground).

[0074] As further shown, each of the studs **350** may accommodate electrical connections with the tracks **310** and contain one or more of an integrated electrical bus **360** that may span longitudinally along portions of (or the length of) a corresponding one of the studs **350**. The bus **360**, like the electrical enclosure **340** and/or bus **320**, can include insulating material and three electrical conductors for hot, neutral, and ground connections. In some embodiments, the second connectors **370** each include an electrical enclosure **380** that is adapted to electrically connect with the electrical enclosure **340** of the first connectors **330**. The electrical enclosure **380** may include three conductors for hot, neutral, and ground, which electrically connect to bus **360**.

[0075] To form the framing assembly **300**, each of the studs **350** may be positioned vertically as shown with respect to one of the tracks **310** such that the second connectors **370** are oriented towards the first connectors **330**. The electrical enclosure **340** of the first connectors **330** may then be engaged to the electrical enclosure **380** of the second connectors **370** simultaneously while the flange **376** of the second connectors **370** may be passed through the channel **334** such that at least a portion of the base **374** passes through the channel **334** so as to lock the engagement portion **378** in place along the edge portion **336** as indicated. As an alternative to a grounding connector, the bodies of bottom ones of the tracks **310** and the studs **350** can be used as conductors for ground.

[0076] As further shown in FIG. **8**, the framing assembly **300** may include components from the framing assembly **200**, such as the first connectors **230**

and the second connectors **250**. In this manner, the framing assembly **300** may include mechanical connections devoid of electrical connectivity provided by the first connectors **230** and the second connectors **250**, and also electromechanical connections provided by the first connectors **330** and the second connectors **370**. Any of these connectors may be deployed as desired for a given framing assembly application.

[0077] Referring to FIGS. **9A-9B**, another embodiment of a framing assembly, designated framing assembly **400**, is shown, having aspects similar to the framing assembly **300** and suitable for forming electromechanical connections. The framing assembly **400** may generally include using any number of a first connector **402** and a second connector **404** configured for snap-fit engagement with one another to interconnect a track **406** with a stud **412** which accommodates efficient mechanical and/or electrical interconnection between various components of the framing assembly **400**, as further described herein. The framing assembly **400** may generally define a portion of a wall frame, a ceiling frame, or any other framing application requiring a framing structure. Further, while the first connector **402** and the second connector **404** are described herein generally as defining discrete components separate from each other and other components of the framing assembly **400**, it is contemplated that in some embodiments the first connector **402** and/or the second connector **404** may be manufactured integrally with studs or tracks of the framing assembly **400** by way of a robotic assembly process or otherwise.

[0078] As shown, the track **406** may generally define a U-shaped configuration such that the track **406** defines a track channel **420** extending along a length of the track **406**. In general, while the track **406** may define a U-shaped track (or U-shaped joist), in other embodiments, the track **406** may also take the form of a C-shaped track or other configuration. Similarly, the stud **412** may be U-shaped or C-shaped, and defines a stud channel **430** defined along a length of the stud **412**.

[0079] In some embodiments, the stud **412** and track **406** are configured to accommodate formation of one or more of an electrical connection for the framing assembly **400**. For example, the track **406** may include one or more of an integrated and optionally armored electrical bus **431** which may span longitudinal portions of (or the length of) the track **406**. The bus **431** may contain three electrical conductors **432** for hot, neutral, and ground connections and may include insulating

material along portions of the bus **431**. In addition, the stud **412** may include one or more of an integrated and optionally armored electrical bus **434** which can span longitudinal portions of (or the length of) the stud **412**. The bus **434** may include three electrical conductors **436** for hot, neutral, and ground connections and insulating material, and electrical conductors **436** may generally correspond to the electrical conductors **432** of the bus **431** of the track **406**. Either of the bus **431** or the bus **434** may comprise a flexible metal conduit. In some embodiments, the bus **434** may terminate inside an electrical box **437** which may be pre-mounted to stud **412**. This configuration of electrical components allows an installer to complete rough electrical wiring to the electrical box **437** simultaneously with the installation of the stud **412** in the framing assembly **400**.

[0080] Referring to FIG. **10A**, at least a portion of the first connector **402** may be received within the track channel **420** in the manner indicated. The first connector **402** may generally include a body **450** defining a center portion **452** and defining a pair of laterally opposed arms designated arm **454A** and arm **454B** along opposite ends of the center portion **452** and adapted to be mounted within the track channel **420**. In some embodiments, the arm **454A** and arm **454B** may be fastened to the track **406**, or may be configured to maintain a fixed position along the track channel **420** by way of friction.

[0081] The first connector **402** further includes an electrical enclosure **460** which may define a socket housing **462** further defining a plurality of sockets **464** in electrical communication with the bus **431** to close a circuit and receive power. The plurality of sockets **464** of the electrical enclosure **460** may correspond to the three electrical conductors **432** of the bus **431** (e.g., hot, neutral, and ground) of the track **406**. As further indicated in FIG. **10A** (and also indicated in FIG. **13A**), the body **450** of the first connector **402** further defines an edge portion **468** along an opposite side of the body **450** relative to the socket housing **462**.

[0082] Referring to FIG. **11**, the second connector **404** may be positioned along the stud **412**, such as the ends of the stud **412**, and may be telescopically received within the stud channel **430**. The second connector **404** may generally include a body **470** adapted for positioning along the stud channel **430**. In some embodiments, the body **470** may be fastened to the stud **412** in some predetermined location, or may be configured to maintain a fixed position relative to the stud **412** by way of friction. As indicated, the second connector **404** further

includes a retention clip **472** extending from the body **470**. In some embodiments, the retention clip **472** includes a flange **474** defining an engagement surface **476** adapted to abut the edge portion **468** of the first connector **402** as further described herein.

[0083] The second connector **404** further includes an electrical enclosure **480** which may define a housing **482** further defining a plurality of electrical contacts **484** in electrical communication with the conductors **436** extending within the bus **434** (not shown) to close a circuit and receive power. In other words, the plurality of electrical contacts **484** of the electrical enclosure **480** may correspond to the three electrical conductors **436** of the bus **434** (e.g., hot, neutral, and ground) extending along the stud **412**, and also to the plurality of sockets **464** of the first connector **402**. As further indicated in FIG. **12**, the electrical enclosure **480** may further include crimp fittings **486** to accept electrical wiring or other conductors that may traverse along the stud **412**. The crimp fittings **486** may, e.g., accept the conductors **436** extending within the bus **434** extending along the stud **412**.

[0084] Referring to FIGS. **13A-13B**, the first connector **402** may be engaged to the second connector **404** to electromechanically interconnect the track **406** with the stud **412**. In FIG. **13A**, the socket housing **462** of the first connector **402** including the plurality of sockets **464** may be oriented towards the plurality of electrical contacts **484** and the retention clip **472** of the second connector **404**. As indicated in FIGS. **13B-13C**, the first connector **402** and the second connector **404** may then be brought together in the manner indicated such that the plurality of electrical contacts **484** engage or plug to within the plurality of sockets **464** to form an electrical connection between the bus **431** of the track **406** and the bus **434** of the stud **412**.

[0085] Simultaneously, the flange **474** may temporarily deflect along a deflecting surface **490** of the first connector **402** and then return to its original position in FIG. **13C** such that the engagement surface **476** of the flange **474** snaps to and abuts the edge portion **468** of the first connector **402** as shown. In this manner, the retention clip **472** of the second connector **404** may generally latch onto the edge portion **468** be locked or fixed in place relative to the first connector **402** such that the second connector **404** 141 is at least temporarily locked in the x, y, and

z-directions. When connected as described, the first connector **402** and the second connector **404** form a locked configuration **498**.

[0086] Similar to any of the foregoing embodiments, it should be appreciated that various modifications and variations to the framing assembly **400** are contemplated. For example, it should be appreciated that aspects of the first connector **402** may be swapped with aspects of the second connector **404**, such that at that least some features of the first connector **402** and second connector **404** may be interchangeable in design; e.g., the flange **474** may be moved to the first connector **402**. Further, the first connector **402** may be manufactured integrally with the track **406** and the second connector **404** may be manufactured integrally with the stud **412**, or each of the aforementioned may be formed independently and later assembled. Different embodiments are further contemplated to accommodate any number of related electrical features. For example, alternative embodiments of the bus **320**, bus **360**, bus **431**, and bus **434** may include one or more electrical conductors, or more than three electrical conductors (e.g. for 240V split phase electrical service, such that each bus may include an extra hot conductor throughout extending through the bus for a total of four conductors).

[0087] Referring to FIG. **14**, another embodiment of first connector **502** for possible deployment with any of the framing assemblies described herein is shown. As indicated, the first connector **502** generally comprises a base **530**, and a first connector body **532** defining a mounting portion **534** extending over the base **530**. The base **530** generally defines a three-dimensional (3D) rectangular shape configuration or substrate which may be configured in size and dimensions suitable for insertion within the track channel **120** or the stud channel **130** of the framing assembly **100** or other framing assembly embodiments.

[0088] As shown, the mounting portion **534** of the first connector body **532** defines a first side **536A** and a second side **536B** opposite the first side **536A**. The mounting portion **534** generally includes a deflection portion **538** defined proximate to the first side **536A**, a retention cavity **542** defined between the first side **536A** and the second side **536B** of the mounting portion **534**, and an edge portion **544** abutting the deflection portion **538**. In some embodiments, the mounting portion **534** may be in communication with the base **530** via a middle portion **545**. Further, the mounting portion **534** may define an access recess **556** along the first side **536A** in communication with the retention cavity **542**. The access recess **556**

accommodates disengagement of the first connector **502** from any one of the second connectors after initial engagement (not shown).

[0089] In some embodiments, along opposite lateral sides of the deflecting portion **538**, the mounting portion **534** may further define a first chamfered arm **558** and a second chamfered arm **560** positioned in parallel relative to one another over opposite lateral ends of the base **530**. In this manner, the mounting portion **534** may generally define a T-shape configuration when viewed directly from the first side **536A**. As further described herein, structural aspects of any of the second connectors **104** may be configured to receive or otherwise correspond to this embodiment of the mounting portion **134** to facilitate engagement. For example, the first chamfered arm **558** and a second chamfered arm **560** may be configured to be received within the mounting recess **166** of the second connector **104A**.

[0090] Referring to FIG. **15**, a framing assembly **600** is shown similar to the framing assembly **100** of FIGS. **1A-1B**. In this embodiment, the framing assembly **600** may generally include a plurality of first connectors **602**, and a plurality of second connectors **604** configured to engage with the first connectors **602** to interconnect, e.g., a top track **606**, a first bottom track **607A**, a second bottom track **607B**, a plurality of studs **612** designated studs **612A-612E**, and a header **614**, as further described herein. The framing assembly **600** components may comprise a rigid or semi-rigid material, such as steel, any number or type of metal, plastic, or the like.

[0091] In the example of the framing assembly **600**, the studs **612A** and **612B** may be positioned between the top track **606** and the bottom track **607A** as shown. In addition, the studs **612D** and **612E** may be positioned between the top track **606** and the bottom track **607B**. As further shown, the header **614** may be positioned between the stud **612B** and the stud **612D**. The stud **612C**, which may have a length less than the other studs **612**, may be positioned between the top track **606** and the header **614**. The header **614** (or lintel) may be used to span across an opening for a window or door, or any other predefined opening along the framing assembly **600**. The header **614** may generally take the form of an elongated connection member, similar to a U-shaped stud or track.

[0092] In general, the aforementioned components of the framing assembly **600** may be interconnected by engaging the first connectors **602** to the second connectors **604** in closest proximity to the first connectors **602**. In some

embodiments, the first connectors **602** and the second connectors **604** may include at least some of the features of the first connectors **102** and the second connectors **104**. Accordingly, it is contemplated that the first connectors **602** are configured for snap-lock engagement with the second connectors **604** consistent with the snap-lock or locking mechanism functionality illustrated in FIGS. **5A-5C** and **6A-6E** and described herein. As shown for example, first connector **602A** engages with a second connector **604** (mounted along stud **612C**), first connector **602B** (mounted along stud **612B** as shown) engages with a second connector **604A** (mounted along a free end of header **614**), and first connector **602C** (mounted along stud **612D** as shown) engages with a second connector **604A** (mounted along another free end of header **614**).

[0093] Referring to FIG. **16**, further detail regarding the header **614** of the framing assembly **600** and possible methods of interconnecting the header **614** with other components of the framing assembly **600** is shown. As indicated, the header **614** may generally define a body **616** including a first flange **617A** and a second flange **617B** defining a header channel **618**. The first flange **617A** and a second flange **617B** may collectively provide a cross-sectional shape of the header **614** suitable for connection with any number of the first connector **602A** at predetermined cripple stud locations. For example, the first flange **617A** may define a first side wall **619A**, a second side wall **619B**, and a third sidewall **619C** extending from a return **620**. Similarly, the second flange **617B** may define a first side wall **621A**, a second side wall **621B**, and a third sidewall **621C** extending from a return **622**.

[0094] A first connector **602A** of the first connectors **602** may be mounted along the header **614** over the header channel **618**. In particular, the first connector **602A** defines a base **624** including a first leg **626A** along one lateral side of the base **624** and a second leg **626B** along another lateral side of the base **624** opposite the first leg **626A**. As indicated, the first leg **626A** of the first connector **602A** may be aligned in abutting fashion relative to the interior portions of the **617A**. More specifically, the first leg **626A** may at least partially rest along the second side wall **619B**, and abut the first side wall **619A**. In addition, the second leg **626B** may at least partially rest along the second side wall **621B**, and abut the first side wall **621A**. The first connector **602A** may further be anchored or fastened to the header **614** in the position shown.

Date Reçue/Date Received 2021-02-08

[0095] With exception to the modified base **624**, the first connector **602A** may generally take the form of the first connector **102A**, and may further include a mounting portion **632**, a deflecting portion **634**, a retention cavity **642**, and an edge portion **644**. The first connector is configured to connect with at least one of the second connectors **604** to interconnect other components of the framing assembly **600** to the header **614**. For example, the header **614** may be interconnected to the stud **612C** shown in FIG. **15**.

[0096] As further indicated, the second connectors **604** may generally define elongated versions of the second connectors **104**. For example, the second connector **604A** shown may include a body **650** with a portion of the body **650** (not shown) telescopically received within the header channel **618**. The body **650** may include a mounting recess **652** extending in concave fashion to within a predetermined portion of the body **650**, and the mounting recess **652** is configured to receive the mounting portion **632** of the first connectors **602**. Like the second connectors **104**, the second connector **604A** may further include a retention clip **654** for engagement along a deflection portion and an edge portion of a corresponding first connector **602** (not shown).

[0097] It is believed that the present disclosure and many of its attendant advantages should be understood by the foregoing description, and it should be apparent that various changes may be made in the form, construction, and arrangement of the components without departing from the disclosed subject matter or without sacrificing all of its material advantages. The form described is merely explanatory, and it is the intention of the following claims to encompass and include such changes.

[0098] While the present disclosure has been described with reference to various embodiments, it should be understood that these embodiments are illustrative and that the scope of the disclosure is not limited to such embodiments. Many variations, modifications, additions, and improvements are possible. More generally, embodiments in accordance with the present disclosure have been described in the context of particular implementations. Functionality may be separated or combined in blocks differently in various embodiments of the disclosure or described with different terminology. These and other variations, modifications, additions, and improvements may fall within the scope of the disclosure as defined in the claims that follow.

