

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

US CONEC LTD.,
Petitioner

v.

SENKO ADVANCED COMPONENTS, INC.,
Patent Owner

Case IPR2024-00122
Patent No. 11,061,190

DECLARATION OF ERIC PEARSON

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND	6
A.	Overview of Duplex Fiber Optic Connectors	6
B.	Polarity in LC Duplex Connectors	18
C.	Invention Claimed in the ‘190 Patent.....	28
III.	THE ASSERTED PRIOR ART	38
A.	U.S. Publication No. 2011/0299814 to Nakagawa (EX1007)	38
B.	U.S. Patent No. 9,557,495 to Raven (EX1008).....	46
C.	U.S. Patent No. 9,684,130 to Veatch (EX1004)	49
D.	U.S. Patent No. 6,575,640 to Connelly (EX1005)	53
E.	U.S. Patent No. 8,662,760 to Cline (EX1006)	55
IV.	US Conec Has Failed to Show that Claims 1-3, 6-16, 19, and 20 of the ‘190 Patent are Invalid	56
A.	Ground 1: US Conec Has Failed to Show the Combination of Nakagawa and Raven Teaches Every Limitation of Independent Claim 1 of the ‘190 Patent	58
1.	The Nakagawa/Raven Combination Does Not Teach “the Rotatable Boot Assembly Further Comprising an Elongate Arm Extending Longitudinally From the Main Body in a Proximal Direction Along the Longitudinal Axis” (1 st Clause of Limitation 1.3.9).....	59
2.	The Nakagawa/Raven Combination Does Not Teach “the Elongate Arm Being Configured for Selectively Setting the Optical Fiber Connector to Each of a First Polarity and a Second Polarity” (2 nd Clause of Limitation 1.3.9)	68
3.	The Nakagawa/Raven Combination Does Not Teach “the Inner Round Surface [of the Main Body of the Rotatable Boot	

	Assembly] Defining a Proximal End Portion of the Boot Passageway” (Limitation 1.3.3)	77
4.	The Nakagawa/Raven Combination Does Not Teach “a Front Body Configured to Hold First and Second Ferrules” (Limitation 1.1).....	81
i.	The Nakagawa/Raven Combination Does Not Teach “the Proximal End Portion of the Back Body Configured to Couple to the Front Body” (2 nd Clause of Limitation 1.2) ..	86
B.	Ground 2: Claim 20 is Not Obvious over Nakagawa, Raven, and Cline.	90
C.	Ground 3: US Conec Has Failed to Show the Combination of Veatch and Connelly Teaches Every Limitation of Independent Claim 1 of the ‘190 Patent	90
1.	The Veatch/Connelly Combination Does Not Teach “a Back Body Having a Proximal End Portion and a Distal End Portion Spaced Apart Along a Longitudinal Axis, the Proximal End Portion of the Back Body Configured to Couple to the Front Body” (First Two Clauses of Limitation 1.2).....	91
2.	The Veatch/Connelly Combination Does Not Teach a “rotatable boot assembly comprising a main body ..., the main body comprising an inner round surface extending along the longitudinal axis” (Limitation 1.3.3)	95
3.	The Veatch/Connelly Combination Does Not Teach “the inner round surface defining a proximal end portion of the boot passageway” (Limitation 1.3.3)	107
D.	Ground 4: Claim 20 is Not Obvious over Veatch, Connelly, and Cline	111

DECLARATION OF ERIC PEARSON

I, Eric Pearson, hereby declare as follows:

I. INTRODUCTION

1. I am the President and founder of Pearson Technologies, Inc., which provides, among other things, fiber optic installation and design training, and fiber optic consulting in the following fiber optic subjects: fiber optic product design and manufacturing, design of custom fiber connections, review of fiber optic network designs and plans, specifications for materials to be incorporated into fiber optic cables, design of fiber optic equipment, and optoelectronic design. I have over 46 years of experience in fiber optic communications.

2. I am a founder of the Fiber Optic Association, an international professional society for fiber optics, and served as its Director from 1995 to 2007. I am a Fiber Optic Association Master Instructor, a Building Industry Consulting Service International (a professional association supporting advancement in information and communications technology) Master Instructor. From 1985 to 2002 I was an editorial advisor for the Fiberoptic Product News.

3. I have trained over 11,000 people in fiber optic design and installation. I have designed over 200 fiber optic cables. I have published over 50 articles on fiber optics. The Fiber Optic Association awarded me the designations: Certified Fiber Optic Technician (CFOT), Certified Fiber Optic Specialist,

Termination (Connectors) (CFOS/C), Certified Fiber Optic Specialist, Testing (CFOS/T), Certified Fiber Optic Specialist, Splicing (CFOS/S), Certified Fiber Optic Specialist, Instructing (CFOS/I), Certified Fiber Optic Specialist, Outside Plant (CFOS/O), and Certified Fiber Optic Specialist, Fiber to the Home (CFOS/H). In the 1980's, I was awarded the designation "Certified Professional Consultant" by the Society for Professional Consultants, Advisors, and Accountants. In 1986, I was chosen for inclusion in the Who's Who Of Technology. I have made more than 500 presentations on fiber optics. I have also authored more than 20 books and training manuals, 13 of which are still in print.

4. I have a Bachelor of Science degree from the Massachusetts Institute of Technology (MIT) in Materials Science and in Metallurgy. I also have a Master of Science degree in the same areas from Case Western Reserve University.

5. My qualifications are further enumerated in detail in my curriculum vitae, along with a list of selected publications, which is Exhibit 2008.

6. I am being compensated at my standard rate of \$450 per hour. My compensation is not contingent on the outcome of this proceeding or my opinion on the issues therein.

7. I have been retained by Patent Owner Senko Advanced Components, Inc. ("Patent Owner" or "Senko") to provide my opinions in the above-captioned *Inter Partes* Review proceeding involving U.S. Patent No. 11,061,190 ("the '190

Patent”, Exhibit 1001), which is titled “Small Form Factor Fiber Optic Connector with Multi-Purpose Boot Assembly”. I understand that in the above-captioned *Inter Partes* Review proceeding, US Conec Ltd. (“Petitioner” or “US Conec”) is asserting claims 1-3, 6-16, 19 and 20 of the ‘190 Patent should be invalidated.

8. In providing the testimony set out in this declaration, I have reviewed the specification and claims of the ‘190 Patent, the file history of the ‘190 Patent, US Conec’s Petition for *Inter Partes* Review of the ‘190 Patent (“Petition”), the prior art and other documents attached to the Petition, and the declaration of Mr. Brennan (“the Brennan Declaration”, Exhibit 1016). I have also reviewed the following materials attached as exhibits to the Patent Owner’s Preliminary Response:

Exhibit No.	Description
2001	International Standard IEC 61754-20
2002	Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (SKU: FODULC-SNG-4m)
2003	PolyPhaser Fiber Optic Patch Cord Duplex Uniboot LC to LC Single Mode Fiber, OFNR, Yellow 3.0mm Jacket, 5m (SKU: FPC2LCLC-USMRY30-05)
2004	Huber+Suhner LC-XD Connector
2005	L-com Fiber Coupler, LC Duplex Bronze Sleeve, Low Profile (SKU: FOA-802)
2006	Application Note: Understanding Duplex Polarity
2009	Cambridge Dictionary Definition of Elongate
2010	U.S. Patent No. 11,428,875
2011	U.S. Patent No. 11,846,813
2012	U.S. Publication No 2023/0393351
2013	U.S. Publication No. 2023/0213709

2014	Terminating and Crimping for Fiber Optics: Methods and Tips
2015	Proper Crimping Techniques are Critical When Terminating Fiber Optic Connectors
2016	The Importance of Proper Crimping in Fiber Optic Assemblies
2017	U.S. Patent No. 9,568,689
2018	U.S. Publication No. 2012/0213484
2019	U.S. Patent No. 11,525,965
2020	U.S. Patent No. 11,719,893

9. In forming my opinions, I have relied upon various legal principles as included in the Brennan Declaration and the US Conec Petition, and as explained to me by Patent Owner's counsel. My understanding of these principles is summarized below.

10. I understand that in patent law a patent's claims define the scope of protection for the claimed invention.

11. I understand that the validity of a patent's claims is determined on a claim-by-claim basis.

12. I understand that in this proceeding, Petitioner has the burden of proving that the challenged claims would have been unpatentable by a preponderance of the evidence.

13. Grounds 1-4 of the Petition argue that the claims 1-3, 6-16, 19 and 20 of the '190 Patent should be invalidated as obvious over one or more combinations of prior art references. I understand that a claim is unpatentable as obvious if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious to a person having ordinary

skill in the art at the time of the invention. I understand that obviousness is typically based on a combination of two or more prior art references and that in order to render a claim as obvious, the combination of two or more prior art references needs to meet each and every limitation of the claim.

14. I understand that the question of obviousness is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of non-obviousness.

15. I further understand that for each of its obviousness grounds, Petitioner must demonstrate a person of ordinary skill would have: (1) a motivation to combine the relevant references and (2) a reasonable expectation of success of developing the claimed invention.

16. I understand that the United States Patent and Trademark Office (“PTO”) will interpret the claims of the ‘190 Patent as they would have been understood by those of ordinary skill in the art at the time of the invention in view of the claim language itself, the patent specification, and the patent’s prosecution history. I understand the terms of a claim should be given their plain and ordinary meaning as understood by those of ordinary skill in the art, unless it is clear a different meaning was intended.

17. In forming my opinions, I have applied the understanding of one of ordinary skill in the art working at the time of the invention claimed in the ‘190 Patent, i.e., prior to July 14, 2017.

II. BACKGROUND

A. Overview of Duplex Fiber Optic Connectors

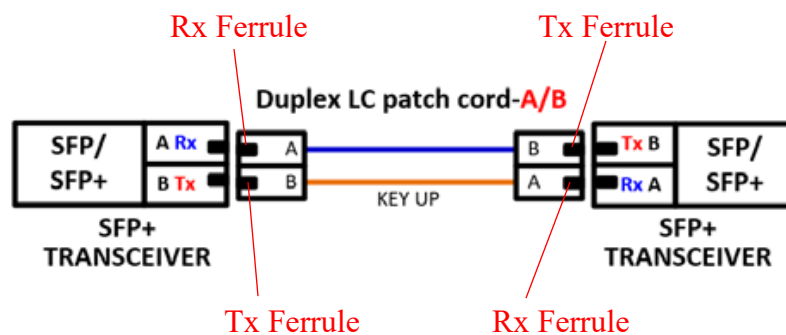
18. The ‘190 Patent pertains to a duplex fiber optic connector with two ferrules for terminating two optical fibers. EX1001: Abstract.

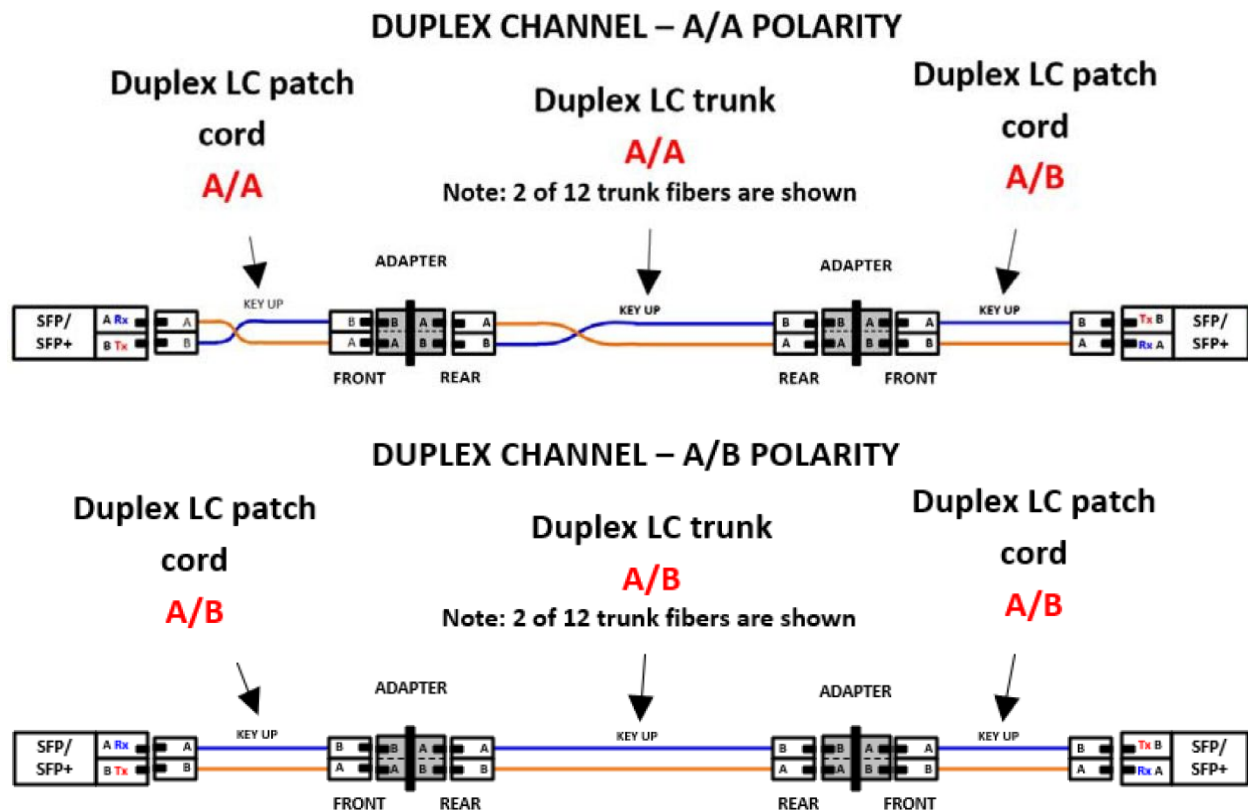
19. A duplex fiber optic connector is used to terminate the end of a fiber optic cable containing two optical fibers (e.g., a duplex fiber optic cable). Hence, the term “duplex.” This allows the optical fibers of the fiber optic cable to be optically connected to other fiber optic components. A duplex fiber optic connector mates with other fiber optic components, such as with a complementary duplex adapter and/or a complementary duplex transceiver. A duplex adapter is used to connect two duplex fiber optic connectors together to form an optical connection between the two duplex fiber optic connectors. Typically, a duplex adapter will include a receptacle on each side of the duplex adapter, one for each duplex fiber optic connector. When the two duplex fiber optic connectors are each inserted into their respective receptacle of the duplex adapter, the optical connection is formed. A fiber optic transceiver is able to send and receive fiber optic signals (i.e., pulses of light). A fiber optic transceiver includes a fiber optic

receiver that receives a fiber optic signal and converts the fiber optic signal into an electrical signal and a fiber optic transmitter that generates or transmits a fiber optic signal from an electrical signal. A fiber optic transceiver includes a receptacle for the duplex fiber optic connector. When the duplex fiber optic connector is inserted into the receptacle of the fiber optic transceiver, the fiber optic transmitter of the fiber optic transceiver is optically coupled to one of the two optical fibers terminated by the duplex fiber optic connector and the fiber optic receiver of the fiber optic transceiver is optically coupled to the other of the two optical fibers terminated by the duplex fiber optic connector. In general, fiber optic transceivers serve as a go-between between more conventional electrical communications and fiber optic communications.

20. Together a duplex fiber optic connector attached to fiber optic cable, complementary adapter(s), and the complementary transceiver(s) form an optical interconnect system. Duplex optical interconnect systems facilitate bi-directional communication over two optical fiber paths. One fiber path (e.g., an uplink fiber path) conveys an optical signal from a fiber optic transmitter at a first location to a fiber optic receiver at a second location, and the other fiber path (e.g., a downlink fiber path) conveys a signal from a fiber optic transmitter at the second location to a fiber optic receiver at the first location.

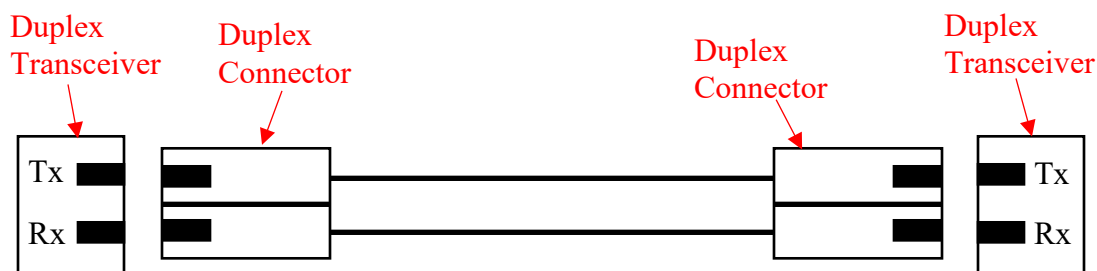
21. Example optical interconnect systems are shown below. In the diagrams illustrated below, the transmitter and receiver at the first location are part of a first fiber optic transceiver and the transmitter and receiver at the second location are part of a second fiber optic transceiver. EX2006: 1, 2. The first fiber optic transceiver at the first location has a transmit (Tx) port and a receive (Rx) port in communication with respective transmitter and receiver of the second fiber optic transceiver at the second location. At each of the first and second locations, a duplex connector terminating a two-fiber cable has a Tx ferrule and an Rx ferrule. To establish bi-directional communication, the Tx ferrule must be plugged into the Tx port and each Rx ferrule must be plugged into the Rx port, as shown in the schematic diagrams below. This way, as can be traced below, one fiber path connects the transmitter of the first fiber optic transceiver to the receiver of the second fiber optic transceiver and the other fiber path connects the transmitter of the second fiber optic transceiver to the receiver of the first fiber optic transceiver, thereby allowing the optical signals to be sent and received between the two fiber optic transceivers.





EX2006: 1, 2 (annotated).

22. If Tx and Rx ferrules are plugged into the wrong ports (e.g., the Tx ferrule is plugged into the Rx port), no bi-directional communication link will be established between the two transceivers, as shown schematically below.



Schematic Diagram Showing Tx-to-Tx and Rx-to-Rx Connections Resulting in No Bi-Directional Communication Link.

23. If Tx and Rx ferrules are plugged into the wrong ports (e.g., the Tx ferrule is plugged into the Rx port), no bi-directional communication link will be established between the two transceivers. This is because, the signals generated by the transmitter of the first fiber optic transceiver will be sent to the transmitter of the second fiber optic transceiver and vice versa. Fiber optic transmitters only generate fiber optic signals, they cannot convert fiber optic signals into an electrical signal. Therefore, in this situation, the transmitters will not do anything with the sent fiber optic signals (e.g., convert the fiber optic signals to electrical signals) and therefore the generated fiber optic signals will become lost. Likewise, fiber optic receivers only receive fiber optic signals, they cannot generate fiber optic signals. Thus, the two fiber optic receivers will be optically coupled together but no fiber optic signal will be transmitted between them.

24. Exhibit 2006 is a true and accurate copy of the Application Note: Understanding Duplex Polarity published by Leviton Manufacturing, Inc.

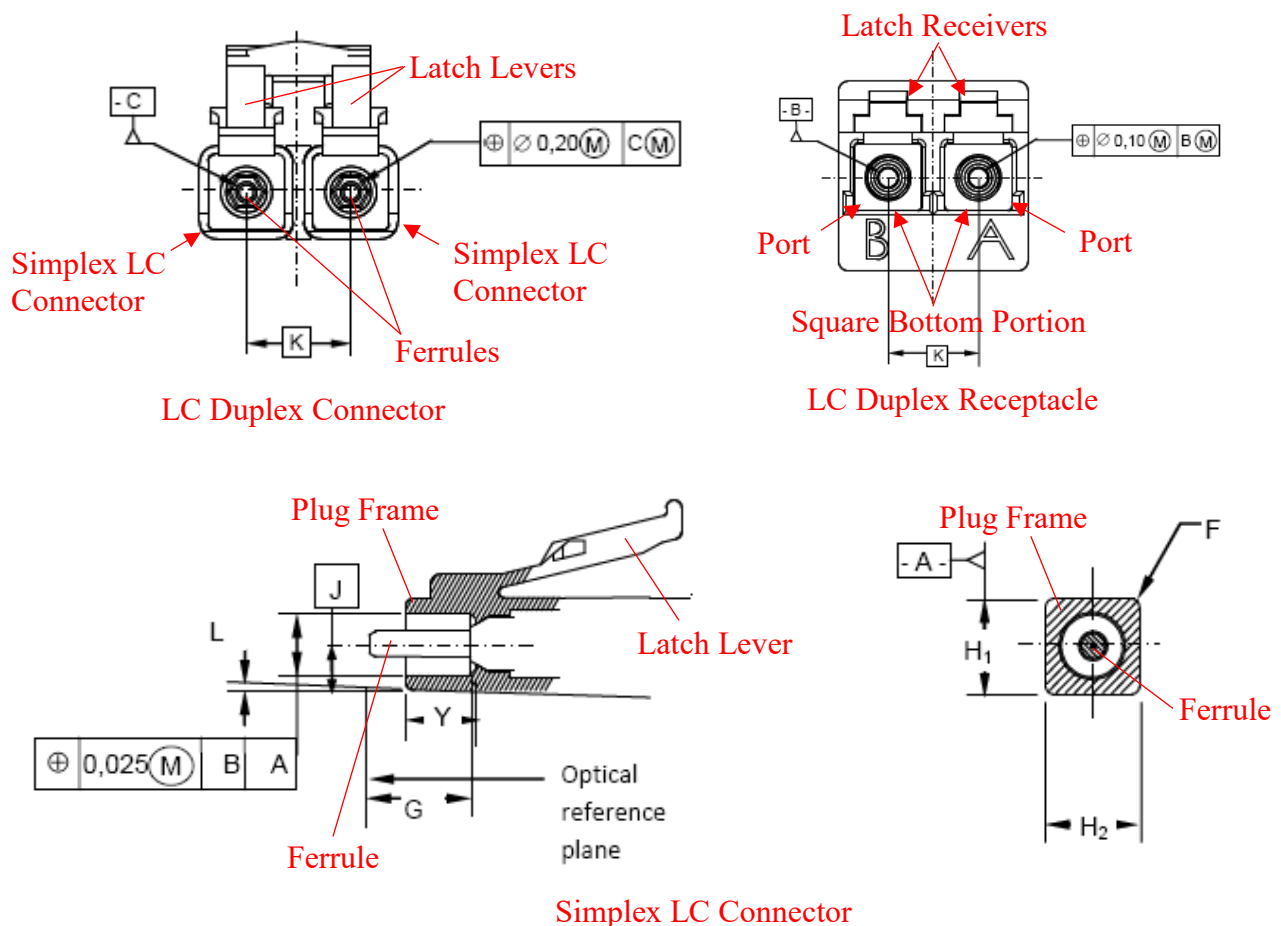
25. A copy of Application Note: Understanding Duplex Polarity is available from Leviton at https://leviton.com/content/dam/leviton/network-solutions/product_documents/application_note/Leviton_AppNote_UnderstandingDuplexPolarity.pdf.

26. A person of ordinary skill in the art would have considered Application Note: Understanding Duplex Polarity to be pertinent, relevant, and instructional within the field of fiber optic connectors.

27. Duplex optical interconnect systems have a keying feature to ensure the connector can only plug into a mating receptacle of an adaptor or of a transceiver in one orientation to ensure the bi-directional communication link is established. EX1008: 1:27-32 (“For many connector types, installers are prevented from simply unplugging the duplex cable connectors and reinserting them in another orientation because the connectors ... can only be inserted into the complementary receiving ports in one orientation.”) (emphasis added).

28. One widely used fiber optic connector is the LC duplex connector. The LC duplex connector is defined by the International Electrotechnical Commission (IEC). EX2001. As shown below, the standard LC duplex connector is made up of two simplex LC connectors held together. Each simplex LC connector includes a square plug frame that holds a spring-loaded single-fiber ferrule. A latch lever is positioned on top of each plug frame. The latch lever

functions as both a latch that secures the connector to the adapter and as a key that defines the single or mating orientation for the connector to be inserted into the adapter. The standard LC duplex receptacle includes two rectangular ports, one for each individual LC connector. Each port has a square bottom portion for mating with the square plug frame of the LC connector and an upper latch receiver configured for latching with the latch lever.



