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(54) **FIBER OPTIC ENCLOSURE WITH INTERNAL CABLE SPOOL**

GLASFASERGEHÄUSE MIT INTERNER KABELSPULE

ENCEINTE DE FIBRE OPTIQUE À ENROULEUR DE CÂBLE EXTERNE

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Description

Cross-Reference to Related Application

Technical Field

[0001] The present disclosure relates to fiber optic enclosure, and more particularly, to a fiber optic enclosure with cable payout.

Background

[0002] As demand for telecommunications increases, fiber optic networks are being extended in more and more areas. In facilities such as multiple dwelling units, apartments, condominiums, businesses, etc., fiber optic enclosures are used to provide a subscriber access point to the fiber optic network. These fiber optic enclosures are connected to the fiber optic network through subscriber cables connected to a network hub. However, the length of subscriber cable needed between the fiber optic enclosure and the network hub varies depending upon the location of the fiber optic enclosure with respect to the network hub. As a result, there is a need for a fiber optic enclosure that can effectively manage varying lengths of subscriber cable.

DESCRIPTION

[0003] One prior art approach is disclosed in US 6 220 413, which shows a cable storage device which has a reel rotatably mounted in a frame. A connector panel for connecting fiber optic cables fits on the reel for rotation with the reel. When lines leading to an equipment are to be connected to the connector panel, the connector panel is moved to a docking station on the reel.

SUMMARY

[0004] The present invention provides a fiber optic enclosure assembly for enclosing optical fiber connections according to independent claim 1. Further, the present invention provides a method of paying out a fiber optic cable from a fiber optic enclosure according to independent claim 8. Further advantageous embodiments of the invention may be realised according to the corresponding dependent claims.

[0005] An exemplary device of the present disclosure relates to a fiber optic enclosure assembly for enclosing optical fiber connections. The fiber optic enclosure assembly includes a housing having an interior region and a bearing mount disposed in the interior region of the housing. A cable spool is connectedly engaged with the bearing mount such that the cable spool selectively rotates within the housing. A termination module is disposed on the cable spool so that the termination module rotates in unison with the cable spool.

[0006] An exemplary method of the present disclosure relates to a method of paying out a fiber optic cable from a fiber optic enclosure. The method includes rotating a cable spool, which has a subscriber cable coiled around a spooling portion of the cable spool, about an axis of a housing of the fiber optic enclosure until a desired length of subscriber cable is paid out. The cable spool is disposed in an interior region of the fiber optic enclosure and a termination module is disposed on the cable spool.

Description of the Drawings

[0007]

FIG. 1 is a schematic representation of a fiber optic network that includes a fiber optic enclosure having features that are examples of inventive aspects in accordance with the principles of the present disclosure.
FIG. 2 is an isometric view of the fiber optic enclosure of FIG. 1.
FIG. 3 is an isometric view of the fiber optic enclosure of FIG. 2 with a cover in an open position.
FIG. 4 is a front view of the fiber optic enclosure of FIG. 2 with the cover in the open position.
FIG. 5 is an exploded isometric view of the fiber optic enclosure of FIG. 2.
FIG. 6 is a perspective view of a fiber optic adapter suitable for use within the fiber optic enclosure of FIG. 2.
FIG. 7 is a cross-sectional view of the fiber optic adapter taken on line 7-7 of FIG. 6.
FIG. 8 is an isometric view of another embodiment of a fiber optic enclosure.
FIG. 9 is a front view of the fiber optic enclosure of FIG. 8.
FIG. 10 is a top view of the fiber optic enclosure of FIG. 8.
FIG. 11 is a side view of the fiber optic enclosure of FIG. 8.
FIG. 12 is an isometric view of the fiber optic enclosure of FIG. 8, showing cables entering and exiting the enclosure.
FIG. 13 is an isometric view of the fiber optic enclosure of FIG. 12 without the cover.
FIG. 14 is a front view of the fiber optic enclosure of FIG. 13.
FIG. 15 is an exploded isometric view of the fiber optic enclosure of FIG. 13.
FIG. 16 is an isometric view of the cable spool of the fiber optic enclosure of FIG. 13.
FIG. 17 is a further isometric view of the fiber optic enclosure of FIG. 12, with the cover in the pivoted open position.
FIG. 18 is an exploded view of a shipping container in which is disposed the fiber optic enclosure of FIG. 8.

Detailed Description

[0008] Reference will now be made in detail to the exemplary aspects of the present disclosure that are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like structure.

[0009] Referring now to FIG. 1, a schematic representation of a fiber optic network, generally designated 11, in a facility 13 (e.g. individual residence, apartment, condominium, business, etc.) is shown. The fiber optic network 11 includes a feeder cable 15 from a central office (not shown). The feeder cable 15 enters a feeder cable input location 17 (e.g., a fiber distribution hub, a network interface device, etc.) having one or more optical splitters (e.g., 1-to-8 splitters, 1-to-16 splitters, or 1-to-32 splitters) that generate a number of individual fibers. In the subject embodiment, and by way of example only, the fiber distribution hub 17 is located on a lower level 19 of the facility 13. Each unit in the facility 13 includes a fiber optic enclosure, generally designated 21, with a subscriber cable 22 extending from each of the fiber optic enclosures 21 to the fiber distribution hub 17. The subscriber cable 22 extending between the fiber distribution hub 17 and the fiber optic enclosure 21 typically includes multiple optical fibers.

[0010] Referring now to FIGS. 2-5, the fiber optic enclosure 21 will now be described. The fiber optic enclosure 21 includes a housing, generally designated 23, having a cover 25.

[0011] The housing 23 includes a base 27, a first sidewall 29, and an oppositely disposed second sidewall 31. The first and second sidewalls 29, 31 extend outwardly from the base 27 such that the base 27 and the first and second sidewalls 29, 31 cooperatively define an interior region 33. In the subject embodiment, the cover 25 is hingedly engaged with a sidewall 35 that is connected to the base 27 and the first and second sidewalls 29, 31. It will be understood, however, that the scope of the present disclosure is not limited to the cover 25 being hingedly engaged the sidewall 35.

[0012] A cable spool, generally designated 37, is disposed in the interior region 33 of the fiber optic enclosure 21. The cable spool 37 includes a spooling portion 39, around which subscriber cable 22 is coiled (shown schematically in FIG. 1). The cable spool 37 further includes an axial end 41.

[0013] In the subject embodiment, the axial end 41 of the cable spool 37 defines a termination area 43 (shown as a dashed line in FIG. 5). Disposed in the termination area 43 is a termination module, generally designated 45. The termination module 45 of the fiber optic enclosure 21 serves as the dividing line between the incoming fibers and the outgoing fibers.

[0014] In the subject embodiment, the termination module 45 includes an adapter plate 47. The adapter plate 47 is an L-shaped bracket having a first side 49 (shown in FIG. 4) and a second side 51. The first side 49 defines a plurality of mounting holes 53 while the second side 51 defines an adapter slot 55. It will be understood, however, that the scope of the present disclosure is not limited to the adapter plate 47 being an L-shaped bracket. The first side 49 of the adapter plate 47 is rigidly mounted (i.e., non-rotatable) to the axial end 41 of the cable spool 37 through a plurality of fasteners 57 (e.g., bolts, screws, rivets, etc.) which are inserted through the mounting holes 53 in the first side 49 and in connected engagement with the axial end 41 of the cable spool 37.

[0015] The adapter slot 55 in the second side 51 of the adapter plate 47 is adapted to receive a plurality of adapters, generally designated 401. In the subject embodiment, the adapters 401 are SC-type adapters 401, although it will be understood that the scope of the present disclosure is not limited to the use of SC-type adapters 401. Similar SC-type adapters 401 have been described in detail in commonly owned U.S. Pat. No. 5,317,663.

[0016] Referring now to FIGS. 6 and 7, the SC-type adapter 401 includes a main body 403 with a pair of tabs 405, 407 located on the exterior of the main body 403. The tabs 405, 407 serve to support the adapter 401 in the adapter slot 55. The adapter 401 further includes a pair of retaining clips 409, 411, with one retaining clip 409, 411 associated with each tab 405, 407. A front side 413 of the adapter 401 is inserted into the adapter slot 55. As the adapter 401 is inserted through the adapter slot 55, the retaining clips 409, 411 compress against the main body 403. The adapter 401 is inserted into the adapter slot 55 until the tabs 405, 407 abut the adapter plate 47. With the tabs 405, 407 abutting the adapter plate 47, the retaining clips 409, 411 decompress on the opposite side of the adapter plate 47, thereby retaining the adapter plate 47 between the retaining clips 409, 411 and the tabs 405, 407.

[0017] In an alternate embodiment, the termination module includes a plurality of sliding adapter modules. Similar sliding adapter modules have been described in detail in commonly owned U.S. Pat. Nos. 5,497,444; 5,717,810, 6,591,051 and U.S. Pat. Pub. No. 2007/0025675.

[0018] Referring now to FIGS 3-5, the axial end 41 of the cable spool 37 further defines a slack storage area 59. The slack storage area 59 includes a cable management spool 61 disposed on the axial end 41 of the cable spool 37. The cable management spool 61 is sized such that an outer radius of the cable management spool 61 is larger than the minimum bend radius of the optical fibers so as to avoid attenuation damage to the optical fibers during storage.

[0019] The cable management spool 61 and the axial end 41 of the cable spool 37 cooperatively define a cable passage 63 that extends axially through the cable management spool 61 and through the axial end 41 of the cable spool 37. The cable passage 63 allows connectorized ends of incoming optical fibers to pass from the spooling portion 39 of the cable spool 37 to the slack storage area 59. The connectorized ends of the incoming

optical fibers are then routed from the slack storage area 59 to the front sides 413 of the adapters 401 in the termination area 43.

[0020] Referring now to FIG. 5, the fiber optic enclosure 21 further includes a bearing mount, generally designated 71. In the subject embodiment, the bearing mount 71 is disposed on the base 27 of the housing 23. An outer surface 73 of the bearing mount 71 is adapted for a bearing 75 (shown as cross-hatching). In the subject embodiment, the bearing 75 is a needle bearing. However, it will be understood that the scope of the present disclosure is not limited to the bearing 75 being a needle bearing as the bearing 75 could also include a bushing, low-friction coating, etc.

[0021] In one embodiment, the bearing 75 is engaged with an inner diameter of a central hole of the cable spool 37. In another embodiment, a rotary plain bearing is formed between the outer surface 73 of the bearing mount 71 and the inner diameter of the central hole of the cable spool 37. In this embodiment, the outer diameter of the bearing mount 71 is sized to fit within an inner diameter of a central hole of the spooling portion 39. The engagement of the bearing mount 71 and the spooling portion 39 of the cable spool 37 allows the cable spool 37 to rotate about the central axis 77 of the bearing mount 71.

