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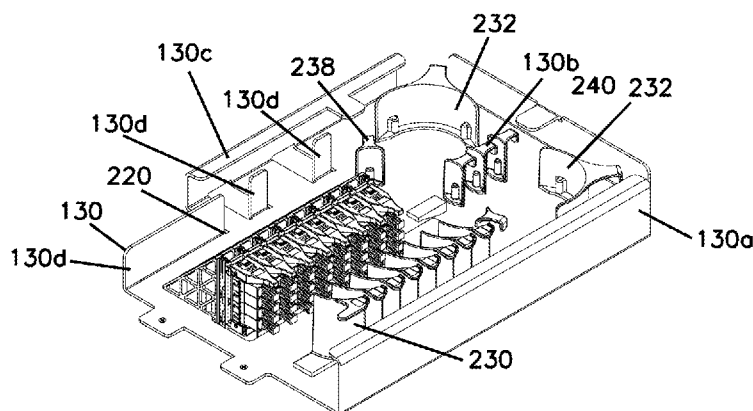
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FIG. 2



(57) Abstract: This disclosure is related to a fiber optic distribution system including a telecommunications enclosure. In one aspect, the telecommunications enclosure can include a main body and a cover that together define an interior cavity. A first tray and a second tray can be mounted within the interior cavity. The first tray can be configured to hold a fiber optic splitter and to include cable management features. The second tray can be configured with a termination feature for connecting cables extending from the splitter to cables that can be distributed to individual locations remote from the enclosure, such as individual dwelling units.

TELECOMMUNICATIONS ENCLOSURE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is being filed on June 10, 2016 as a PCT International Patent Application and claims the benefit of U.S. Patent Application Serial No. 62/196,119, filed on July 23, 2015 and claims the benefit of U.S. Patent Application Serial No. 62/175,047, filed on June 12, 2015, the disclosures of which are incorporated herein by reference in their entireties.

FIELD OF THE INVENTION

[0002] The present invention relates to telecommunications enclosures and fiber optic distribution systems.

BACKGROUND

[0003] Numerous telecommunications enclosures exist today and are used in various applications. One such application is for use in fiber distribution to multiple dwelling units (MDU's). In many applications, telecommunications enclosures are configured to house various telecommunications components in a single main compartment.

SUMMARY

[0004] This disclosure is related to a fiber optic distribution system including a telecommunications enclosure. In one aspect the fiber optic distribution system can include a first optical cable including at least one first optical fiber, a plurality of second optical cables each of which includes at least one second optical fiber, and a plurality of third optical cables each of which includes at least one third optical fiber. The fiber optic distribution system may also include an optical splitter connected to the first and second optical cables. The optical splitter can be configured to split an optical signal from the first optical fiber to the plurality of second optical fibers.

[0005] The telecommunications enclosure can include a main body and a cover that together define an interior cavity. In one aspect, one of the main body and the cover includes a first opening for receiving the first optical cable into the interior cavity and

includes a second opening for allowing the plurality of third cables to exit the interior cavity. The enclosure can also include a first layer or tray mountable within the interior cavity. The first tray can be provided with a wall structure for retaining the optical splitter and a plurality of cable management clips for retaining the plurality of second cables extending from the optical splitter. The enclosure can also include a second layer or tray mountable to the first tray. The second tray can include an aperture for allowing passage of the plurality of second cables from the first tray into the second tray, a termination location for placing the second optical fibers in optical communication with third optical fibers, and a cable routing passageway for guiding the plurality of third cables from the termination location to the second opening. Cable slack storage systems are provided within the enclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The accompanying drawings, which are incorporated in and constitute a part of the description, illustrate several aspects of the present disclosure. A brief description of the drawings is as follows:

[0007] Figure 1 is a perspective view of a telecommunications enclosure having features and aspects in accordance with the present disclosure.

[0008] Figure 2 is a an exploded perspective view of the telecommunications enclosure shown in Figure 1 including a main body, a first tray, and a second tray;

[0009] Figure 3 is a perspective view of the first tray of the telecommunications enclosure shown in Figure 1.

[0010] Figure 4 is a perspective view of the second tray of the telecommunications enclosure shown in Figure 1.

[0011] Figure 5 is a top view of the telecommunications enclosure shown in Figure 1 with the cover and second tray removed to show the first tray.

[0012] Figure 6 is a top view of the telecommunications enclosure shown in Figure 1 with the cover removed to show the second tray.

[0013] Figure 7 is a perspective view of the telecommunications enclosure shown in Figure 1 with the cover removed from the telecommunications enclosure and with the second tray in an outwardly pivoted position.

[0014] Figure 8 is a perspective view of a fiber distribution system including the telecommunications enclosure shown in Figure 1.

[0015] Figure 9 is a perspective view of the fiber distribution system shown in Figure 8 with the cover removed from the telecommunications enclosure and with the second tray in an outwardly pivoted position.

[0016] Figure 10 is a perspective view of the fiber distribution system shown in Figure 8 with the cover removed from the telecommunications enclosure and with the second tray in a rested position.

[0017] Figure 11 is a front perspective view of the fiber distribution system shown in Figure 8 with the cover removed from the telecommunications enclosure.

[0018] Figure 12 is a perspective view of the fiber distribution system shown in Figure 8 showing details of the cable routing pathways.

[0019] Figure 13 is a partial exploded perspective view of another embodiment of a telecommunications enclosure and fiber distribution system including a slack storage system for the distribution cables, the embodiment having features and aspects in accordance with the present disclosure.

[0020] Figure 14 is an exploded view of the telecommunications enclosure shown in Figure 13.

[0021] Figure 15 is a front view of the fiber distribution system shown in Figure 13 with the cover and a second tray removed.

[0022] Figure 16 is a front view of the fiber distribution system shown in Figure 13 with the cover removed to show the telecommunications enclosure.

[0023] Figure 17 is a perspective view of the fiber distribution system shown in Figure 13 with the cover removed to show the telecommunications enclosure.

[0024] Figure 18 is a perspective view of the fiber distribution system shown in Figure 13 with the cover removed to show the telecommunications enclosure and with a portion of the slack management system shown detached from the telecommunications enclosure.

[0025] Figure 19 is a front view of the fiber distribution system shown in Figure 13 with the cover removed to show the telecommunications enclosure and with telecommunications cables routed therein.

DETAILED DESCRIPTION

[0026] Reference will now be made in detail to exemplary aspects of the present disclosure that are illustrated in the accompanying drawings. Whenever possible, the same reference numbers will be used throughout the drawings to refer.

[0027] As presented at Figures 1-12, a telecommunications enclosure 100 that is part of a fiber distribution system 1 is shown. Figures 1-7 generally emphasize features of the enclosure 100 while figures 8-12 show the enclosure 100 with additional telecommunications components (e.g. adapters, splitter, cables, etc.) to form the fiber distribution system 1. In one aspect, the telecommunications enclosure 100 can be configured as a building distribution wall box that houses an optical splitter in an outdoor or outdoor environment. The enclosure 100 can be utilized as a final distribution point in a “Fiber to the X (FTTX)” network, for example in a network where individual fibers from the enclosure 100 are routed to individual living spaces in a multiple dwelling unit (MDU).

[0028] As shown, the enclosure 100 includes a main body 102 and a cover 104 that together define an interior cavity 106. The cover 104 is movable with respect to the main body 102 and can be completely removable from the main body 102 and/or pivotally attached to the main body 102. In the embodiment shown, the cover 104 can be secured to the main body 102 by a pair of captive screws 103. A weather seal 105 may be provided on the main body 102 or the cover 104 to provide a weather resistant seal between the main body 102 and cover 104. As shown, a continuous weather seal 105 is provided within a channel 105a defined in the main body 102.

[0029] In one aspect, the enclosure includes a first opening 108 for receiving an incoming feeder cable 200 and a second opening 110 for allowing distribution cables or patch cords 204 to exit the enclosure 100. In the embodiment shown, the first and second openings are shown as being provided in the main body 102.

[0030] The first opening 108 is provided with a threaded compression fitting 109 that is configured to fully secure one or more feeder cables 200 in a fixed position and to provide a weather tight seal around the feeder cable 200. The second opening 110 is constructed to have a first slot 110a and a second slot 110b that extend to the top edge of the enclosure main body 102. Each of the slots is defined by an elastic (i.e. foam) material 111 secured by channels 113 in the main body 102. The foam material frictionally retains the cables 204 in a generally fixed position and provides a seal against weather and debris. This construction allows for patch cords and cables 204 to be individually slid down into the slots 110a, 110b when the cover 104 is open or removed and to be secured into the slots 110a, 110b when the cover 104 is secured to the main body 102. The enclosure 100 may also be provided with mounting lugs 112 such that the enclosure 112 can be mounted to a surface 113, such as a wall, by mechanical fasteners 114, such as screws.

[0031] The main body 102 and cover 104 can be formed from a variety of materials. In one example, the main body 102 and cover 104 are molded from a plastic material. In one example, the materials used for the enclosure 100 and cables 200, 202, 204, including the main body 102 and cover 104 are provided to be fire retardant and/or have a “low smoke zero halogen” (LSZH) rating.

[0032] As presented, the enclosure 100 may include a first tray 120 mountable within the interior cavity 106 of the enclosure and a second tray 130 mountable to the first tray 120. The first and second trays 120, 130 may be formed of any suitable material. In the embodiment shown, the first and second trays 120, 130 are formed from an initially flat sheet of steel that is first cut to have the appropriate shape and openings and is then folded in to the desired form. The first tray 120 can be secured to the main body 102 via fasteners, such as screws 121. The second tray 130 can be secured to the second tray via fasteners or a latch mechanism 131 that engages with a corresponding aperture 128 associated with the first tray 120. In an alternative embodiment, the back wall of the enclosure main body 102 may be utilized as the first layer instead of having a separate tray.

[0033] In one aspect, the first tray 120 is formed to have sidewalls 120a, 120b, 120c, and 120d, each of which extends outwardly from a back wall 120e. The first tray 120 is additionally provided with a wall structure 122 defined by walls 120d, 120f, 120g, and 120i. The wall structure 122 is for retaining an optical splitter 210 within the first tray 120. The optical splitter 210 may be further secured within the first tray 120 with a strap and/or fasteners, such as screws. In one aspect, the optical splitter 210 can be a connectorized type splitter for splitting an optical signal from the optical fiber of the feed cable 200 to a plurality of second optical fibers associated with splitter cables 202. The optical splitter 210 can be configured to split the feeder signal into, for example, 16 or 32 splitter cables 202 which are ultimately connected to output cables 204 for connection to individual subscribers. In the embodiment shown, a single splitter 210 is provided that outputs to 32 output cables 202. Other exemplary configurations include a single splitter with 16 outputs (i.e. 1 x 16) and a two splitter arrangement wherein each splitter has 16 outputs (i.e. 2 x 1 x 16). The wall structure 122 can be configured to retain multiple optical splitters 210, such as two or three optical splitters 210 in a stacked configuration. The splitter 210 connects to a connectorized input cable 200 through an adapter.