Date Reçue/Date Received 2021-02-08

Docket No. PCT App. No. PCT/US19/45809 | 100231-633759 (HYP-001-PCT)
Title: FRAMING ASSEMBLY WITH MODULAR CONNECTORS

NATIONAL STAGE CLAIMS

1. A framing assembly (100), comprising:

   a first connector (102A), the first connector including a deflection portion (138) defining a deflection surface (140) and an edge portion (144) in communication with the deflection portion (138); and

   a second connector (104A) including a retention clip (170) defining a base portion (186) and a contact end (191) extending from the base portion (186),

   wherein the second connector (104A) is configured to engage with the first connector (102A) to form a locked configuration and interconnect framing components (106A/112A) with the contact end (191) abutting the edge portion (144) of the first connector (102A) and restricting movement of the second connector (104A) relative to the first connector (102A), and

   wherein in the locked configuration the contact end (191) of the second connector (104A) is oriented towards the edge portion (144).

2. The framing assembly of claim 1, wherein the edge portion (144) defines a pair of edges in parallel alignment relative to the deflection portion (138).

3. The framing assembly of claim 1, wherein the deflection surface (140) extends at least partially between a first side (136A) and a second side (136B) of the first connector (102A).

4. The framing assembly of claim 1, wherein the first connector (102A) and the second connector (104A) form the locked configuration by temporary deflection of the contact end (191) of the retention clip (170) against the deflection surface (140) of the first connector (102A).

Date Reçue/Date Received 2021-02-08

5. The framing assembly of claim 4, wherein in the locked configuration the contact end (191) completely traverses the deflection portion (138) from a first section (146) to a second section (148) of the deflecting portion (138), such that the contact end (191) clears the deflection portion (138) enabling the retention clip (170) to return to its original configuration from a temporary deflection.

6. The framing assembly of claim 1, further comprising:
wherein the framing components include:
a first framing component (106A), the first connector (102A) positioned along the first framing component; and
a second framing component (112A) extending orthogonally from the first framing component (106A), the second connector (104A) positioned along the second framing component, and
wherein the first connector and the second connector interconnect the first framing component with the second framing component.

7. The framing assembly of claim 6, wherein the first connector includes (102A/330) a first electrical enclosure (340), and the second connector (104A/370) includes a second electrical enclosure (380) that electrically connects with the first electrical enclosure (340) to form an electrical circuit along the first framing component (106A) and the second framing component (112A).

8. A framing assembly (100), comprising:
a first connector (102A), the first connector (102A) including a deflection portion (138) defining a deflection surface (140) and an edge portion (144) in communication with the deflection portion (138); and
a second connector (104A) including a retention clip (170) defining a base portion (186) and a contact end (191) extending from the base portion (186),
wherein the second connector (104A) is configured to engage with the first connector (102A) to form a locked configuration and interconnect

Date Reçue/Date Received 2021-02-08

framing components (106A/112A) with the contact end (191) abutting the edge portion (144) of the first connector (102A) and restricting movement of the second connector (104A) relative to the first connector (102A, and

wherein to assume the locked configuration, the contact end (191) of the second connector (104A) is oriented away from the first connector (102A).

9. The framing assembly of claim 8, wherein to assume the locked configuration, the edge portion (144) of the first connector (102A) is oriented away from the second connector (104A).

10. The framing assembly of claim 9, wherein to assume the locked configuration, the second connector (104A) slides across the first connector (102A) in a first direction (D1).

11. The framing assembly of claim 10, wherein in the locked configuration the contact end (191) contacts the edge portion (144) and restricts movement of the second connector (104A) from the first connector (102A) in a second direction opposite the first direction (D1).

12. A framing assembly (100), comprising:

a first connector (102A), the first connector (102A) including a deflection portion (138) defining a deflection surface (140) and an edge portion (144) in communication with the deflection portion (138); and

a second connector (104A) including a retention clip (170) defining a base portion (186) and a contact end (191) extending from the base portion (186),

wherein the second connector (104A) is configured to engage with the first connector (102A) to form a locked configuration and interconnect framing components (106A and 112A) with the contact end (191) abutting the edge portion (144) of the first connector (102A) and

Date Reçue/Date Received 2021-02-08

restricting movement of the second connector (104A) relative to the first connector (102A),

wherein the framing components include:

a first framing component (106A), the first connector (102A) positioned along the first framing component; and

a second framing component (112A) extending orthogonally from the first framing component, the second connector (104A) positioned along the second framing component, and

wherein the first connector and the second connector interconnect the first framing component with the second framing component.

13. The framing assembly of claim 12, wherein the first connector (102A) slides freely within the first framing component (106A) to accommodate deflection.

14. The framing assembly of claim 12, further comprising:

wherein the first framing component (106A) includes a track defining a track channel (120), the first connector (102A) engaged within the track channel (120); and

wherein the second framing component (112A) includes a stud in perpendicular alignment relative to the track (106A) and defining a stud channel (130), the second connector (104A) telescopically received within the stud channel (130), and

wherein the track (106A) defines a wall head track and the second connector (104A) is slidable freely within the stud channel (130) to accommodate head-of-wall deflection associated with the track (106A).

15. The framing assembly of claim 12, further comprising:

a header (614) positioned in orthogonal relation relative to the second framing component (112A/612B);

Date Reçue/Date Received 2021-02-08

a third connector (602A) positioned along a first side of the header (614), the third connector (602A) defining a first profile configuration such that the third connector (602A) includes an edge portion;

a fourth connector (604A) positioned along a second side of the header (614) adjacent the first side of the header (614), the fourth connector (604A) defining a second profile configuration such that the fourth connector (604A) includes a flange;

a fifth connector (604) that connects to the third connector (602A), the fifth connector (604) defining the second profile configuration such that the fifth connector (604) includes a flange that engages with the edge portion of the third connector (602A); and

a sixth connector (602B) mounted to the second framing component (112A/612B), the sixth connector (602B) defining the first profile configuration such that the sixth connector (602B) includes an edge portion that engages with the flange of the fourth connector (604A).

