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(54) Title: TELESCOPING CONNECTOR ASSEMBLY

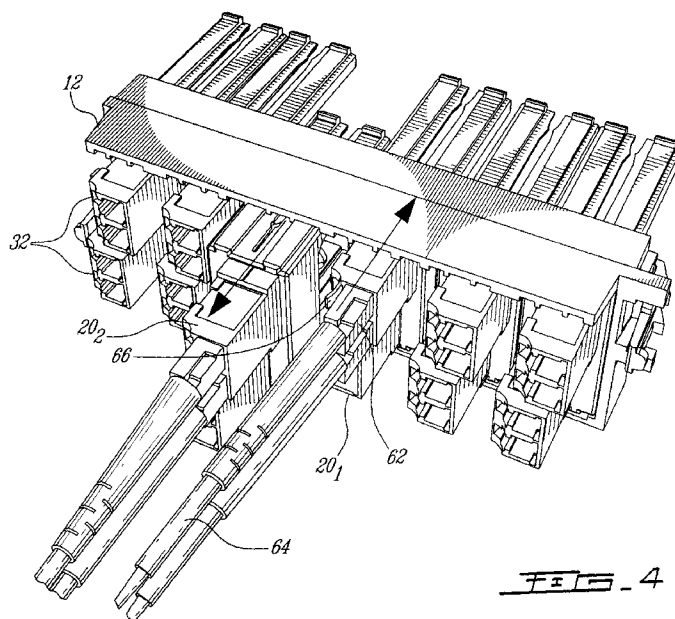


FIG. 4

(57) Abstract: A telescoping connector assembly comprising a hollow rectangular bezel adapted for mounting in a patch bay panel frame. A plurality of telescoping connectors are mounted in the bezel and are adapted for relative movement thereto between a rearward position and a forward position. For this purpose, each of the telescoping connectors illustratively comprises a subframe having a pair of upper and lower runners adapted to engage complementary pairs of upper and lower slots formed in the bezel. The runners are fabricated from a flexible material, which allows the connectors to be extracted from the bezel by applying a bending force to the runners.

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TITLE

TELESCOPING CONNECTOR ASSEMBLY

5 CROSS REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority on U.S. Provisional Application No. 60/954,934, filed on August 9, 2007 and which is herein incorporated by reference in its entirety.

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FIELD OF THE INVENTION

[002] The present invention relates to a telescoping connector assembly for use together with a variety of communications technologies such as wireless,
15 light and copper for applications in fiber optics, broadcast, industrial and telecommunications.

BACKGROUND

20 [003] The prior art discloses a variety of connector assemblies for use with patch bay panels allowing for the interconnection of cables terminated along a rearward face of the patch bay panel with cables received into sockets along the front face of the patch bay panel. Cables are typically terminated by a plug or the like which is inserted into the socket. Such plugs typically comprise a
25 latch assembly which interlocks with the socket thereby reducing the chance that a cable is inadvertently removed from its respective socket. In the event that it is wished to removed a plug from a socket, the latch must first be actuated, typically by depressing an exposed portion of the latch using the fingers or a thumb. In many cases space within the patch bays is limited and as
30 a result the density of cables which must be terminated within a given patch bay is steadily increasing. In order to accommodate the increases in density, the inter-spacing between the connectors of adjacent cables is typically

decreased.

[004] With inter-spacing sufficiently small, or when the receptacle is occluded by the sides of the rack or opening within which the connector is disposed, it becomes difficult or impossible to actuate the latches using the fingers or thumb. In order to overcome this problem, the prior art discloses using a sufficiently slim special tool to actuate the latch mechanism. Often, however, such a tool is unavailable. Additionally such tools are typically designed for use with a particular connector/plug type and therefore a multiple of such tools must ordinarily be carried.

[005] Additionally, prior art devices are difficult to access from behind, making the termination of cables or the like on the rearward side of the connectors difficult or impossible.

SUMMARY OF THE INVENTION

[006] More specifically, in order to address the above and other drawbacks, there is provided a telescoping connector assembly for mounting in a mounting opening in a face of a network equipment such as a patch panel, the assembly for interconnecting a first cable comprising a first cable plug with a second cable and comprising at least one connector comprising a first socket on a front face thereof, the socket adapted to receive the first cable plug and an interface at a rear face thereof, the interface adapted to receive the second cable, and a sliding mechanism positioned between the mounting opening and the at least one connector, the mechanism enabling movement of the at least one connector along a path arranged at an angle to the face between a rearward position and a forward position.

[007] There is also provided a telescoping connector assembly for mounting in a mounting opening in a face of a network equipment such as a patch panel and terminating a pair of cables, each of the cables comprising a cable plug.

The connector assembly comprises a pair of connectors within the mounting opening, each of the connectors comprising at a front face thereof a socket adapted to receive the cable plug, and a sliding mechanism positioned between the mounting opening and each of the pair of connectors for enabling independent movement of each of the pair of first connectors between a rearward position and a forward position along respective parallel paths arranged at an angle to the front face of the frame.

[008] There is also disclosed a method for removing a cable plug terminating a cable from a socket into which the cable plug has been secured, the cable plug further comprising a release lever for releasing the cable plug from the socket. The method comprises providing a mounting opening in a face of a network equipment, providing a sliding mechanism positioned between the mounting opening and the socket, the sliding mechanism enabling movement of the socket along a predetermined path arranged at an angle to the face between a rearward position and a forward position, sliding the socket from the rearward position to the forward position; and depressing the release lever while simultaneously retracting the cable plug from the socket.

[009] Other objects, advantages and features of the present invention will become more apparent upon reading of the following non-restrictive description of specific embodiments thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

[010] Figure 1 is a raised right front perspective view of a telescoping connector assembly in accordance with an illustrative embodiment of the present invention;

[011] Figure 2 is a front plan view of a bezel of a telescoping connector assembly in accordance with an illustrative embodiment of the present

invention;

[012] Figure 3A is a raised right front perspective view of a telescoping connector in accordance with an illustrative embodiment of the present invention;

[013] Figure 3B is a left rear perspective view of the connector of Figure 3A;

[014] Figure 3C is a front plan view of the connector of Figure 3A; and

[015] Figure 4 is a raised left front perspective view of the telescoping connector assembly of Figure 1 with a cable installed.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

[016] Referring now to Figure 1, a telescoping connector assembly, generally referred to using the reference number 10, will now be described. The assembly 10 is comprised of a hollow rectangular bezel 12 adapted for mounting to a network equipment, illustratively a patch bay panel frame 14, for example a patch panel frame adapted to fit within a standard (e.g. 19 inch) network rack (not shown). In this regard, a front face of the network equipment/frame 14 defines a mounting opening 16 adapted for receiving the bezel. A plurality of telescoping connectors as in 20 (illustratively six (6) can fit within the bezel 12 although only four (4) are shown) are mounted within each bezel 12 and adapted for sliding movement relative to the bezel 12 and to one another along a path arranged at an angle (e.g. 90 degrees as illustrated) to a front face of each bezel 12 between a connector in a normal rearward position (20₁) and a connector in a forward position (20₂).