[0034] The first tray 120 additionally includes a plurality of walls 120h that are for supporting cable management clips 124. The cable management clips 124 are for securing the cables 202 leading from the optical splitter 210 and are arranged such that the cables 202 can be looped in a circular fashion to take up any necessary slack in the cables 202. With this design, standard length cables 202 may be utilized and the need for custom cable lengths can be avoided. As shown, the cable management clips 124 are movable between an open position in which the cables can be installed and removed to and from the clips 124 and a closed position in which the cables 202 are securely held within the clips 124. The clips 124 can also be arranged to provide bend radius limiting protection for the cables 202. For example, clip 124a is located to provide such protection for the cables 202 proximate the location where the cables 202 extend from the optical splitter 210. Examples of clips suitable for the disclosed enclosure 100 and system 1 are described and shown in United States Patent Numbers 6,665,484 and 6,771,871, the entireties of which are each incorporated by reference herein.

[0035] The first tray 120 is also shown as being provided with a pair of slots 126 in the wall 120a. The slots 126 are shaped to receive corresponding tabs 136 of the second

tray 130 and allow for a pivotal connection between the first tray 120 and the second tray 130. The width of the slots 126 is such that the rotation of the tabs 136, and thus the tray 130, is limited to a maximum outward position. Figures 7 and 9 show this maximum position with the enclosure 100 mounted to a wall such that the slots 126 and tabs 136 are proximate the bottom of the enclosure 100. In this configuration, the second tray 130 is held in the outwardly pivoted position by gravity. It is noted that the second tray 130 can be removed from the first tray 120 and enclosure 100 by simply pulling the second tray 130 away from the first tray 120 such that the tabs 136 are removed from the slots 126. In a folded or storage position, the second tray 130 is rotated against the first tray 120 and secured to the first tray 120 via the latch 131. In this position, the second tray 130 is prevented from moving away from wall 120a such that the tabs 136 are prevented from being removed from the slots 126. As such, it is the combination of the tabs 136 (and slots 126) and the latch 131 that secure the second tray 130 to the first tray 120. If desired, a securing element 137 can be installed onto the tabs 136 to prevent removal of the tabs 136 from the slots 126. In the embodiment shown, the securing element 137 is a threaded screw.

[0036] The second tray 130 is also provided with sidewalls 130a, 130b, 130c, and 130d which extend outwardly from a back wall 130e. These sidewalls and back wall 130e can be formed from an initially flat sheet of material and subsequently cut and bent to form the sidewall features. For example, the sidewalls 130d can be configured as cut-away portions of the back wall 130e that are bent upwardly to form the sidewalls. As shown, the previously discussed tabs 136 are an extension of the back wall 130e. The second tray 130 is also provided with an aperture 130f in the back wall 130e for allowing the splitter cables 202 to extend from the first tray 120 and into the second tray 130.

[0037] The second tray 130 is configured to retain a number of telecommunications components. For example, the back wall 130e of the second tray 130 is configured to accept a termination location 220. The termination location 220 is for placing the optical fibers of the splitter cables 202 in optical communication with the optical fibers of the patch cords or cables 204. In the embodiment shown, the termination location 220 is bank of sliding adapter packs configured to connect to connectors 202a of the splitter cables 202 and to connect to connectors 204a of the cables 204. The bank of sliding adapter packs 220 includes a plurality of guide walls 222 secured to the back wall 130e and a plurality of

sliding termination blocks 224 having multiple adapter modules 226. Each of the sliding termination blocks 224 is located between and is slidably connected to a pair of guide walls 222 such that the termination blocks 224 can be raised and lowered away from and towards the back wall 130e. Examples of termination locations 220 suitable for the disclosed enclosure 100 and system 1 are described and shown in United States Patent Numbers 6,591,051 and 5,497,444 the entireties of each being incorporated by reference herein. As shown, eight termination blocks 224 each having four adapters 226 are provided that are supported by nine guide walls 222. However, more or fewer termination blocks 224, adapters 226, and guide walls 222 may be provided for any given application. Alternatively, the termination locations can be stationary.

[0038] The second tray 130 may also be provided with bend radius limiters 230 for guiding the patch cables 204 from the termination location 220 and directing the cables 204 in a direction generally parallel to the sidewall 130a. As shown, a bend radius limiter 230 is provided for each termination block 224 such that an array of eight bend radius limiters 230 is provided. The second tray 130 may be provided with additional bend radius limiters 232 for further guiding the cables 204 towards the sidewall 130c at which the cables 204 are guided between the sidewall 130c and the sidewalls 130d towards the second opening 110. Accordingly, the bend radius limiters 230, 232 and the sidewalls 130a, 130b, 130c, 130d define a cable routing passageway for the cables 204.

[0039] The second tray 130 may be further provided with bend radius limiters 236, 238, 240 for guiding the splitter cables 202 as the cables 202 exit the aperture 130f and extend to the termination location 220. The sidewalls 130d also act to guide the patch cords or splitter cables 202 and additionally function to keep the splitter cables 202 separated from the patch or output cables 204. The sidewalls 130d can also act as bend radius limiters.

[0040] Referring now to Figures 13-19, an alternative enclosure 300 is shown. Many of the features of enclosure 300 are similar to the features of enclosure 100. Thus, the previous description for the first embodiment is largely applicable to the description of enclosure 300. To the extent that the embodiments are similar, the description will not be repeated and will instead be directed to the primary differences. Also, it is noted that the cover 104 is not shown in Figures 13-19, but is similar to that shown at Figure 1. In general, the main body 102, the cover 104, and first tray 120 are the same between the two

embodiments 100, 300. However, enclosure 300 differs in that the second tray 130 has a different configuration. Namely, the enclosure 300 has a distribution cable slack storage system 306 for managing cables 304 instead of bend radius limiters 232. For the second tray of enclosure 300, the features will be similarly numbered for tray 130, but will be in the 300 series (i.e. 330 instead of 130).

[0041] As shown, the second tray 330 is provided with an aperture 333 located within the back wall 330e and between wall 330b and the termination location 220 and bend radius limiters 230. This location corresponds to the location where the bend radius limiters 232, 236, 240, and 238 are located on the second tray 130. The second tray 330 is additionally provided with a recessed frame 335 which mounts to the back wall 330e and covers the aperture 333. In the embodiment shown, the frame 335 is mounted to the back wall 330e at support walls 335a of the frame 335 with mechanical fasteners, such as screws. The bend radius limiters 236, 238, and 240 are mounted to a support surface 335 of the frame 335, and thus extend through the aperture 333. As the frame 335 is recessed in height, the bend radius limiters 236, 238, and 240 are mounted below the level of the back wall 330e and are disposed at a lower height in comparison to their position within second tray 130. This reduced height can allow for sufficient room for the cable slack storage system 306 to be installed directly above while still fitting within the main body and cover 102, 104. In an alternative construction, the back wall 330e could be formed with an integral recessed tray and/or the bend radius limiters 236, 238, 240 could be provided with a reduced height albeit with a lower storage capacity. The lower elevation of the support surface 335a can also enlarge or create an opening 335e into the first tray 120 and thereby allows cables to be routed between the first tray 120 and the bend radius limiters 236, 238, 240. The removable frame 335 is advantageous in that multiple tray configurations could be developed to allow for a modular construction approach wherein a frame 335 constructed for a particular application can be chosen without requiring the entire second tray 330 to be redesigned.

[0042] The cable slack storage system 306 is shown as being provided with a frame 308 having a support surface 308a, wherein the frame 308 is mounted to the second tray 330. In the embodiment shown, sidewalls 308b of the frame 308 are mounted to the sidewalls 330a, 330c with mechanical fasteners, such as screws. The frame 308 further includes a sloped front wall 308c which includes a notch or aperture 308d. The sloped

wall 308c enables for a smooth transition area for cables traversing from along the back wall 330e to the support surface 308a which is elevated relative to the back wall 330e. The notch 308d provides for a passageway for cables routed about the bend radius limiters 236, 238, 240 to extend into and out of the enclosed space defined between the support surfaces 335a, 308a, sidewall 330b, and front wall 308c. A sidewall 335c of the frame 335 is provided that is aligned at one side of the notch 308d to further define the enclosed space. The sidewall 335c can also act as a guide for the cables extending through the notch 308d. The frame 308 is removable and can therefore be removed during the routing of the cables about bend radius limiters 236, 238, 240 and later installed after routing is complete.

[0043] The cable slack management system 306 also includes one or more bend radius limiters 310 to enable cable slack storage for cables 304 internal to enclosure 300. As shown, the radius limiters 310 are mounted to the support surface 308a of the frame 308 and are attached by mechanical fasteners, such as screws 309. In the example shown, three similarly oriented semi-circular radius limiters 310 are provided with a fourth semi-circular radius limiter 310 being provided at one end to form a fully circular radius limiter assembly with another limiter 310. Other configurations are possible. To further aid in guiding and retaining the cables about the radius limiters 310, the back wall 330b can be additionally provided with slanted extensions 331 which extend towards the bend radius limiters 310 and partially cover the open space defined between the back wall 330b and the limiters 310. The removable frame 308 is advantageous in that multiple cable management configurations could be developed to allow for a modular construction approach wherein system 306 constructed for a particular application can be chosen without requiring the entire second tray 330 to be redesigned.

[0044] While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention encompassed by the appended claims. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention and other modifications within the scope. Any such modifications or variations that fall within the purview of this description are intended to be included therein as well.

It is understood that the description herein is intended to be illustrative only and is not intended to be limitative.

What is claimed is:

1. A telecommunications enclosure comprising:
 - a. a main body and a cover that together define an interior cavity, wherein one of the main body and the cover includes a first opening and a second opening;
 - b. a first tray mountable within the interior cavity, the first tray being provided with:
 - i. a wall structure for retaining an optical splitter for splitting an optical signal from a first optical fiber associated with a first cable extending from the first opening to a plurality of second optical fibers associated with a plurality of second cables;
 - ii. a plurality of cable management clips for retaining the plurality of second cables extending from the optical splitter;
 - c. a second tray mountable to the first tray, the second tray including:
 - i. an aperture for allowing passage of the plurality of second cables from the first tray into the second tray;
 - ii. a termination location for placing the second optical fibers in optical communication with third optical fibers associated with a plurality of third cables;
 - iii. a cable routing passageway for guiding the plurality of third cables from the termination location to the second opening.
2. The telecommunications enclosure of claim 1, wherein the second tray is pivotally mounted to the first tray.
3. The telecommunications enclosure of claim 2, wherein the second tray includes at least one tab extension that is received into a slot of the first tray.
4. The telecommunications enclosure of claim 3, wherein the second tray includes a first lock feature for securing the at least one tab extension in the slot.
5. The telecommunications enclosure of claim 2, wherein the second tray is secured to the first tray by a first lock mechanism and a by a pivotal connection point between the first and second trays.