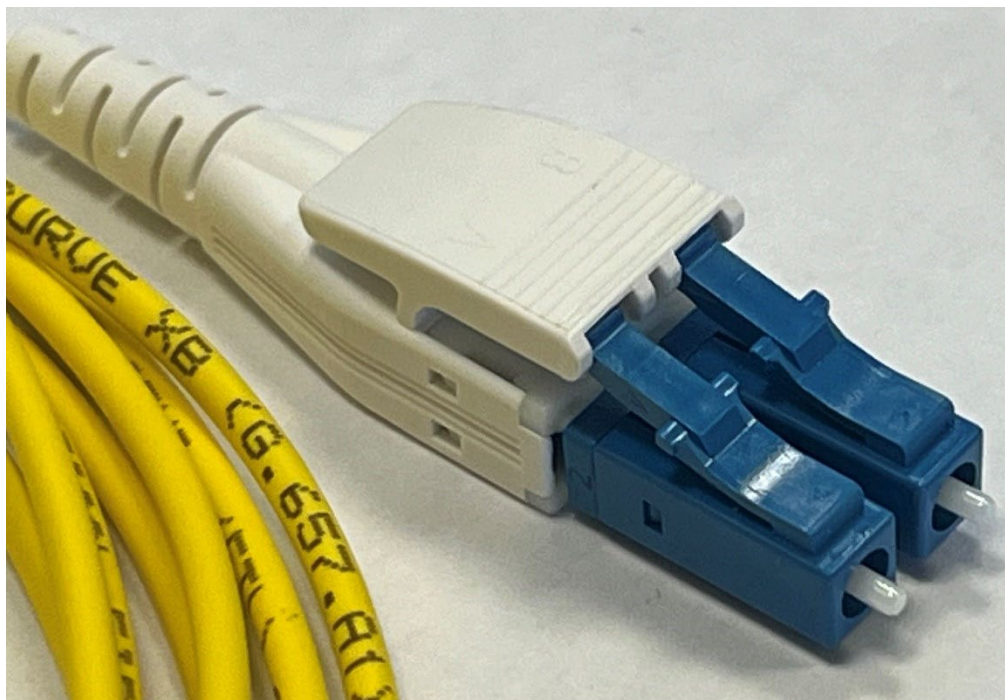
EX2001: Figs. 3, 5, and 8 (annotated).

29. Exhibit 2001 is a true and accurate copy of International Standard IEC 61754-20 published by the International Electrotechnical Commission.

30. The International Electrotechnical Commission is recognized within the fiber optic arts as a reputable organization.

31. A person of ordinary skill in the art would consider the standards published by the International Electrotechnical Commission, including the International Standard IEC 61754-20, to be authoritative within the art as of the July 14, 2017 priority date of the '190 Patent.

32. Examples of various LC duplex connectors that meet the International Standard IEC 61754-20 are shown below:

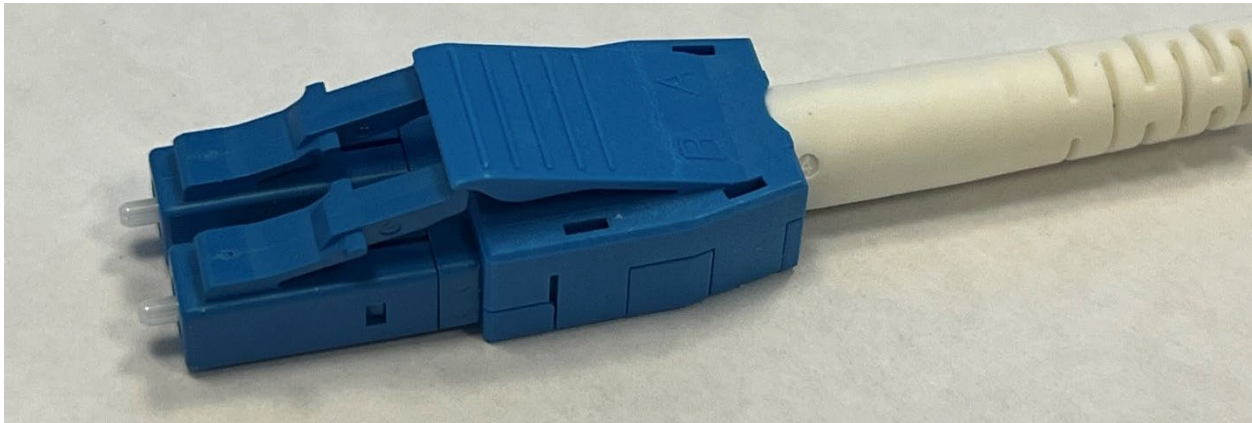


EX2002.

33. Exhibit 2002 is a true and accurate example of Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (SKU: FODULC-SNG-4m) sold by L-com.

34. A person of ordinary skill in the art would have considered Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (SKU: FODULC-SNG-4m) to be relevant within the field of fiber optic connectors as an example LC duplex connector.

35. The Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (SKU: FODULC-SNG-4m) is in Senko's counsel's possession and is available for inspection by US Conec.



EX2003.

36. Exhibit 2003 is a true and accurate example of PolyPhaser Fiber Optic Patch Cord Duplex Uniboot LC to LC Single Mode Fiber, OFNR, Yellow 3.0mm Jacket, 5m (SKU: FPC2LCLC-USMRY30-05) sold by PolyPhaser.

37. A person of ordinary skill in the art would have considered PolyPhaser Fiber Optic Patch Cord Duplex Uniboot LC to LC Single Mode Fiber, OFNR, Yellow 3.0mm Jacket, 5m (SKU: FPC2LCLC-USMRY30-05) to be relevant within the field of fiber optic connectors as an example LC duplex

connector.

38. The PolyPhaser Fiber Optic Patch Cord Duplex Uniboot LC to LC Single Mode Fiber, OFNR, Yellow 3.0mm Jacket, 5m (SKU: FPC2LCLC-USMRY30-05) is in Senko's counsel's possession and is available for inspection by US Conec.



EX2004.

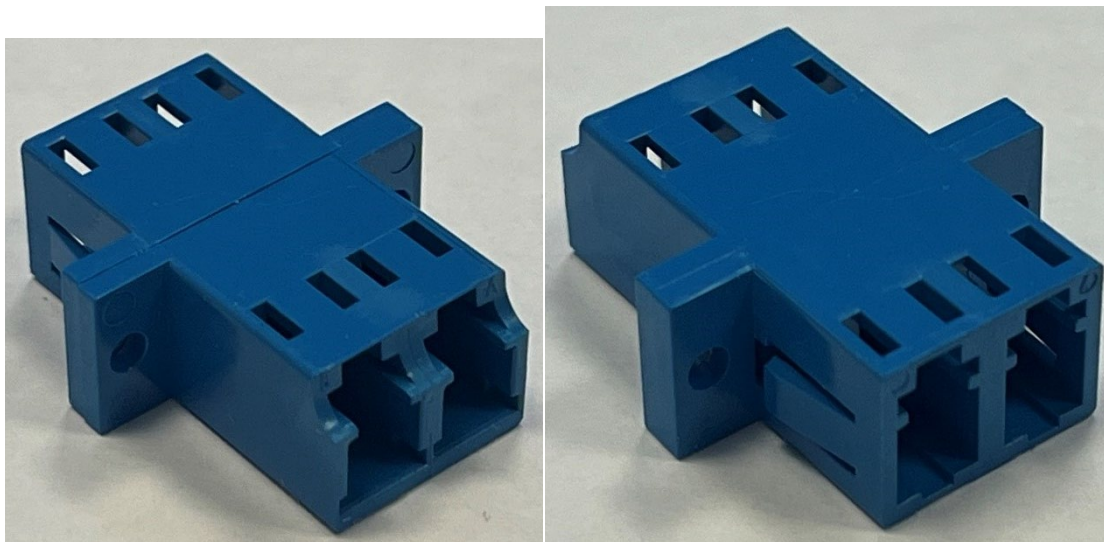
39. Exhibit 2004 is a true and accurate example of Huber+Suhner LC-XD Connector sold by Huber+Suhner.

40. A person of ordinary skill in the art would have considered Huber+Suhner LC-XD Connector to be relevant within the field of fiber optic connectors as an example LC duplex connector.

41. The Huber+Suhner LC-XD Connector is in Senko's counsel's possession and is available for inspection by US Conec.

42. An example of an LC duplex adaptor that meets the International

Standard IEC 61754-20 is shown below:



EX2005.

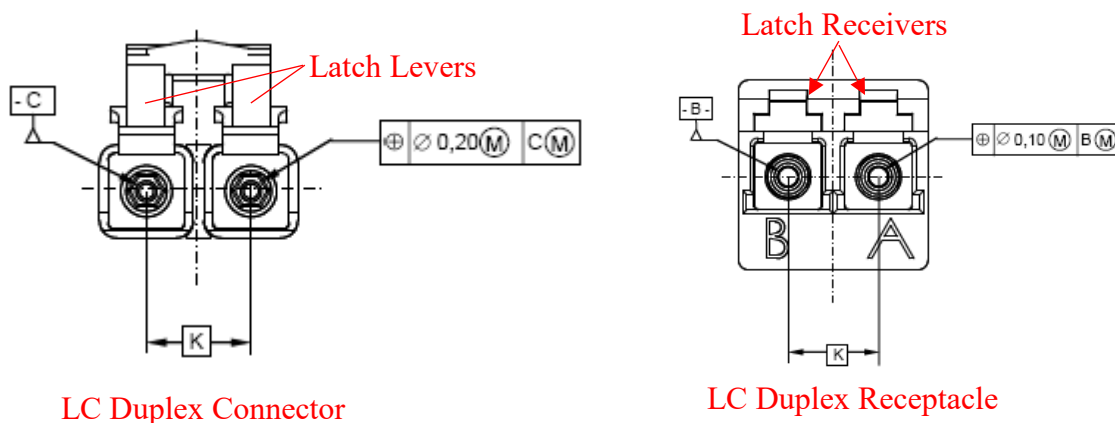
43. Exhibit 2005 is a true and accurate example of L-com Fiber Coupler, LC Duplex Bronze Sleeve, Low Profile (SKU: FOA-802) sold by L-com.

44. A person of ordinary skill in the art would have considered L-com Fiber Coupler, LC Duplex Bronze Sleeve, Low Profile (SKU: FOA-802) to be relevant within the field of fiber optic connectors as an example LC duplex adapter.

45. The L-com Fiber Coupler, LC Duplex Bronze Sleeve, Low Profile (SKU: FOA-802) is in Senko's counsel's possession and is available for inspection by US Conec.

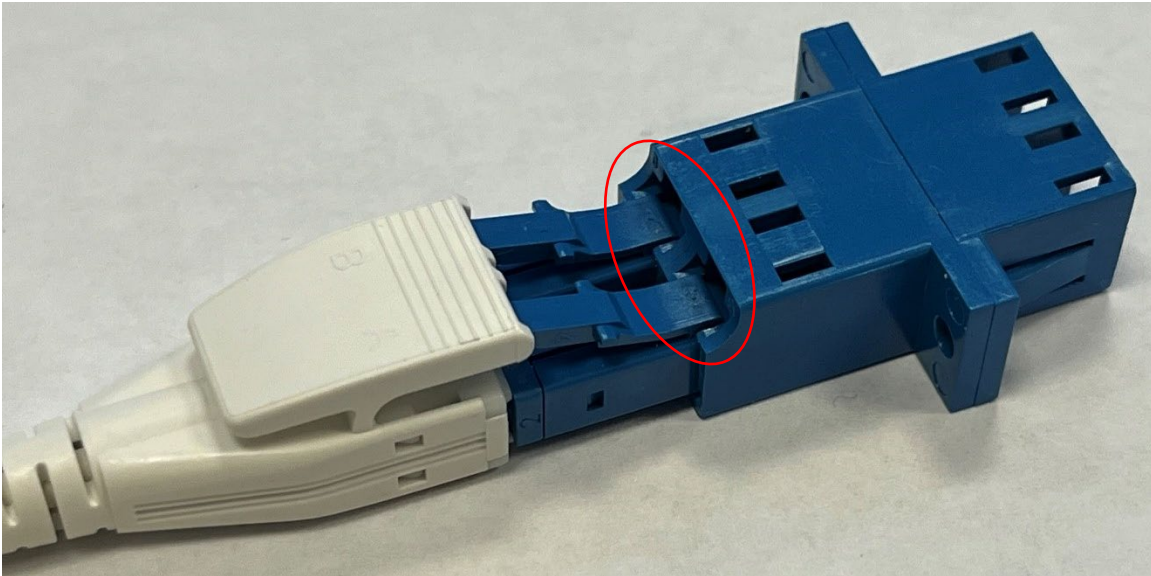
46. Referring back to the International Electrotechnical Commission's standards for LC duplex connectors and adapters, an LC duplex connector can only

plug into the LC duplex adapter in one orientation—with the latch levers facing up to align with the latch receivers of the ports. EX2001: Figs. 3 and 8. As readily appreciated by looking at the images below, the geometry of the LC duplex adapter interface (e.g., the latch receivers) allows the latch levers of the LC duplex connector to be inserted in only one orientation—the orientation where the latch receivers and latch levers are aligned. The interface geometry blocks insertion of the LC duplex connector if it is upside down in relation to the adapter. EX2001: Figs. 3 and 8. This interface geometry is shown below:



EX2001: Figs. 3 and 8 (annotated).

47. The mating of the latch levers of an LC duplex connector (EX2002) with the latch receivers of an LC duplex adapter (EX2005) is shown in the photograph below. The LC duplex connector is shown partially inserted into the receptacle of the LC duplex adapter to show the alignment of the latch levers with the latch receivers.



EX2002; EX2005 (annotated).

48. Therefore, the person of ordinary skill in the art understands and knows that the latch levers of an LC duplex connector function as keys that define *a single proper mating orientation* of the LC duplex connector and restrict the LC duplex connector to being inserted into the LC duplex adapter in only this single proper mating orientation. EX2001: 6 (“plug has a single male key”).

B. Polarity in LC Duplex Connectors

49. Turning to the concept of “polarity” in LC duplex connectors, I will discuss “polarity” in terms of LC duplex connectors because the Nakagawa (EX1007), Raven (EX1008), and Veatch (EX1004) prior art references applied by US Conec in the obviousness grounds are LC duplex connectors. EX1007: Fig. 1, ¶¶[0001], [0047]; EX1008: Fig. 1, 1:5-9, 10:66-11:3; EX1004: Fig. 2, 2:6-9. Further, the additional secondary prior art reference Cline (EX1006) is also an LC

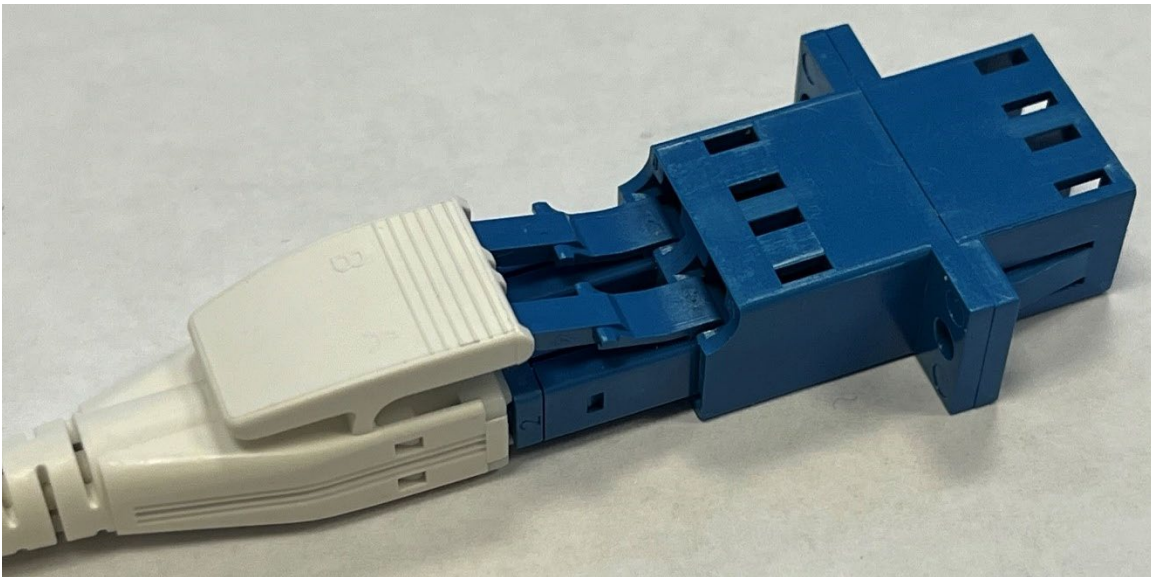
duplex connector. EX1006: Fig. 2, 2:65-67. The other secondary prior art reference applied by US Conec, Connelly (EX1005) is also a duplex connector, although not a standard LC duplex connector (e.g., is not a duplex connector that meets the standards as set forth in International Standard IEC 61754-20). EX1005: Fig. 1.

50. In general, “polarity” refers to the relative positions of the Tx and Rx ferrules in the connector when the connector is inserted into a corresponding adapter. Similarly, polarity refers to the relative positions of the Rx and Tx ferrules when the connector is inserted into a transceiver. For simplicity, I will focus on the connector inserted into an adapter. It is understood that mating/inserting a connector into an adapter is the same as inserting the connector into a transceiver.

51. To talk about polarity, we first need to establish *a frame of reference for the LC duplex connector* to describe the relative positions of the Tx and Rx ferrules within the connector. Because the latch levers of an LC duplex connector function as the key of the LC duplex connector that allows insertion into a standard LC duplex adapter in *only one orientation* (e.g., a mating orientation), as explained above, a connector’s “polarity” is defined by the positions of the Tx and Rx ferrules in relation to the key, in this case the latch levers.

52. For simplicity, I will discuss polarity in terms of the positions of the

Tx and Rx ferrules when the latch levers are on top of the connector. In other words, the LC duplex connector oriented with the latch levers on top will be the frame of reference used to discuss the polarity of LC duplex connectors. Orienting the LC duplex connector such that the latch levers are on the top side of the connector is the common mating orientation for inserting the connector into an LC duplex adapter. This is because it is easier to remove the LC duplex connector from the LC duplex adapter when pressing down on the latches. In practice, pushing up on the latches (if the mating orientation is flipped over and the latches are on the bottom) is more difficult than pushing down.



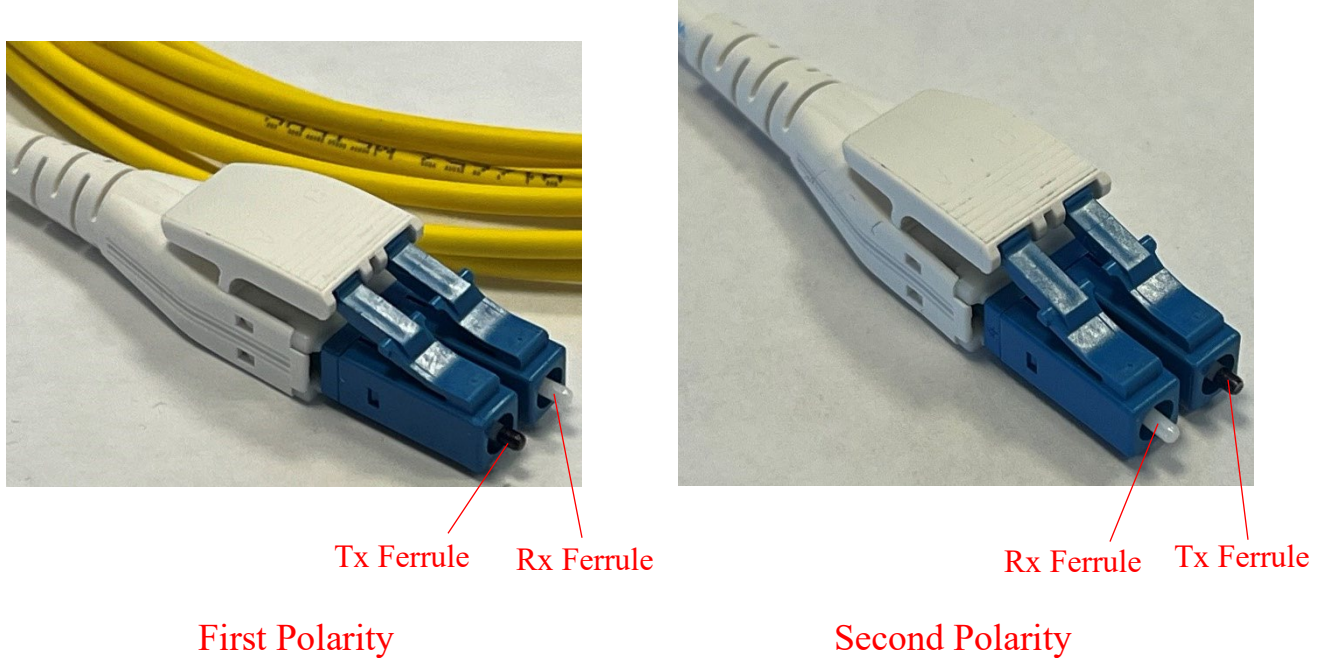
EX2002; EX2005 (a LC duplex connector partially inserted into a receptacle of a LC duplex adapter).

53. In order to make proper optical connections in an optical interconnect system, it is essential that the LC duplex connector's polarity matches the polarity

of the LC Duplex adapter with which the connector is mated. Matching polarity results in the Tx ferrule of the connector mating with the Tx port of the adapter and the Rx ferrule of the connector mating with the Rx port of the adapter to establish optical communication. Otherwise, the optical communication would not occur. When installed incorrectly, the LC duplex connector will have the wrong polarity for the adapter in the field. EX1008: 1:23-27. For example, the position of the Tx and Rx ferrules in relation to the latch levers would cause the Tx ferrule to mate with the Rx port and the Rx ferrule to mate with the Tx port when the LC duplex connector is inserted into the LC duplex adapter. To fix this, it is necessary to change the polarity of the LC duplex connector by changing the positions of the Tx and Rx ferrules in relation to the latch levers. This way, the Tx ferrule will mate with the Tx port and the Rx ferrule will mate with the Rx port.

54. An example of such a polarity change for an LC duplex connector is shown below. In this example, the positions of the Tx and Rx ferrules relative to the latch levers is different between the two polarities. Note, that in both polarities, the LC duplex connector is in the mating orientation, with the LC duplex connector orientated such that the latch levers are on the top side of the connector. The LC duplex connector has a first polarity when the Tx ferrule (black) is on the left, the Rx ferrule (white) is on the right, **and** the latch levers are on the top. The LC duplex connector has a second polarity when the Tx ferrule is on the right, the Rx

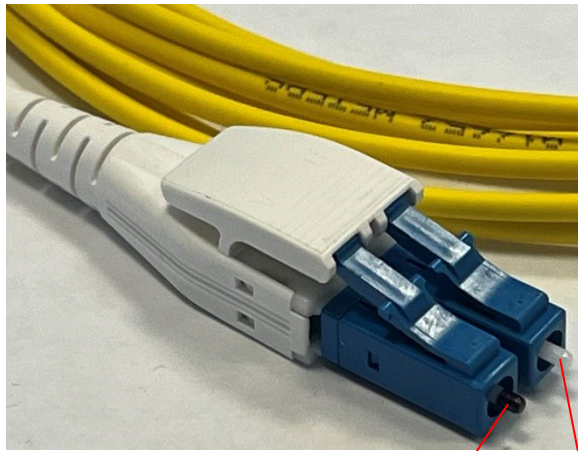
ferrule is on the left, **and** the latch levers are on top. The images show the same duplex LC connector in two different polarities. One ferrule has been colored black to clearly show the positions of the ferrules switching sides based on whether the connector is in the first polarity or the second polarity. The “first polarity” image shows the black-colored ferrule on the right-hand side of the connector and the “second polarity” image shows the same back-colored ferrule on the left-hand side of the connector.



EX2002 (annotated).

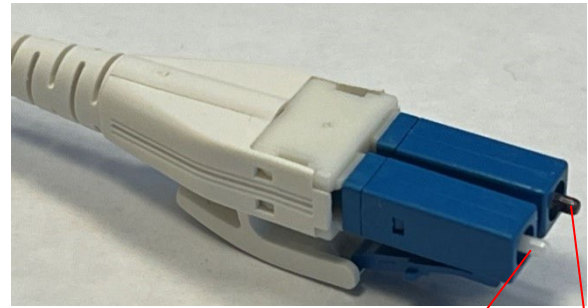
55. Changing polarity is not as simple as just flipping the LC duplex connector over. ***It is not possible*** to change the polarity of an LC duplex connector by flipping the entire connector over. EX1008: 1:27-32; EX1007: ¶[0012]. This is because LC duplex connectors can only be inserted into the LC duplex adapters in

one orientation—the mating orientation—and therefore the connector is not able to be connected to the adapter in this flipped over orientation. EX1008:27-32; EX1007: ¶[0012]. Because the LC duplex connector will always have to return to the mating orientation to be inserted into the LC duplex adapter, simply flipping the LC duplex connector over does nothing. In other words, while the entire connector may have changed orientation in its flipped-over state, the positions of the Tx and Rx ferrules in relation to the latch levers (the frame of reference for polarity) have not changed, as shown below. For example, when the LC duplex connector is reoriented from the orientation shown in the right image below to the mating orientation shown in left image below, the positions of the Tx and Rx ferrules will be as is shown in the left image. Hence, this LC duplex connector, while in different orientations in the images below, has the same polarity in each image. For the polarity of this LC duplex connector to change, the positions of the Tx and Rx ferrules need to switch positions when the connector is in the mating orientation, as shown in the images above.