Date Reçue/Date Received 2021-02-08

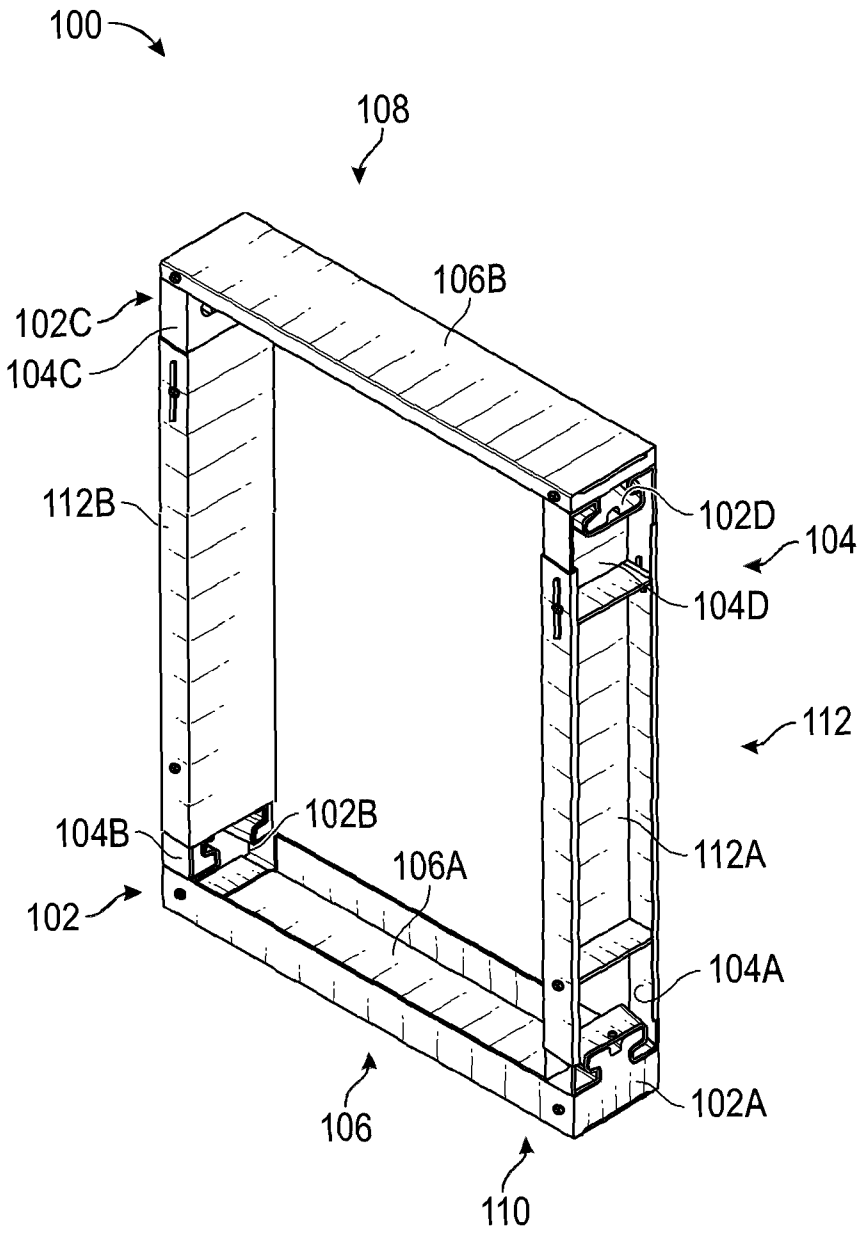

100
108
106B
102C
104C
112B
102D
104
104D
112
104B
102B
106A
112A
102
104A
106
102A
110

FIG. 1A

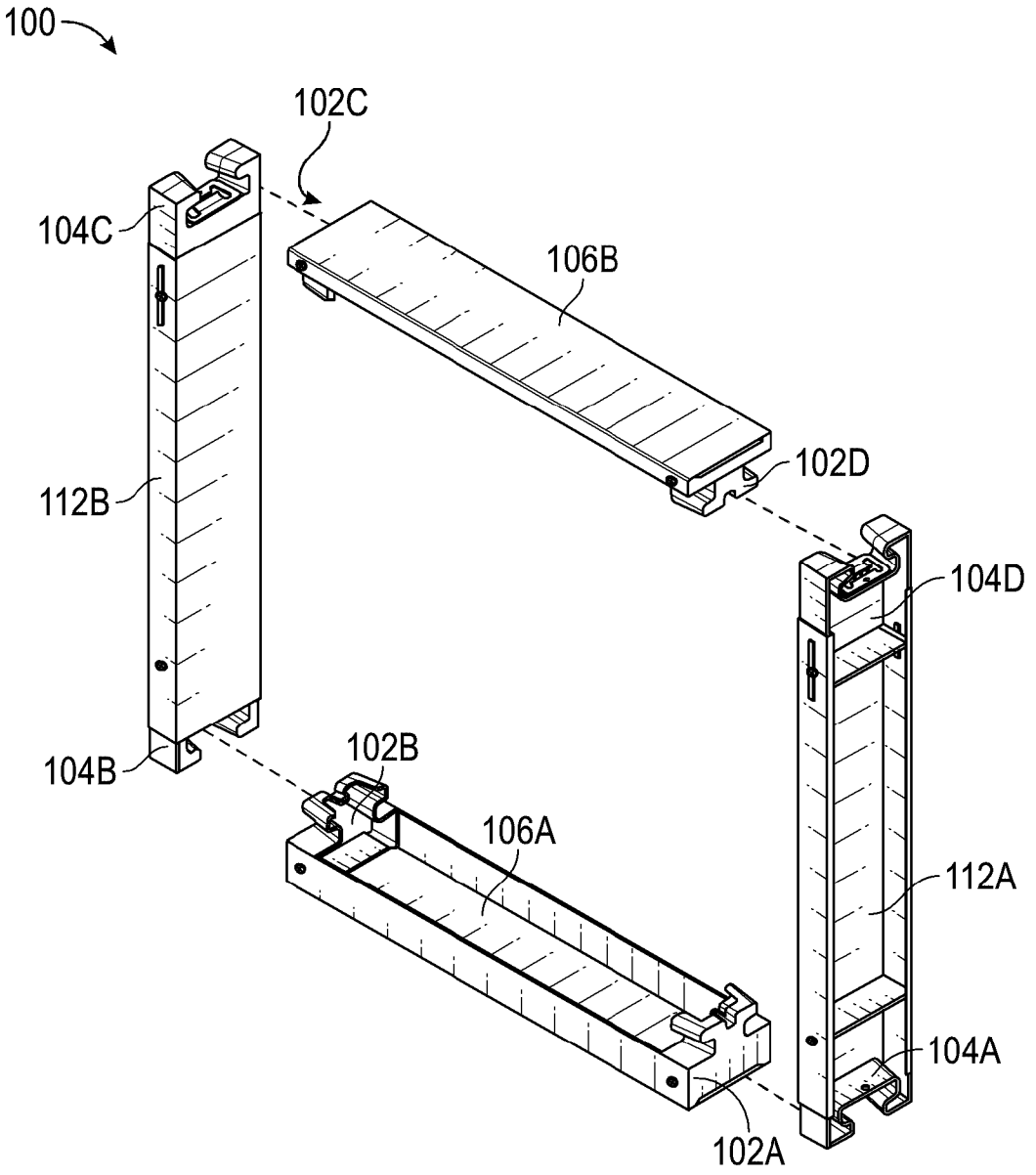

100
102C
104C
106B
112B
102D
104D
104B
102B
106A
112A
104A
102A

FIG. 1B

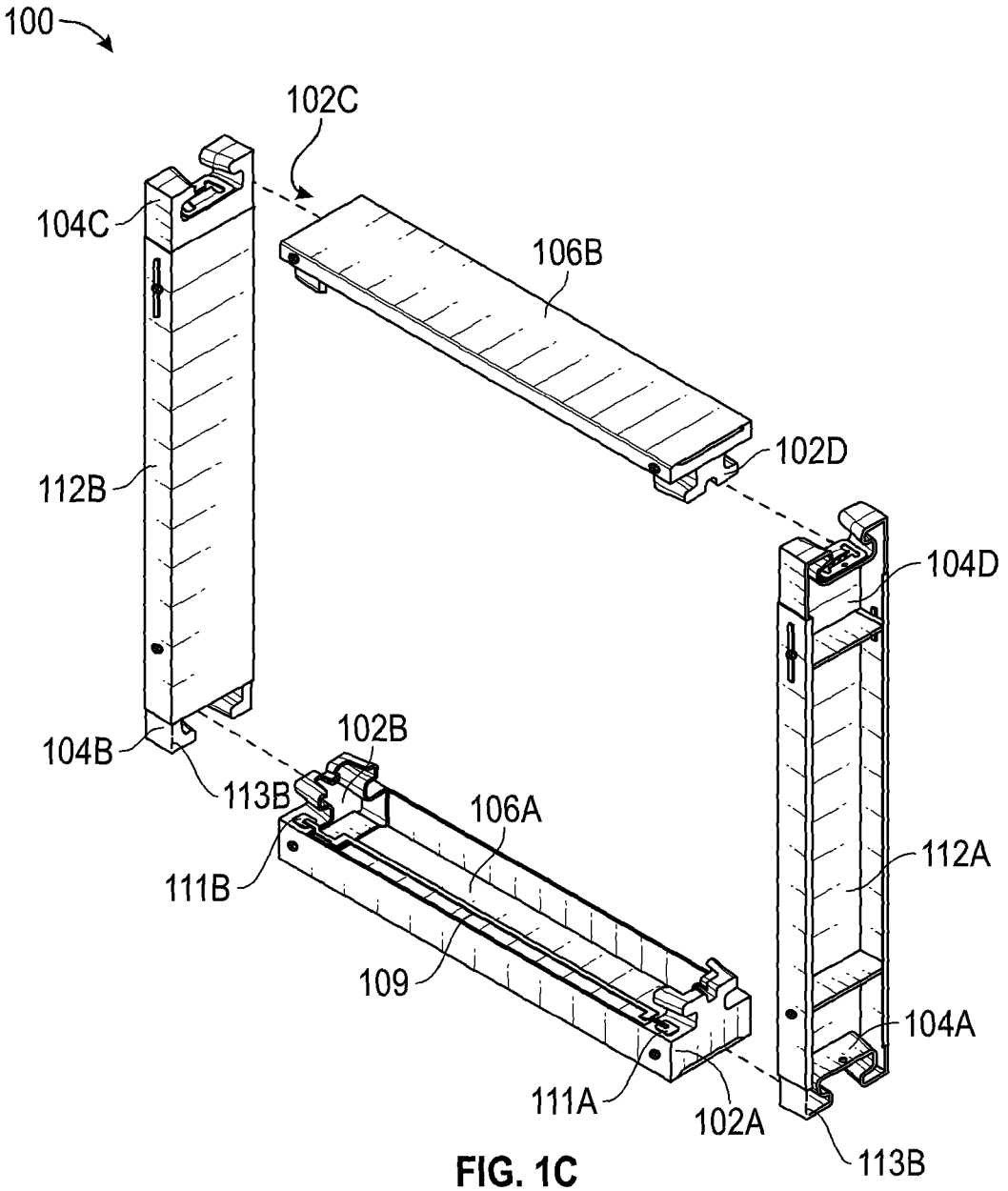

100
102C
104C
106B
112B
102D
104D
104B
102B
113B
106A
111B
112A
109
104A
111A
102A
113B

FIG. 1C

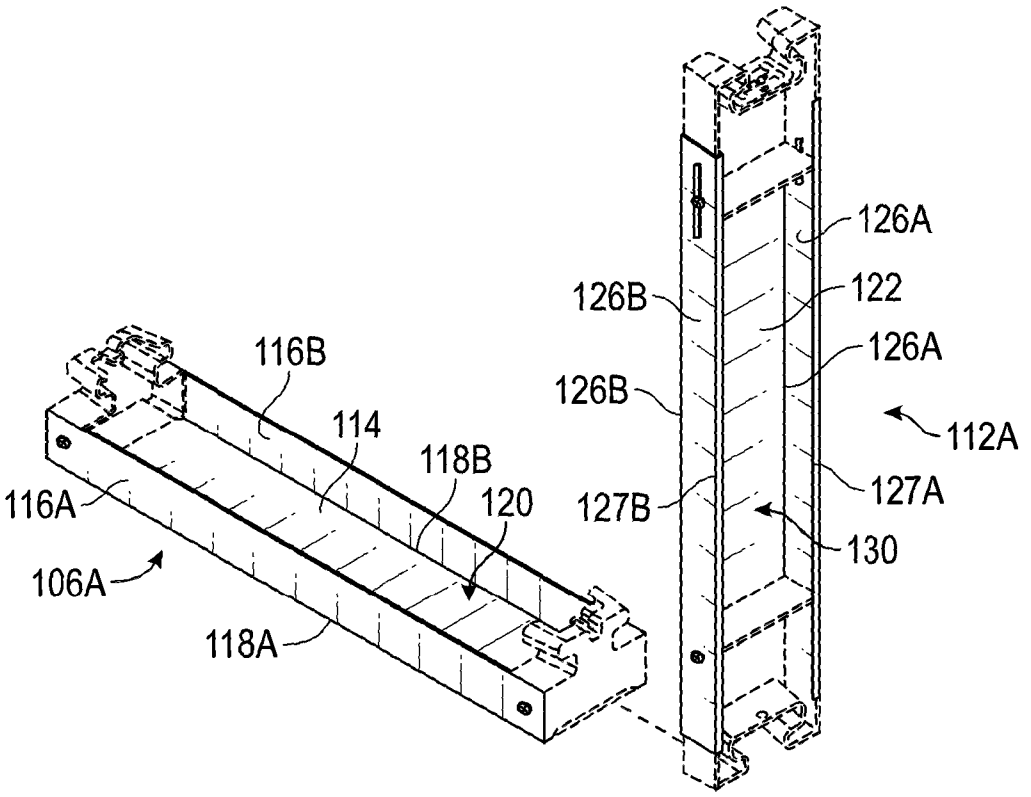

126A
126B
122
126A
126B
112A
116B
114
118B
116A
120
127B
127A
130
106A
118A

FIG. 2

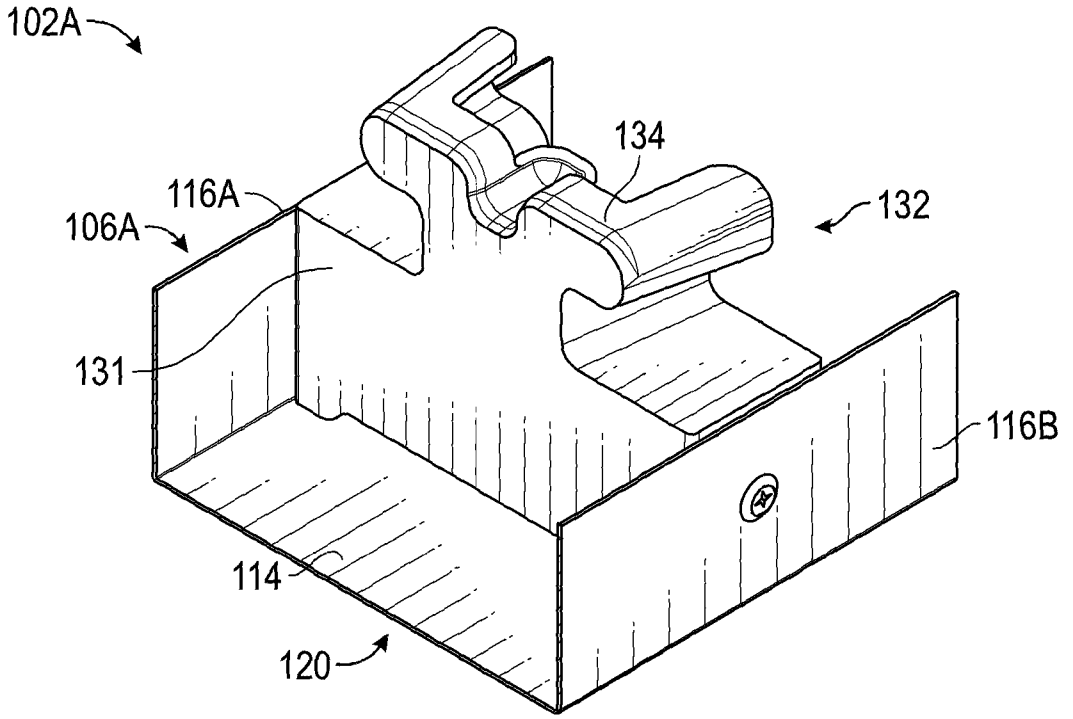

102A
134
116A
106A
132
131
116B
114
120

FIG. 3A

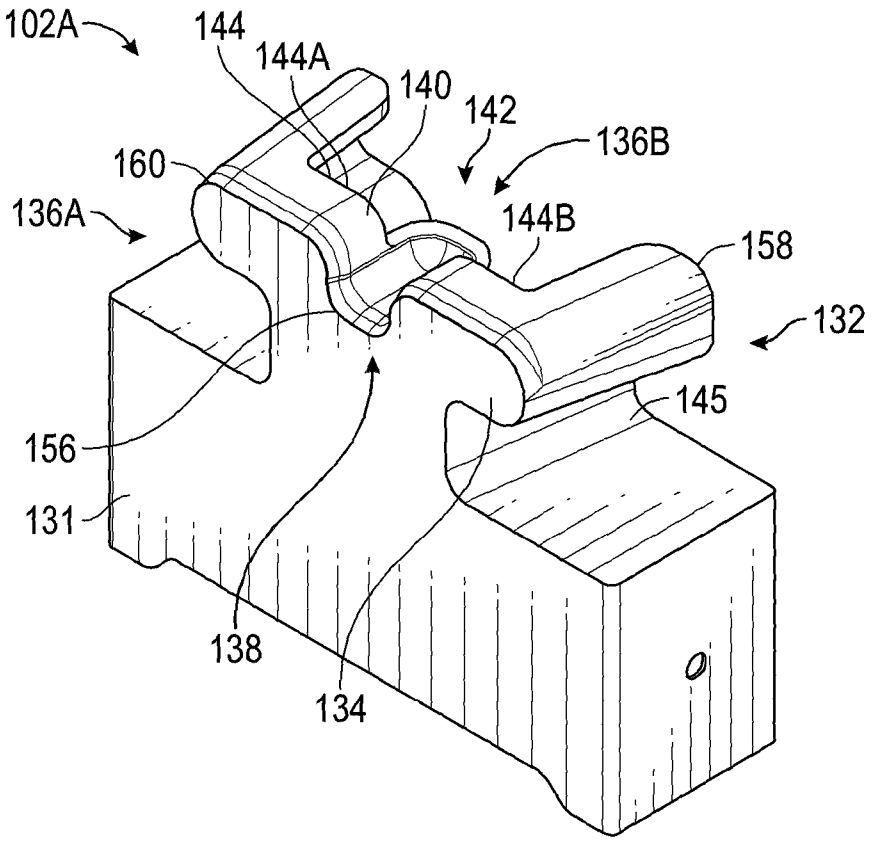

102A
144
144A