6. The telecommunications enclosure of claim 1, wherein the termination location includes a plurality of sliding adapter packs including a plurality of optical adapters each configured to connect one of the plurality of second cables with one of the plurality of third cables.
7. The telecommunications enclosure of claim 1, wherein the plurality of cable management clips is movable between an open position and a closed position.
8. The telecommunications enclosure of claim 1, wherein the second opening is configured as at least one slot.
9. The telecommunications enclosure of claim 8, wherein the at least one slot is provided with a foam seal member.
10. The telecommunications enclosure of claim 1, wherein the cable routing passageway includes at least one bend radius limiting element.
11. The telecommunications enclosure of claim 6, wherein the cable routing passageway includes a plurality of first bend radius limiting elements, each of which is aligned with one of the plurality of sliding adapter packs.
12. The telecommunications enclosure of claim 11, wherein the cable routing passageway includes a second bend radius limiting element.
13. The telecommunications enclosure of claim 1, wherein the first and second trays are each formed from an initially flat sheet of metal.
14. The telecommunications enclosure of claim 13, wherein the main body and cover are molded plastic components.
15. The telecommunications enclosure of claim 14, wherein the main body is provided with mounting lugs for mounting the enclosure to a surface.
16. The telecommunications enclosure of any of claims 1-15, further comprising slack storage for the splitter outputs and/or slack storage for the third cables.

17. The telecommunications enclosure of claim 1, further comprising:
 - a. a first frame mounted to the second tray that at least partially covers the aperture, the first frame including at least one bend radius limiter for supporting the plurality of second optical fibers.
18. The telecommunications enclosure of claim 17, further comprising:
 - a. a cable slack management frame mounted to the second tray directly above the first frame, the cable slack management frame including a plurality of bend radius limiters for supporting splitter outputs and/or the third cables.
19. The telecommunications enclosure of claim 1, further comprising:
 - a. a cable slack management frame mounted to the second tray directly above the aperture, the cable slack management frame including a plurality of bend radius limiters for supporting splitter outputs and/or the third cables.
20. A fiber optic distribution system comprising:
 - a. a first optical cable including at least one first optical fiber;
 - b. a plurality of second optical cables, each of which including at least one second optical fiber;
 - c. a plurality of third optical cables, each of which including at least one third optical fiber;
 - d. an optical splitter connected to the first and second optical cables, the optical splitter being configured to split an optical signal from the first optical fiber to the plurality of second optical fibers;
 - e. a telecommunications enclosure including:
 - i. a main body and a cover that together define an interior cavity, wherein one of the main body and the cover includes a first opening for receiving the first optical cable into the interior cavity and includes a second opening for allowing the plurality of third cables to exit the interior cavity;
 - ii. a first tray mountable within the interior cavity, the first tray being provided with:
 1. a wall structure for retaining the optical splitter;

2. a plurality of cable management clips for retaining the plurality of second cables extending from the optical splitter;
 - iii. a second tray mountable to the first tray, the second tray including:
 1. an aperture for allowing passage of the plurality of second cables from the first tray into the second tray;
 2. a termination location for placing the second optical fibers in optical communication with third optical fibers;
 3. a cable routing passageway for guiding the plurality of third cables from the termination location to the second opening.
21. The fiber optic distribution system of claim 20, wherein the termination location includes a plurality of sliding adapter packs including a plurality of optical adapters each configured to connect one of the plurality of second cables with one of the plurality of third cables.
22. The fiber optic distribution system of claim 20, wherein the second tray is pivotally mounted to the first tray.
23. The fiber optic distribution system of claim 22, wherein the second tray includes at least one tab extension that is received into a slot of the first tray.
24. The fiber optic distribution system of claim 23, wherein the second tray is secured to the first tray by a first lock mechanism and a by a pivotal connection point between the first and second trays.
25. The fiber optic distribution system of claims 20-24, further comprising slack storage for the splitter outputs and/or slack storage for the third cables.

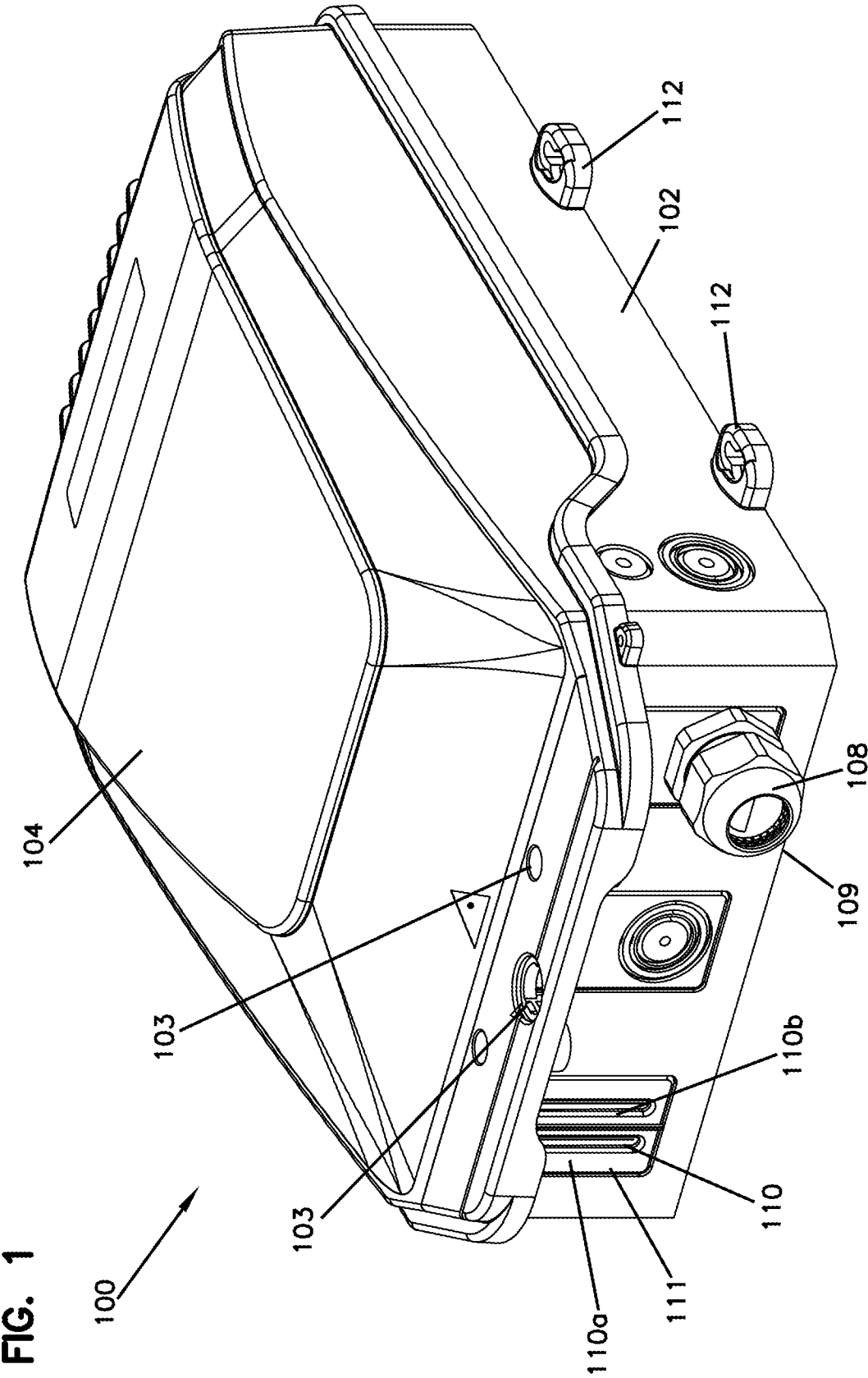
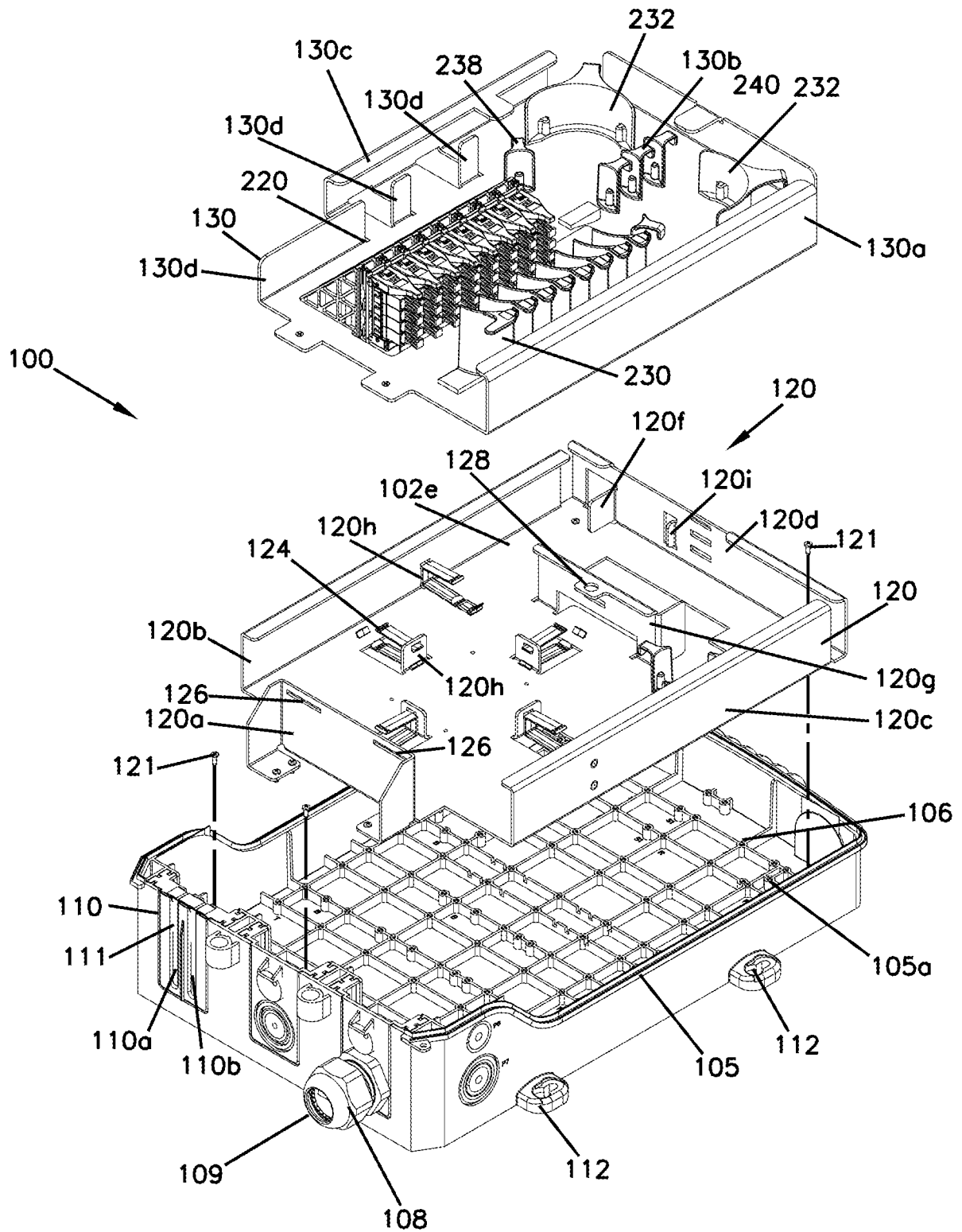


