

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))*

FIBER OPTIC ADAPTER HOLDER; ASSEMBLY; AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION

5 This application is being filed on March 23, 2020 as a PCT International Patent Application and claims the benefit of U.S. Patent Application Serial No. 62/824,824, filed on March 27, 2019, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

10 The present disclosure relates generally to optical fiber communications and fiber optic connector devices. More particularly, the present disclosure relates to fiber optic adapter holders, assemblies, and methods for retaining the same.

BACKGROUND

15 Optical fiber connectors are an important part of most fiber optic communication systems. Fiber optic connectors allow two optical fibers to be quickly optically connected without requiring a splice. Fiber optic connectors can be used to optically interconnect two lengths of optical fiber. Fiber optic connectors can also be used to interconnect lengths of optical fiber to passive and active equipment.

20 Fiber optical adapters are used to optically couple together optical fiber tips of optical connectors. Fiber optical adapters can include specialized fiber alignment devices to receive bare optical fibers and align the fiber tips to enable the transfer of optical signals therebetween. Optical connectors can be secured to the fiber optical adapters when received at the ports of the fiber optical adapters.

25 The fiber optical adapters are normally configured to be mounted to a piece of telecommunications equipment and accessible to an operator. Improvements are desired.

SUMMARY

30 The present disclosure relates to a one-piece fiber optic adapter holder that can be used to retain a fiber optical adapter without adding to an overall height of the fiber optical adapter.

One aspect of the present disclosure relates to a fiber optic adapter holder that includes a base member that has a first major side, a second major side generally parallel to the first major side, a first minor side, and a second minor side oppositely disposed to the first minor side. The first minor side and the second minor side may extend generally perpendicularly between the first major side and the second major side. The base member may also include a first surface and an opposite, second surface.

The fiber optic adapter holder may include a plurality of upright arms that extend upwardly from the base member. The plurality of upright arms together may define a pocket region that has an open, U-shape.

In certain examples, the plurality of upright arms may extend upwardly at the first and second major sides of the base member. Each one of the plurality of upright arms may have a proximal end attached to the base member and a distal free end. The distal free ends may have an edge. A height of the fiber optic adapter holder may be defined between the second surface of the base member and the edge of the distal free ends of the plurality of upright arms.

A fiber optic adapter may be received in the open, U-shaped pocket region of the fiber optic adapter holder.

When the fiber optic adapter is mounted within the pocket region of the fiber optic adapter holder, the height of the fiber optic adapter holder may be lower than or equal to a height of the fiber optic adapter. That is, the fiber optic adapter may be mounted and retained within the open top pocket region of the fiber optic adapter holder such that the fiber optic adapter holder does not increase the overall height above the fiber optic adapter.

Another aspect of the present disclosure relates to a fiber optic adapter holder assembly that may include a fiber optic adapter holder, a fiber optic adapter, and a structure. The structure may include mounting locations for receiving mounting features of the fiber optic adapter holder for mounting the fiber optic adapter holder to the structure.

A further aspect of the present disclosure relates to a method of retaining a fiber optic adapter. The method may include a step of providing a one piece fiber optic adapter holder that includes a plurality of upright arms extending upwardly from a base member of the fiber optic adapter holder. The plurality of upright arms together define an open, U-shaped pocket region.

The method may include a step of mounting a fiber optic adapter within the pocket region of the fiber optic adapter holder such that when the fiber optic adapter is mounted to the fiber optic adapter holder, a length of the fiber optic adapter extends between the first and second minor sides of the base member, and a height of the fiber optic adapter extends above or is equal to a height of the fiber optic adapter holder.

The method may include a step of securing the fiber optic adapter holder to a structure via mounting features. In certain examples, the method may include a step of mounting the fiber optic adapter holder to the structure prior to mounting the fiber optic adapter within the pocket region of the fiber optic adapter holder. In certain examples, the method may include a step of mounting the fiber optic adapter holder to the structure after mounting the fiber optic adapter within the pocket region of the fiber optic adapter holder.

A variety of additional aspects will be set forth in the description that follows. The aspects can relate to individual features and to combinations of features. It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the broad inventive concepts upon which the examples disclosed herein are based.

BRIEF DESCRIPTION OF THE DRAWINGS

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:

FIG. 1 is a perspective view showing an example telecommunications equipment with a cover in accordance with principles of the present disclosure;

FIG. 2 is a perspective view of the telecommunications equipment of FIG. 1 with the cover removed showing a fiber optic adapter holder assembly including fiber optic connectors latched in ports of fiber optic adapters where the fiber optic adapter holders are mounted to a base member of the telecommunications equipment in accordance with the principles of the present disclosure;

FIG. 3 is a perspective view of an enlarged portion of the telecommunications equipment of FIG. 2;

FIGS. 4-8 are multiple views of the fiber optic adapter holder of FIG. 2 in accordance with the principles of the present disclosure;

FIGS. 9-12 are multiple views of the fiber optic adapter of FIG. 2 optically coupling together the fiber optic connectors of FIG. 2, the fiber optic adapter is shown mounted within the fiber optic adapter holder of FIGS. 9-13;

FIG. 13 is an exploded perspective view of FIG. 9;

5 FIG. 14 is a bottom perspective view of the telecommunications equipment of FIG. 3;

FIG. 15 is a bottom plan view of the telecommunications equipment of FIG. 1;

10 FIG. 16 is a cross-sectional view of the fiber optic adapter holder assembly taken along section line 16-16 of FIG. 15;

FIG. 17 is an enlarged view of a portion of FIG. 16; and

FIG. 18 is a cross-sectional view taken along section line 18-18 of FIG. 5.

DETAILED DESCRIPTION

Fiber optics have revolutionized communication throughout the world.

15 Fiber optics are generally thin strings of glass designed to carry light which can be grouped together. With the increased use of fiber optics, it has become increasingly important to be able to connect and disconnect fiber optic cables from various sources. Two fiber optic cables can be optically coupled so that they are in communication with one another by using well-known connectors and adapters, thereby putting each fiber optic
20 cable in communication with the other. The connectors are terminated to the end of each cable and then plugged into the adapters. The adapters normally include an opening at each end designed to receive the connectors. An example adapter for holding two SC-type mating connectors in axial alignment is described in U.S. Pat. No. 5,317,663.

25 With the fiber optic connectors connected, their respective optical fibers are coaxially aligned such that the end faces of the optical fibers directly oppose one another. In this way, an optical signal can be transmitted from optical fiber to optical fiber through the aligned end faces of the optical fibers. For many fiber optic connector styles (LC, SC, MPO), alignment between two fiber optic connectors is provided through the use of an intermediate fiber optic adapter. The adapters normally include an opening at each end
30 designed to receive the connectors.

FIGS. 1-2 depict an example telecommunications equipment 10. The telecommunications equipment 10 may be provided with a cover 20 for protecting the components and fiber supported within the telecommunications equipment 10. The cover

20 may include latch members 22 to form a snap-fit type of connection with a retention element 24 on the telecommunications equipment 10. In certain examples, the telecommunications equipment 10 may include a fiber management tray, plate, or other structure.

5 FIGS. 2-3 depict a plurality of first and second optical fiber connectors 30a, 30b. The first and second optical fiber connectors 30a, 30b include a housing 40 and a strain relief boot 50. The external surface of the housing 40 includes a longitudinal key 60 (e.g., keying feature) that is sized to be received into a slot 70 (e.g., a keying feature) of a fiber optic adapter 80 when the first and second optical fiber connectors 30a, 30b are
10 inserted into the fiber optic adapter 80. In the example depicted, the optical fiber connectors 30a, 30b are SC-type connectors. However, it should be noted that the SC-type fiber optic adapter 80 described herein represents only one example embodiment of the features of the present disclosure and that the features may be applicable to adapters configured to be used with other types of connectors (e.g., LC, LX, MPO, etc.). The fiber
15 optic adapter 80 may be constructed of plastic or polymeric material. It is contemplated that other materials and injection molding processes may be used for the construction of the fiber optic adapter 80.

 The fiber optic adapter 80 can be configured for interconnecting the first and second optical fiber connectors 30a, 30b in coaxial alignment along an optical axis X.
20 The plurality of first and second optical fiber connectors 30a, 30b can each include a generally cylindrical ferrule 32 (see FIG. 18) that holds an end of a bare optical fiber. As used herein, the term, “bare optical fiber” and variants thereof, in this context, means an optical fiber with a core, a cladding layer surrounding the core, and no coating over the cladding layer.

25 Turning to FIGS. 4-8, an example fiber optic adapter holder 100 is depicted in accordance with the principles of the present disclosure. The fiber optic adapter holder 100 may include a base member 102. In certain examples, the base member 102 may have a first major side 104, a second major side 106 that is generally parallel to the first major side 104, a first minor side 108, and a second minor side 110 oppositely disposed to the
30 first minor side 108. The first minor side 108 and the second minor side 110 may extend generally perpendicularly between the first major side 104 and the second major side 106. The fiber optic adapter holder 100 may be constructed of plastic or polymeric material. It is contemplated that other materials and injection molding processes may be used for the construction of the fiber optic adapter holder 100.

The fiber optic adapter holder 100 may also include a plurality of upright arms 112. In the example shown, there are a total of four upright arms 112, although alternatives are possible. For example, the fiber optic adapter holder 100 may include more or less upright arms 112. For example, two upright arms 112 are possible.

5 In certain examples, the plurality of upright arms 112 may have spring like properties such that the plurality of upright arms 112 may be flexible enough to engage the fiber optic adapter 80 while maintaining its integrity.

The plurality of upright arms 112 may extend upwardly from the first and second major sides 104, 106 of the base member 102, although alternatives are possible.

10 The plurality of upright arms 112 together define a pocket region 114 (see FIG. 8). The fiber optic adapter holder 100 has an open top. That is, the fiber optic adapter holder 100 has an open, U-shape configuration for receiving the fiber optic adapter 80. Each one of the plurality of upright arms 112 have a proximal end 116 attached to the base member 102 and a distal free end 118. The distal free ends 118 may have an edge 120.

15 The base member 102 may have a thickness T (see FIG. 4) defined between a first surface 122 (e.g., a bottom surface) of the base member 102 and an opposite, second surface 124 (e.g., top surface) of the base member 102. A height H_1 (see FIGS. 4 and 8) of the fiber optic adapter holder 100 may be defined between the second surface 124 of the base member 102 and the edge 120 of the distal free ends 118 of the plurality of upright

20 arms 112. When the fiber optic adapter 80 is mounted within the pocket region 114 of the fiber optic adapter holder 100 as shown in FIGS. 9-12, the height H_1 of the fiber optic adapter holder 100 is lower than a height H_2 (see FIG. 12) of the fiber optic adapter 80. Alternatively, when the fiber optic adapter 80 is mounted within the pocket region 114 of the fiber optic adapter holder 100, the height H_1 of the fiber optic adapter holder 100

25 may be equal to the height H_2 of the fiber optic adapter 80.