[0022] Referring now to FIGS. 1 and 5, the subscriber cable 22, which includes multiple optical fibers, is coiled around the spooling portion 39 of the cable spool 37. In order to protect the subscriber cable 22 from attenuation resulting from the coiling of the subscriber cable 22 around the spooling portion 39, the cable spool 37 has an outer circumferential surface having a radius that is greater than the minimum bend radius of the subscriber cable 22. The subscriber cable 22 includes a first end having connectorized ends, which are inserted through the cable passage 63 and connectedly engaged with the first ends 413 of the adapters 401. A second end of the subscriber cable 22 is configured for connectivity with the fiber distribution hub 17. However, as shown in FIG. 1, the length of subscriber cable 22 needed between each of the fiber optic enclosures 21 in the facility 13 and the fiber distribution hub 17 will vary depending upon the location of each fiber optic enclosure 21 with respect to the fiber distribution hub 17.

[0023] A method of installing and using the fiber optic enclosure 21 to account for the varying lengths of subscriber cable 22 needed between the fiber optic enclosure 21 and the fiber distribution hub 17 will now be described. The fiber optic enclosure 21 provides dual functionality by serving as a storage location for the subscriber cable 22 and by selectively paying out a desired length of the subscriber cable 22.

[0024] A first length of subscriber cable 22 is stored in the fiber optic enclosure 21 by coiling the length of subscriber cable 22 around the cable spool 37. The first length of subscriber cable 22 includes an installation length, which is sufficiently long to extend from the mounting location of the enclosure 28 to the fiber distribution hub 17, and an excess length; which is the length of subscriber cable 22 remaining on the cable spool 37 after the installation length has been paid out. In one embodiment, the first length is greater than or equal to about 100 feet. In another embodiment, the first length of subscriber cable 22 is greater than or equal to about 200 feet. In another embodiment, the first length of subscriber cable 22 is greater than or equal to about 300 feet. In another embodiment, the first length of subscriber cable 22 is greater than or equal to about 400 feet. In another embodiment, the first length of subscriber cable 22 is greater than or equal to about 500 feet. In another embodiment, the first length of subscriber cable 22 is in the range of about 100 to about 2,000 feet. In another embodiment, the first length of subscriber cable 22 is in the range of about 100 to about 1,500 feet. In another embodiment, the first length of subscriber cable 22 is in the range of about 500 to about 1,500 feet. In a preferred embodiment, the first length of subscriber cable 22, which is coiled around the cable spool 89, is in the range of 100 to 500 feet.

[0025] In one embodiment, a second length, or the excess length, of subscriber cable 22 is stored around the cable spool 37 after the first length of subscriber cable 22 has been paid out. If the first length of subscriber cable 22 is greater than the installation length of subscriber cable 22, the second length, or excess length, is stored around the cable spool 37.

[0026] The second function of the fiber optic enclosure 21 involves the selective payout of the subscriber cable 22. With the cable spool 37 mounted to the bearing mount 71, the first end of the subscriber cable 22 in connected engagement with the front sides 413 of the adapters 401 and the outgoing optical fibers disengaged from the back sides of the adapters 401, the subscriber cable 22 can be paid out through fiber ports 79 disposed in the first and second sidewalls 29, 31. The subscriber cable 22 is paid out of the fiber optic enclosure 21 by selectively rotating the cable spool 37 with respect to the housing 23 about the central axis 77 of the bearing mount 71. As the termination module 45 is disposed on the axial end 41 of the cable spool 37, the selective rotation of the cable spool 37 with respect to the housing 23 results in the selective rotation of the termination module 45. Since the termination module 45 rotates unitarily with or in unison with the cable spool 37, the second end of the subscriber cable 22 can be paid out without the first end of the subscriber cable 22 being pulled out of the termination module 45.

[0027] Once the desired length of subscriber cable 22 has been paid out, the rotation of the cable spool 37 is ceased. At this point, the position of the cable spool 37 can be fixed such that it does not rotate relative to the housing 23. In one embodiment, a pin is inserted through an opening in the axial end 41 of the cable spool 37 and through a corresponding opening in the base 27 of the housing 23 to fix the position of the cable spool 37 with

respect to the housing 23. It will be understood, however, that the scope of the present disclosure is not limited to the use of a pin to fix the position of the cable spool 37 with respect to housing 23.

[0028] An alternate method of selectively paying-out subscriber cable 22 from the fiber optic enclosure 21 will now be described. With the fiber optic enclosure 21 positioned near the fiber distribution hub 17, the second end of the subscriber cable 22 is unwound from the cable spool 37. In one embodiment, the second end is optically connected to the fiber distribution hub 17. With the second end of the subscriber cable 22 optically connected to the fiber distribution hub 17 and the first end of the subscriber cable 22 in connected engagement with the termination module 45, the fiber optic enclosure 21 is transported away from the fiber distribution hub 17. In one embodiment, the fiber optic enclosure 21 is carried away from the fiber distribution hub 17 by an installer. In another embodiment, the fiber optic enclosure 21 is transported away from the fiber distribution hub 17 in a wheeled cart (e.g., dolly, 4-wheeled cart, etc.). In a preferred embodiment, the fiber optic enclosure is disposed in a packaging enclosure (e.g., a box) during transport. As the fiber optic enclosure 21 is transported away from the fiber distribution hub 17, the subscriber cable 22 unwinds from the cable spool 37 causing the cable spool 37 to rotate within the interior region 33 of the housing 23, which is disposed in the packaging enclosure. When the fiber optic enclosure 21 has been transported to its mounting location, the fiber optic enclosure 21 is removed from the packaging enclosure, mounted to the mounting location. The cable spool 37 can be fixed in position relative to the housing 23 to prevent inadvertent rotation of the cable spool 37.

[0029] Referring now to FIGS. 8-18, an alternate embodiment of a fiber optic enclosure 121 is shown. The fiber optic enclosure 121 includes a housing 123 and a hinged cover 125.

[0030] The housing 123 includes a base wall 120, a first sidewall 127 and an oppositely disposed second sidewall 128. The first and second sidewalls 127, 128 extend outwardly from the base wall 120 such that the base wall 120 and the first and second sidewalls 127, 128 cooperatively define an interior region 130.

[0031] In the subject embodiment, the first sidewall 127 of the housing 123 defines a first port 131 while the second sidewall 128 defines a second port 132. The subscriber cable 122 enters/exits the fiber optic enclosure 121 at the first port 131 or at the second port 132. In the subject embodiment, both of the first and second ports 131, 132 are provided as knockout portions.

[0032] A cable spool 137 is positioned within the interior region 130 of enclosure 121. In the subject embodiment, the cable spool 137 is adapted for rotation within the interior region 130 of the enclosure 121. In the subject embodiment, the cable spool 137 includes a first axial end 136, an oppositely disposed second axial end 138 and a spool portion 139. The spool portion 139 is disposed between the first and second axial ends 136, 138 of the cable spool 137. The spool portion 139 is adapted to receive a subscriber cable 122 coiled around or spooled on the spool portion 139.

[0033] With the subscriber cable 122 spooled on the spool portion 139, the subscriber cable 122 can be selectively paid out by rotating the cable spool 137. As the cable spool 137 is rotated, the subscriber cable 122 is unwound from the spool portion 139 of the cable spool 137. After a desired length of subscriber cable 122 has been paid out, pin openings 141 can be used with a pin to fix the position of cable spool 137 relative to housing 123.

[0034] The subscriber cable 122 is shown with a connectorized end 144 (e.g., MTP connector) for connecting to the fiber distribution hub 17 or other equipment. An opposite end of the subscriber cable 122 passes through an opening 145 disposed in the first axial end 136 of the cable spool 137. After passing through the opening 145, the subscriber cable 122 is routed to a fanout 147 disposed on the first axial end 136 of the cable spool 137 where the cable is broken out into individual fibers 124 having connectorized ends 146 (e.g., SC connectors).

[0035] A cable management spool 161 is also disposed on the first axial end 136 of the cable spool 137. The cable management spool 161 manages fibers 124. In the subject embodiment, the cable management spool 161 includes a plurality of fingers 162 disposed on an end of the cable management spool 161. The fingers 162 assist with cable retention.

[0036] The first axial end 136 of the cable spool 137 further includes an outer guide wall 163. In the subject embodiment, the outer guide wall 163 is disposed at a portion of the peripheral edge of the first axial end 136 adjacent to the cable management spool 161. In the subject embodiment, the outer guide wall 163 extends outwardly in a direction that is generally perpendicular to the first axial end 136.

[0037] The outer guide wall 163 includes with a cable finger 164 disposed at an end of the outer guide wall 163 that is opposite the end engaged with the first axial end 136 of the cable spool 137. The cable finger 164 assists with retention and protection of the fibers 124.

[0038] An adapter plate 149 is disposed on the first axial end 136 of the cable spool 137. In the subject embodiment, the adapter plate 149 includes separate openings 151. Each of the separate openings 151 is adapted to receive two adapters 401.

[0039] In the depicted embodiment of FIG. 16, the cable management spool 161, the outer guide wall 163 and the adapter plate 149 are integrally formed with the first axial end 136 of the cable spool 137. In the subject embodiment, the first axial end 136 of the cable spool 137 is formed from plastic. In another embodiment, the first and second axial ends 136, 138, the spool portion 139, the adapter plate 149, the cable management spool 161 and the outer guide wall 163 are integrally formed from a plastic material.

[0040] Referring now to FIGS. 13 and 14, the fiber optic enclosure 121 is shown connected to a second subscriber cable 126. After the subscriber cable 122 is paid out and cable spool 137 fixed in position relative to the housing 123, individual connectorized ends of the second subscriber cables 126 can be connected to the fibers 124 at adapters 401 of adapter plate 149. The second subscriber cables 126 exit the fiber optic enclosure 121 at a port 136 in a side 165 of the housing 123. In the illustrated embodiment, a slotted foam member 138 is disposed in the port 136. The slotted foam member 138 includes a plurality of slots through which the second subscriber cables 126 can be inserted in order to prevent or reduce the risk of ingress of environmental contamination (e.g., dust, water, etc.).

[0041] While the fiber optic enclosure 121 is shown mounted to a mounting location 183 (e.g., wall, pole, etc.) in FIGS. 1 and 17, it will be understood that the subscriber cable 122 can be paid out from the fiber optic enclosure 121 while the fiber optic enclosure 121 is either mounted to a mounting location 183 or removed from the mounting location 183. As shown in FIG. 18, the subscriber cable 122 could be paid out while the fiber optic enclosure 121 is still packaged in a shipping container 179 provided there is an opening 181 in the shipping container 179 through which the subscriber cable 122 can be pulled. After the subscriber cable 122 has been paid out, the fiber optic enclosure 121 can be removed from the shipping container 179 and mounted to the mounting location 183.