FIG. 2

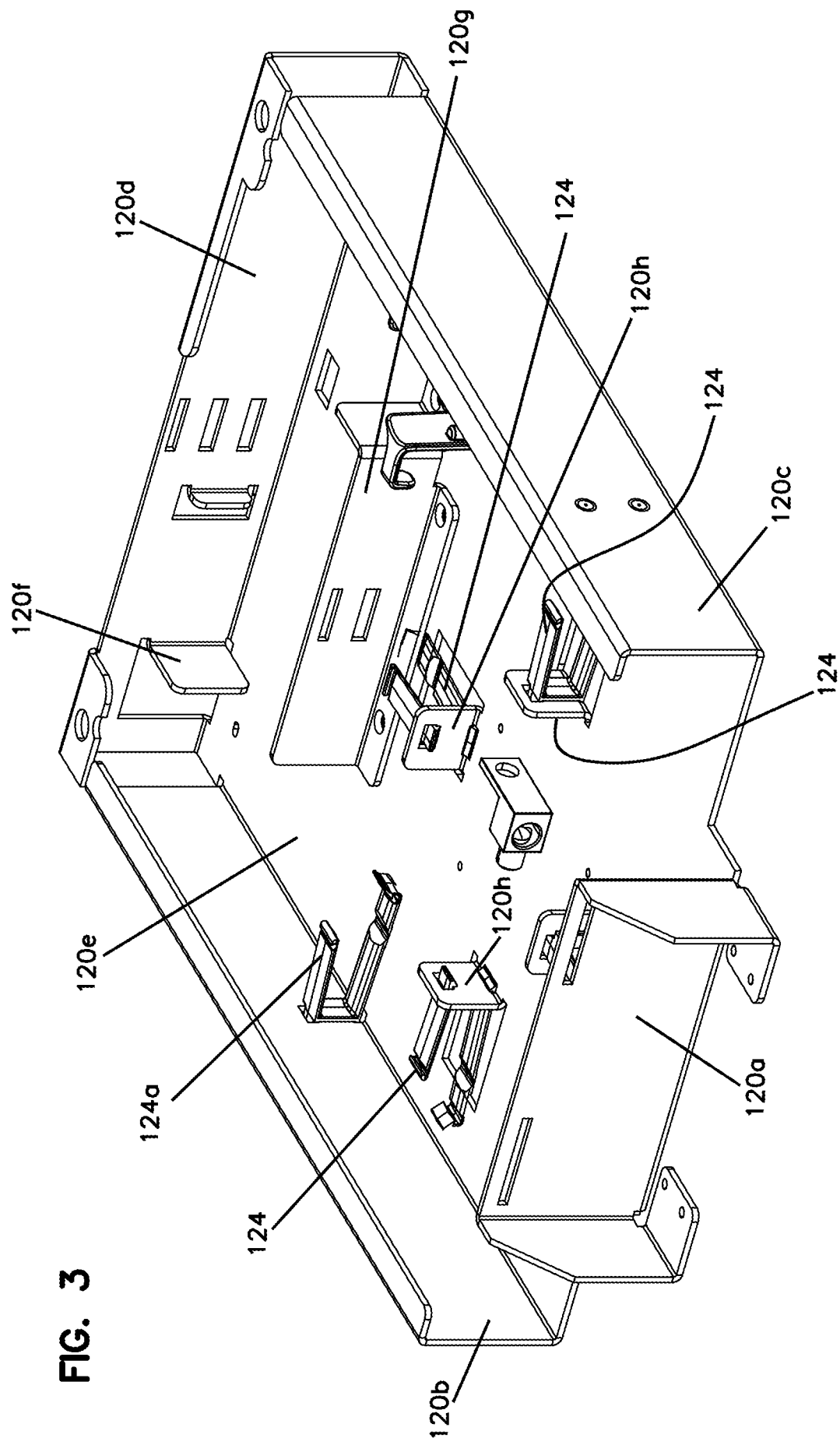


FIG. 3

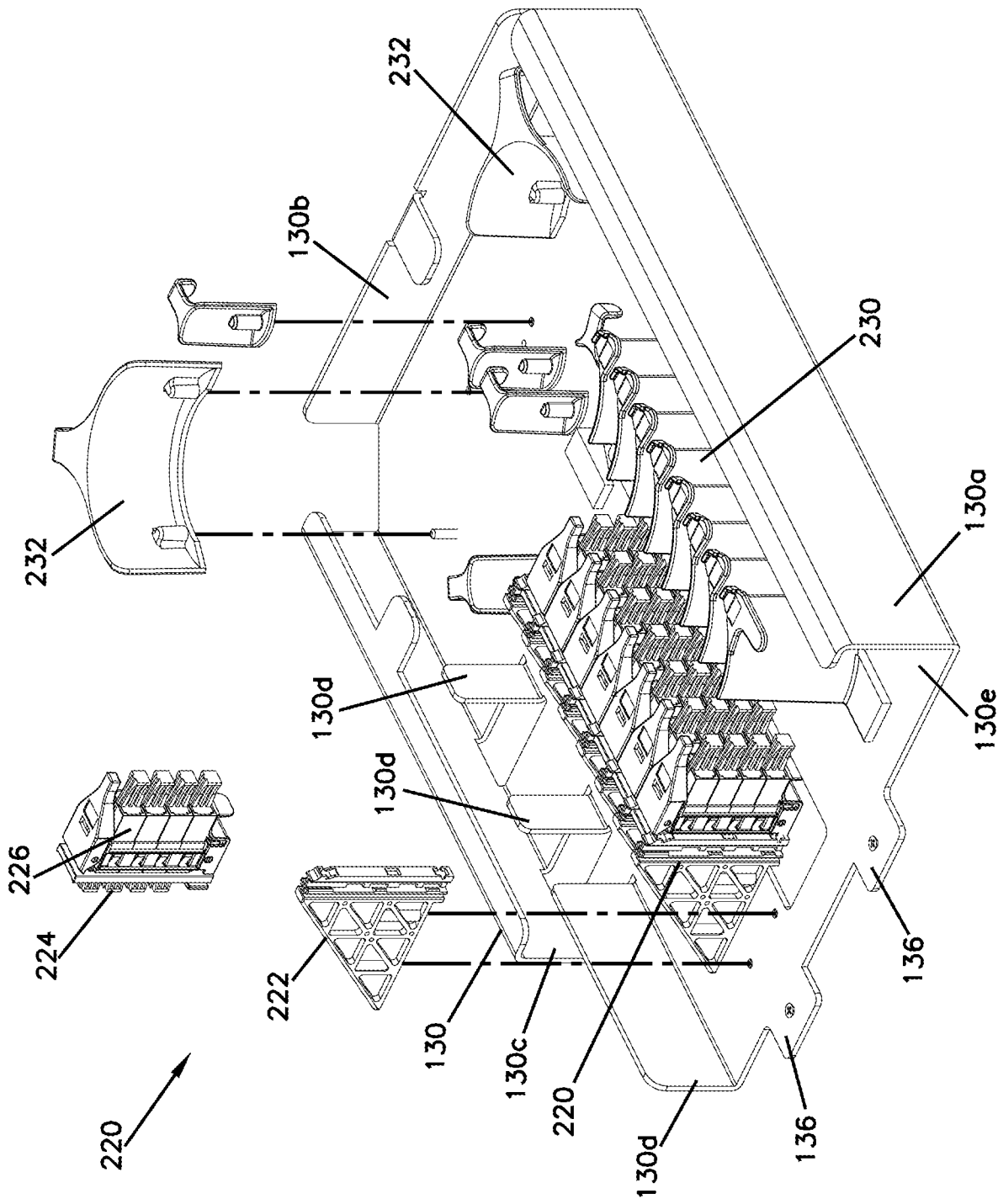


FIG. 4

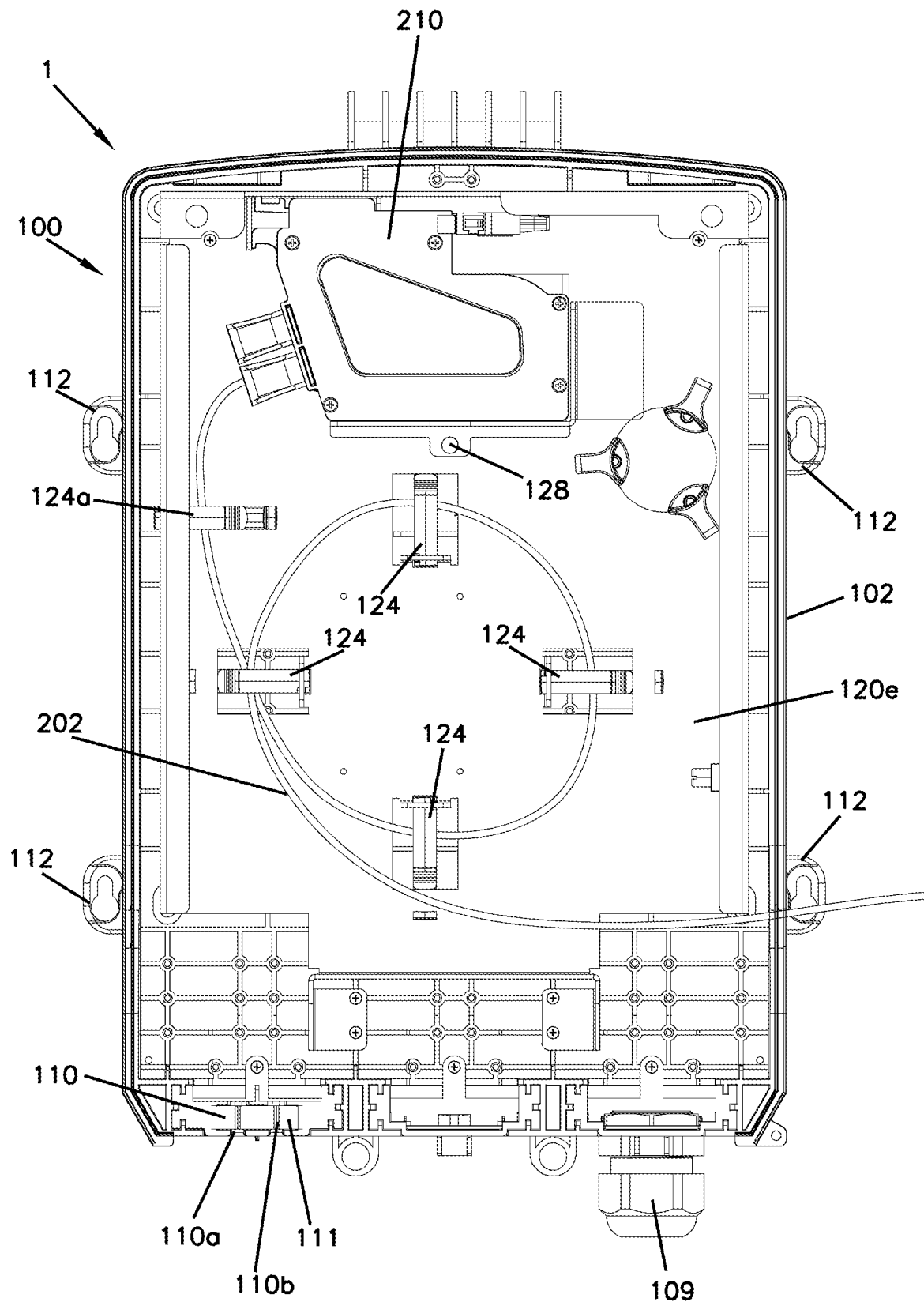
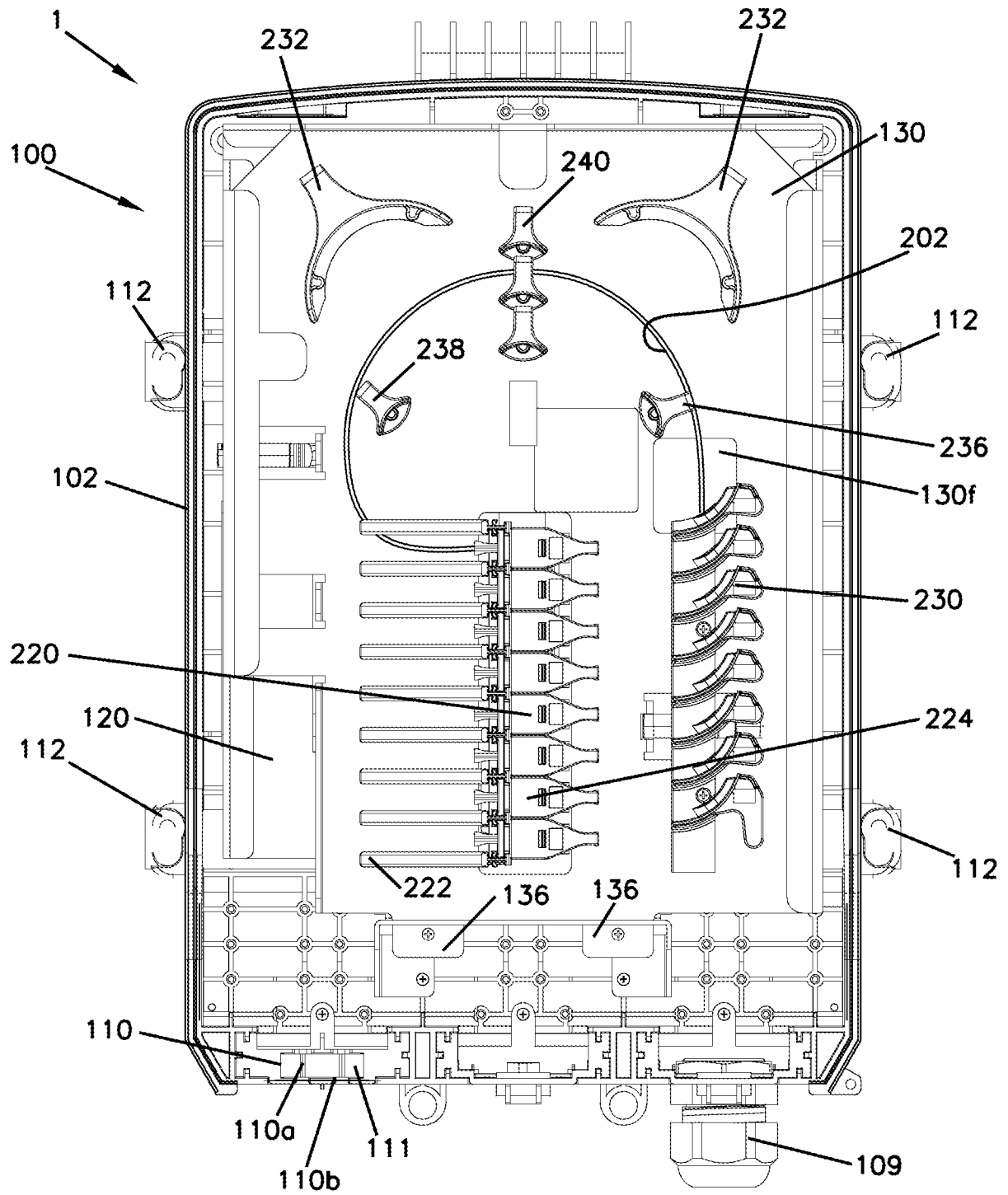
FIG. 5