In certain examples, when the fiber optic adapter 80 is mounted within the pocket region 114 of the fiber optic adapter holder 100, the height H_1 of the fiber optic adapter holder 100 is at least one of lower than the height H_2 of the fiber optic adapter 80 and equal to the height H_2 of the fiber optic adapter 80. That is, when the fiber optic

30 adapter 80 is mounted within the pocket region 114 of the fiber optic adapter holder 100, the height H_1 of the fiber optic adapter holder 100 may be only lower than the height H_2 of the fiber optic adapter 80; the height H_1 of the fiber optic adapter holder 100 may be only equal to the height H_2 of the fiber optic adapter 8; or the height H_1 of the fiber optic

adapter holder 100 may be both lower than and equal to the height H_2 of the fiber optic adapter 80.

Turning to FIGS. 9-12, the fiber optic adapter 80 and first and second fiber optic connectors 30a, 30b are shown mounted within the fiber optic adapter holder 100.

5 Because the fiber optic adapter holder 100 has an open, u-shaped top, the fiber optic adapter 80 may be mounted within the fiber optic adapter holder 100 by mounting the fiber optic adapter 80 through the open, u-shaped top into the pocket region 114 of the fiber optic adapter holder 100. That is, the fiber optic adapter 80 may be placed into the fiber optic adapter holder 100 from the open top of the fiber optic adapter holder 100.

10 The fiber optic adapter 80 may be mounted into the fiber optic adapter holder 100 by sliding in from an end of the fiber optic adapter holder 100. Mounting the fiber optic adapter 80 into the fiber optic adapter holder 100 from a side is not necessary because the fiber optic adapter holder 100 is not enclosed about 360 degrees (i.e., a fiber optic adapter holder that is fully enclosed about 360 degrees has no open top).

15 When the fiber optic adapter 80 is mounted within the fiber optic adapter holder 100, the height H_2 of the fiber optic adapter 80 is taller than the height H_1 of the fiber optic adapter holder 100 such that there is no structure on top or above the fiber optic adapter 80. As such, the fiber optic adapter holder 100 does not add any structure to the total or overall height H_2 of the fiber optic adapter 80.

20 In some examples, height H_2 is equal to height H_1 .

In still further examples, height H_2 is shorter than height H_1 , to take advantage of the drop in mounting system that does not require pushing an adapter axially.

At least two of the plurality of upright arms 112 of the fiber optic adapter holder 100 may define a window opening 126 and at least two of the plurality of upright arms 112 may be solid (i.e., no window opening). When the fiber optic adapter 80 is mounted within the pocket region 114 of the fiber optic adapter holder 100, the plurality of upright arms 112 of the fiber optic adapter holder 100 may be configured to be positioned in cutouts 128 (e.g., recesses, pockets) defined in the fiber optic adapter 80. That is, the fiber optic adapter holder 100 includes adapter housing side walls 130 (e.g., exterior walls). In certain examples, the adapter housing side walls 130 may include a first side wall 130a, a second side wall 130b, a third side wall 130c, and a fourth side wall 130d. The first and second cutouts 128a, 128b may be defined in at least the first, second, and third side walls 130a-c.

The fiber optic adapter 80 may include a flange 132 for mounting or capturing the fiber optic adapter 80 to or against a structure (e.g., dividing wall, telecommunications equipment, panel, etc.). For example, the fiber optic adapter 80 may be used with a panel aperture where the flange 132 may serve as a stop when the fiber
5 optic adapter 80 is pushed through an opening (e.g., hole, aperture) defined by a bulkhead structure or panel. That is, the flange 132 may help to prevent the fiber optic adapter 80 from being pushed too far into the bulkhead structure or panel. In certain examples, the first and second cutouts 128a, 128b may be positioned on opposing sides of the flange 132.

10 The first and second cutouts 128a, 128b may also be adapted to receive a pair of retaining clips 134 (e.g., cantilever wings, cantilever clips, spring arms, latch arms) of a clip 136. The clip 136 may be formed of a metallic material. The clip 136 may be mounted to the adapter housing side walls 130 of the fiber optic adapter 80 such that the retaining clips 134 can be positioned on opposite sides of the fiber optic adapter 80 and
15 can be received within one of the first and second cutouts 128a, 128b thereof. The clip 136 may be positioned on the adapter housing side walls 130a-c of the fiber optic adapter 80 such that the pair of retaining clips 134 may at least partially deflect into the first and second cutouts 128a, 128b of the fiber optic adapter 80.

Also, when the fiber optic adapter 80 is mounted within the fiber optic
20 adapter holder 100, the plurality of upright arms 112 may flex to allow the fiber optic adapter 80 to mount therein. As such, the retaining clips 134 may be positioned to be received within the window openings 126 of respective upright arms 112. The window openings 126 of the respective upright arms 112 may include a chamfer surface 138. The chamfer surface 138 may engage the retaining clips 134 to hold the retaining clips 134 in
25 place or prevent the retaining clips 134 from reversing direction. The retaining clips 134 may be adapted to help secure the fiber optic adapter 80 and the fiber optic adapter holder 100 together. That is, the retaining clips 134 may provide integrity to help prevent the fiber optic adapter holder 100 from disengaging with the fiber optic adapter 80.

To accommodate the thickness of the retaining clips 134, the upright arms
30 112 with window openings 126 are thinner than the upright arms without the window openings 126, in one embodiment.

The fiber optic adapter holder 100 may also include a mounting feature 140 located on the first surface 122 of the base member 102. In the example depicted, the mounting feature 140 includes dovetail structures 142. In a preferred example, the

mounting feature 140 may also include a bump 144 (e.g., ridge), although alternatives are possible. In the example shown, the mounting feature 140 is positioned offset from a center of the base member 102, although alternatives are possible. In certain examples, the mounting feature 140 may be centrally located on the base member 102. The advantageous feature of having an offset position provides for improved density of fiber optic adapters 80 that can be mounted to a structure, such as the telecommunications equipment 10. In this case holder 100 covers two mounting locations 146, with the dovetail structures 142 mounted to one mounting location 146.

Turning to FIGS. 14-18, the telecommunications equipment 10 may define a plurality of mounting locations 146 (e.g., retention openings). The telecommunications equipment 10 may include a base 148, a rear side 150 and a front side 152 that extend between opposite first and second sides 154, 156. The base 148 of the telecommunications equipment 10 may define the plurality of mounting locations 146. The first and second sides 154, 156 may function to define a cable routing pathway 158 (see FIG. 3). Cables can be further retained within the cable routing pathway 158 via a plurality of cable guides 160 located at a top of the telecommunications equipment 10. The plurality of cable guides 160 may be positioned at the rear, first, and second sides 150, 154, 156 of the telecommunications equipment 10.

The telecommunications equipment 10 may include support arms 162 that may be adapted for mounting the telecommunications equipment 10 to a chassis, panel, or other structure. In certain examples, the support arms 162 may allow the telecommunications equipment 10 to be pivotally mounted, although alternatives are possible.

The fiber optic adapter holder 100 may be configured to mount in the mounting locations 146 of the telecommunications equipment 10 via the mounting features 140. The mounting locations 146 may be configured in a recess region 164 (see FIG. 3) of the base 148 of the telecommunications equipment 10, although alternatives are possible. The recess region 164 thins down the base 148 of the telecommunications equipment 10. In one example, the recess region 164 of the base 148 has a thickness of about 1 mm, although alternatives are possible. Other parts of the telecommunications equipment 10 may be thicker without having to change the dovetail structures 142 sized for the 1 mm thickness. The mounting locations 146 may extend through the base 148 of the telecommunications equipment 10 from a first side 166 (see FIG. 3) to an opposite, second side 168 thereof.

In certain examples, the mounting locations 146 may include a T-shaped slots that have first portions 170 and second portions 172, although alternatives are possible. The first portions 170 of the T-shaped slots have a larger cross-dimension than a cross-dimension of the second portions 172 of the T-shaped slot. When the fiber optic adapter holder 100 is mounted to the telecommunications equipment 10 at the recess region 164, the dovetail structures 142 of the mounting feature 140 of the fiber optic adapter holder 100 have dovetail cross-sectional profiles that mate with a corresponding dovetail cross-section profile defined by the second portions 172 of the mounting locations 146 defined in the telecommunications equipment 10.

The mounting locations 146 may also include slots 174 that have a cantilever tab 176 (e.g., cantilever flange) arranged and configured to flex when the fiber optic adapter holder 100 is mounted at the mounting locations 146. The dovetail structures 142 may include ramped surfaces 178 (see FIG. 5) that tapers narrowly in a direction towards the first surface 122 of the base 148. That is, when the fiber optic adapter holders 100 are mounted at the mounting locations 146 of the telecommunications equipment 10, the dovetail structures 142 may drop down into the first portions 170 of the mounting locations 146 while the bumps 144 may be configured to push the cantilever tab 176 downwardly and away from the dovetail structures 142 upon insertion into the second portion 172 of the T-shape slot and be slid therein. The bumps 144 may also include a 90-degree side 180 (see FIG. 4) relative to the base member 102 of the fiber optic adapter holder 100 and opposite to the 90-degree side 180 of the bumps 144 is a ramped surface 182 (see FIG. 4). The 90-degree side 180 of the bumps 144 may help to prevent the dovetail structures 142 from backing out or reversing out of the first portions 170 of the mounting locations 146. That is, when the bumps 144 engage the cantilever tab 176 to push it down while the fiber optic adapter holder 100 is being inserted into the mounting location 146, the cantilever tab 176 snaps back against the 90-degree side 180 to create a stop.

With the fiber optic adapter holder 100 mounted to the telecommunications equipment 10, there is no additional structure added to the overall height H_2 of the fiber optic adapter 80 above the top surface in the preferred embodiment.

The fiber optic adapter holder 100 may be mounted to the telecommunications equipment 10 such that the base member 102 of the fiber optic adapter holder 100 occupies or covers two mounting locations 146, although alternatives are possible. That is, the base member 102 of the fiber optic adapter holder 100 may be

wide enough to cover at least two mounting locations 146. In one example, the telecommunications equipment 10 may include six mounting locations 146. The six mounting locations 146 may provide area for three fiber optic adapter holders 100 to be mounted thereon. As such, by having the mounting features 140 of the fiber optic adapter holder 100 in an offset configuration, extra mounting locations 146 are not necessary to accommodate the number of fiber optic adapters 80 used.

Also, the fiber optic adapter holders 100 may be mounted to the telecommunications equipment 10 with increased density. As such, a plurality of fiber optic adapter holders 100 may be mountable to the telecommunications equipment 10 in a side-by-side arrangement. In certain examples, the fiber optic adapter holders 100 may abut against structure (e.g., wall) of the telecommunications equipment 10.

The telecommunications equipment 10 is shown in the form of a tray. The telecommunications equipment 10 can also be in the form of a generally planar panel useable by itself or mountable to other structures, with one or more mounting locations 146. In some examples, the telecommunications equipment 10 can be made to include arms 112 extending upwardly from a base portion of the telecommunications equipment 10.

The various examples described above are provided by way of illustration only and should not be construed to limit the scope of the present disclosure. Those skilled in the art will readily recognize various modifications and changes that may be made with respect to the examples and applications illustrated and described herein without departing from the true spirit and scope of the present disclosure.