[017] Note that although the connector assembly 10 is illustratively shown mounted to a patch bay panel frame 14, in a particular embodiment the connector assembly 10 may be used, for example, together with other devices

- 5 -

or equipment (not shown).

[018] Referring now to Figure 2, the bezel 12 comprises on a periphery thereof a locking assembly 22 providing a snap fit interlock with the edge of the patch bay panel frame 14 and securing the bezel 12 within the mounting opening. Additionally, the bezel 12 may optionally include an upper strip 24 on which an identification label or the like may be fastened. In a particular embodiment the bezel 12 may also include one or more supporting members as in 25 positioned within the bezel 12 substantially at right angles to an upper and a lower inner surface thereof (not shown) to provide for a more rigid construction. In a standard sized 19" rack typically four (4) bezels as in 12 will be used in each row of the patch bay panel.

[019] Referring now to Figures 3A, 3B and 3C, each of the telescoping connectors as in 20 comprises a subframe 26 including a planar front surface 28 defining at least one aperture as in 30 and adapted for receiving a back-to-back receptacle 32. Each back-to-back receptacle 32 illustratively comprises a pair of plug receiving sockets as in 34 on a forward face thereof and a second pair of plug receiving sockets (not shown), one of which is in back-to-back configuration with a respective one of the front sockets as in 34. Illustratively, both sockets in back-to-back configuration are adapted to receive a connector plug terminating a cable (not shown), thereby provisioning the interconnection of cables terminated along a rearward face of the patch bay panel with cables received into sockets along the front face of the patch bay panel.

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[020] Still referring to Figures 3A, 3B and 3C, illustratively two (2) LC type duplex modular back-to-back receptacles as in 32 for interconnecting fiber optic cables are provided for each telescoping connector 20. The pair of modular receptacles as in 32 are illustratively staggered within the subframe 26 in order to reduce their combined length (as overlap of the locking tabs, not shown, used to secure each receptacle as in 32 within their respective apertures as in 30 is avoided). In a particular embodiment the connection modules could

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otherwise be arranged in rows and include different receptacles supporting different technologies, in particular those related to fiber optics, such as LC, ST, SC, FC, MTJR, or MPOtype receptacles and the like. Additionally, with appropriate modifications each connector 20 could also be adapted to receive multiple connectors of different copper technologies such as RJ-45, MDVO, Keystone, IDC compatible connectors or the like. Of note is that space which remains free on the front surface 28 can also be used for adhering labels or the like (not shown) for identification purposes. Alternatively, or additionally, the connectors as in 20 and/or the back-to-back receptacles as in 32 may be color coded to indicate a particular type of technology or for other identification purposes. Additionally of note is that, although the receptacles as in 32 are shown as being modular and adapted for insertion into their respective apertures as in 30, in a particular embodiment the receptacles as in 32 and/or their respective sockets 34 could be molded or otherwise formed directly in the subframe 22.

[021] Referring back to Figure 2 in addition to Figures 3A, 3B and 3C, each connectors as in 20 is comprised of a pair of generally parallel and opposed runners or running surfaces, such as an upper runner 36 and a lower runner 38. The upper runner 36 and the lower runner 38 are illustratively manufactured from a flexible and non-conductive material such as plastic and engage complementary pairs of upper and lower elongate slots as in 40 formed in the bezel 12. In order to prevent the connectors as in 20 from being easily removed from the bezel 12, each of the runners as in 36, 38 is provided with a raised lip 42 which engages a rearward edge of the bezel 12 when a connector as in 20 is in the forward position. Provision of a flexible material used in fabrication of the pairs of runners 36, 38 allows the connectors as in 20 to be extracted by the bezel 12 by applying a bending force to the pairs of runners 36, 38 (for example by gripping the pairs of runners 36, 38 between opposed finger and thumb and applying a suitable gripping force) such that the raised lips 42 clear the rearward edge of the bezel 12.

[022] One advantage of providing for removal of the connectors as in 20 is that the connectors as in 20 can be replaced with others, for example having a different technology (as will be discussed in more detail below). Another advantage of providing for removal of the connectors as in 20 is that the reverse side of the connector 20 can be more readily accessed thereby allowing, for example, cables (not shown) to be easily attached to the rearward side of the connector 20 or easily removed for cleaning, or repair or the like. In this regard, typically during installation of fiber optic cables the ends of the cables must be cleaned of dust and the like to ensure good transmission of light signals via the connector 20. This is typically carried out using a small rotary brush or the like (not shown). Provision of access to the rearward side of the connector 20 can improve the quality of the cleaning which can be carried out and therefore the resultant connection. Additionally, provision of removable connectors as in 20 allows a patch bay frame (not shown) to be preinstalled with a plurality of bezels 12 which can subsequently, for example following installation of the frame in a network rack or the like (also not shown), be stocked with suitable telescoping connectors as in 20 (for example, and as will be discussed in more detail below, of different communication technologies or the like) in the field.

[023] Still referring to Figure 2 in addition to Figures 3A, 3B and 3C, an open ended upper slot 44 is defined by the upper runner 36 and a similar open ended lower slot 46 is defined by the lower runner 38. A corresponding series of bosses as in 48 are provided along the upper inner surface 50 and lower inner surface 52 of the bezel 12. When a connector 20 is mounted within the bezel 12 at a particular position, a corresponding boss 48 is positioned within a respective one of the slots 44, 46. Pairs of opposed teeth as in 54 are provided projecting into the slots 44, 46 at various positions along the inside of the runners 36, 38 which engage the boss 48 when the connector 20 is moved between the forward position and the rearward position within the bezel 12. The teeth as in 54 provide both tactile feedback as to whether the connector is in a given position as well as providing some protection against inadvertent

movement of the connector 20 within the bezel 12 (for example when a cable, not shown, is tugged on or the like). In particular embodiment, a series of opposing teeth as in 54 are provided such that the connector 20 may be positioned at a plurality of positions relative to the bezel 12, similar in action to a ratchet mechanism or the like. One advantage of this configuration when in use together with copper wire technologies (such as the ubiquitous twisted pair conductors, not shown) is that the positioning of the connectors relative to one another can be adjusted in order to potentially reduce cross talk.

[024] Still referring to Figure 2 in addition to Figures 3A, 3B and 3C, in order to ensure correct orientation or polarization of the connectors as in 20 within the bezel, ridges as in 56 are provided along the outer edges 58 of the runners 36, 38. The ridges as in 56 are adapted to be engaged by corresponding channels as in 60 molded or otherwise formed across the upper and lower inner surfaces 50, 52 of the bezel 12. Illustratively the ridges as in 60₁ along the upper runners 36 are of different width than the ridges as in 60₂ along the lower runners 38 (as are the widths of their corresponding slots as in 60). As a result, if the connector 20 is inadvertently reversed it will be unable to be correctly installed within the bezel 12. Additionally, the ridges 56 are illustratively of slightly increasing width along their length from front to back which provides additional tactile clues as to the position of the connector 20 within the bezel 12 as well as providing for increased pressure on the rearmost opposed teeth as in 54.