FIG. 6

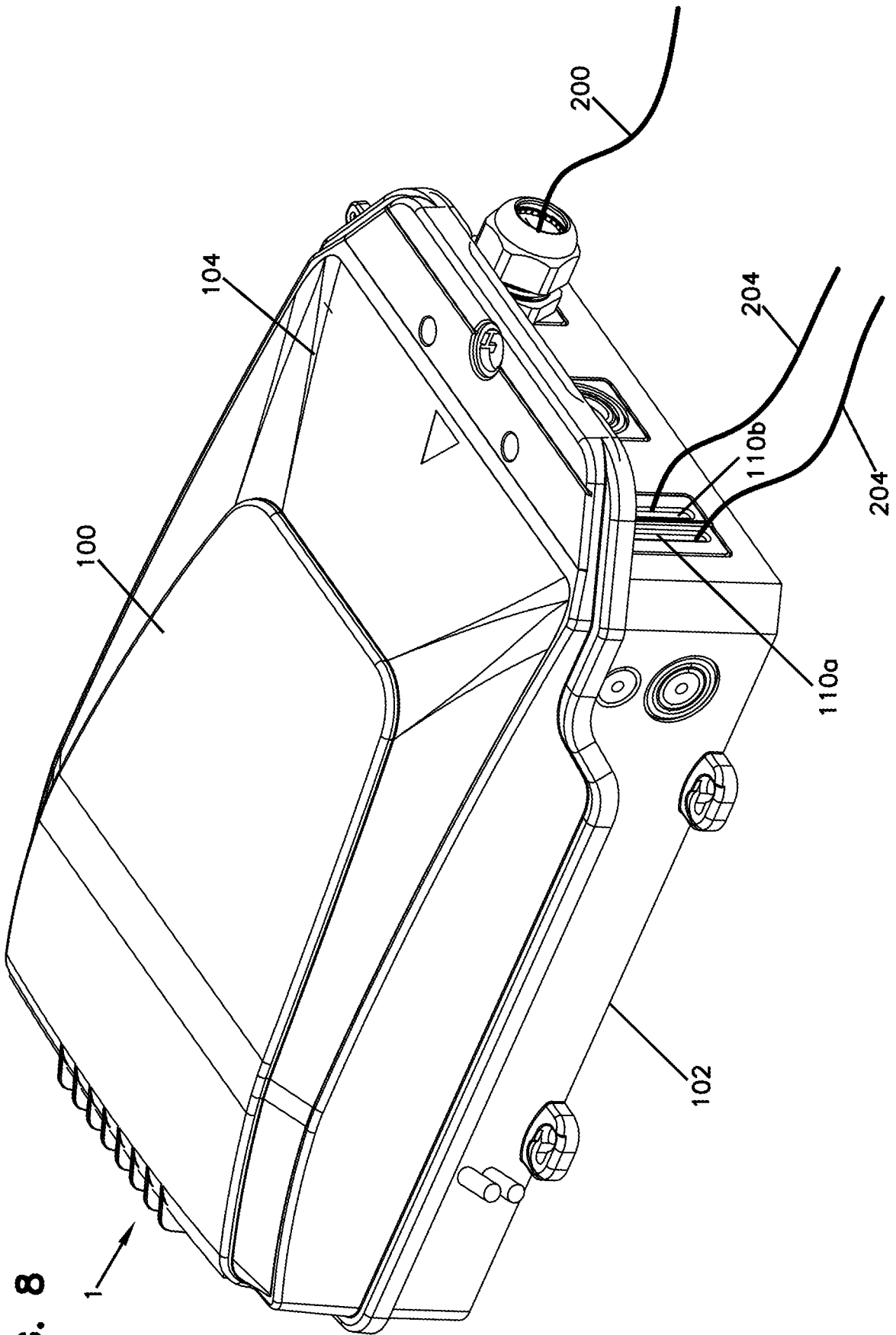


FIG. 8



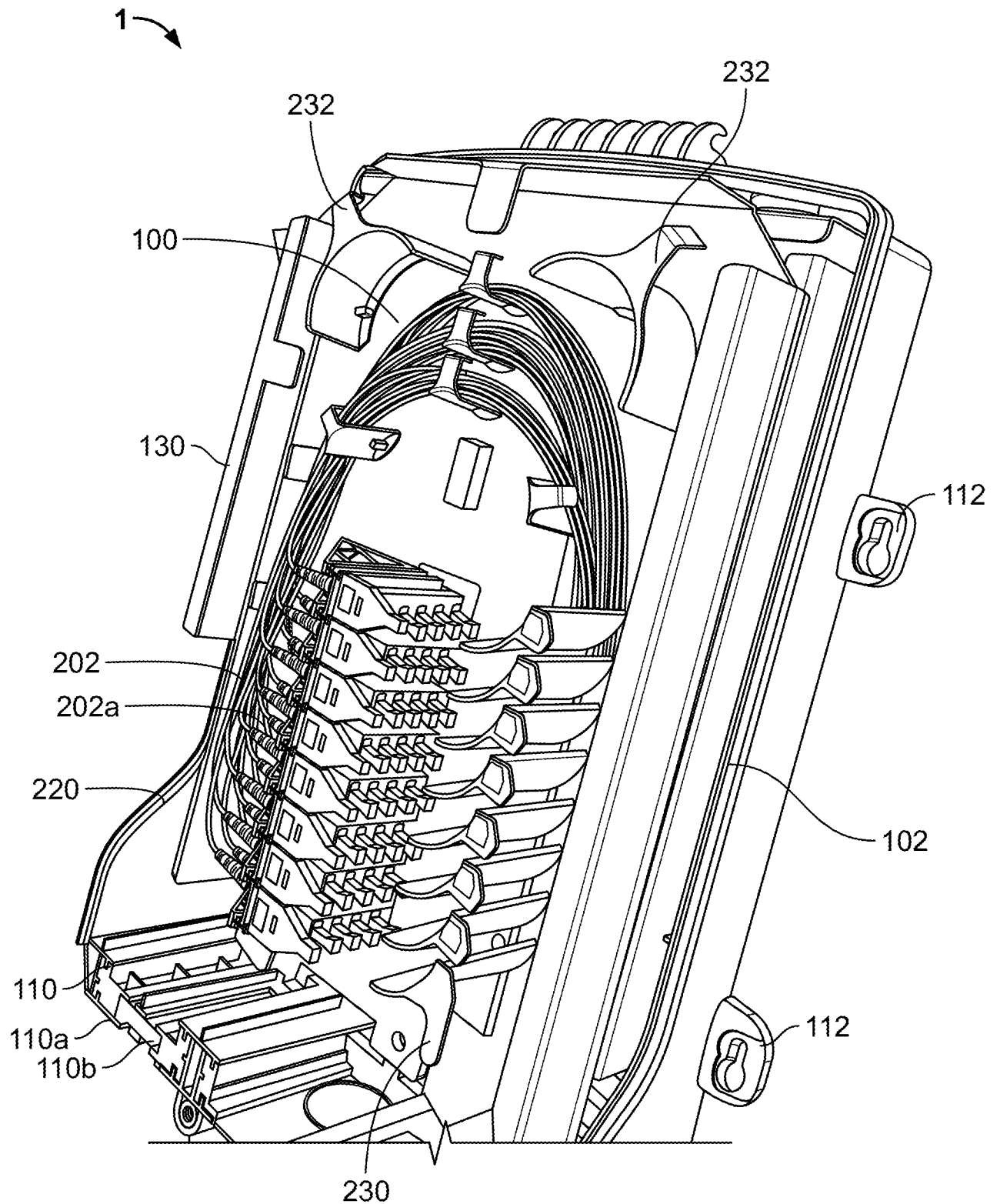


FIG. 10