140
142
136B
160
136A
144B
158
132
145
156
131
138
134

FIG. 3B

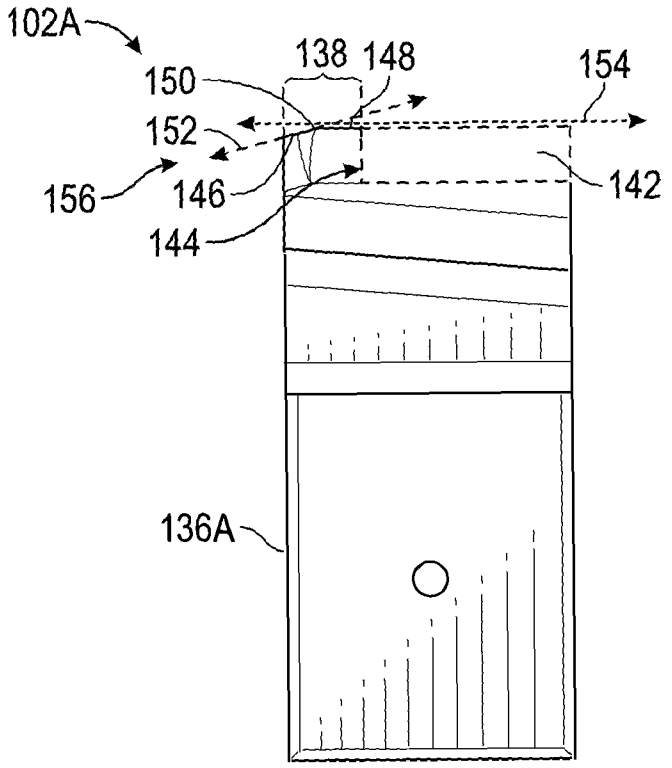

102A
138
148
154
150
152
156
146
142
144
136A

FIG. 3C

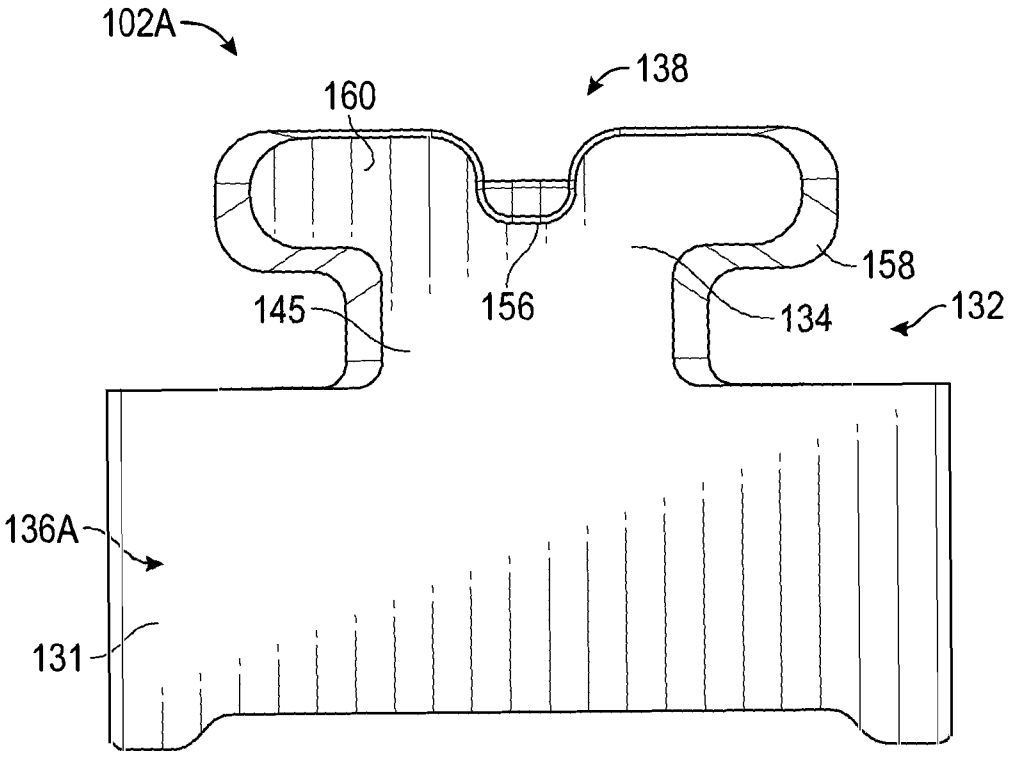

102A
138
160
158
145
156
134
132
136A
131

FIG. 3D

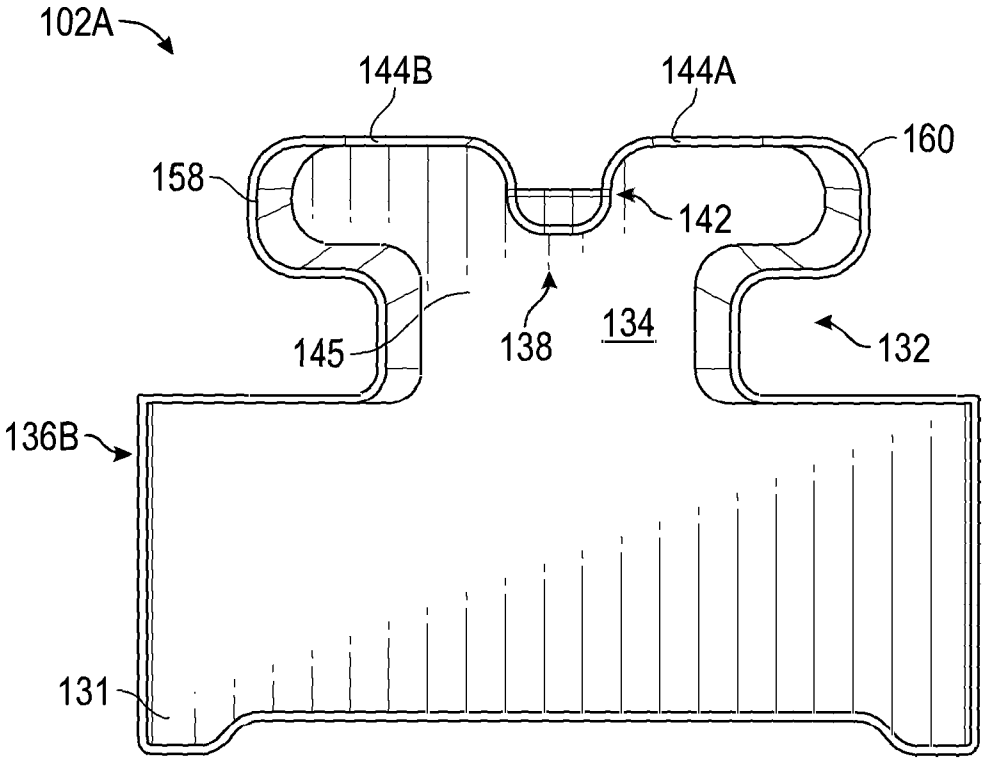

102A
144B
144A
160
158
142
145
138
134
132
136B
131

FIG. 3E

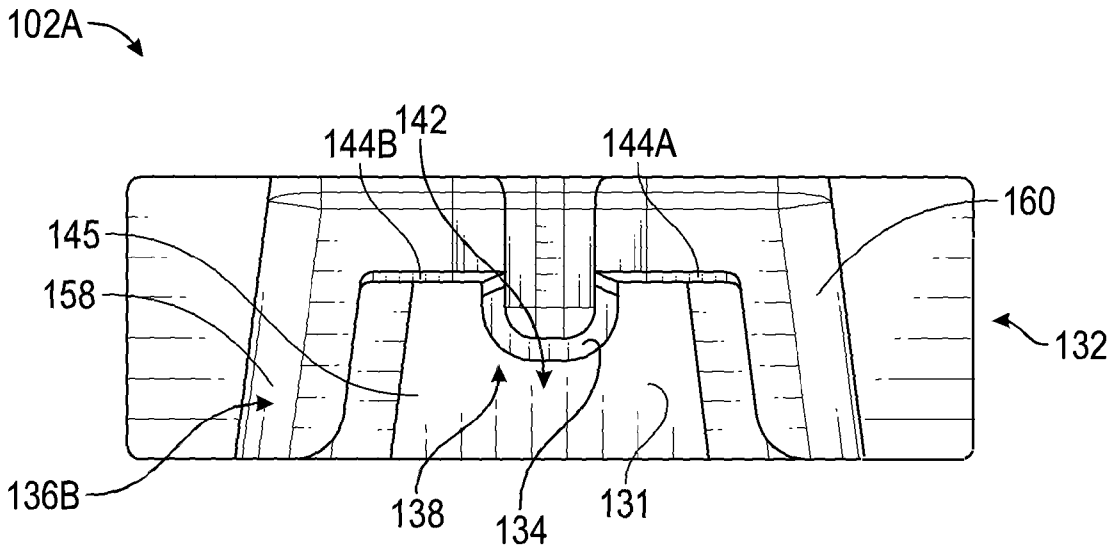

102A
142
144B
144A
160
145
158
132
136B
138
134
131

FIG. 3F

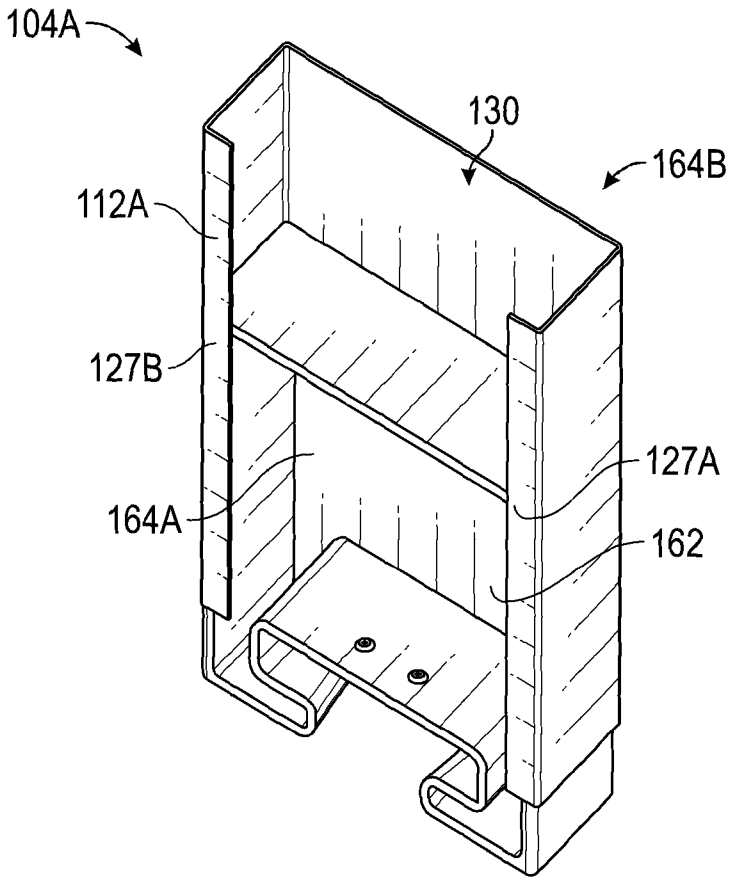

104A
130
164B
112A
127B
127A
164A
162

FIG. 4A

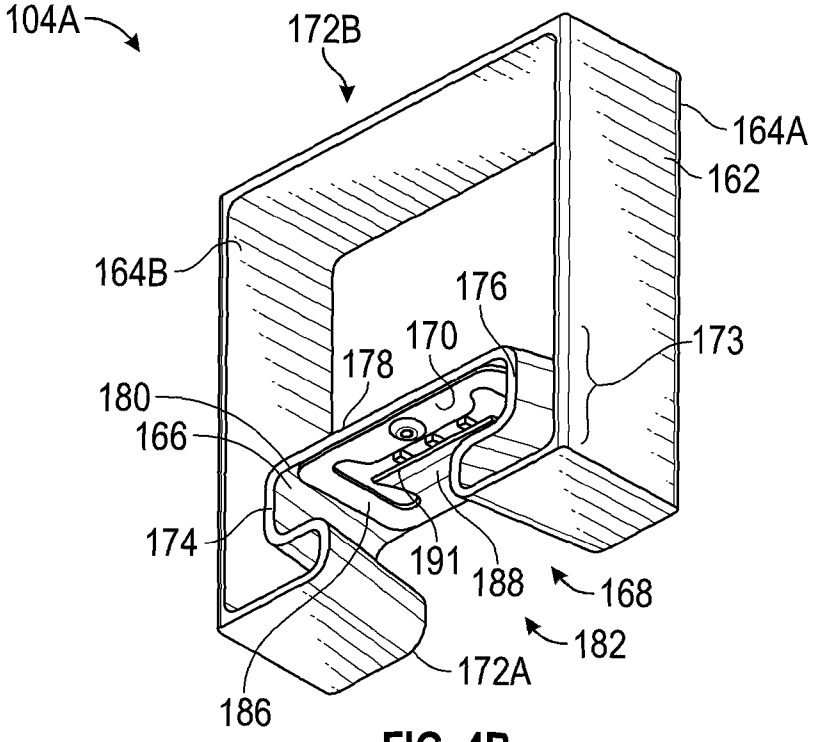

104A
172B
164A
162
164B
176
170
178
173
180
166
174
191
188
168
182
172A
186

FIG. 4B

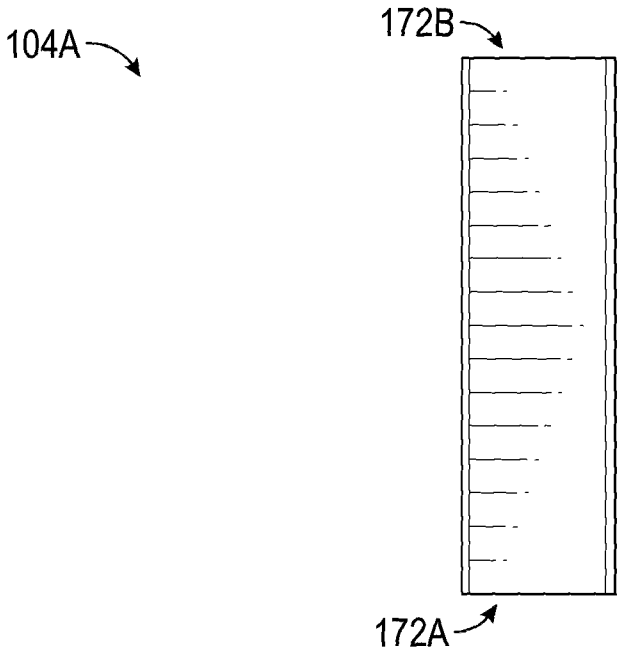

