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(72) Inventeurs/Inventors:
PETTA, GABRIEL, CA;
OHRSTROM, ROLF J., CA

(73) Propriétaire/Owner:
ALPA LUMBER INC., CA

(74) Agent: BERESKIN & PARR LLP/S.E.N.C.R.L.,S.R.L.

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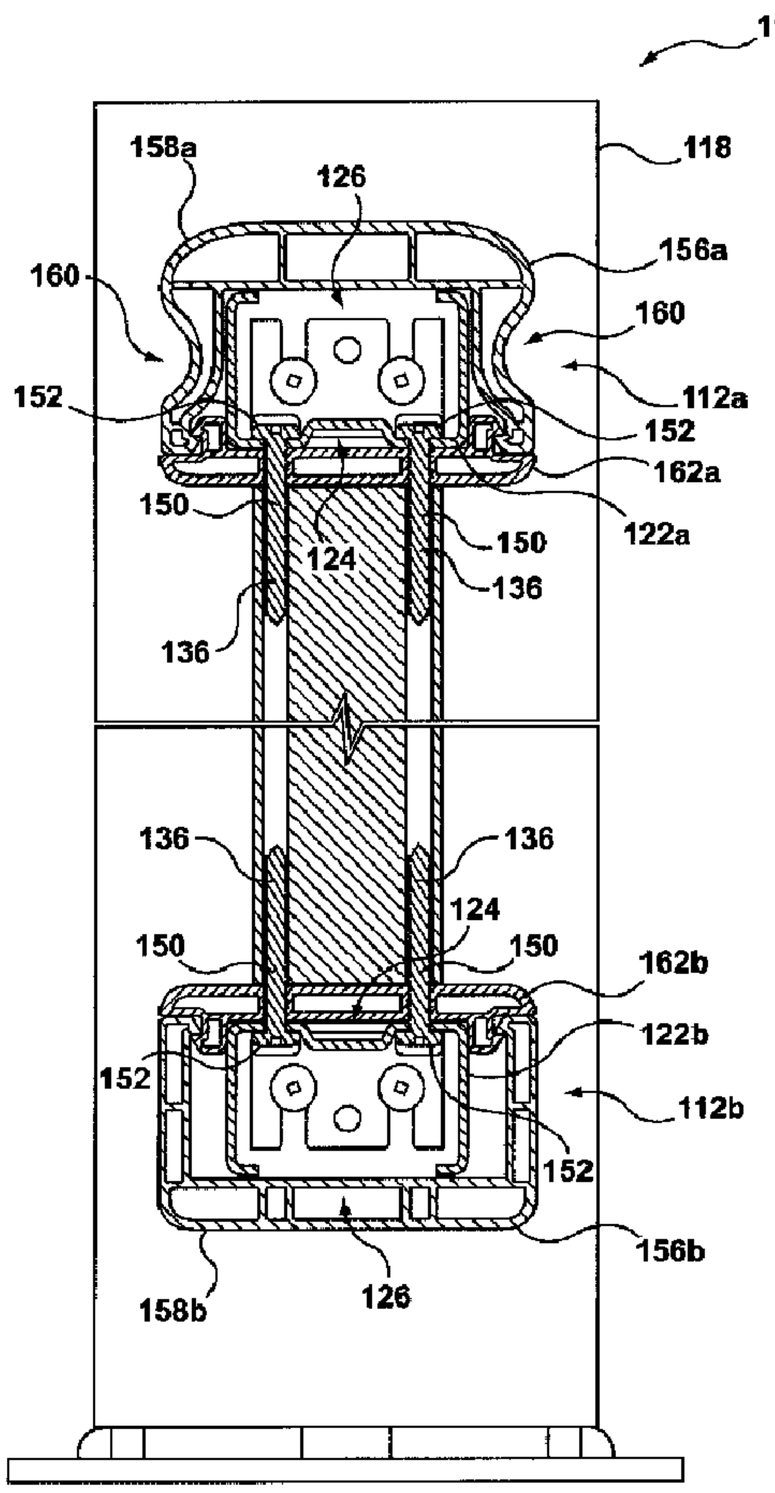
(54) Title: RAILING SYSTEM



(57) Abrégé/Abstract:
A railing apparatus includes an upper rail, a lower rail spaced below and generally parallel to the upper rail, and a plurality of balusters extending generally vertically between the upper and lower rails. Each baluster includes a hollow casing and a brace

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(57) Abrégé(suite)/Abstract(continued):
extending lengthwise within the casing, the brace having an upper end secured to the upper rail and a lower end secured to the lower rail.

ABSTRACT

A railing apparatus includes an upper rail, a lower rail spaced below and generally parallel to the upper rail, and a plurality of balusters extending generally vertically between the upper and lower rails. Each baluster includes a hollow casing and a brace extending lengthwise within the casing, the brace having an upper end secured to the upper rail and a lower end secured to the lower rail.

TITLE: RAILING SYSTEM

FIELD

[0001] The Applicant's teaching disclosed herein relates to railing systems that can be used with, for example, porches and stairways, and to components of such railing systems.

BACKGROUND

[0002] U.S. Pat. No. 6,702,259 (Pratt) discloses a guard rail system fabricated from standard-sized components, preferably extruded, including balusters fastened to a lower rail and to an upper retainer at fixed intervals. The balusters are provided with central bores for receiving fasteners such as screws through predrilled holes in the upper retainer and lower rail. A hand rail is slip-fitted over the upper retainer in locking relation, to provide integrated guard rail sections. Guard rail sections so assembled are fastened to end posts, preferably using mounting brackets having a flanged arm which nests in grooves or recesses in the upper retainer and lower rail to provide a safe, secure and aesthetically appealing guard rail.

[0003] U.S. Pat. No. 6,874,766 (Curatolo) discloses a deck railing section comprising synthetic posts held spaced from one another by top and bottom rail members. Each of the rail members has a multiple piece construction including first and second interlocking synthetic rail pieces and a metallic reinforcing insert. The insert has holes at post attachment locations along the insert. Each post has screw ports to opposite ends of the post. Rail members are secured to the posts by threaded attachment members passing through the holes in the inserts and into the screw ports of the posts. The first rail pieces are trapped between the posts and the inserts. The second rail pieces lock onto the first rail pieces hiding the reinforcing inserts internally of the rail members.

SUMMARY

[0004] The following summary is intended to introduce the reader to the disclosure provided herein but not to define any invention. In general, this disclosure describes one or more methods or apparatuses related to railing systems and components thereof, and which can be used with, for example porches and stairways of homes or other buildings.

[0005] According to one aspect, a rail for a railing system comprises an upper rail, a lower rail spaced below and generally parallel to the upper rail; and a plurality of balusters extending generally vertically between the upper and lower rails, each baluster including a hollow casing and a brace extending lengthwise within the casing, the brace having an upper end secured to the upper rail and a lower end secured to the lower rail.

[0006] Each brace can be constructed of metal. Each brace can comprise an extruded lineal cut to length. The upper rail can comprise an upper beam and the lower rail can comprise a lower beam, each beam extending lengthwise of the respective rail. Each of the beams can be constructed of metal. The upper ends of each brace can be secured to the upper beam, and the lower ends of each brace can be secured to the lower beam. Each beam can comprise a proximal face directed towards the balusters, and a distal face opposite the proximal face. The upper rail can comprise an upper cover generally covering the distal face of the upper beam, and the lower rail can comprise a lower cover generally covering the distal face of the lower beam. The upper rail can comprise an upper retainer extending lengthwise of the upper rail and disposed between the upper ends of the balusters and the upper beam, and the lower rail can comprise a lower retainer extending lengthwise of the lower rail and disposed between the lower ends of the balusters and the lower beam. The outer surface of each brace can engage an inner surface of the casing such that relative lateral movement between the casing and the brace is inhibited. The

brace can have at least two screw bosses at each end for anchoring a fastener therein. The screw bosses can be generally vertical. The screw bosses can comprise vertical channels having open ends adjacent the proximal surface of the beam. The beam can have apertures in registration with the open ends of the screw bosses for receiving fasteners therethrough. The fasteners can comprise screws with threaded shanks and a head at one end, the head can bear against distal surface of beam, drawing beam and baluster securely together.

[0007] According to another aspect, a baluster assembly for a mounting between upper and lower rails of a railing section includes an elongate hollow casing extending lengthwise between opposed first and second casing ends; and a brace extending within the hollow casing and having first and second brace ends generally coterminous with the first and second casing ends, the brace having brace screw bosses at each end for receiving fasteners to secure the brace to said upper and lower rails. The brace can comprise an extruded aluminum lineal cut to length, the brace extending continuously between the first and second ends.

[0008] Each brace can have a transverse extent configured to engage an inner surface of the casing, so as to inhibit lateral movement of casing relative to brace. Each brace can have two screw bosses, laterally spaced apart by a first spacing.

[0009] According to another aspect, a method of reinforcing a railing system is provided, wherein the railing system including a plurality of hollow polymeric baluster casings configured for installation in a generally vertical orientation between upper and lower rails, the baluster casings having at least two casing screw bosses at either end for anchoring a fastener, the two casing screw bosses at each end spaced apart by a first spacing, the upper and lower rails each having a metal beam extending lengthwise thereof, the metal beam comprising apertures in registration with the screw bosses of the baluster

casings, and wherein the method includes providing a plurality of braces each configured for insertion in a respective casing, each brace having first and second ends and a length generally equal to the length of the corresponding casing, and each brace having at least two screw bosses at each of the first and second ends, the brace screw bosses at each end spaced apart by a second spacing, the second spacing equal to the first spacing; inserting a brace in the baluster casings; aligning the brace screw bosses with the apertures in the beam; and inserting fasteners through the apertures and into the brace screw bosses.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The drawings included herewith are for illustrating various examples of articles, methods, and apparatuses of the present specification and are not intended to limit the scope of what is taught in any way. In the drawings:

[0011] Figure 1 is a front elevation view of a railing system according to one aspect of the Applicant's teaching;

[0012] Figure 2 is a cross-sectional view of the railing system of Figure 1 taken along the lines 2-2;

[0013] Figure 3 is an exploded view of the railing system of Figure 1;

[0014] Figure 3a is an enlarged portion of the railing system of Figure 3;

[0015] Figure 3b is another enlarged portion of the railing system of Figure 3;

[0016] Figure 4 a cross-sectional view of a baluster portion of the railing system of Figure 1 taken along the lines 4-4;

[0017] Figure 5 is an enlarged perspective view of a casing portion of the baluster of Figure 4;

[0018] Figure 6 is an enlarged perspective view of a brace member of the baluster of Figure 4;

[0019] Figure 7 is a cross-sectional view of an alternative baluster;

[0020] Figure 8 is a cross-sectional view of another alternative baluster;

[0021] Figure 9 is a cross-sectional view of another alternative baluster;

[0022] Figure 10 is a cross-sectional view of another alternative baluster;

[0023] Figure 11 is an exploded perspective view of another example of a railing system;

[0024] Figure 12 is an enlarged cross-sectional view of an upper railing portion of the system of Figure 11; and

[0025] Figure 13 is a cross-sectional view of a baluster portion of the system of Figure 11; and

[0026] Figure 14 is an enlarged view of a beam portion of the upper railing of Figure 12.

DETAILED DESCRIPTION

[0027] Various apparatuses or processes will be described below to provide an example of an embodiment of each claimed invention. No embodiment described below limits any claimed invention and any claimed invention may cover processes or apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process described below is not an embodiment of any claimed invention. The applicants, inventors or owners reserve all rights that they may have in any invention disclosed in an apparatus or process described below that is not claimed in this document, for example the right to claim such an invention

in a continuing application and do not intend to abandon, disclaim or dedicate to the public any such invention by its disclosure in this document.

[0028] A railing system 110 in accordance with an example of one aspect of the Applicant's teaching can be seen in Figure 1. The railing system 110 comprises a pair of rails, (i.e. an upper rail 112a, and a lower rail 112b) and a plurality of balusters 116 each extending generally vertically between the rails 112a, 112b. In the example illustrated, the railing system 110 is shown in a horizontal configuration, with generally horizontal upper and lower rails 112a, 112b. The railing system 110 can also be configured for inclined applications, such as along a staircase, with inclined rails and vertical balusters 116.

[0029] Each of the rails 112a, 112b is generally elongate, having opposed ends adapted to be secured to uprights 118. The uprights 118 can be in the form of, for example, but not limited to, walls, columns, or posts. In the example illustrated, the uprights 118 are in the form of newel posts.