[025] Referring now to Figure 4, in operation a cable plug 62 terminating a cable 64 is inserted into a respective one of the receptacles as in 32 and secured therein via a latch mechanism 66 which is engaged by a latch engaging structure (not shown) on the receptacle 32. As will now be apparent to a person of skill in the art, given the high density of receptacles as in 32, the individual receptacles as in 32 are difficult to access. In order to simplify access to a particular receptacle as in 32, the telescoping connector 20 is slid forward in the bezel 12 until in the forward position as indicated. As will now be apparent to a person of ordinary skill in the art, when a given telescoping

connector 20 is placed individually in a forward position, the latch mechanism 66 of a given cable plug 62 is rendered more easily accessible. Additionally, the interconnection between the receptacle 30 and the subframe 22 could be modified such that a degree of play is introduced between the receptacle 30 and the subframe 22, thereby allowing the receptacle 30 to pivot (or bend) slightly relative to the subframe 22.

[026] Still referring to Figure 4, typically, the runners as in 36, 38 are of the same length sufficient to provide adequate access to the latch mechanisms as in 66, illustratively about 25 mm. In a particular embodiment, however, the runners as in 36, 38 of different telescoping connectors 20 could be of different lengths, allowing, for example, the positioning of the telescoping connectors 20 to be staggered when all in the forward position.

[027] Referring back to Figure 1 in addition to Figure 4, although the fronts of the receptacles 32 are shown as projecting slightly in front of the frame 14 when in the connector is in the normal rear ward position (20_1), in a particular embodiment the bezel 12 and connectors as in 20 could be adapted such that the fronts of the receptacles 32 are flush with the surface of the frame 14 or retracted when the connector(s) are positioned in the normal rear ward position (20_1). As such, the assembly of the present invention is not only suitable for high density applications but also for recessed applications where the latch mechanisms 66 of the cable plugs 62 are not easily accessible. In this regard, the connector can be between the normal rear ward position (20_1) and the forward position (20_2) simply by pulling on the cable 64.

[028] Although the present invention has been described above by way of specific embodiments thereof, it can be modified without departing from the spirit and nature of the subject invention as defined by the appended claims.

We Claim

1. A telescoping connector assembly for mounting in a mounting opening in a face of a network equipment, the assembly for interconnecting a first cable comprising a first cable plug with a second cable and comprising:

at least one connector comprising a first socket on a front face thereof, said socket adapted to receive the first cable plug and an interface at a rear face thereof, said interface adapted to receive the second cable; and

a sliding mechanism positioned between the mounting opening and said at least one connector, said mechanism enabling movement of said at least one connector along a path arranged at an angle to the face between a rearward position and a forward position.

2. The telescoping connector assembly of Claim 1, wherein the network equipment is a patch panel.

3. The telescoping connector assembly of Claim 1, wherein said angle is a right angle.

4. The telescoping connector assembly of Claim 1, wherein the second cable comprises a second cable plug, and said interface comprises a second socket adapted to receive the second cable plug.

5. The telescoping connector assembly of Claim 4, wherein the first cable plug comprises a first ferrule and the second cable plug comprises a second ferrule and wherein when the first cable plug is inserted into said first socket and the second cable plug is inserted into said second socket, the first ferrule is aligned with and touching the second ferrule.

6. The telescoping connector assembly of Claim 1, wherein the patch panel has a longitudinal width sized to fit within the network rack.

7. The telescoping connector assembly of Claim 1, wherein said at least one connector comprises a pair of opposed and substantially parallel runners extending backwards from said front face, said sliding mechanism
5 comprises a hollow rectangular bezel mounted within said mounting opening, said bezel comprising a pair of substantially flat and opposing inner surfaces and a pair of transverse slots, one of each of said pair of transverse slots in respective ones said pair of inner surfaces, and said pair of runners is spaced to fit between said pair of inner surfaces, each of said pair of runners adapted
10 to slide within a respective one of said pair of transverse slots between said rearward position and said forward position.

8. The telescoping connector assembly of Claim 7, wherein said bezel comprises a lock for releasably securing said bezel within said mounting
15 opening.

9. The telescoping connector assembly of Claim 7, comprising a plurality of said connectors, and wherein said bezel further comprises at least one transverse supporting member positioned substantially right angles to said
20 first and said second inner surface.

10. The telescoping connector assembly of Claim 7, wherein said bezel includes on an outer surface thereof a strip for fastening an identification label thereto.
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11. The telescoping connector assembly of Claim 1, wherein said angle is 90 degrees, and further wherein each of said pair of runners extends substantially at right angles to said front face.

12. The telescoping connector assembly of Claim 1, wherein said retaining means comprises a pair of raised lips, one of each of said lips provided at an end of a respective one of each of said pair of runners and
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further wherein when said connector is moved to said forward position said pair of lips engage a rear edge of said bezel.

13. The telescoping connector assembly of Claim 12, wherein said
5 pair of runners are manufactured from a flexible and nonconductive material.

14. The telescoping connector assembly of Claim 13, wherein said at
least one connector is releasably received in said bezel and is extractable there
from by applying a bending force to said pair of runners such that said pair of
10 lips clear said rearward edge.

15. The telescoping connector assembly of Claim 7, wherein each of
said pair of runners comprises a slot formed therein and said bezel further
comprises a pair of bosses, one of each of said bosses provided on a
15 respective one of said pair of opposing inner surfaces and wherein in operation,
each of said bosses slides within a respective one of said pair of slots.

16. The telescoping connector assembly of Claim 15, wherein each of
said pair of slots is open ended and extends to a rear end of its respective
20 runner, at least one of said runners further comprising a pair of opposing
teeth projecting into said open ended slot towards a rearward end thereof, each
of said pairs of teeth engaging a respective one of said bosses when said at
least one connector is in a forward position.

25 17. The telescoping connector assembly of Claim 16, wherein each of
said slots further comprises a plurality of pairs of opposing teeth arranged
along a length thereof for positioning said connector at a plurality of positions.

18. The telescoping connector assembly of Claim 7, wherein said
30 bezel further comprises first and second elongate channels, one of each of said
first and second elongate channels formed in a respective one of said pair of
inner surfaces, a first elongate ridge formed along a length of a first of said pair

of runners dimensioned to fit within said first elongate channel and a second elongate ridge formed along a length of a second of said pair of runners dimensioned to fit within said second elongate channel and wherein in operation said first ridge slides within said first elongate channel and said
5 second ridge slides within said second elongate channel.