Claims

1. A fiber optic enclosure assembly for enclosing optical fiber connections comprising:

   a housing (23; 123) having an interior region (33; 130);
   a bearing mount (71) disposed in the interior region (33; 130) of the housing (23; 123);
   a cable spool (37; 137) engaged with the bearing mount (71) such that the cable spool (37; 137) selectively rotates within the housing (23; 123);
   a termination module (45; 149) disposed on the cable spool (37; 137) so that the termination module (45; 149) rotates in unison with the cable spool (37; 137);
   a first fiber optic cable (22; 122) wrapped about a spooling portion of the cable spool (37; 137), the first fiber optic cable (22; 122) having connectorized ends (146) that are routed to the termination module (45; 149); and
   fixing means to fix the position of the cable spool (37; 137) with respect to the housing (23; 123);
   characterized in that the housing (23; 123) includes a port (136) wherein a second fiber optic cable having connectorized ends can be connected to the termination module (45; 149) in the interior region (33; 130) of the housing (23; 123) and exits the housing via the port, after the cable spool (37; 137) has been fixed in position relative to the housing (23; 123).

2. A fiber optic enclosure assembly as claimed in claim 1, wherein a needle bearing is disposed on an outer surface (73) of the bearing mount (71).

3. A fiber optic enclosure assembly as claimed in claim 1, wherein the termination module (45; 149) includes an adapter plate (47; 149) having an adapter slot (55) with a plurality of adapters (401) engaged with the adapter slot (55).

4. A fiber optic enclosure assembly as claimed in claim 1, wherein the termination module (45; 149) includes a plurality of sliding adapter modules.

5. A fiber optic enclosure assembly as claimed in claim 1, wherein the axial end (41; 136) of the cable spool (37; 137) defines a cable passage (63).

6. A fiber optic enclosure assembly as claimed in claim 1, wherein the fiber optic enclosure assembly further comprises a cable manager that is a cable management spool (61; 161).

7. A fiber optic enclosure assembly as claimed in claim 1, wherein the fiber optic enclosure assembly further comprises a cable manager that includes an outer radius that is larger than a minimum bend radius of the fiber optic cable.

8. A method of paying out a fiber optic cable from a fiber optic enclosure, comprising:

   providing a fiber optic enclosure including:

      a housing (23; 123) defining an interior region (33; 130);
      a cable spool (37; 137) disposed in the interior region (33; 130), the cable spool (37; 137) having a spooling portion (39);
      a termination module (45; 149) disposed on the cable spool (37; 137);
      a first fiber optic cable (22; 122) coiled around the spooling portion (39) of the cable spool (37; 137), the first fiber optic cable (22; 122) including connectorized ends (146) that are engaged with the termination module (45; 149);

   and fixing means to fix the position of the cable spool (37; 137) with respect to the housing (23, 123):

rotating the cable spool (37; 137) about an axis of the housing (23; 123) of the fiber optic enclosure until a desired length of the first fiber optic cable (22; 122) is paid out;

characterized by
fixing the position of the cable spool (37; 137) with respect to the housing (23; 123) when a desired length of the first fiber optic cable (22; 122) has been paid out;
connecting a connectorized end of a second fiber optic cable to the termination module (45; 149) in the interior region (33; 130) of the fiber optic enclosure after the fixing has been carried out.

9. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 8, wherein the termination module (45; 149) includes a plurality of adapters (401).

10. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 9, wherein the termination module (45; 149) includes an adapter plate (47; 149) having an adapter slot (55) with the plurality of adapters (401) engaged with the adapter slot (55).

11. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 9, where the termination module (45; 149) includes a plurality of sliding adapter modules.

12. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 8, wherein the connectorized ends (146) of a first end of the first fiber optic cable (22; 122) are connected to adapters (401) disposed in the termination module (45; 149).

13. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 8, wherein the housing (23; 123) is mounted to a wall.

14. A method of paying out a fiber optic cable from a fiber optic enclosure as claimed in claim 8, wherein a pin fixes the position of the cable spool (37; 137) with respect to the housing (23; 123).

Patentansprüche

1. Lichtwellenleiterumschließungssystem zum Umschließen von Lichtwellenleiterverbindungen, Folgendes umfassend:

ein Gehäuse (23; 123) mit einem Innenbereich (33; 130);
eine Lagerhalterung (71), die im Innenbereich (33; 130) des Gehäuses (23; 123) angeordnet ist;
eine Kabelspule (37; 137), die mit der Lagerhalterung (71) derart in Eingriff ist, dass sich die Kabelspule (37; 137) selektiv in dem Gehäuse (23; 123) dreht;
ein Anschlussmodul (45; 149), das so an der Kabelspule (37; 137) angeordnet ist, dass sich das Anschlussmodul (45; 149) in Übereinstimmung mit der Kabelspule (37; 137) dreht;
ein erstes Lichtwellenleiterkabel (22; 122), das um einen Wickelabschnitt der Kabelspule (37; 137) gewickelt ist, wobei das erste Lichtwellenleiterkabel (22; 122) vorkonfektionierte Enden (146) besitzt, die zum Anschlussmodul (45; 149) geleitet sind; und
Fixierungseinrichtungen, um die Position der Kabelspule (37; 137) im Hinblick auf das Gehäuse (23; 123) zu fixieren;
dadurch gekennzeichnet, dass das Gehäuse (23; 123) eine Anschlussöffnung (136) aufweist, wobei ein zweites Lichtwellenleiterkabel mit vorkonfektionierten Enden an das Anschlussmodul (45; 149) im Innenbereich (33; 130) des Gehäuses (23; 123) angeschlossen werden kann und über die Anschlussöffnung aus dem Gehäuse austritt, nachdem die Kabelspule (37; 137) in Bezug auf das Gehäuse (23; 123) in seiner Position fixiert wurde.

2. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei ein Nadellager an einer Außenfläche (73) der Lagerhalterung (71) angeordnet ist.

3. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei das Anschlussmodul (45; 149) eine Adapterplatte (47; 149) mit einem Adapterschlitz (55) umfasst, wobei mehrere Adapter (401) mit dem Adapterschlitz (55) in Eingriff sind.

4. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei das Anschlussmodul (45; 149) mehrere Verschiebeadaptermodule umfasst.

5. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei das axiale Ende (41; 136) der Kabelspule (37; 137) eine Kabeldurchführung (63) definiert.

6. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei das Lichtwellenleiterumschließungssystem darüber hinaus einen Kabelmanager aufweist, bei dem es sich um eine Kabelführungsspule (61; 161) handelt.

7. Lichtwellenleiterumschließungssystem nach Anspruch 1, wobei das Lichtwellenleiterumschließungssystem darüber hinaus einen Kabelmanager

aufweist, der einen Außenradius hat, der größer ist als ein Mindestbiegeradius des Lichtwellenleiterkabels.

8. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung, Folgendes umfassend:

Bereitstellen einer Lichtwellenleiterumschließung, die Folgendes aufweist:

ein Gehäuse (23; 123), das einen Innenbereich (33; 130) definiert;
eine Kabelspule (37; 137), die im Innenbereich (33; 130) angeordnet ist, wobei die Kabelspule (37; 137) einen Wickelabschnitt (39) besitzt;
ein Anschlussmodul (45; 149), das an der Kabelspule (37; 137) angeordnet ist;
ein erstes Lichtwellenleiterkabel (22; 122), das um den Spulenabschnitt (39) der Kabelspule (37; 137) aufgewickelt ist, wobei das erste Lichtwellenleiterkabel (22; 122) vorkonfektionierte Enden (146) aufweist, die mit dem Anschlussmodul (45; 149) in Eingriff sind;

und Fixierungseinrichtungen, um die Position der Kabelspule (37; 137) im Hinblick auf das Gehäuse (23; 123) zu fixieren:
Drehen der Kabelspule (37; 137) um eine Achse des Gehäuses (23; 123) der Lichtwellenleiterumschließung, bis eine gewünschte Länge des ersten Lichtwellenleiterkabels (22; 122) ausgegeben ist;
gekennzeichnet durch
Fixieren der Position der Kabelspule (37; 137) im Hinblick auf das Gehäuse (23; 123), wenn eine gewünschte Länge des ersten Lichtwellenleiterkabels (22; 122) ausgegeben wurde;
Anschließen eines vorkonfektionierten Endes eines zweiten Lichtwellenleiterkabels an das Anschlussmodul (45; 149) im Innenbereich (33; 130) der Lichtwellenleiterumschließung, nachdem das Fixieren durchgeführt wurde.

9. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 8 beansprucht, wobei das Anschlussmodul (45; 149) mehrere Adapter (401) aufweist.

10. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 9 beansprucht, wobei das Anschlussmodul (45; 149) eine Adapterplatte (47; 149) mit einem Adapterschlitz (55) umfasst, wobei die mehreren Adapter (401) mit dem Adapterschlitz (55) in Eingriff sind.

11. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 9 beansprucht, wobei das Anschlussmodul (45; 149) mehrere Schiebeadaptermodule umfasst.

12. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 8 beansprucht, wobei die vorkonfektionierten Enden (146) eines ersten Endes des ersten Lichtwellenleiterkabels (22; 122) an Adapter (401) angeschlossen werden, die im Anschlussmodul (45; 149) angeordnet sind.

13. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 8 beansprucht, wobei das Gehäuse (23; 123) an einer Wand montiert ist.

14. Verfahren zum Ausgeben eines Lichtwellenleiterkabels aus einer Lichtwellenleiterumschließung wie in Anspruch 8 beansprucht, wobei ein Stift die Position der Kabelspule (37; 137) im Hinblick auf das Gehäuse (23; 123) fixiert.

Revendications

1. Ensemble d'enceinte de fibre optique pour enfermer des connexions de fibre optique, comprenant :

un boîtier (23 ; 123) ayant une région intérieure (33 ; 130) ;
un montant de roulement (71) disposé dans la région intérieure (33 ; 130) du boîtier (23 ; 123) ;
une bobine de câble (37 ; 137) mise en prise avec le montant de roulement (71) de sorte que la bobine de câble (37 ; 137) tourne sélectivement à l'intérieur du boîtier (23 ; 123) ;
un module de terminaison (45 ; 149) disposé sur la bobine de câble (37, 137) de sorte que le module de terminaison (45 ; 149) tourne à l'unisson avec la bobine de câble (37 ; 137) ;
un premier câble à fibre optique (22 ; 122) enroulé autour d'une partie de bobinage de la bobine de câble (37 ; 137), le premier câble à fibre optique (22 ; 122) ayant des extrémités de connecteur (146) qui sont acheminées vers le module de terminaison (45 ; 149) ; et
des moyens de fixation pour fixer la position de la bobine de câble (37 ; 137) par rapport au boîtier (23 ; 123) ;
caractérisé en ce que le boîtier (23 ; 123) comprend un orifice (136), dans lequel un second câble à fibre optique ayant des extrémités de connecteur peut être raccordé au module de terminaison (45 ; 149) dans la région intérieure (33 ; 130) du boîtier (23 ; 123) et sort du boîtier

via l'orifice, après que la bobine de câble (37 ; 137) a été fixée en position par rapport au boîtier (23 ; 123).

2. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel un roulement à aiguilles est disposé sur une surface externe (73) du montant de roulement (71).

3. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel le module de terminaison (45 ; 149) comprend une plaque d'adaptateur (47 ; 149) ayant une fente d'adaptateur (55) avec une pluralité d'adaptateurs (401) mis en prise avec la fente d'adaptateur (55).

4. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel le module de terminaison (45 ; 149) comprend une pluralité de modules d'adaptateur coulissants.

5. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel l'extrémité axiale (41 ; 136) de la bobine de câble (37 ; 137) défini un passage de câble (63).

6. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel l'ensemble d'enceinte de fibre optique comprend en outre un gestionnaire de câble qui est une bobine de gestion de câble (61 ; 161).

7. Ensemble d'enceinte de fibre optique selon la revendication 1, dans lequel l'ensemble d'enceinte de fibre optique comprend en outre un gestionnaire de câble qui comprend un rayon externe qui est supérieur à un rayon de flexion minimum du câble à fibre optique.

8. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique, comprenant les étapes consistant à :

prévoir une enceinte de fibre optique comprenant :

un boîtier (23 ; 123) définissant une région intérieure (33 ; 130) ;
une bobine de câble (37 ; 137) disposée dans la région intérieure (33 ; 130), la bobine de câble (37 ; 137) ayant une partie de bobinage (39) ;
un module de terminaison (45 ; 149) disposé sur la bobine de câble (37 ; 137) ;
un premier câble à fibre optique (22 ; 122) enroulé autour de la partie de bobinage (39) de la bobine de câble (37 ; 137), le premier câble à fibre optique (22 ; 122) comprenant des extrémités de connecteur (146) qui sont mises en prise avec le module de terminaison (45 ; 149) ;
et des moyens de fixation pour fixer la position de la bobine de câble (37 ; 137) par rapport au boîtier (23, 123) ;

faire tourner la bobine de câble (37 ; 137) autour d'un axe du boîtier (23 ; 123) de l'enceinte de fibre optique jusqu'à ce qu'une longueur souhaitée du premier câble à fibre optique (22 ; 122) soit déroulée ;
caractérisé par les étapes consistant à :
fixer la position de la bobine de câble (37 ; 137) par rapport au boîtier (23 ; 123) lorsqu'une longueur souhaitée du premier câble à fibre optique (22 ; 122) a été déroulée ;
raccorder une extrémité de connecteur d'un second câble à fibre optique au module de terminaison (45 ; 149) dans la région intérieure (33 ; 130) de l'enceinte de fibre optique après avoir réalisé la fixation.

9. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 8, dans lequel le module de terminaison (45 ; 149) comprend une pluralité d'adaptateurs (401).

10. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 9, dans lequel le module de terminaison (45 ; 149) comprend une plaque d'adaptateur (47 ; 149) ayant une fente d'adaptateur (55) avec la pluralité d'adaptateurs (401) mis en prise avec la fente d'adaptateur (55).

11. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 9, dans lequel le module de terminaison (45 ; 149) comprend une pluralité de modules d'adaptateur coulissants.

12. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 8, dans lequel les extrémités de connecteur (146) d'une première extrémité du premier câble à fibre optique (22 ; 122) sont raccordées aux adaptateurs (401) disposés dans le module de terminaison (45 ; 149).

13. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 8, dans lequel le boîtier (23 ; 123) est monté sur une paroi.

14. Procédé pour dérouler un câble à fibre optique d'une enceinte de fibre optique selon la revendication 8, dans lequel une broche fixe la position de la bobine de câble (37 ; 137) par rapport au boîtier (23 ; 123).

