



(51) International Patent Classification:
H04Q 1/02 (2006.01)

(21) International Application Number:

PCT/EP2012/074779

(22) International Filing Date:

7 December 2012 (07.12.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/579,482 22 December 2011 (22.12.2011) US

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

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

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(54) Title: MULTI-OPERATOR BOX

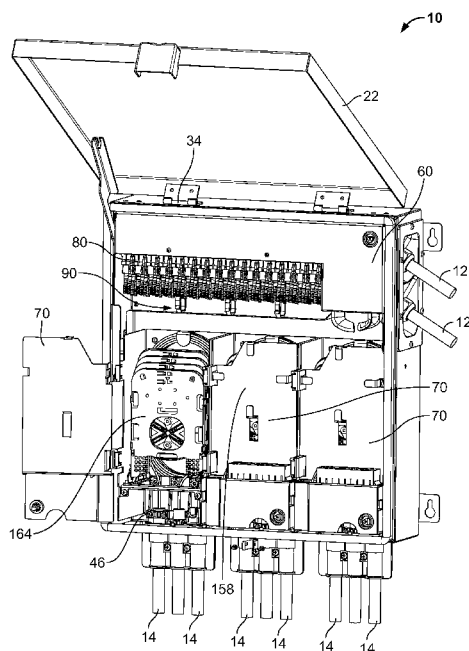


FIG. 6

(57) Abstract: An enclosure (10) is provided for connecting drop cables (12) to feeder cables (14). The enclosure (10) includes a movable cover (22). Disposed within an interior of the enclosure (10) is a drop cable box (60), a termination panel (80), and at least one feeder cable box (70). Disposed within the drop cable box (60) are cable splices (212). A movable door (200) of the drop cable box (60) pivots downwardly to access an interior of the drop cable box. Each feeder cable box (70) includes a pivoting door (152) which allows access to cable splices (164), cable splitters (180), and the loop cable (102). The splices pivot (164) downwardly to expose the splitters (180) positioned behind the splices. The splitters (180) are positioned within an inner area (184) of a loop cable pathway (170) of the fiber cable box (70). A plurality of fiber cable boxes (70) are provided for multiple fiber cables to feed enclosure (10) for selective connection to the drop cables (12). Cable storage is provided on door (152) for unused pigtailed cables.

**Declarations under Rule 4.17:**

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.1 7(H))*

Published:

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

MULTI-OPERATOR BOX

Field of the Invention

5 The present invention relates to systems and methods for wall boxes for fiber optic terminations and equipment.

Background of the Invention

10 Wall boxes are known for managing telecommunications cables and connectivity equipment, including splices, splitters, wave division, multiplexers and terminations. Typically, the wall boxes are mounted to the wall, or other mounting equipment. Cables enter and exit the box and are managed within the box for connecting feeder cables to distribution cables for connecting fiber optic cables to individual
15 customers.

Summary of the Invention

 The present invention concerns an enclosure with a movable cover allowing
20 access to an interior of the enclosure. The enclosure includes one or more drop cable ports, and one or more feeder cable ports. Disposed within the interior of the enclosure is a drop cable region, which includes a movable cover. Disposed within the drop cable region is preferably a splice arrangement. Outputs from the splice arrangement are terminated at a termination panel. Preferably, the termination panel forms a portion of the drop cable
25 region.

 The enclosure of the preferred embodiment includes at least one feeder cable region. In the preferred embodiment, a plurality of feeder cable regions are provided. Disposed within each feeder cable region is at least one feeder cable box. The feeder cable box includes a movable cover. The feeder cable box allows for receipt of a

loop cable, and preferably splices and splitters. Outputs from the splice and/or splitters exit the feeder cable box and can be connected to the drop cables through the termination panel.

5 In one preferred embodiment, a parking arrangement is provided on the movable cover of the feeder box for storage of unused splice and/or splitter outputs.

In another preferred embodiment, the termination panel is positioned on a movable cover of the drop cable region.

10 In a further preferred embodiment, splice trays are provided in the drop cable region and are hingedly mounted to a panel member of the drop cable region associated with the movable cover.

In a still further preferred embodiment, a plurality of splice trays are provided in the feeder cable box. Preferably, the splice trays are hinged so as to pivot toward an open front of the enclosure.

15 In a further embodiment, a plurality of splitters are positioned in each feeder cable box behind the splice trays. In one embodiment, the splitters are in splitter modules or boxes. In a further preferred embodiment, the splitters are removable for improved access.

In one preferred embodiment, the plurality of splitters are disposed in an area within the loop cable pathway of each feeder cable box.

20 In other embodiments, the splitters can be located on trays instead of in splitter boxes.

In one embodiment, three feeder cable boxes are provided. In one preferred embodiment, the feeder boxes are symmetrical in construction.

25 In still further preferred embodiments, a lock is associated with each movable cover of the drop cable region, and the feeder cable boxes to allow selective access.

The present invention also relates to a method of using the devices described above wherein multiple operators can utilize the same enclosure and selectively connect different feeder cables to the drop cables.

Brief Description of the Figures

FIG. 1 is a perspective view of a telecommunications enclosure in accordance with the principles of the present invention;

5 FIG. 1A is a schematic view showing interior features of the enclosure of FIG. 1;

FIG. 1B is a further schematic view showing interior features of the enclosure of FIGS. 1 and 1A;

10 FIG. 2 is a perspective view of the enclosure of FIG. 1 showing the cover of the enclosure in the open position;

FIG. 3 is a perspective view of the enclosure showing the movable cover or door of the drop cable box region or area;

FIG. 4 is a side view of the view of FIG. 3;

FIG. 5 is a further perspective view of the enclosure of FIG. 3;

15 FIG. 6 shows one of the feeder cable boxes with the movable cover or door in the open position;

FIG. 7 is a view like FIG. 6, with the splice trays pivoted downward to expose the splitters;

20 FIG. 8 is a view like FIG. 7, showing the splitters removed from the feeder cable box;

FIG. 9 shows one of the feeder cable boxes with the door closed;

FIG. 10 shows the feeder cable box of FIG. 9, with the door open, and the splice trays pivoted downwardly to expose the splitters;

FIG. 11 is a view like FIG. 10, showing the splitters removed;

25 FIG. 12 shows the feeder cable box in side perspective view with the door open, and portions of the chassis removed for visibility, showing the splitters and splitter box positioned inside;

FIG. 13 shows the feeder cable box of FIG. 11, with the splitter box partially removed;

30 FIG. 14 is a front view of a similar enclosure, showing one feeder cable box

mounted therein, and showing the various cables entering and exiting the enclosure, as well as the interior cabling;

FIG. 15 shows further details of the internal cabling of the enclosure of FIG. 14;

5 FIG. 16 shows further details of the internal cabling of the enclosure of FIG. 14 associated with a feeder cable box;

FIGs. 17-20 shows further details of the cabling and use of the enclosure of FIG. 14.

10 Detailed Description

Referring now to FIGS. 1, 1A, 1B, and 2-8, an enclosure 10 is shown for receiving input and output cables, and managing the connections between the cables and other telecommunications equipment. Enclosure 10 can be in the form of a wall box, 15 which is mountable to a wall, or other telecommunications mounting structures such as racks, cabinets, or frames.

Enclosure 10 includes drop cables 12, also described as distribution cables, and loop cables 14. Loop cables 14 are brought to enclosure 10 and certain of the cables are connected to the drop cables.

20 Enclosure 10 includes various regions or areas disposed within an interior 11, the various areas in interior 11 can be segregated into different functions, and can allow for different technicians to have selective access.

Enclosure 10 includes a drop cable region 16 for receiving drop cables 12. Disposed within drop cable region 16 are splices and cable management features for 25 managing the interior cables which are connected to a termination area 18.

As will be described below, enclosure 10 includes a feeder cable region 38 for receiving one or more feeder cables, and allowing management of the feeder cables which connect at termination area 18, and also for the unused feeder cables to exit enclosure 10.

30 In one embodiment drop cable region 16 is separate from feeder cable

region 38 so as to allow only selected access by certain technicians or users of enclosure 10. In one preferred embodiment, feeder cable region 38 includes the capability of receiving more than one feeder cable. As shown, three feeder cables can be received by enclosure 10. Each feeder cable can be selectively connected to a selected drop cable at the termination area 18. Further, feeder cable region 38 can be divided into subregions which are only selectively accessible by desired technicians or operators.

Enclosure 10 includes a chassis 20 with a movable cover 22. Chassis 20 includes four sides, 24, 26, 28, 30 and a rear 32. Chassis 20 with cover 22 provides a protected enclosure area for interior 11.

Cover 22 is hingedly mounted about a hinge 34 to a top of chassis 20 at side 24. Cover 22 lifts upwardly as shown in the figures. A cover support 36 holds cover 22 in the open position. Cover 22 can hinge from the sides.

Enclosure 10 includes a plurality of drop cable ports 40 including clamps 42 for connecting drop cables 12 to enclosure 10. As shown, drop cable ports 40 are on side 26, which is vertically mounted during use. Port 40 can be on side 30 also.

Enclosure 10 includes loop cable ports 44 including clamps 46 for mounting of loop cables 14 to enclosure 10. As shown, loop cable ports 44 are mounted on side 28 of chassis 20, which is on the bottom of enclosure 10, during use.

Enclosure 10 includes mounting tabs or ears 48 for mounting to the wall or other structure. A lock 50 is provided to lock cover 22 to chassis 20. A perimeter seal 52 helps seal interior 11 from debris and other damaging materials outside of enclosure 10, even including dust or water. In one preferred embodiment, enclosure 10 can be used outside.

Enclosure 10 includes various regions within interior 11. A drop cable box 60 is formed in an upper area of interior 11. Three feeder cables boxes 70 are positioned in feeder cable region 38 in a lower portion of interior 11. Termination panel 80 separates drop cable box 60 from feeder cable boxes 70. In one preferred embodiment, termination panel 80 is mounted to drop cable box 60 as will be described below. Termination panel 80 holds fiber optic adapters 82 which allow connection of two fiber optic connectors which connect fibers of the loop cables 14 to fibers of the drop cables 12. A cable

management pathway 90 assists with cable management for fibers extending from the feeder cable boxes 70 up to termination panel 80. In the preferred embodiment, enclosure 10 also includes a parking feature 100 for holding unused feeder cable fibers not yet ready for connection to termination panel 80.

5 Referring additionally to FIGS. 9-20, each loop cable 14 enters enclosure 10 and forms a cable loop 102. Fibers desired for use in enclosure 10 form a splice input 104 for splicing to a splitter input 106. Pigtail fibers 108 extend from the splitters 180 and are terminated with connectors 110.

Each drop cable 12 has a splice input 120 which is spliced to a pigtail output 122 terminated by a connector 110. Connectors 110 connect to each other through adapters 82 at termination panel 80.

Each feeder cable box 70 is separately mountable in feeder cable region 38. In one embodiment, enclosure 10 can be initially installed with one feeder cable box. Additional feeder cable boxes can be added later. As shown, enclosure 10 receives three
15 feeder cable boxes. Enclosure 10 can be configured to support fewer or greater than three feeder cable boxes 70. Each feeder cable box 70 includes a chassis 150 and a cover or door 152. Door 152 is hinged to chassis 150 about a vertical hinge 154. A lock 156 provides selective access to an interior of feeder cable box 70. Door 152 is stepped at a step 160 which supports a parking area 162 for unused connectorized cables.

20 Feeder cable box 70 further includes splice trays 164 which are positioned within an interior of chassis 150 and are hinged at a hinge 166 oriented horizontally. Splice trays 164 pivot upwardly in the closed position so that they are parallel to rear 32 of enclosure 10, during normal usage. To access storage trays 164, door 152 is opened, and splice trays 164 are pivoted downwardly. A strap 168 holds splice trays in the closed
25 position. Each feeder cable box 70 defines a loop cable pathway 170 generally around the inner periphery of chassis 150. Loop cable pathway 170 includes a plurality of loop management features 174, such as tabs or other elements or clips for organizing cables. . Each loop cable port 44 includes at least two loop cable access openings 176. As shown, three openings 176 are provided, such as for adding a repair cable. The middle access
30 opening 176 would be used for the repair cable or other connections.

Each feeder cable box 70 includes one or more splitters 180. Splitters 180 are positioned between splice trays 164 and a rear 186 of chassis 150. A strap 182 mounts splitters 180 to rear 186. Strap 182 allows selective removal of splitters 180, as desired. Splitters 180 are positioned in area 184 which is within the loop cable pathway 170. Each
5 feeder cable box 70 has a compact cable management arrangement when door 152 is closed. With door 152 closed, unused splitter pigtails 108 can be stored in a loop in area 158 on door 152. This storage loop does not need to be removed if door 152 needs to be opened. A splitter box 188 can also be used to mount the splitters 180 to the feeder cable box with fasteners.