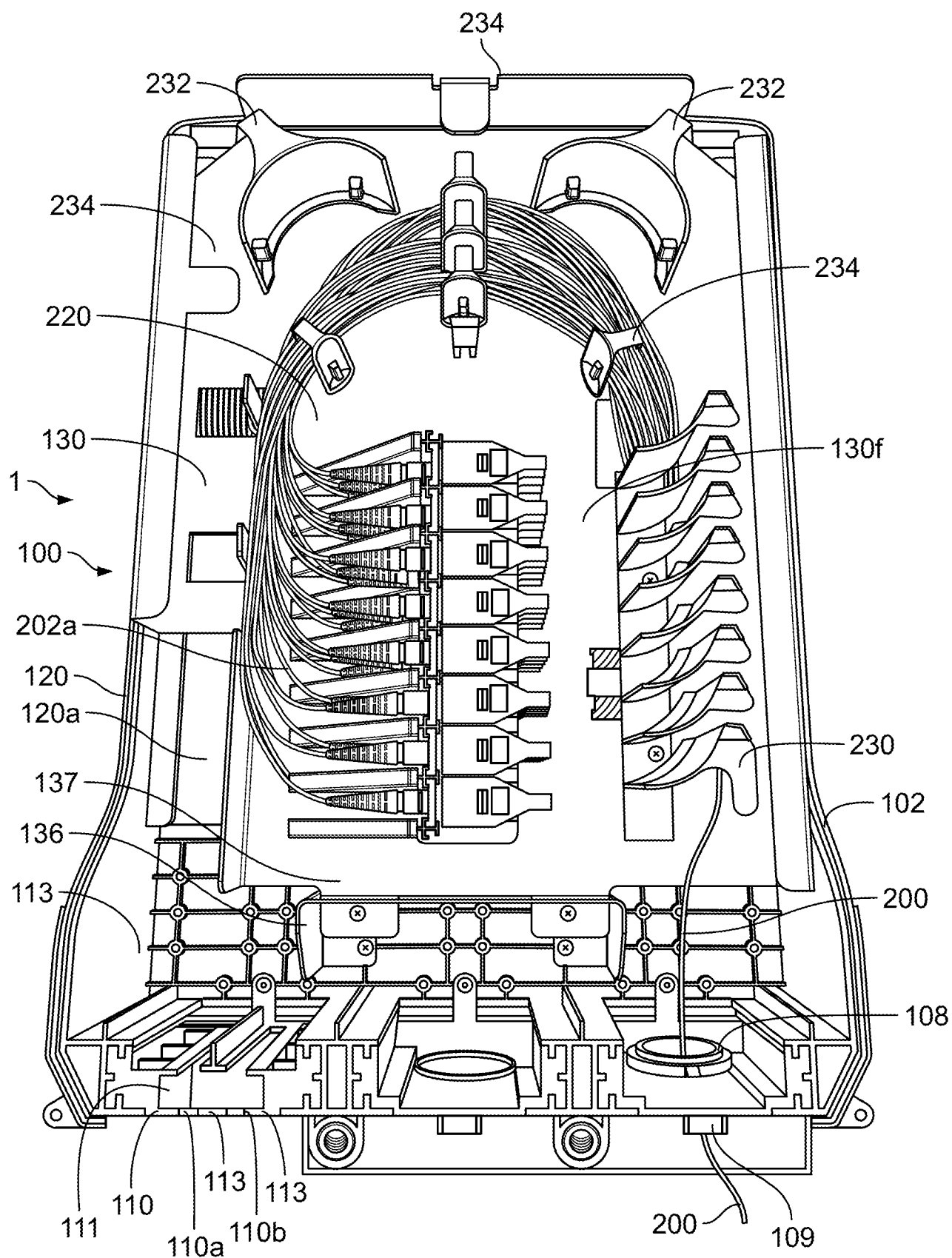


FIG. 11

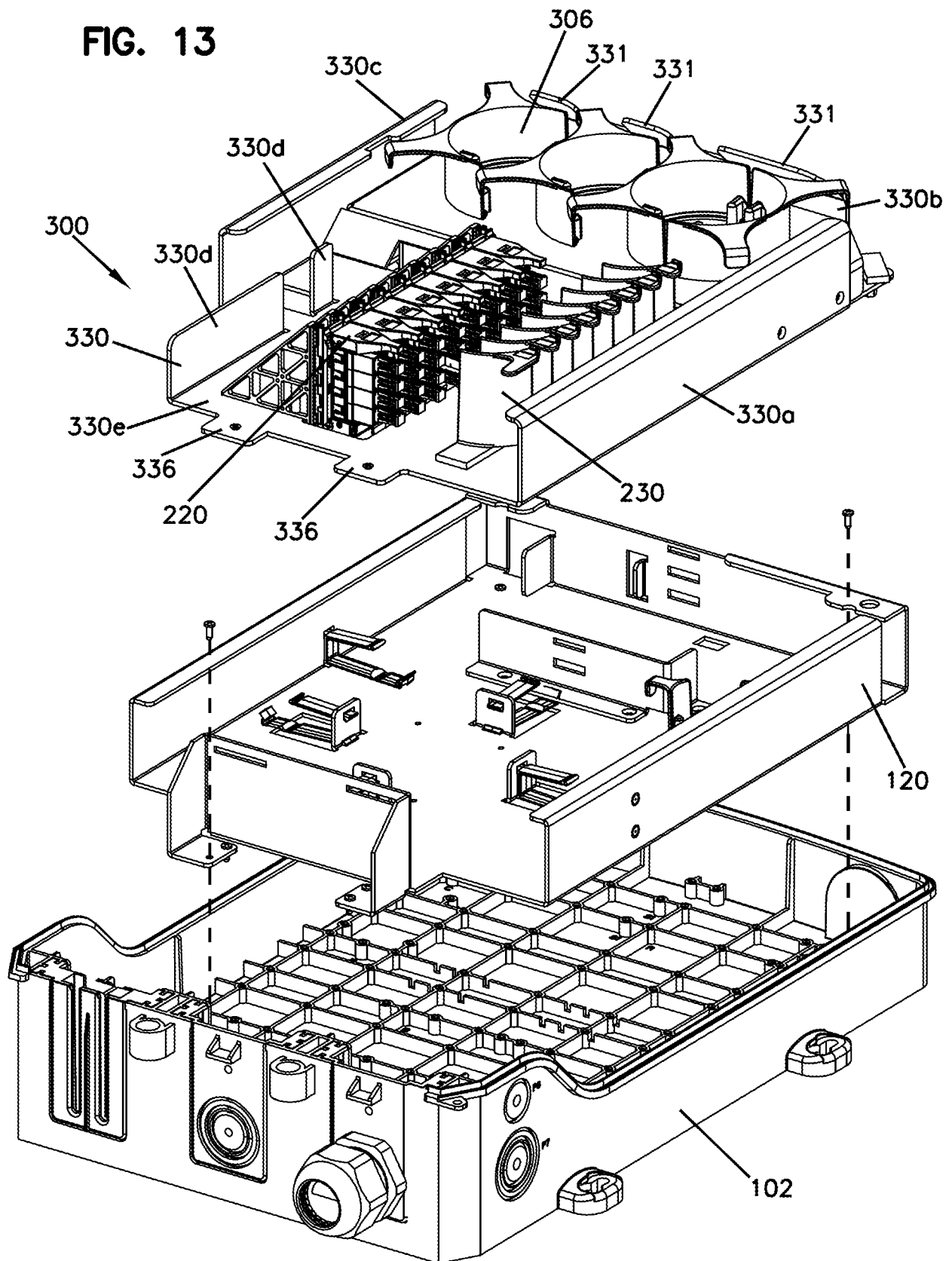
FIG. 13

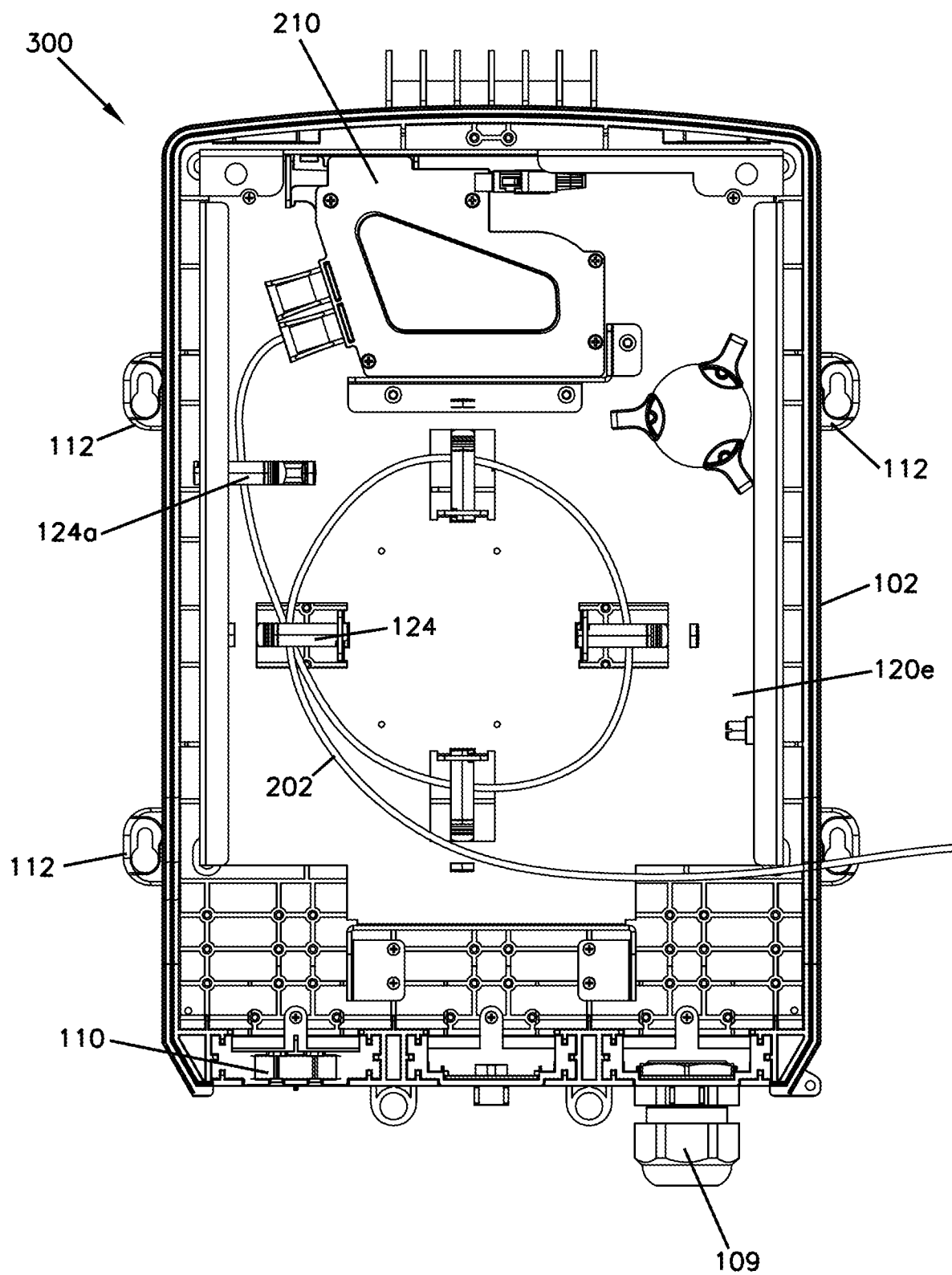