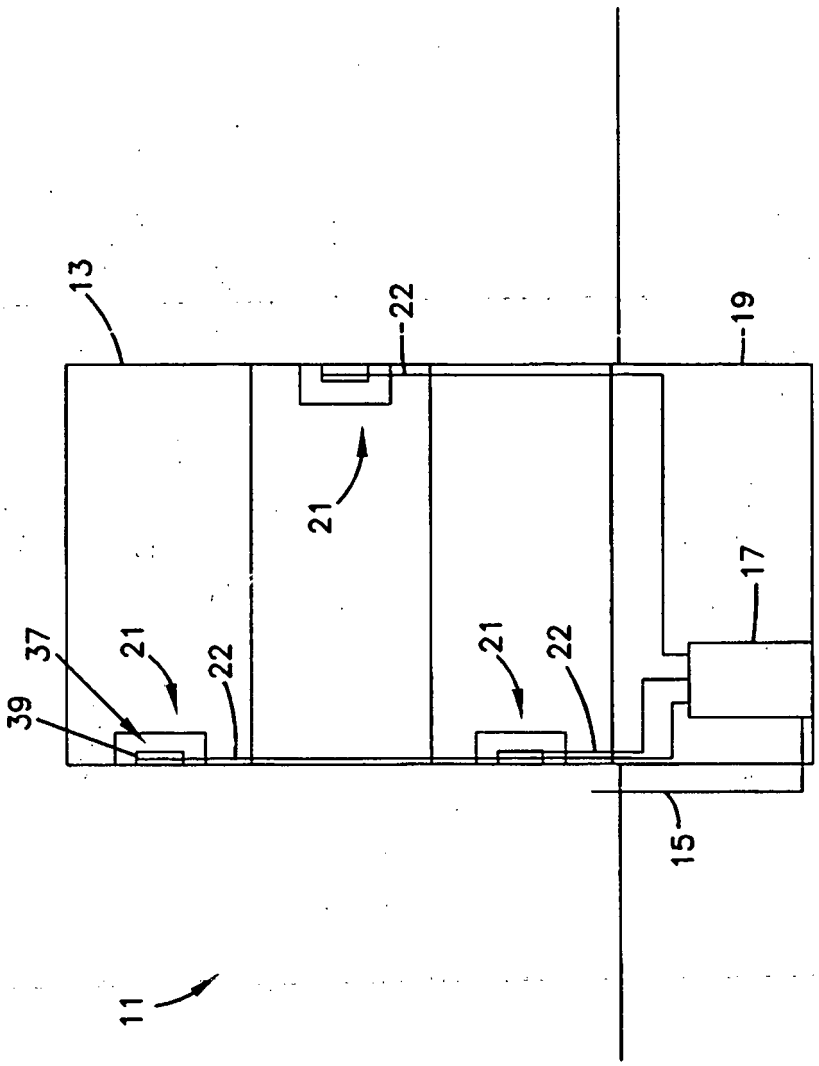


FIG. 1

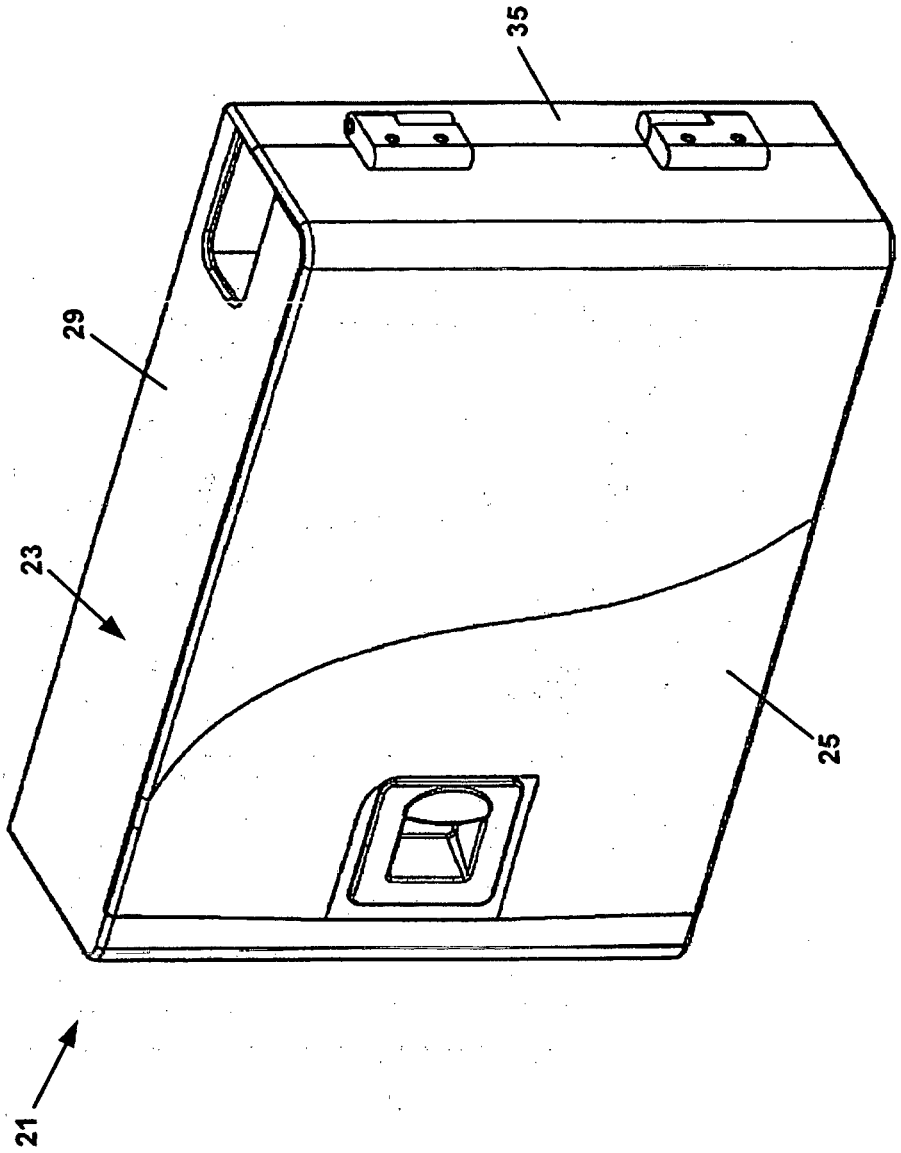


FIG. 2

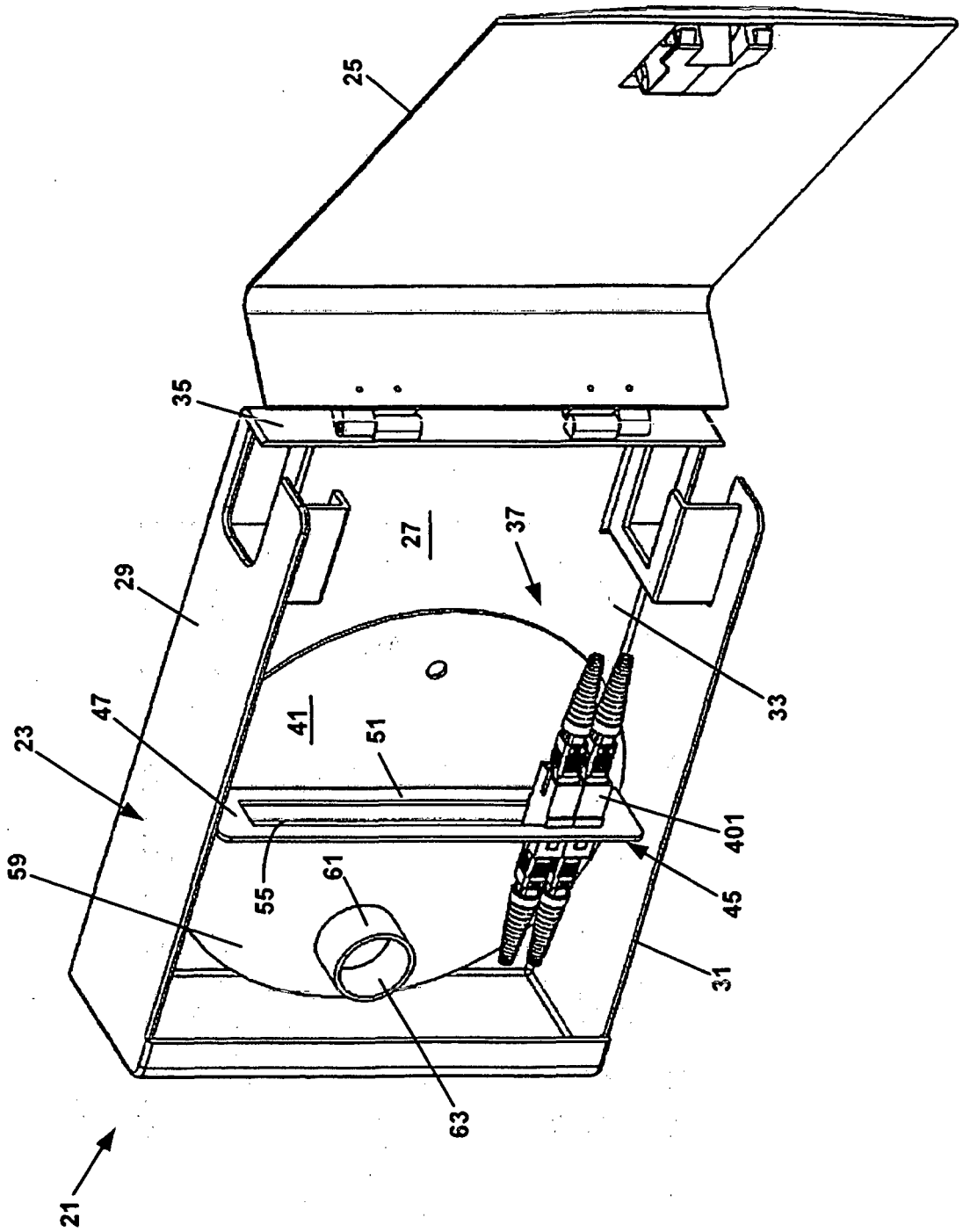


FIG. 3

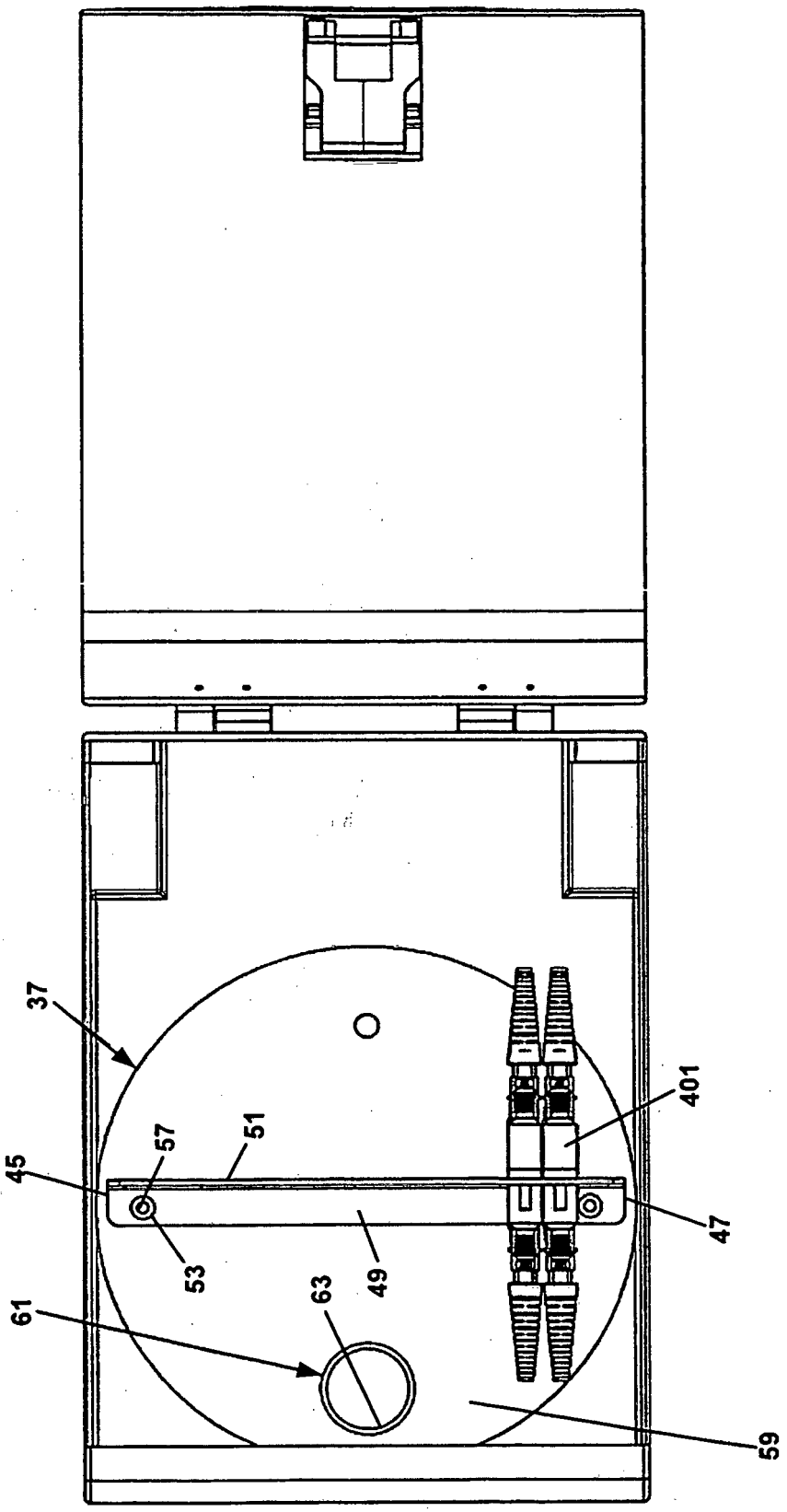


FIG. 4