19. The telescoping connector assembly of Claim 18, wherein said first ridge and said first channel are dimensioned different from said second ridge and said second channel thereby preventing mounting of a reversed one
10 of said connector within said mounting opening.

20. The telescoping connector assembly of Claim 18, wherein each of said first and said second ridge increase in width along a length thereof for providing a tactile feedback of a position thereof relative to said front face of
15 said frame.

21. The telescoping connector assembly of Claim 4, wherein said connector uses an optical fiber technology selected from the group consisting of LC, ST, SC, FC, MTJR and MPO.
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22. The telescoping connector assembly of Claim 1, wherein said connector uses a copper technology selected from the group consisting of RJ-45, MDVO, keystone, and IDC.

23. The telescoping connector assembly of Claim 1, wherein said connector is color-coded for identification thereof.
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24. A telescoping connector assembly for mounting in a mounting opening in a face of network equipment and terminating a pair of cables, each
30 of the cables comprising a cable plug, the connector assembly comprising:

a pair of connectors within the mounting opening, each of said connectors comprising at a front face thereof a socket adapted to receive the cable plug ; and

a sliding mechanism positioned between the mounting opening and each of said pair of connectors for enabling independent movement of each of said pair of first connectors between a rearward position and a forward position along respective parallel paths arranged at an angle to said front face of said frame.

25. The telescoping connector assembly of Claim 24, wherein each of said pair of connectors comprises a pair of opposed and substantially parallel runners extending backwards from said front face, said sliding mechanism comprises a hollow rectangular bezel mounted within said mounting opening, said bezel comprising a pair of substantially flat and opposing inner surfaces and, for each of said pair of connectors, a pair of transverse slots, one of each of said pair of transverse slots in respective ones said pair of inner surfaces, and further wherein each of said pair of runners is spaced to fit between said pair of inner surfaces, said pairs of runners adapted to slide within a respective pair of said transverse slots between said rearward position and said forward position.

26. A method for removing a cable plug terminating a cable from a socket into which the cable plug has been secured, the cable plug further comprising a release lever for releasing the cable plug from the socket, the method comprising:

providing a mounting opening in a face of a network equipment;

providing a sliding mechanism positioned between said mounting opening and the socket, said sliding mechanism enabling movement of the socket along a predetermined path arranged at an angle to said face between a rearward position and a forward position;

sliding the socket from said rearward position to said forward position;
and
depressing the release lever while simultaneously retracting the cable
plug from the socket.

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27. The method of Claim 26, wherein said angle is a right angle.

28. The method of Claim 26, wherein said network equipment is a
patch panel.

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29. The method of Claim 26, further comprising providing a connector
wherein the socket is positioned in a front face thereof, said connector further
comprising a pair of opposed and substantially parallel running surfaces
extending backwards from said front face, said sliding mechanism comprising a
15 hollow rectangular bezel mounted within said mounting opening, said bezel
comprising a pair of substantially flat and opposing inner surfaces and a pair of
transverse slots, one of each of said pair of transverse slots in respective ones
said pair of inner surfaces, wherein said pair of running surfaces is spaced to fit
between said pair of inner surfaces, each of said pair of running surfaces
20 adapted to slide within a respective one of said pair of transverse slots between
said rearward position and said forward position.

We Claim

1. A telescoping connector assembly for mounting in a mounting opening in a face of a network equipment, the assembly for interconnecting a first cable comprising a first cable plug with a second cable and comprising:

at least one connector comprising a first socket on a front face thereof, said socket adapted to receive the first cable plug and an interface at a rear face thereof, said interface adapted to receive the second cable and wherein a direction of insertion of the first cable plug into said socket is along a path at an angle to the face; and

a sliding mechanism positioned between the mounting opening and said at least one connector, said mechanism enabling movement of said at least one connector parallel to said path between a rearward position and a forward position.

2. The telescoping connector assembly of Claim 1, wherein the network equipment is a patch panel.

3. The telescoping connector assembly of Claim 1, wherein said angle is a right angle.

4. The telescoping connector assembly of Claim 1, wherein the second cable comprises a second cable plug, and said interface comprises a second socket adapted to receive the second cable plug.

5. The telescoping connector assembly of Claim 4, wherein the first cable plug comprises a first ferrule and the second cable plug comprises a second ferrule and wherein when the first cable plug is inserted into said first socket and the second cable plug is inserted into said second socket, the first ferrule is aligned with and touching the second ferrule.

6. The telescoping connector assembly of Claim 1, wherein the patch panel has a longitudinal width sized to fit within the network rack.

7. The telescoping connector assembly of Claim 1, wherein said at least one connector comprises a pair of opposed and substantially parallel runners extending backwards from said front face, said sliding mechanism comprises a hollow rectangular bezel mounted within said mounting opening, said bezel comprising a pair of substantially flat and opposing inner surfaces and a pair of transverse slots, one of each of said pair of transverse slots in respective ones said pair of inner surfaces, and said pair of runners is spaced to fit between said pair of inner surfaces, each of said pair of runners adapted to slide within a respective one of said pair of transverse slots between said rearward position and said forward position.

8. The telescoping connector assembly of Claim 7, wherein said bezel comprises a lock for releasably securing said bezel within said mounting opening.

9. The telescoping connector assembly of Claim 7, comprising a plurality of said connectors, and wherein said bezel further comprises at least one transverse supporting member positioned substantially right angles to said first and said second inner surface.

10. The telescoping connector assembly of Claim 7, wherein said bezel includes on an outer surface thereof a strip for fastening an identification label thereto.

11. The telescoping connector assembly of Claim 1, wherein said angle is 90 degrees, and further wherein each of said pair of runners extends substantially at right angles to said front face.

12. The telescoping connector assembly of Claim 1, wherein said retaining means comprises a pair of raised lips, one of each of said lips provided at an end of a respective one of each of said pair of runners and further wherein when said connector is moved to said forward position said pair of lips engage a rear edge of said bezel.

13. The telescoping connector assembly of Claim 12, wherein said pair of runners are manufactured from a flexible and nonconductive material.

14. The telescoping connector assembly of Claim 13, wherein said at least one connector is releasably received in said bezel and is extractable therefrom by applying a bending force to said pair of runners such that said pair of lips clear said rearward edge.

15. The telescoping connector assembly of Claim 7, wherein each of said pair of runners comprises a slot formed therein and said bezel further comprises a pair of bosses, one of each of said bosses provided on a respective one of said pair of opposing inner surfaces and wherein in operation, each of said bosses slides within a respective one of said pair of slots.

16. The telescoping connector assembly of Claim 15, wherein each of said pair of slots is open ended and extends to a rear end of its respective runner, at least one of said runners further comprising a pair of opposing teeth projecting into said open ended slot towards a rearward end thereof, each of said pairs of teeth engaging a respective one of said bosses when said at least one connector is in a forward position.

17. The telescoping connector assembly of Claim 16, wherein each of said slots further comprises a plurality of pairs of opposing teeth arranged along a length thereof for positioning said connector at a plurality of positions.