FIG. 15

FIG. 16

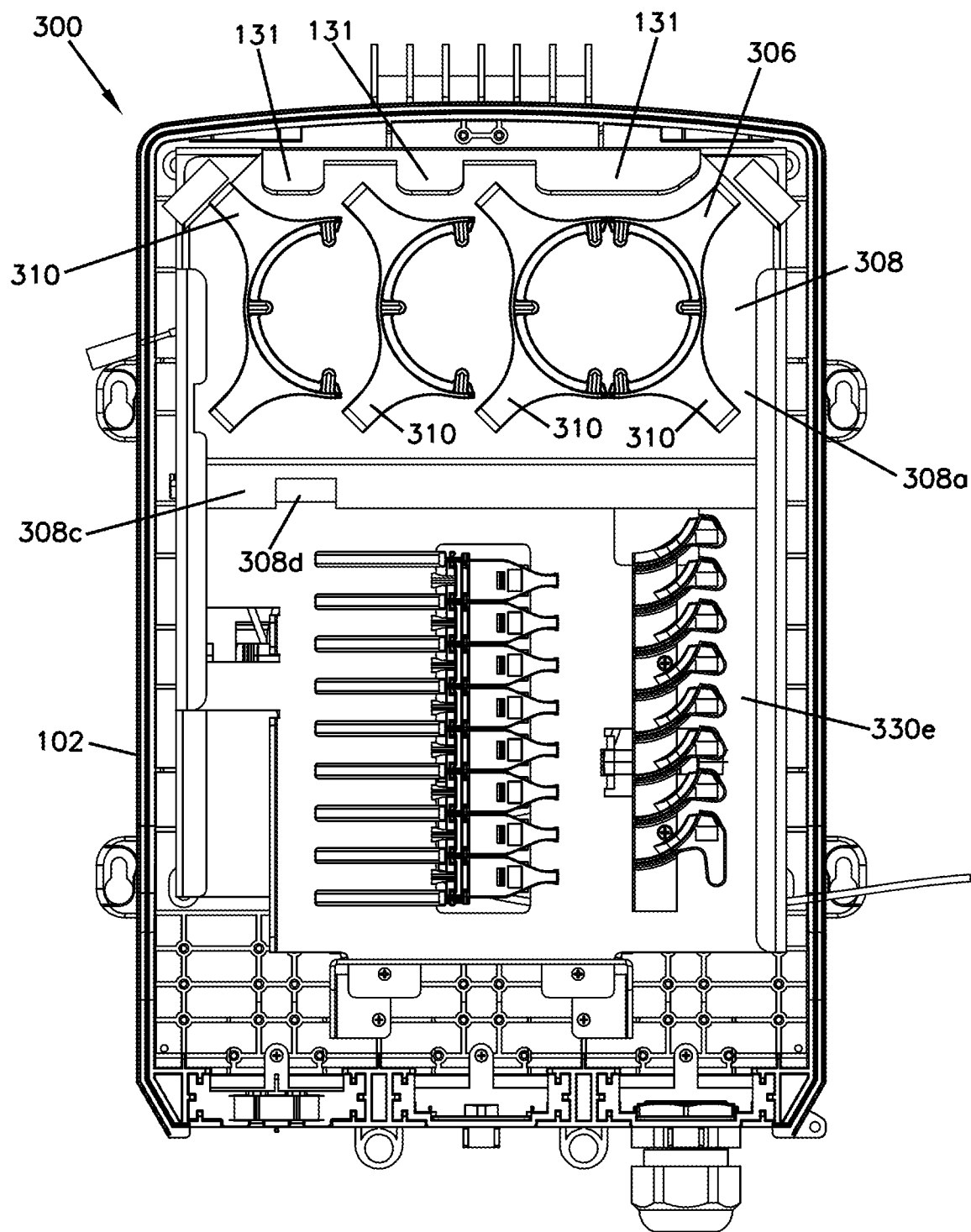
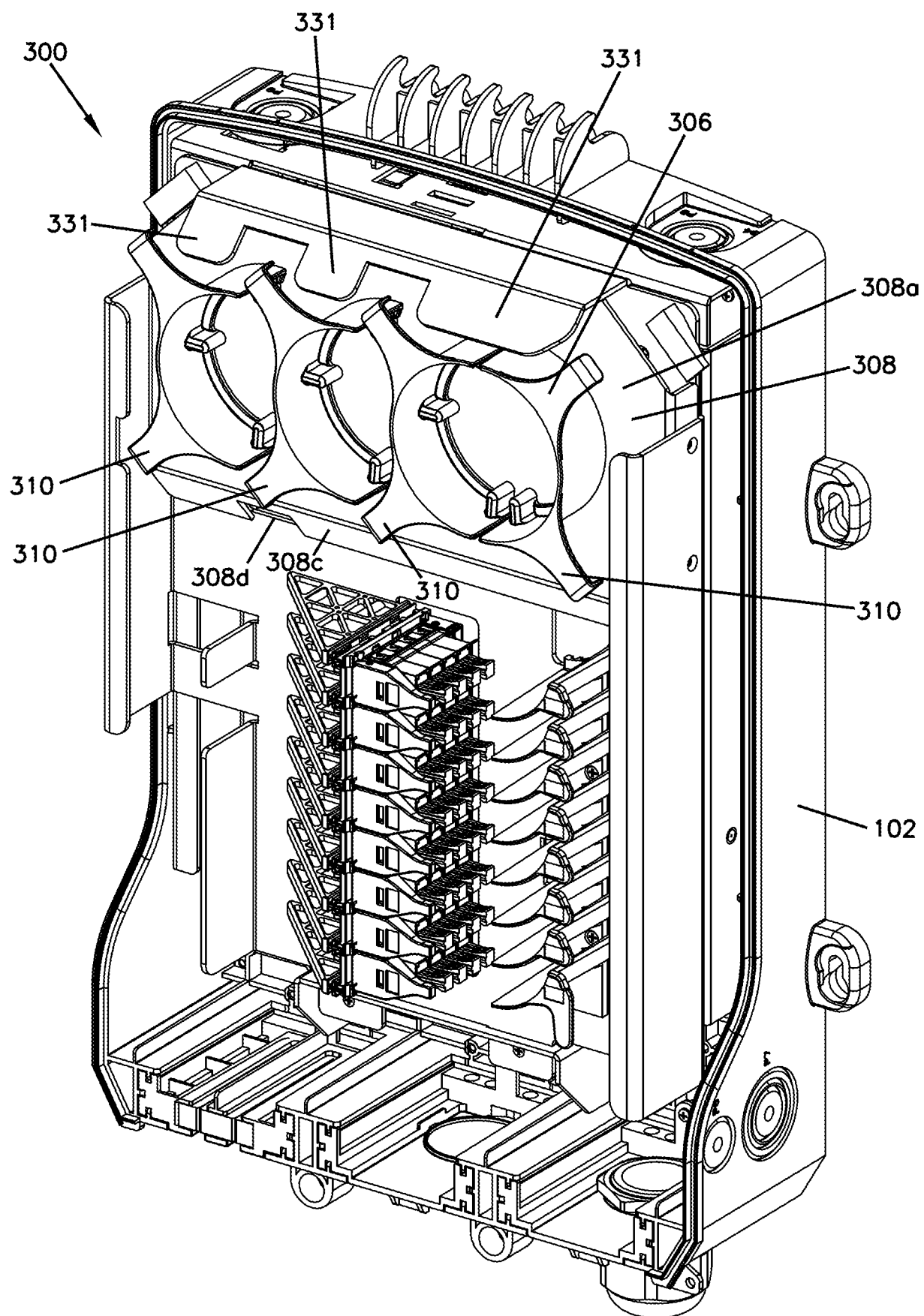