104A
172B
172A

FIG. 4C

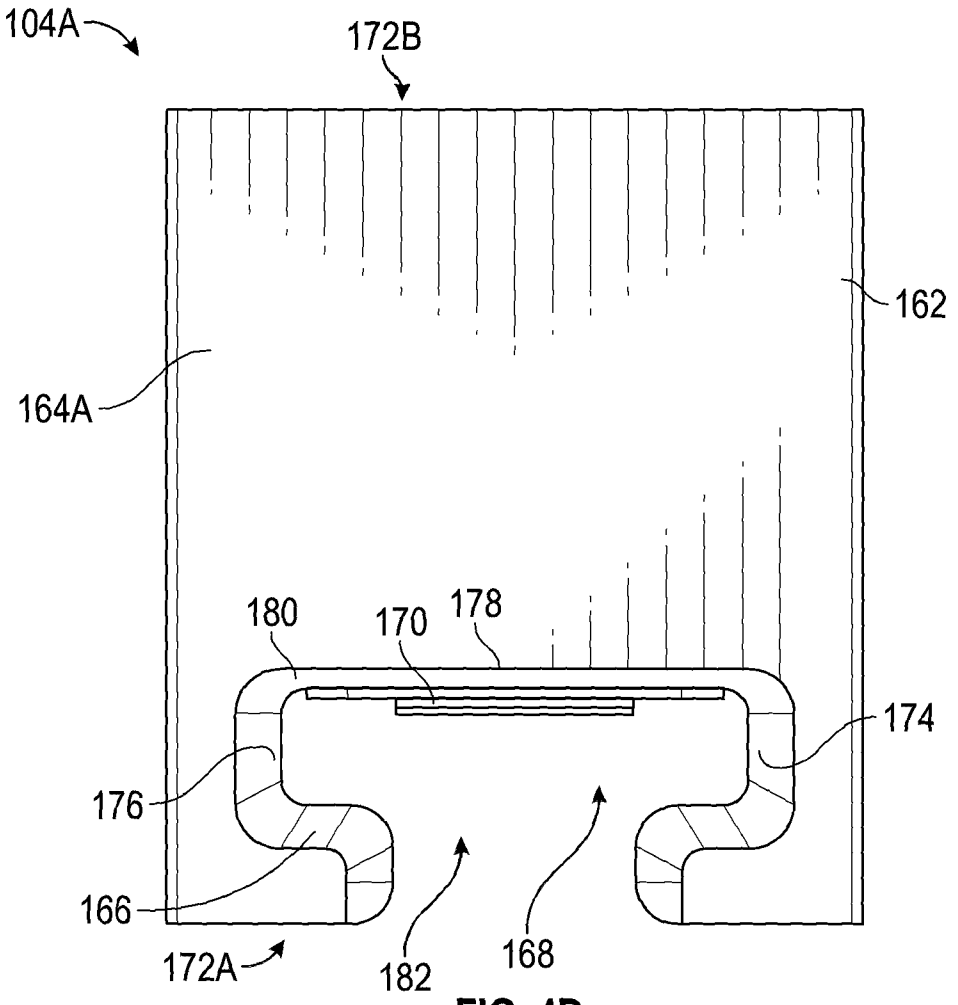

104A
172B
162
164A
180
170
178
174
176
166
172A
182
168

FIG. 4D

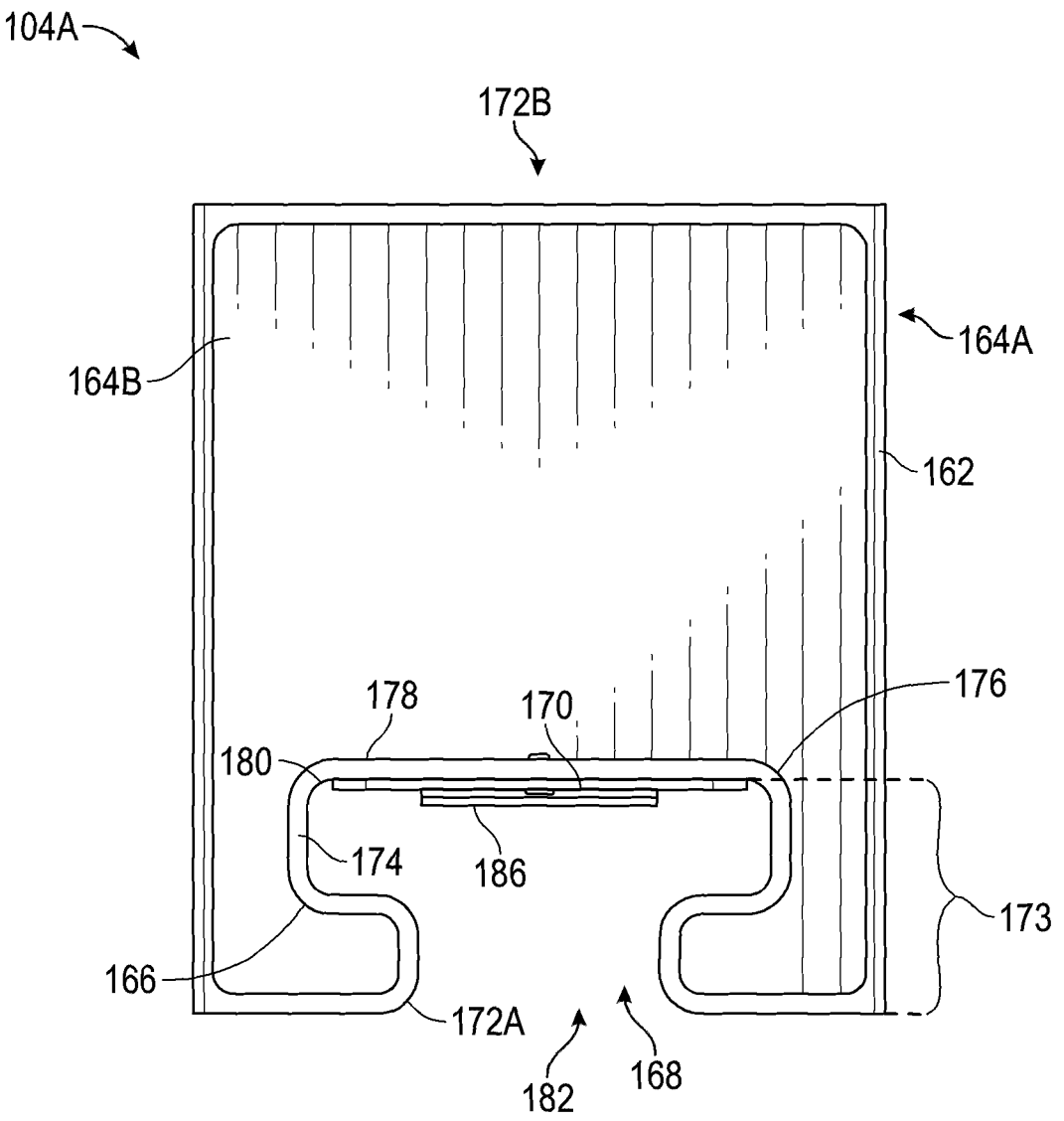

104A
172B
164A
164B
162
176
178
170
180
174
186
173
166
172A
182
168

FIG. 4E

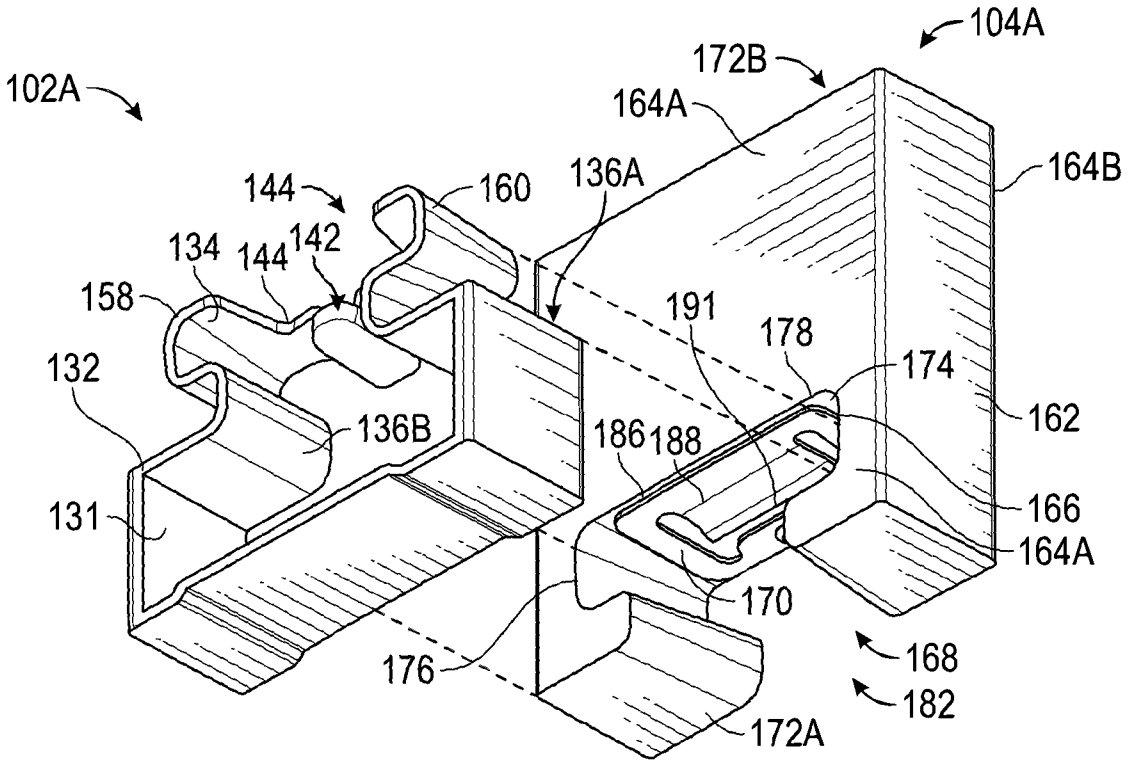

104A
172B
102A
164A
164B
144
160
136A
134
144
142
158
191
178
174
132
162
136B
186
188
166
131
164A
170
168
176
182
172A

FIG. 5A

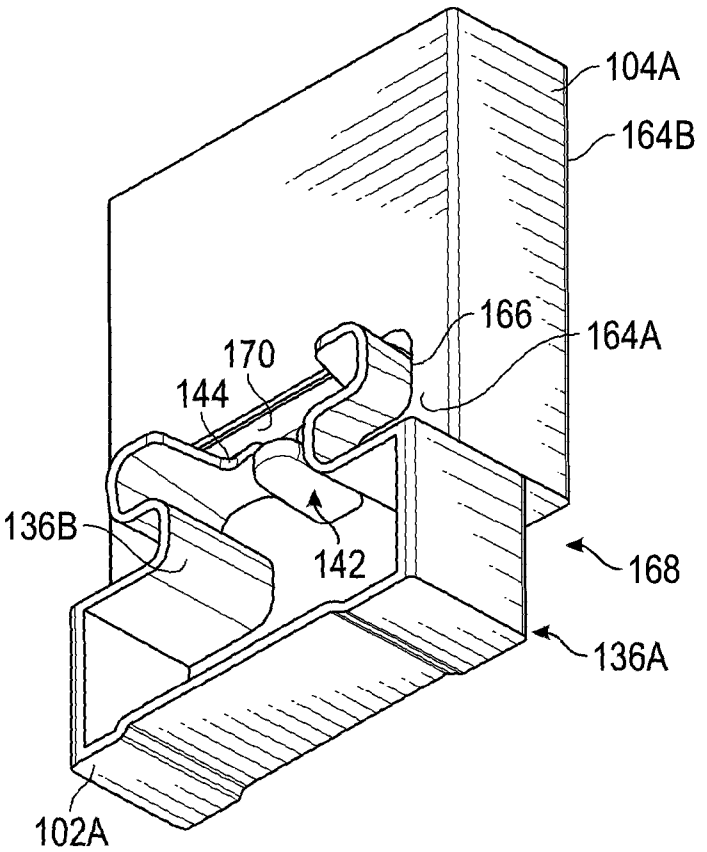

104A
164B
166
164A
170
144
136B
142
168
136A
102A

FIG. 5B

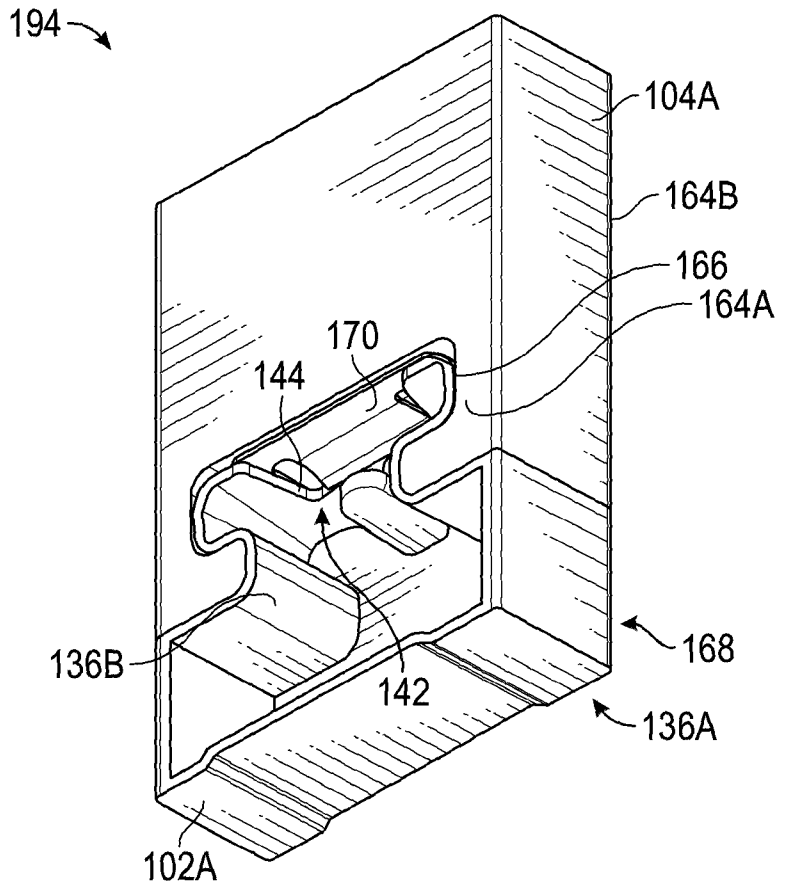


FIG. 5C

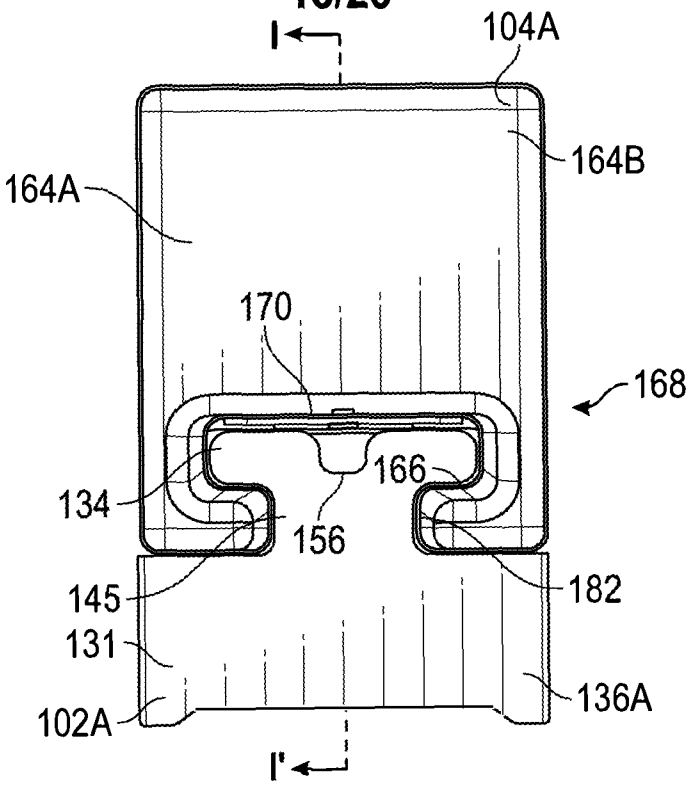

I
104A
164B
164A
170
168
166
134
156
145
182
131
136A
102A
I'