10 Drop cable box 60 is formed by portions of chassis 20, and a cover or door 200. Hinge 202 allows for door 200 to pivot downwardly. Hinge 202 is located adjacent rear 32 of chassis 20. A lock 204 provides selective access to the area behind door 200. Disposed behind door 200 in drop cable box 60 are various cable management features 208 to assist with cable management. Splice trays 212 are mounted within drop cable box 60
15 and are hingedly mounted about a hinge 214 which extends horizontally when door 200 is open, and transversely to rear 32. A strap 216 holds splice trays 212 in the closed position. A frame 218 is mounted to door 200 and defines the termination area. Frame 218 includes a panel 220 which holds the adapters 82. A further frame 224 supports splice trays 212. Door 200 is stepped at a stepped area 230 to allow room for the feeder cable terminations.
20 As shown, cable management pathway 90 includes cable management features 250 for organizing the feeder cables extending toward termination panel 80.

During use, enclosure 10 can allow for multi-operator functionality. Each feeder cable box 70 can be dedicated for a different operator in which the operator can install a looped cable, splice the looped cable towards the input of one or more splitter
25 modules, such as up to four as shown (or more or less), and connect the connectorized outputs of the splitter modules into termination panel 80. This termination panel 80 is used by all of the different operators. At the opposite side of termination panel 80, the pigtails are spliced toward the drop cables which will serve the customers or other enclosures.

The first operator will install enclosure 10 and will splice the entire back of
30 termination panel 80 to the drop cables and will install one feeder cable box 70 with

splitters and connect to the front of termination panel 80 for drop cables that need connection. For those drop cables that do not need connection, the feeder cables will be stored in parking 100.

5 A second or third operator can come in and install additional operator boxes 70 in enclosure 10 and splice the looped cables to splitters. The connectors of the pigtails from the splitters can be connected to termination panel 80 to connect to additional drop cables, or earlier connections made to the drop cables can be removed, and new connections made from the new operator.

10 Various advantages are noticed with the feeder cable boxes including storing the splitter modules inside the cable loop. A further advantage is that the splitter modules are removable to have improved access to the cable loop during installation, and later cable management. The doors to the feeder cable boxes are hinged on the vertical side so a wrap around installation can be provided for the pigtails from the splitter modules. The outputs from the feeder cable boxes are organized upon exiting the feeder
15 cable boxes and connection to termination panel 80. A further advantage is that the drop cable splicing is easily accessible when door 200 is horizontally pivoted open. Also, drop cables 12 are positioned at a side of the box, separate from the feeder cables 14 which enter at the bottom.

Parts List

10	enclosure
12	drop cables
14	feeder cables
20	chassis
24	side
26	side
28	side
30	side
32	rear
22	cover
34	hinge
36	cover support
40	drop cable ports
42	clamps
44	loop cable ports
46	clamps
48	mounting tabs
50	lock for cover
52	perimeter seal
60	drop cable box
70	feeder cable boxes
80	termination panel
82	adapters
90	cable management pathway
100	parking
102	loop cable
106	splitter input

104	splice input
108	pigtails
110	connectors
120	splice input
122	pigtails
150	chassis
152	door
154	hinge
156	lock
158	area
160	step
162	parking area
164	splice trays
166	hinge
168	strap
170	loop cable pathway
174	loop management features
176	loop cable access openings
180	splitters
182	strap
184	area inside of loop
186	rear
188	splitter box
200	door
202	hinge
204	lock
208	cable management features
212	splice trays
214	hinge
216	strap
218	frame for terminators

- 220 panel
- 224 frame for splice trays
- 230 stepped door
- 250 cable management features

CLAIMS:

1. A telecommunications enclosure (10) comprising:
a chassis (20) including a movable cover (22);
a drop cable port (40);
a feeder cable port (44);
the chassis (20) defining an interior (11) having a drop cable box (60) with a movable cover (200);
a termination panel (80);
a plurality of feeder cable regions (38), wherein at least one feeder cable box (70) is positioned in one of the feeder cable regions, the feeder cable box including a movable door (152).
2. The enclosure of claim 1, further comprising connector parking (100) on the door (152) of the feeder box (70).
3. The enclosure of claims 1 and 2, wherein the termination panel (80) is mounted on the movable door (200) of the drop cable box (60).
4. The enclosure of claims 1-3, further comprising a plurality of splice trays (164) in the drop cable box (60).
5. The enclosure of claims 1-4, further comprising a plurality of splice trays (164) in the feeder box (70).
6. The enclosure of claims 1-5, further comprising a plurality of splitters (180) in the feeder cable box (70).

7. The enclosure of claim 6, wherein the splitters (180) are disposed in an interior area of a loop cable pathway (170) defined in the feeder cable box (70).
8. The enclosure of claims 1-7, further comprising a plurality of feeder cable boxes (70).
9. The enclosure of claim 8, wherein three feeder cable boxes (70) are provided.
10. The enclosure of claims 1-9, wherein the drop cable box (60) is positioned in an upper area of enclosure (10) and the feeder cable box or boxes (70) are positioned in a lower portion of the enclosure (10).
11. The enclosure of claims 1-10, further comprising a cable management pathway (90) positioned between the drop cable box (60) and the feeder cable box or boxes (70), wherein the cable pathway (90) extends horizontally.
12. The enclosure of claims 1-11, further comprising a cable storage area (158) on a front of the door (152) of the feeder box (70).
13. The enclosure of claim 12, wherein the cable storage area (158) allows the door (152) to pivot open without removing the stored cables.