Tx Ferrule Rx Ferrule

First Polarity (latch levers on top)

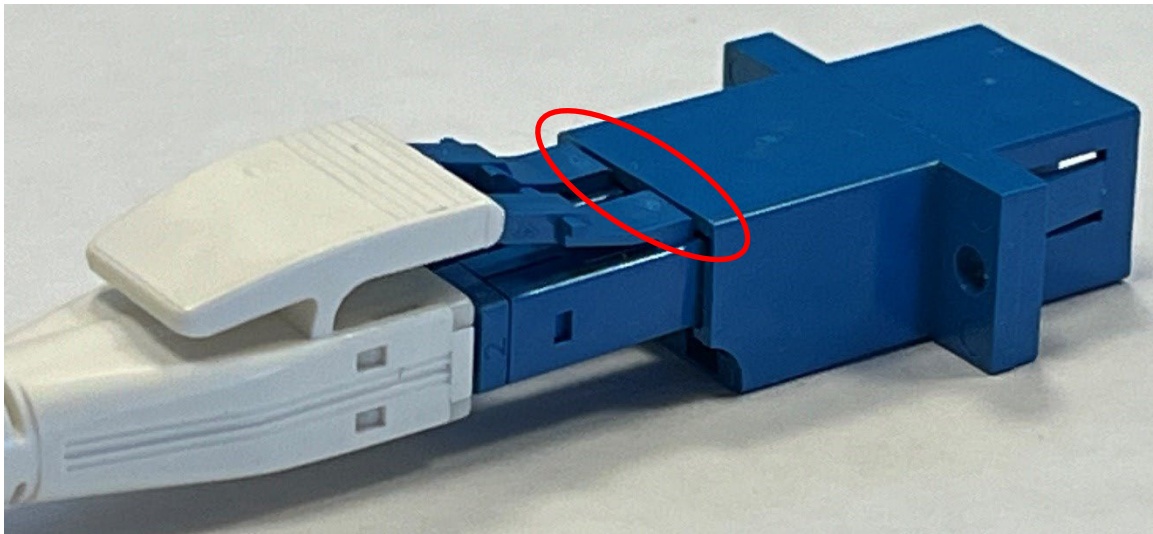
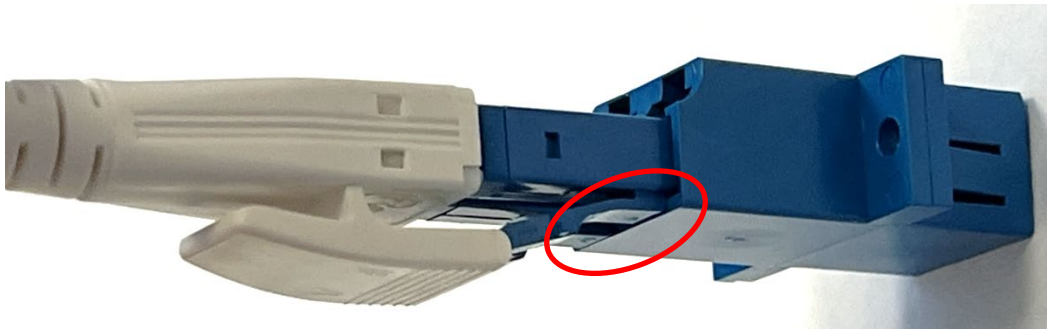


Rx Ferrule Tx Ferrule

First Polarity (latch levers on bottom)

EX2002 (annotated).

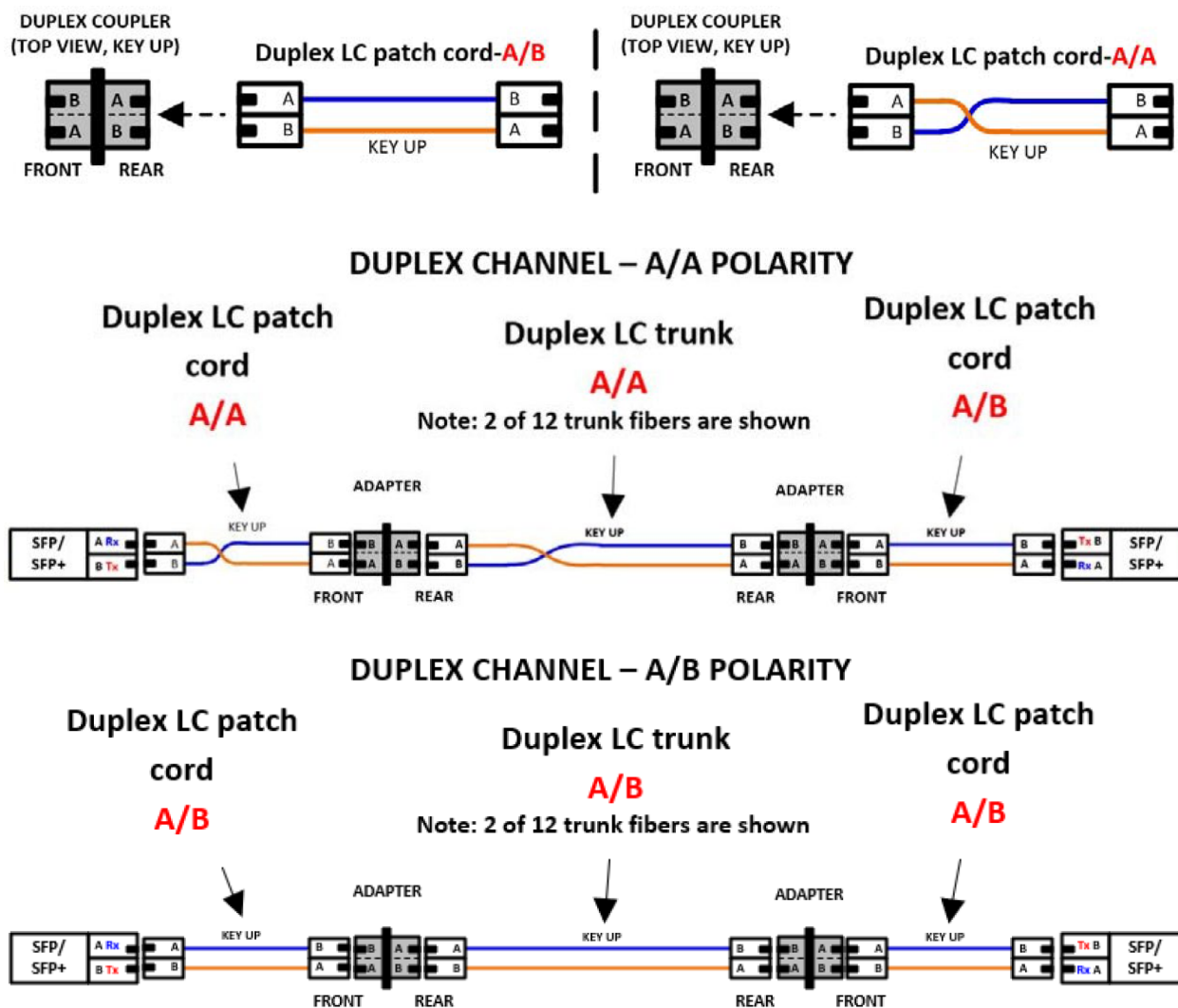
56. The following images show why it is impossible to simply change the polarity of an LC duplex connector by flipping the entire connector over. When the LC duplex connector is flipped-over and then attempted to be inserted into the LC duplex adapter in this flipped-over state, an interference forms between the latch levers of an LC duplex connector and the LC duplex adaptor. This interference inhibits the LC duplex connector from being connected to the LC duplex adapter in the flipped-over state. In order to mate the LC duplex connector with the LC duplex adapter, the LC duplex connector will have to be flipped-over again to return the LC duplex connector to its mating orientation.



EX2002 (annotated).

57. Pre-terminated duplex fiber optic cables have duplex connectors on each end. Such connectors have a fixed polarity configuration. As represented below, either (i) a first fiber connects a ferrule of first connector to the opposite-position ferrule of the second connector and a second fiber connects second ferrule of first connector to the opposite-position ferrule of second connector (sometimes called an A/A cable) or (ii) the first fiber connects first ferrule of the first connector to the same-position ferrule of the second connector and the second fiber connects second ferrule of the first connector to the same-position ferrule of the second

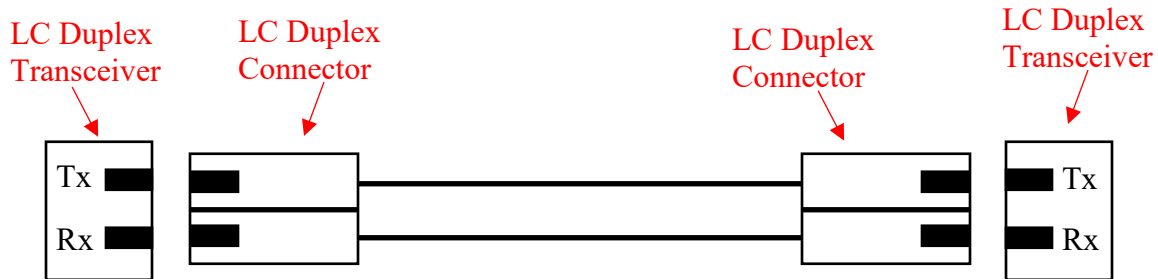
connector (sometimes called an A/B cable).



EX2006: 2.

58. Pre-terminated cables with fixed polarity can lead to installation difficulties because they must match the alignment of latch lever of the connector to the latch receiver of the duplex adapters to which they are mated. Otherwise, the fiber optic signal connection will not occur for the reasons explained above—e.g., a transmitter at one end is not connected to a receiver at the opposite end.

EX1001: 4:55-58 (“As known in the art, a mismatch of ferrules 9203 with opposing ferrules secured in an opposing adapter port, the signal would be lost.”); EX1008: 1:15-32. The cable will make an improper Tx-to-Tx connection and an improper Rx-to-Rx connection, as shown below.

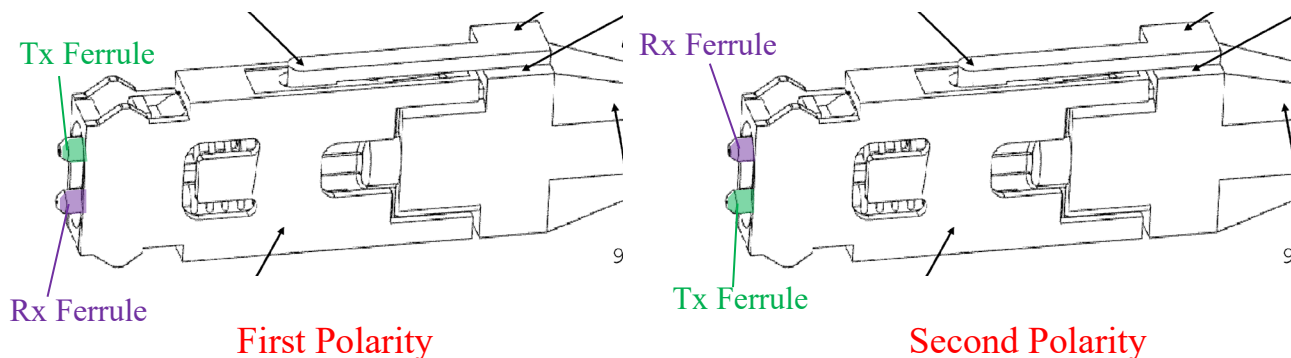


Schematic Diagram Showing Tx-to-Tx and Rx-to-Rx Connections.

59. To address this polarity installation issue, connector manufacturers have developed various polarity change mechanisms that enable the end user to change the polarity of one of the connectors by switching the positions of the ferrules in relation to the connector’s latch levers (e.g., switch the positions of the ferrules in the connector’s mating orientation). The two primary references—Nakagawa (EX1007) and Veatch (EX1004)—applied in the Petition disclose polarity change mechanisms for LC duplex connectors that facilitate switching the positions of the ferrules in relation to the connector’s latch levers by separately repositioning multiple parts of the connector in a series of steps.

60. The Veatch, Nakagawa, and Raven LC duplex connectors applied by US Conec in the Petition are considered “small form factor” (“SFF”) connectors.

By contrast, the drawings in the ‘190 Patent depict a smaller next-generation “very small form factor” (“VSFF”) connector. In contrast with the SFF LC duplex connector, most VSFF duplex connectors are designed so that the first and second ferrules are spaced apart vertically when the keying feature is on the top side of the connector (e.g., when the connector is in the mating orientation). Thus, a duplex VSFF connector has a first polarity when the Tx ferrule is above the Rx ferrule *and* a keying feature is on top. The duplex VSFF connector has a second polarity when the Tx ferrule is below the Rx ferrule *and* the keying feature is on top. Regardless of the type of duplex connector, the polarity is determined by the positions of the ferrules relative to the keying feature.



EX1001: Fig. 16 (annotated to show first and second polarities).

C. Invention Claimed in the ‘190 Patent

61. The ‘190 Patent describes optical connectors 9100 (Figs. 16-36) with a boot assembly 9109.1, 9209.1 that is rotatable to change the polarity of the optical connector—e.g., switch the vertical positions of the two ferrules. EX1001: Abstract. The same boot assembly 9109.1, 9209.1 is also pulled backward to

unlatch the connector from a corresponding mating adapter. EX1001: Figs. 34-36, 8:58-9:23.

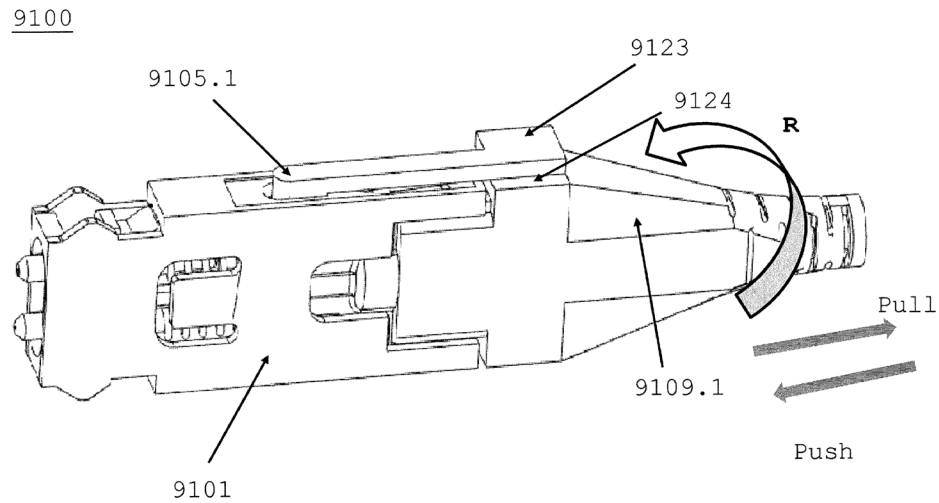


FIG. 16

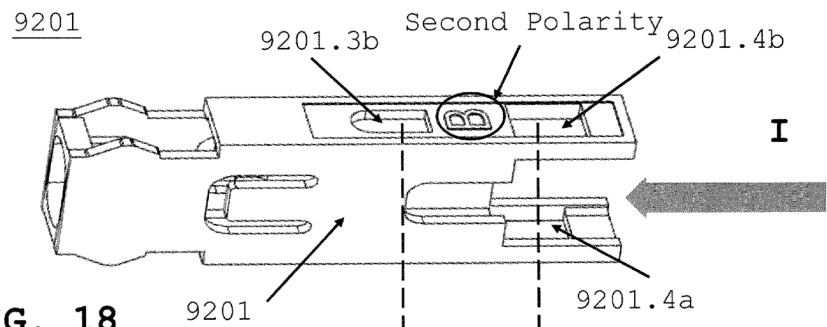


FIG. 18

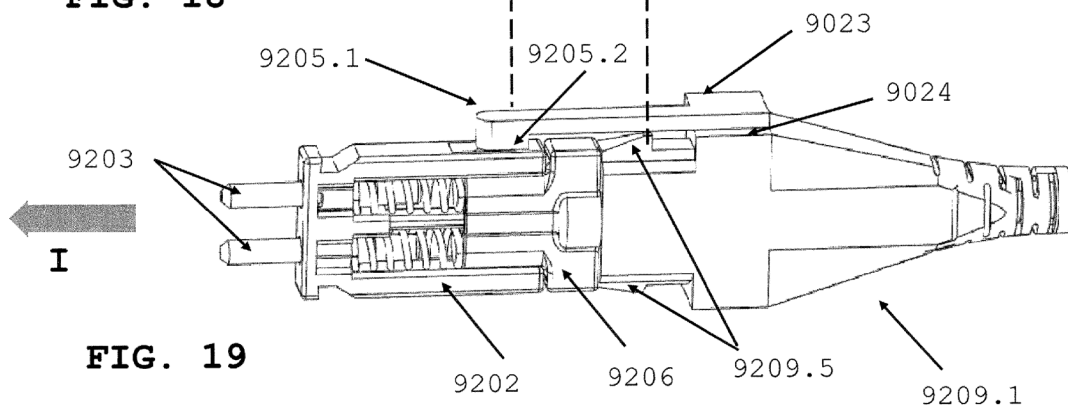


FIG. 19

62. The optical connector 9100 has an outer housing 9101, 9201, a front body 9202, two ferrules 9203 supported by the front body, a back body 9206, a crimp ring 9207 (Fig. 34), and a rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1. EX1001: Figs. 16-19, 6:13-16, 6:50-61, 8:48-51. The rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1 includes an alignment and offset key 9105.1, 9205.1, 9305.1, 9405.1 (which can be referred to as just a “key”) for setting the polarity of the optical connector 9100. EX1001: 6:19-22, 6:30-34, 6:50-51, 7:4-9. As shown in the figures below, the key 9105.1, 9205.1, 9305.1, 9405.1 is an elongate arm that extends forward along the longitudinal axis of the optical connector 9100:

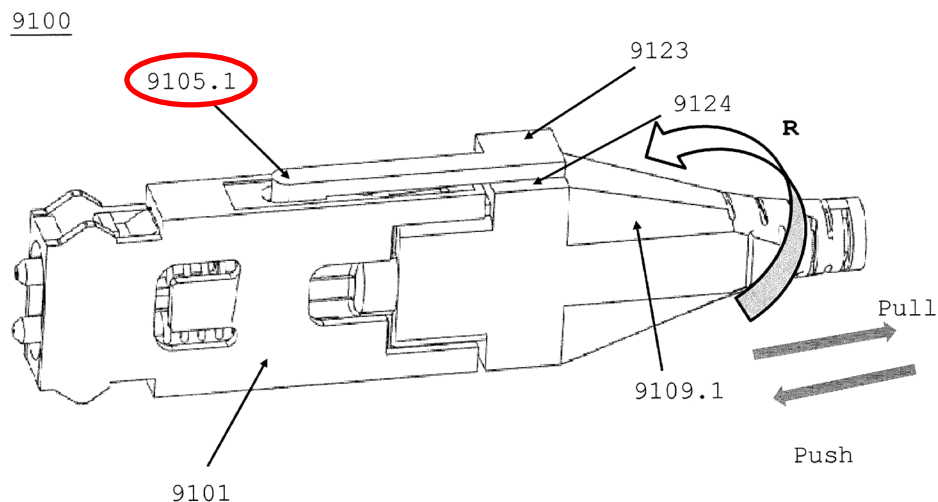
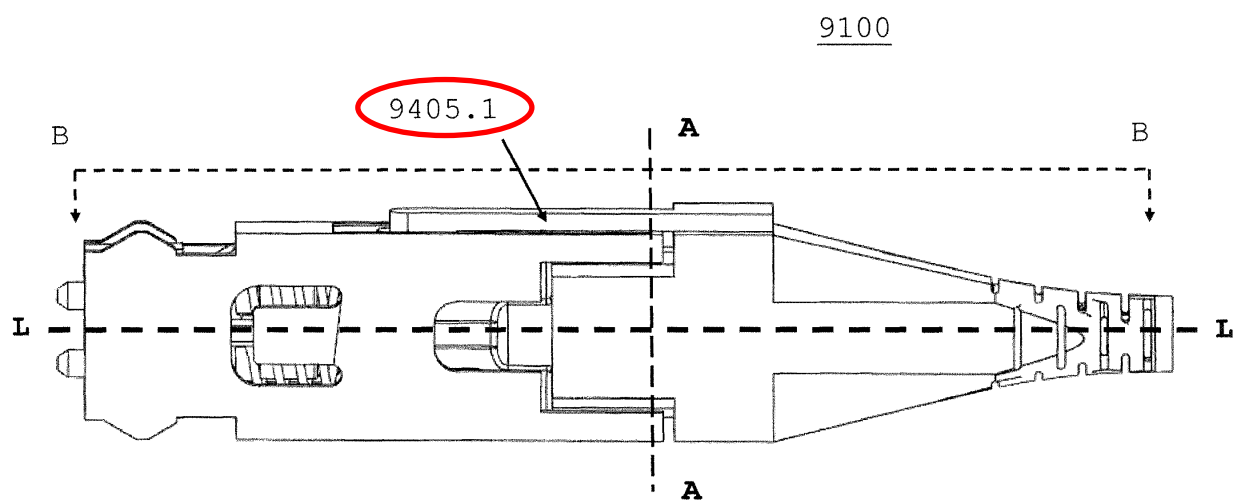
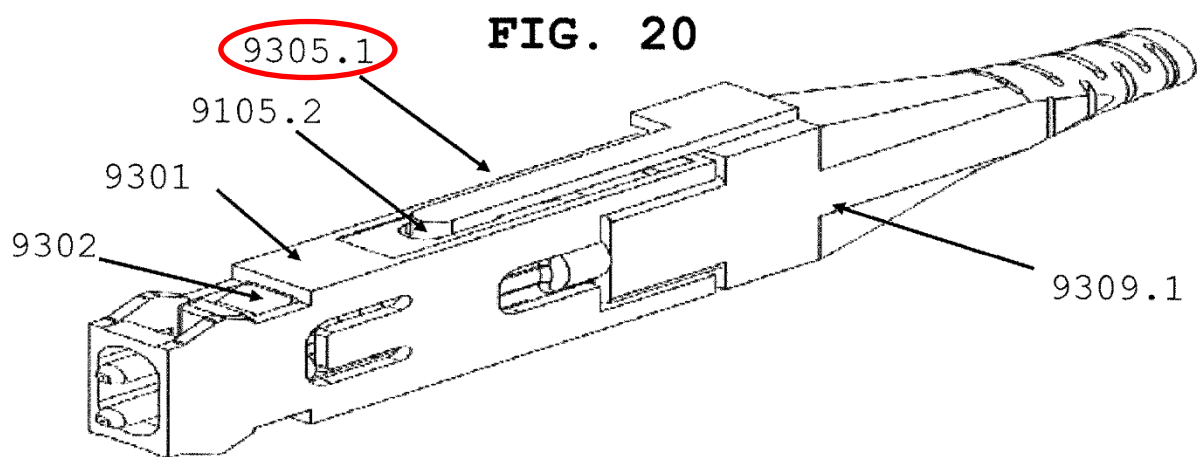
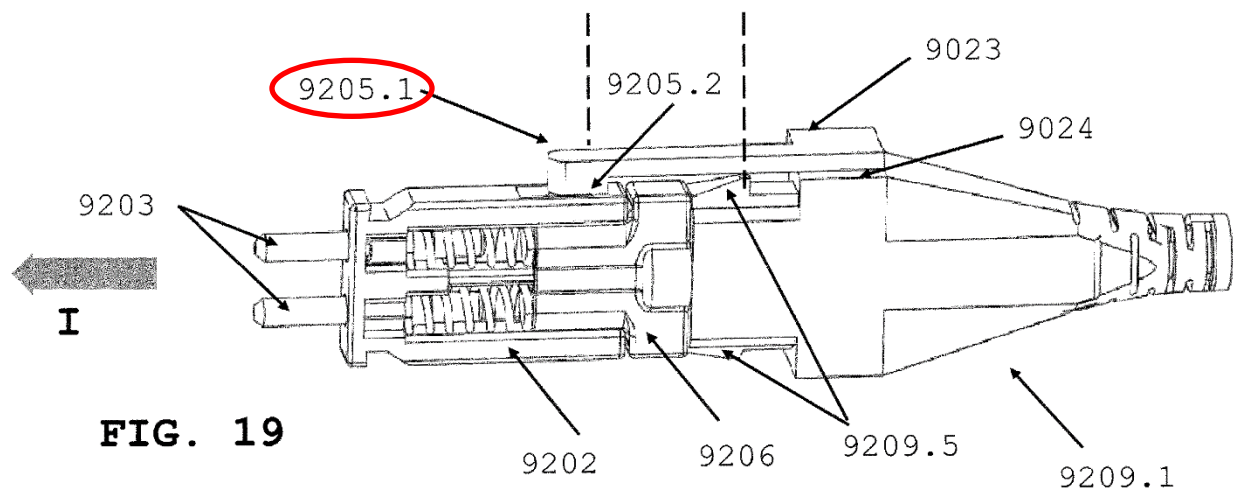


FIG. 16



EX1001: Fig. 16, 19, 20, and 24 (annotated).