18. The telescoping connector assembly of Claim 7, wherein said bezel further comprises first and second elongate channels, one of each of said first and second elongate channels formed in a respective one of said pair of inner surfaces, a first elongate ridge formed along a length of a first of said pair of runners dimensioned to fit within said first elongate channel and a second elongate ridge formed along a length of a second of said pair of runners dimensioned to fit within said second elongate channel and wherein in operation said first ridge slides within said first elongate channel and said second ridge slides within said second elongate channel.

19. The telescoping connector assembly of Claim 18, wherein said first ridge and said first channel are dimensioned different from said second ridge and said second channel thereby preventing mounting of a reversed one of said connector within said mounting opening.

20. The telescoping connector assembly of Claim 18, wherein each of said first and said second ridge increase in width along a length thereof for providing a tactile feedback of a position thereof relative to said front face of said frame.

21. The telescoping connector assembly of Claim 4, wherein said connector uses an optical fiber technology selected from the group consisting of LC, ST, SC, FC, MTJR and MPO.

22. The telescoping connector assembly of Claim 1, wherein said connector uses a copper technology selected from the group consisting of RJ-45, MDVO, keystone, and IDC.

23. The telescoping connector assembly of Claim 1, wherein said connector is color-coded for identification thereof.

24. A telescoping connector assembly for mounting in a mounting opening in a face of a network equipment and terminating a pair of cables, each of the cables comprising a cable plug, the connector assembly comprising:

- a pair of connectors within the mounting opening, each of said connectors comprising at a front face thereof a socket adapted to receive one of the cable plugs and wherein a direction of insertion of the cable plug into said socket is along a path arranged at an angle to the face of the network equipment; and
- a sliding mechanism positioned between the mounting opening and each of said pair of connectors for enabling independent movement of each of said pair of first connectors parallel to said respective paths between a rearward position and a forward position.

25. The telescoping connector assembly of Claim 24, wherein each of said pair of connectors comprises a pair of opposed and substantially parallel runners extending backwards from said front face, said sliding mechanism comprises a hollow rectangular bezel mounted within said mounting opening, said bezel comprising a pair of substantially flat and opposing inner surfaces and, for each of said pair of connectors, a pair of transverse slots, one of each of said pair of transverse slots in respective ones said pair of inner surfaces, and further wherein each of said pair of runners is spaced to fit between said pair of inner surfaces, said pairs of runners adapted to slide within a respective pair of said transverse slots between said rearward position and said forward position.

26. A method for removing a cable plug terminating a cable from a socket into which the cable plug has been secured, the cable plug further comprising a release lever for releasing the cable plug from the socket, the method comprising:

- providing a mounting opening in a face of a network equipment;

providing a sliding mechanism positioned between said mounting opening and the socket, said sliding mechanism enabling movement of the socket along a predetermined path arranged at an angle to said face between a rearward position and a forward position;

sliding the socket from said rearward position to said forward position;
and

depressing the release lever while simultaneously retracting the cable plug from the socket

wherein a direction of extraction of the cable plug from the socket is parallel to said predetermined path.

27. The method of Claim 26, wherein said angle is a right angle.

28. The method of Claim 26, wherein said network equipment is a patch panel.

29. The method of Claim 26, further comprising providing a connector wherein the socket is positioned in a front face thereof, said connector further comprising a pair of opposed and substantially parallel running surfaces extending backwards from said front face, said sliding mechanism comprising a hollow rectangular bezel mounted within said mounting opening, said bezel comprising a pair of substantially flat and opposing inner surfaces and a pair of transverse slots, one of each of said pair of transverse slots in respective ones said pair of inner surfaces, wherein said pair of running surfaces is spaced to fit between said pair of inner surfaces, each of said pair of running surfaces adapted to slide within a respective one of said pair of transverse slots between said rearward position and said forward position.

Statement under Article 19 (1)

Claims were amended to define what the Applicants consider their invention, as fully supported by an enabling disclosure. In particular Claim 1 has been amended to claim a telescoping connector comprising at least one connector comprising a first socket where a direction of insertion of a first cable plug is along a path at an angle to a face of a network equipment and a sliding mechanism which enables movement of the connector parallel to the path. Similar amendments have been introduced into claims 24 and 26. No new subject matter has been added by the foregoing amendments. Indeed, Figure 1 as filed clearly indicates this relationship between the components.

Applicant submits the prior art, in particular US Patent No. 6,466,724 by Glover, et al. does not disclose a telescoping connector comprising at least one connector comprising a first socket where a direction of insertion of a first cable plug is along a path at an angle to a face of a network equipment and a sliding mechanism which enables movement of the connector parallel to the path. Indeed, the connectors of Glover et al. are clearly inserted into their respective sockets at right angles to the direction with which the connector telescopes.

Yours truly,

GOUDREAU GAGE DUBUC

A handwritten signature in black ink, appearing to read 'H. Mansfield', written over a horizontal line.