[0030] Referring now to Figure 2, each of the rails 112a, 112b can comprise a beam extending lengthwise of the respective rail 112a, 112b. In the example illustrated, the upper rail 112a comprises an upper beam 122a, and the lower rail 112b comprises a lower beam 122b. The beams 122a, 122b can be constructed of a structural material, the material having properties that are well-known and/or already accepted by local building codes for use in railing systems. Additionally or alternatively, the structural material used to make the beams 122a, 122b can have mechanical properties that are stable over time and that are consistently reproducible from one manufacturing lot to another. Examples of structural materials from which the beams 122a, 122b can be made include metal (ferrous or non-ferrous), wood, and/or fiberglass. In the example illustrated, the beams 122a, 122b are made of cold rolled steel.

[0031] Each beam 122a, 122b comprises a proximal face 124 directed towards the balusters 116, and a distal face 126 opposite the proximal face 124.

The upper and lower beams 122a, 122b can optionally have a common profile. In the example illustrated, the beams 122a, 122b have a common profile and are interchangeable with each other.

[0032] Each baluster 116 in the embodiment illustrated includes a hollow casing 130 and a brace 132 extending lengthwise within the casing 130. The casing 130 can be made of a material that is generally non-structural, and the casings 130 can provide cosmetic or other ancillary benefits to the railing system 110, rather than necessarily satisfying strength and/or other performance requirements. In the example illustrated, the casings 130 are made of polymer, such as an extruded vinyl.

[0033] Referring to Figures 4 and 6, the brace 132 of each baluster 116 can be constructed of a structural material that, similar to the structural material of the beams 122a, 122b, has properties that are well-known and/or already accepted by local building codes for use in railing systems. Additionally or alternatively, the structural material used to make the braces 132 can have mechanical properties that are stable over time and that are consistently reproducible from one manufacturing lot to another. In the example illustrated, the braces 132 are made of extruded aluminum lineals cut to a desired length to provide each brace 132 with an upper end 132a and a lower end 132b, between which the brace 132 extends continuously.

[0034] In the railing 110, the upper end 132a of each brace 132 is secured to the upper rail 112a and the lower end 132b of each brace 132 is secured to the lower rail 112b. In the example illustrated, the upper ends 132a of each brace 132 are secured to the upper beam 122a of the upper rail 112a, and the lower ends 132b of each brace 132 are secured to the lower beam 122b of the lower rail 112b.

[0035] To facilitate securing the braces 132 to the beams 122a, 122b, each brace 132 can have at least two brace screw bosses 134 at each end for

anchoring a fastener 136 therein. More particularly, in the example illustrated, each brace 132 has two upper brace screw bosses 134a at the upper end 132a and two lower brace screw bosses 134b at the lower end 132b. The two screw bosses 134 can be spaced apart laterally by a brace screw boss spacing 137.

[0036] In the example illustrated, the brace screw bosses 122a, 122b are generally vertical and can comprise vertical channels 138 having open ends 138a, 138b adjacent the proximal surface 124 of the upper and lower beams 122a, 122b, respectively. The vertical channels 138 can extend continuously along the length of each brace 132.

[0037] Each beam 122a, 122b can have apertures in registration with the open ends of the brace screw bosses 134 for receiving the fasteners 136 therethrough. In the example illustrated, the upper beam 122a has upper apertures 140a and the lower beam 122b has lower apertures 140b. The apertures 140a, 140b can be spaced apart lengthwise along the length of the beam 122a, 122b by a lengthwise spacing 144, which can be selected to match the desired spacing between adjacent balusters 116. The two apertures in each pair of apertures can be spaced apart transversely by a transverse aperture spacing 147 that can be equal to the brace screw boss spacing 137.

[0038] The fasteners 136 can comprise screws with threaded shanks 150 and a head 152 at one end thereof. Upon assembly, the head 152 can bear against the distal face 126 of the beam 122a, 122b, drawing the beam 122a, 122b and baluster 116 securely together.

[0039] The rails 112a, 112b can be provided with a cover that can conceal and/or enclose the beam 122a, 122b. In the example illustrated, the upper rail 112a comprises an upper cover 156a generally covering the distal face 126 of the upper beam 122a, and the lower rail 112b comprises a lower cover 156b generally covering the distal face 126 of the lower beam 112b.

[0040] The covers 156a, 156b can be made of a material that is generally non-structural, and the covers can provide cosmetic or other ancillary benefits to the railing system 110, rather than necessarily satisfying strength and/or other performance requirements. In the example illustrated, the covers 156a, 156b are made of polymer, such as an extruded vinyl. The vinyl can provide a good gripping surface that remains warmer to the touch than would, for example, a metal cover.

[0041] The upper and lower covers 156a, 156b can optionally have a common profile. In the example illustrated, the upper cover 156a has a profile that is distinct from that of the lower cover 156b. The upper cover 156a has an outer surface 158a that is slightly more contoured (rounded) with recesses 160 on either side, which can facilitate being grasped by the hand of a user. The lower cover 156b has an outer surface 158b that is more rectangular (relative to the upper cover 156a).

[0042] The covers 156a, 156b can be coupled to the beams 122a, 122b, to the ends of the balusters 116, and/or to other elements of the rails 112a, 112b. In the example illustrated, the rails include retainers to which the covers 156a, 156b can be coupled. The upper rail 112a comprises an upper retainer 162a extending lengthwise of the upper rail 112a and disposed between the upper ends of the balusters 116 and the proximal surface 124 of the upper beam 122a. The lower rail 112b in the example illustrated comprises a lower retainer 162b extending lengthwise of the lower rail 112b and disposed between the lower ends of the balusters 116 and the proximal face 124 of the lower beam 122b.

[0043] Further details of the brace 132 will be described, with reference to Figures 4 and 6. In the example illustrated, the brace 132 is generally H-shaped in cross-section, having a two opposed arms 172 and a central web 174 extending between the arms 172. The channels 138 forming the brace screw bosses 134 are located proximate the intersection of the web 174 and the respective arms 172.

[0044] Each brace 132 has an outer surface 176, at least a portion of which is configured to engage at least a portion of the inner surface 178 of the casing 130 such that relative lateral movement between the casing 130 and the brace 132 is inhibited. In the example illustrated, the opposed ends 180 of the arms 172 provide a portion of the outer surface 176 of the brace 132 that engages an the inner surface 178 of a first pair of opposed sidewalls 182 of the casing, to inhibit motion in a first lateral direction (up-down direction in Figure 4). The brace screw bosses 134 have laterally outermost surfaces 184 that form a portion of the outer surface 176 that engages the inner surface 178 of a second pair of opposed sidewalls 186 of the casing 130, to inhibit motion in a second lateral direction (left-right in Figure 4), normal to the first direction.

[0045] The casing 130 can be provided with optional casing screw bosses 188 at each end, which can be engageable with the fastener 136 (or another fastener) to secure the casings 116 to the rails 112a, 112b. In the example illustrated, each casing 130 has two upper brace screw bosses 188a at the upper end and two lower casing screw bosses 188b at the lower end. The two screw bosses 188 at each end can be spaced apart by a casing screw boss spacing 187. The casing screw boss spacing 187 can be equal to the brace screw boss spacing 137. Providing equal screw boss spacing 137, 187 can facilitate installation of casings 130 without braces 132 in cases where braces are not required (for example, on ground floor railing installations). The casings 130 can then be universal, in the sense that the same extrusion can be used with or without braces 132. Rotating the casing 130 by 90 degrees (or inverting the casing 130 end-over-end by 180 degrees) can provide aligned registration of the casing screw bosses 188 with the apertures 140a, 140b in the beam 122a, 122b.

[0046] Referring to Figure 7, another example of a baluster 216 is illustrated. The baluster 216 is similar to the baluster 116, and like features are identified by like reference characters, incremented by 100. The baluster 216 can generally be interchanged with the baluster 116 in the railing 110, with some

changes required such as, for example, the quantity and relative positioning of the apertures 140a, 140b in the beams 122a, 122b.

[0047] The baluster 216 has a casing 230 and a brace 232. The brace 232 comprises, in the example illustrated, a generally planar central web 274 with brace screw bosses 234 extending along each opposed side edge. The brace 232 is sized to fit snugly within the casing on a diagonal, between opposed first and second corners 231a, 231b. The other two opposed interior corners 231c, 231d of the casing 230 are provided with casing screw bosses 288. The casing screw bosses 288 are spaced apart from each other by a casing screw boss spacing 287 which is equal to the casing boss spacing 237, and which defines a common screw boss diameter centered about a central longitudinal axis of the baluster 216, and about which the four screw bosses are equally spaced at 90 degree increments.

[0048] Referring to Figure 8, another example of a baluster 316 is illustrated. The baluster 316 is similar to the baluster 116, and like features are identified by like reference characters, incremented by 200. The baluster 316 can generally be interchanged with the baluster 116 in the railing 110, with some changes required such as, for example, the quantity and relative positioning of the apertures 140a, 140b in the beams 122a, 122b.

[0049] In the baluster 316, the casing screw bosses 388 and the brace screw bosses 334 are not spaced equally apart. Installing the balusters 316 with the brace 332 requires a distinct aperture spacing 147 in the beam 122a, 122b to match the spacing 337 between the brace bosses 332. This can provide a failsafe and/or a visual indication as to whether or not a baluster 316 has been installed with or without a brace 332 in the casing 330.

[0050] Referring to Figure 9, another example of a baluster 416 is illustrated. The baluster 416 is similar to the baluster 116, and like features are identified by like reference characters, incremented by 300. The baluster 416

can generally be interchanged with the baluster 116 in the railing 110, with some changes required such as, for example, the quantity and relative positioning of the apertures 140a, 140b in the beams 122a, 122b.

[0051] In the baluster 416, the casing 430 is provided with interior supports 491 for engaging the outer surface of the brace 432. In the example illustrated, the interior supports 491 have inner surfaces that engage opposing outer surfaces of each of the brace screw bosses 434, to inhibit lateral motion in one direction (left-right in Figure 9). The inner surfaces of the sidewalls 486 from which the supports 491 extend inhibit lateral motion in a second direction (up down in Figure 9), normal to the first direction.

[0052] Referring to Figure 10, another example of a baluster 516 is illustrated. The baluster 516 is similar to the baluster 116, and like features are identified by like reference characters, incremented by 400. The baluster 516 can generally be interchanged with the baluster 116 in the railing 110, with some changes required such as, for example, the quantity and relative positioning of the apertures 140a, 140b in the beams 122a, 122b.

[0053] In the baluster 516, the casing 530 is free of any casing screw bosses. The brace 532 has a web structure that is X-shaped in cross section, with four web segments 474a, 474b, 474c and 474d extending from a central axis 475, and a respective brace screw boss 434 provided along the side edge of each web segment.

[0054] Another example of a railing system 610 is shown in Figure 11. The railings system 610 is similar to the railing system 110, with like features identified by like reference characters, incremented by 500.

[0055] The railing system 610 includes an upper rail 612a including an upper beam 622a and an upper cover 656a coupled to the upper beam 622a. In Figure 11, plastic covers 656 and casings 630 have not been shown, so as to more clearly reveal the metal skeletal structure. The upper beam 622a can be

constructed of metal and the upper cover 656a (see Fig. 12) can be constructed of plastic. In the example illustrated, the upper beam 622a is constructed of aluminum. At least a portion of the outer surface of the aluminum beam 622a (including the proximal face 624) can be painted to match the colour of the cover 656a and/or casings 630.

[0056] The railing system 610 further includes a lower rail 612b extending generally parallel to the upper rail 612a and spaced vertically below the upper rail 612b. The lower rail 612b includes a lower beam 622b constructed of metal. The lower beam 622b is, in the example illustrated, constructed of aluminum.

[0057] With reference also to Figure 13, a plurality of balusters 616 are provided, each baluster 616 extending generally vertically between the upper and lower rails 612a, 612b, and each baluster 616 including a hollow plastic casing 630 and a metal brace 632 extending vertically within the casing 630. Each brace 632 has an upper brace end 632a secured to the upper beam 622a and a lower brace end 632b secured to the lower beam 622b. In the example illustrated, each brace 632 is constructed of aluminum.

[0058] Each brace 632 has at least two brace screw bosses 634 at each of the upper and lower brace ends 632a, 632b. The upper beam 622a and the lower beam 622b have apertures 640a, 640b therethrough in registration with the brace screw bosses 634. A plurality of brace fasteners 636 are provided for securing the braces 632 to the beams 622a, 622b, each fastener 636 extending through one of the apertures 640a, 640b and into a respective one of the brace screw bosses 634 in registration therewith.

[0059] Each brace 632 has transversely spaced apart contact surfaces 676 that engage opposed inner surfaces 678 of the casing 630, wherein lateral movement of the casing 630 relative to the brace 632 is inhibited.