63. The key 9105.1, 9205.1, 9305.1, 9405.1 functions as the keying structure that defines the reference mating orientation for the connector 9100 to be inserted into the mating adapter. Because of the key 9105.1, 9205.1, 9305.1, 9405.1, the optical connector 9100 can only be inserted into a mating adapter in one orientation—i.e., the orientation in which the key aligns with a corresponding keyway in the adapter. EX1001: 4:51-67, 7:4-26. The elongate shape of the key 9105.1, 9205.1, 9305.1, 9405.1 allows the key to span from the boot along the narrow wall of the VSFF connector housing 9101, 9201 to a forward position. The key must extend to this forward position to allow the key to enter a corresponding keyway in the adapter when plugged into the adapter, as only the forward portion of the optical connector 9100 is fully plugged into the adapter, as shown below. EX1001: Fig. 34. Otherwise, the key would not function because the key would not interact with the adapter (e.g., a keyway thereof) to set the orientation of the optical connector relative to the adapter.

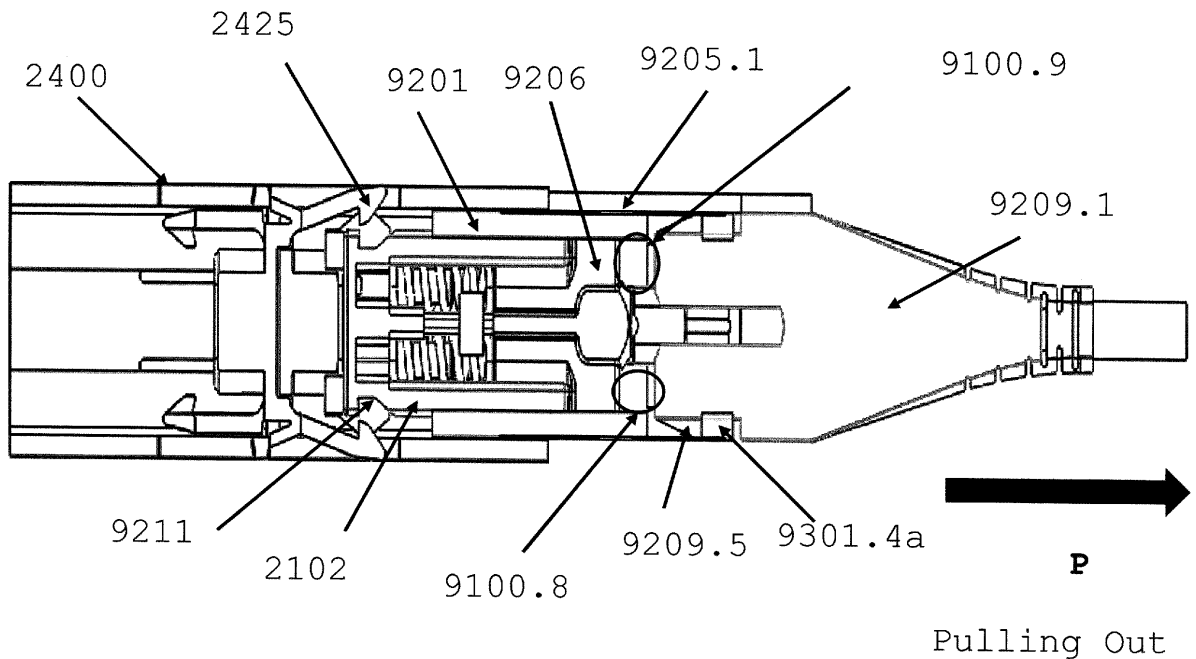
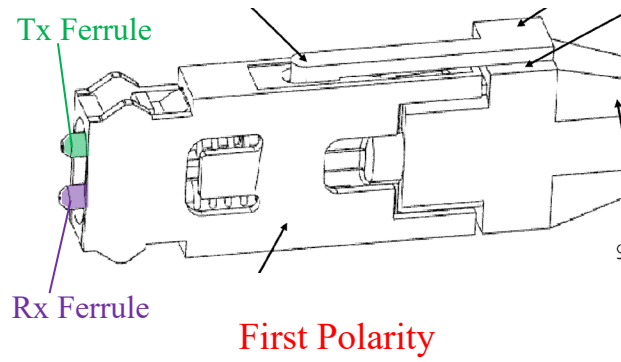


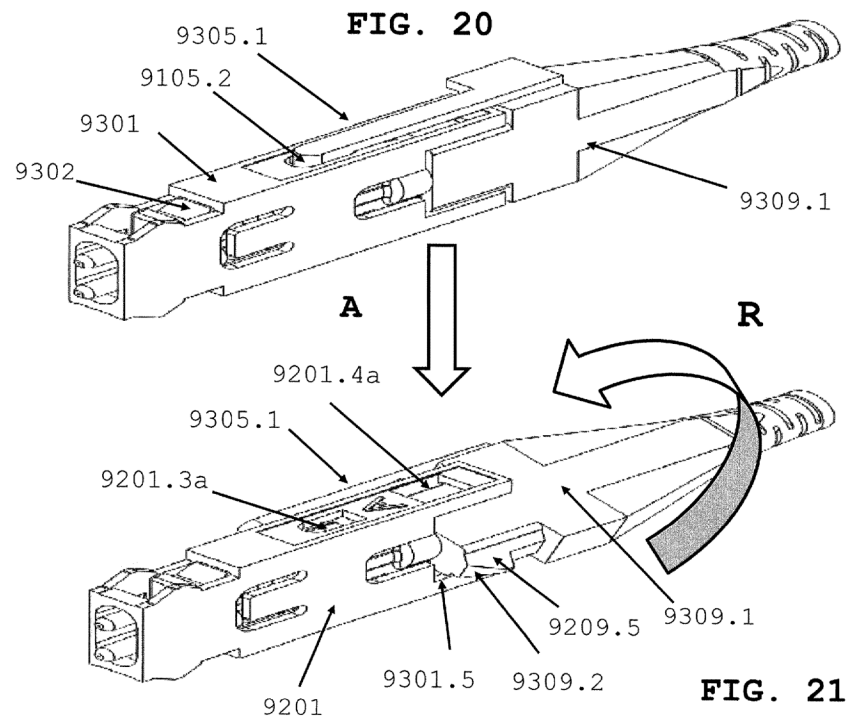
FIG. 35

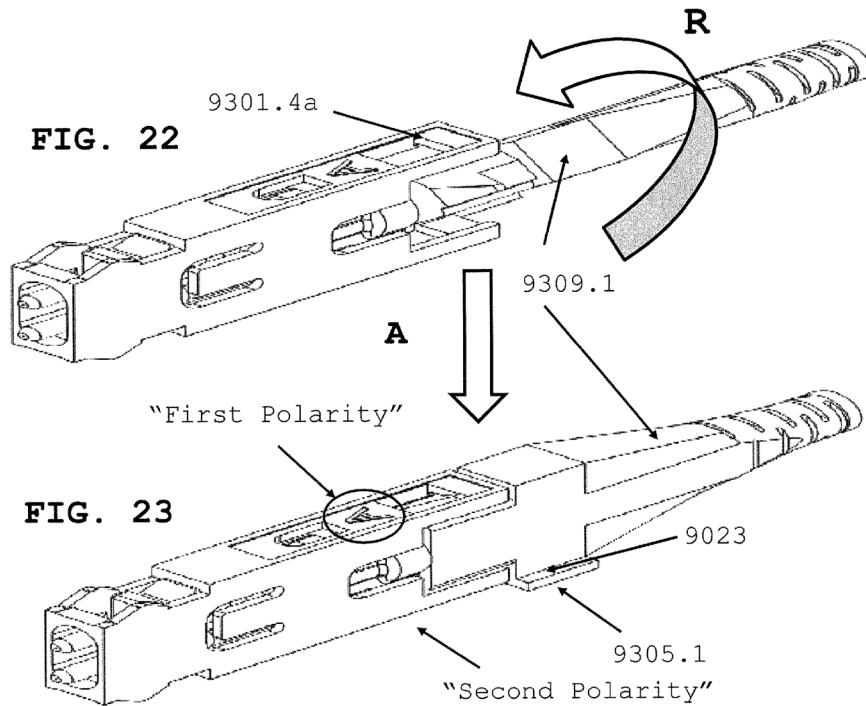
EX1001: Fig. 35.

64. By rotating the rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1, the key 9105.1, 9205.1, 9305.1, 9405.1 is moved from a top side (Fig. 24) of the optical connector 9100 to the bottom side (Fig. 33) of the optical connector to set the connector in one of a first polarity or a second polarity. EX1001: 4:51-67, 6:28-34, 7:4-26. The process for changing polarity is illustrated in Figs. 20-23 and again in Figs. 25, 28, 29, 31, and 33.



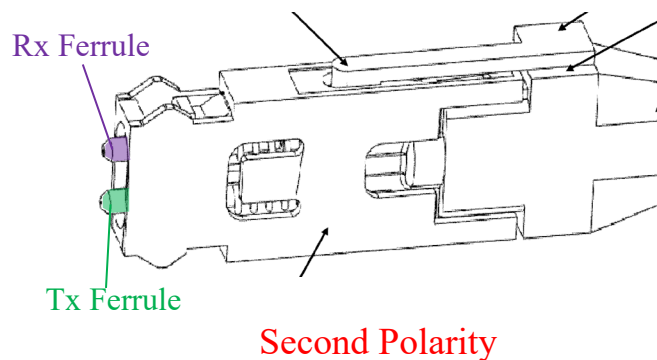
EX1001: Fig. 16 (annotated).





EX1001: Figs. 20-23.

65. After the key is moved from the top side to the bottom side of the connector via rotating the rotatable boot assembly (Figs. 20-23), the entire optical connector is flipped over to re-orient the connector in the mating orientation with the key on the top side of the connector, thereby switching the places of the Tx ferrule and Rx ferrule, as shown below:



EX1001: Fig. 16 (annotated).

66. The optical connector 9100 of the ‘190 Patent improves on previous polarity change mechanisms—such as Nakagawa and Veatch—by simplifying the polarity changing mechanism to eliminate disassembly. An operator only needs to rotate one component, the rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1, to change the polarity of the optical connector 9100. EX1001: 6:28-34, 7:4-26. Because the key 9105.1, 9205.1, 9305.1, 9405.1 is part of the rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1, the key moves with the rotatable boot assembly to set the polarity of the optical connector 9100. EX1001: 6:19-22, 6:30-34, 6:50-51, 7:4-9. This makes changing the polarity of the optical connector 9100 of the ‘190 Patent quicker and easier than the optical connectors disclosed by Nakagawa and Veatch. In addition, since the rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1 is rotatable with respect to the cable terminated by the connector 9100, the entire polarity change operation can take place without any portion of the connector detaching from another portion of the connector. Such detachment is a requirement of previous polarity change mechanisms.

67. The ‘190 Patent explains the rotatable boot assembly 9109.1, 9209.1, 9309.1, 9409.1 is a “multi-purpose” component of the connector 9100. EX1001: 6:10-13. This is because in addition to facilitating polarity change, the multi-purpose boot assembly also enables removal of the connector 9100 when latched in

a mating adapter. EX1001: Figs. 34-36, 8:58-9:23. When the connector 9100 is latched in an adapter, a user pulls backward on the boot assembly 9109.1, 9209.1, 9309.1, 9409.1. The boot assembly slides backward in relation to the back body 9206 and thereby causes the connector 9100 to unlatch from the adapter. EX1001: Figs. 34-36, 8:58-9:23. This is illustrated in Figs. 35 and 36:

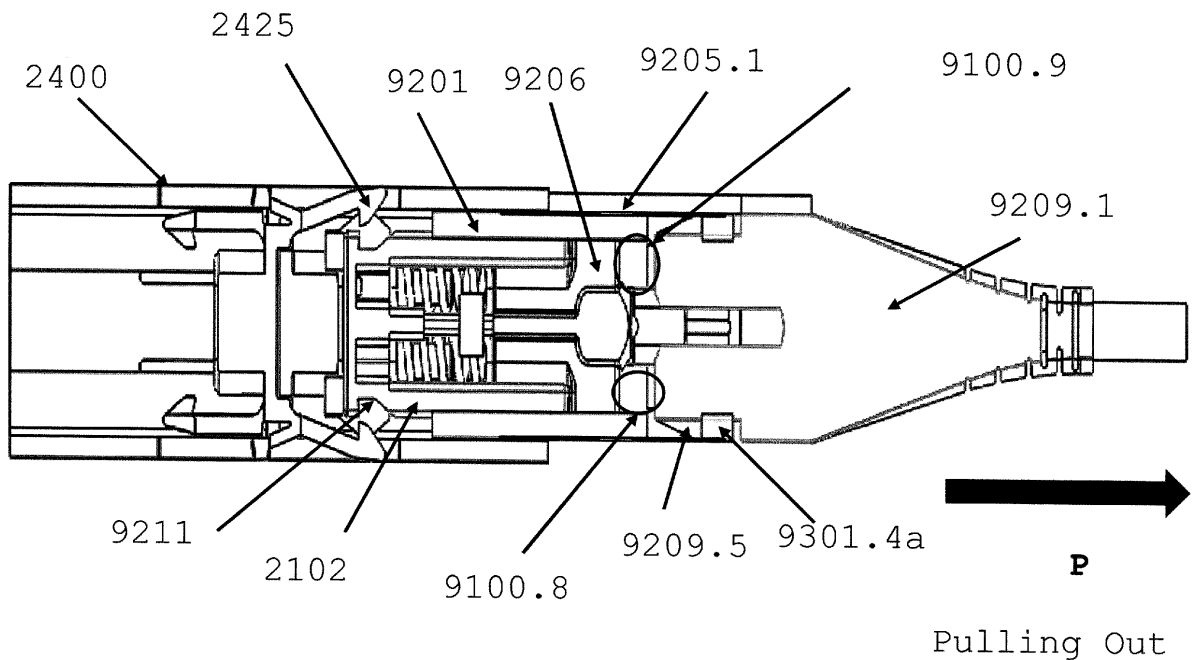


FIG. 35

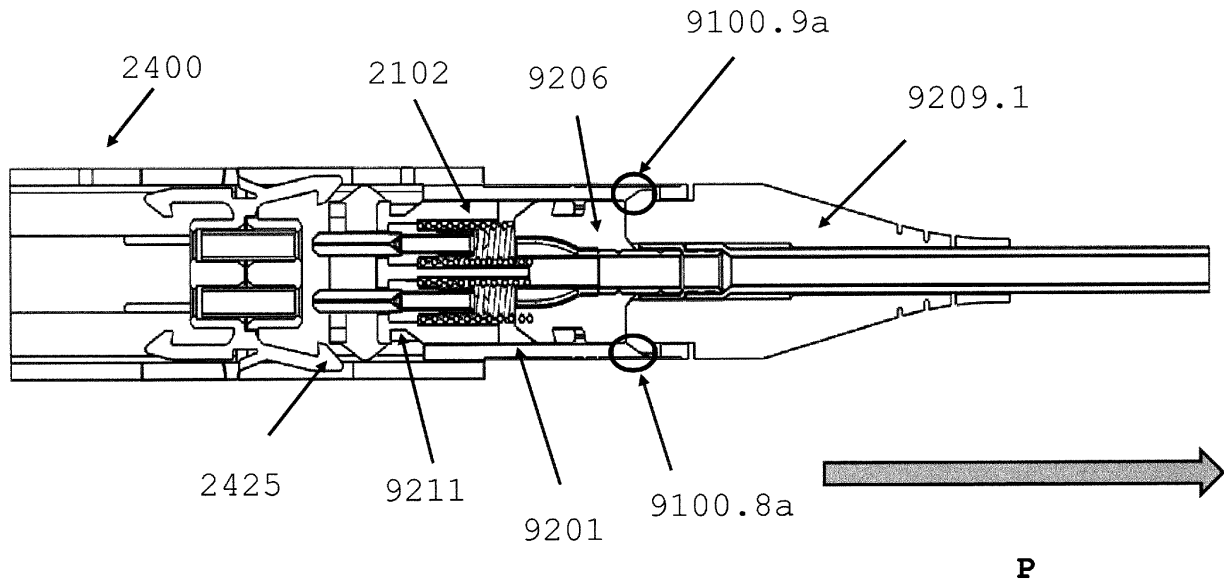


FIG. 36

EX1001: Figs. 35 and 36.

III. THE ASSERTED PRIOR ART

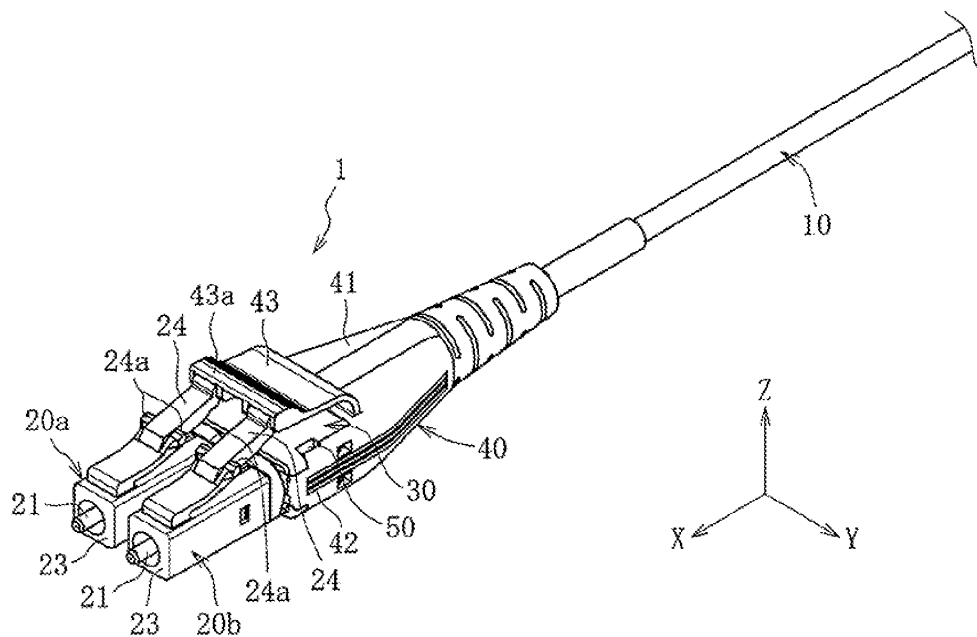
A. U.S. Publication No. 2011/0299814 to Nakagawa (EX1007)

68. Upon my review of the file history of the ‘190 Patent, I note that Nakagawa was one of the references applied by the Examiner during prosecution and was successfully distinguished during prosecution. EX1003: 88-89, 146.

69. Nakagawa discloses a LC duplex optical connector unit 1 having the ability to change polarity. EX1007: ¶¶[0011], [0062]-[0064]. Even though Nakagawa does not use the term “polarity,” Nakagawa does explain the positions of its “optical connectors 20a, 20b can be easily exchanged”. EX1007: ¶[0060]. As understood by the person of skill in the art, this is changing polarity.

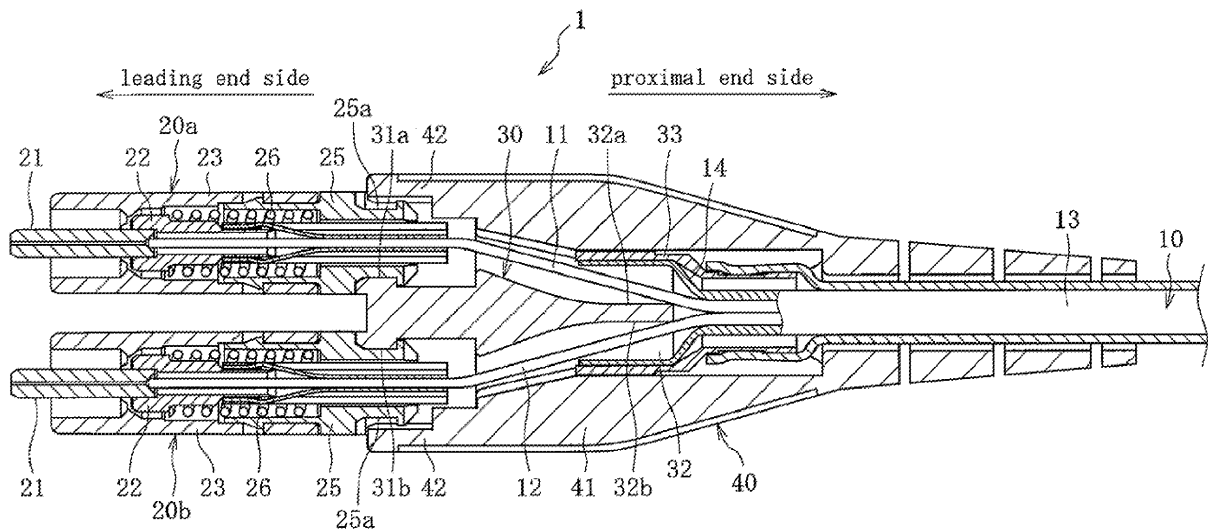
70. Nakagawa's optical connector unit 1 includes optical connectors 20a, 20b, a holder 30, and a boot 40. EX1007: Fig. 1, ¶[0046]. Each optical connector 20a, 20b includes a locking lever 24. EX1007: Fig. 1, ¶[0047]. Each optical connector 20a, 20b of Nakagawa is equivalent to the square plug frame of the International Standard IEC 61754-20 and each locking lever 24 of Nakagawa is equivalent to the latch levers of the International Standard IEC 61754-20, described above. For reasons I have already explained, the locking levers 24 of Nakagawa function as the key that sets the mating orientation in which Nakagawa's LC duplex connector unit 1 is inserted into a corresponding LC duplex adapter. Paragraphs 46-51.