FIG. 6A

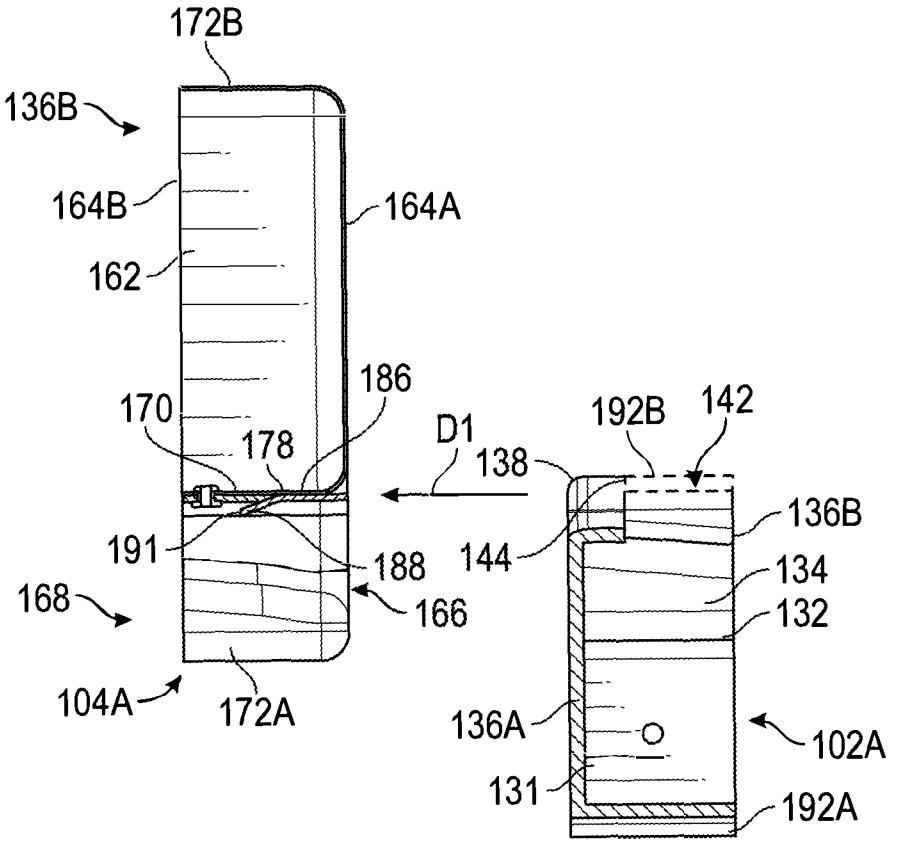

172B
136B
164B
164A
162
186
170
178
D1
192B
142
138
136B
191
188
144
134
168
166
132
104A
172A
136A
102A
131
192A

FIG. 6B

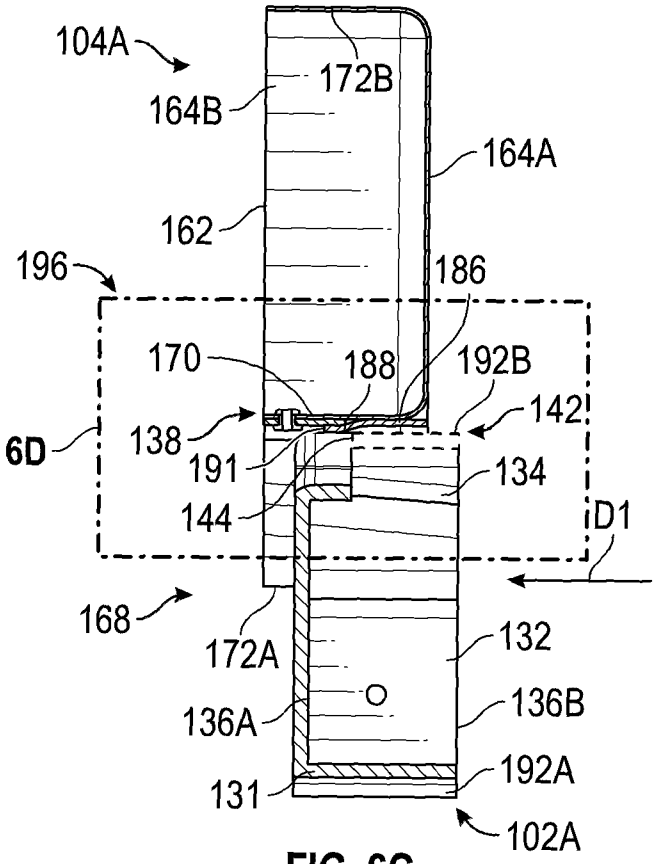

104A
172B
164B
164A
162
196
186
170
188
192B
142
6D
138
191
134
144
D1
168
172A
132
136A
136B
131
192A
102A

FIG. 6C

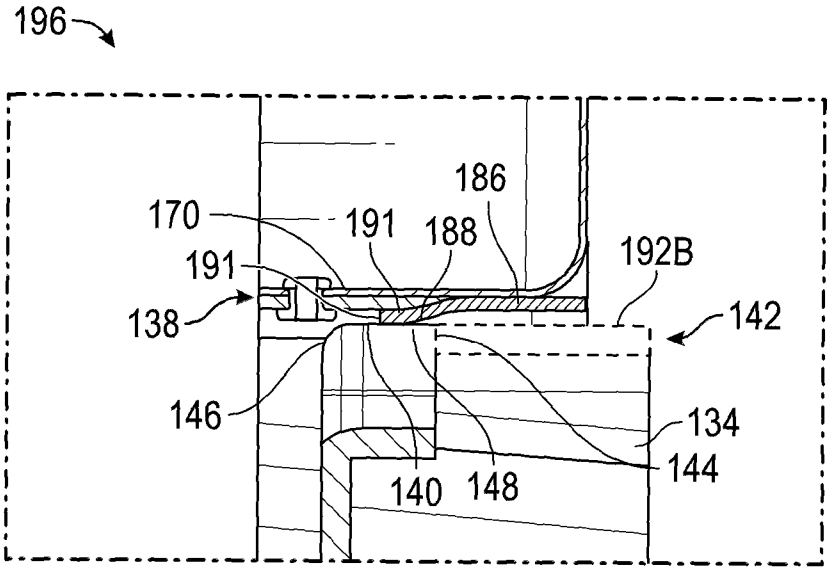

196
186
170
191
188
191
192B
138
142
146
134
144
140
148

FIG. 6D

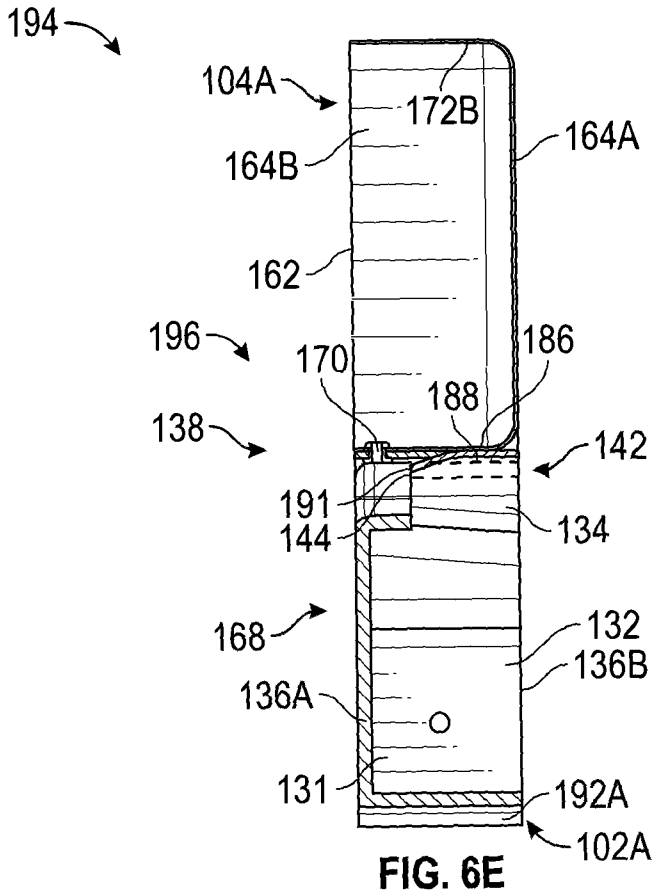

194
104A
172B
164A
164B
162
196
170
186
188
138
142
191
144
134
168
132
136B
136A
131
192A
102A

FIG. 6E

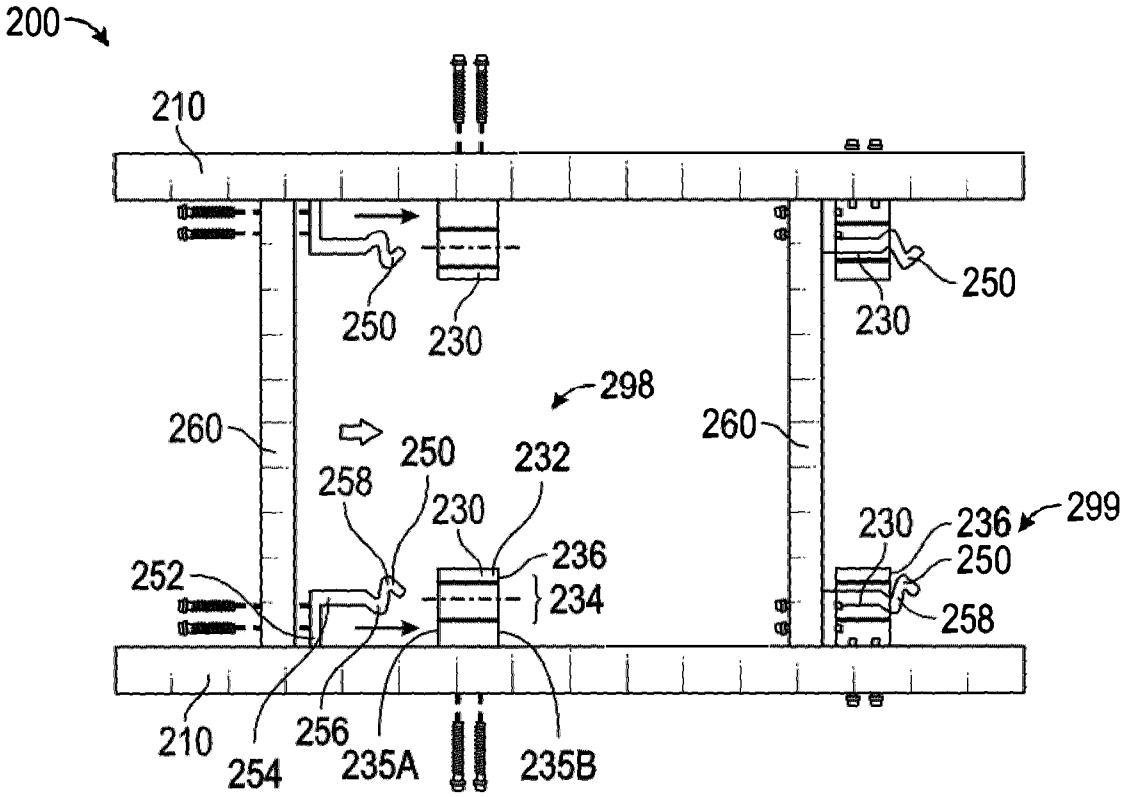

200
210
250
230
250
230
298
260
260
250
232
258
230
230
236
299
252
236
250
234
258
210
254
256
235A
235B

FIG. 7

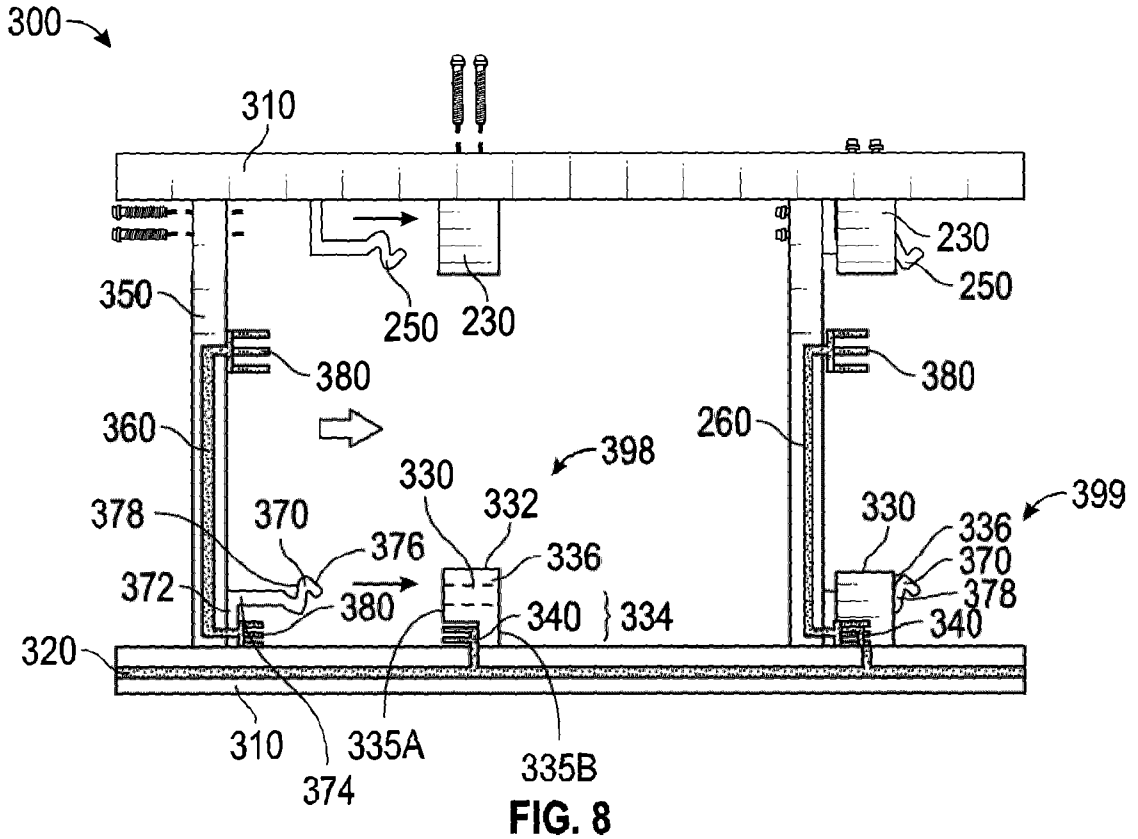

300
310
230
250
250
230
350
380
380
360
260
398
330
332
330
399
378
370
376
336
336
370
372
380
340
334
378
340
320
310
335A
335B
374