FIG. 17

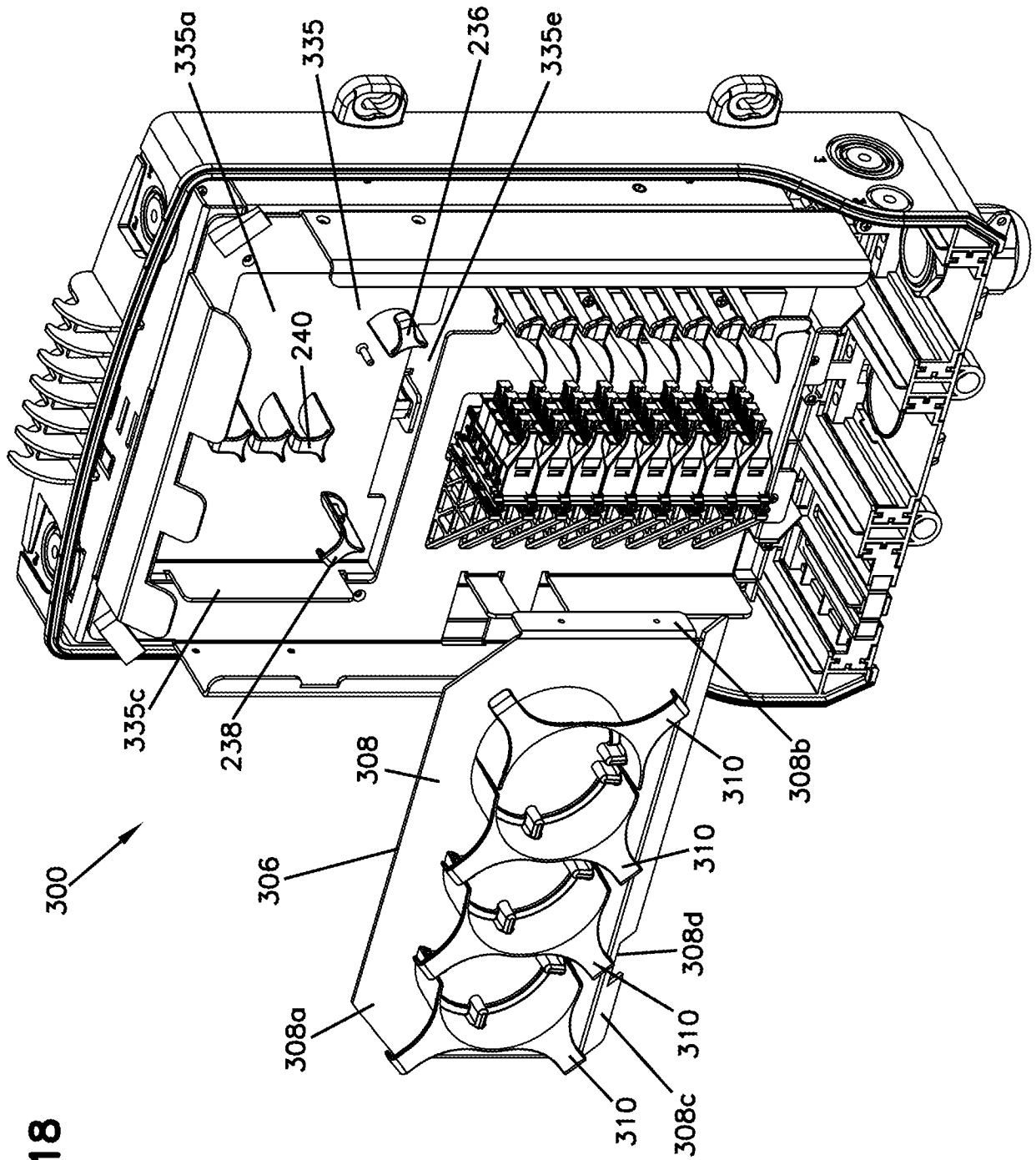


FIG. 18

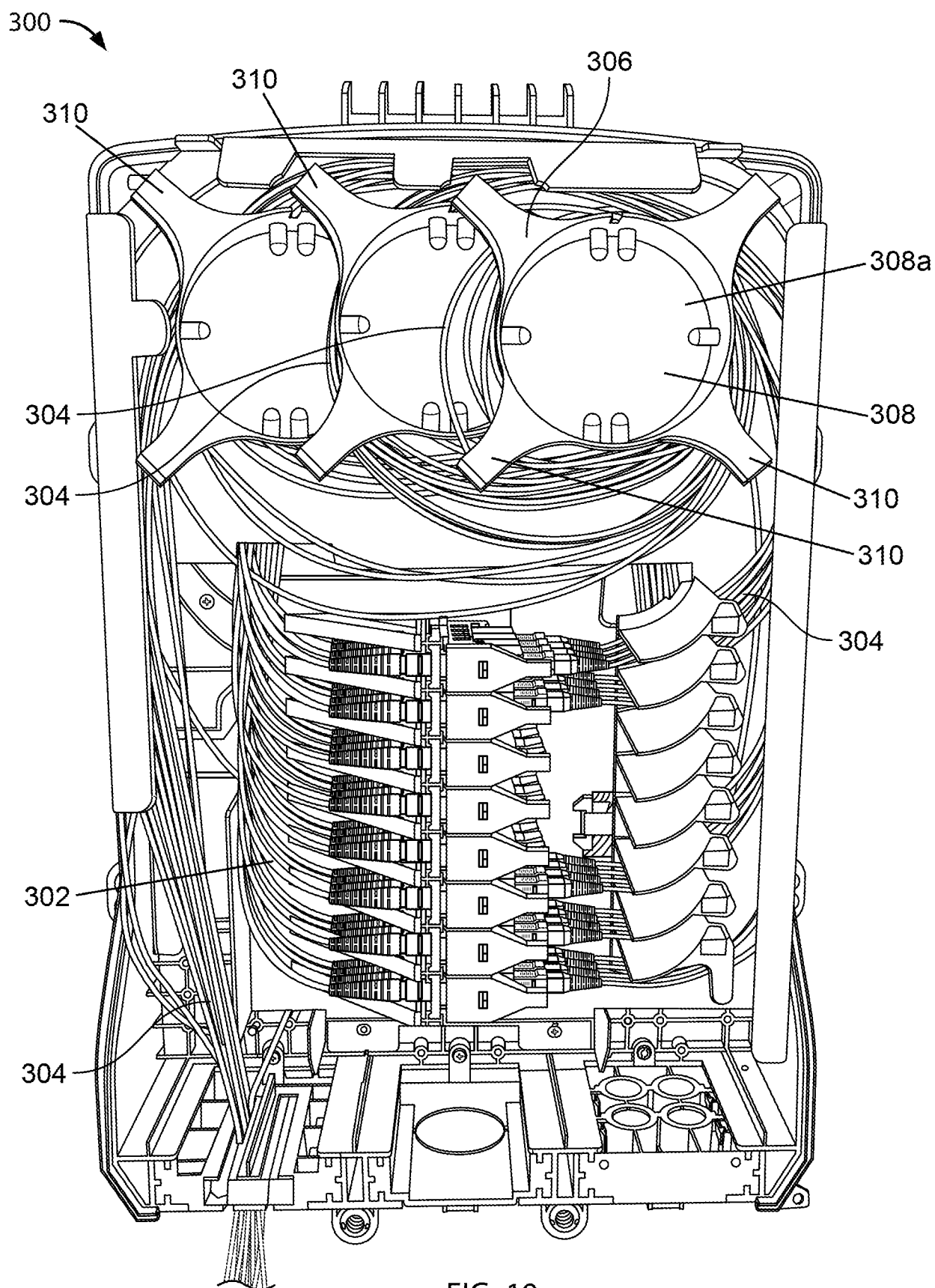


FIG. 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/037025

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

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

3. ☒ Claims Nos.: 25
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

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

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/037025**A. CLASSIFICATION OF SUBJECT MATTER****G02B 6/44(2006.01)I, G02B 6/42(2006.01)I, G02B 6/48(2006.01)I**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02B 6/44; G02B 6/46; G02B 6/00; G02B 6/42; G02B 6/48

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: cable, splitter, second, tray, enclosure

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008-0285933 A1 (VOGEL et al.) 20 November 2008 See paragraphs [0030]-[0059] and figures 1-9.	1-24
Y	US 2010-0329623 A1 (SMITH et al.) 30 December 2010 See paragraphs [0046]-[0047] and figures 9-10.	1-24
A	US 2011-0222829 A1 (LOEFFELHOLZ et al.) 15 September 2011 See abstract and figures 2-7.	1-24
A	US 2010-0329624 A1 (ZHOU et al.) 30 December 2010 See figures 1-7.	1-24
A	US 2010-0183274 A1 (BRUNET et al.) 22 July 2010 See figures 1-10.	1-24



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

12 September 2016 (12.09.2016)

Date of mailing of the international search report

12 September 2016 (12.09.2016)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/037025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0285933 A1	20/11/2008	CA 2685258 A1 CN 101743496 A CN 101743496 B EP 2147342 A1 JP 2010-527463 A KR 10-2010-0017404 A MX 2009012303 A US 7471867 B2 WO 2008-144203 A1	15/11/2008 16/06/2010 15/02/2012 27/01/2010 12/08/2010 16/02/2010 17/05/2010 30/12/2008 27/11/2008
US 2010-0329623 A1	30/12/2010	AR 069141 A1 AU 2008-318753 A1 AU 2008-318753 B2 CN 101842727 A CN 103676042 A CN 103676042 B EP 2206004 A2 EP 2259114 A1 ES 2361544 A1 ES 2361544 B1 MX 2010004736 A US 2009-0110359 A1 US 2015-078718 A1 US 7751672 B2 US 9348103 B2 WO 2009-058882 A2 WO 2009-058882 A3 WO 2009-058882 A8	30/12/2009 07/05/2009 30/01/2014 22/09/2010 26/03/2014 18/05/2016 14/07/2010 08/12/2010 20/06/2011 02/04/2012 27/05/2010 30/04/2009 19/03/2015 06/07/2010 24/05/2016 07/05/2009 13/08/2009 05/11/2009
US 2011-0222829 A1	15/09/2011	EP 2545402 A2 EP 2545402 A4 US 2016-018617 A1 US 9063316 B2 WO 2011-112705 A2 WO 2011-112705 A3	16/01/2013 14/05/2014 21/01/2016 23/06/2015 15/09/2011 19/04/2012
US 2010-0329624 A1	30/12/2010	CN 101521545 A CN 101521545 B EP 2255236 A2 US 8488934 B2 WO 2009-108846 A2 WO 2009-108846 A3	02/09/2009 10/10/2012 01/12/2010 16/07/2013 03/09/2009 03/12/2009
US 2010-0183274 A1	22/07/2010	CN 101517446 A CN 101517446 B EP 2074458 A1 RU 2009-105229 A RU 2451957 C2 US 8189983 B2	26/08/2009 13/04/2011 01/07/2009 20/10/2010 27/05/2012 29/05/2012

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/037025Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

WO 2008-033997 A1

20/03/2008