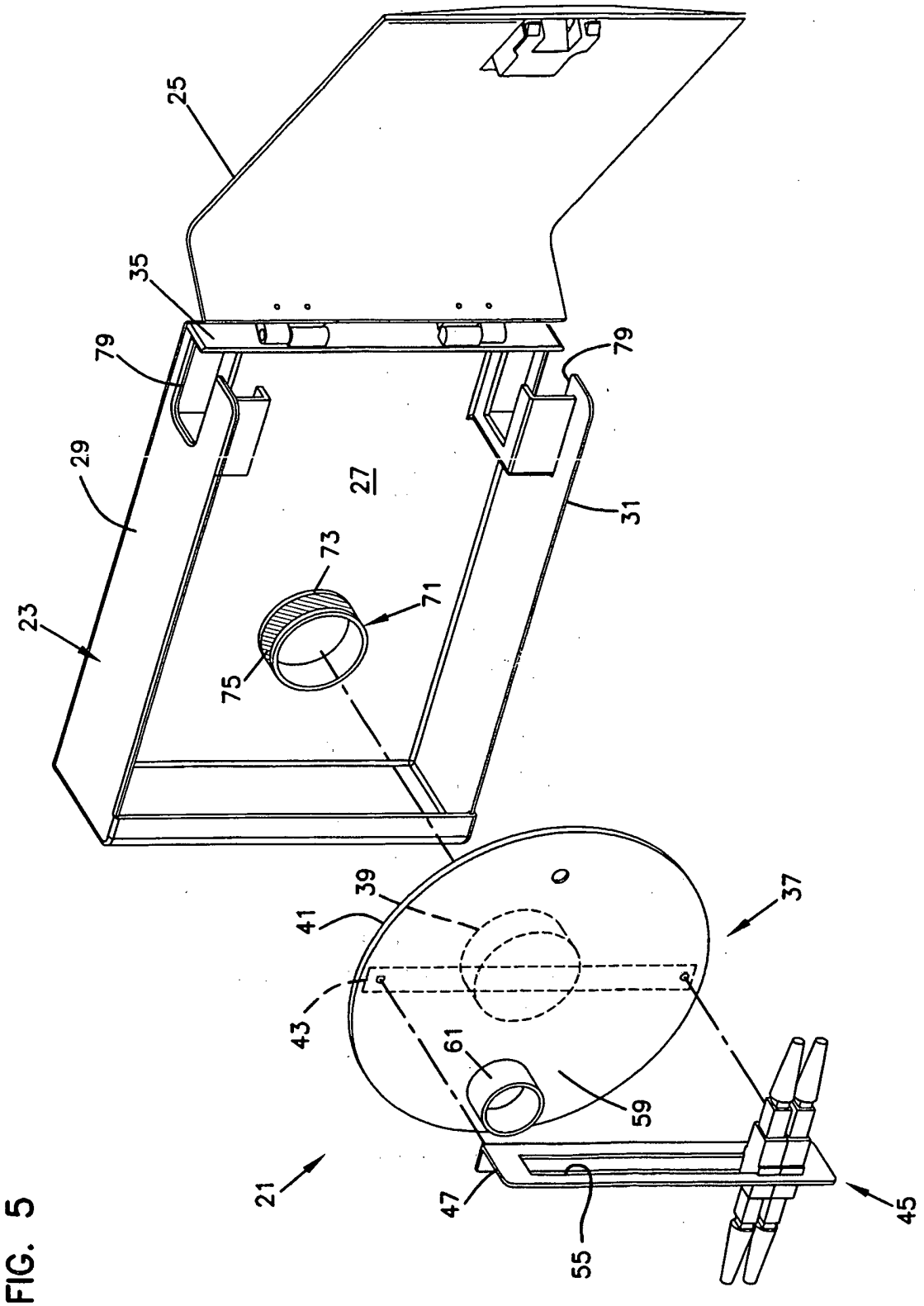


FIG. 5

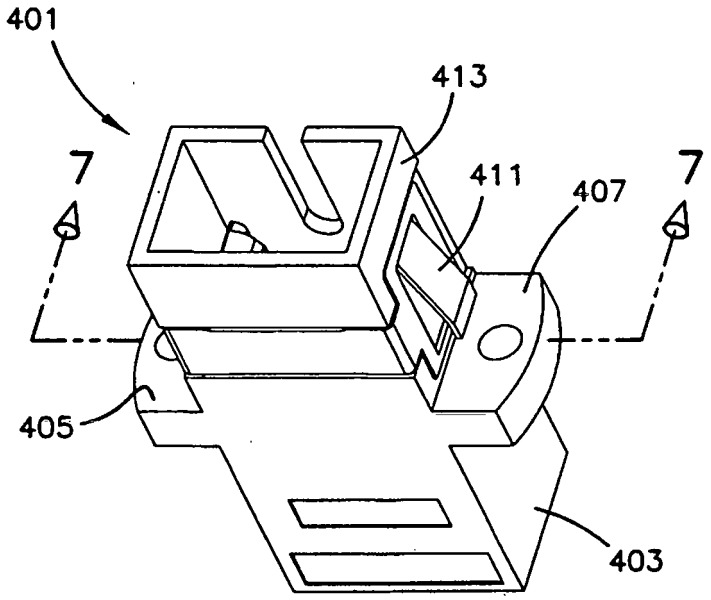


FIG. 6

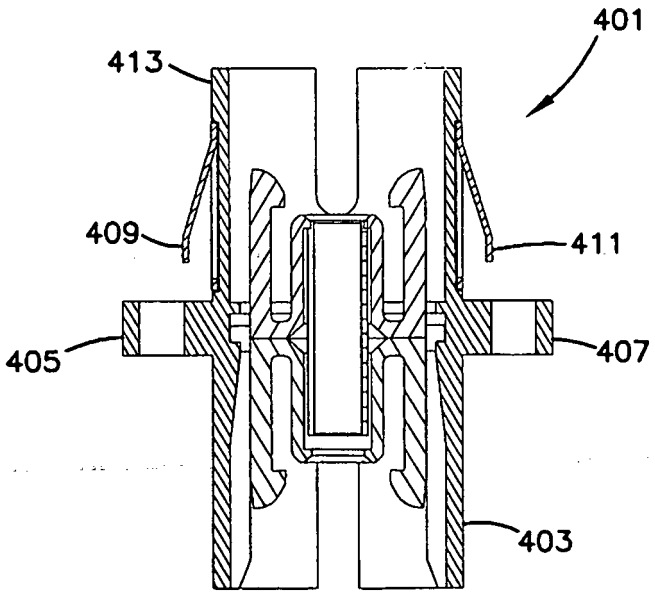


FIG. 7

FIG. 8

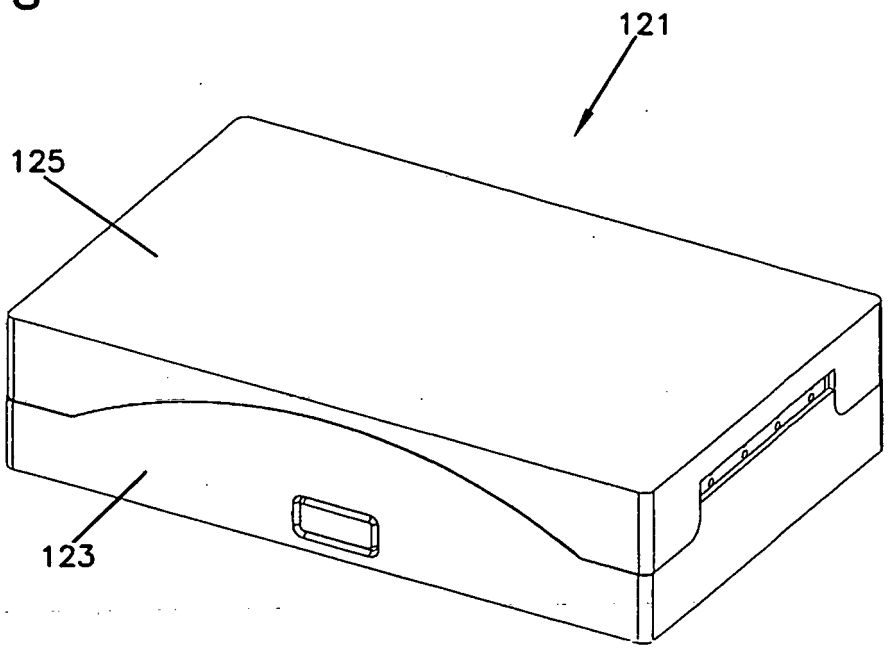


FIG. 9