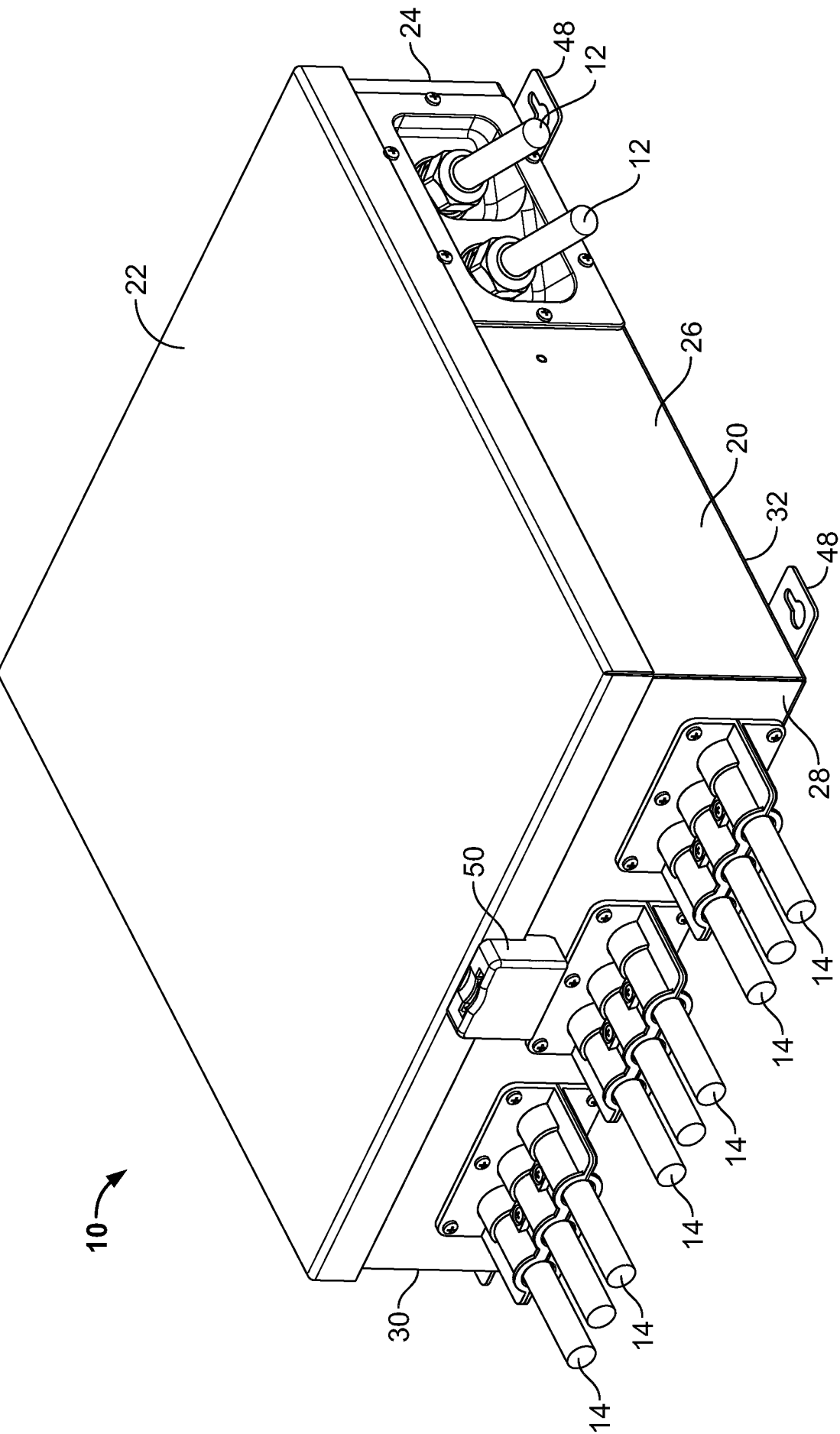


FIG. 1

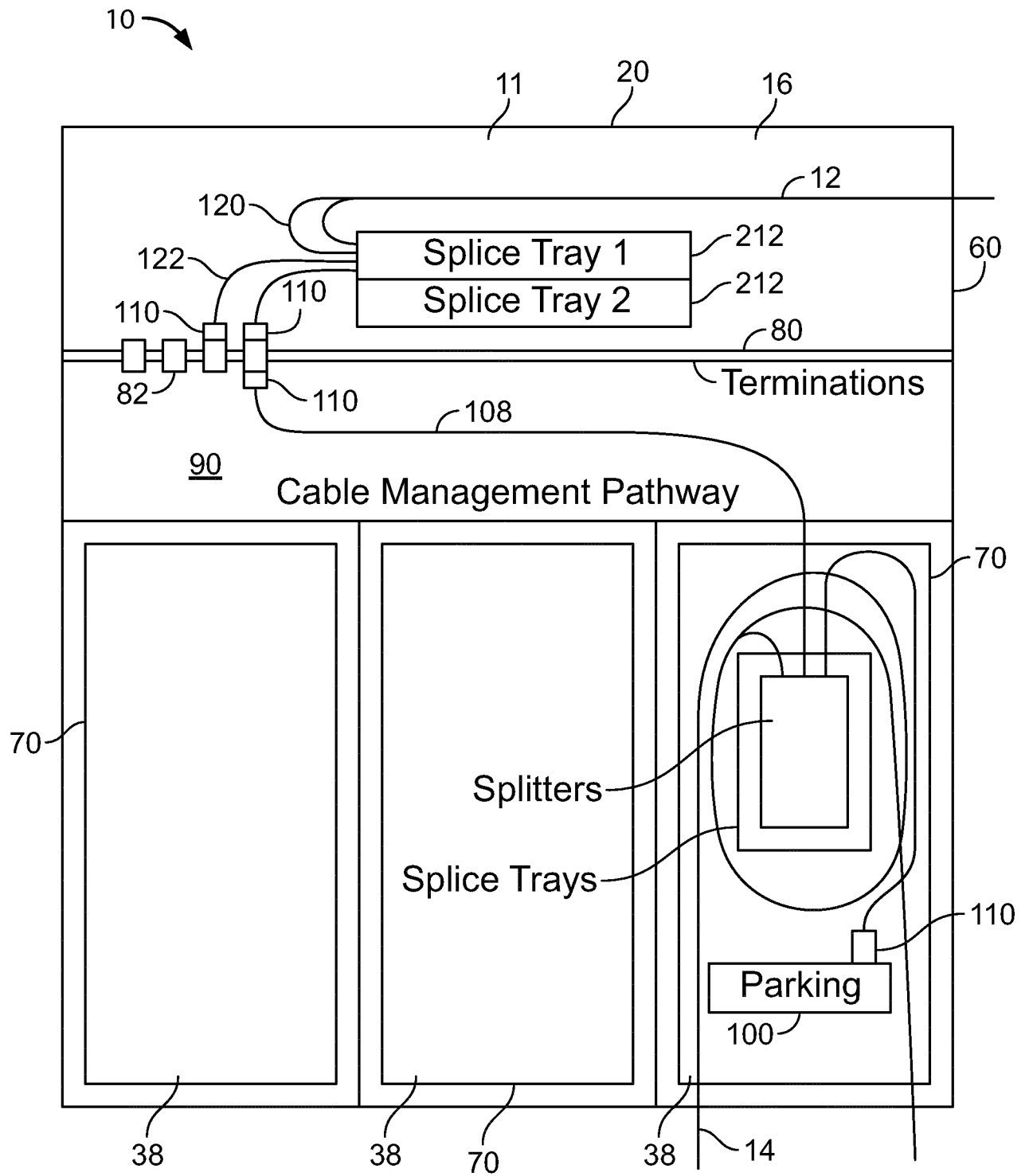


FIG. 1A

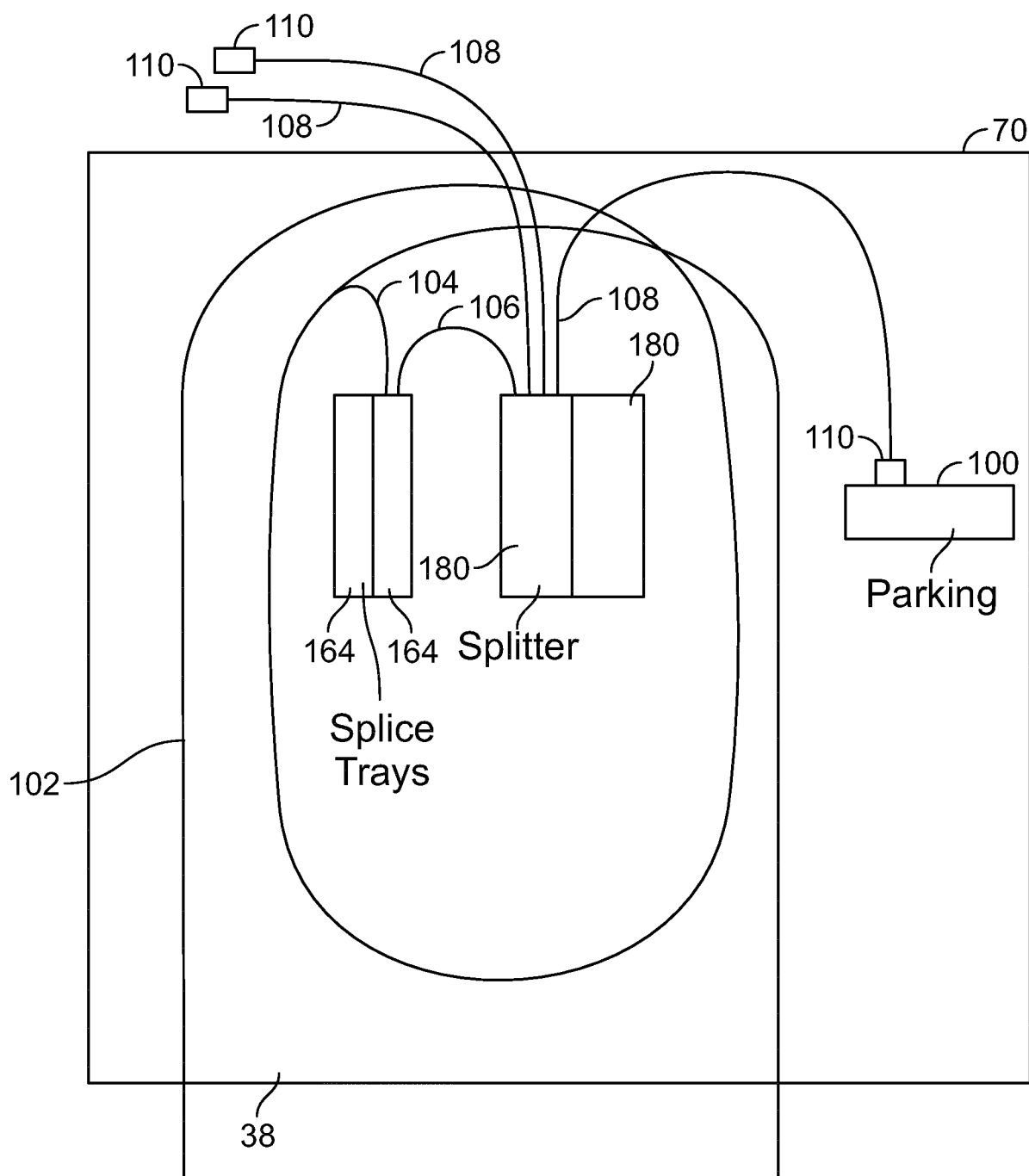


FIG. 1B