[0060] With reference also to Figure 14, the upper beam 622a has an upwardly directed upper distal face 626 concealed by the upper cover 656a, and

the upper beam 622a has an upper proximal face 624 opposite the upper distal face 626 and directed towards the balusters 616, the upper baluster ends 632a bearing directly against the proximal face 624 (Fig. 12).

[0061] The upper beam 622a comprises an extruded beam lineal including laterally spaced-apart attachment grooves 701 (Fig. 14) extending lengthwise along the upper beam 622a. The upper cover 656a comprises an extruded cover lineal having sidewalls 703 with laterally spaced apart and inwardly directed barbs 705 (Fig. 12) extending lengthwise along the upper cover 656a. The barbs 705 are received in the grooves 701 for coupling the upper cover 656a to the upper beam 622a.

[0062] The railing system 610 can further include a mounting bracket 707 (Fig. 11) at one or both longitudinal ends of the upper rail and/or the lower rail 612a, 612b for securing the rails to an upright 618. The upright 618 can be, for example, a wall, column, or newel post.

[0063] In the example illustrated, and with reference to attachment of the upper rail 612a, one mounting bracket 707 is provided at each end of the upper rail. Each mounting bracket includes a generally planar first flange 711 oriented parallel to the upper rail 612a and secured to the upper beam 622a, and a generally planar second flange 713 joined to the first flange and oriented vertically for securing the mounting bracket 707 to the upright 618.

[0064] The extruded beam lineal can include integrally extruded bracket engagement members for engaging the first flange 711 of the mounting bracket 707 in sliding fit. In the example illustrated, bracket engagement members are provided, including a transverse support surface 717 (Fig. 14) spaced vertically above a base panel 719 of the beam 622a by a vertical web 721. The transverse support surface 717 extends across a central portion of the upper beam 622a, and an underside surface 723 of the first flange 711 bears against the transverse support surface 717 (Fig. 12).

[0065] A bracket fastener 725 can be passed through an aperture in the first flange 711 and anchored in the transverse support surface 717 for fixing the first flange 711 to the upper rail 612a. The transverse support surface 717 can be provided with an integrally extruded central score line 727 (Fig. 14) to identify a desired lateral position of the fastener 725. The vertical spacing between the transverse support surface and the base panel of the beam is, in the example illustrated, sized to accommodate the length of the fastener 725 so that the fastener 725 does not protrude through the proximal face 624 of the beam 622a.

[0066] In the example illustrated, the bracket engagement members further comprise a pair of top retaining segments 731 extending horizontally inwardly from opposed sides of the upper beam 622a (Fig. 14). Each top retaining segment 731 has a bottom surface 733 spaced at a greater elevation than the transverse support surface 717 to receive the thickness of the first flange 711 therebetween (i.e. between the vertical position of the bottom surface 733 and that of the transverse support surface 717) in sliding fit.

[0067] The bracket engagement members can further include a pair of sideways retaining segments 735 each extending generally downwardly from respective ones of the top retaining segments 731. Each sideways retaining segment 735 can have a side engagement surface 737 spaced vertically intermediate the bottom surfaces 733 of the top retaining segments 731 and the transverse support surface 717. The side engagement surfaces 737 are, in the example illustrated, configured to engage opposed lateral edges 739 of the first flange 711, and to receive the lateral extent of the first flange 711 between the laterally opposed side engagement surfaces 737 in sliding fit.

[0068] While the above description provides examples of one or more processes or apparatuses, it will be appreciated that other processes or apparatuses may be within the scope of the accompanying claims.

CLAIMS:

1. A railing apparatus, comprising:

a) an upper rail, the upper rail comprising an upper beam extending lengthwise of the upper rail;

b) a lower rail spaced below and generally parallel to the upper rail, the lower rail comprising a lower beam extending lengthwise of the lower rail; and

c) a plurality of balusters extending generally vertically between the upper and lower rails, each baluster including a hollow casing and a brace extending lengthwise within the casing, the brace having an upper brace end secured to the upper rail and a lower brace end secured to the lower rail; and

wherein each of the upper beam and lower beam comprises a proximal face directed towards the balusters, and a distal face opposite the proximal face, and wherein the upper rail comprises an upper cover generally covering the distal face of the upper beam, and the lower rail comprises a lower cover generally covering the distal face of the lower beam.

2. The apparatus of claim 1, wherein the upper cover is of plastic material, and the upper beam is constructed of metal.

3. The apparatus of claim 1 or 2, wherein each casing is constructed of plastic, and each brace is constructed of metal.

4. The apparatus of any one of claims 1-3, wherein the hollow casing of each baluster is formed of a single extruded lineal cut to length, the hollow casing having a casing length extending from the upper rail to the lower rail, and the hollow casing having a constant cross-sectional profile along the casing length

5. The apparatus of any one of claims 1-4, wherein the upper ends of each brace are secured to the upper beam, and the lower ends of each brace are secured to the lower beam.

6. The apparatus of any one of claims 1-5, wherein each brace comprises brace screw bosses at each of the upper and lower brace ends, and wherein the upper beam and the lower beam have apertures therethrough in registration with the brace screw bosses.

7. The apparatus of claim 6, further comprising a plurality of fasteners, each fastener extending through one of the apertures and into a respective one of the brace screw bosses in registration therewith.

8. The apparatus of any one of claim 1-7, wherein the upper brace end of each brace bears directly against the proximal face of the upper beam, and the lower brace end bears directly against the proximal face of the lower beam.

9. The apparatus of any one of claim 1-7, further comprising an upper retainer extending lengthwise of the upper rail and disposed generally between the proximal face of the upper beam and upper ends of the balusters.

10. A metal-reinforced railing system, comprising:

a) an upper rail including an upper beam and an upper cover coupled to the upper beam, the upper beam constructed of metal and the upper cover constructed of plastic, the upper beam having an upwards directed upper distal face concealed by the upper cover;

b) a lower rail extending generally parallel to the upper rail and spaced vertically below the upper rail, the lower rail comprising a lower beam, the lower beam constructed of metal; and

c) a plurality of balusters extending generally vertically between the upper and lower rails, each baluster including a hollow plastic casing and a metal brace extending vertically within the casing, each brace having an upper brace end secured to the upper beam and a lower brace end secured to the lower beam.

11. The railing system of claim 10, wherein each brace comprises at least two brace screw bosses at each of the upper and lower brace ends, and wherein the upper beam and the lower beam have apertures therethrough in registration with the brace screw bosses.

12. The railing system of claim 11, further comprising a plurality of fasteners, each fastener extending through one of the apertures and into a respective one of the brace screw bosses in registration therewith.

13. The railing system of any one of claims 10-12, wherein the upper beam has an upper proximal face opposite the upper distal face and directed towards the balusters, the upper baluster ends bearing directly against the upper proximal face.

14. The railing system of any one of claims 10-13, wherein each brace has transversely spaced apart contact surfaces that engage opposed inner surfaces of the casing, wherein lateral movement of the casing relative to the brace is inhibited.

15. The railing system of claim 10, wherein the upper beam comprises an extruded beam lineal including laterally spaced-apart attachment grooves extending lengthwise along the upper beam, and wherein the upper cover comprises an extruded cover lineal having sidewalls with laterally spaced apart and inwardly directed barbs extending lengthwise along the upper cover, the barbs received in the grooves for coupling the upper cover to the upper beam.

16. The railing system of claim 15, further comprising a mounting bracket at each longitudinal end of the upper rail, each mounting bracket including a generally planar first flange oriented parallel to the upper rail and secured to the upper beam, and a generally planar second flange joined to the first flange and oriented vertically for securing the mounting bracket to an upright.

17. The railing system of claim 16, wherein the extruded beam lineal includes integrally extruded bracket engagement members for engaging the first flange of the mounting bracket in sliding fit, the bracket engagement members including a transverse support surface spaced vertically above a base panel by a vertical web, the transverse support surface extending across a central portion of the upper beam, an underside surface of the first flange bearing against the transverse support surface.

18. The railing system of claim 17, wherein the bracket engagement member further comprises a pair of top retaining segments extending horizontally inwardly from opposed sides of the upper beam, each top retaining segment having a bottom surface spaced vertically above the transverse support surface and receiving the thickness of the first flange therebetween in sliding fit.

19. The railing system of claim 18, wherein the bracket engagement members further comprise a pair of sideways retaining segments each extending generally downwardly from respective ones of the top retaining segments, each sideways retaining segment having a side engagement surface spaced vertically intermediate the bottom surfaces of the top retaining segments and the transverse support surface, the side engagement surfaces configured to engage opposed lateral edges of the first flange, and to receive the lateral extent of the first flange between the side engagement surfaces in sliding fit.

20. A baluster assembly for mounting between upper and lower rails of a railing section, comprising:

a) an elongate hollow casing extending lengthwise between opposed first and second casing ends;

b) a brace extending within the hollow casing and having first and second brace ends generally coterminous with the first and second casing ends, the brace having brace screw bosses at each end for receiving fasteners to secure the brace to said upper and lower rails.

21. The baluster assembly of claim 20, wherein the baluster has a baluster axis extending lengthwise of the baluster and generally through the geometric center of the hollow casing when viewed in cross-section.

22. The baluster assembly of claim 21, wherein the brace screw bosses are oriented generally parallel to the baluster axis.

23. The baluster assembly of any one of claims 20-22, comprising a first brace screw boss at the first brace end, and a second brace screw boss at the second brace end.

24. The baluster assembly of claim 23, wherein the first screw boss comprises a first channel portion having a first open end at the first brace end.

25. The baluster assembly of claim 24, wherein the second screw boss comprises a second channel portion having a second open end at the second brace end.

26. The baluster assembly of claim 25, wherein the first and second channel portions are disposed at respective ends of a first channel extending continuously between the first and second brace ends.

27. The baluster assembly of any one of claims 20-26, wherein the brace is formed of metal.

28. The baluster assembly of any one of claims 20-27, wherein the brace is formed of aluminum.

29. The baluster assembly of any one of claims 20-28, wherein the brace comprises an extruded lineal cut to length.

30. The baluster assembly of any one claims 20-29, wherein the brace has a generally constant cross-sectional profile along its length.

31. The baluster assembly of any one of claims 20-30, further comprising at least a third brace screw boss at the first brace end, the third brace screw boss spaced laterally apart from the first brace screw boss by a brace boss offset.

32. The baluster assembly of claim 31, wherein the casing includes at least a first casing screw boss at the first casing end and a second casing screw boss at the second casing end.

33. The baluster assembly of claim 32, comprising at least a third casing screw boss at the first casing end, the third casing screw boss spaced laterally apart from the first casing screw boss by a casing boss offset.

34. The baluster assembly of claim 33, wherein the brace boss offset is equal to the casing boss offset.

35. A method of reinforcing a railing system, comprising:

a) providing upper and lower rails for mounting between spaced apart uprights, the upper and lower rails each having polymeric upper and lower covers and metal upper and lower beams extending lengthwise thereof, the metal beam comprising apertures at spaced-apart locations along its length;

b) providing a plurality of hollow polymeric baluster casings configured for installation in a generally vertical orientation between the upper and lower rails;

c) providing a plurality of braces each configured for insertion in a respective casing, each brace having first and second brace ends and a length generally equal to the length of the corresponding casing, and each brace having a screw boss at each of the first and second brace ends;

d) inserting a respective brace in each of the baluster casings;

e) aligning the brace screw bosses with respective ones of the apertures in the beam; and

f) inserting fasteners through the apertures and into the brace screw bosses.

36. The method of claim 35, wherein step (f) comprises turning a screw having a head into each brace screw bosses until the head bears snugly against an outer surface of the beam.

37. The method of claim 35 or 36, wherein the upper and lower covers are assembled in snap-fit to the upper and lower rails, respectively, after step (f).

38. The method of claim 37, wherein the upper cover is assembled in snap-fit engagement with the upper beam.

39. The method of claim 37, further comprising before step (e), inserting a retainer between the upper beam and upper ends of the braces, the retainer extending lengthwise of the rail.

40. The method of claim 39, wherein the upper cover is assembled in snap-fit engagement with the upper retainer.

41. A method of reinforcing a railing system, comprising:

a) inserting a plurality of metal braces within respective ones of a plurality of plastic hollow baluster casings, the braces having upper and lower brace ends generally coterminous with respective upper and lower casing ends of the respective baluster casings;

b) connecting the lower brace ends to a lower beam of a lower rail, the lower beam constructed of metal;

c) connecting the upper brace ends to an upper beam of an upper rail, the upper beam constructed of metal and extending generally parallel to the lower beam; and

d) after step (c), assembling a plastic upper cover over the upper beam to generally conceal at least an upwardly directed surface of the upper beam.