Hugh Mansfield

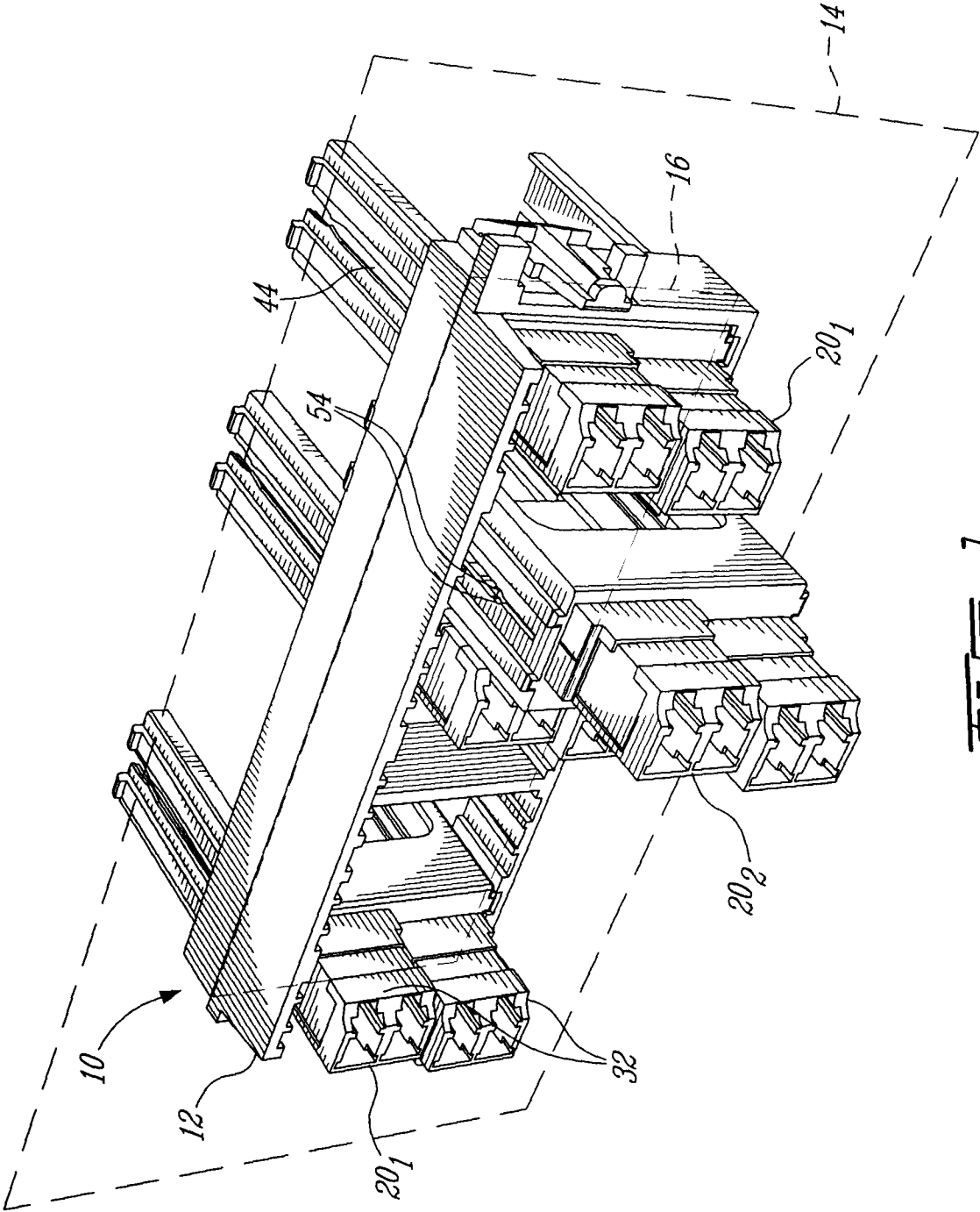


FIG. 1

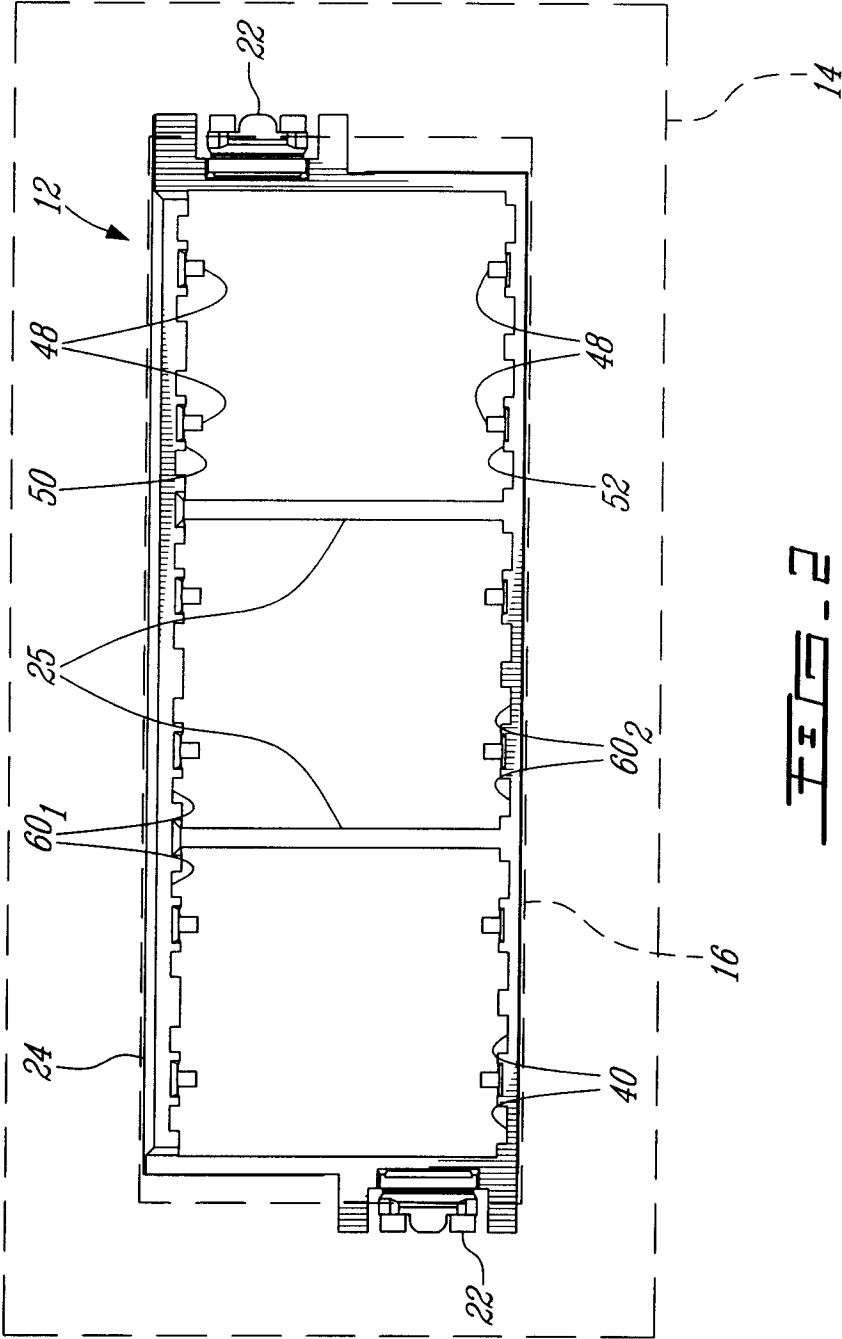
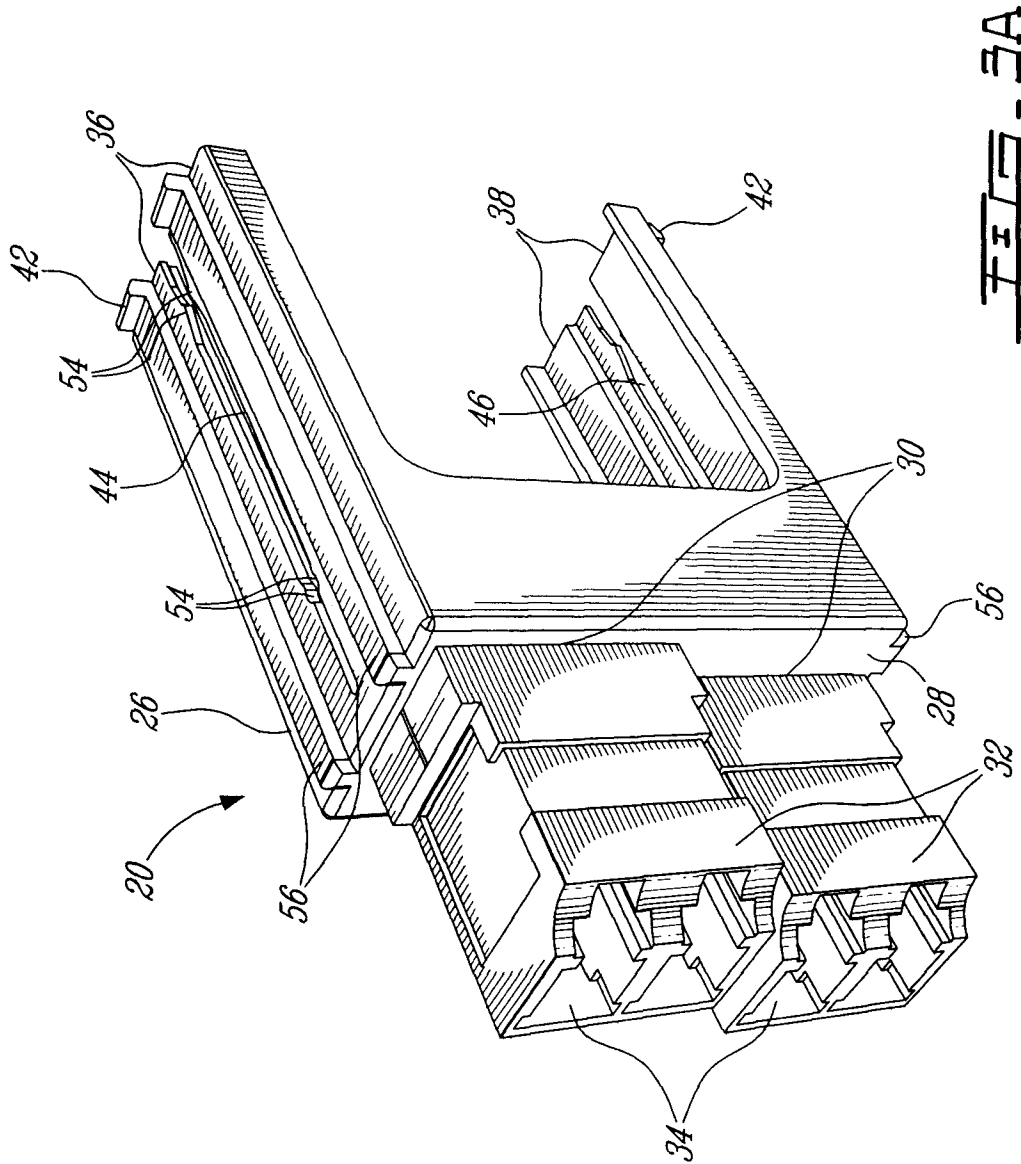