What is claimed is:

1. A fiber optic adapter holder comprising:
a base member, the base member including:
a first major side;
a second major side generally parallel to the first major side;
a first minor side; and
a second minor side oppositely disposed to the first minor side;
wherein the first minor side and the second minor side extend generally perpendicularly between the first major side and the second major side, the base member also including a first surface and an opposite, second surface; and
a plurality of upright arms extending upwardly from the first and second major sides of the base member, the plurality of upright arms together defining a pocket region having an open, U-shape for receiving a fiber optic adapter, each one of the plurality of upright arms having a proximal end attached to the base member and a distal free end, the distal free ends having an edge, a height of the fiber optic adapter holder being defined between the second surface of the base member and the edge of the distal free ends of the plurality of upright arms;
wherein when the fiber optic adapter is mounted within the pocket region of the fiber optic adapter holder, the height of the fiber optic adapter holder is lower than or equal to a height of the fiber optic adapter.
2. The fiber optic adapter holder of claim 1, wherein when the fiber optic adapter is mounted within the pocket region of the fiber optic adapter holder, the plurality of upright arms of the fiber optic adapter holder are configured to be positioned in recesses defined in the fiber optic adapter.
3. The fiber optic adapter holder of claim 1, wherein at least two of the plurality of upright arms each define a window opening for receiving outer retaining clips respectively located on the fiber optic adapter.
4. The fiber optic adapter holder of claim 3, wherein the window openings each include a chamfer surface to respectively hold the outer retaining clips in place.

5. The fiber optic adapter holder of claim 3, wherein the outer retaining clips provide integrity for securing the fiber optic adapter to the fiber optic adapter holder.
6. The fiber optic adapter holder of claim 1, wherein the fiber optic adapter is adapted for interconnecting first and second optical fiber connectors in coaxial alignment along an optical axis.
7. The fiber optic adapter holder of claim 1, further comprising a mounting feature on a bottom surface of the base member.
8. The fiber optic adapter holder of claim 7, wherein the mounting feature includes dovetail structures.
9. The fiber optic adapter holder of claim 7, further comprising a structure, wherein the fiber optic adapter holder is mounted to the structure via the mounting feature.
10. The fiber optic adapter holder of claim 9, wherein the structure is a fiber management tray.
11. The fiber optic adapter holder of claim 9, wherein the structure defines a first side and an opposite second side, the structure also defining retention openings that extend through the structure from the first side to the second side, the retention openings including T-shaped slots that each have a first portion and a second portion.
12. The fiber optic adapter holder of claim 11, wherein the first portions of the T-shaped slots have larger cross-dimensions than cross-dimensions of the second portions of the T-shaped slots.
13. The fiber optic adapter holder of claim 11, wherein the mounting feature has dovetail cross-sectional profiles that mate with corresponding dovetail cross-sectional profiles defined by the first portions of the retention openings.
14. The fiber optic adapter holder of claim 1, further comprising a plurality of fiber optic adapter holders mountable to a structure in a side-by-side arrangement.

15. The fiber optic adapter holder of claim 11, wherein the mounting feature also includes ridges that mount within the second portions of the retention openings.

16. A fiber optic adapter holder assembly comprising:

a fiber optic adapter holder including:

a base member, the base member including:

a first major side;

a second major side generally parallel to the first major side;

a first minor side; and

a second minor side oppositely disposed to the first minor side, the

base member also including a first surface and an opposite, second surface; and

a plurality of upright arms extending upwardly from the first and second major sides of the base member, each one of the plurality of upright arms having free ends, a height of the fiber optic adapter holder being defined between the second surface of the base member and the free ends of the plurality of upright arms;

a fiber optic adapter mounted within a pocket region of the fiber optic adapter holder, the pocket region of the fiber optic adapter holder defining an open, U-shape, wherein the height of the fiber optic adapter holder is lower than or equal to a height of the fiber optic adapter; and

a structure, wherein the fiber optic adapter holder is mounted to the structure via a mounting feature.

17. The fiber optic adapter holder assembly of claim 16, wherein when the fiber optic adapter is mounted within the pocket region of the fiber optic adapter holder, the plurality of upright arms of the fiber optic adapter holder are configured to be positioned in recesses defined in the fiber optic adapter.

18. The fiber optic adapter holder assembly of claim 16, wherein at least two of the plurality of upright arms each define a window opening for receiving outer retaining clips respectively located on the fiber optic adapter.

19. The fiber optic adapter holder assembly of claim 18, wherein the window openings each include a chamfer surface to respectively hold the outer retaining clips in place.

20. The fiber optic adapter holder assembly of claim 18, wherein the outer retaining clips provide integrity for securing the fiber optic adapter to the fiber optic adapter holder.

21. A method of retaining a fiber optic adapter, the method comprising:

providing a one-piece fiber optic adapter holder, the fiber optic adapter holder including a base member, the base member including a first major side, a second major side generally parallel to the first major side, a first minor side, and a second minor side oppositely disposed to the first minor side, wherein the first minor side and the second minor side extend generally perpendicularly between the first major side and the second major side, the base member also including a first surface and an opposite, second surface, the fiber optic adapter holder also including a plurality of upright arms extending upwardly from the first and second major sides of the base member, each one of the plurality of upright arms having a proximal end attached to the base member and a distal free end, the distal free end having an edge, a height of the fiber optic adapter holder being defined between the second surface of the base member and the edge of the distal free ends of the plurality of upright arms, the plurality of upright arms together defining a pocket region having an open, U-shape;

mounting a fiber optic adapter within the pocket region of the fiber optic adapter holder, wherein when the fiber optic adapter is mounted to the fiber optic adapter holder, a length of the fiber optic adapter extends between the first and second minor sides of the base member, and a height of the fiber optic adapter extends above or is equal to the height of the fiber optic adapter holder; and

securing the fiber optic adapter holder to a structure via mounting features.

22. The method of claim 21, wherein the step of mounting the fiber optic adapter within the pocket region of the fiber optic adapter holder includes positioning the plurality of upright arms in recesses defined in the fiber optic adapter.

23. The method of claim 21, wherein at least two of the plurality of upright arms each define a window opening for receiving outer retaining clips respectively located on the fiber optic adapter.

24. The method of claim 23, wherein the window openings each include a chamfer surface to respectively hold the outer retaining clips in place, and wherein the outer retaining clips provide integrity for securing the fiber optic adapter to the fiber optic adapter holder.
25. The method of claim 21, further comprising a step of interconnecting first and second optical fiber connectors in coaxial alignment along an optical axis in the fiber optic adapter.
26. The method of claim 21, wherein the structure is a fiber management tray.
27. The method of claim 21, further comprising a step of mounting a plurality of fiber optic adapter holders to the structure in a side-by-side arrangement.
28. A method of retaining a fiber optic adapter, the method comprising:
providing a one-piece fiber optic adapter holder, the fiber optic adapter holder including a base member, the base member including a first major side, a second major side generally parallel to the first major side, a first minor side, and a second minor side oppositely disposed to the first minor side, wherein the first minor side and the second minor side extend generally perpendicularly between the first major side and the second major side, the base member also including a first surface and an opposite, second surface, the fiber optic adapter holder also including a plurality of upright arms extending upwardly from the first and second major sides of the base member, each one of the plurality of upright arms having a proximal end attached to the base member and a distal free end, the distal free end having an edge, a height of the fiber optic adapter holder being defined between the second surface of the base member and the edge of the distal free ends of the plurality of upright arms, the plurality of upright arms together defining a pocket region having an open, U-shape;
securing the fiber optic adapter holder to a structure via mounting features; and
mounting a fiber optic adapter within the pocket region of the fiber optic adapter holder, wherein when the fiber optic adapter is mounted to the fiber optic adapter holder, a length of the fiber optic adapter extends between the first and second minor sides of the base member, and a height of the fiber optic adapter extends above or is equal to the height of the fiber optic adapter holder.

29. The method of claim 28, wherein the step of mounting the fiber optic adapter within the pocket region of the fiber optic adapter holder includes positioning the plurality of upright arms in recesses defined in the fiber optic adapter.

30. The method of claim 28, wherein at least two of the plurality of upright arms each define a window opening for receiving outer retaining clips respectively located on the fiber optic adapter.

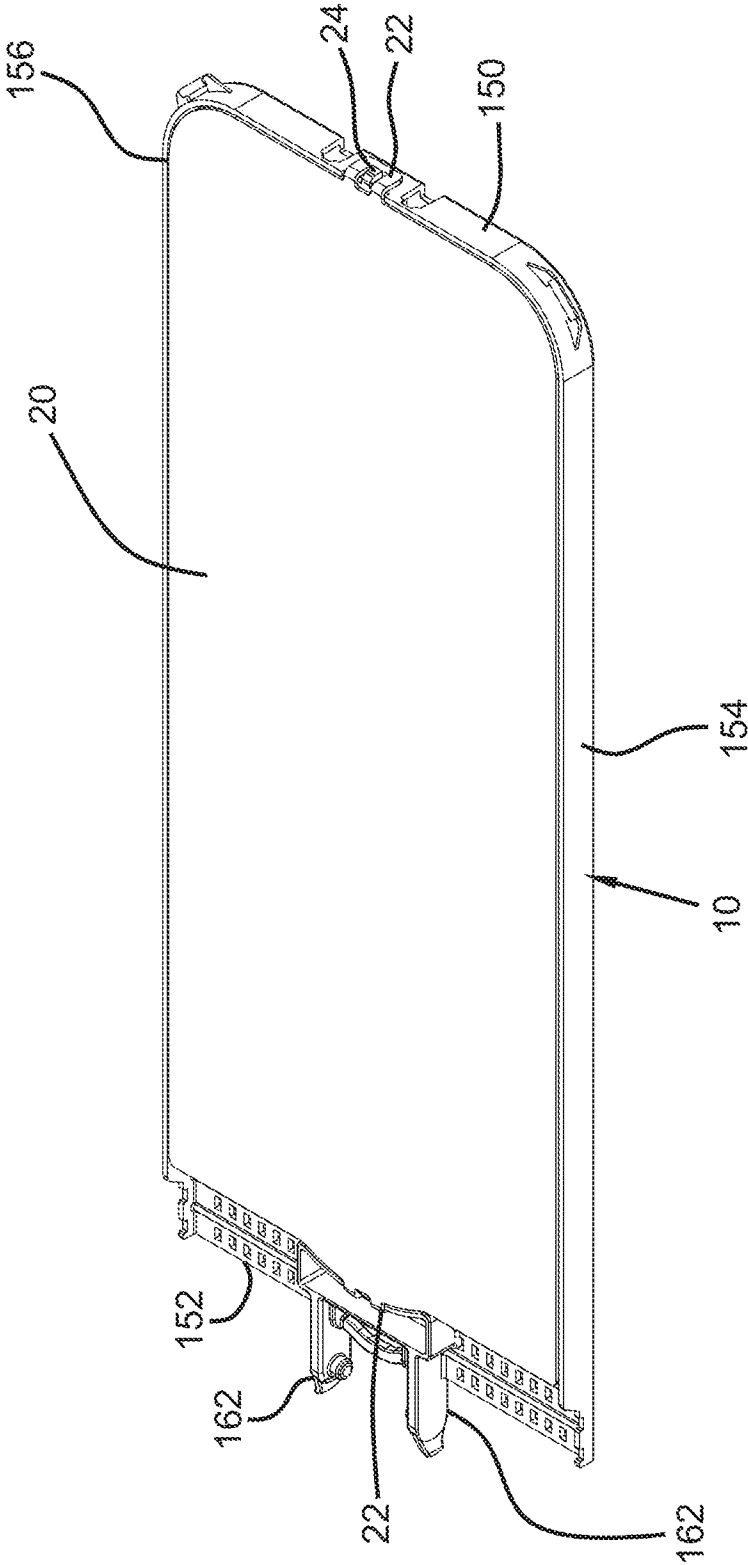
31. The method of claim 30, wherein the window openings each include a chamfer surface to respectively hold the outer retaining clips in place, and wherein the outer retaining clips provide integrity for securing the fiber optic adapter to the fiber optic adapter holder.