Fig. 1



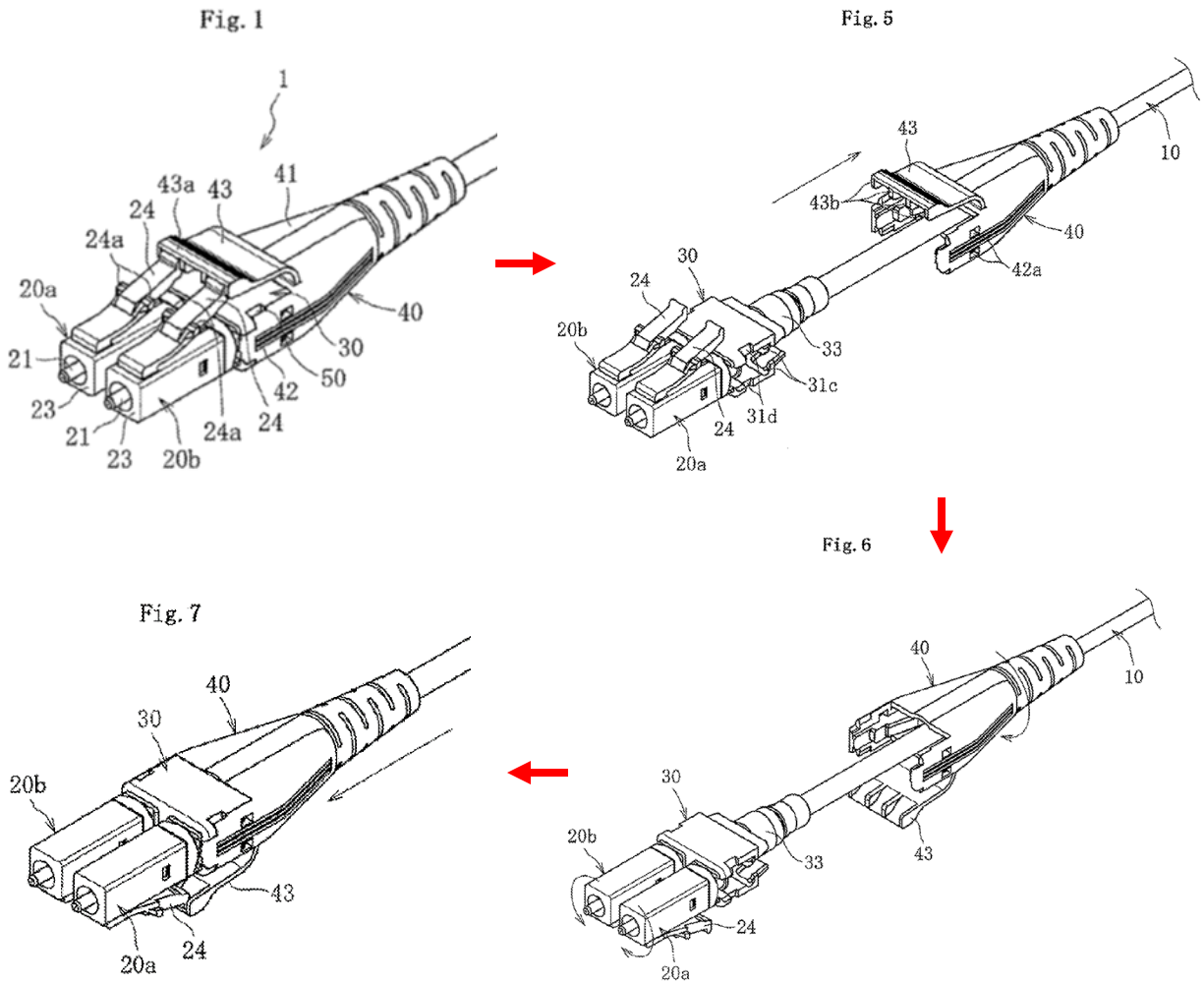
71. The optical connector unit 1 also includes a crimp ring or caulking member 33 for securing the cable 10 to the holder 30 by squeezing the reinforcement fiber 14 (more commonly known as a cable strength member) against the cable fixing portion 32 of the holder 30. EX1007: Fig. 2, ¶[0055]. Thus, the caulking member 33 is incapable of rotating or moving with respect to the holder 30 that sets the locations of the ferrules 21.

Fig. 2



72. Nakagawa discloses a four-step polarity change operation. First, the boot 40 is disconnected from the holder 30 and slid rearward along the cable 10 (Fig. 5, below). Second, each optical connector 20a, 20b is rotated 180° to relocate the locking levers 24 from the top side to the bottom side of the optical connector unit (Fig. 6, below). Third, the boot 40 is rotated 180° about the cable 10 (Fig. 6, below). Fourth, the boot 40 is reattached to the holder 30 (Fig. 7, below).

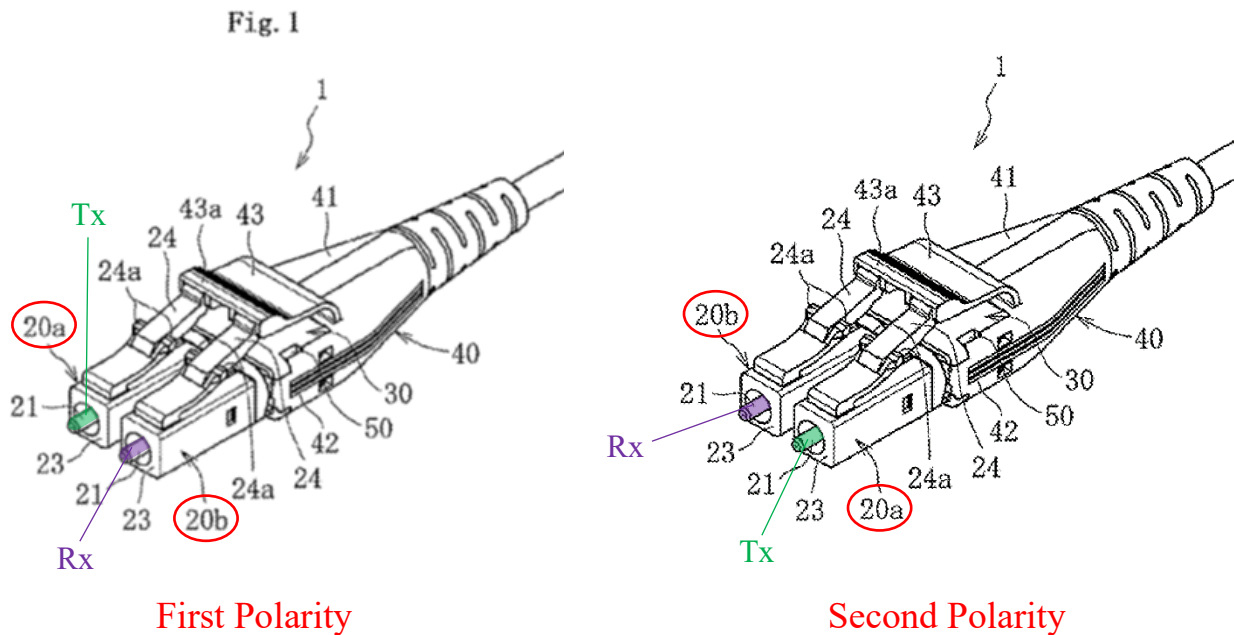
EX1007: Figs. 1 and 5-7, ¶¶[0060]-[0063]. This process requires each optical connector 20a, 20b to be individually rotated to change polarity by repositioning the locking levers 24 from above the ferrules to below the ferrules.



EX1007: Figs. 1 and 5-7, ¶[0017].

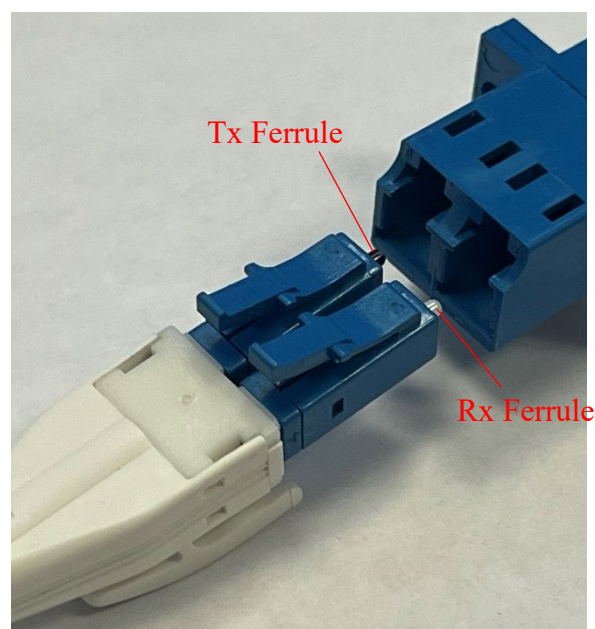
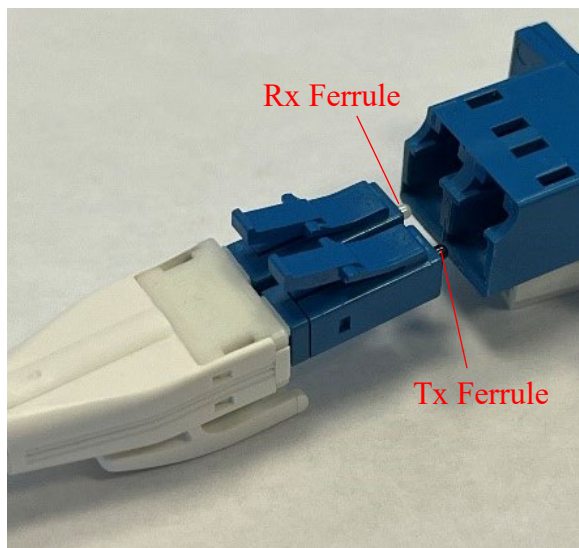
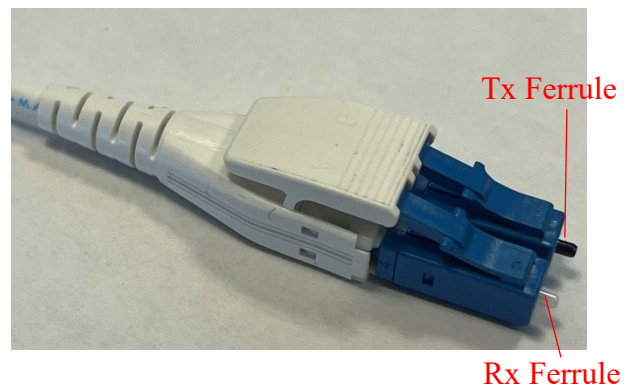
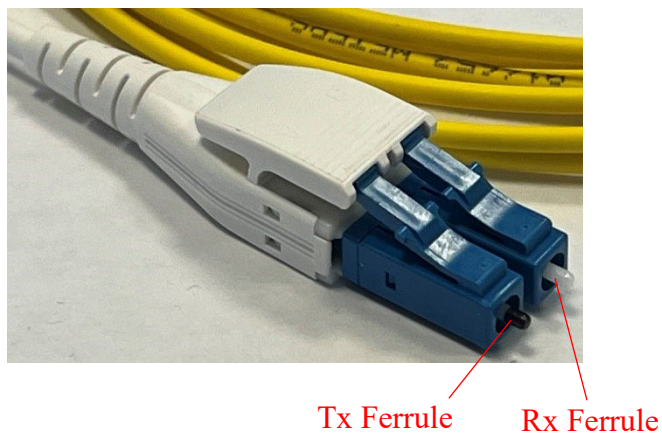
73. After fourth step, the whole optical connector unit 1 is then flipped over to the mating orientation to reposition the locking levers 24 on the top side of the connector. EX1007: ¶[0063] (“the entire optical connector unit 1 is reversed

upside down”). This results in the position of the ferrules in the optical connector unit 1 being switched, as shown below, thereby completing the change of the optical connector unit 1 from the first polarity to the second polarity:



EX1007: Fig. 1 (annotated).

74. Although the four-step polarity change process disclosed in Nakagawa involves rotating the boot, the position of the boot does not set the polarity. In Nakagawa, it is the locking levers 24 that form the key that establishes the mating orientation in which the connector will mate with an upright LC duplex adapter. Therefore, as shown below, rotating the simplex connectors 20a, 20b sets the polarity of the duplex optical connector unit 1, irrespective of the rotational orientation of the boot.



First Polarity

Second Polarity

EX2002¹; EX2005.

75. The images of Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (EX2002) and L-com Fiber Coupler, LC Duplex Bronze Sleeve, Low Profile (SKU: FOA-802) (EX2005) above show that

¹ EX2002 is a physical duplex LC connector that embodies Nakagawa.

the polarity does not change just because the boot was rotated (which moves the white lever on the boot from a topside to a bottom side).

76. The Uniboot LC Connector of Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (EX2002) is a physical embodiment of the optical connector unit 1 disclosed by Nakagawa. For example, like Nakagawa's optical connector unit 1, the Uniboot LC Connector is also an LC duplex connector having two connectors (each having a ferrule) attached to a holder with a detachable boot that has an operation lever for pressing down on the locking levers of the two connectors. And the Uniboot LC Connector changes polarity in the same manner as Nakagawa's optical connector unit 1, by detaching the boot, rotating the boot and connectors 180 degrees, and then reattaching the boot. Confirmation that the Uniboot LC Connector is a physical embodiment of Nakagawa's optical connector unit 1 is made apparent by the straight forward comparison of the Uniboot LC Connector with the figures of Nakagawa as demonstrated below:

Fig. 1

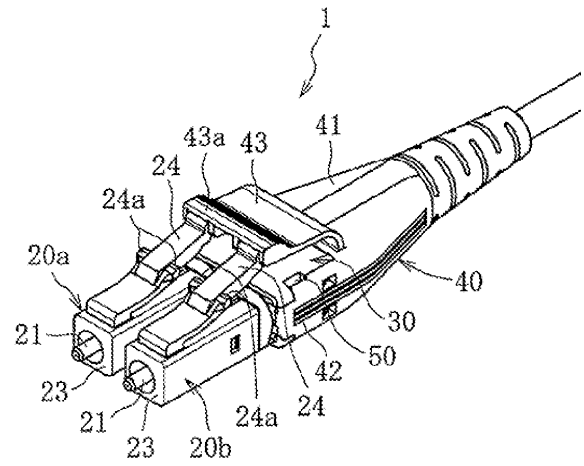
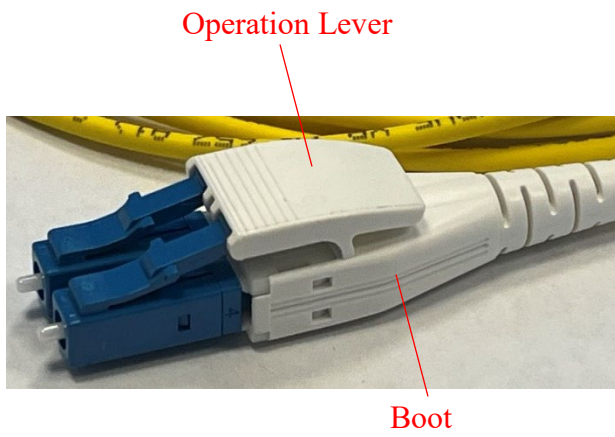


Fig. 5

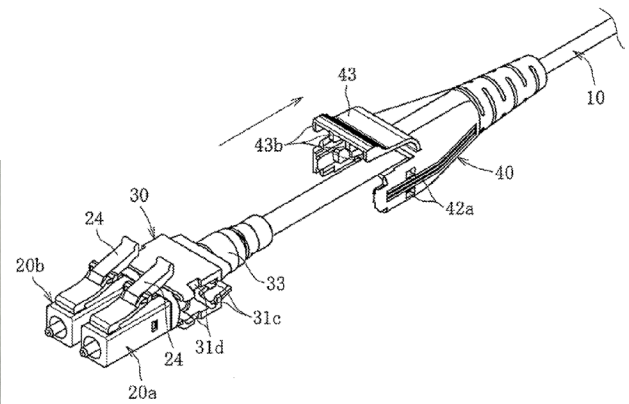
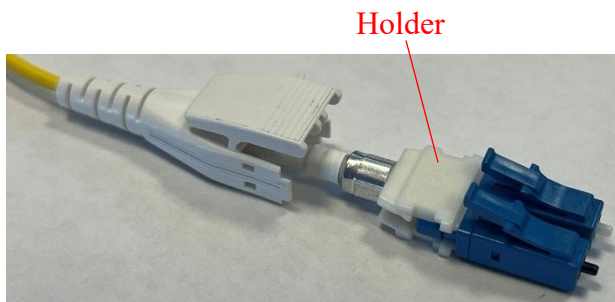
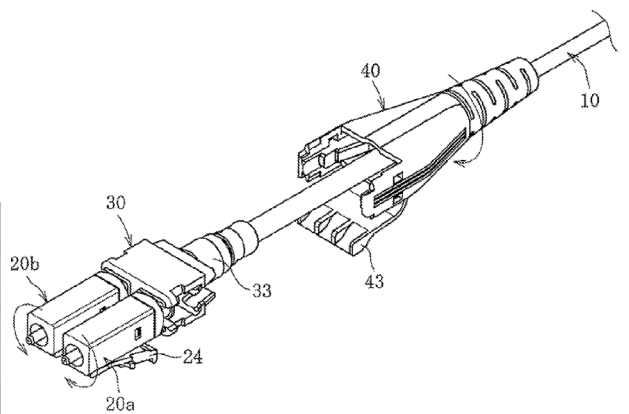
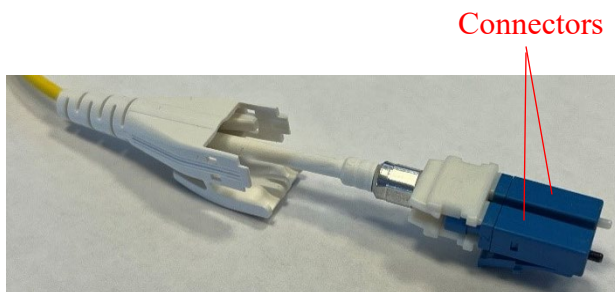


Fig. 6



EX2002 (annotated); EX1007: Figs. 1, 5, and 6.

77. Nakagawa's boot 40 does not slide rearward to unlatch the optical connector unit 1 from a mating adapter. Instead, Nakagawa discloses an operation lever 43 that may be depressed to depress the locking levers 24 and unlatch the connector. EX1007: ¶[0058].

B. U.S. Patent No. 9,557,495 to Raven (EX1008)

78. Raven discloses a LC duplex fiber optic connector 1 also having the ability to change polarity. EX1008: 1:5-9. The LC duplex fiber optic connector 1 includes a leading end unit 3, a housing 5, a boot 7, and a duplex fiber optic cable 9. EX1008: Fig. 1, 9:51-53. The leading end unit 3 is detachable from the housing 5. EX1008: 12:35-52. The leading end unit 3 covers the LC duplex ferrule holders but does not itself hold the ferrules. Instead, the housing 5 includes two ferrule holders 25, 31 that fit inside two fiber optic connectors 47, 49 of the leading end unit 3. EX1008: Fig. 3. The leading end unit 3 carries the latch levers 51.

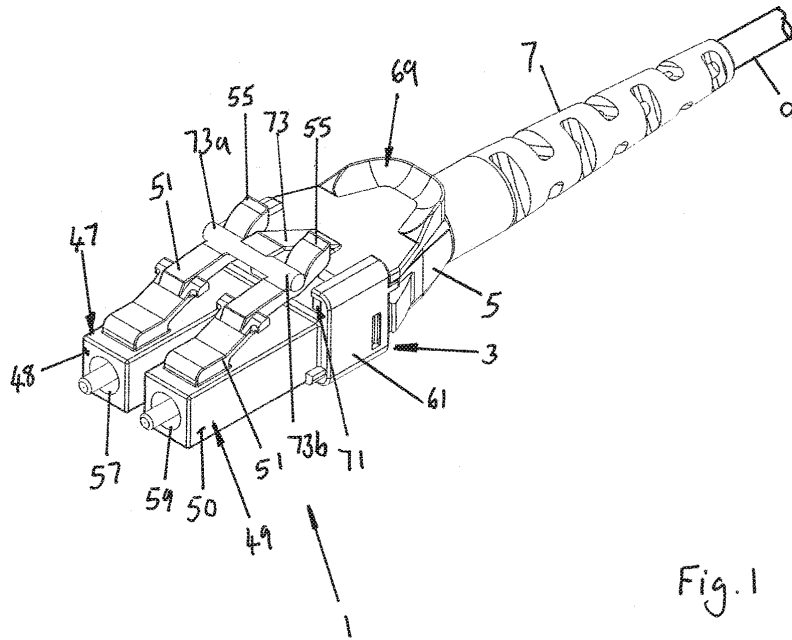
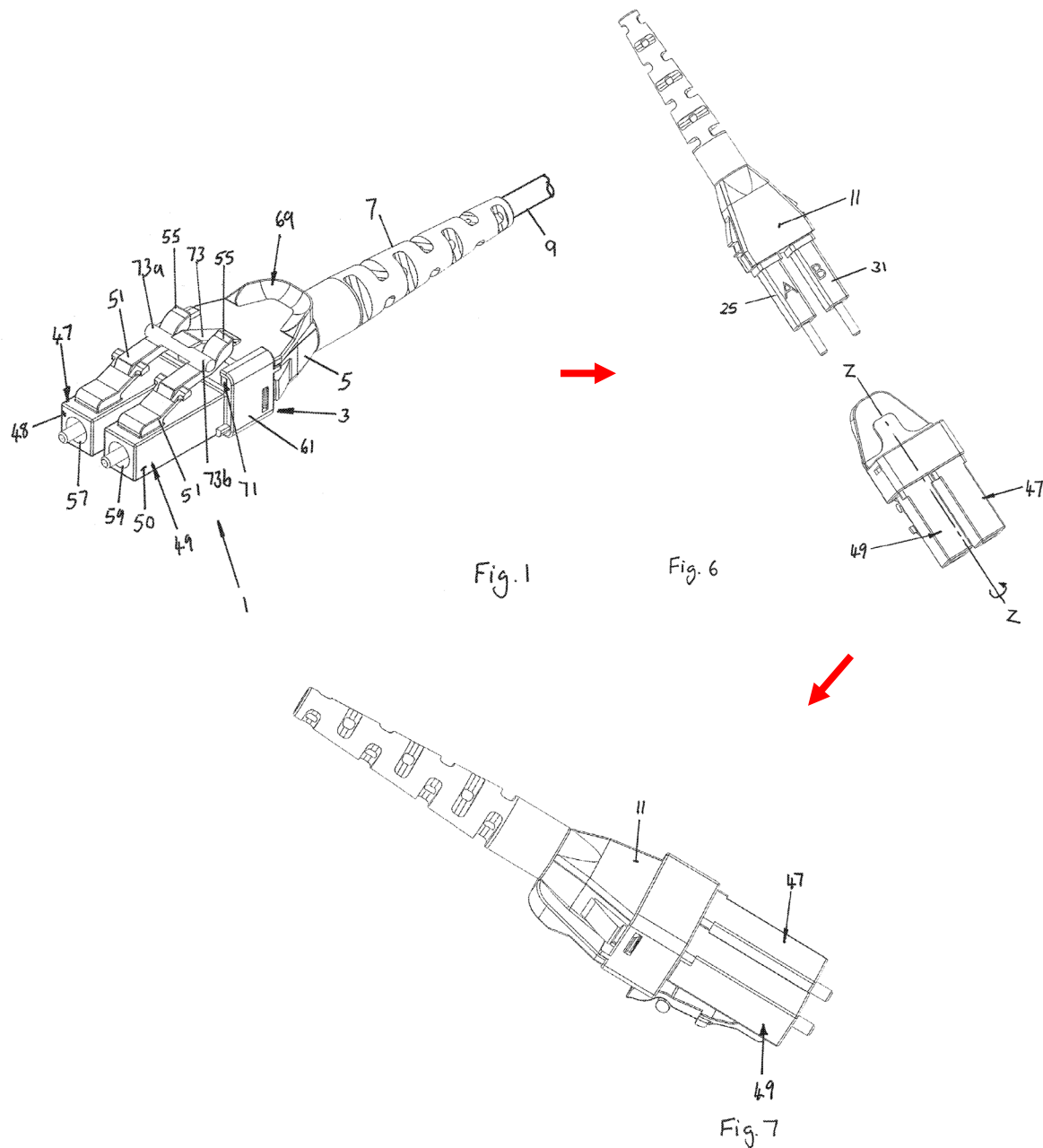
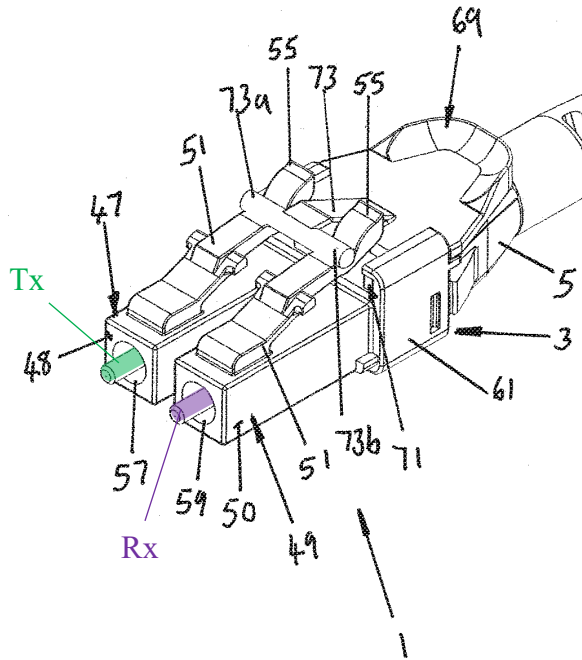


Fig. 1

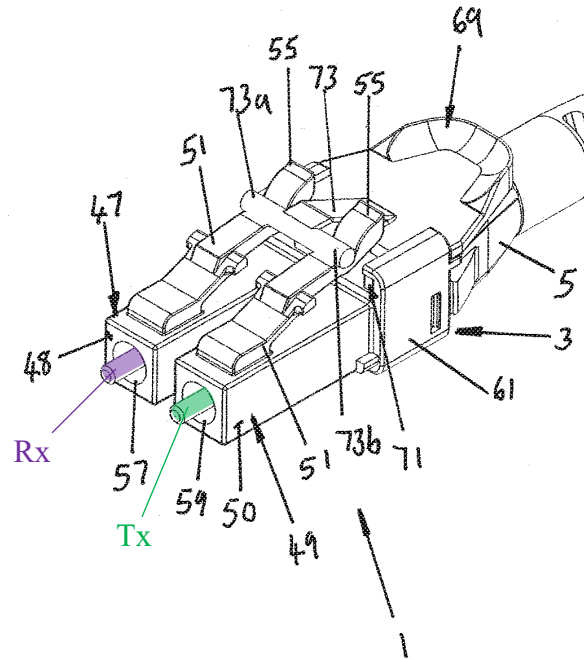
79. Raven discloses a three-step polarity change process. First, the leading end unit 3 is moved forward off the housing 5 (Fig. 6, below). In this step, the two ferrule holders 25, 31 are moved out of the two fiber optic connectors 47, 49, respectively. Second, the leading end unit 3 is rotated 180° relative to the housing 5 (Fig. 6, below). Third, the leading end unit 3 is reattached to the housing 5 by sliding the leading end unit rearward onto the housing (Fig. 7, below). In this step, the ferrule holders 25, 31 are inserted into the respective fiber optic connectors 47, 49 of the leading end unit 3. EX1008: Figs. 1, 6 and 7, 12:35-52.