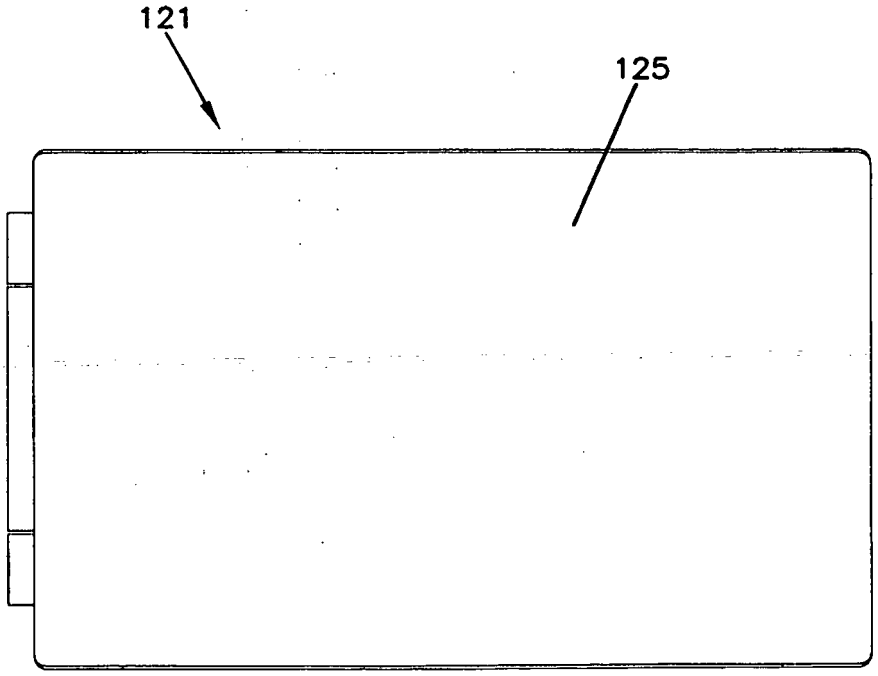


FIG. 10

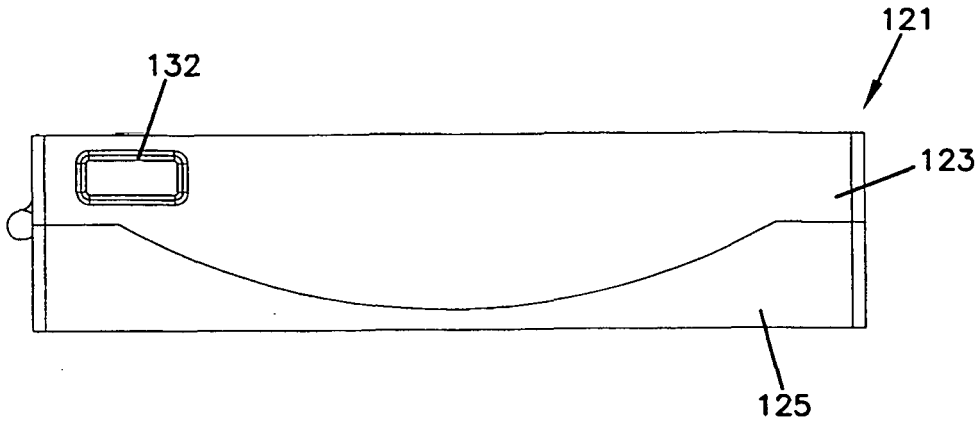


FIG. 11

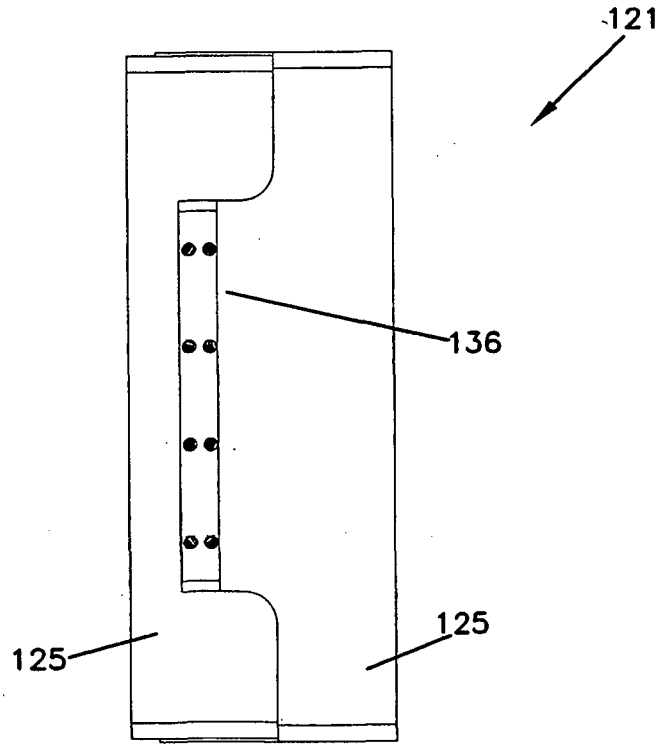


FIG. 12

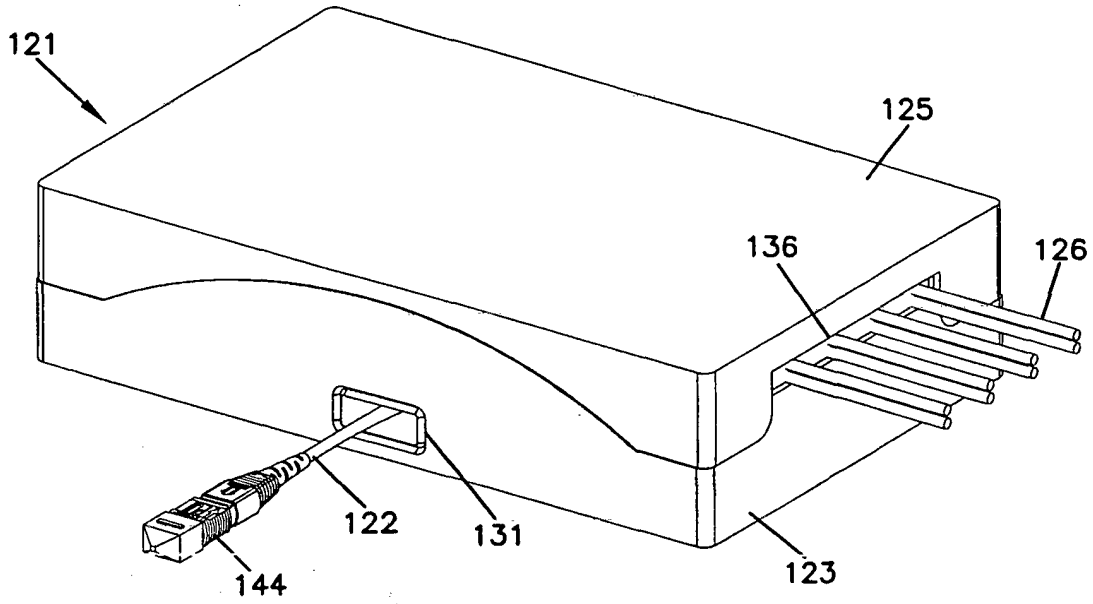
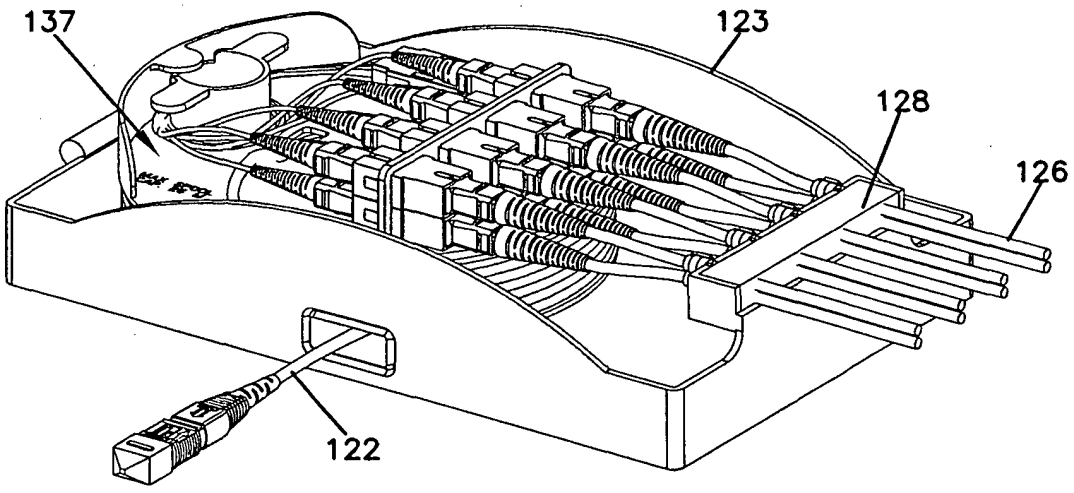