32. The method of claim 28, further comprising a step of interconnecting first and second optical fiber connectors in coaxial alignment along an optical axis in the fiber optic adapter.

33. The method of claim 28 wherein the structure is a fiber management tray.

34. The method of claim 28, further comprising a step of mounting a plurality of fiber optic adapter holders to the structure in a side-by-side arrangement.

FIG. 1



2016

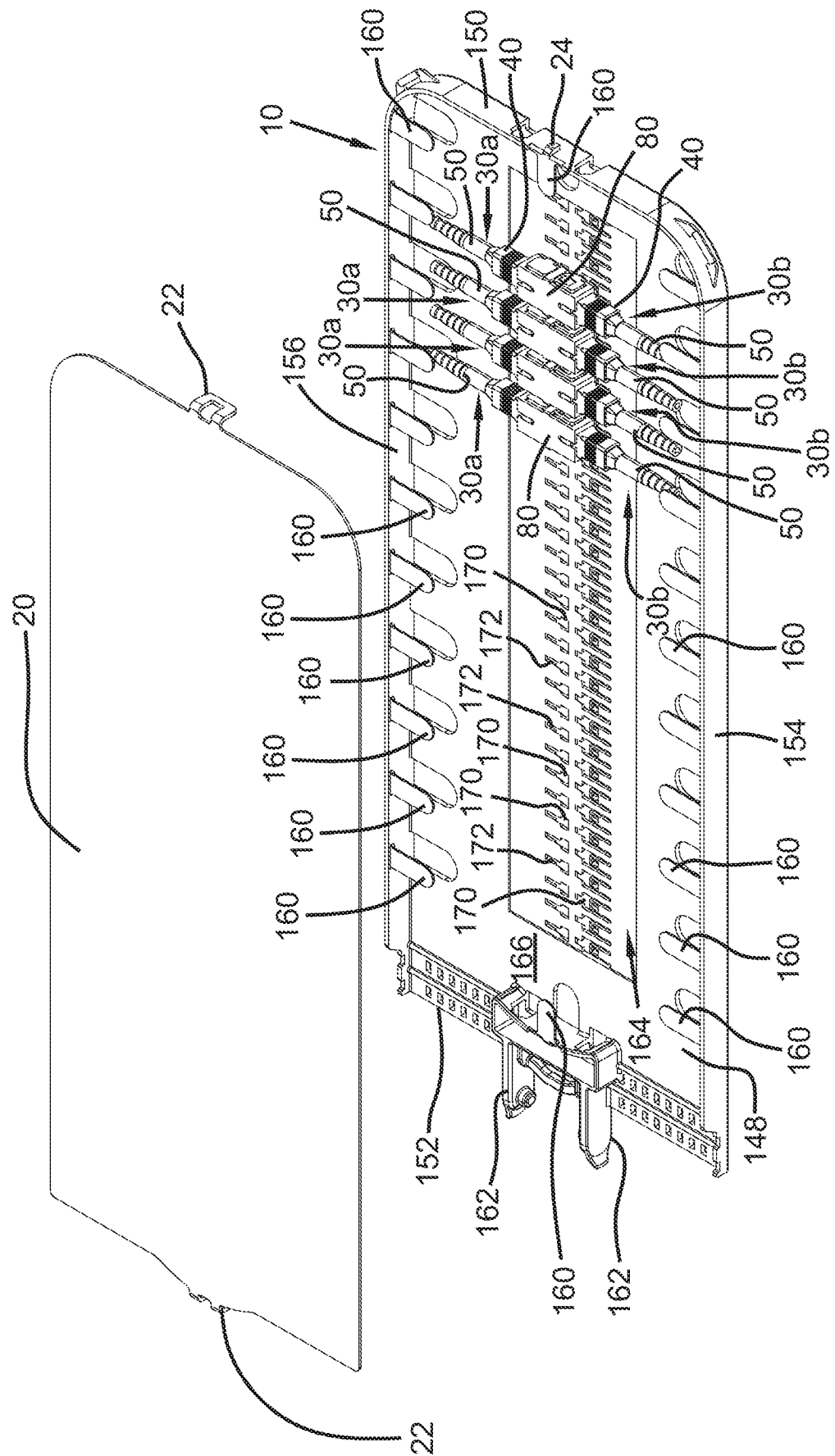


FIG. 3

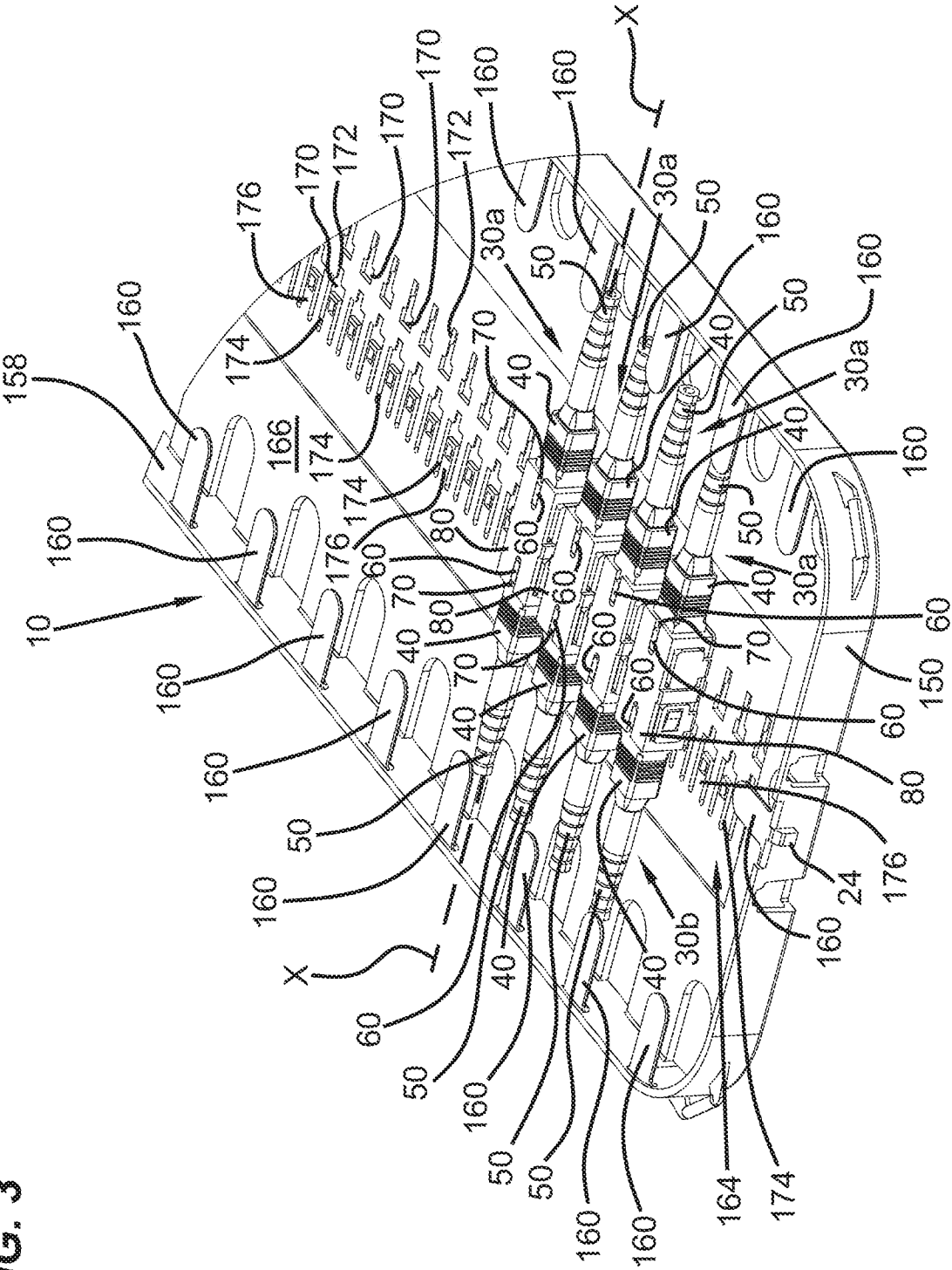


FIG. 4

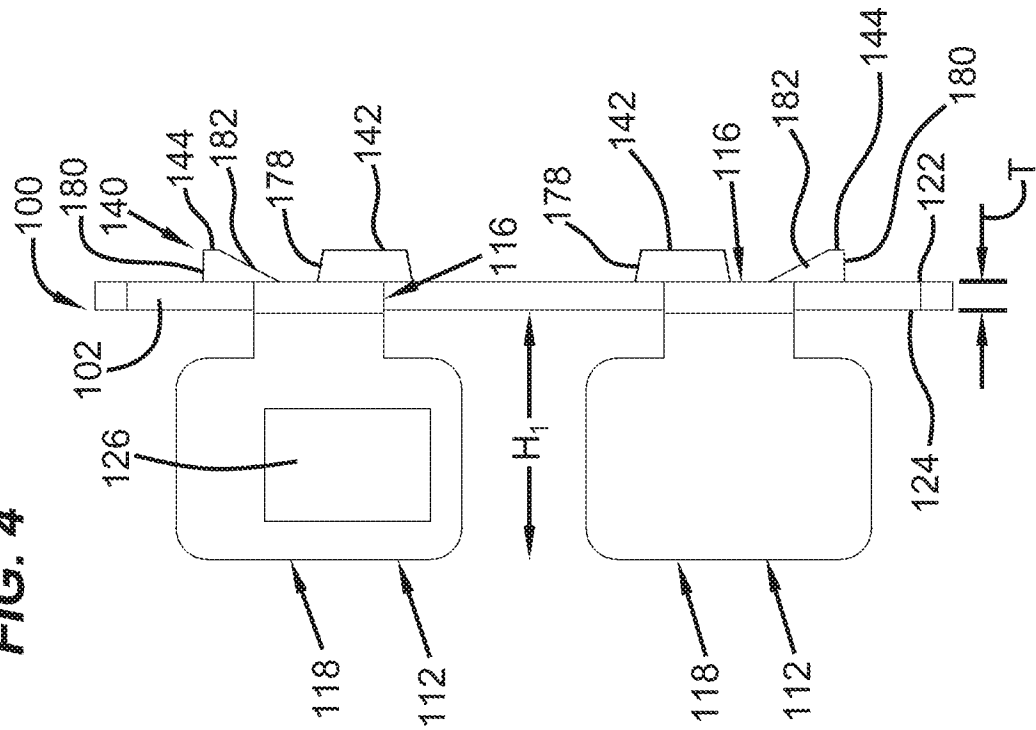
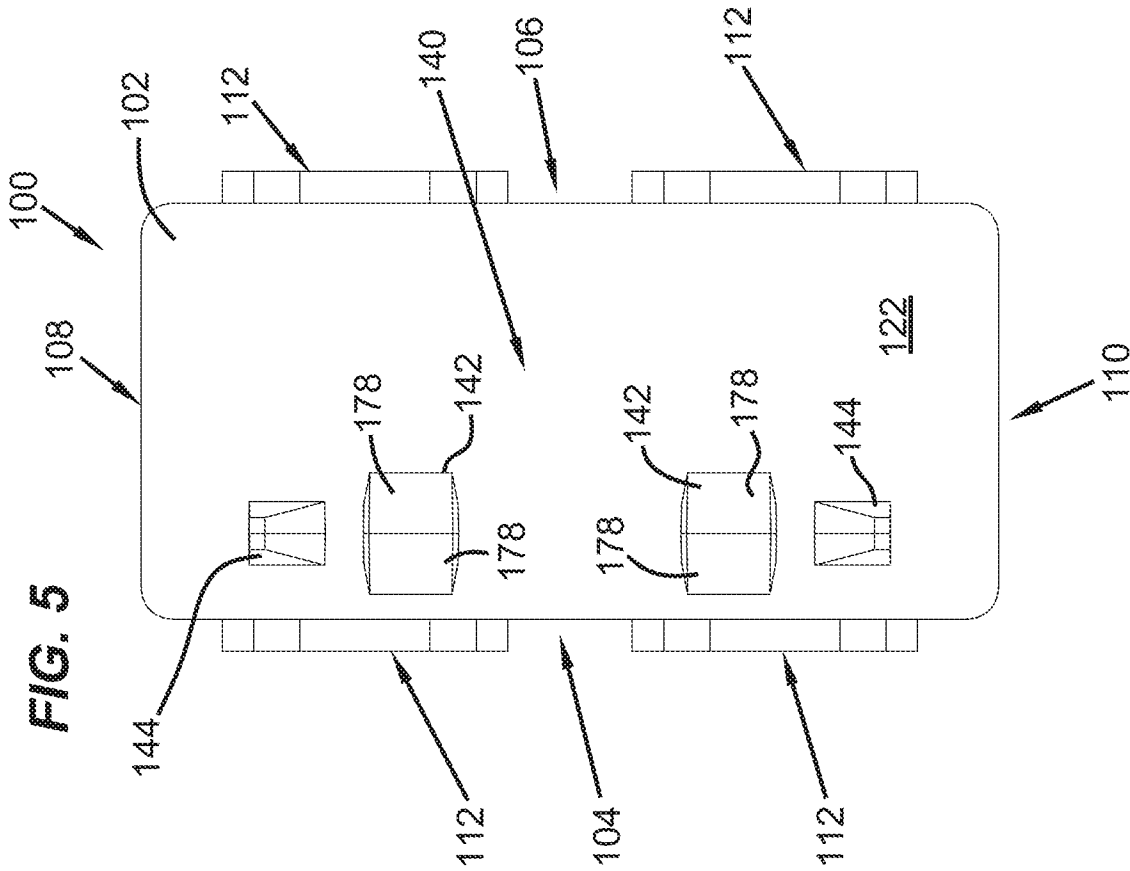


FIG. 5



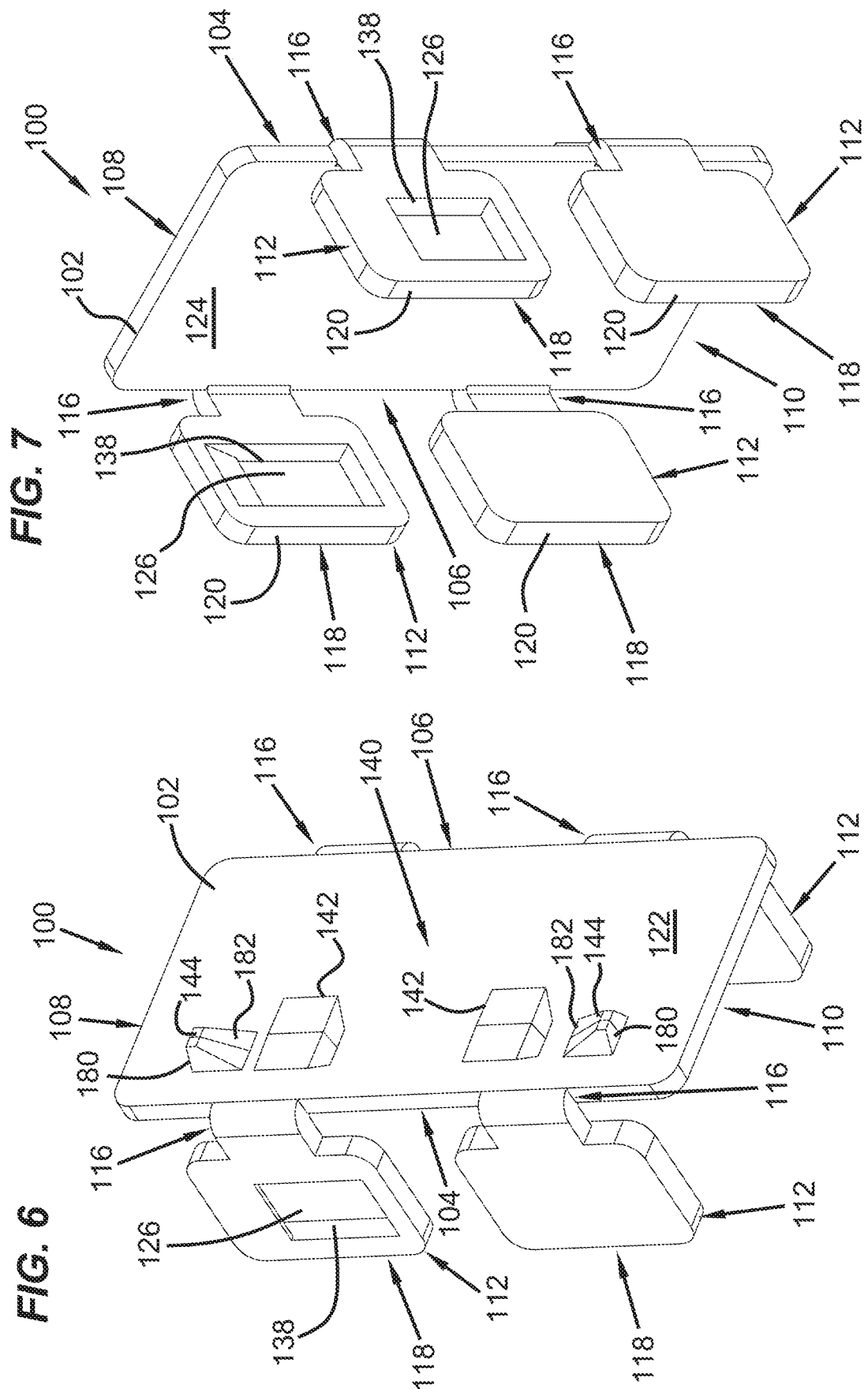
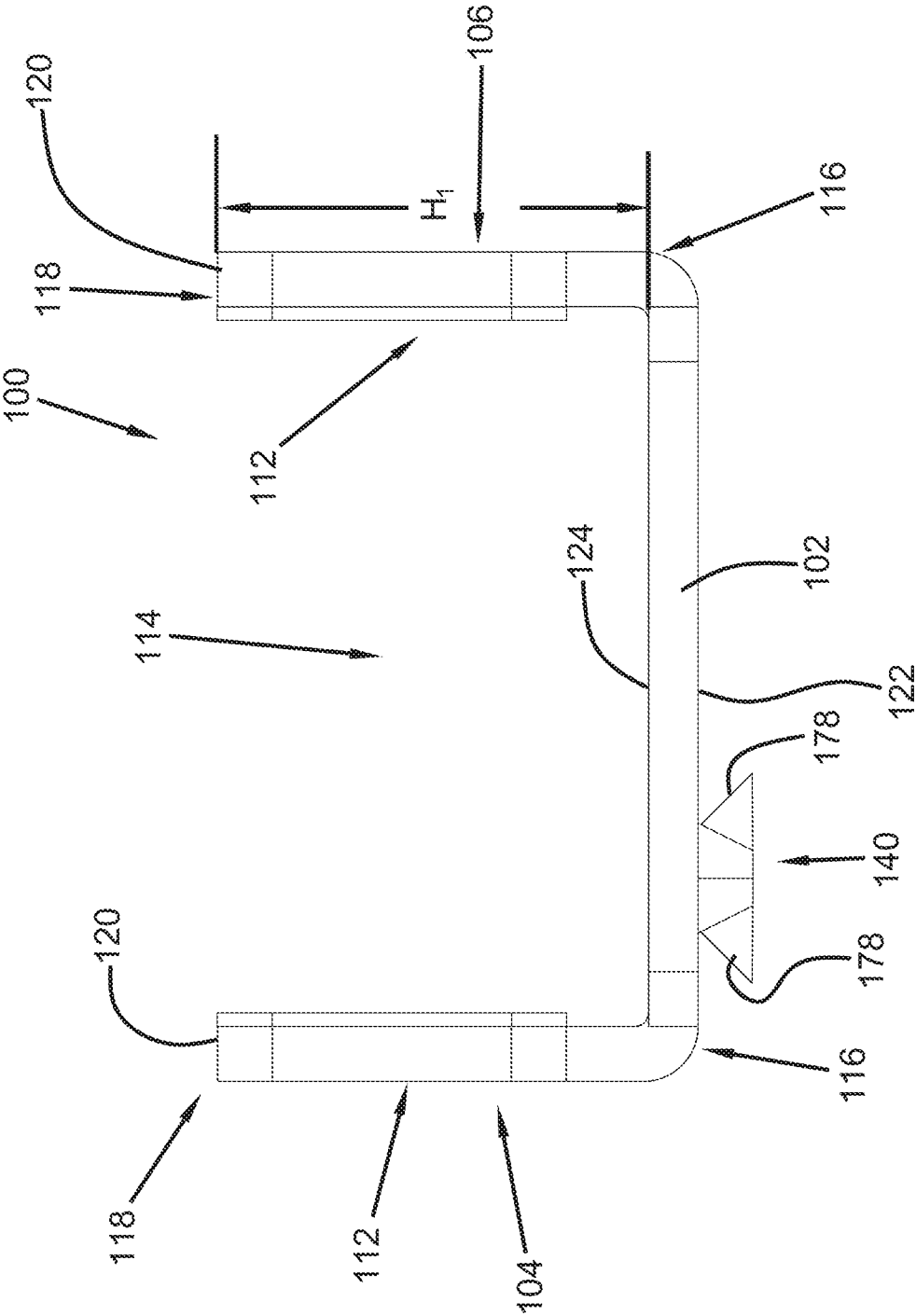
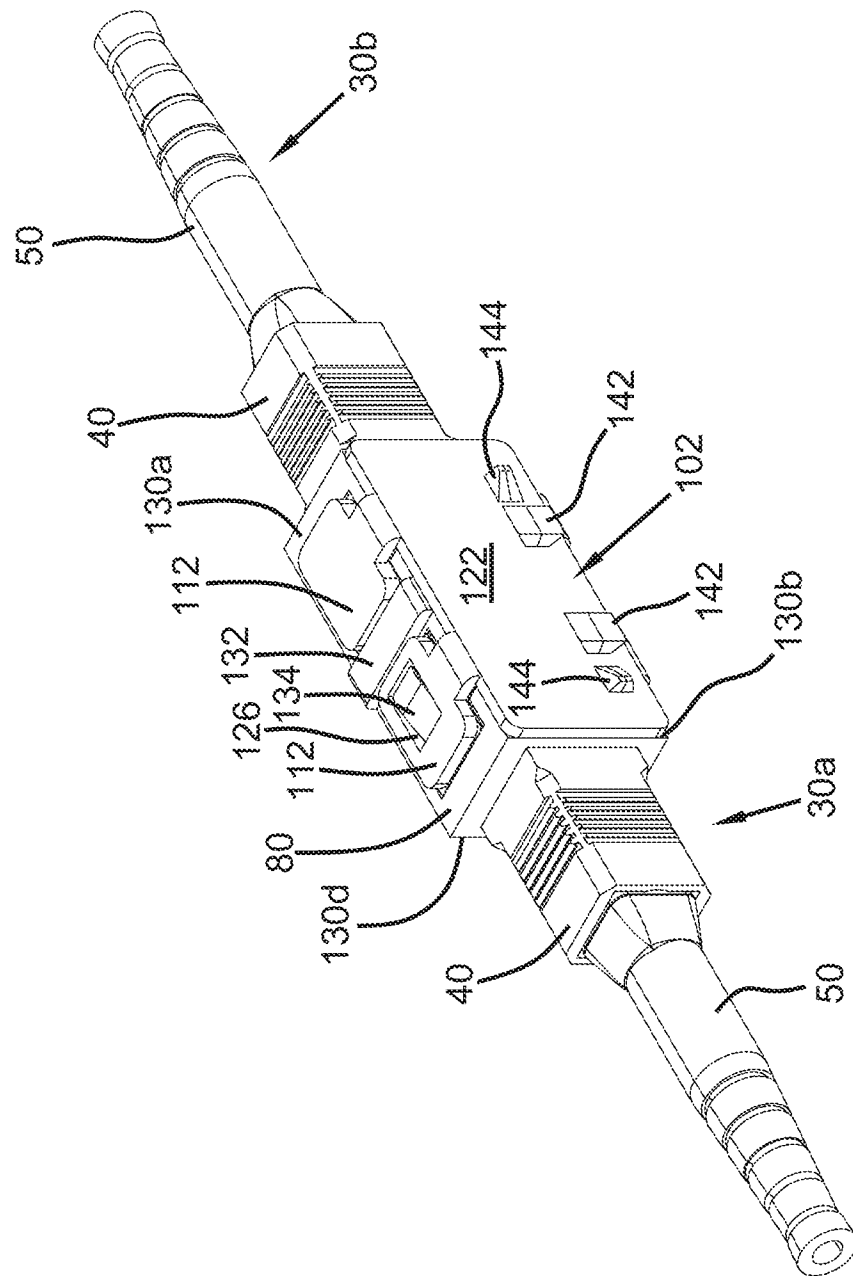