80. After step three, the whole assembly 1 is flipped over to reposition the assembly in the mating orientation, with the latching levers 51 on the top side of the connector. This results in the position of the ferrules in the assembly 1 being switched, as shown below, thereby completing the change of the assembly 1 from the first polarity to the second polarity:



First Polarity



Second Polarity

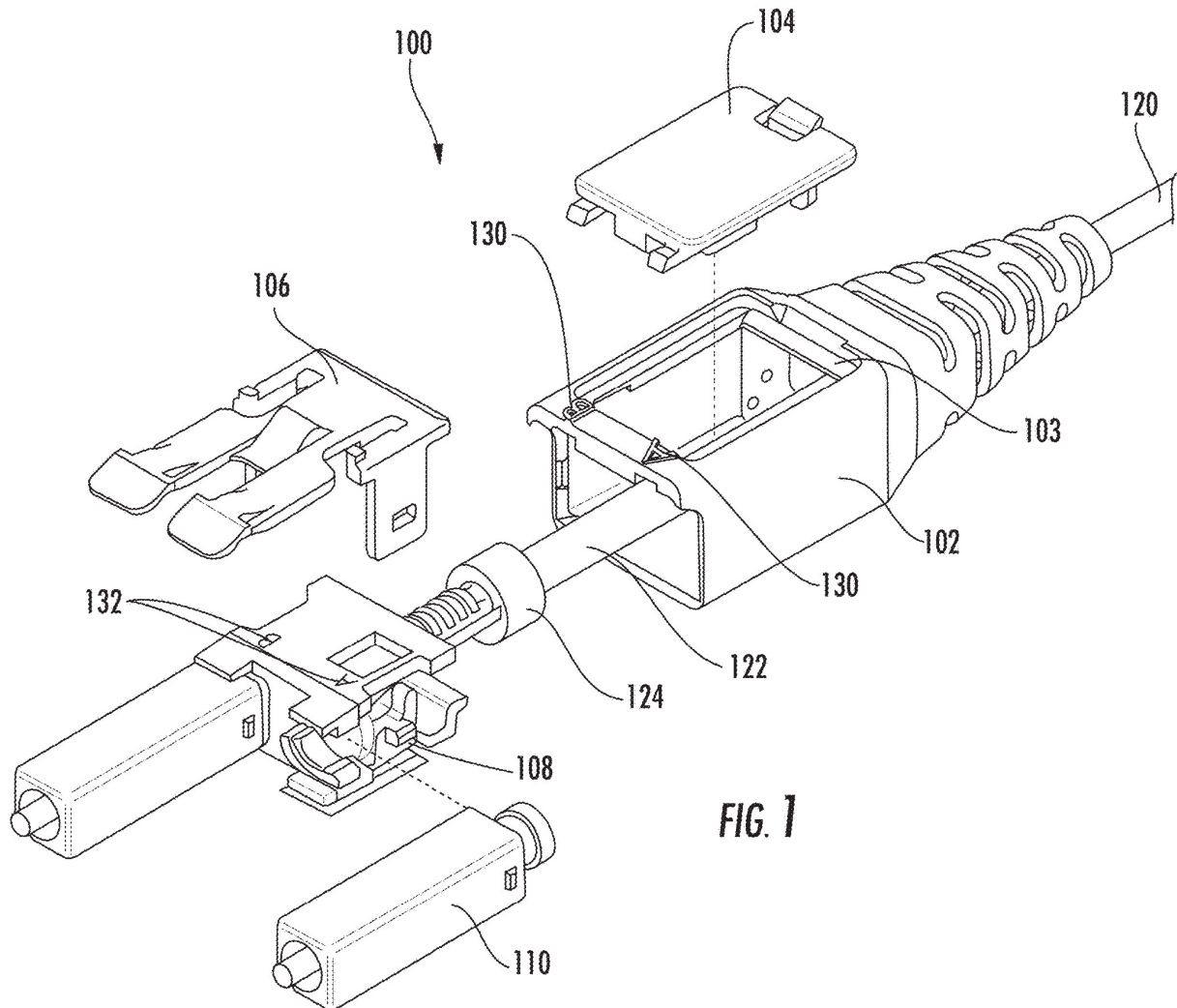
EX1008: Fig. 1 (annotated).

81. Raven's boot 7 does not slide rearward to unlatch the assembly 1 from a mating adapter. Instead, Raven discloses a separate release element 69 supported by the leading end unit 3. The release element 69 slides backward in relation to the remainder of the assembly 1 (including the boot 7) to depress the latching levers 51 by camming action. EX1008: 11:63-12:3.

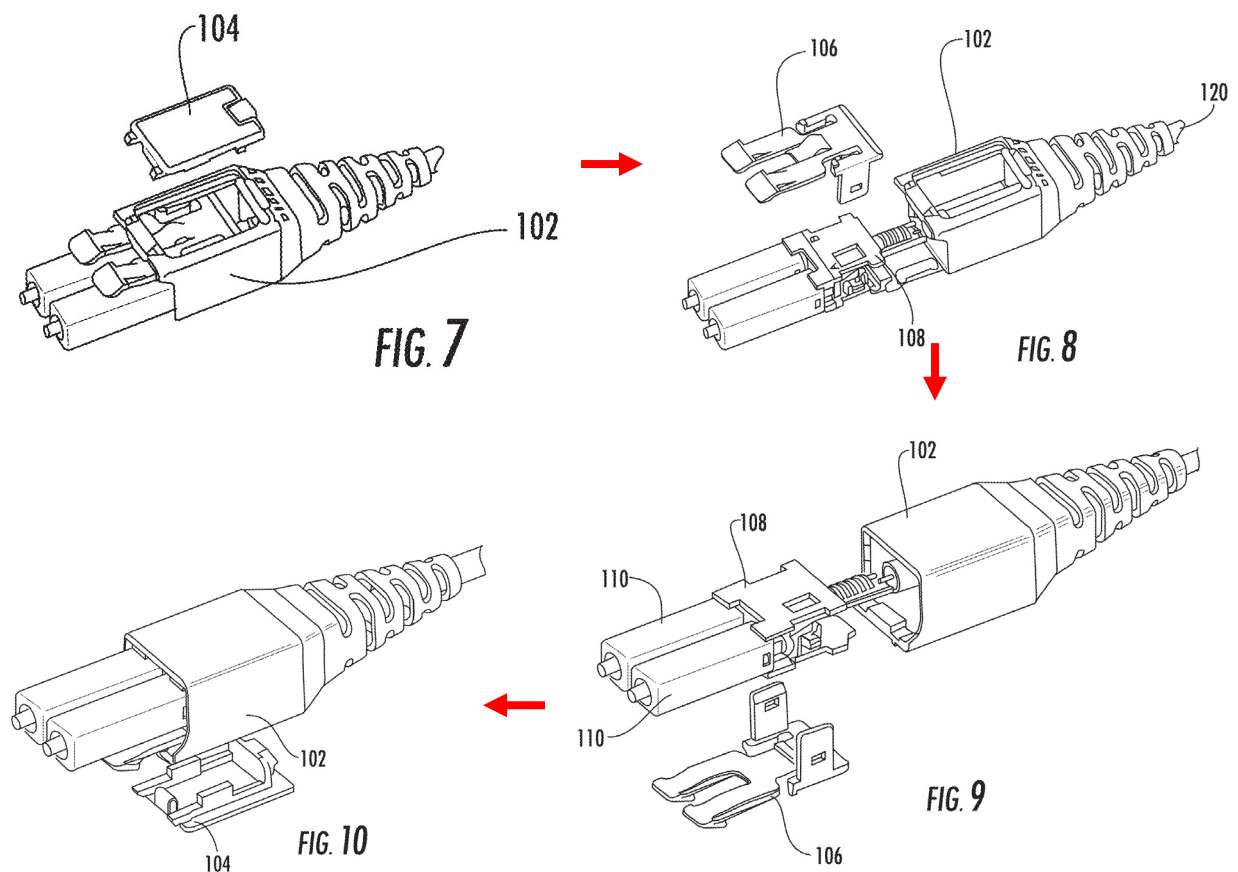
C. U.S. Patent No. 9,684,130 to Veatch (EX1004)

82. Upon my review of the file history of the '190 Patent, I note that Veatch was one of the references applied by the Examiner during prosecution and was successfully distinguished during prosecution. EX1003: 88-89, 146.

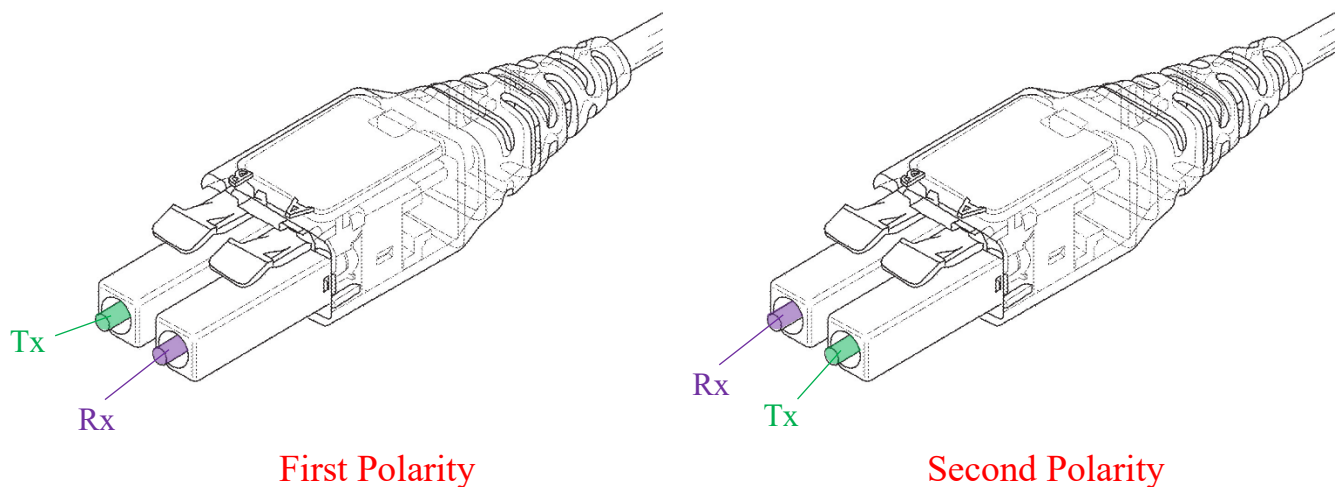
83. Veatch discloses a LC duplex connector 100 with a complex polarity change mechanism. EX1004: 2:6-13. The connector 100 includes a boot 102, a cover 104 releasably attached to the boot, a fiber holder 108, a latch 106 releasably attached to the fiber holder, and connector bodies or plug frames 110 supported by the fiber holder. EX1004: Fig. 1, 2:14-16, 2:42-43, 3:18-20. A crimp ring 124 and heat shrink material 122 secure the cable 120 to the fiber holder 108. EX1004: Fig. 1, 2:19-22, 4:34-36.



84. To change polarity, the following seven steps are required. First, the cover 104 is removed from the boot 102 (Fig. 7, below). Second, the boot 102 is slid rearward along the cable 120 (Fig. 8, below). Third, the boot 102 is rotated 180° about the cable 120 (Fig. 9, below). Fourth, the latch 106 is removed from the top of the fiber holder 108 (Fig. 8, below). Steps four and five can take place in any order. Fifth, the latch 106 is reattached to the bottom of the fiber holder 108 (Fig. 9, below). Sixth, the boot 102 is slid forward over the fiber holder 108 (Fig. 10, below). Seventh, the cover 104 is reattached to the boot 102 (Fig. 10, below).
EX1004: Figs. 7-10, 3:10-36.



85. After step seven, the whole optical connector is flipped over to the mating orientation to reposition the latch 106 on the top side of the connector. This results in the position of the ferrules in the connector 100 being switched, as shown below, thereby completing the change of the connector 100 from the first polarity to the second polarity:



EX1004: Fig. 2 (annotated).

86. Although the seven-step polarity change process disclosed in Veatch involves rotating the boot 102, the rotational position of the boot 102 does not set the polarity. Instead, it is the latch 106 that forms the key and sets the mating orientation for insertion into a corresponding LC duplex adapter. EX1004: Abstract. This is why Veatch explains “the latch [is] repositionable relative to the connector body to enable polarity change of the fiber optic connector,” not the boot 102. EX1004: Abstract. Veatch requires that the boot 102 and the latch 106 are

repositioned in separate steps because the boot must be decoupled from the latch to free the latch to detach from the fiber holder 108 and flip the latch over.

87. In Veatch, the boot 102 slides rearward to depress the latch 106 by cam action. EX1004: 2:64-3:7. This facilitates removal of the connector 100 from an adapter by allowing a user to pull rearward on the boot to depress the latch 106 and then move the connector 100 rearward from the adapter.

D. U.S. Patent No. 6,575,640 to Connelly (EX1005)

88. Connelly discloses a fiber optic connection system 10 for coupling first and second fiber optic cables 12, 14. EX1005: 2:8-11. The system 10 includes a fiber optic plug 34 attached to the end of the first fiber optic cable 12. EX1005: Fig. 1. The fiber optic plug 34 includes a housing 38, a strain relief boot 148, and an insert 44 coupling the housing 38 and strain relief boot 148. EX1005: 2:27-29, 4:35-38. The system 10 of Connelly is not an LC duplex connector that meets the International Standard IEC 61754-20. It is a different type of duplex connector.

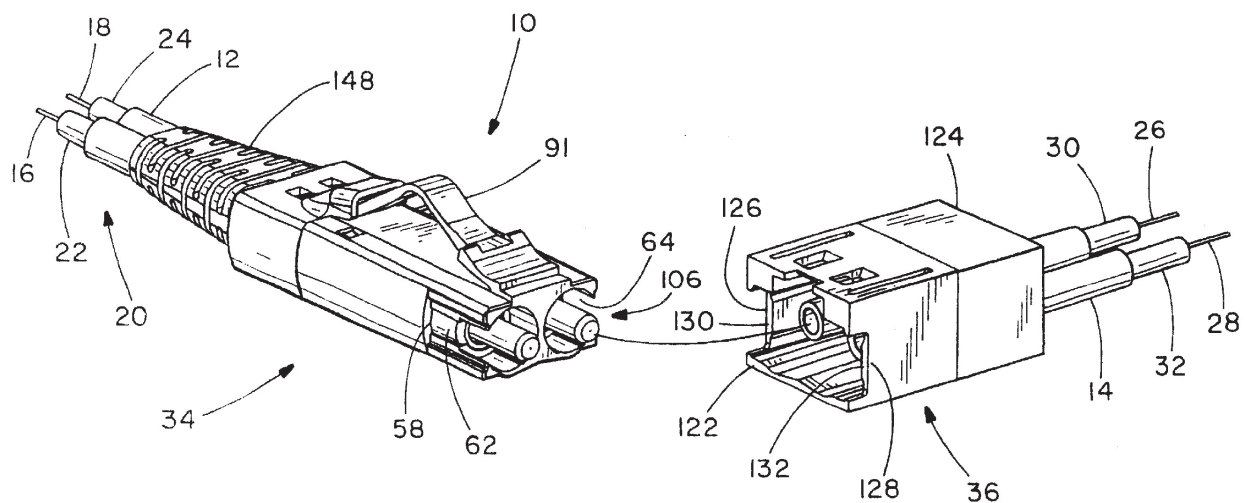


FIG. 1

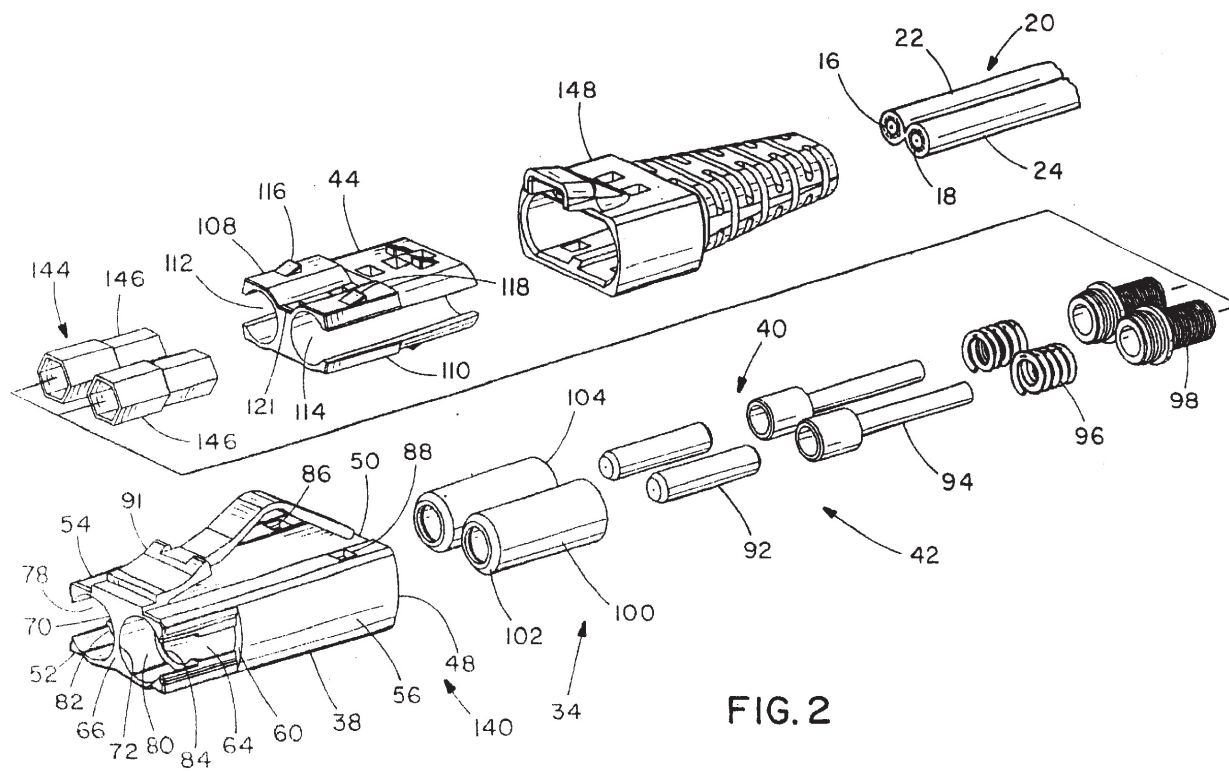
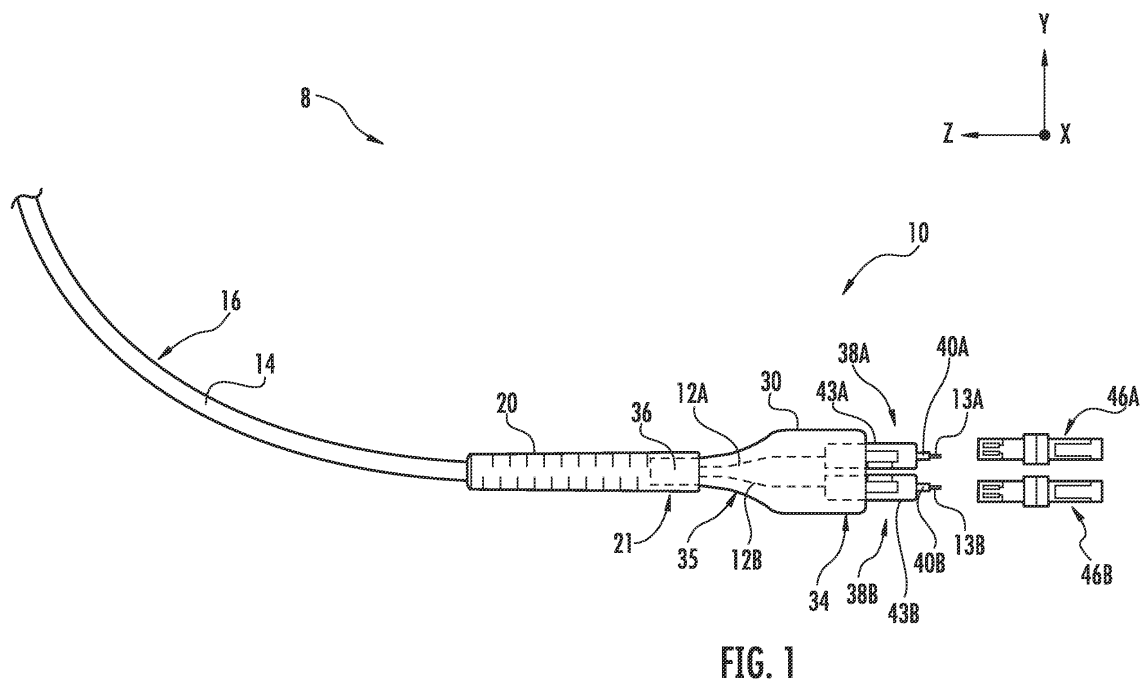


FIG. 2

EX1005: Figs. 1 and 2.

E. U.S. Patent No. 8,662,760 to Cline (EX1006)

89. Cline is used as an additional secondary reference by US Conec against dependent claim 20. Petition: 74, 122. Cline discloses a LC duplex fiber optic connector 10 having a connector housing 30 shaped as shown in Figs. 1 and 3. EX1006: Figs. 1 and 3, 3:22-23, 3:42-42. The optical fibers 12A, 12B extend from the fiber optic cable 16, through the connector housing 30 and into ferrules 40A, 40B supported by respective connector sub-assemblies 38A, 38B. EX1006: Fig. 3, 4:29-34.