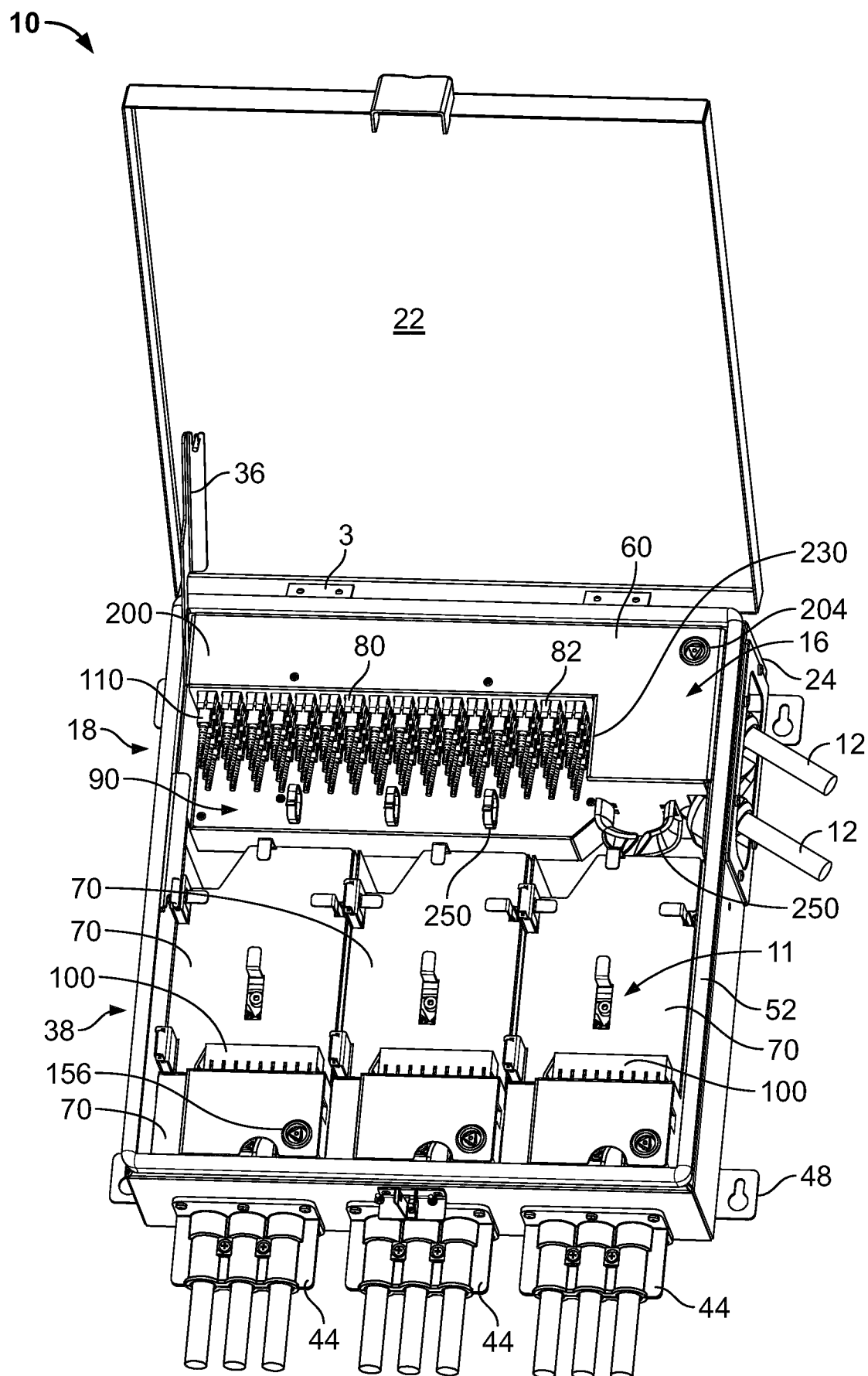


FIG. 2

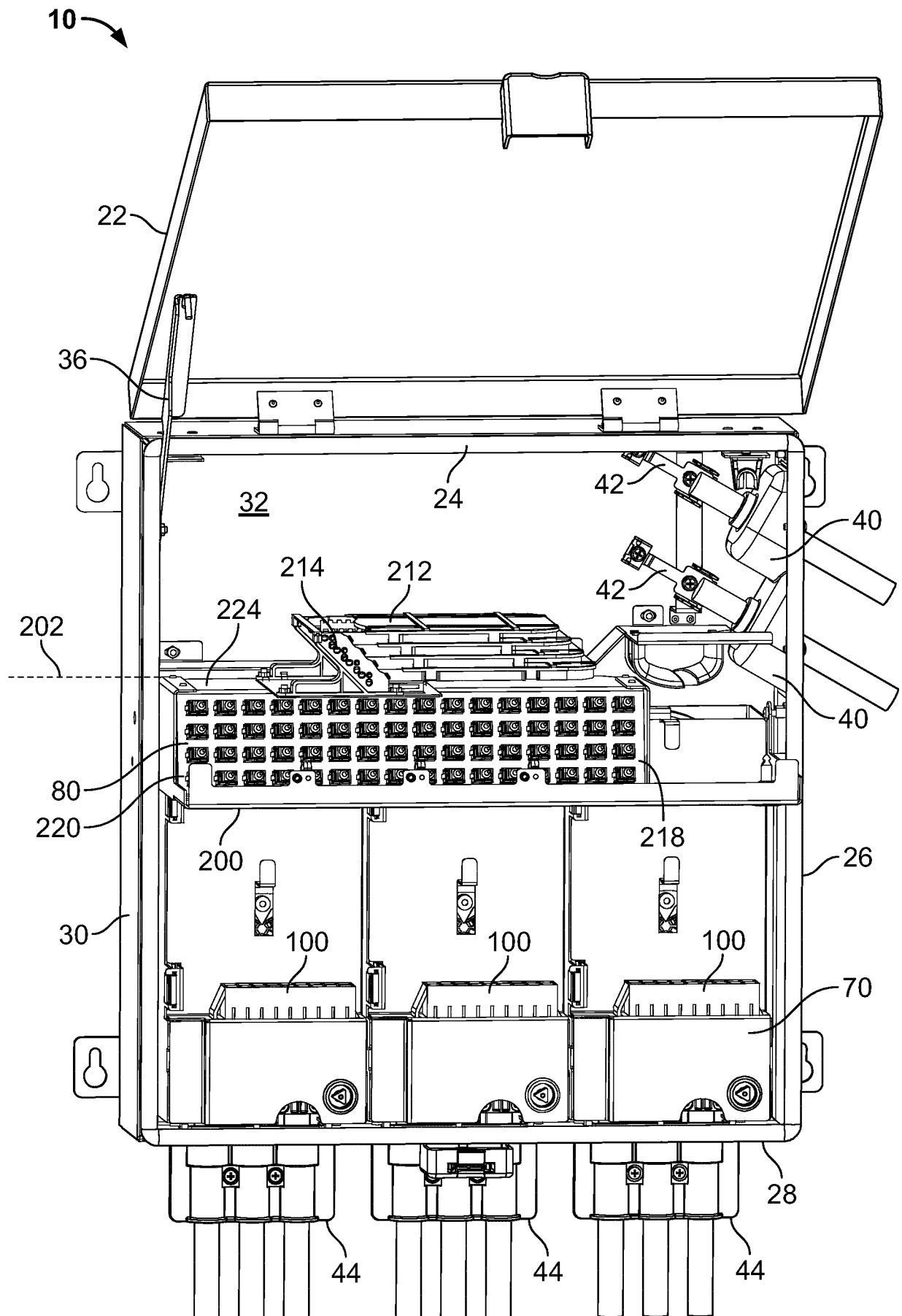


FIG. 3

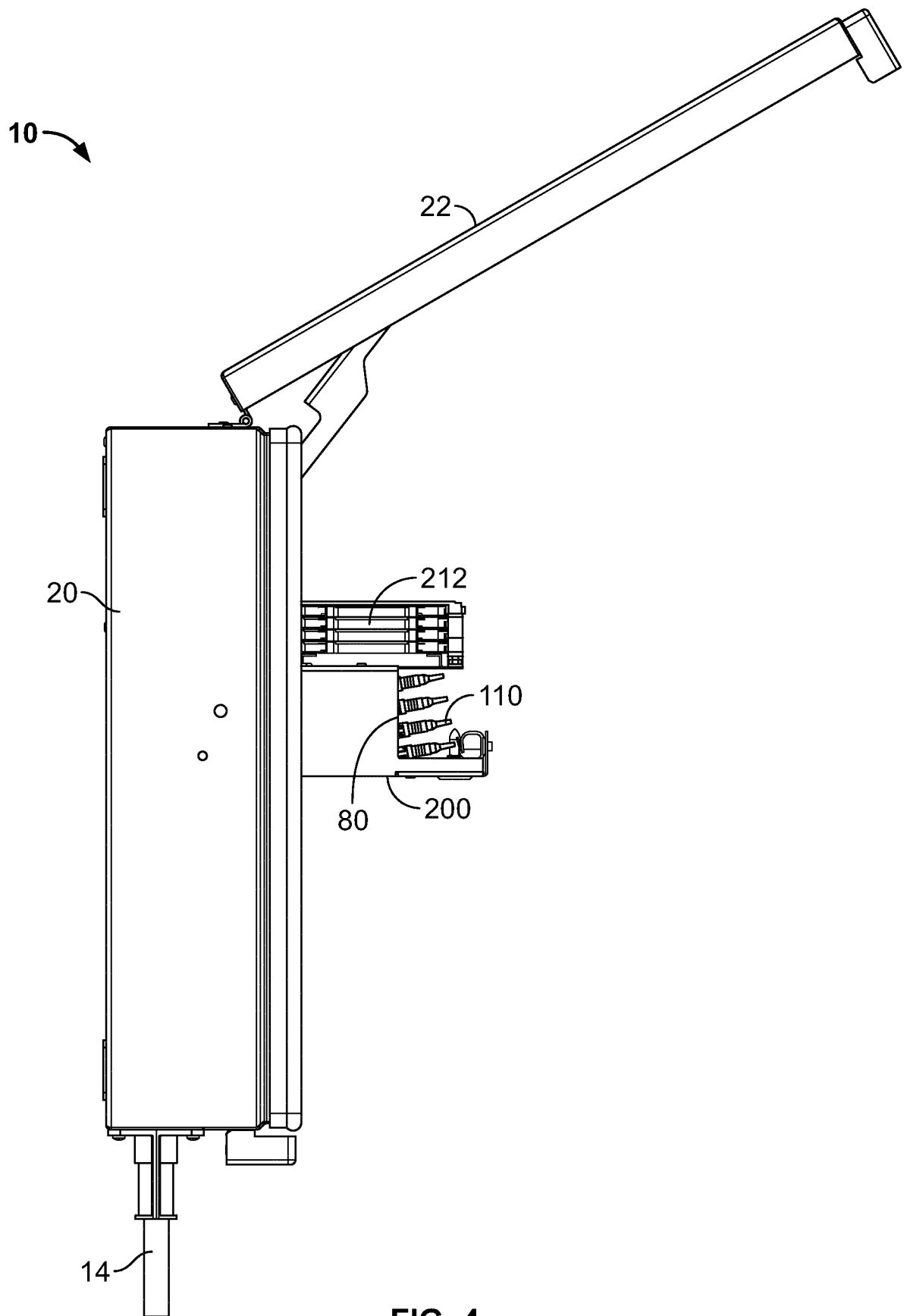


FIG. 4

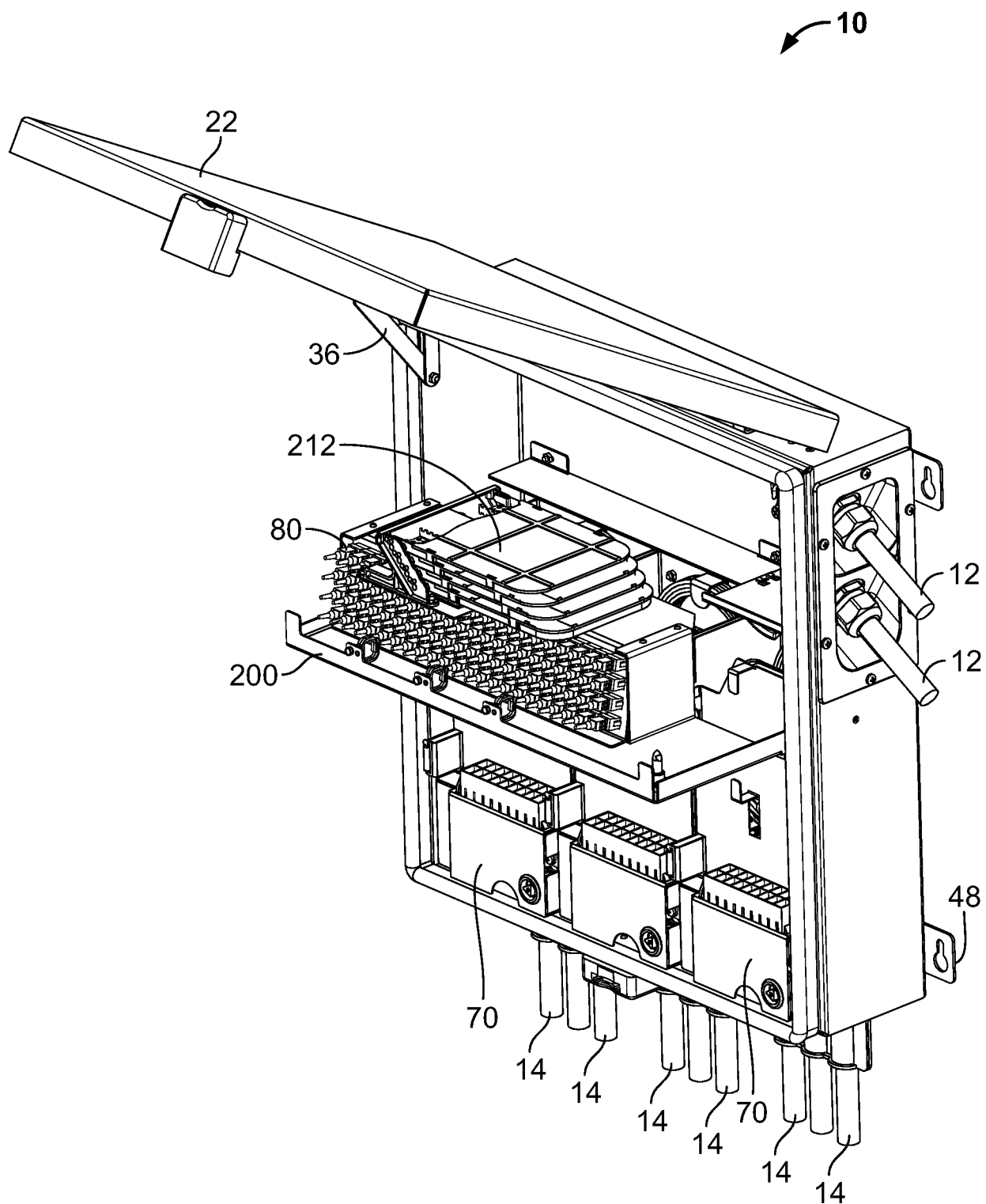