FIG. 8

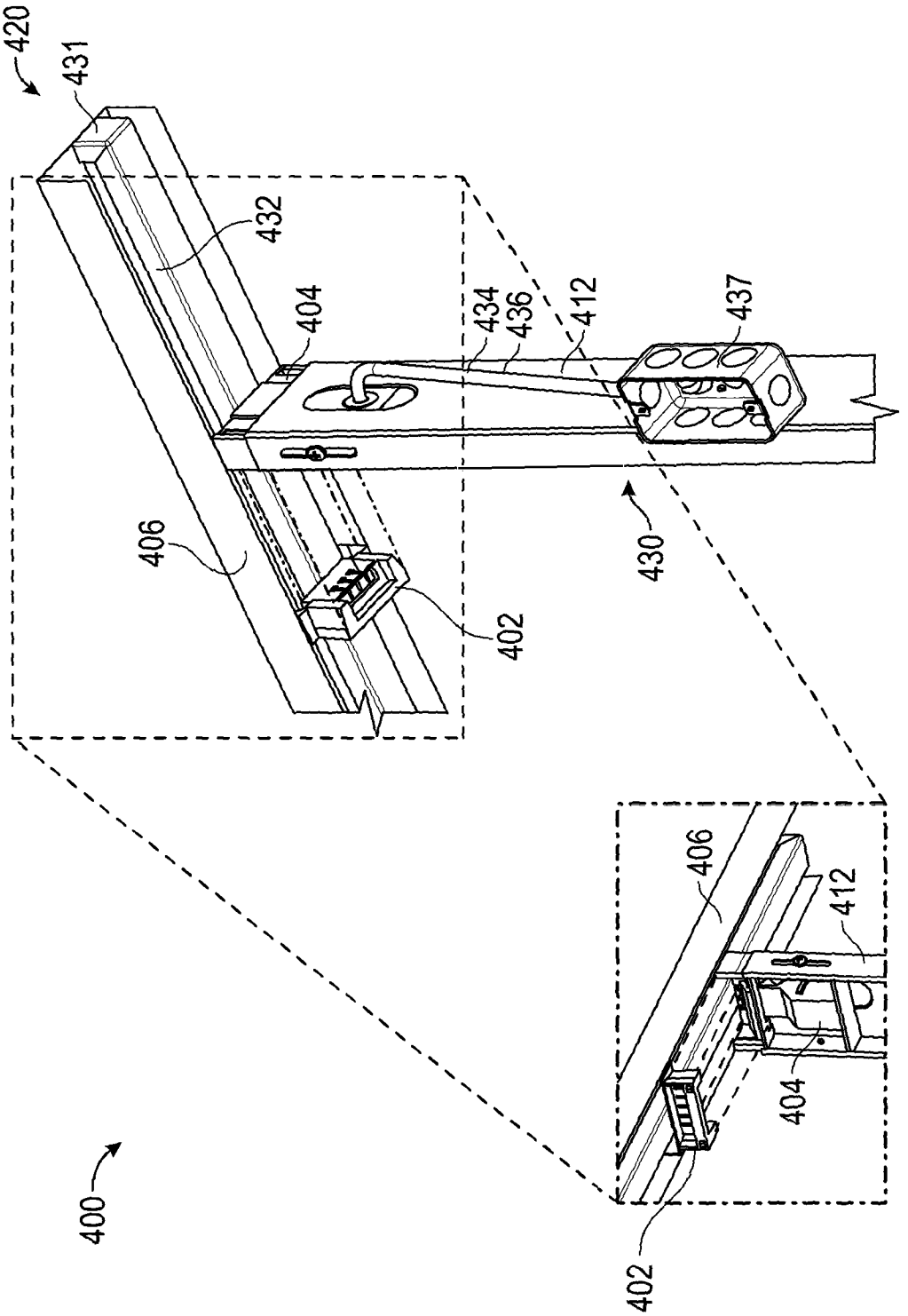


FIG. 9B

FIG. 9A

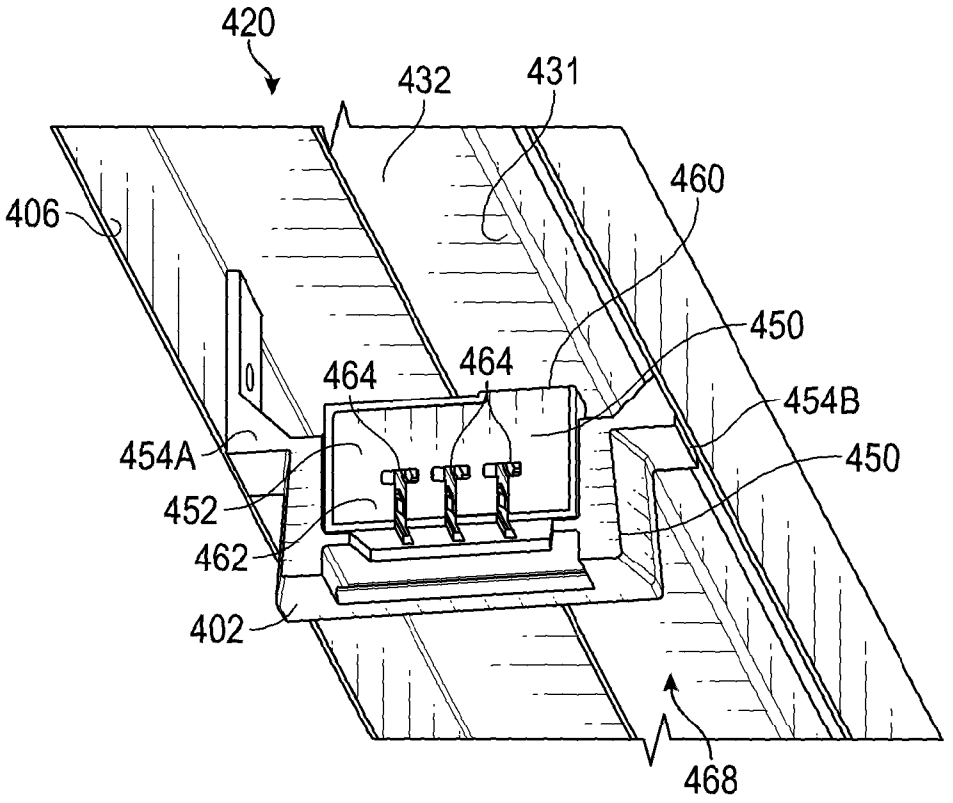


FIG. 10A

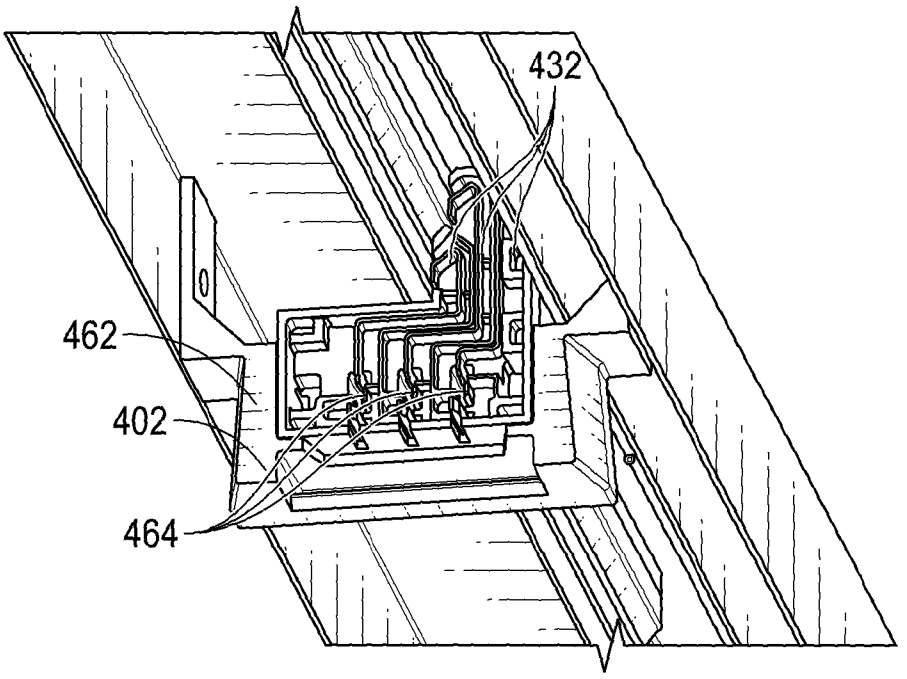


FIG. 10B

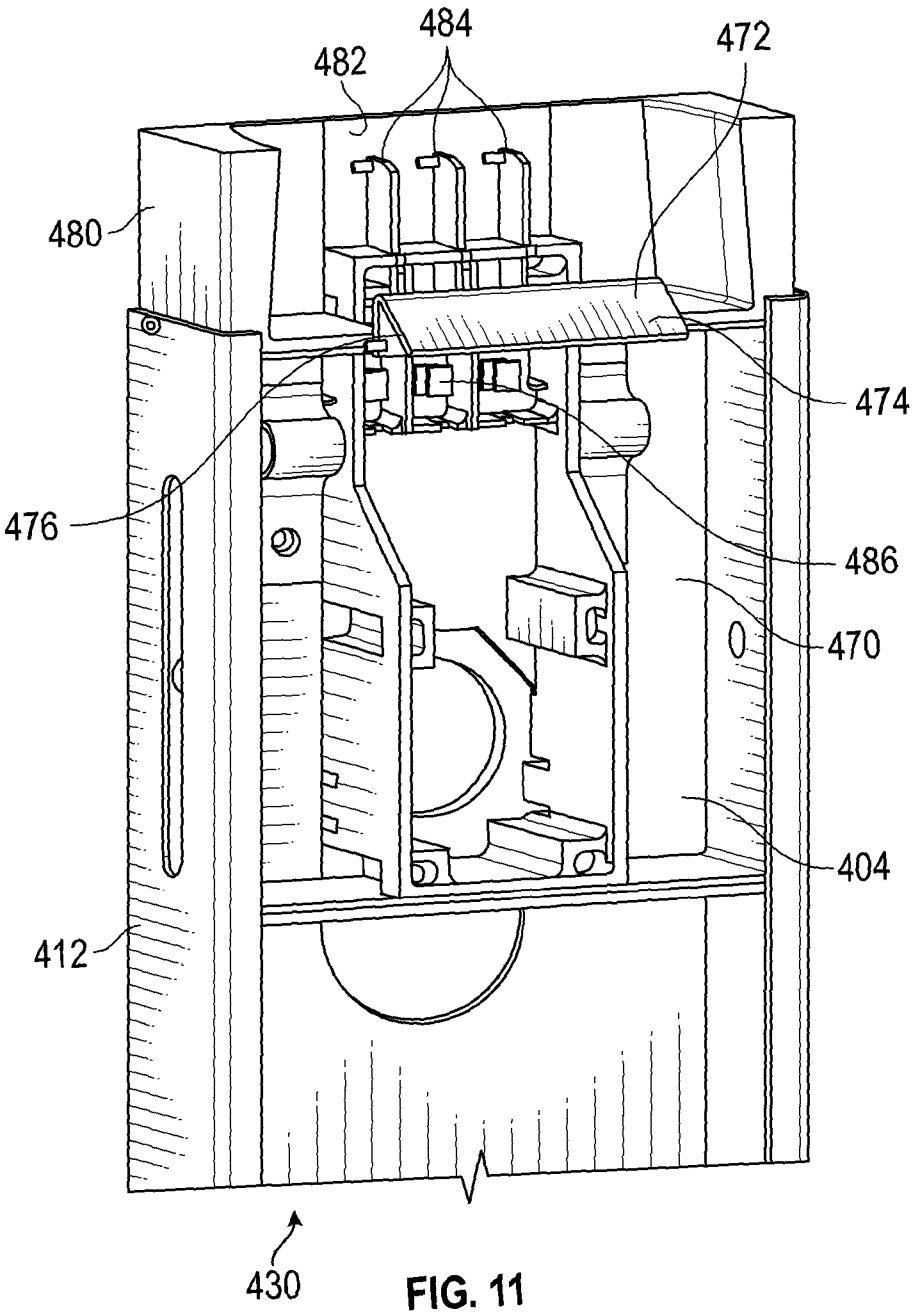


FIG. 11

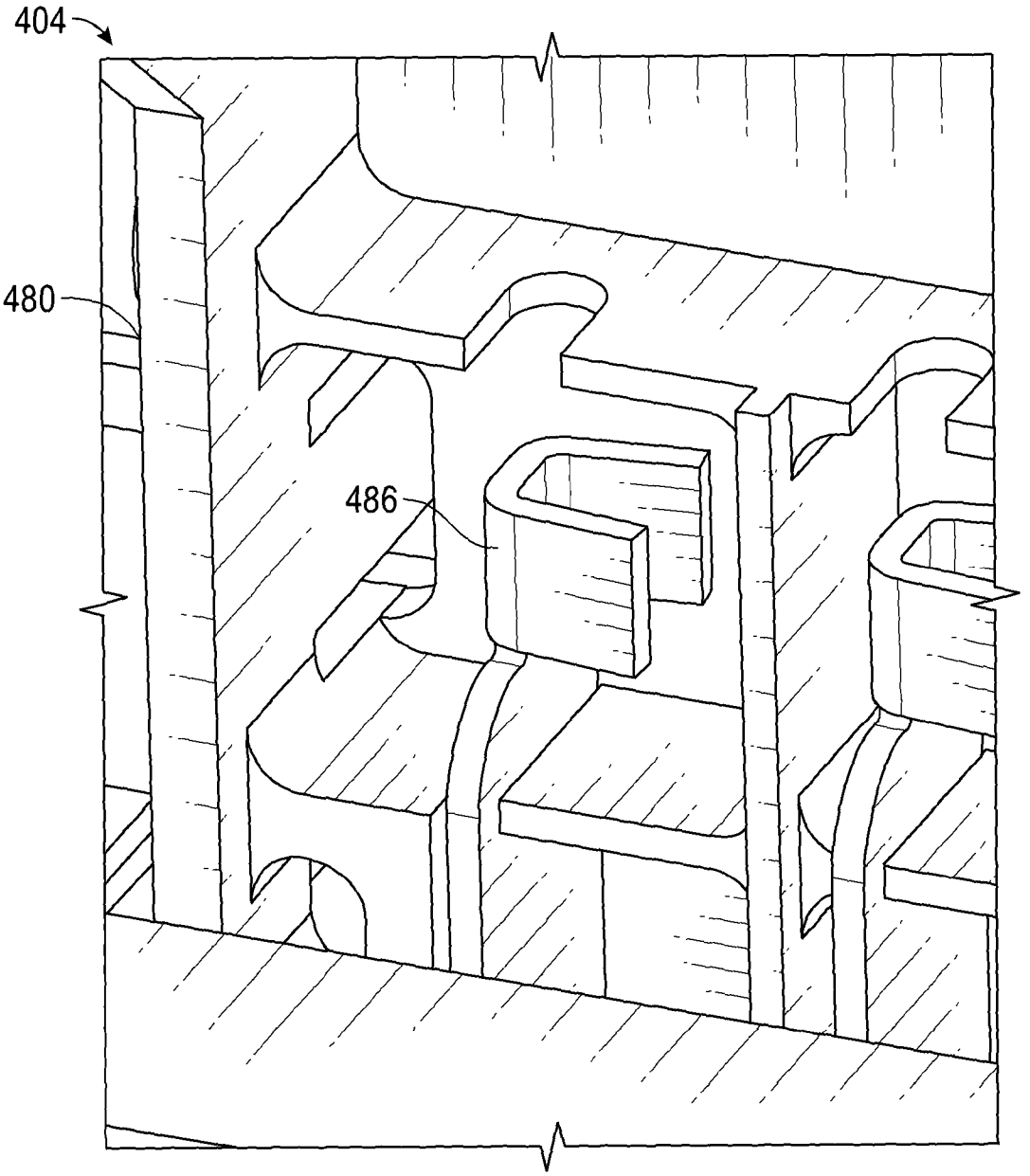


FIG. 12

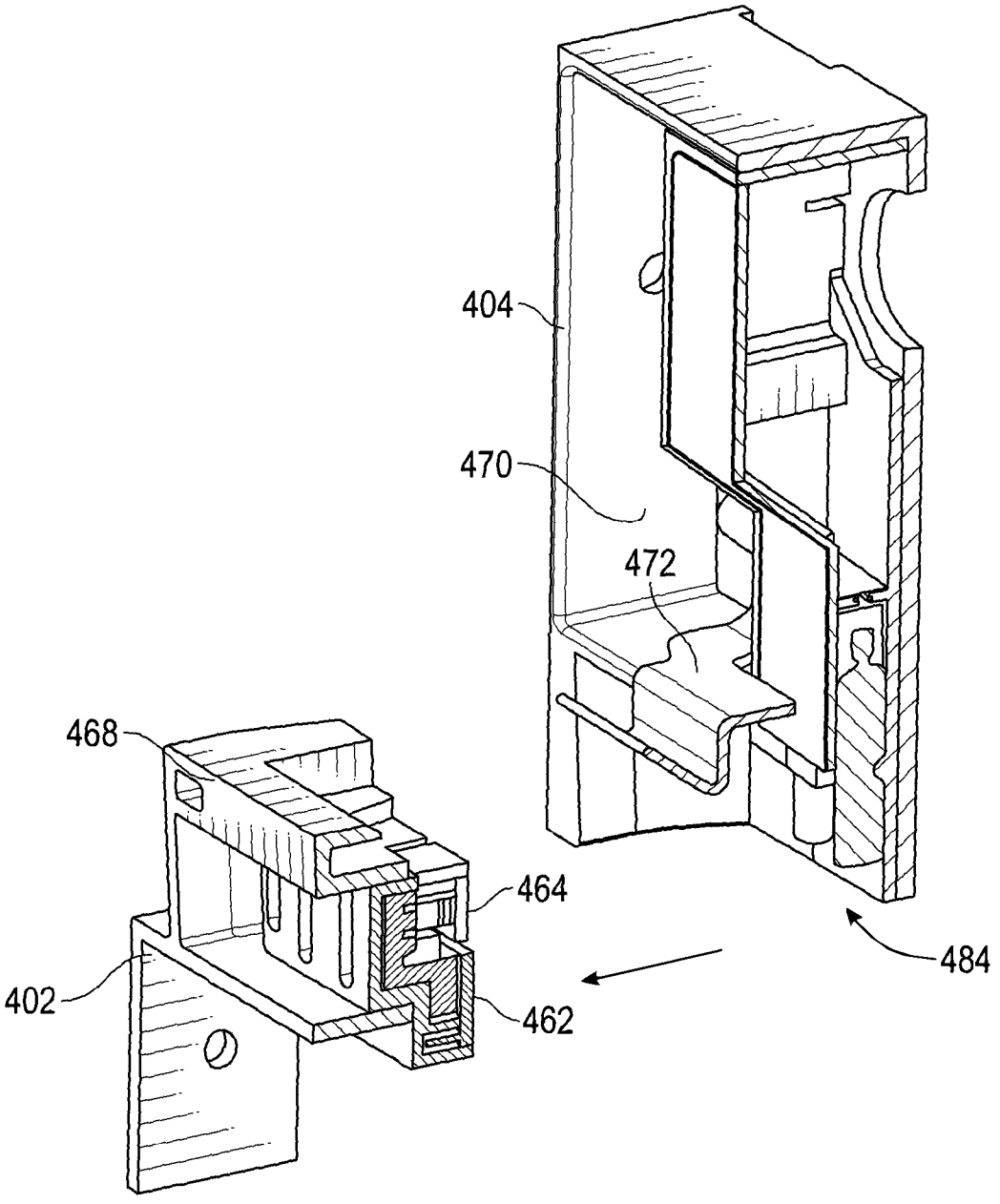


FIG. 13A

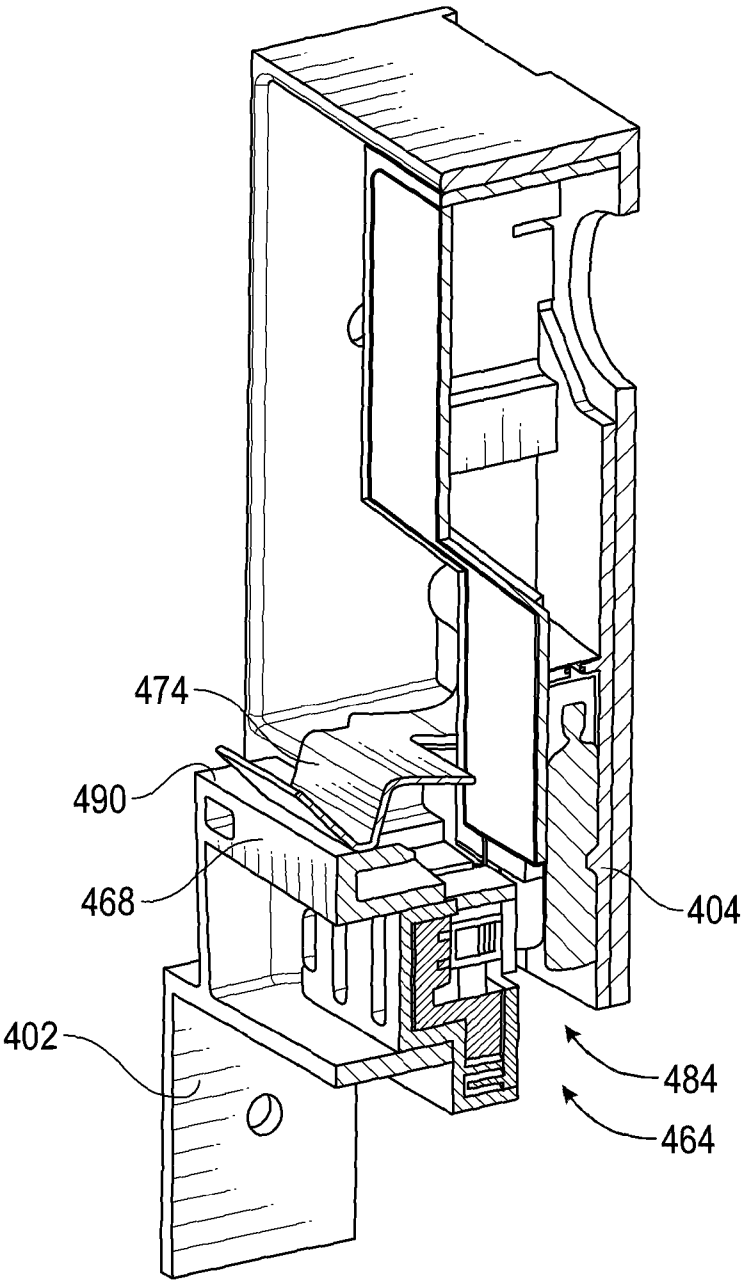


FIG. 13B

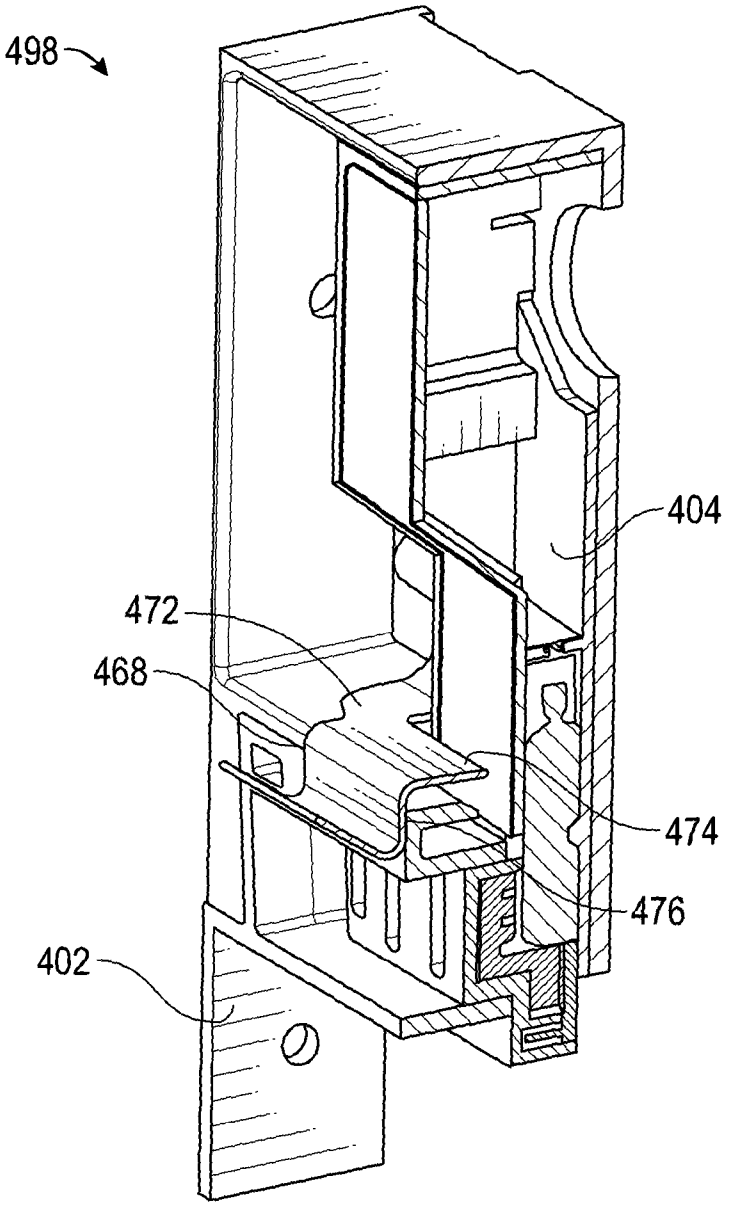


FIG. 13C

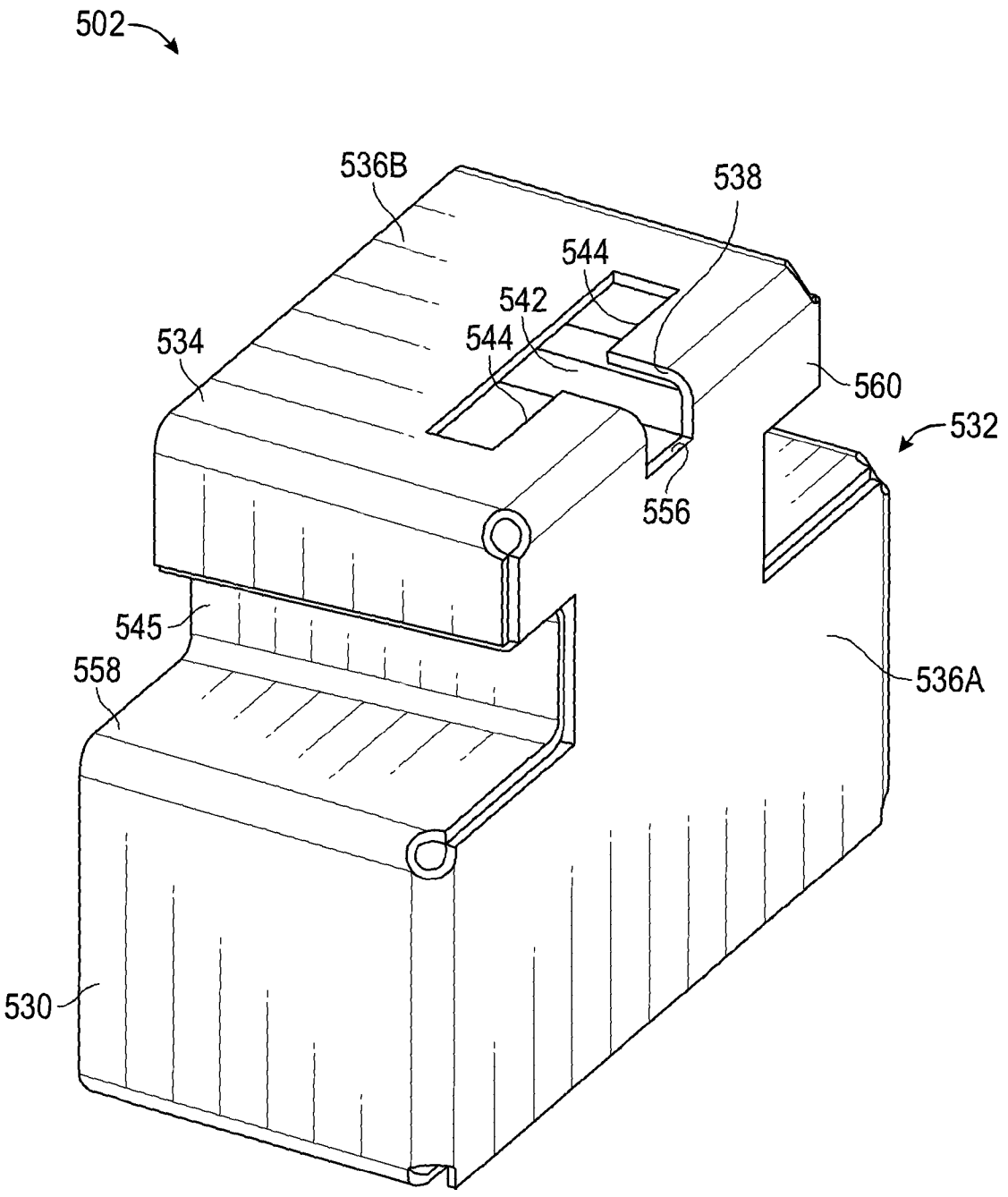