FIG. 8





964

FIG. 10

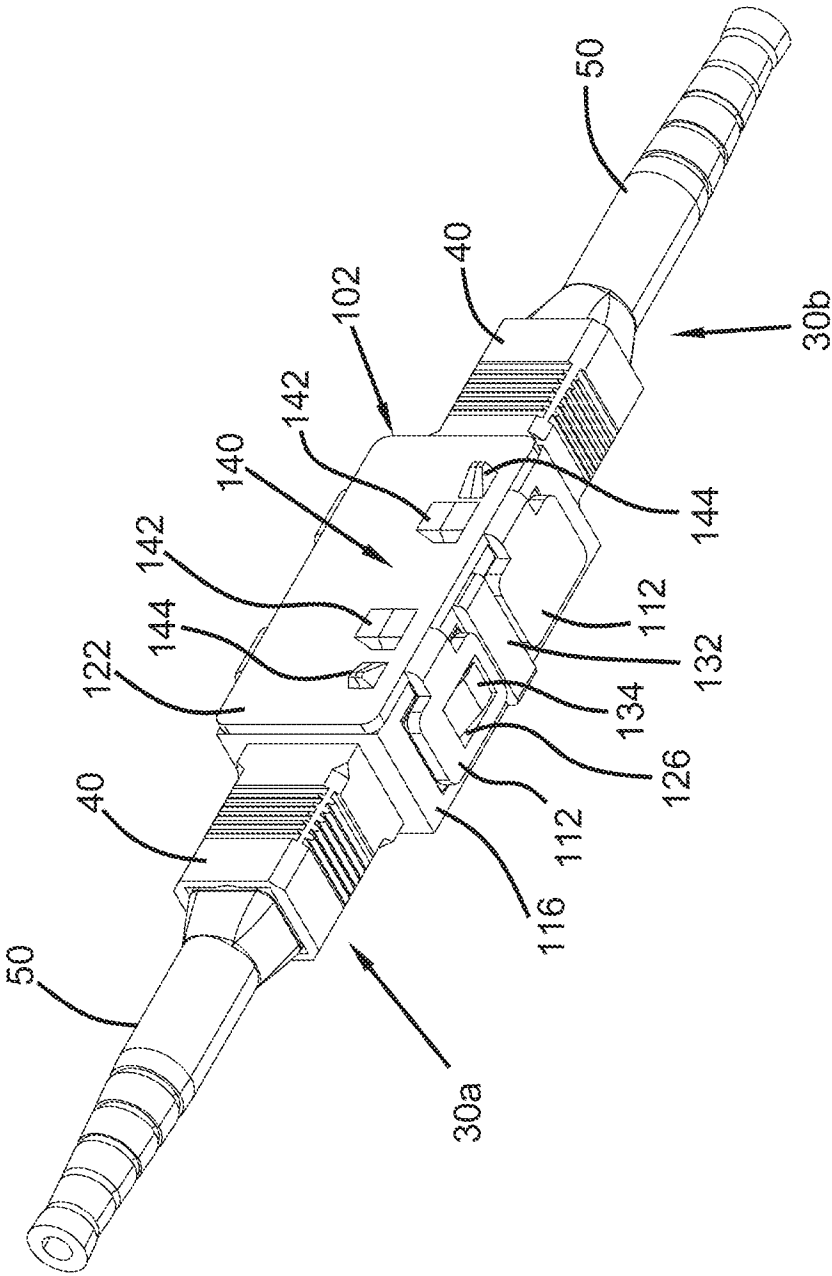


FIG. 11

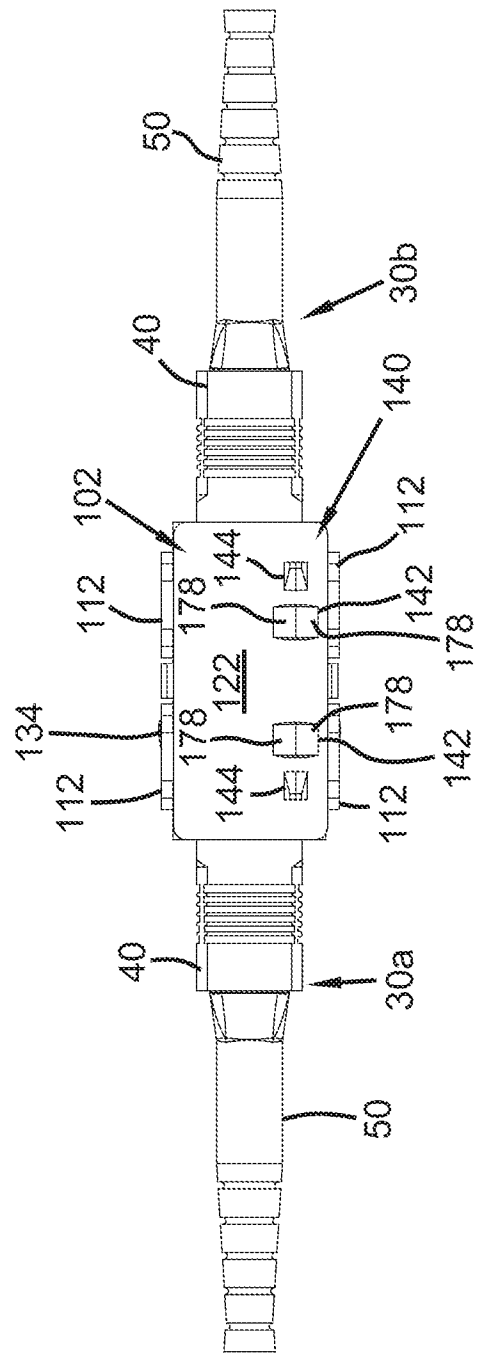


FIG. 12

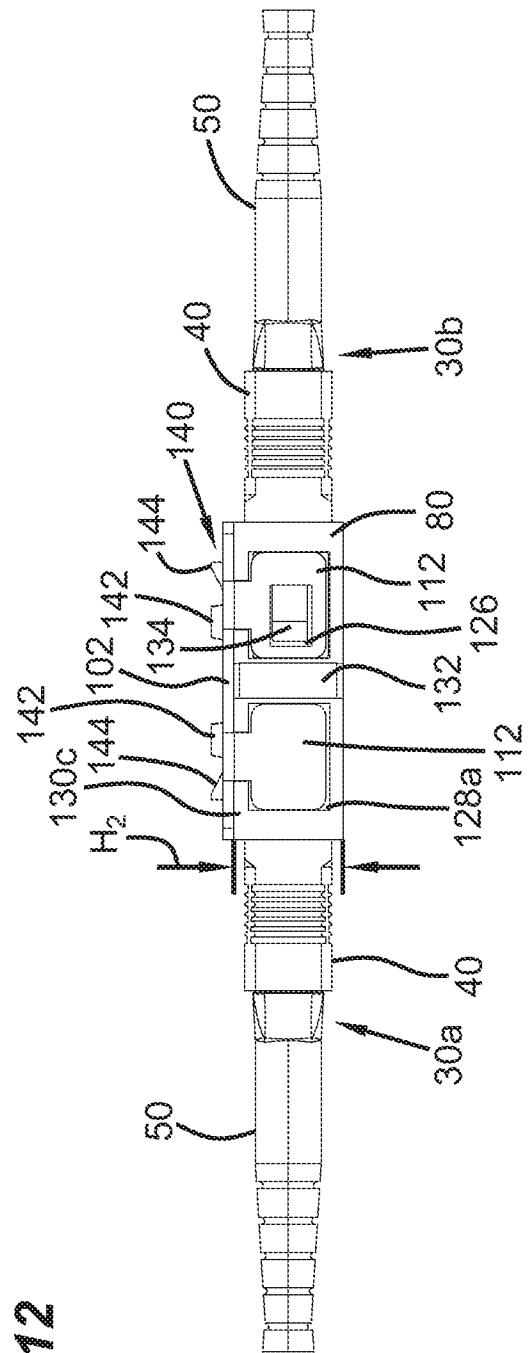