FIG. 5

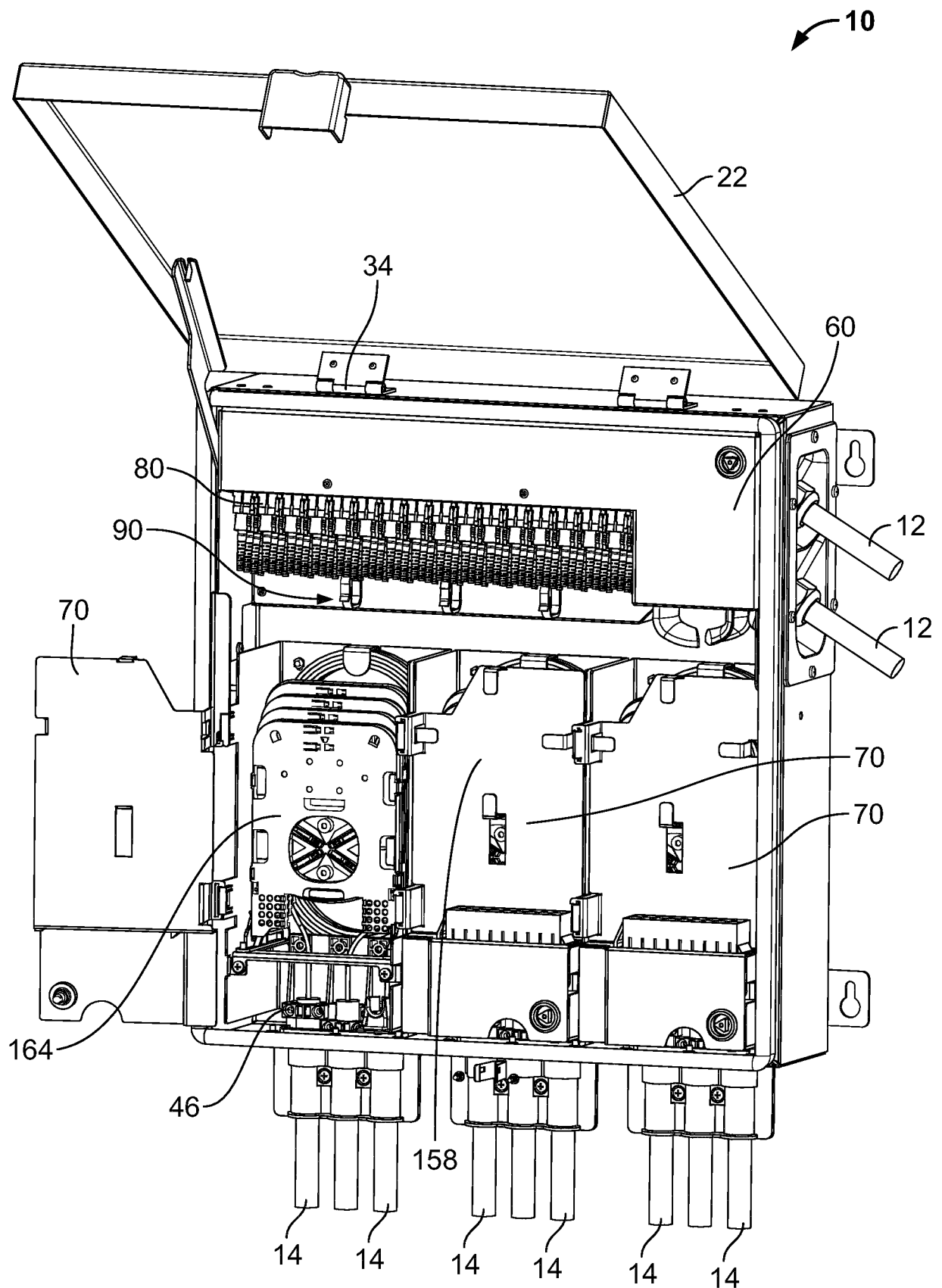


FIG. 6

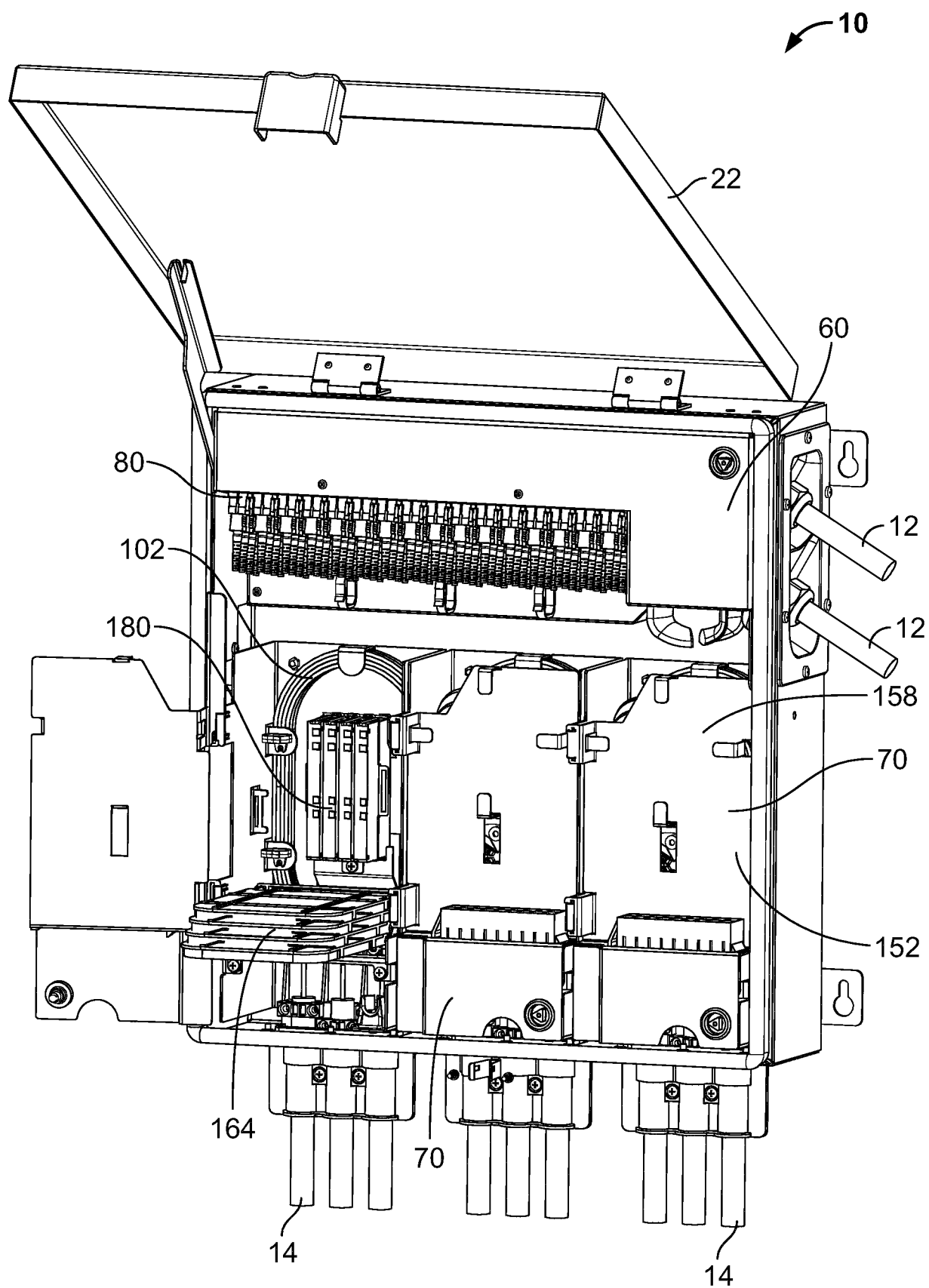


FIG. 7

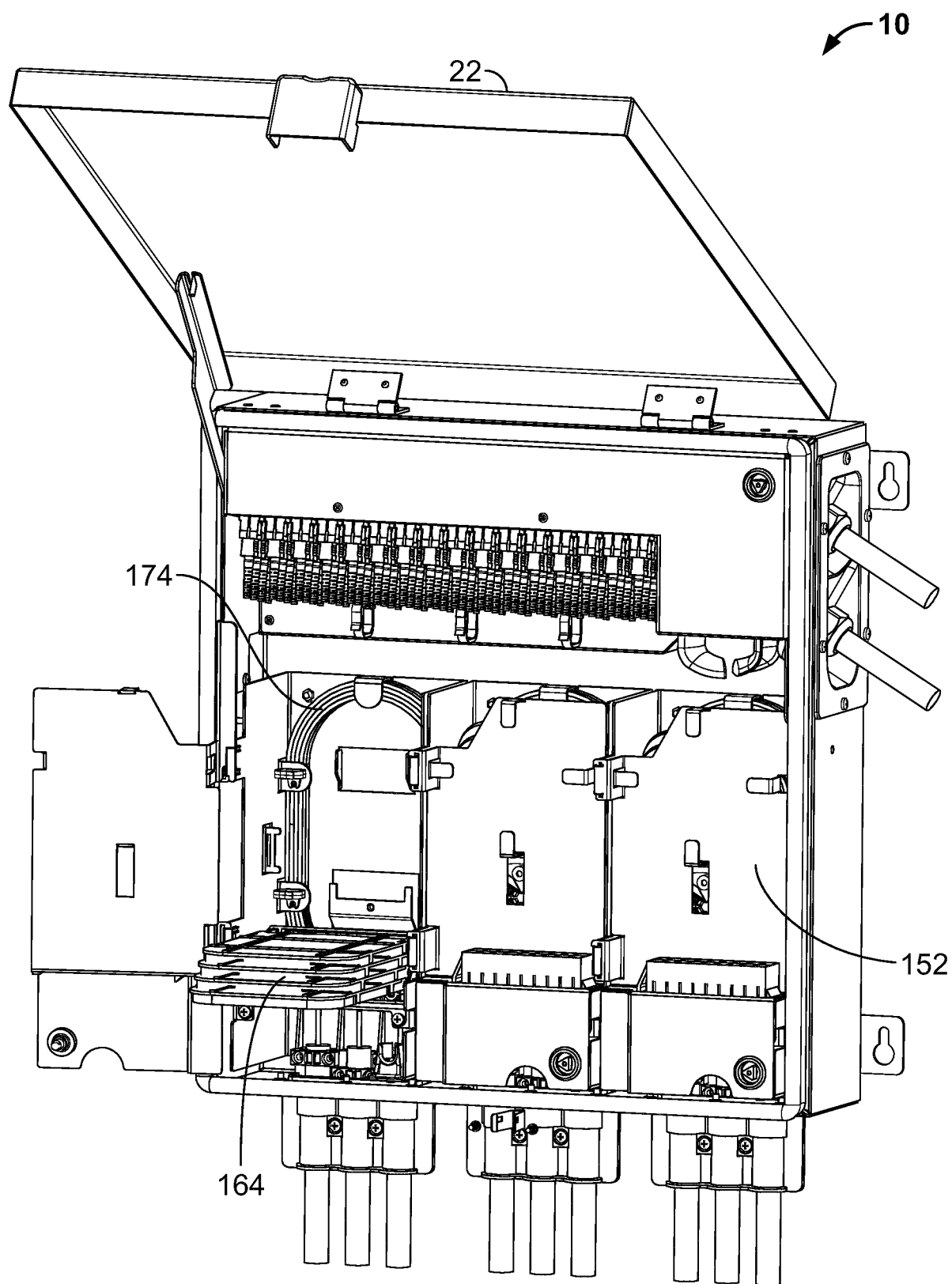


FIG. 8