FIG. 14

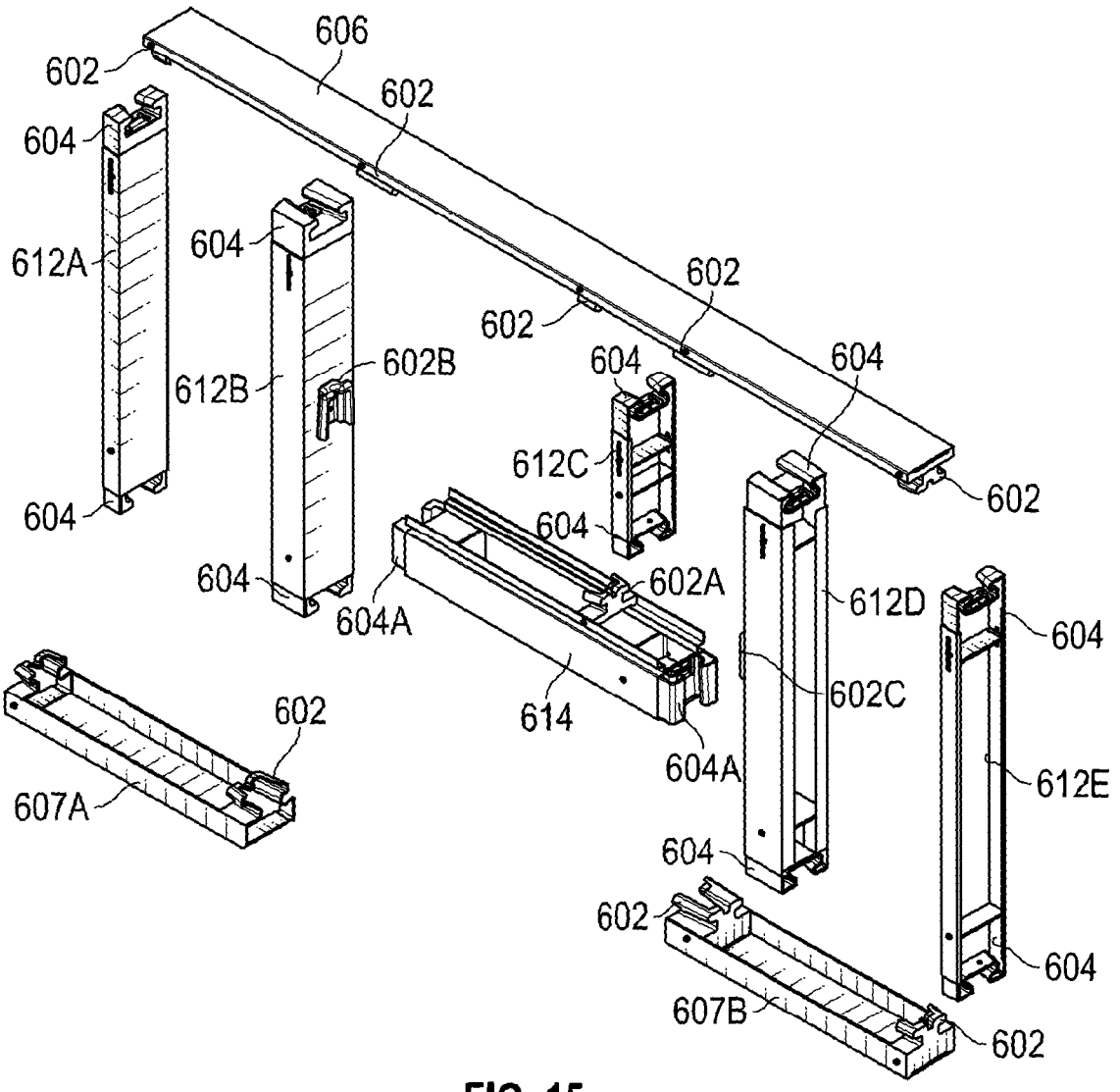

606
602
602
604
612A
604
604
612B
602B
604
602
602
604
604
612C
604
602
604A
602A
612D
604
602C
614
604A
612E
602
607A
604
602
607B
604
602

FIG. 15

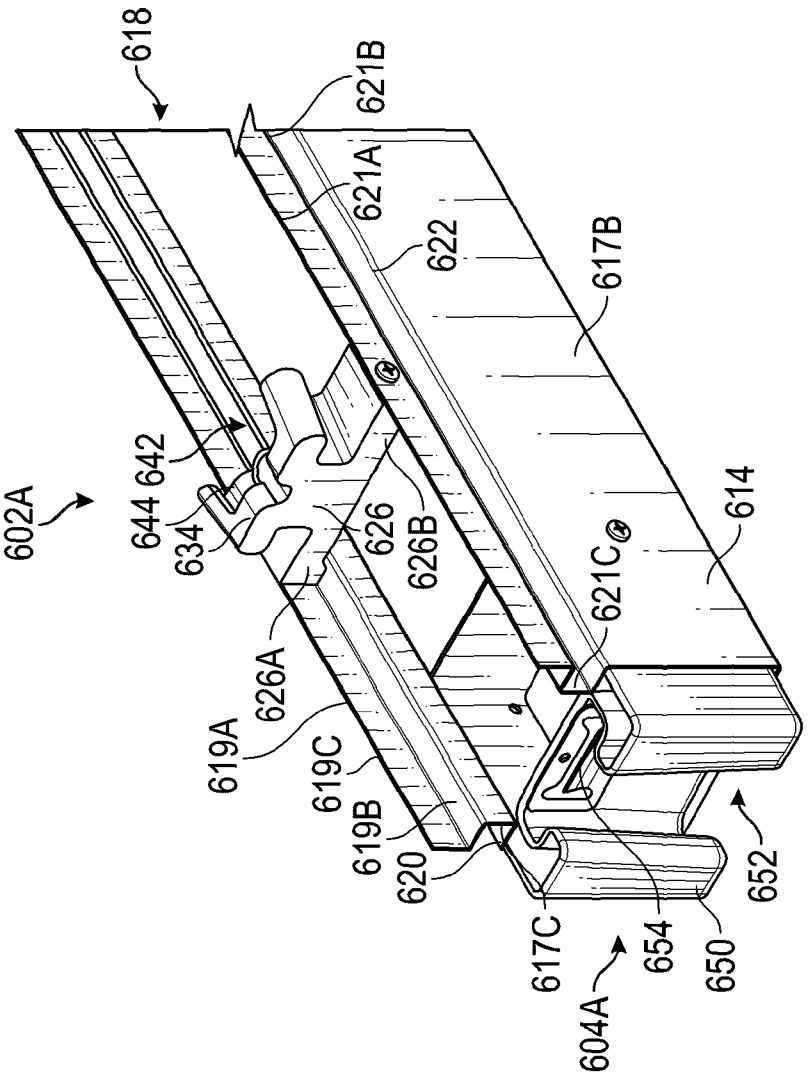
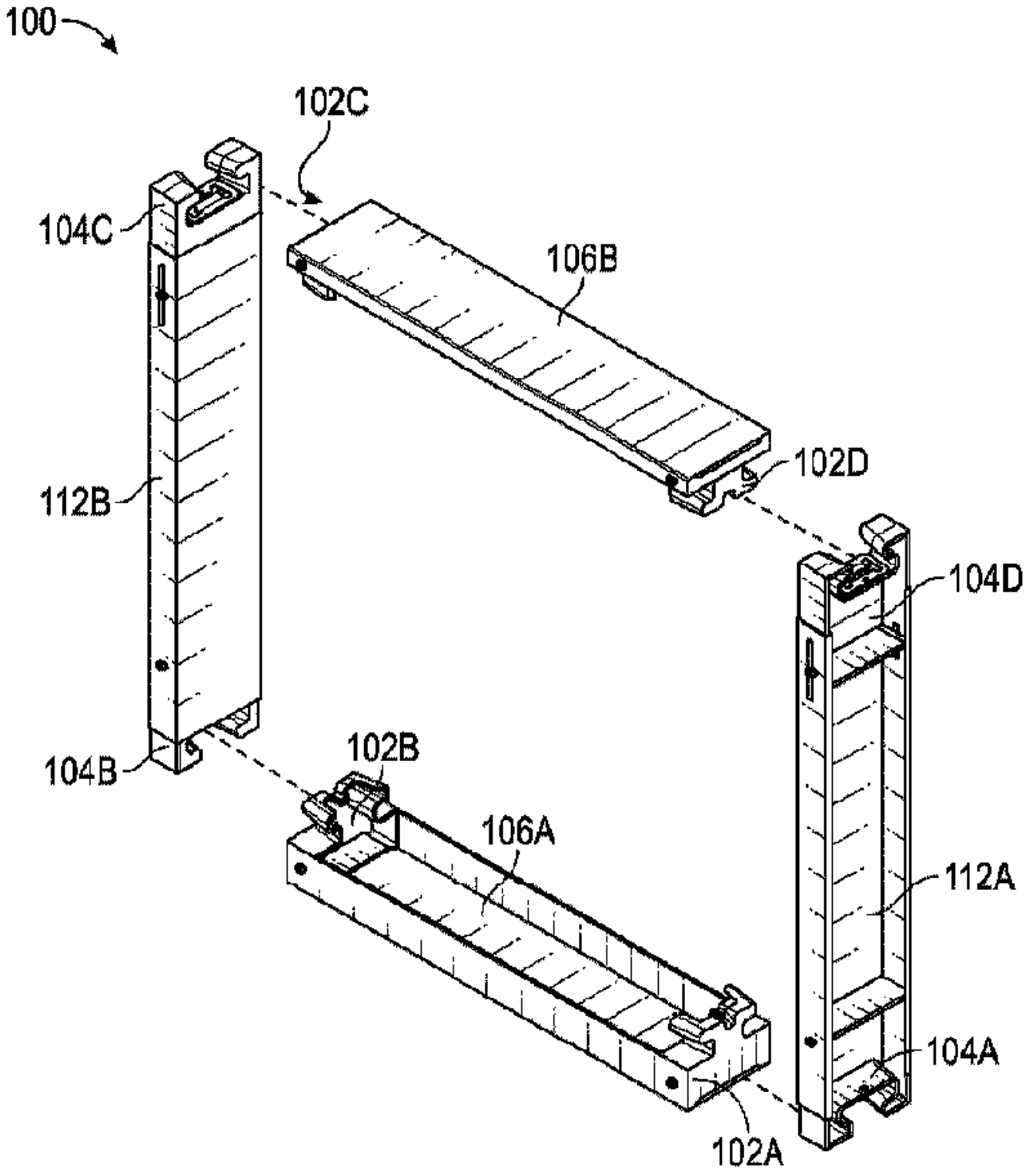

618
621B
621A
622
617B
614
602A
644 642
634
626
626B
621C
626A
619A
619C
619B
620
652
617C
654
650
604A

FIG. 16


100
102C
104C
106B
112B
102D
104D
102B
104B
106A
112A
104A
102A