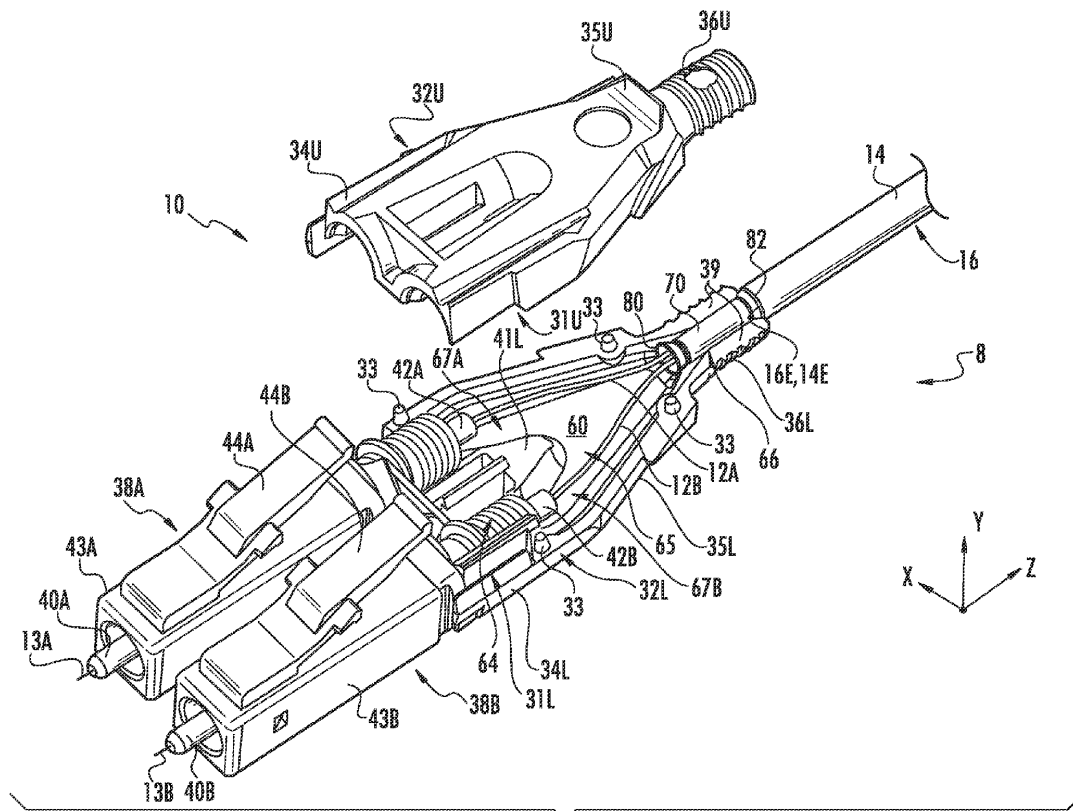


FIG. 3

EX1006: Figs. 1 and 3.

IV. US Conec Has Failed to Show that Claims 1-3, 6-16, 19, and 20 of the '190 Patent are Invalid

90. In my opinion, US Conec has failed to show that its prior art combinations teach each and every limitation in independent claim 1.

91. I understand that US Conec has broken claim 1 up into the following labeled limitations. I will refer to the limitations of claim 1 by this labeling in my analysis.

[1.P] An optical fiber connector comprising:

[1.1] a front body configured to hold first and second ferrules;

[1.2] a back body having a proximal end portion and a distal end portion spaced apart along a longitudinal axis, the proximal end portion of the back body configured to couple to the front body, the distal end portion of the back body comprising a cylindrical back post having an outer round surface extending along the longitudinal axis, the back body defining a back body passageway extending from the distal end portion through the proximal end portion; and

[1.3.1] a rotatable boot assembly having a proximal end portion and a distal end portion spaced apart along the longitudinal axis,

[1.3.2] the rotatable boot assembly comprising a main body and a strain relief sleeve extending longitudinally from the main body to the distal end portion of the rotatable boot assembly,

[1.3.3] the rotatable boot assembly comprising a boot passageway extending from the distal end portion through the main body, the main body comprising an inner round surface extending along the longitudinal axis, the inner round surface defining a proximal end portion of the boot passageway,

[1.3.4] the rotatable boot assembly configured to be disposed on the back body such that (i) the outer round surface of the back post is matingly received in the inner round surface of the main body and

[1.3.5] (ii) the cable boot member is slidable along the longitudinal axis relative to the back body for releasing the optical fiber connector from an adapter,

[1.3.6] the optical fiber connector being configured to terminate a fiber optic cable such that a jacket of the cable is received in the strain relief sleeve in the boot passageway,

[1.3.7] the boot passageway and the back body passageway configured to align for passing first and second fibers from the fiber optic cable to the front body to complete a signal path to the first and second ferrules within the front body;

[1.3.8] the main body further comprising at least one boot hook configured for releasably securing the multi-purpose rotatable boot assembly against rotation relative to the back body,

[1.3.9] and the rotatable boot assembly further comprising an elongate arm extending longitudinally from the main body in a proximal direction along the longitudinal axis, the elongate arm being configured for selectively setting the optical fiber connector to each of a first polarity and a second polarity.

A. Ground 1: US Conec Has Failed to Show the Combination of Nakagawa and Raven Teaches Every Limitation of Independent Claim 1 of the ‘190 Patent

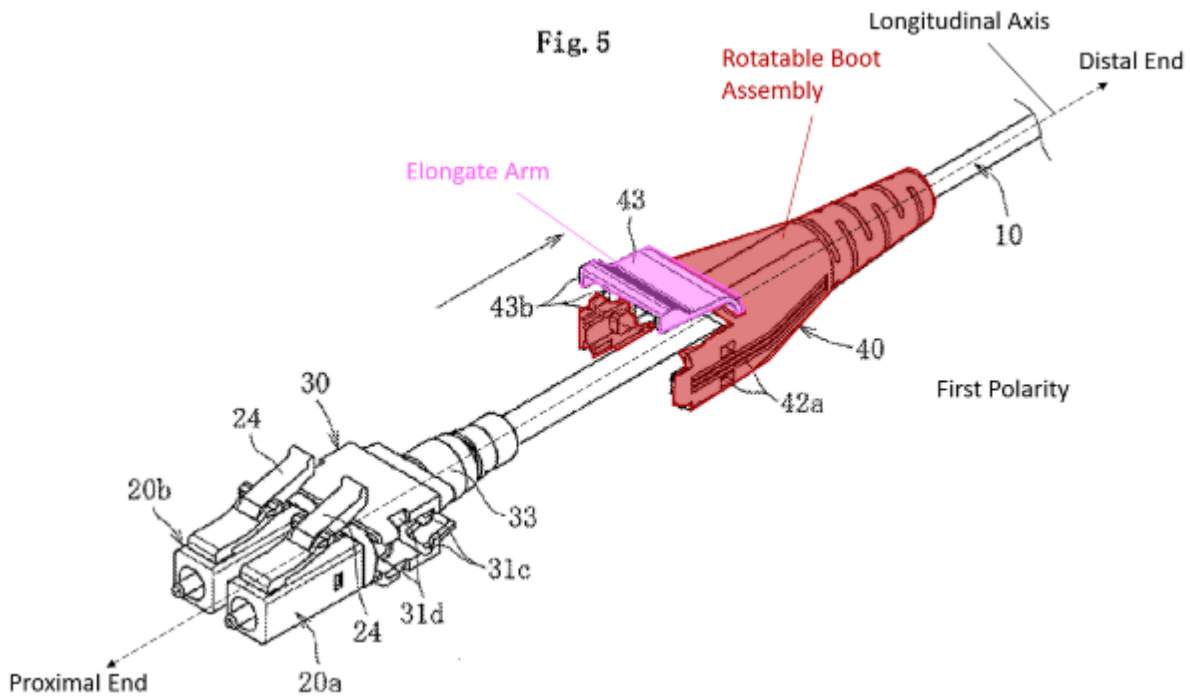
92. Ground 1 of US Conec’s Petition asserts that independent claim 1 (and dependent claims 2, 3, 6-16, and 19) are obvious over Nakagawa modified in view of Raven. However, in my opinion, US Conec has failed to demonstrate correspondence of the specific structural details recited in independent claim 1 to those details in Nakagawa modified by Raven. This failure occurs in at least four

limitations of claim 1, as I demonstrate below. Therefore, independent claim 1 is valid over the Nakagawa/Raven combination.

1. The Nakagawa/Raven Combination Does Not Teach “the Rotatable Boot Assembly Further Comprising an Elongate Arm Extending Longitudinally From the Main Body in a Proximal Direction Along the Longitudinal Axis” (1st Clause of Limitation 1.3.9)

93. Independent claim 1 recites “a rotatable boot assembly ... comprising an *elongate* arm extending longitudinally from the main body in a proximal direction along the longitudinal axis.” EX1001: 11:44-47 (emphasis added). In my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses an “elongate arm” as claimed.

94. In the Petition, US Conec asserts that Nakagawa teaches a rotatable boot assembly with an elongate arm. Petition: 52-55. Specifically, US Conec asserts that Nakagawa’s operation lever 43 teaches the claimed “elongate arm,” as shown below:



Petition: 53 (EX1007: Fig. 5 (annotated by US Conec)).

95. However, Nakagawa's operation lever 43 is not elongate. The plain and ordinary meaning of "elongate" is having a shape that is much longer than it is wide.

96. This is the plain and ordinary meaning a person of ordinary skill in the art would have given to this term at the time of invention of the '190 Patent in view of the specification of the '190 Patent. The figures of the '190 Patent show that the key 9105.1, 9205.1, 9305.1, 9405.1 is an "elongate" arm in that the key has "a shape that is much longer than it is wide." EX2009; EX1001: Figs. 16, 17, 19, 20, and 24.

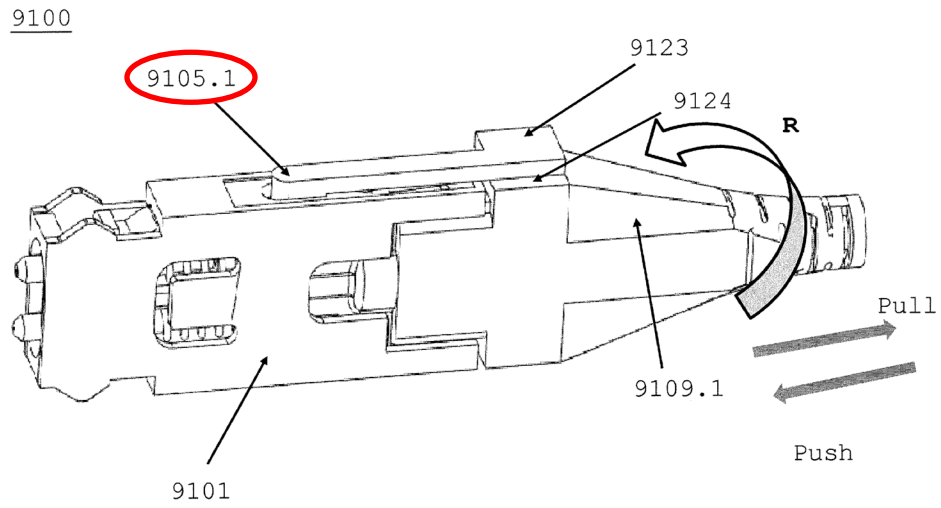


FIG. 16

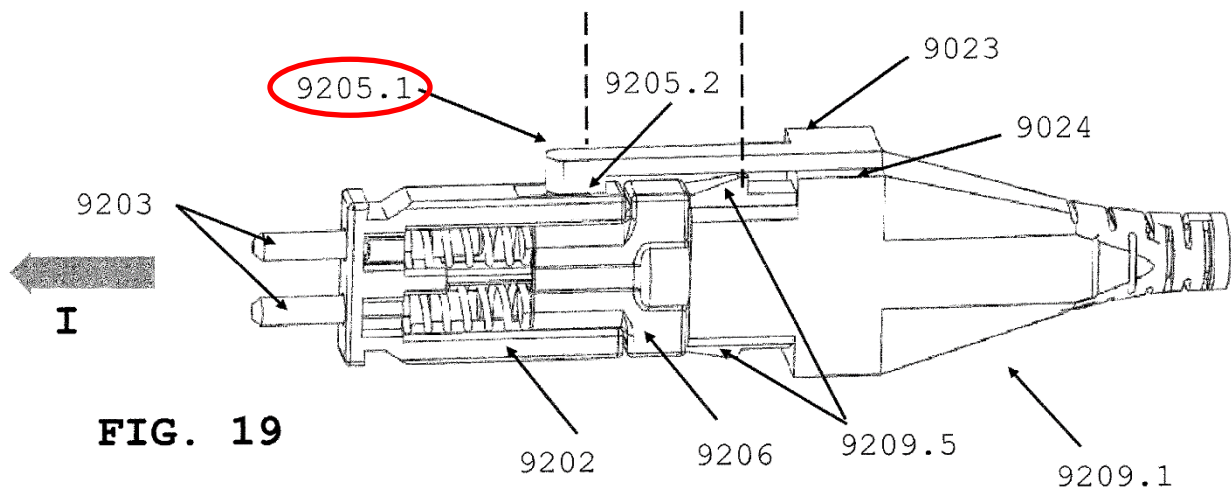


FIG. 19

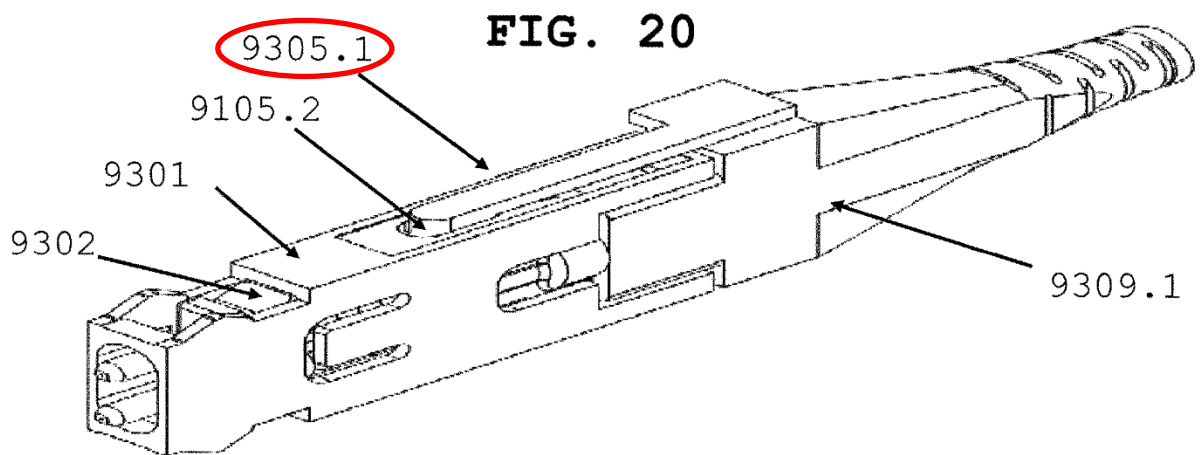


FIG. 20

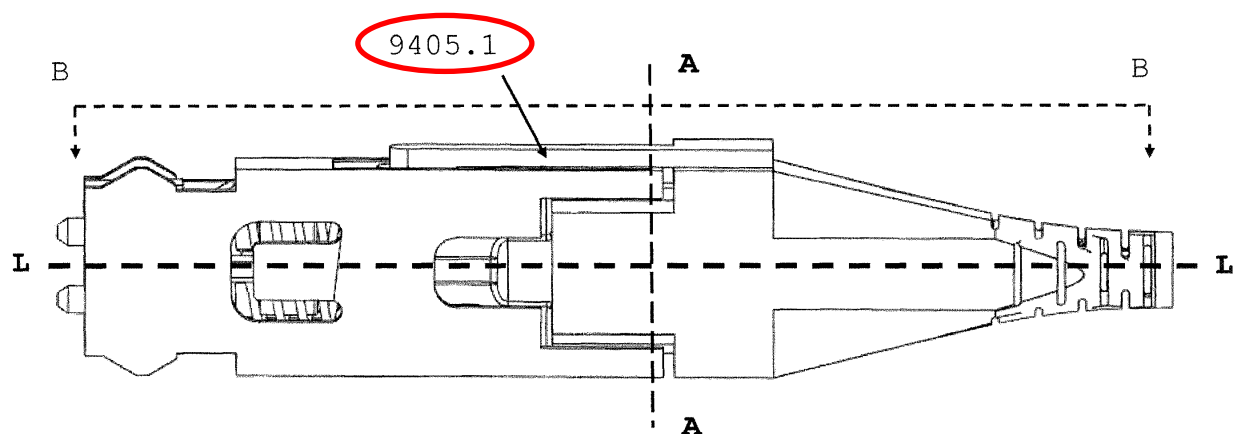


FIG. 24

EX1001: Fig. 16, 19, 20, and 24 (annotated).

97. Further, the dictionary definition of “elongate” supports this plain and ordinary meaning. EX2009. This definition is the plain and ordinary meaning of “elongate” that a person skilled in the art would have understood at the time of invention of the ‘190 Patent—e.g., on or just prior to July 14, 2017. I understand extrinsic evidence, like dictionaries, can be used to establish the plain and ordinary meaning.

98. This plain and ordinary meaning is how US Conec has used the term “elongate” in its own patents and patent applications. For example, with reference to Fig. 9 below, in U.S. Patent No. 11,428,875, US Conec states that the “alignment steps 94 are illustrated in FIGS. 9 and 12 as having an *elongate* form.” EX2010: 5:61-62 (emphasis added).

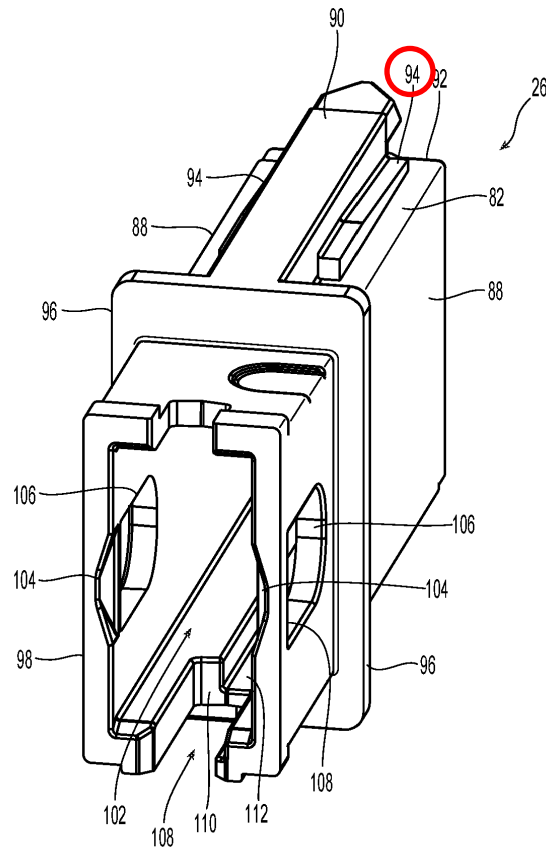
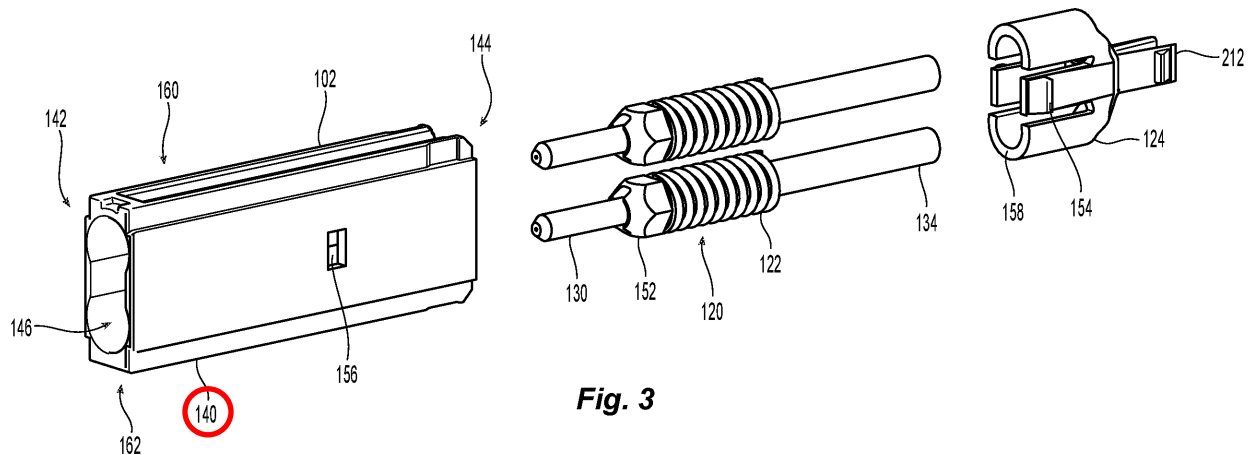


Fig. 9

EX2010: Fig. 9 (annotated).

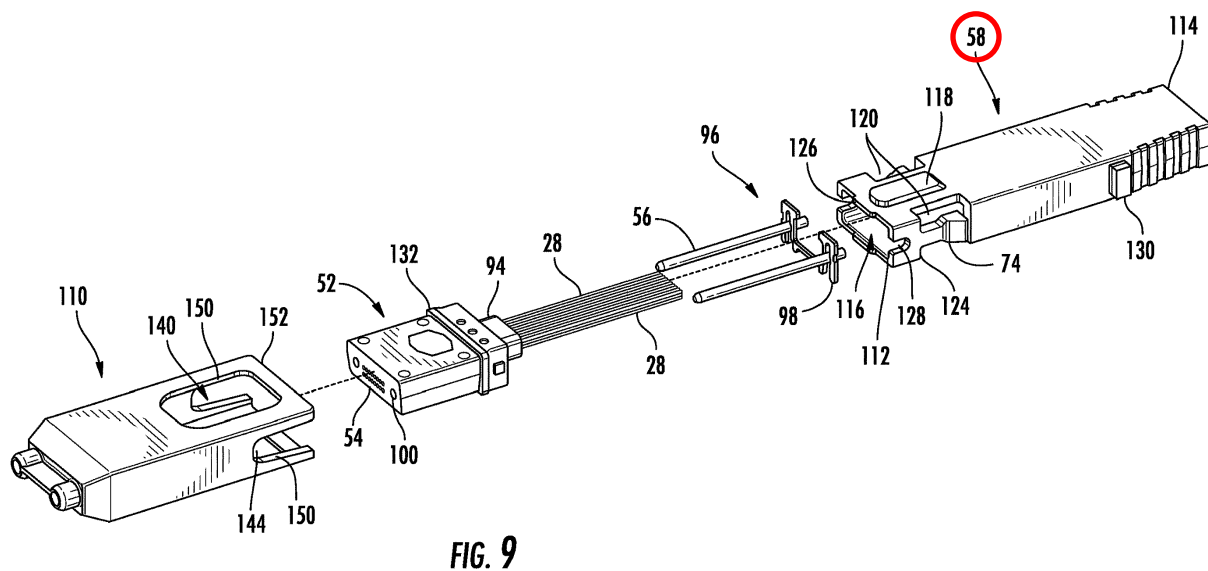
99. Similarly, with reference to Fig. 3 below, in U.S. Patent No. 11,846,813, US Conec explains that “the main body [140] has an *elongate* structure.” EX2011: claim 17 (emphasis added).



EX2011: Fig. 3 (annotated).

100. Likewise, with reference to Fig. 9 below, in U.S. Publication No. 2023/0393351, US Conec states “ferrule push 58 is a generally *elongate* structure.”

EX2012: ¶[0064] (emphasis added).



EX2012: Fig. 9 (annotated).

101. Lastly, with reference to Fig. 33 below, in U.S. Publication No. 2023/0213709, U.S. Conec explains that “the spine member 608’ of boot 600’ may have two *elongated* members.” EX2013: ¶[0077] (emphasis added).