42. The method of claim 41, wherein the upper beam comprises a plurality of upper apertures through the upper beam, the upper apertures positioned at spaced-apart locations lengthwise of the upper beam, and wherein step (c) comprises inserting a respective upper one of the fasteners through a respective one of the upper apertures and into engagement with the upper end of a respective brace.

43. The method of claim 42, wherein the upper brace end of each brace comprises an upper brace screw boss for receiving the respective upper fastener in anchoring engagement.

44. The method of any one of claims 41-43, wherein the lower beam comprises a plurality of lower apertures through the lower beam, the lower apertures positioned at spaced-apart locations lengthwise of the lower beam, and wherein step (b) comprises inserting a respective lower one of the fasteners through a respective one of the lower apertures and into engagement with the upper end of a respective brace.

45. The method of claim 42, wherein the lower brace end of each brace comprises a lower brace screw boss for receiving the respective lower fastener in anchoring engagement.

46. The method of any one of claims 41-44, further comprising after step (b), assembling a plastic lower cover over the lower beam to generally conceal at least a downwardly directed surface of the lower beam.

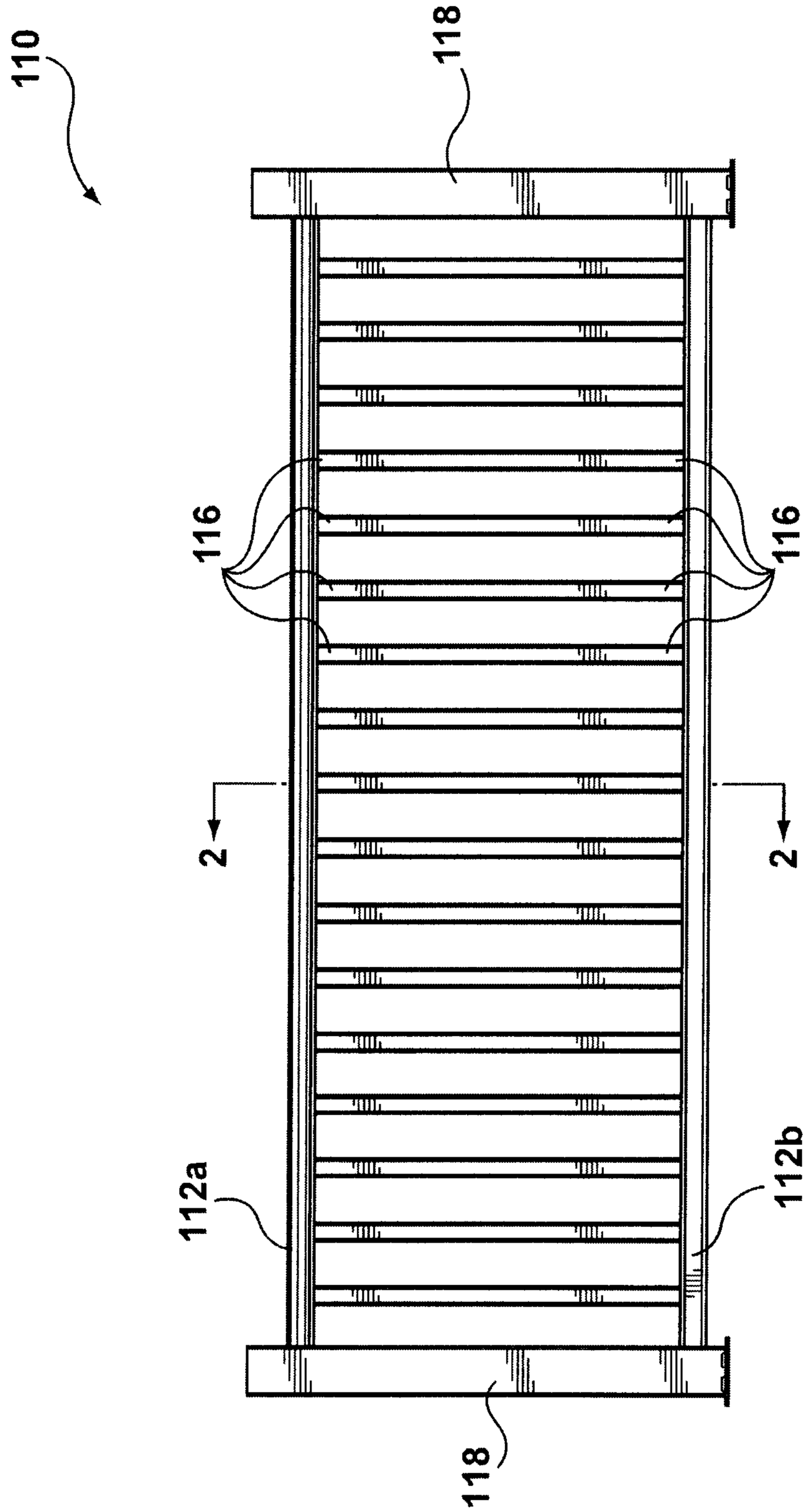

FIG. 1

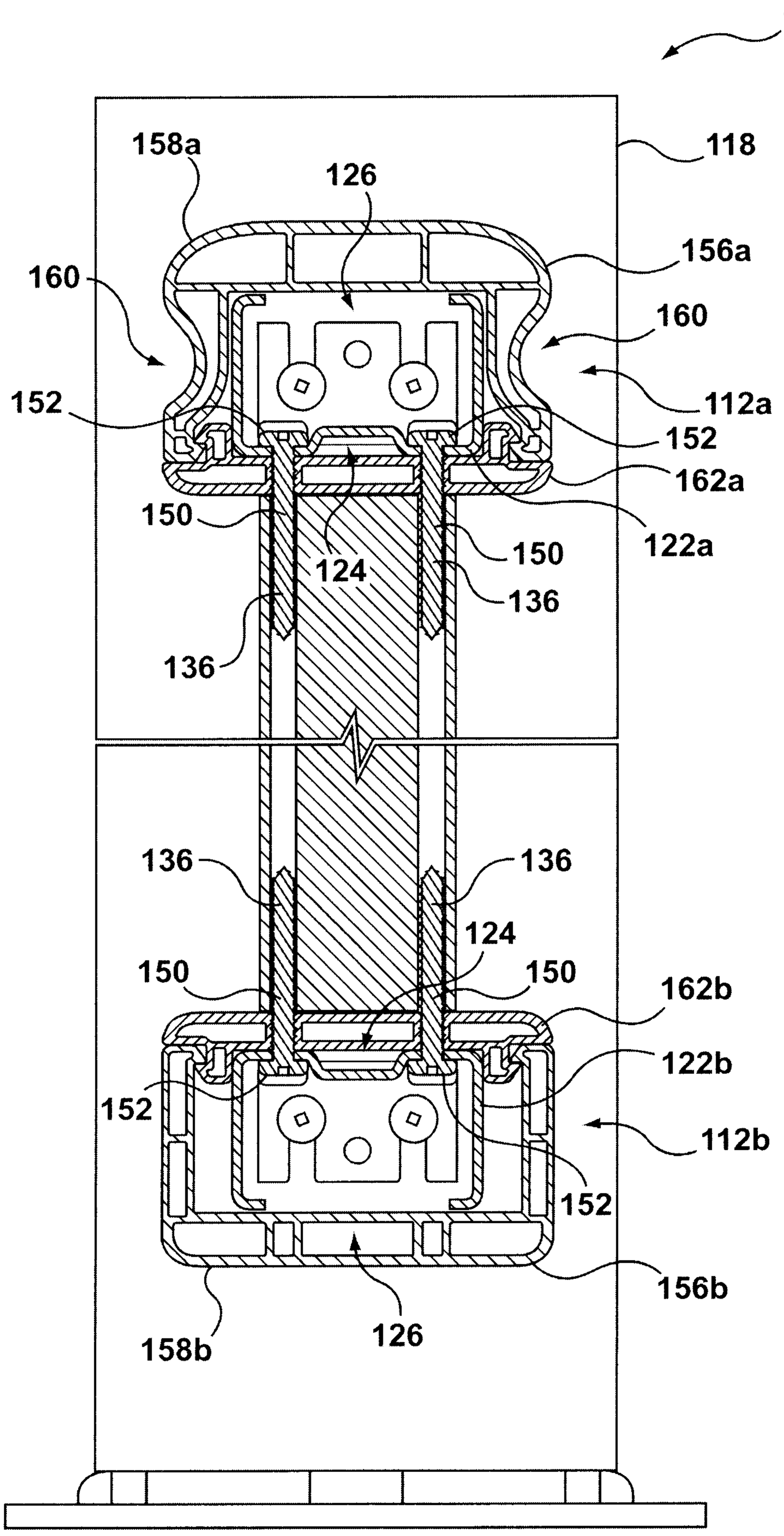
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FIG. 2