FIG. 2



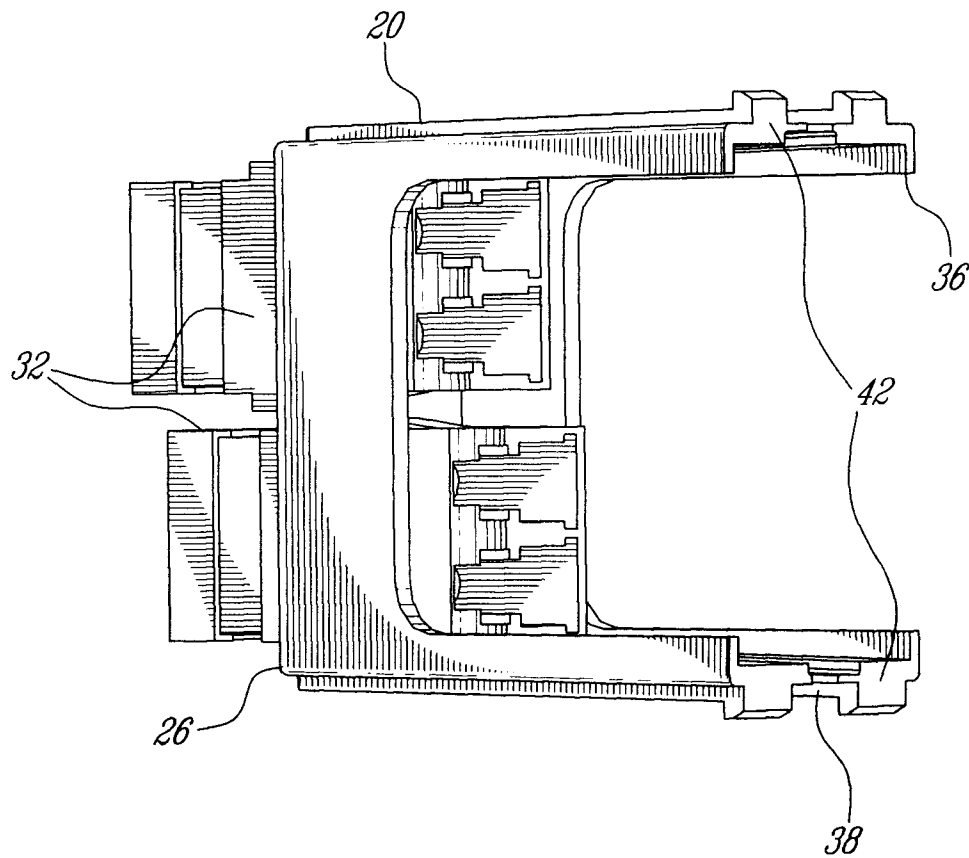


FIG. 3B

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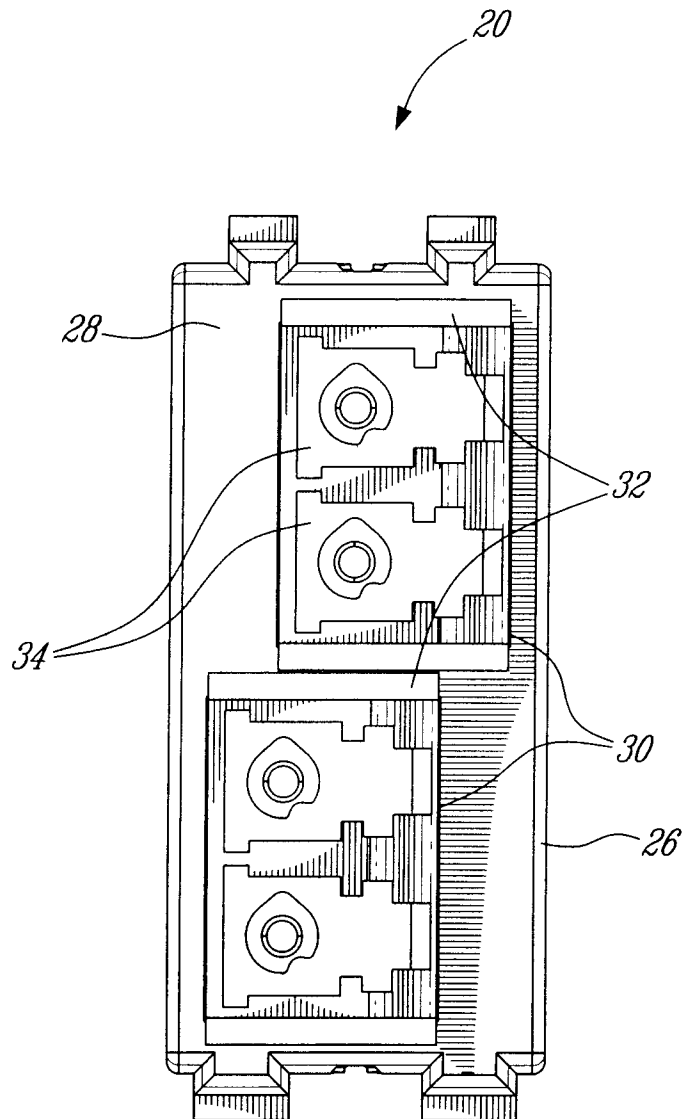