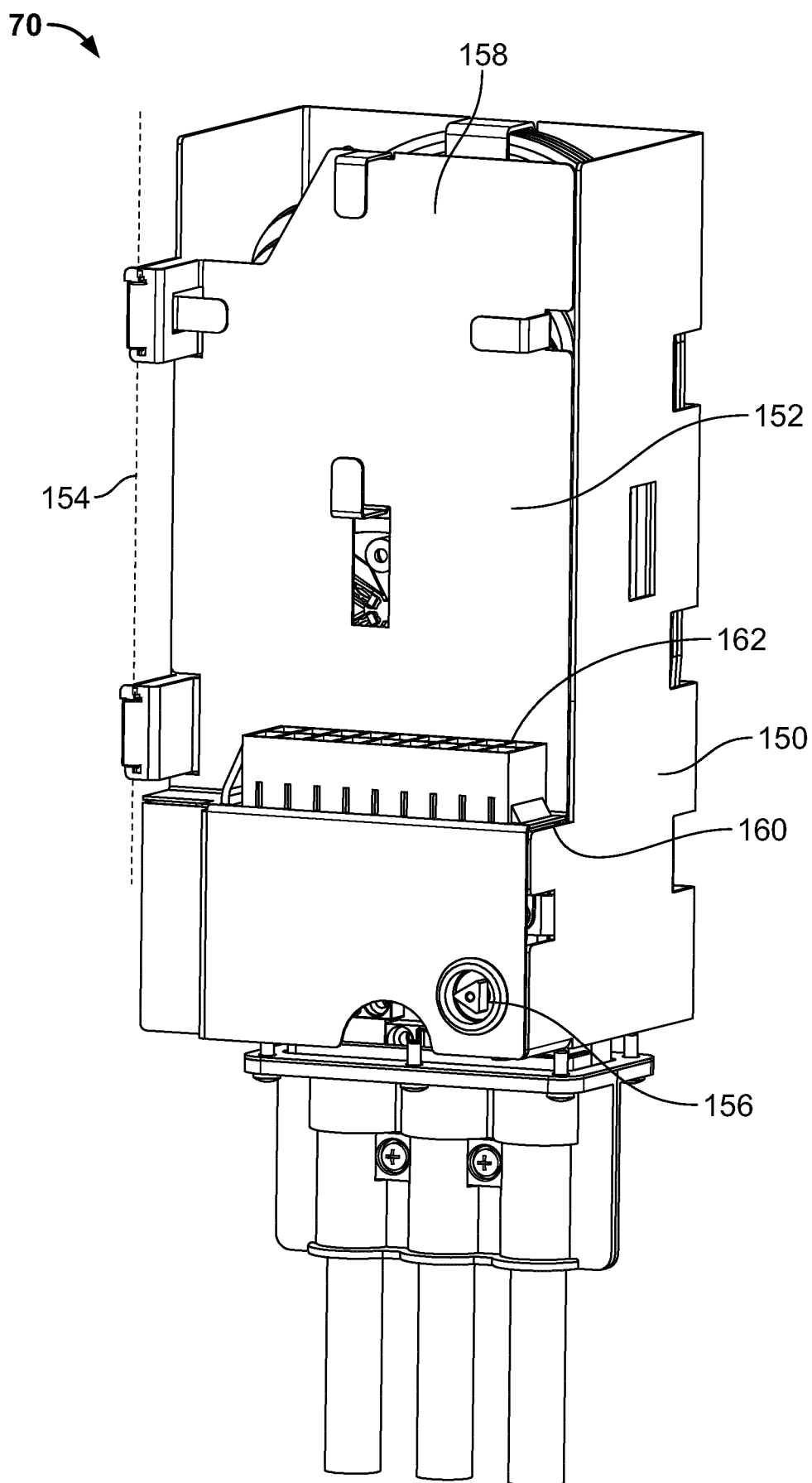


FIG. 9

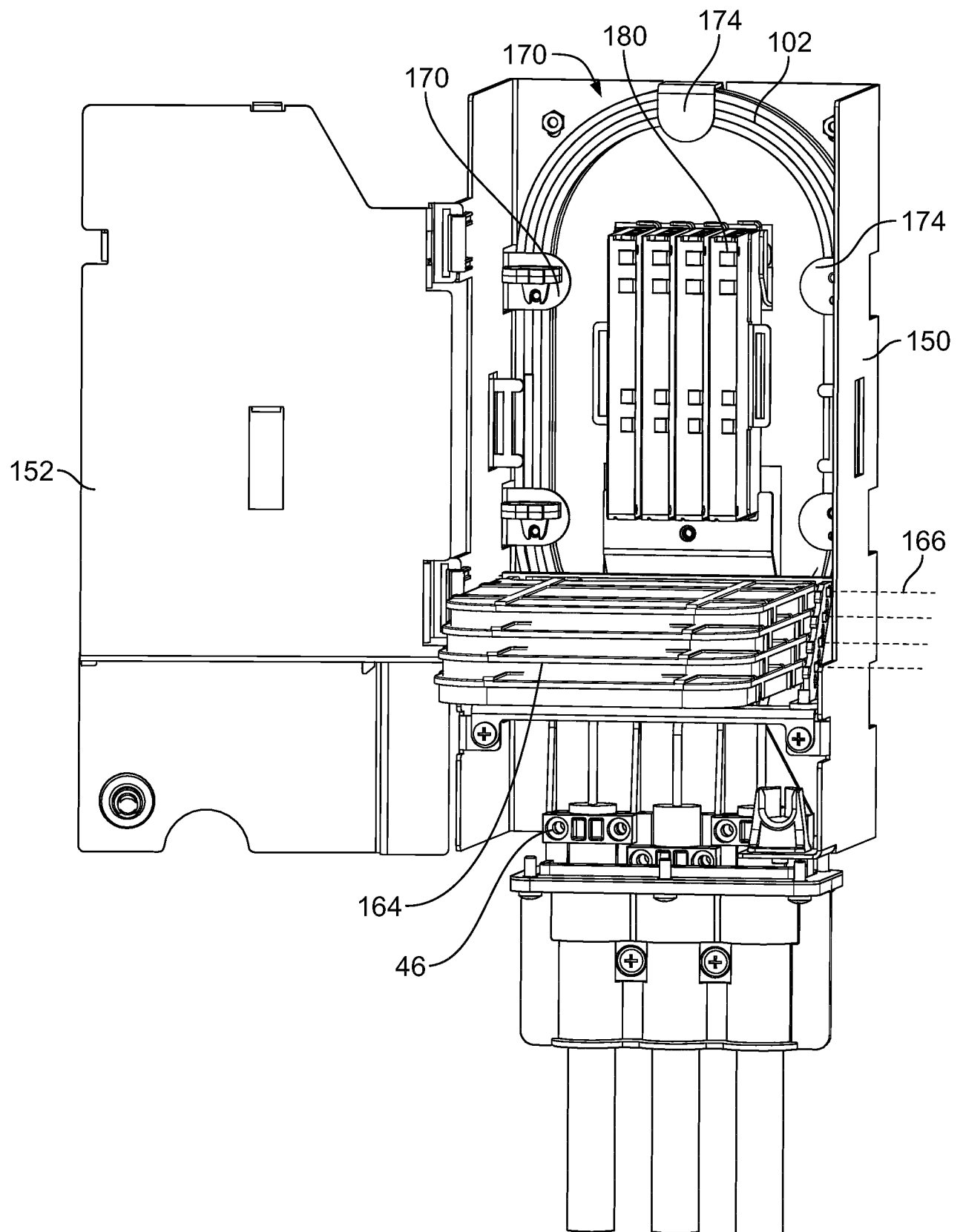


FIG. 10

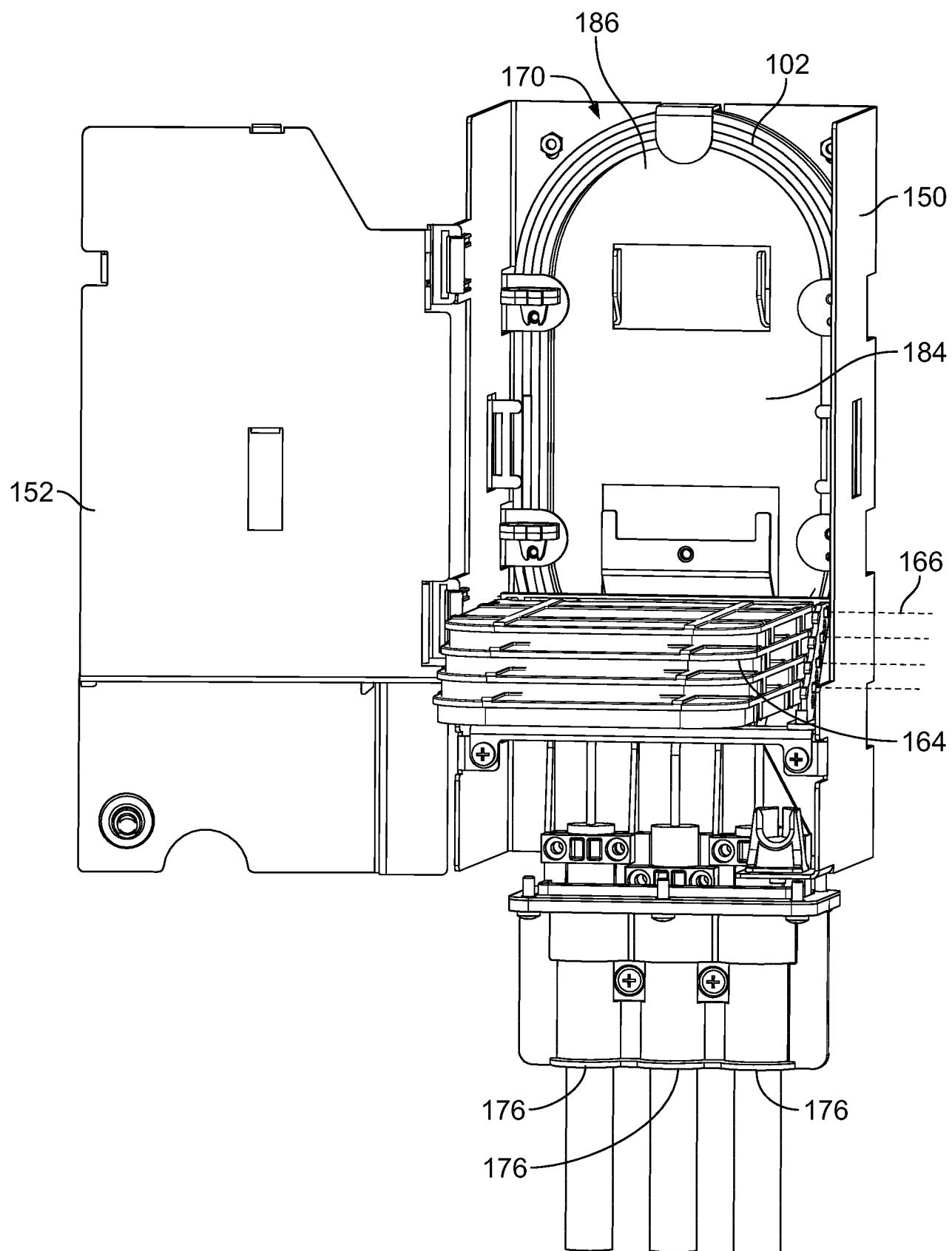
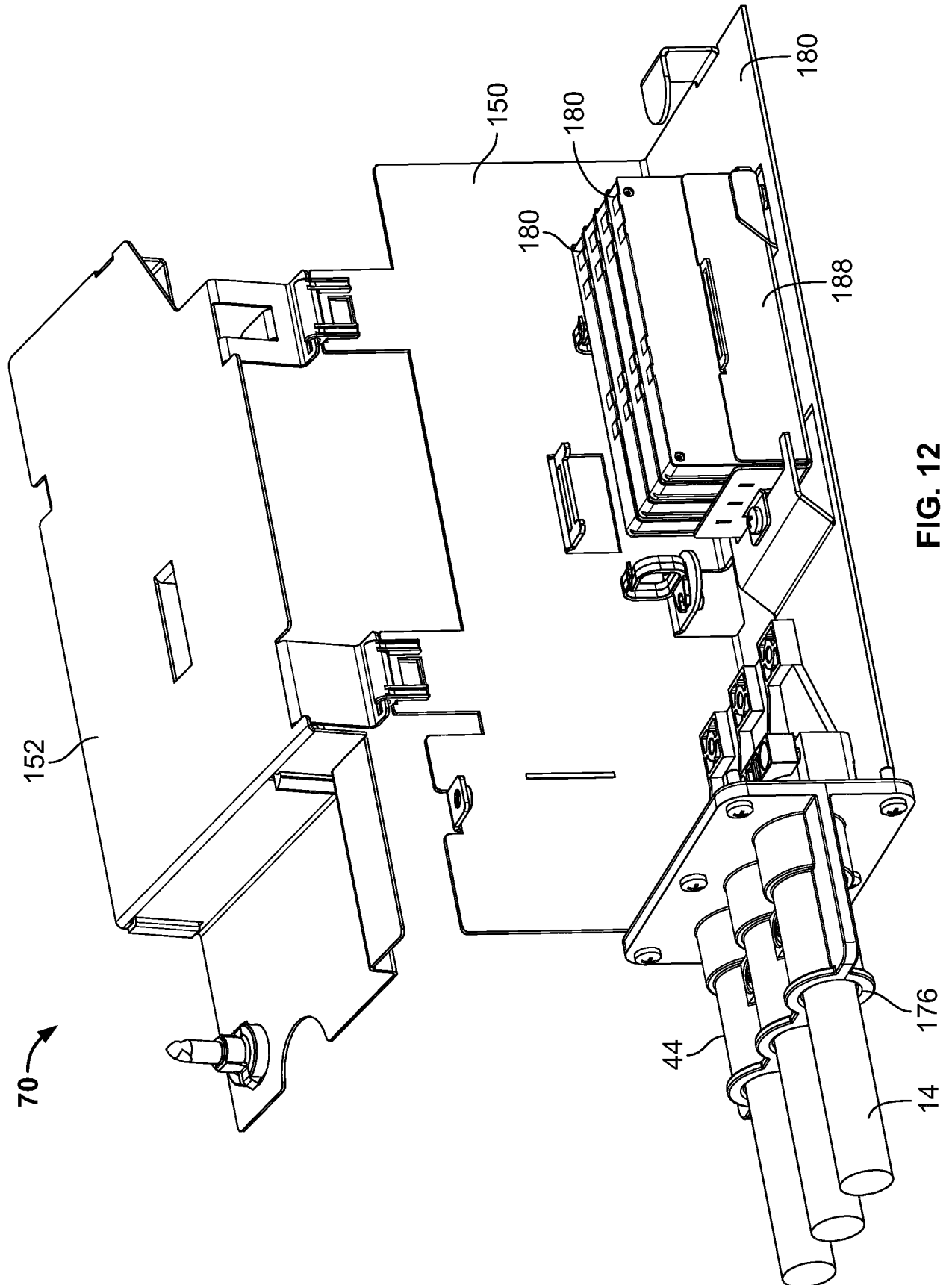