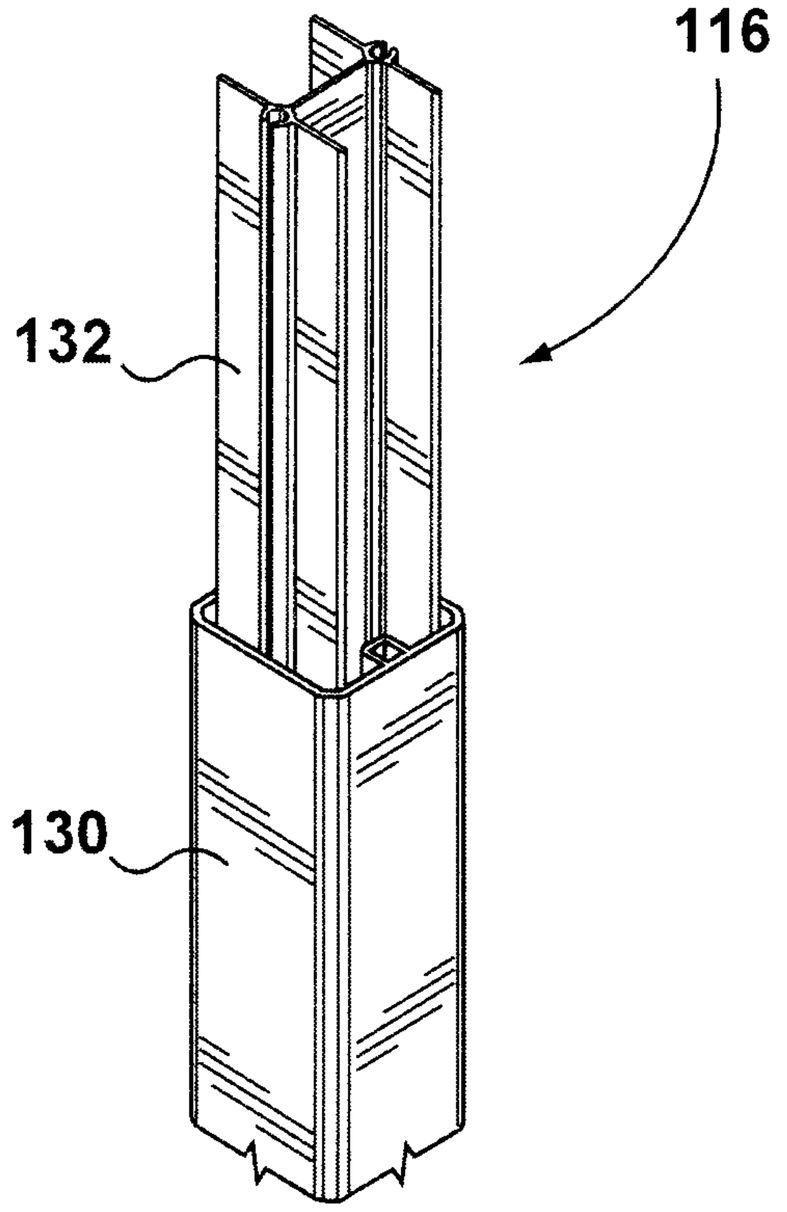

FIG. 3a

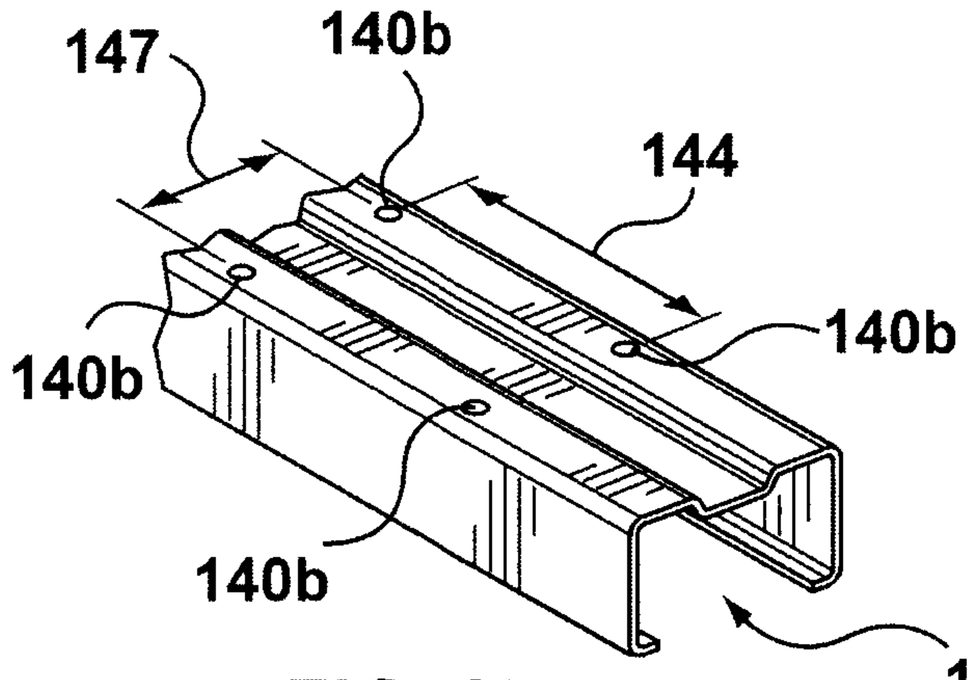

FIG. 3b

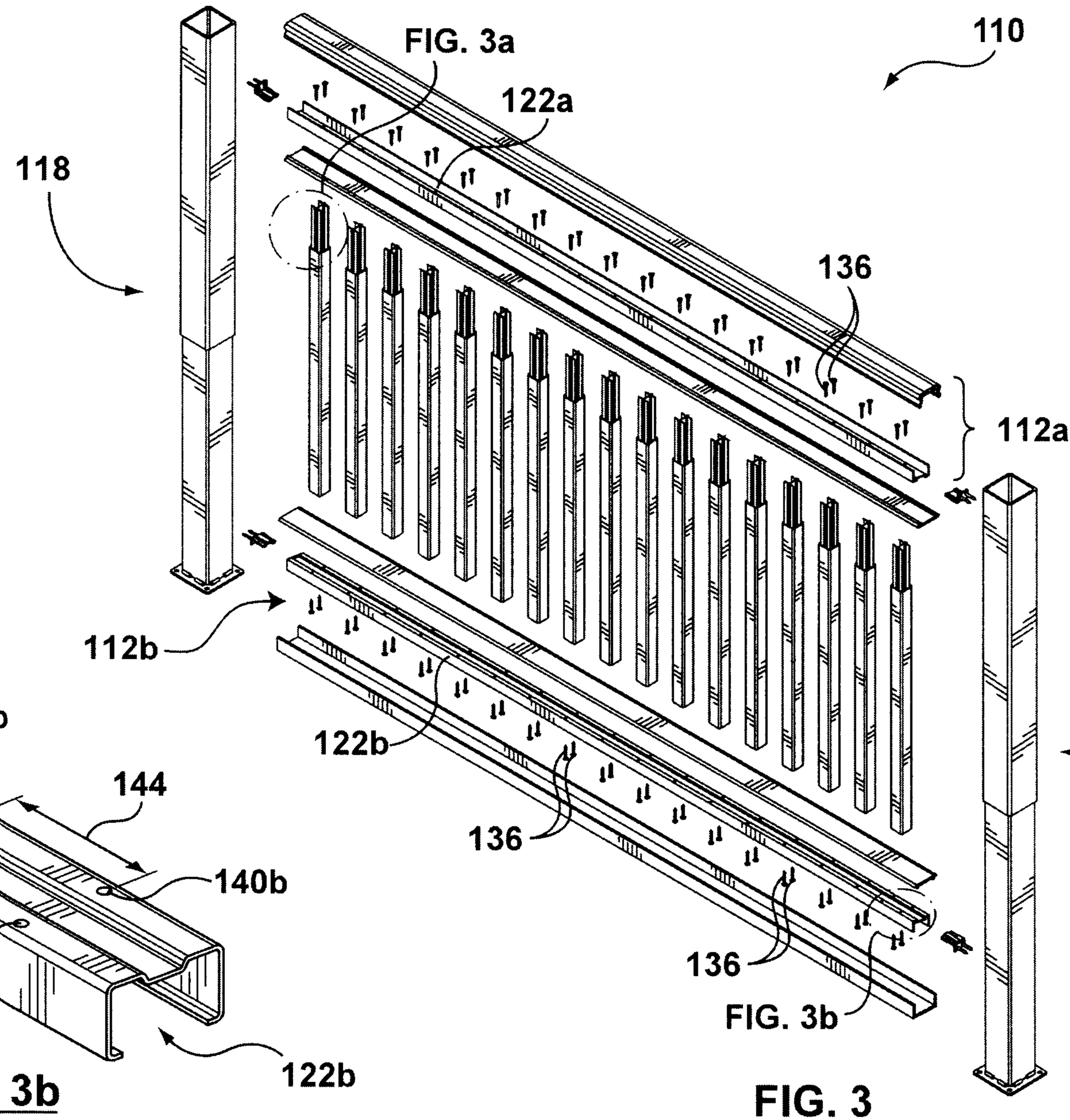

FIG. 3

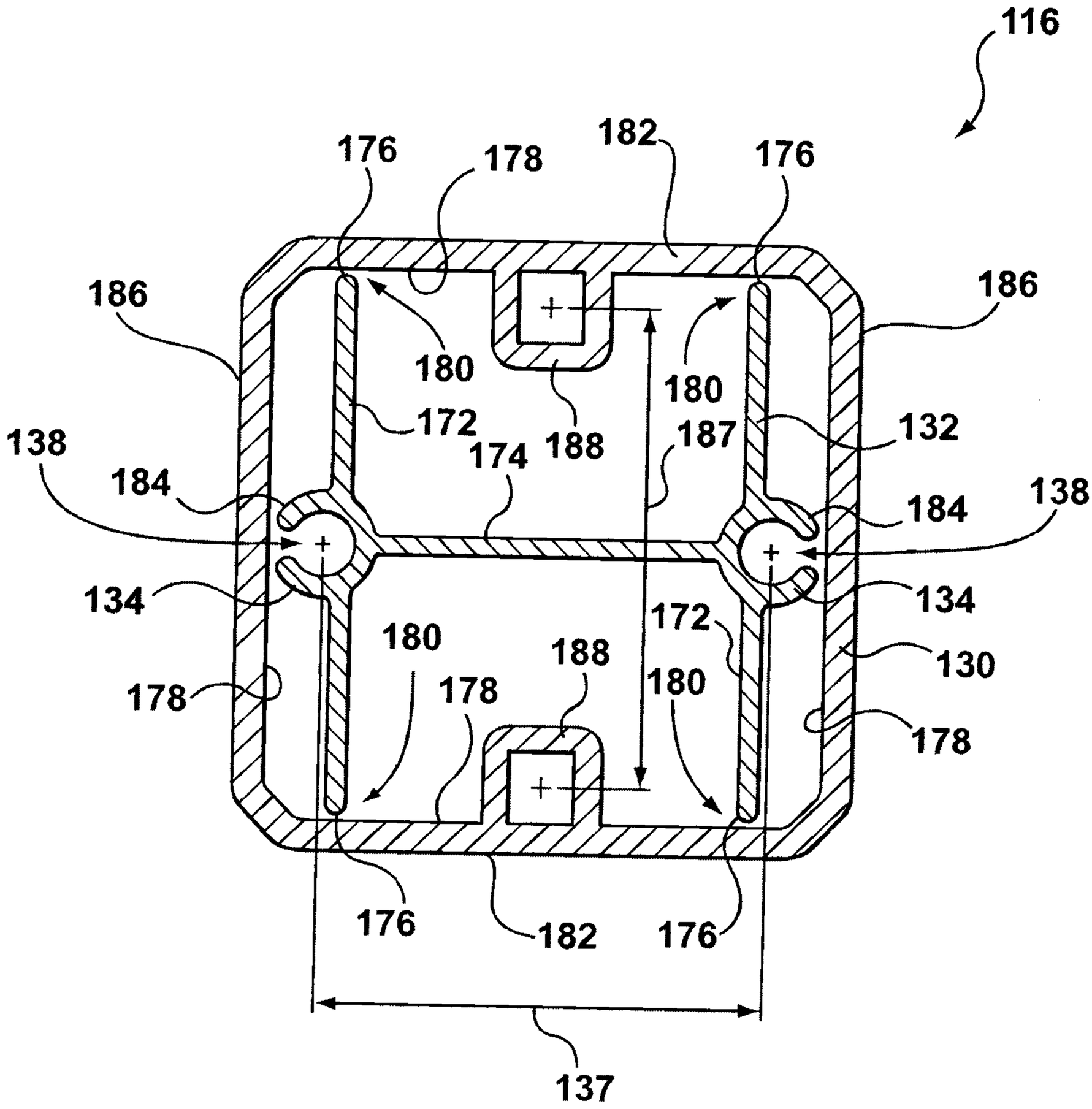
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FIG. 4

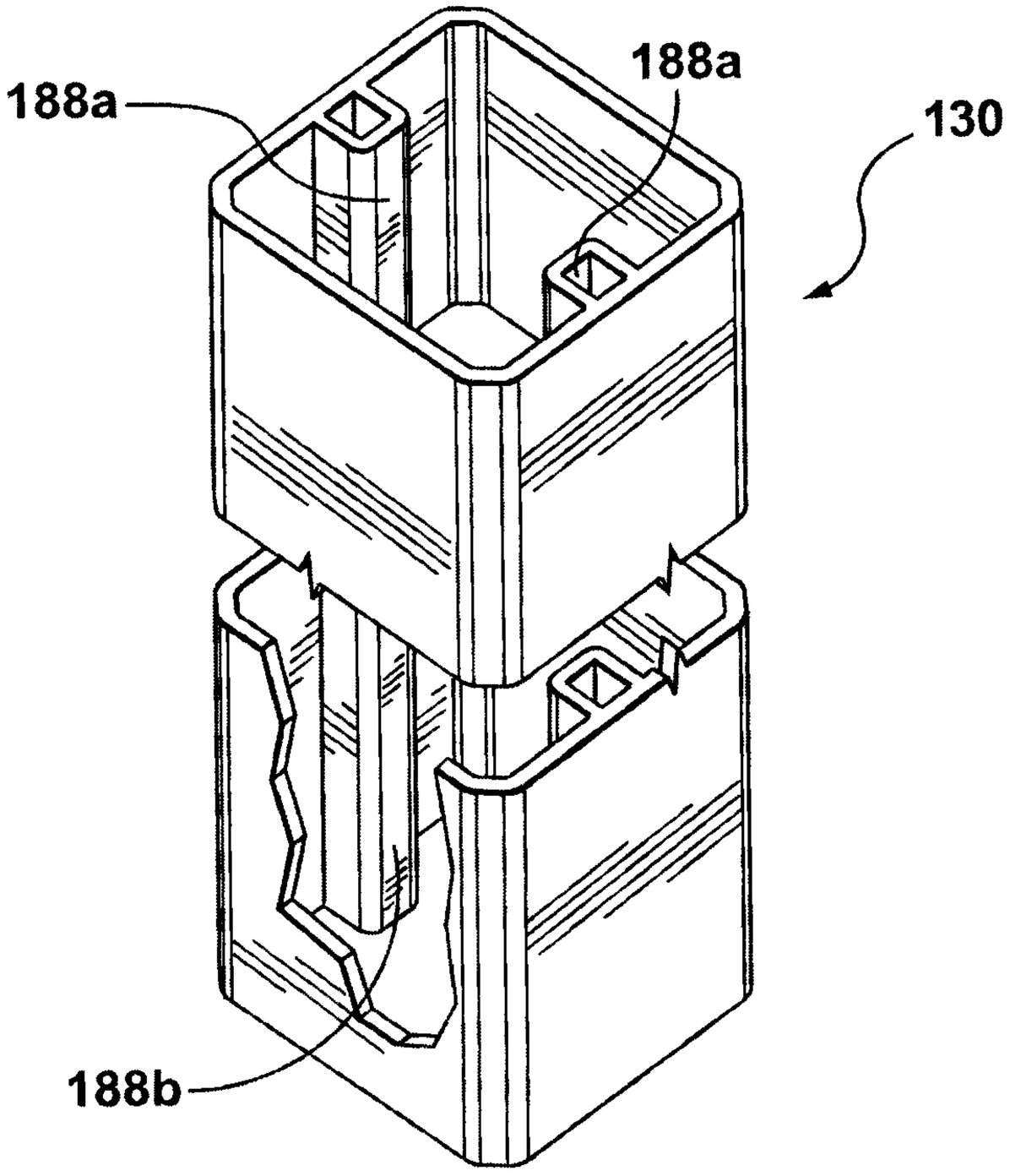
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FIG. 5