FIG. 3C

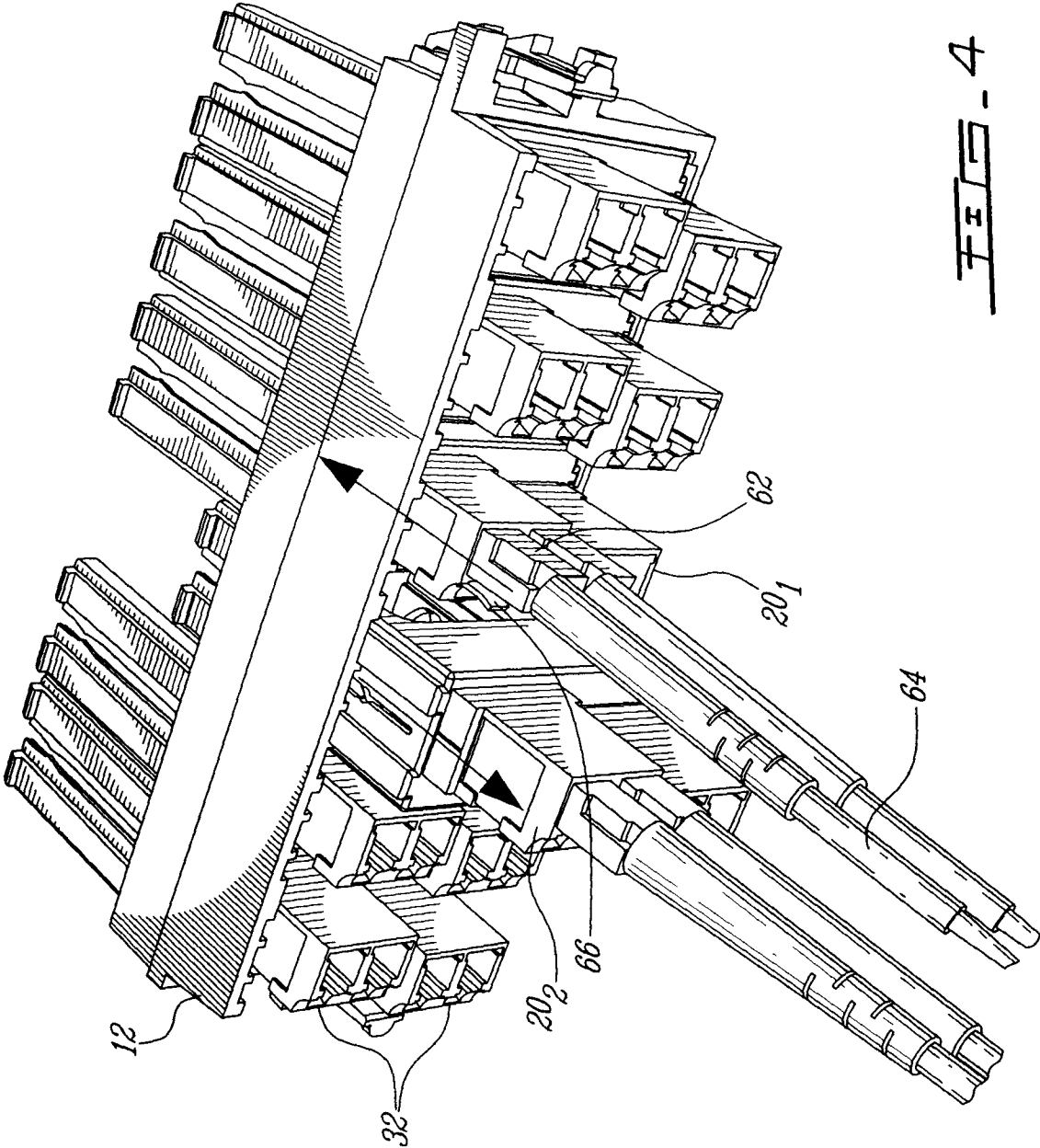


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2008/001448

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **H01R 13/502** (2006.01) , **H01R 24/04** (2006.01)
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)
IPC⁷ : H01R , H02B, H04Q, G02B 6/00

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Databases: Delphion, Espacenet, WEST
Search terms: connector, sliding, telescoping, plug, patch, retractable

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 6466724 B1 (GLOVER, R. et al.) 15 October 2004 (15-10-2002) *Whole document*	1-6, 21, 24 and 26-28 ----- 22 and 23
A	US 6761594 B2 (JOHNSEN, D. et al.) 13 July 2004 (13-07-2004) *Whole document*	1-29
A	US 5497444A (WHEELER, T.) 05 May 1996 (05-05-1996) *Whole document*	1-29
A	US 4986762 A (KEITH, R.) 22 January 1991 (22-01-1991) *Whole document*	1-29

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

14 October 2008 (14-10-2008)

Date of mailing of the international search report

12 November 2008 (12-11-2008)

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Authorized officer
Jim Triantafillou 819- 934-4268

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2008/001448

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US 6466724B1	15-10-2002	None	
US 6761594B2	13-07-2004	AT 352887T AU 2002307277A1 BR 0208848A CA 2443703A1 DE 60217856D1 DE 60217856T2 EP 1391010A2 EP 1391010B1 EP 1793454A2 EP 1793454A3 ES 2281537T3 HK 1063535A1 MX PA03009319A US 6457999B1 US 6533616B2 US 6872097B2 US 2002151221A1 US 2002151222A1 US 2003134541A1 US 2004259425A1 WO 02084802A2 WO 02084802A3	15-02-2007 28-10-2002 09-03-2004 24-10-2002 15-03-2007 21-06-2007 25-02-2004 24-01-2007 06-06-2007 13-06-2007 01-10-2007 04-05-2007 12-11-2004 01-10-2002 18-03-2003 29-03-2005 17-10-2002 17-10-2002 17-07-2003 23-12-2004 24-10-2002 04-12-2003
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