FIG. 13

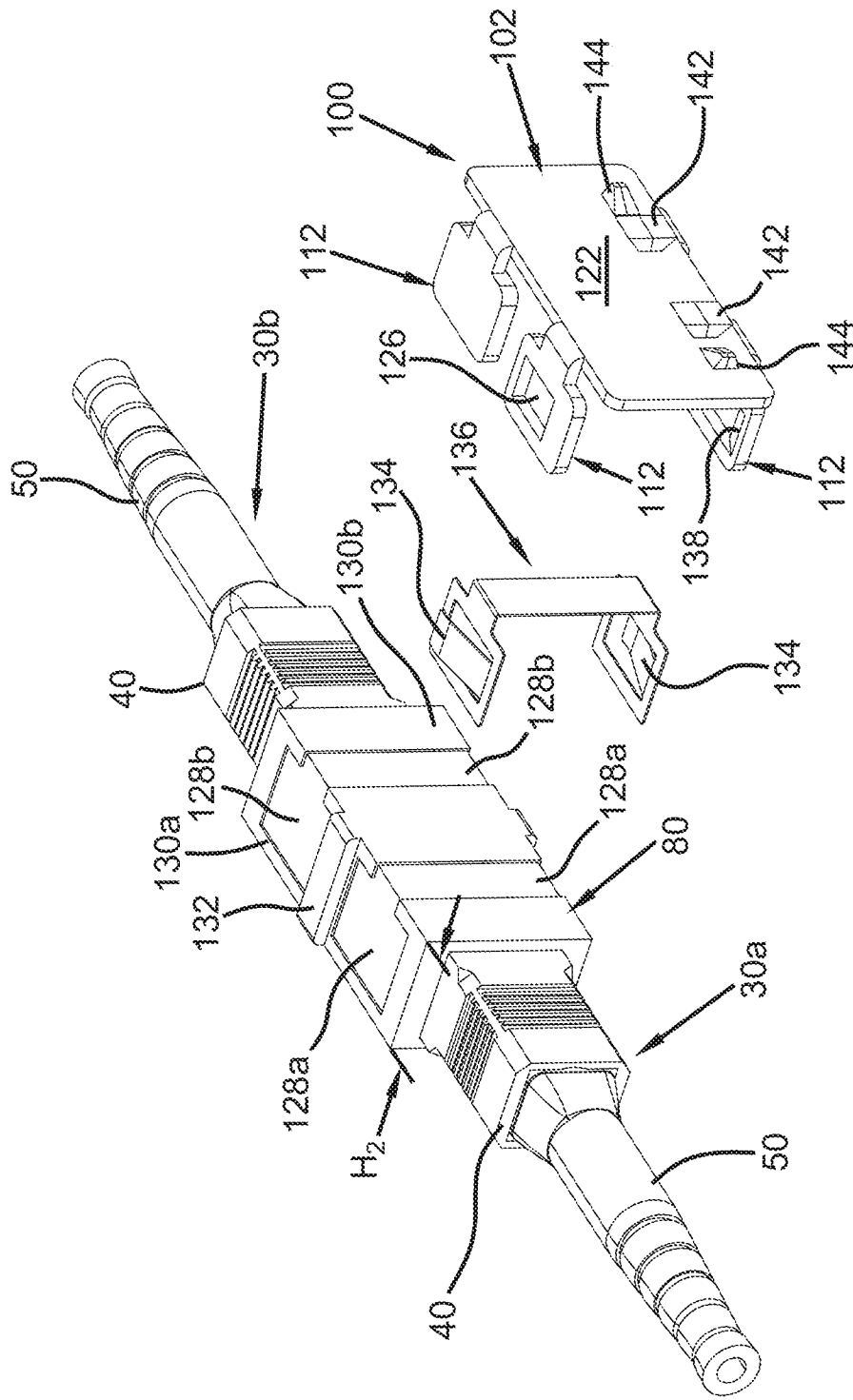


FIG. 14

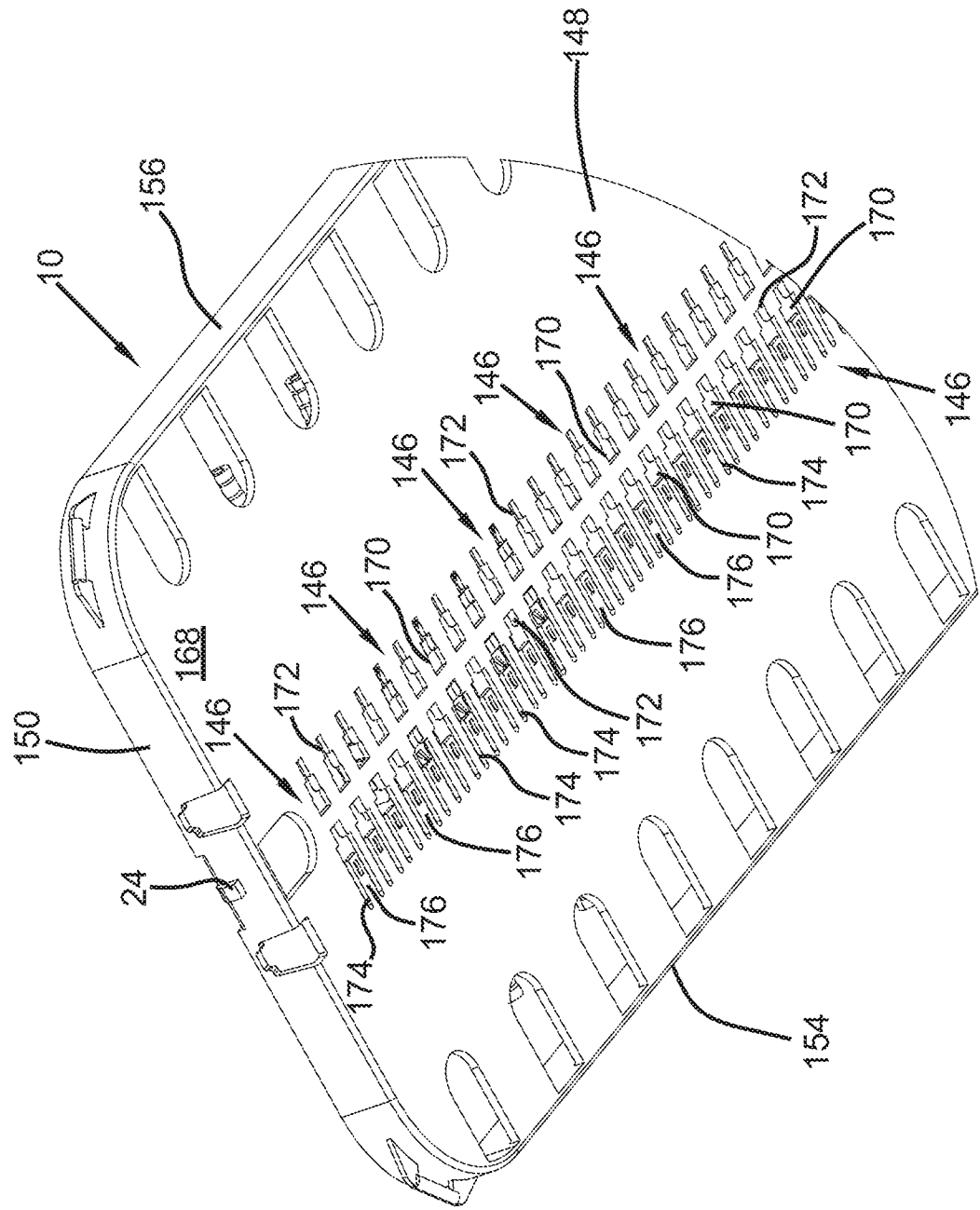
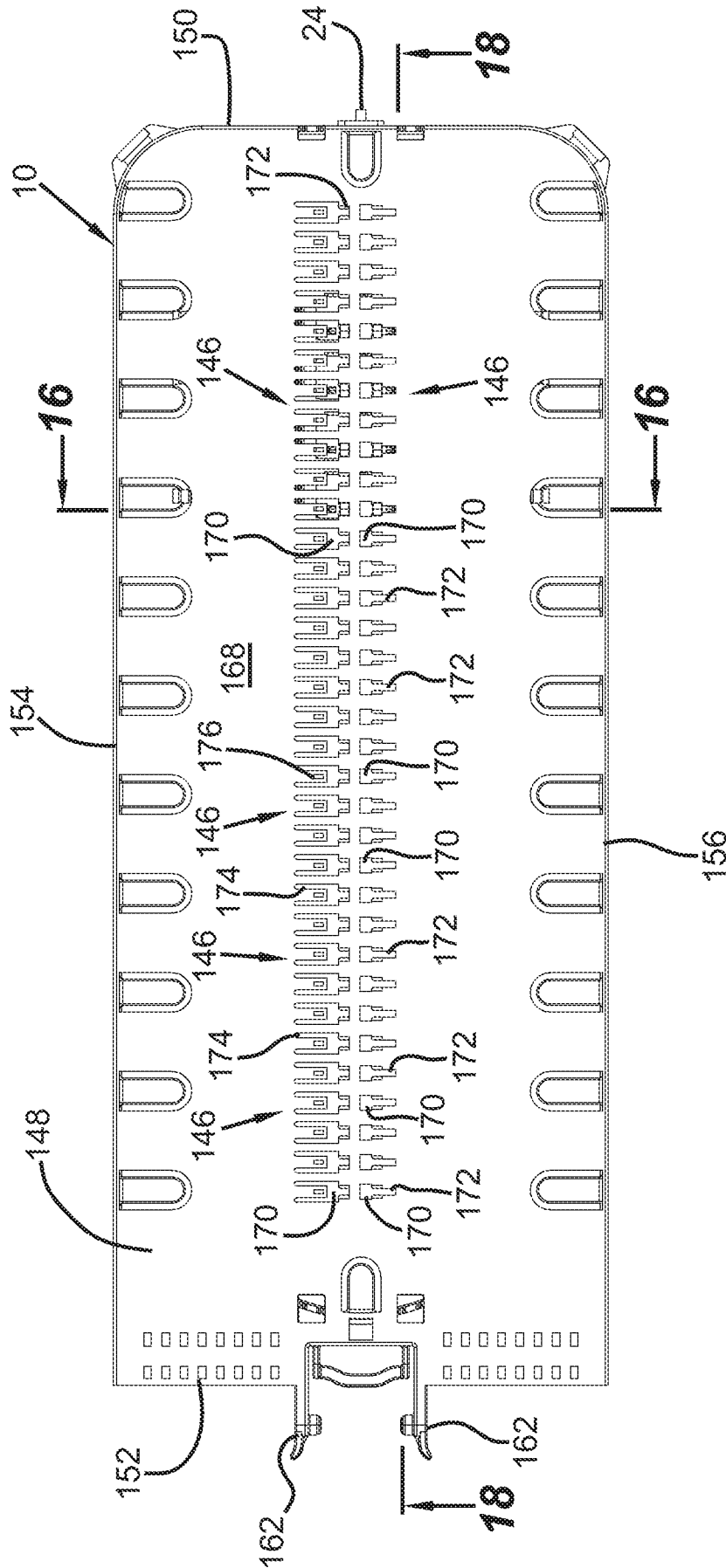