FIG. 11



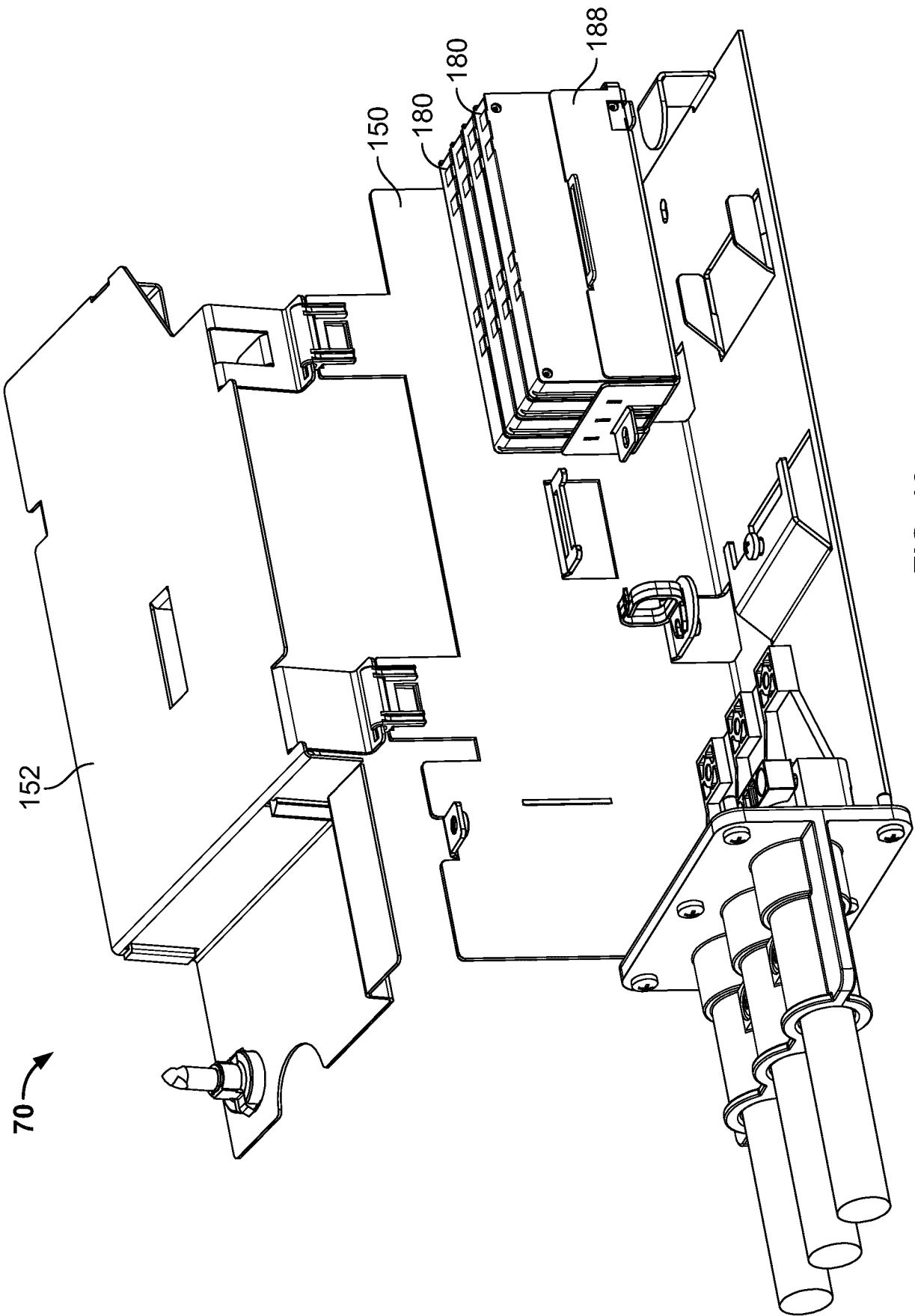


FIG. 13

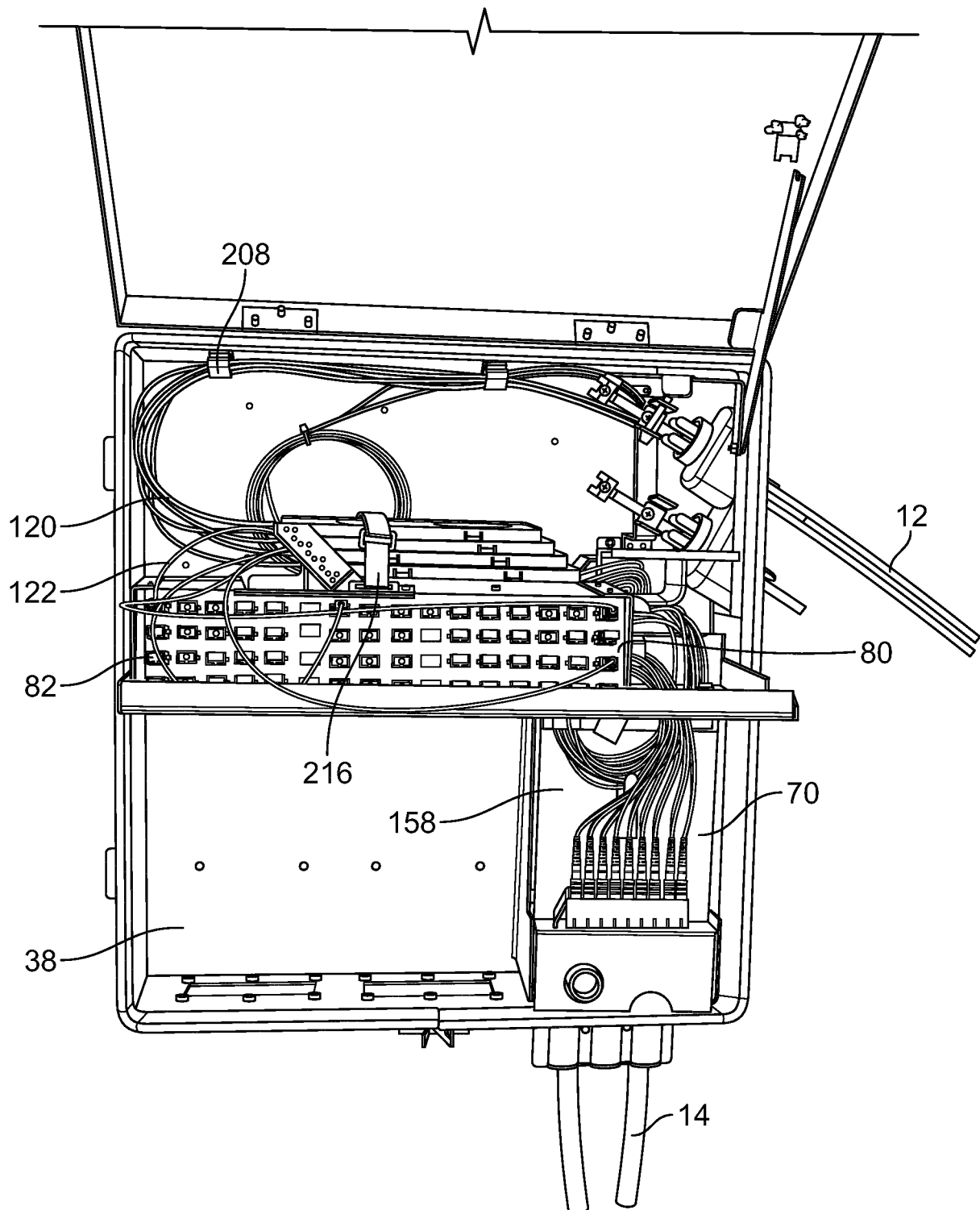


FIG. 14

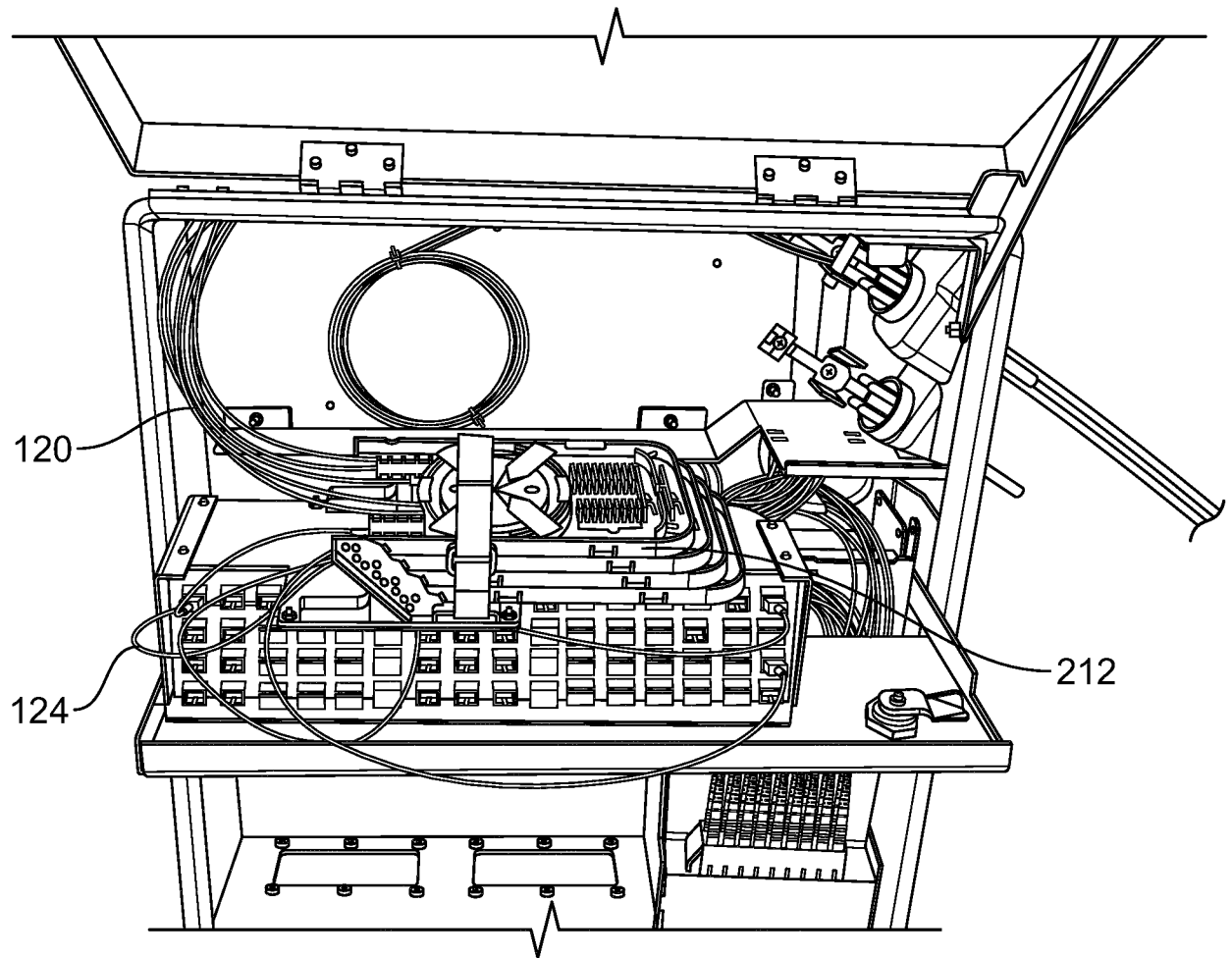


FIG. 15

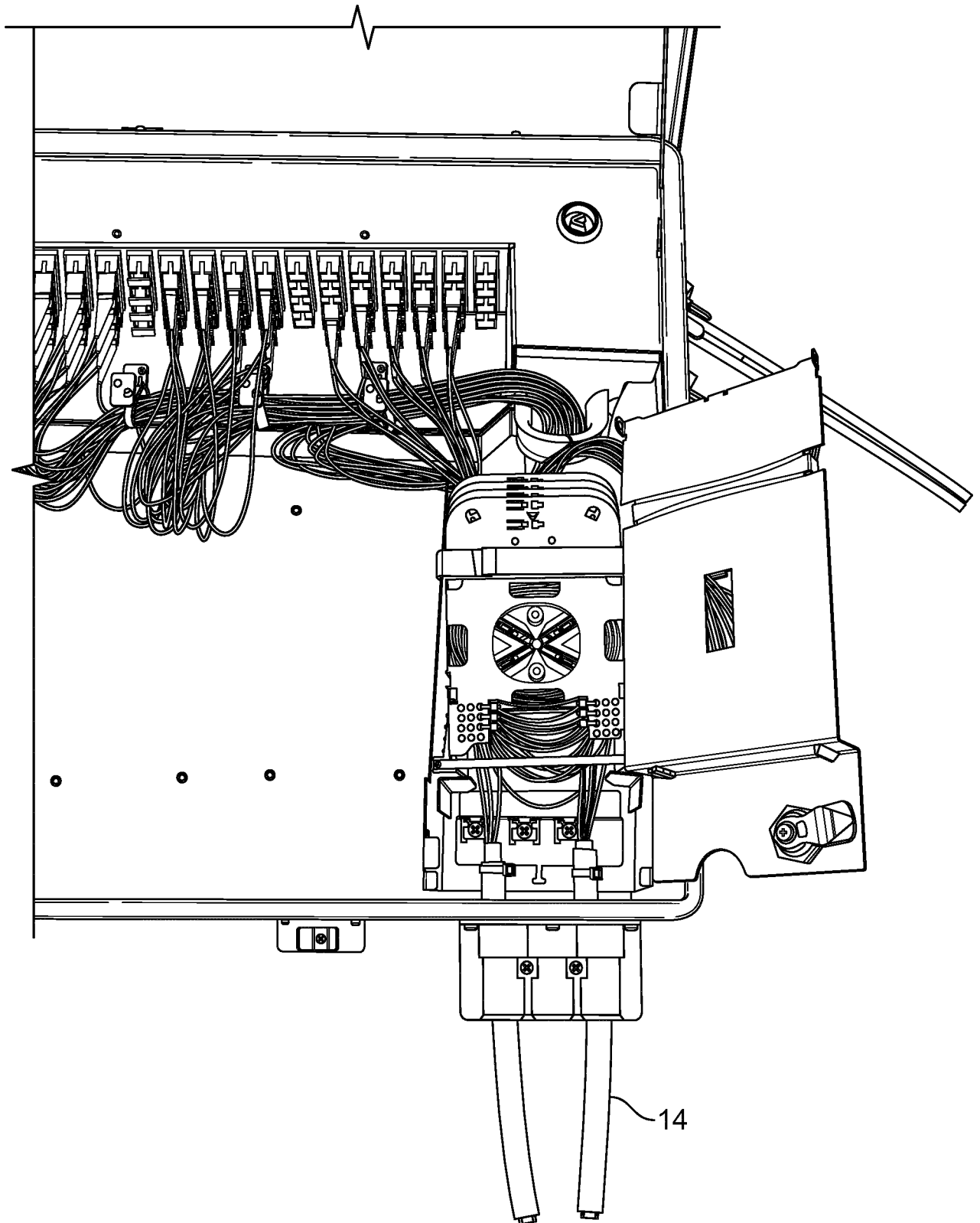


FIG. 16

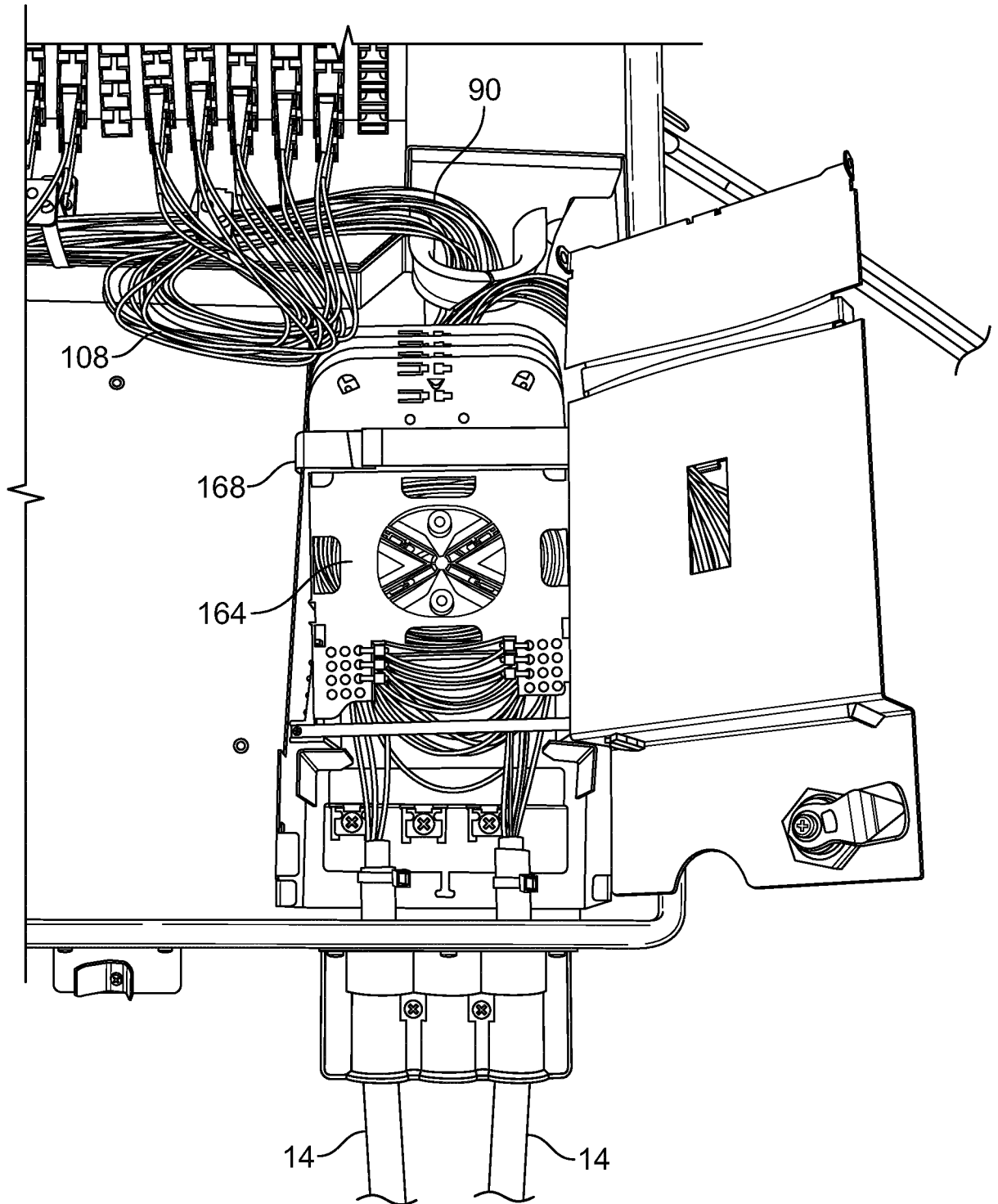


FIG. 17

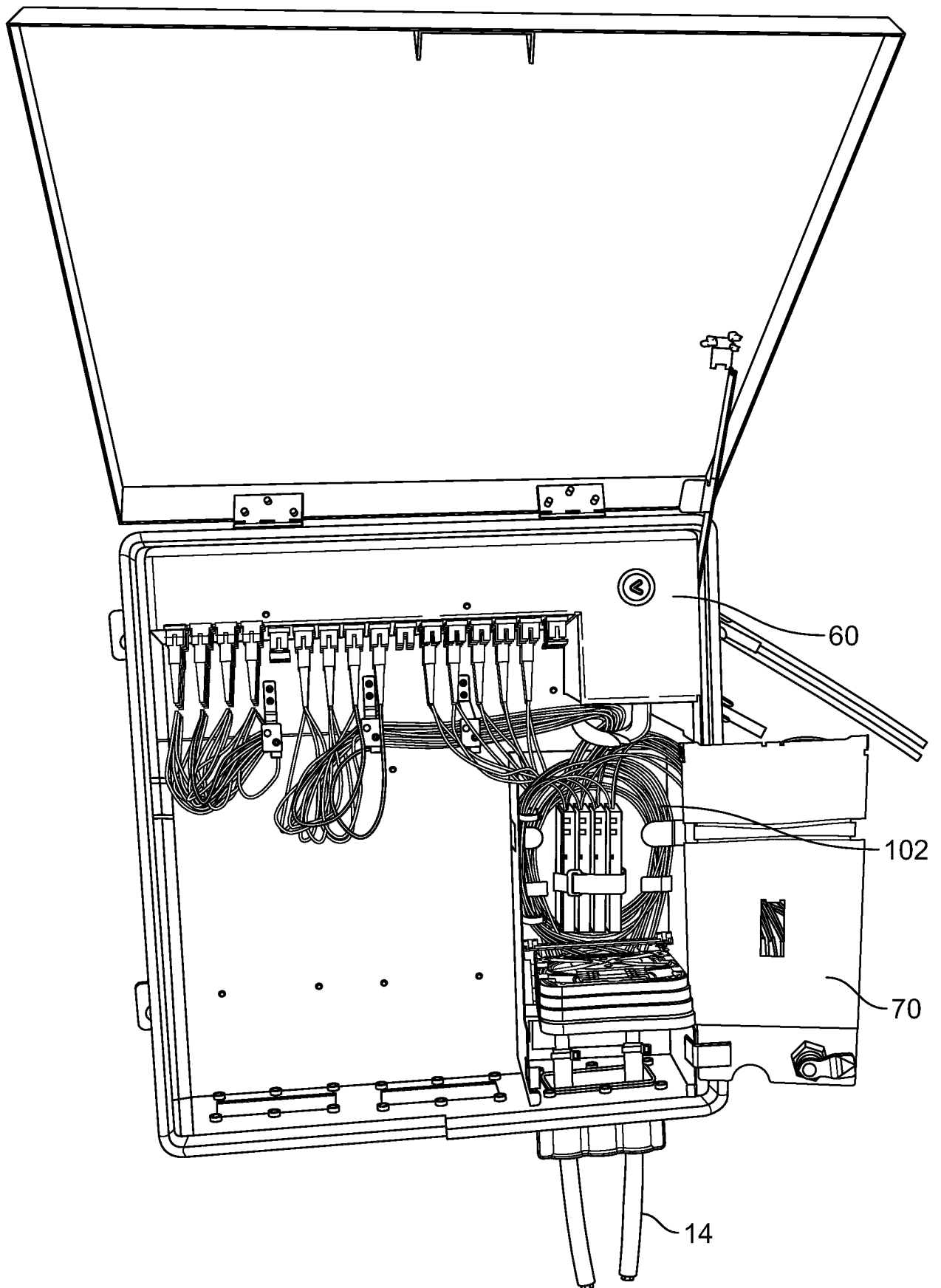


FIG. 18

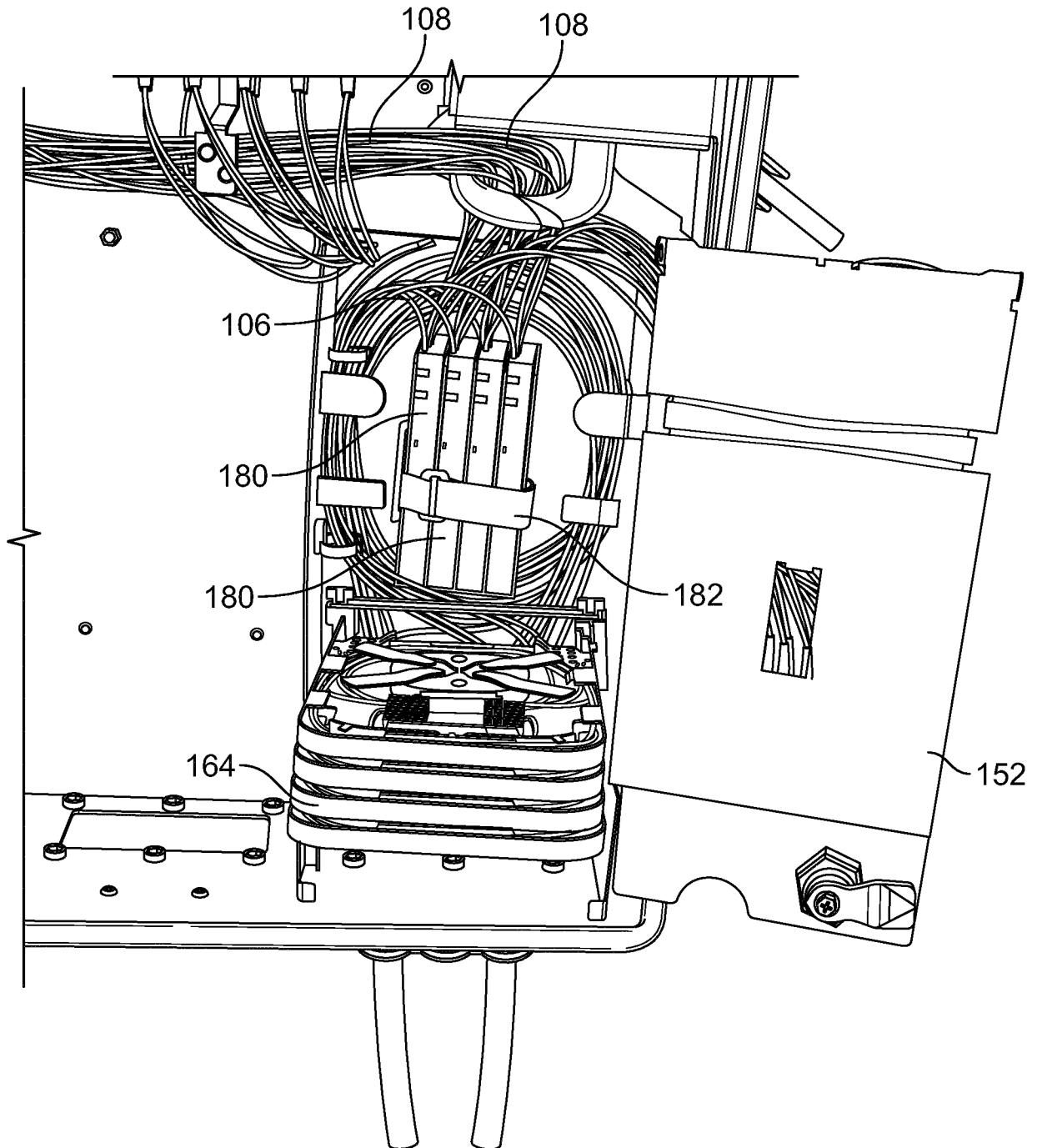


FIG. 19

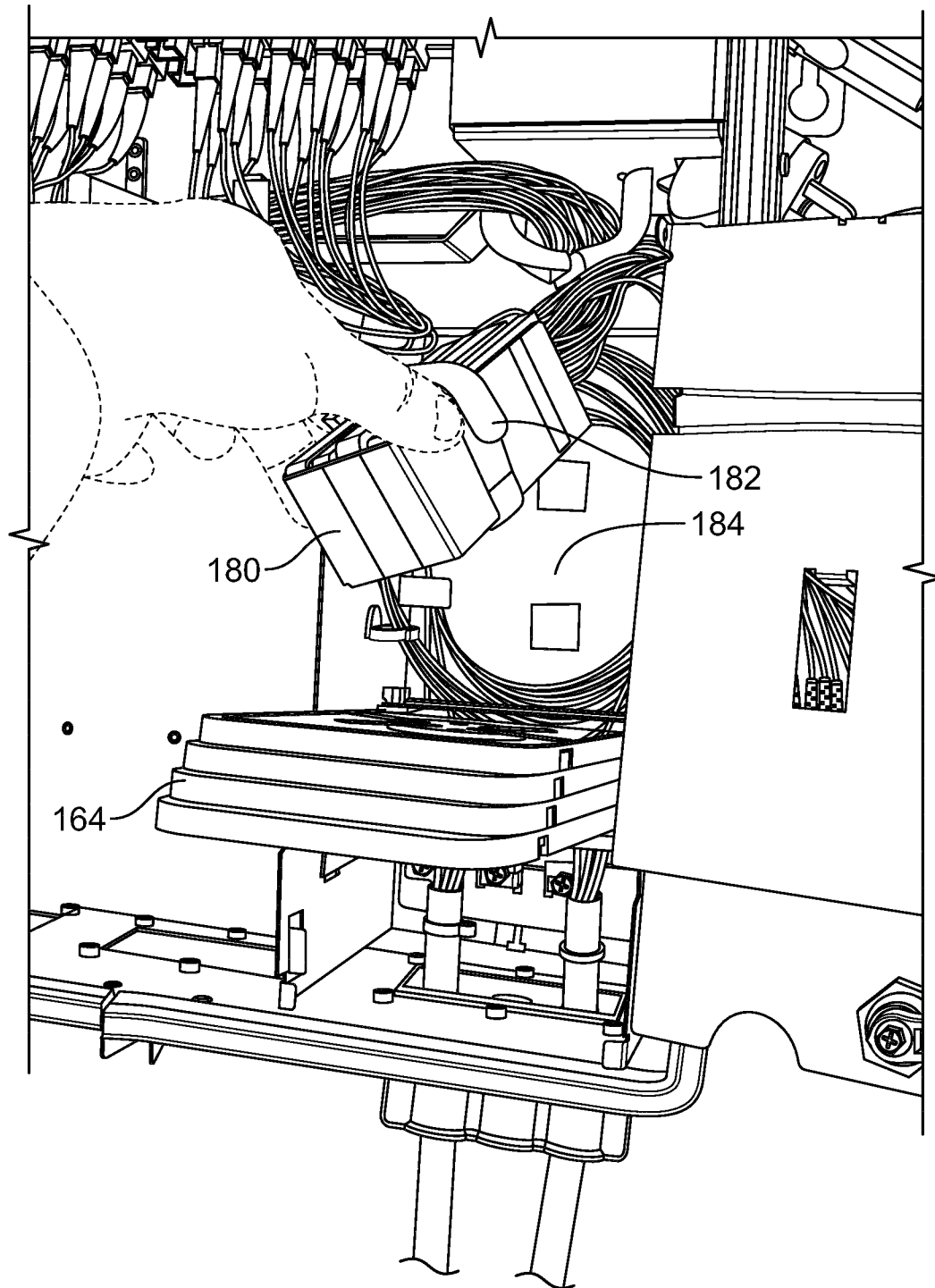


FIG. 20

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/074779

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04Q1/02

ADD.

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)

H04Q H05K H02G G02B H01R H04M

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

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

EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	wo 2010/062626 AI (CORNING CABLE SYS LLC [US] ; CONNER MARK E [US] ; GI RAUD WI LLIAM J [US] ;) 3 June 2010 (2010-06-03) paragraph [0053] - paragraph [0054] paragraph [0071] - paragraph [0072] figures 1, 3, 10 -----	1-13
Y	EP 1 944 886 AI (FURUKAWA ELECTRIC NORTH AM INC [US]) 16 July 2008 (2008-07-16) paragraph [0007] -----	1-13



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

6 March 2013

Date of mailing of the international search report

14/03/2013

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INTERNATIONAL SEARCH REPORT

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International application No

PCT/EP2012/074779

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