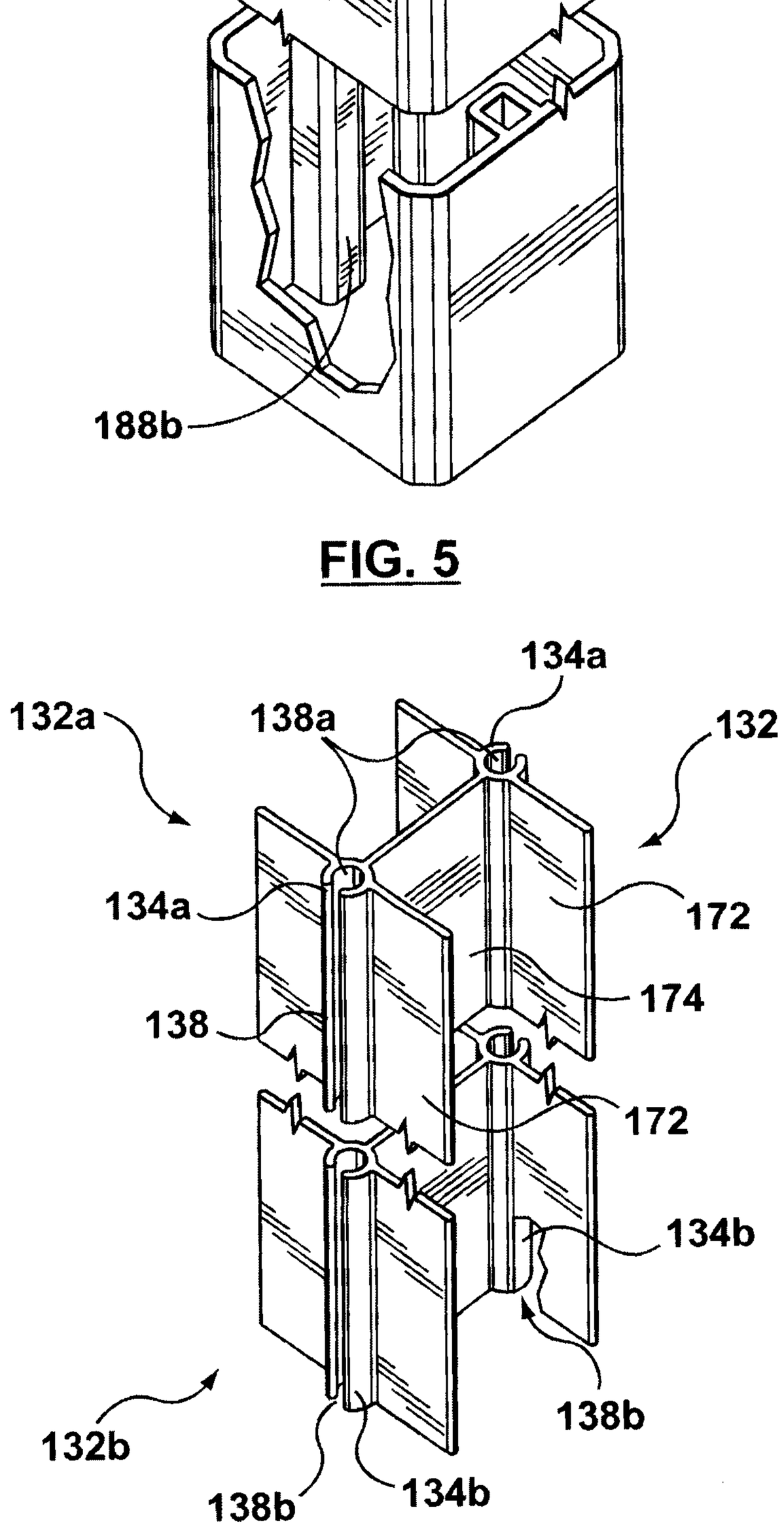
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FIG. 6

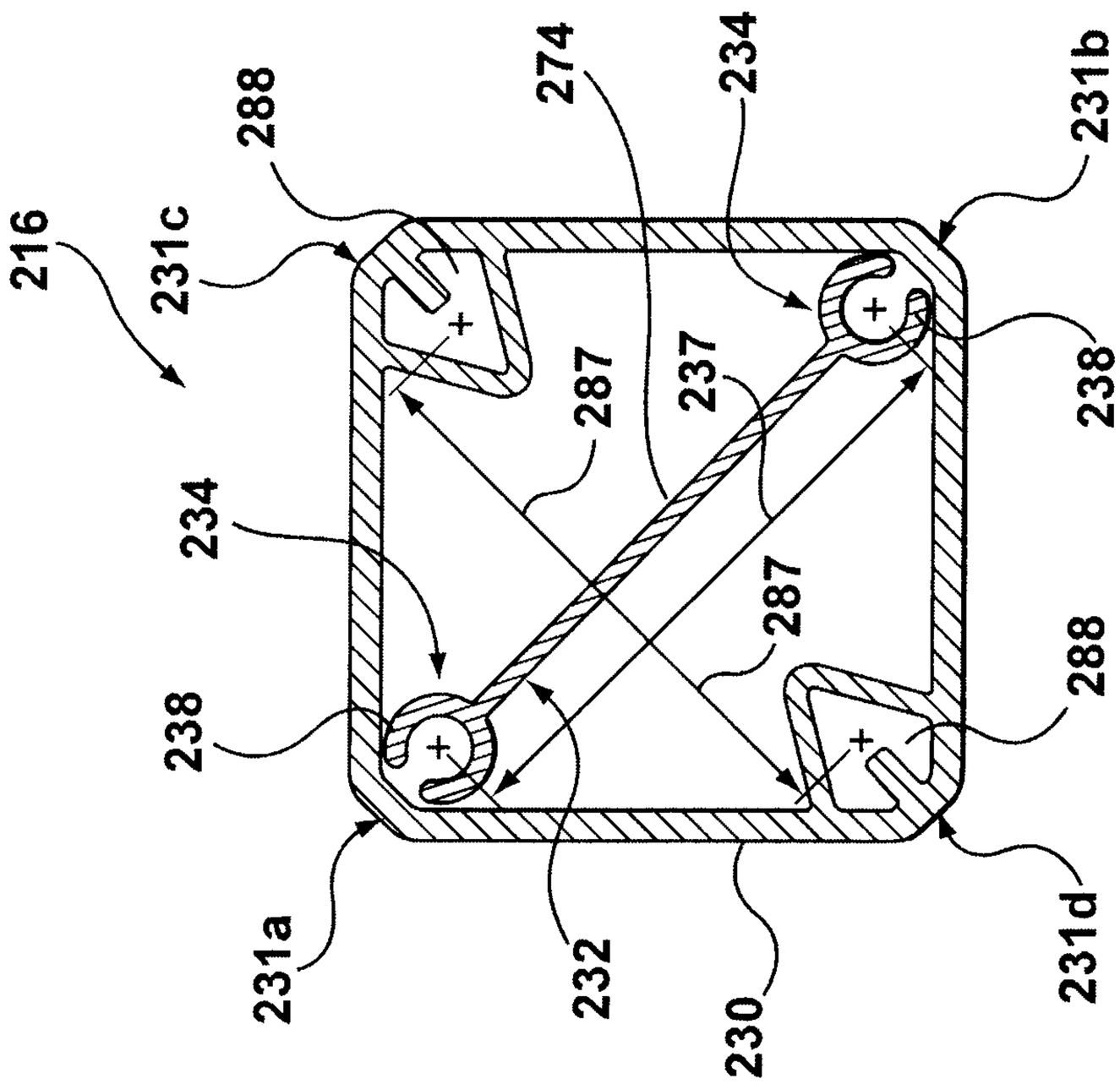
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FIG. 7

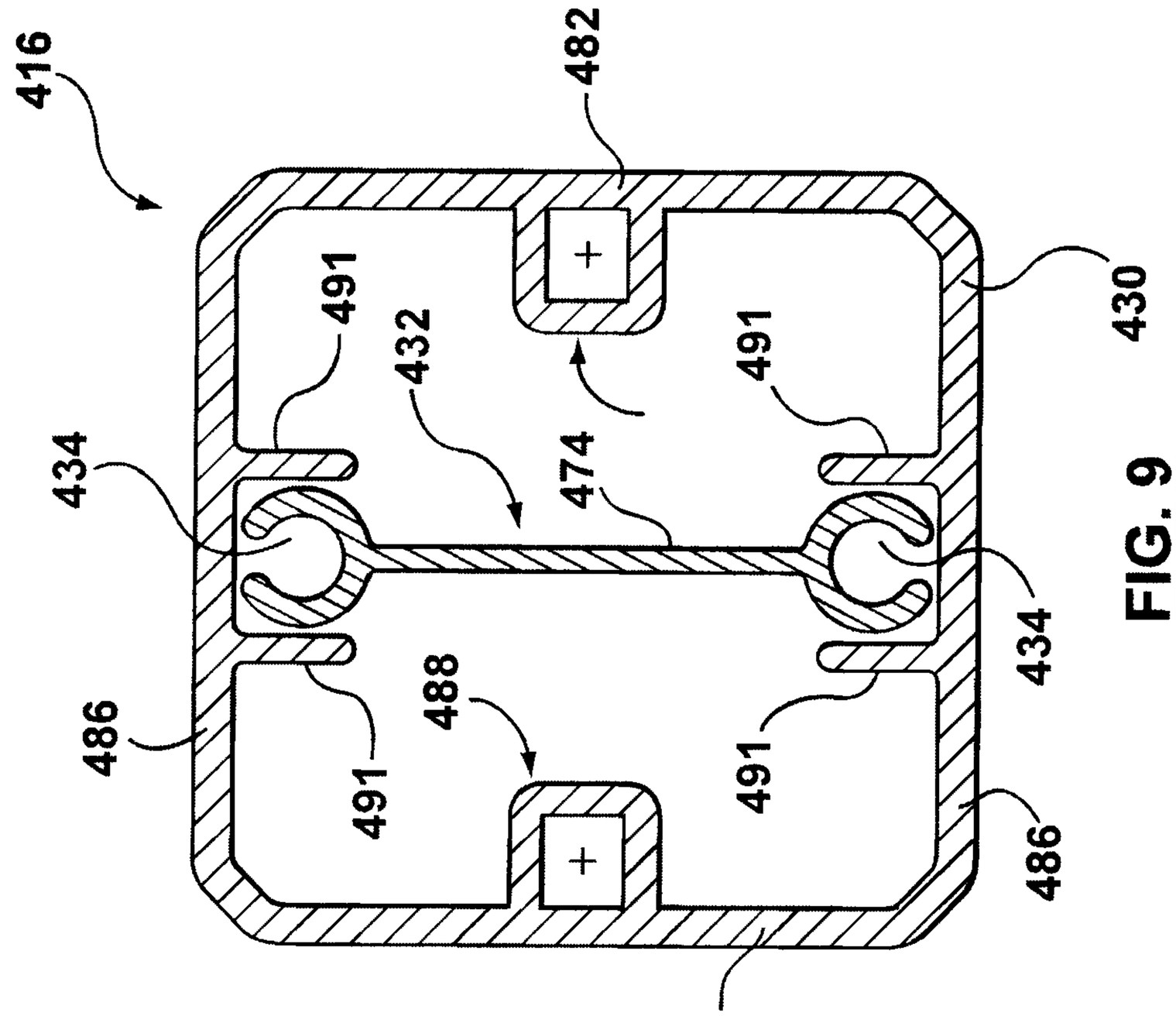
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FIG. 9