FIG. 13



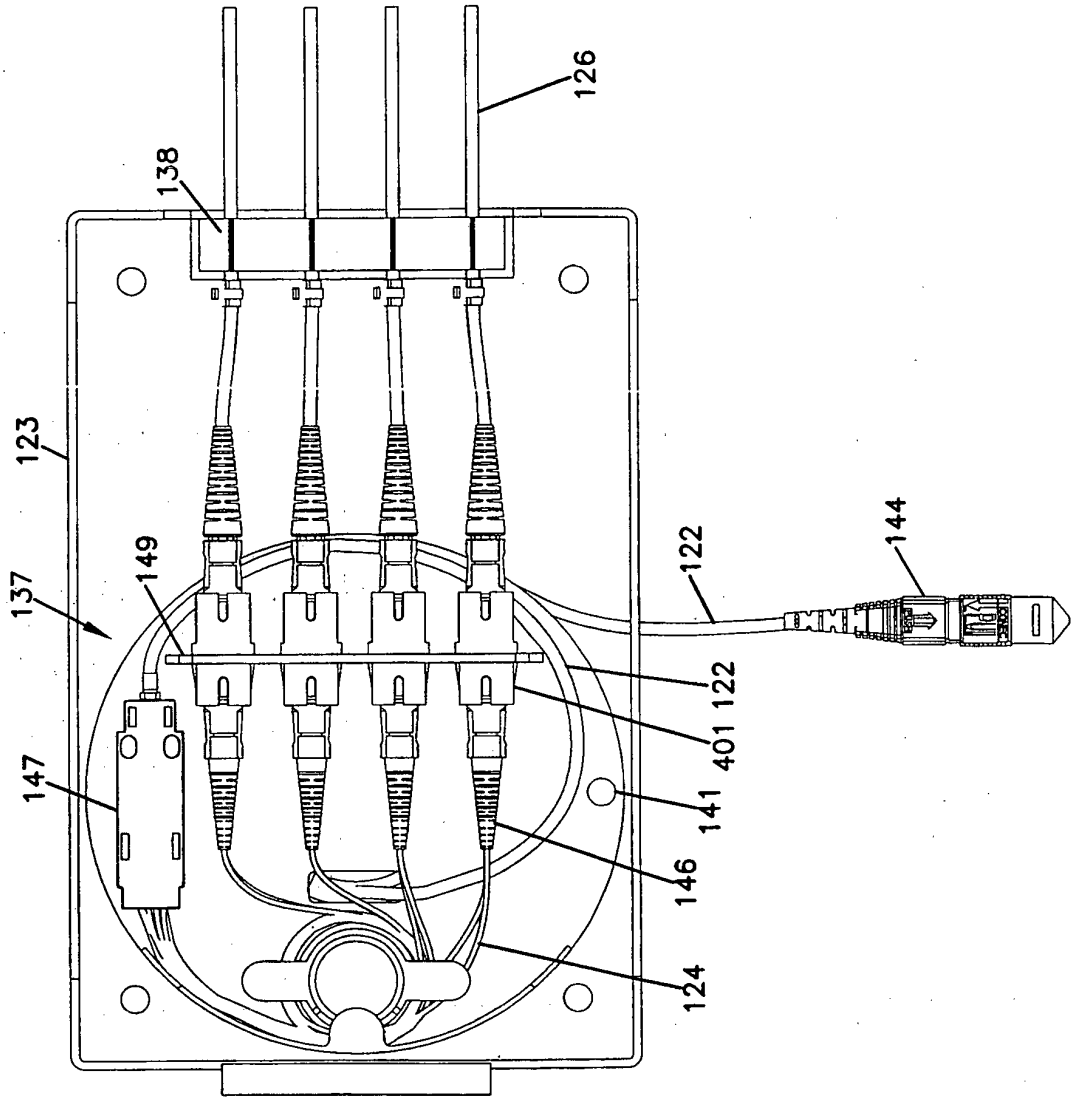


FIG. 14

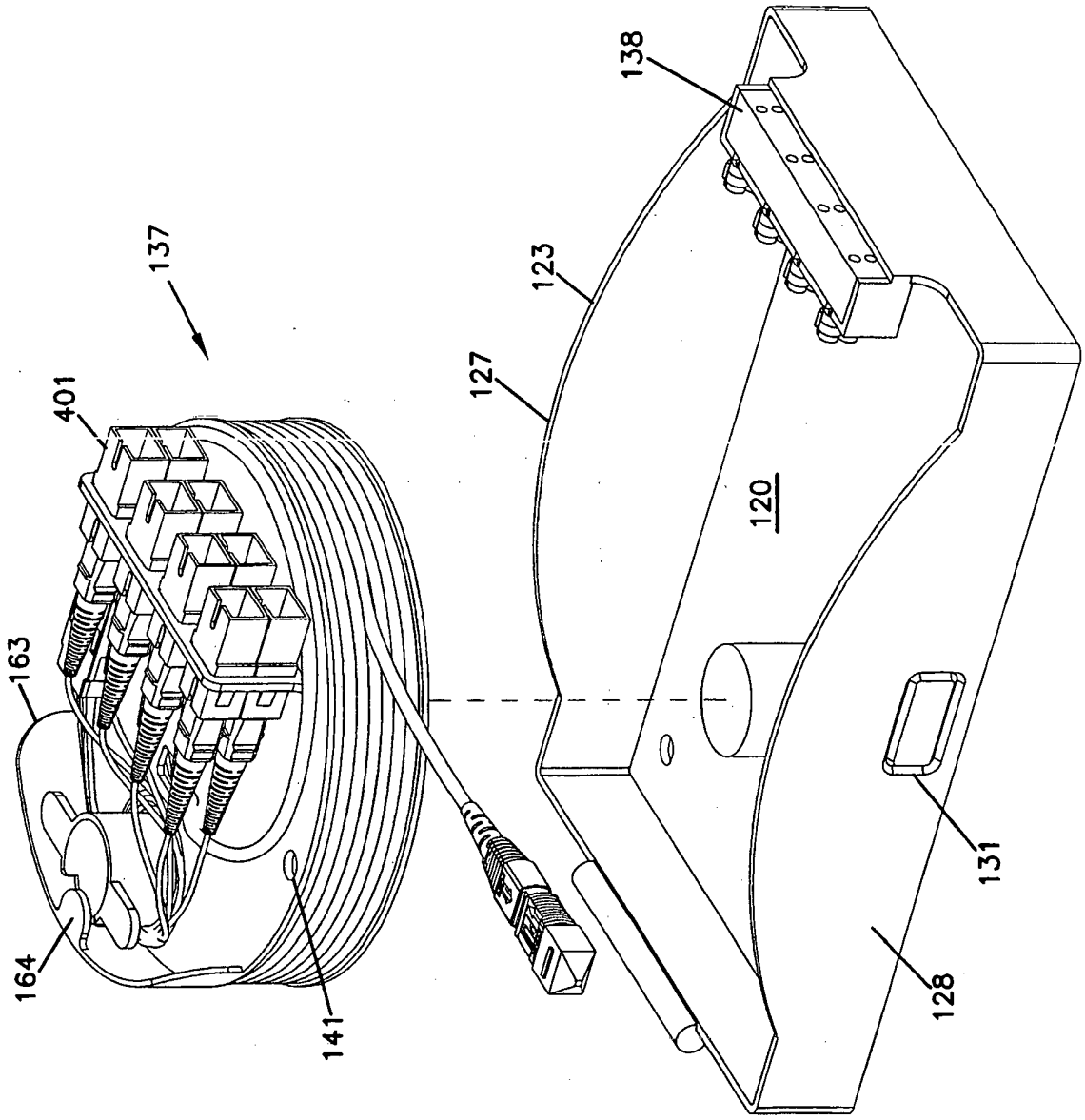


FIG. 15

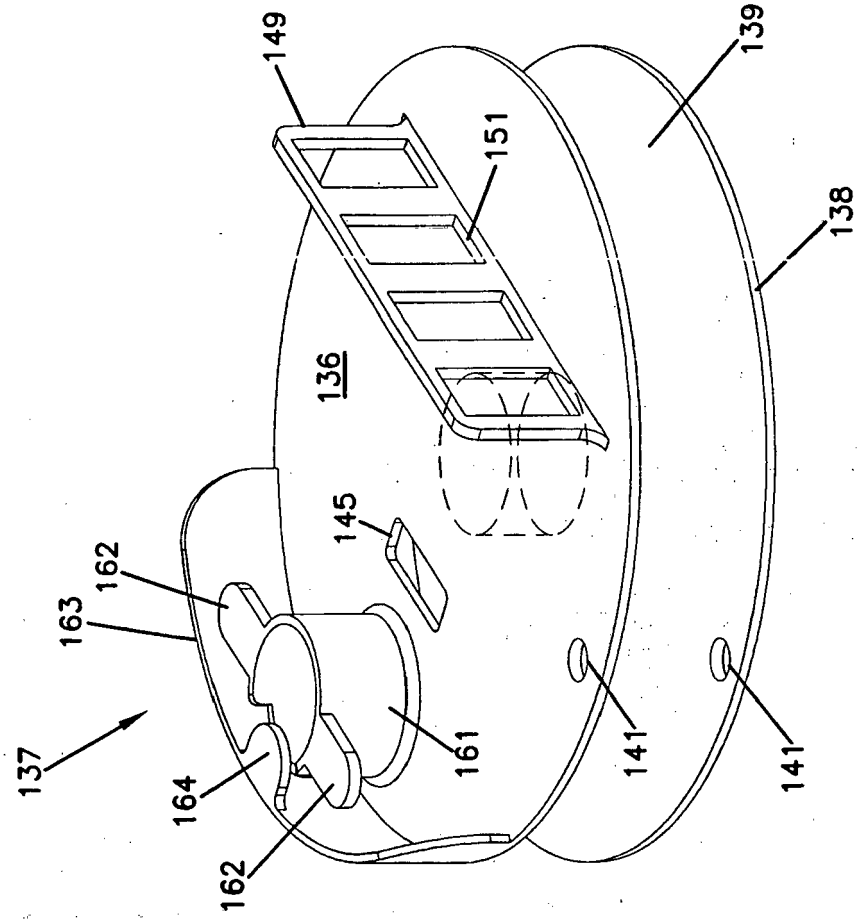


FIG. 16

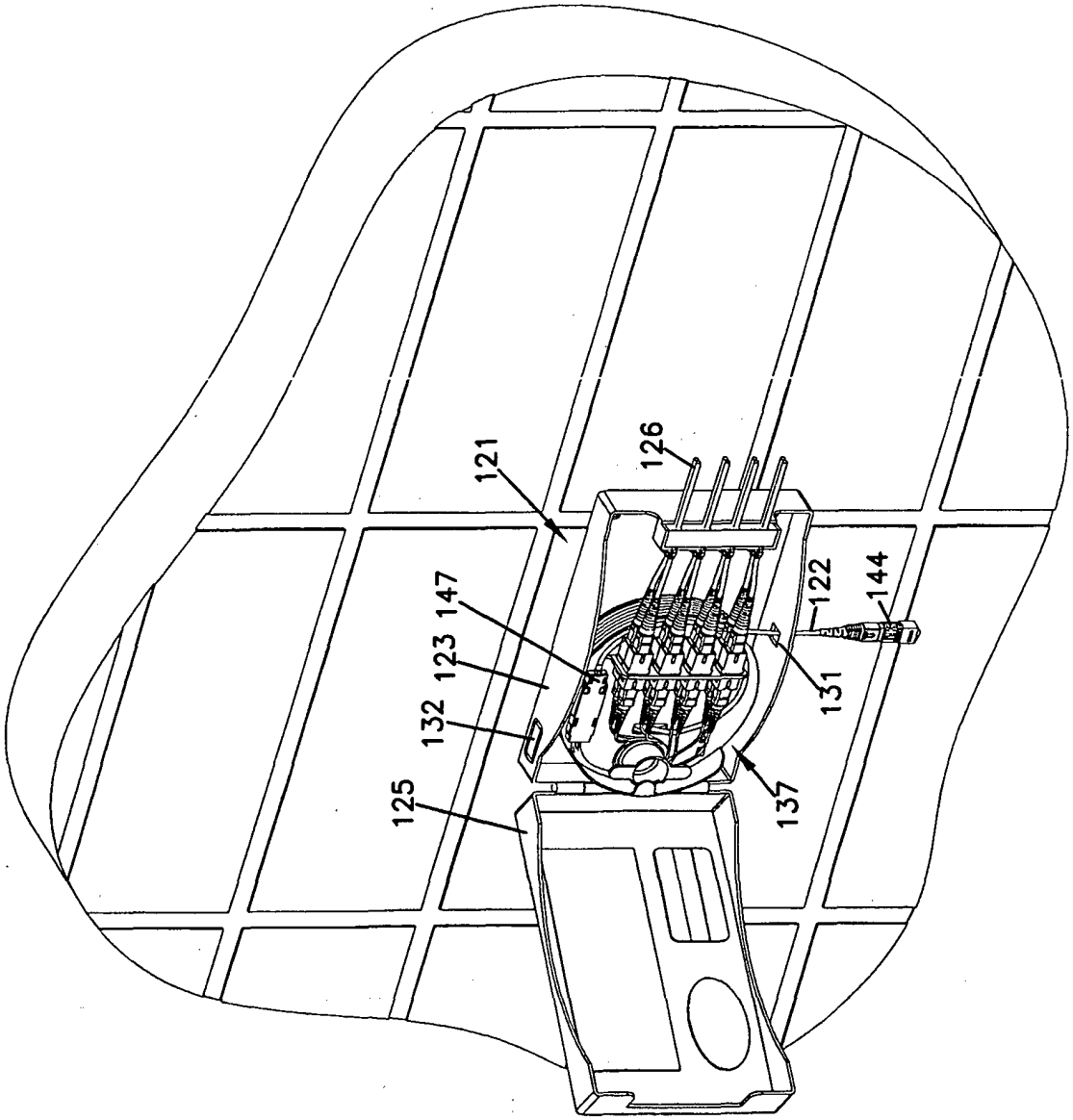
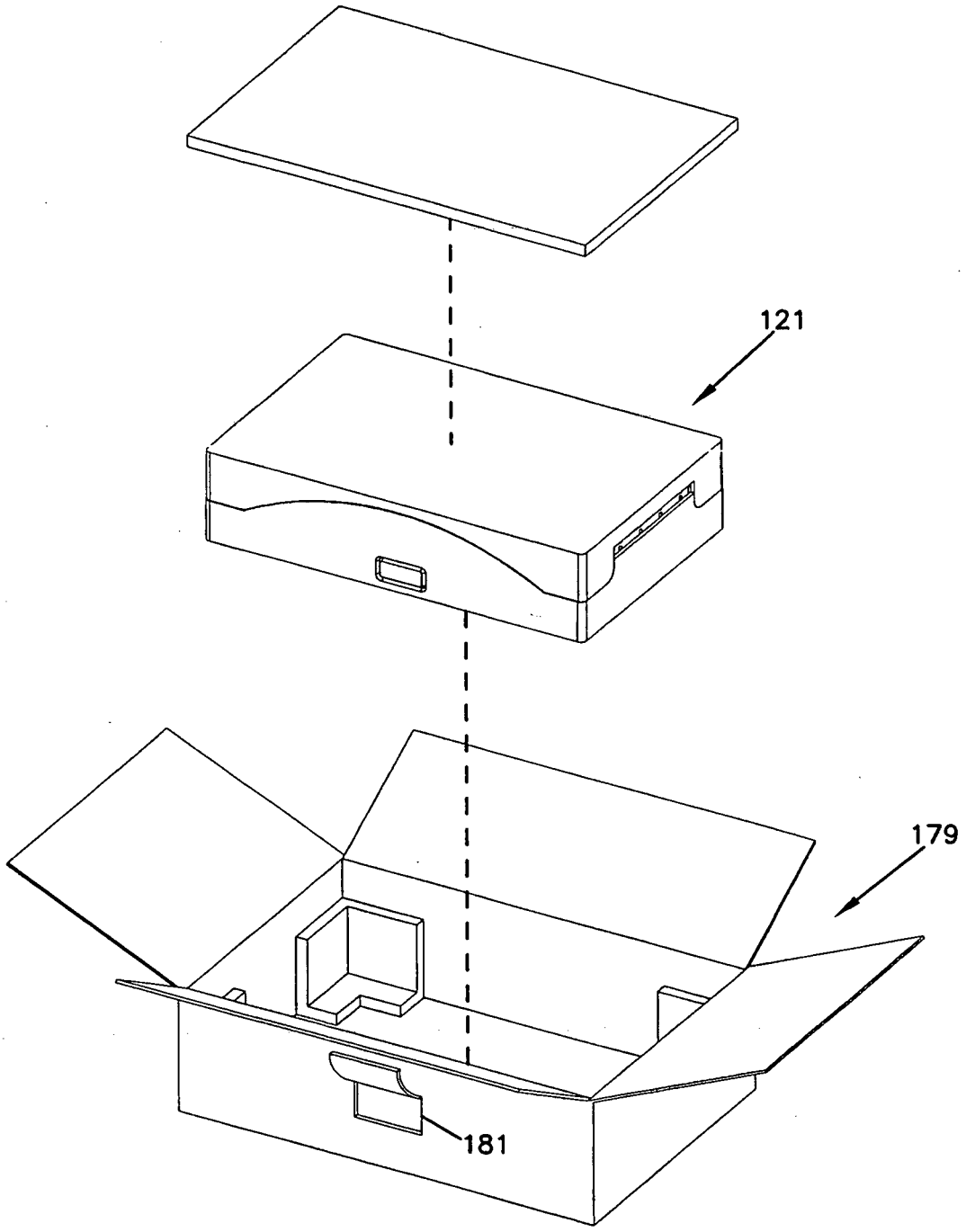


FIG. 17

FIG. 18



REFERENCES CITED IN THE DESCRIPTION

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