FIG. 15



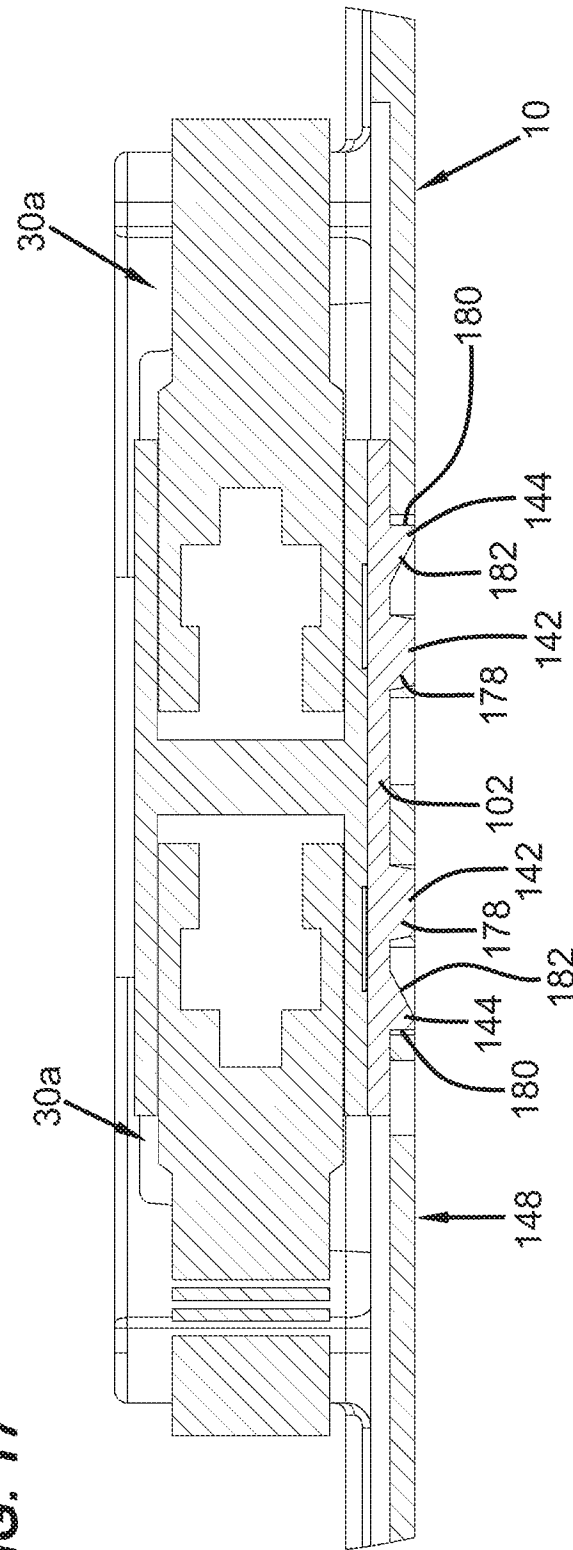
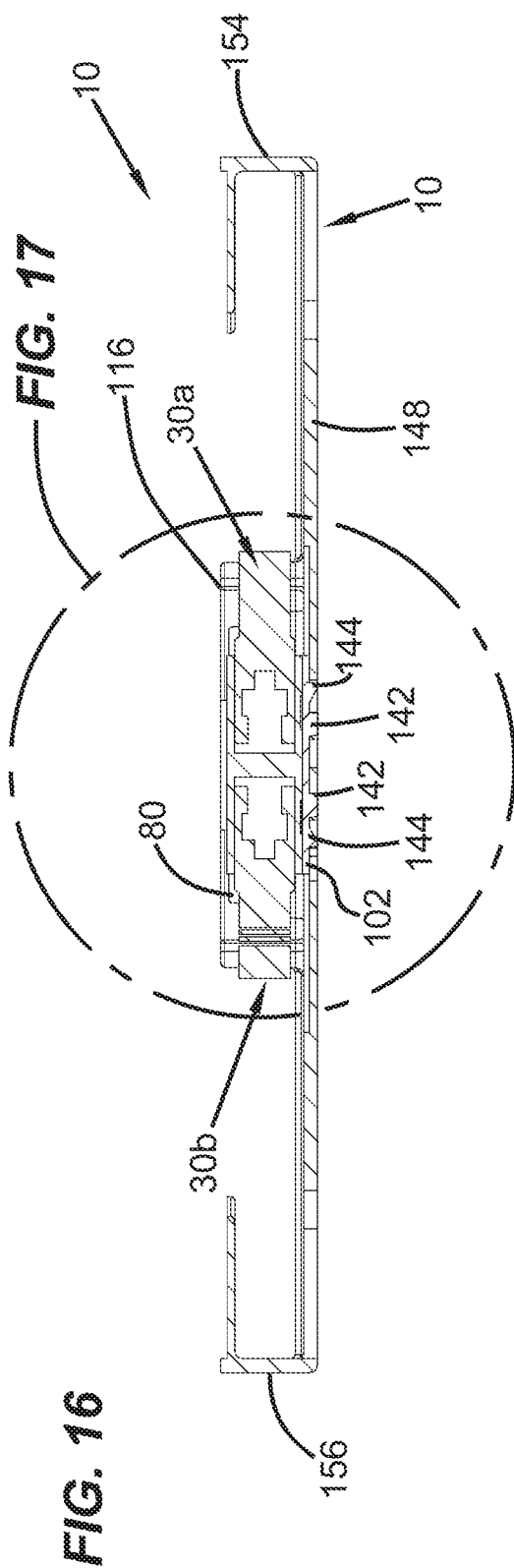
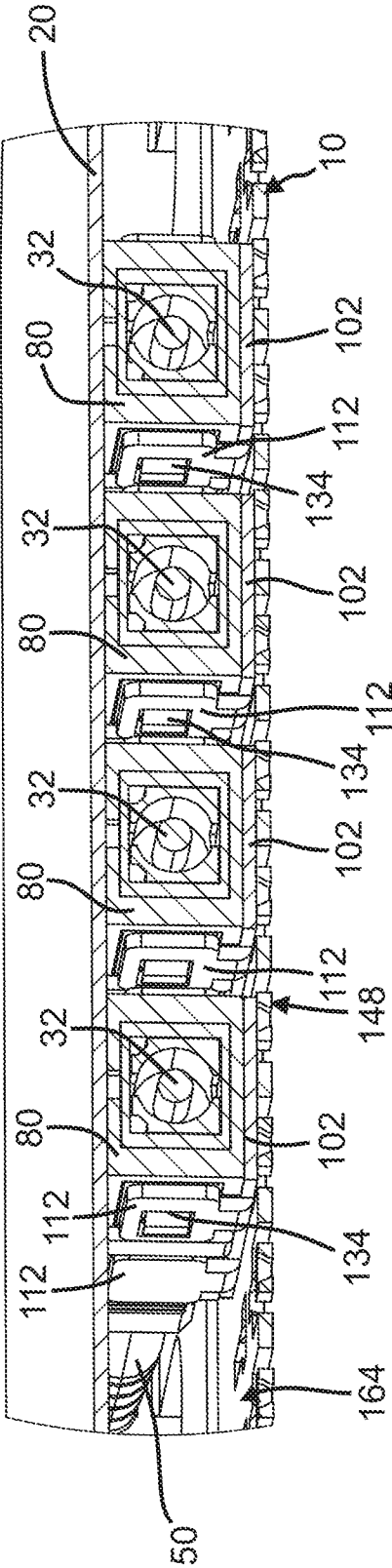


FIG. 18



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2020/024275**A. CLASSIFICATION OF SUBJECT MATTER****G02B 6/38(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 6/38; G02B 006/38; G02B 6/44; G02B 600; H05K 3/36

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: fiber, optic, adapter, holder, mount, height

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0232550 A1 (MASAHIRO NAKAJIMA et al.) 20 October 2005 paragraphs [0144]-[0177], [0201]-[0211] and figures 1-2C, 12-15	1-34
A	US 2018-0329152 A1 (COMMScope CONNECTIVITY BELGIUM BVBA) 15 November 2018 claims 1-7 and figures 1-14	1-34
A	US 2016-0370552 A1 (TYCO ELECTRONICS UK LTD. et al.) 22 December 2016 claims 1-9 and figures 1-6	1-34
A	US 6307997 B1 (MARK D. WALTERS et al.) 23 October 2001 claims 1-5 and figures 1-9	1-34
A	US 9632267 B1 (OFS FITELE, LLC) 25 April 2017 claims 1-8 and figures 1-9	1-34

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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

"D" document cited by the applicant in the international application

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

13 July 2020 (13.07.2020)

Date of mailing of the international search report

13 July 2020 (13.07.2020)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea



Facsimile No. +82-42-481-8578

Authorized officer

KANG MIN JEONG

Telephone No. +82-42-481-8131



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2020/024275

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0232550 A1	20/10/2005	JP 2004-151670 A JP 2008-299348 A JP 2009-199097 A JP 4266319 B2 JP 4336733 B2 JP 4951029 B2 US 2004-0072454 A1 US 2005-0226568 A1 US 6908233 B2 US 7118283 B2 US 7118284 B2	27/05/2004 11/12/2008 03/09/2009 20/05/2009 30/09/2009 13/06/2012 15/04/2004 13/10/2005 21/06/2005 10/10/2006 10/10/2006
US 2018-0329152 A1	15/11/2018	EP 3374812 A1 US 10598867 B2 WO 2017-081295 A1	19/09/2018 24/03/2020 18/05/2017
US 2016-0370552 A1	22/12/2016	CN 106461897 A CN 106461897 B EP 3105627 A1 EP 3105627 A4 US 10444457 B2 WO 2015-120617 A1	22/02/2017 21/01/2020 21/12/2016 13/12/2017 15/10/2019 20/08/2015
US 6307997 B1	23/10/2001	BR 0007107 A EP 1079638 A1	17/07/2001 28/02/2001
US 9632267 B1	25/04/2017	US 10234636 B2 US 2017-0285272 A1 US 2017-0357070 A1 US 2017-0357072 A1 US 2017-0357073 A1 US 9846290 B1 US 9874712 B2 US 9904026 B2	19/03/2019 05/10/2017 14/12/2017 14/12/2017 14/12/2017 19/12/2017 23/01/2018 27/02/2018