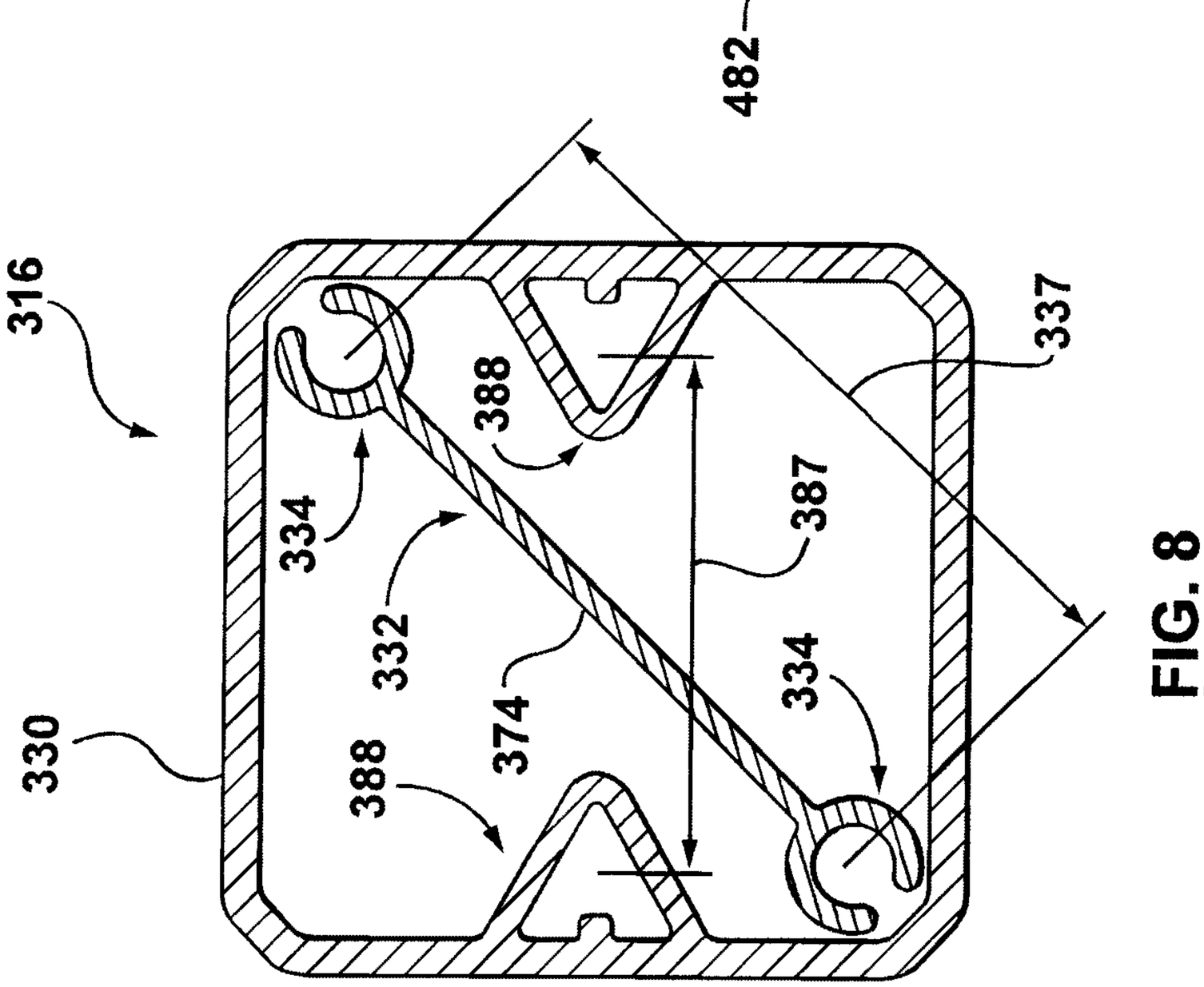
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FIG. 8

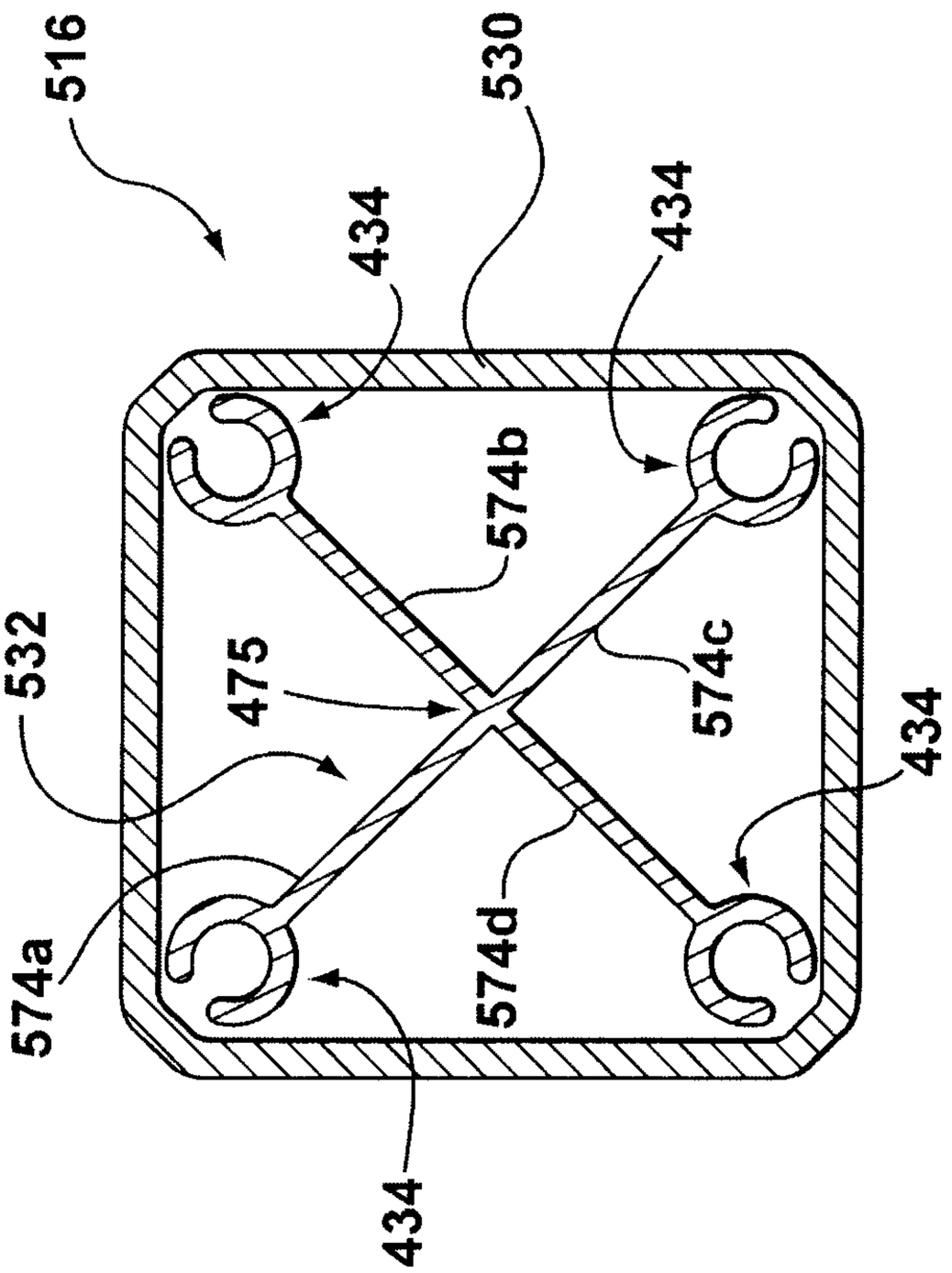

FIG. 10

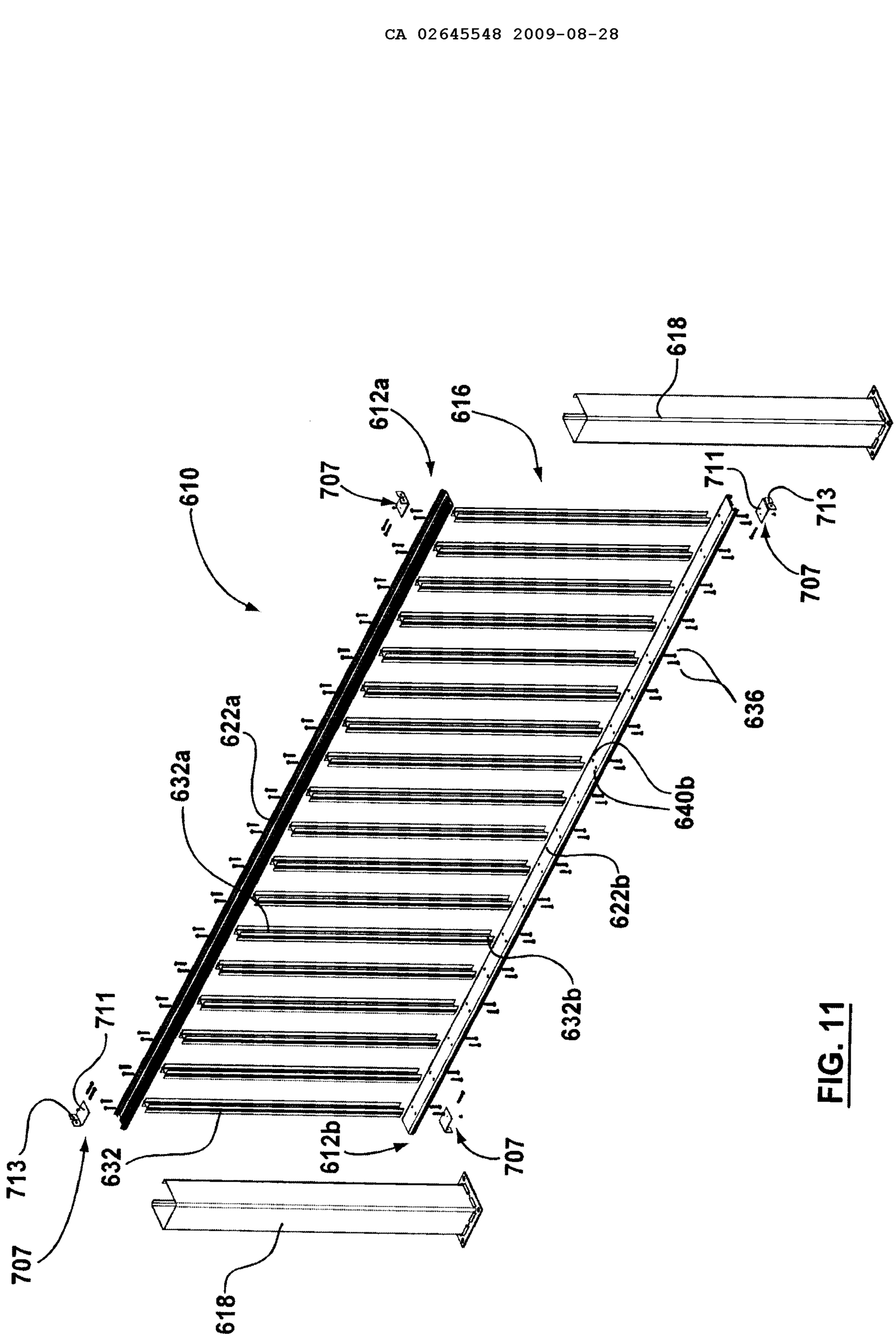
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FIG. 11

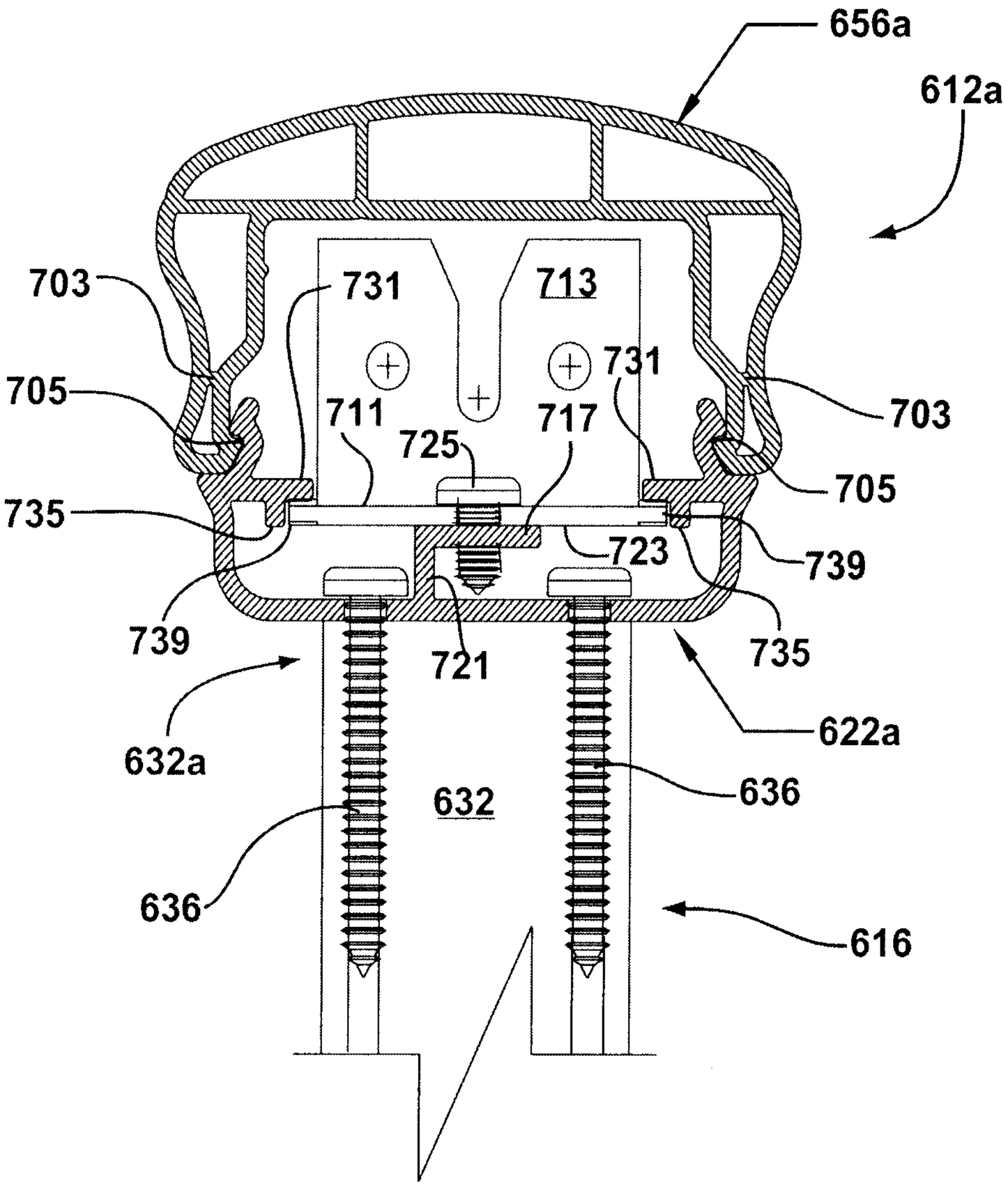
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FIG. 12

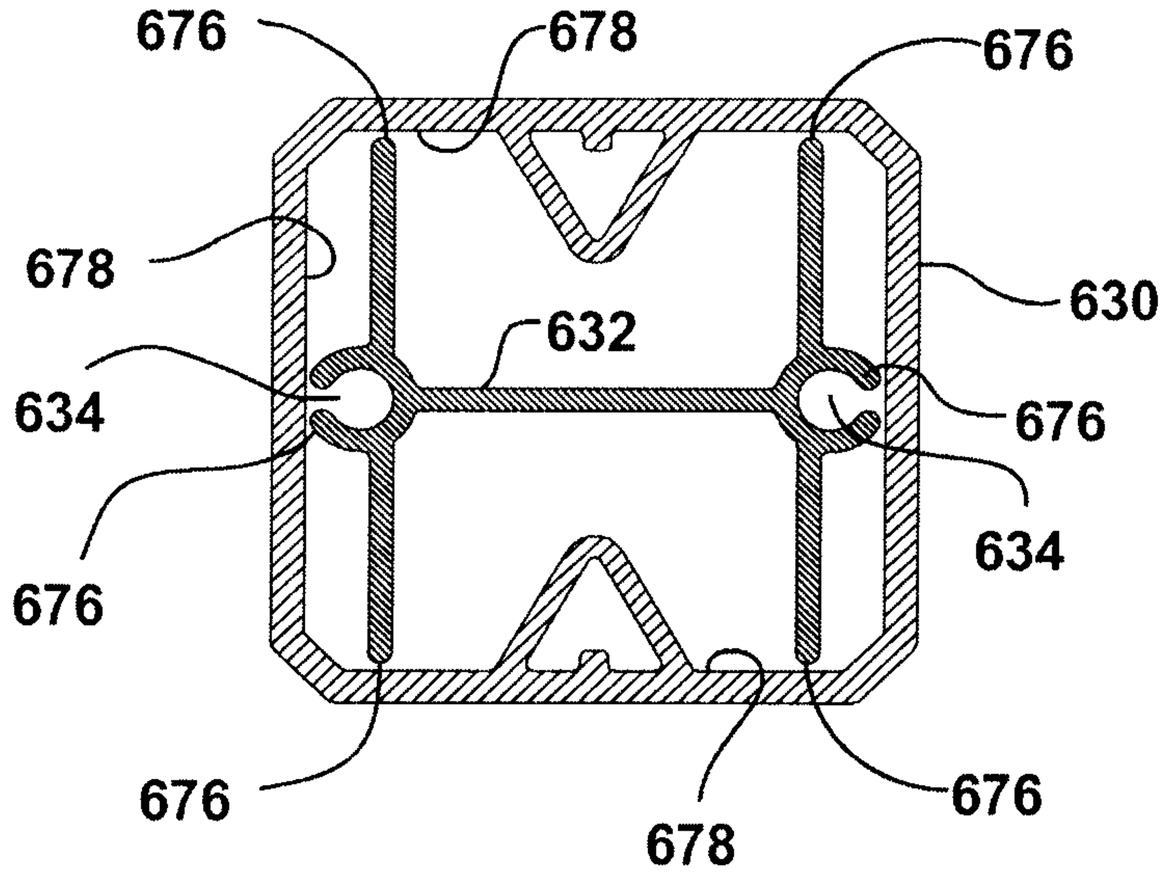
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FIG. 13

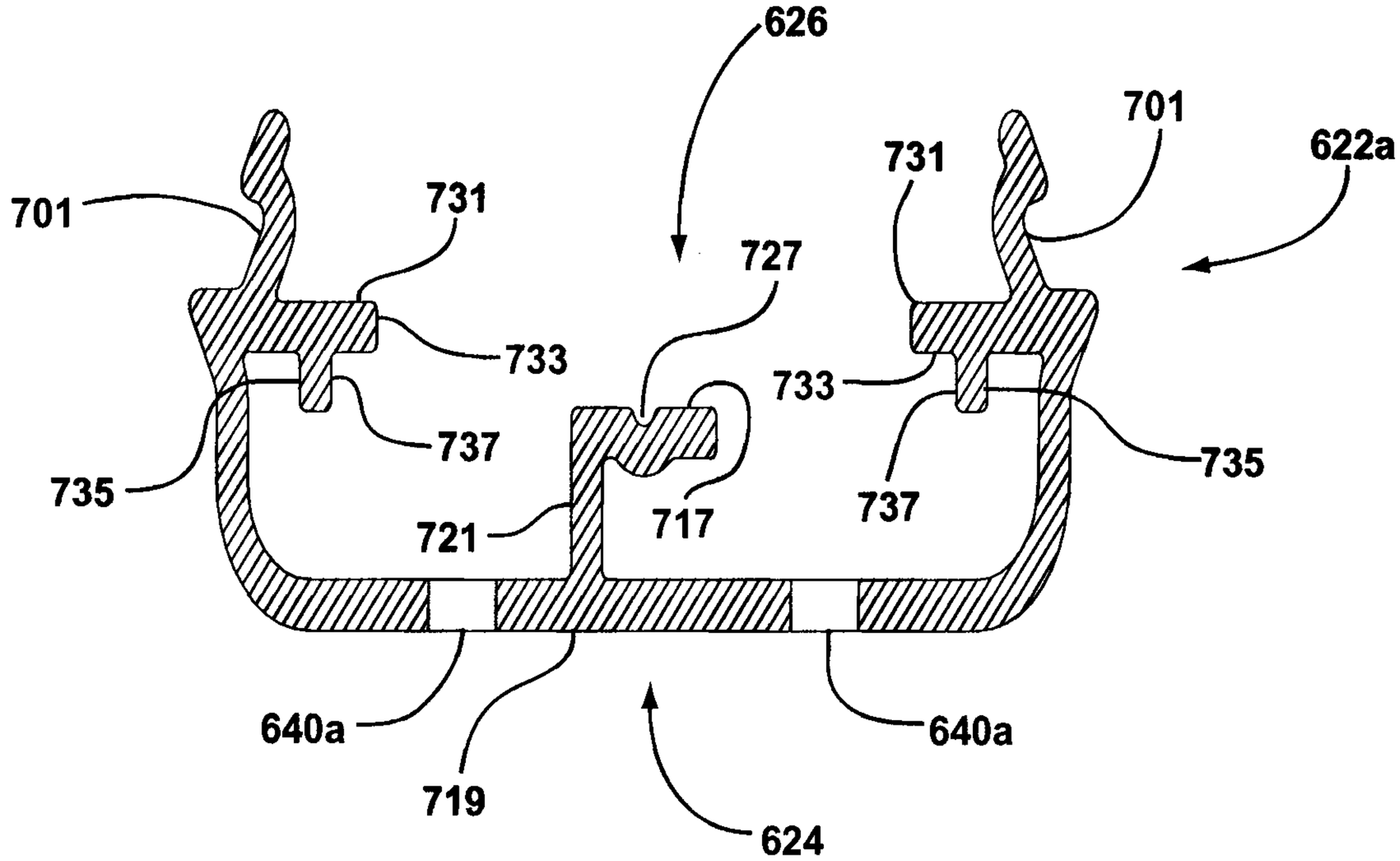
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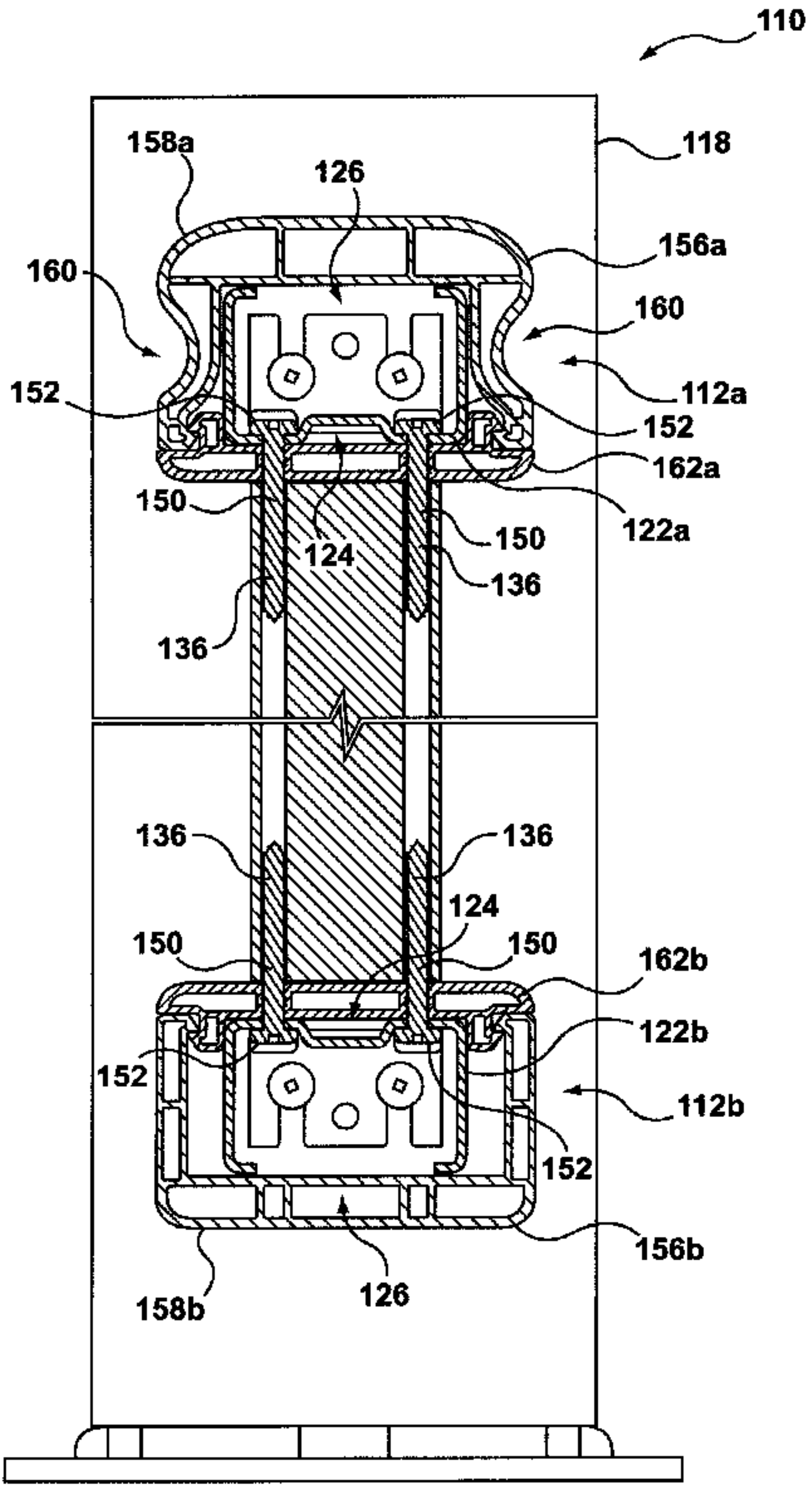
FIG. 14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