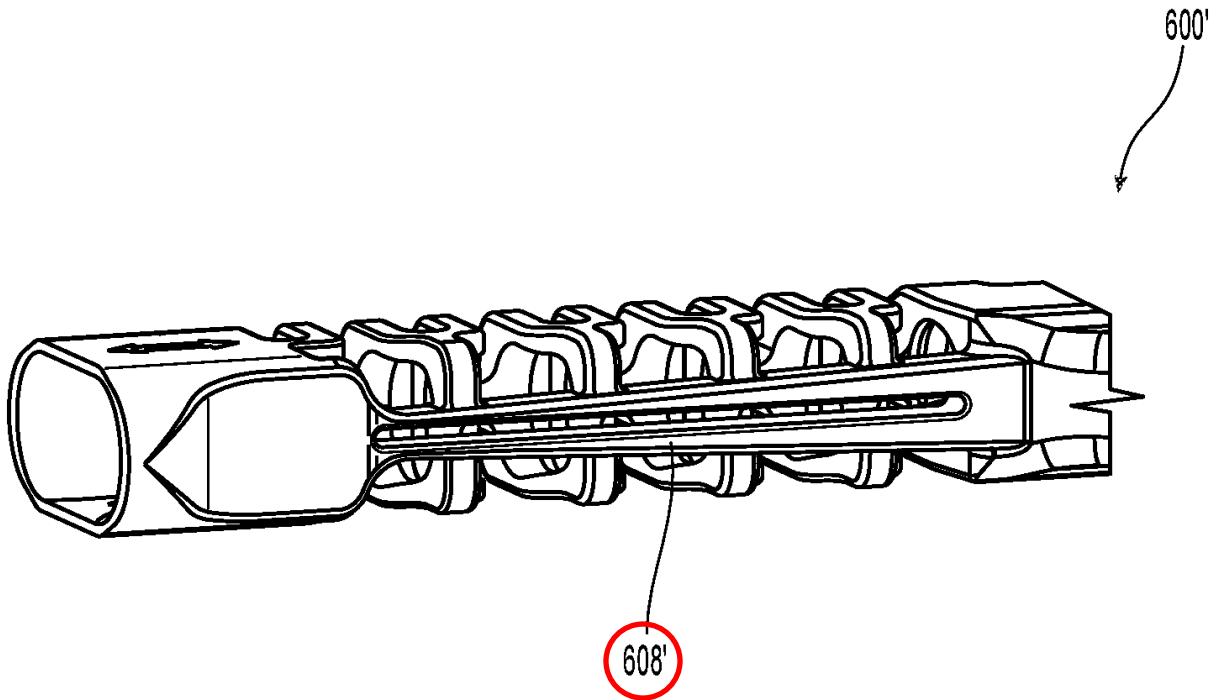
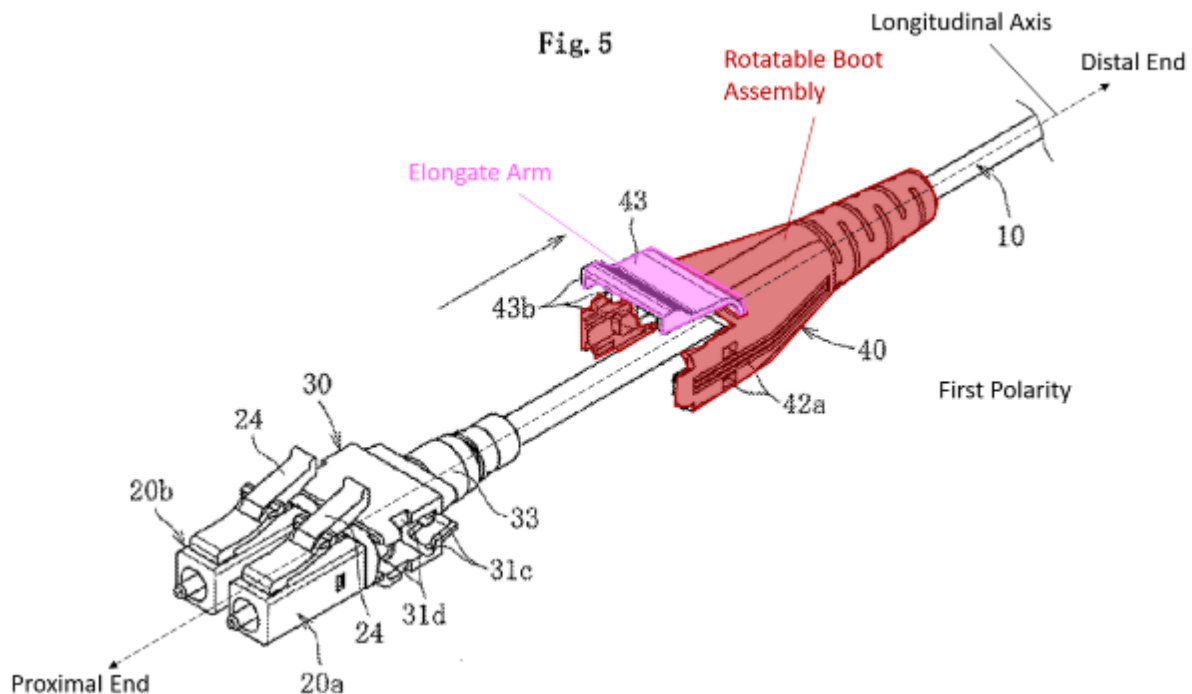


Fig. 33

EX2013: Fig. 33 (annotated).

102. The language of independent claim 1, moreover, sets the elongate orientation as being along the longitudinal axis by reciting that the “elongate arm extending longitudinally from the main body in a proximal direction *along the longitudinal axis*.” EX1001: 11:45-47 (emphasis added). As shown below in US

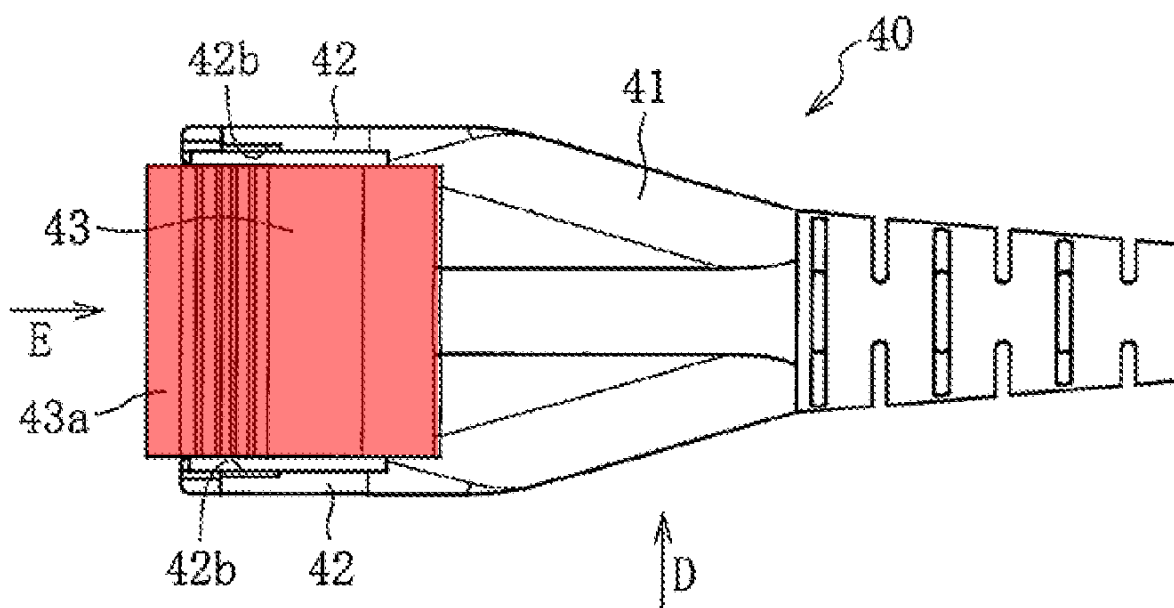
Conec's annotated Fig. 5 of Nakagawa, the operation lever 43 is not longer along the longitudinal axis than it is wide.



Petition: 53 (EX1007: Fig. 5 (annotated by US Conec)).

103. This is clearly shown in Fig. 4C of Nakagawa (reproduced below), which provides a top down view of the operation lever 43. As shown, the footprint of Nakagawa's operation lever 43 is a perfect square. This is confirmed by the red box annotation in Fig. 4C below. The red box annotation added to Fig. 4C was generated using a "rectangle" shape tool in Word and has dimensions of 1.51 x 1.51 inches according to Word.

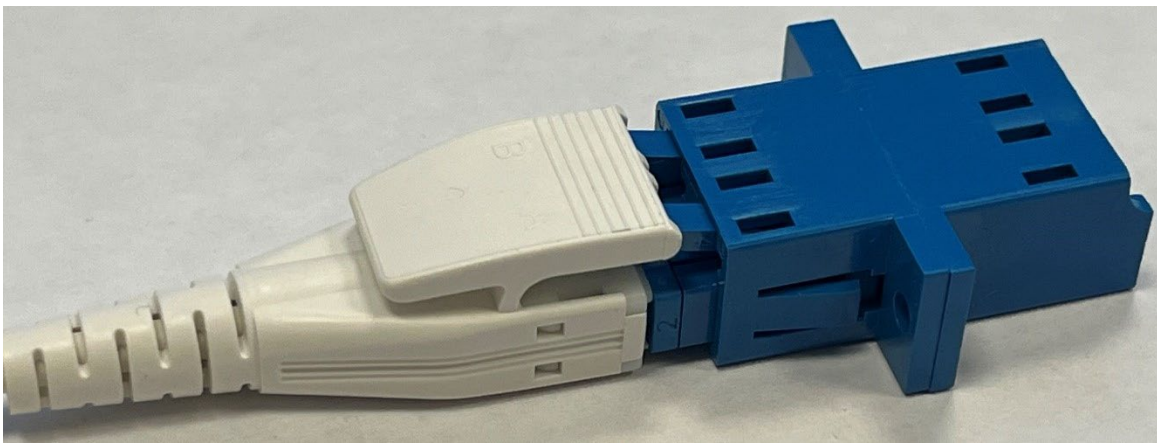
Fig. 4C



EX1007: Fig. 4C (annotated).

104. As explained above in Paragraph 63, the elongate shape of the arm 9105.1, 9205.1, 9305.1, 9405.1 in the '190 Patent is what enables the arm to function as the polarity key structure that permits insertion of the connector 9100 in only the correct mating orientation because the elongate arm cooperates with the corresponding structure, i.e., keyway, in the adapter. Because Nakagawa's operation lever 43 is not elongate, it does not extend forward along the top of the optical connector unit 1 a sufficient distance to function as a polarity key. Instead, Nakagawa's operation lever 43 only extends the minimal distance needed to effectively press the ends of the locking levers 24.

105. In fact, no portion of Nakagawa's operation lever 43 is ever received in an adapter when the optical connector unit 1 is plugged in. This is illustrated by the Uniboot LC Connector of Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (EX2002) below. As shown, the operation lever of the Uniboot LC Connector is spaced apart from the adapter when coupled together, and therefore, is not received by or engages the adapter.



See EX2002; EX2005.

106. Therefore, in my opinion, US Conec has failed to demonstrate the Nakagawa/Raven combination discloses the “elongate arm” of claim 1.

2. The Nakagawa/Raven Combination Does Not Teach “the Elongate Arm Being Configured for Selectively Setting the Optical Fiber Connector to Each of a First Polarity and a Second Polarity” (2nd Clause of Limitation 1.3.9)

107. Independent claim 1 recites “the *elongate arm* being configured for *selectively setting* the optical fiber connector to each of *a first polarity and a second polarity*.” EX1001: 11:47-49 (emphasis added). US Conec asserts that

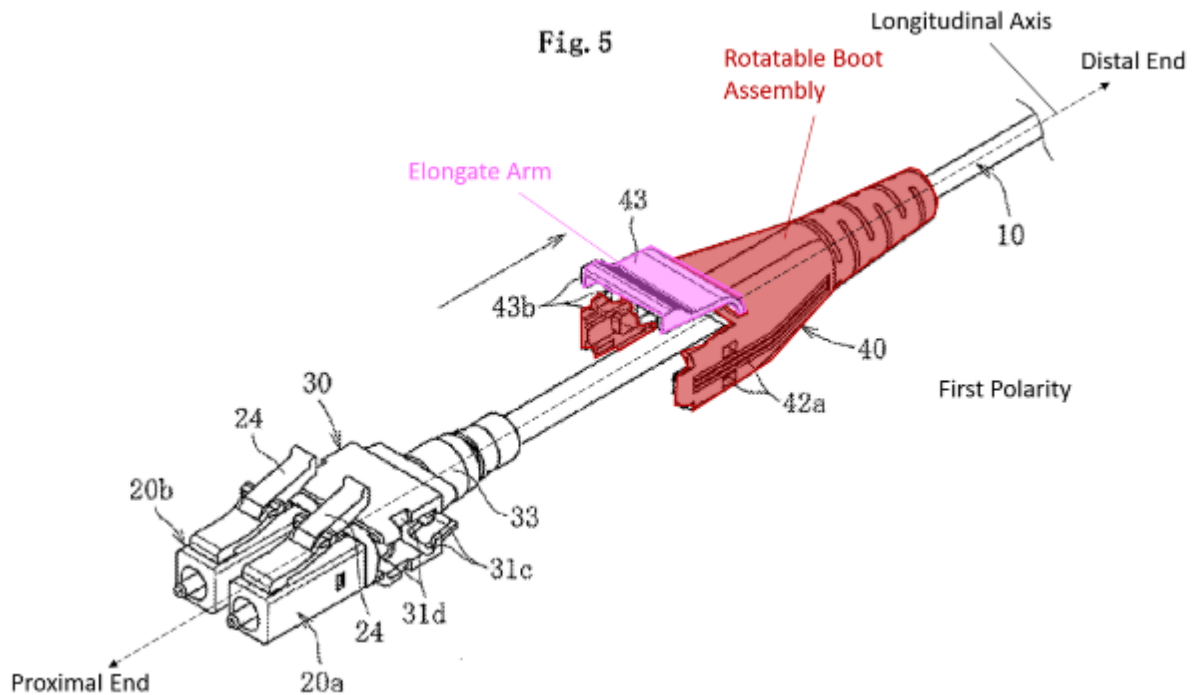
Nakagawa's operation lever 43 meets this limitation. Petition: 53-54. In my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses an "elongate arm" that selectively sets the polarity as claimed.

108. Nakagawa's operation lever 43 does not set the polarity of the optical connector unit 1.

109. As explained above in Paragraphs 46-51 above, in an LC duplex connector like Nakagawa, the latch levers on top of the plug frames set the polarity of the connector because they are the key structures that fit inside an adapter and they only fit in an adapter when the connector is in the proper mating orientation. This proper mating orientation is when the latch levers of the LC duplex connector are aligned with the latch receivers of the LC duplex adapter such that the LC duplex connector can be inserted into and mated with the LC duplex adapter. Applying this understanding to Nakagawa, it is Nakagawa's locking levers 24 that set the polarity of the optical connector unit 1—not the operation lever 43.

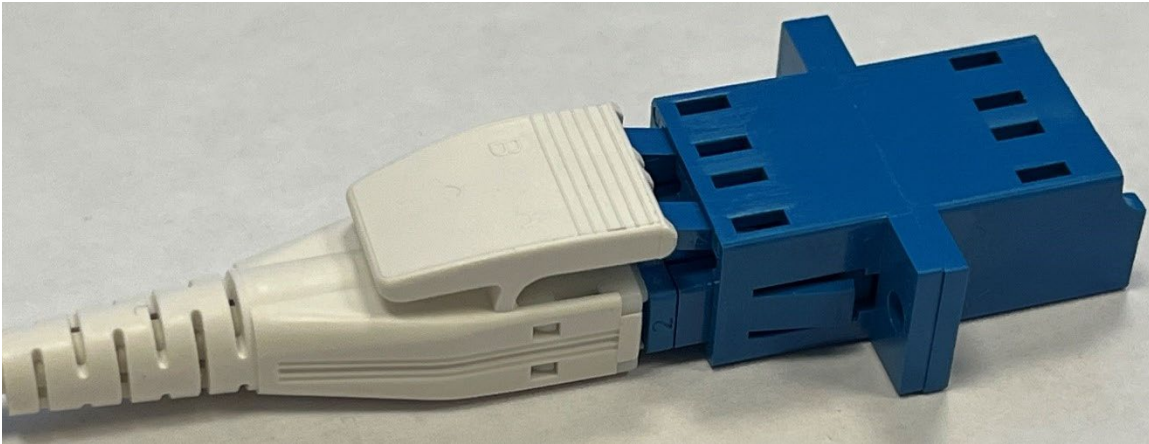
EX1007: ¶[0050]. Nakagawa teaches rotating each connector 20a, 20b 180° (when the boot 40 is removed) to change polarity. EX1007: ¶[0062]. Rotating the connectors 20a, 20b 180° moves the locking levers 24 from top to bottom so that the arrangement of the two ferrules in relation to the locking levers 24 has changed. EX1007: ¶¶[0062]-[0063]. The change in position of the ferrules relative to the locking levers 24 is apparent when the entire optical connector unit 1

is subsequently flipped over to return the optical connector unit to the mating orientation. EX1007: ¶¶[0062]-[0063]. Thus, the rotational positions of the connectors 20a, 20b sets the polarity, not rotation of the operation lever 43.



Petition: 53 (EX1007: Fig. 5 (annotated by US Conec)).

110. The operation lever 43 does not set polarity. The operation lever 43 is not constructed to set polarity, nor arranged with respect to the other parts of Nakagawa's optical connector to set polarity because the operation lever does not interact with (e.g., is not inserted into) a corresponding adapter, as demonstrated in the image below:

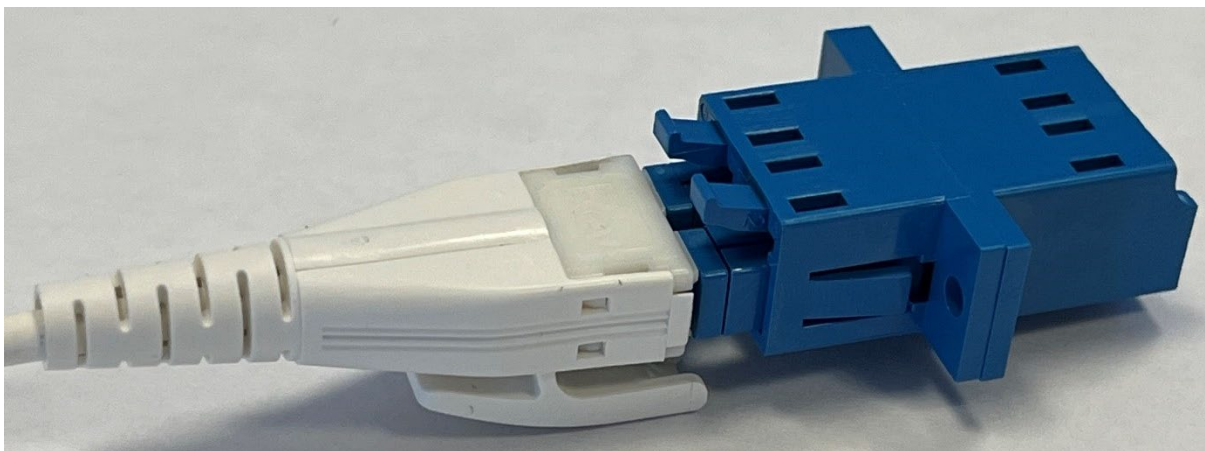
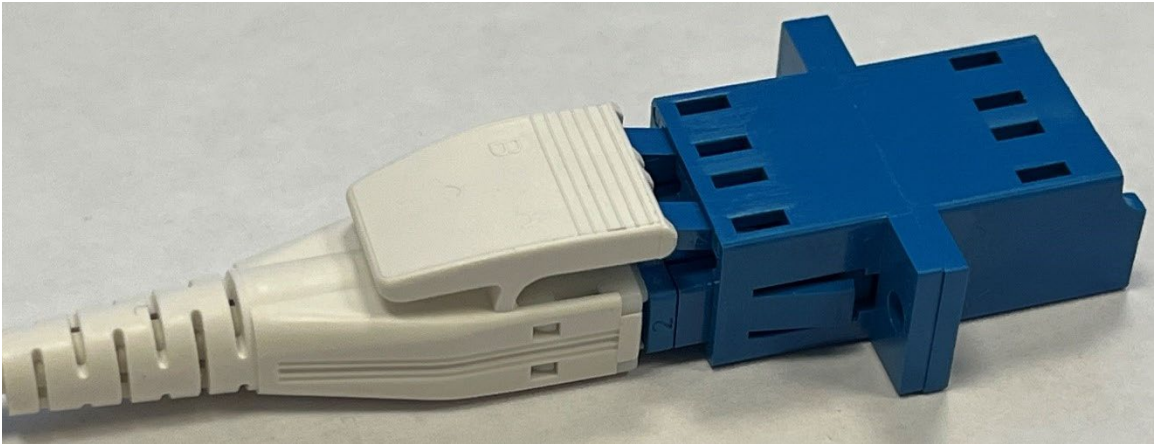


EX2002; EX2005.

111. The position of the operation lever 43 is, in fact, irrelevant to the polarity of Nakagawa's optical connector. Movement of the operation lever 43 is irrelevant to the positions of the ferrules in relation to the locking levers 24 (i.e., the key feature). As shown below, changing the position of the locking lever 43 from the top to the bottom does not change the polarity of the optical connector. Nakagawa's optical connector can have the same polarity when the boot 40 is oriented with the operation lever 43 on top (left) or bottom (right). In this example, the image on the right is Fig. 1 reconstructed to show only the boot 40 rotated 180°. Because only the boot 40 was rotated 180°, and the locking levers 24 remain in their same position relative to unedited Fig. 1, the polarity of the Nakagawa's optical connector has not changed between these two images.

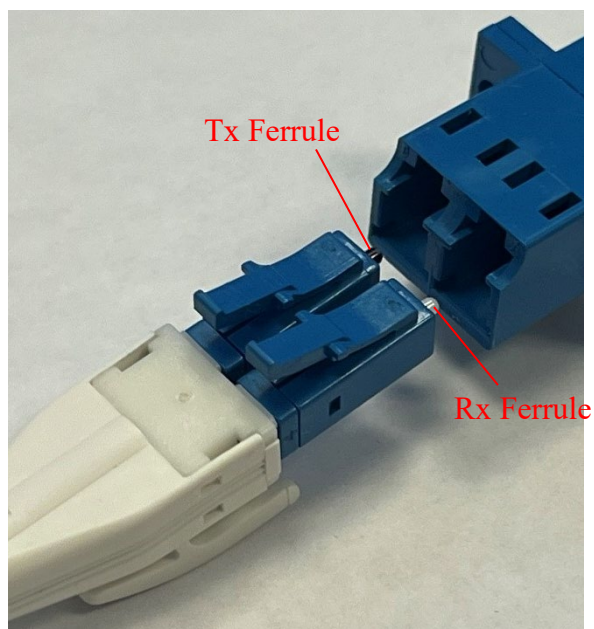
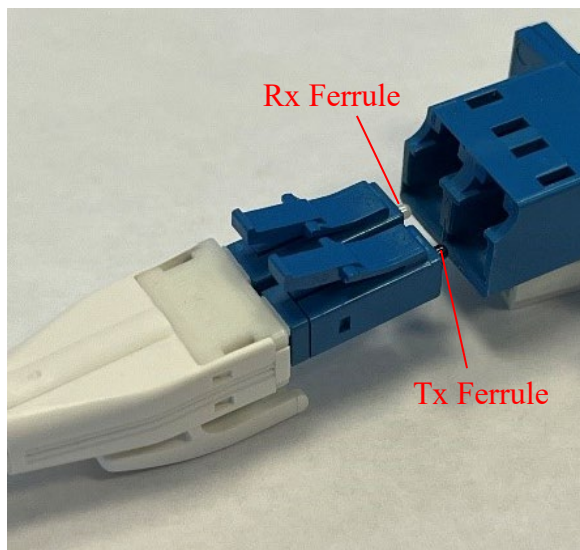
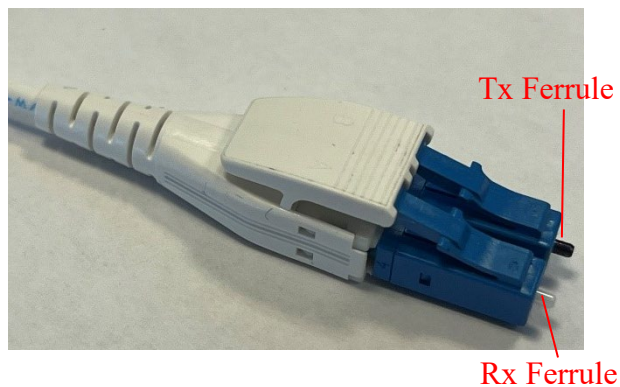
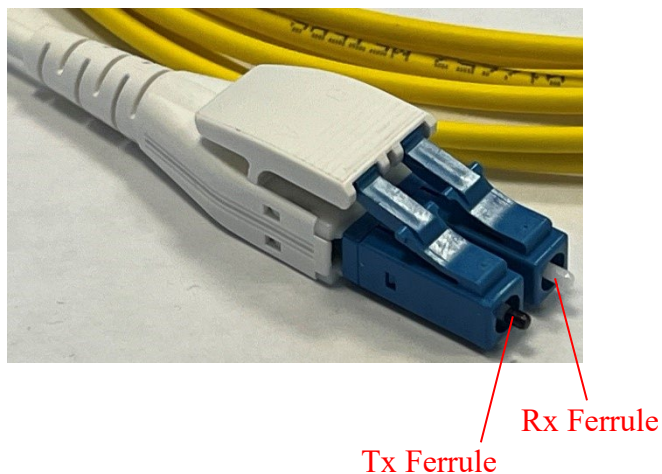
the optical connector unit has to be in to mate with a corresponding LC duplex adapter. Nakagawa's operation lever 43 cannot set the polarity of Nakagawa's optical connector unit 1 because the operation lever 43 never interacts with the LC duplex adapter.

113. This concept is further illustrated by the Uniboot LC Connector of Universal LC Fiber Cable - Singlemode 9/125 - Plenum 4M with Uniboot LC Connectors (EX2002) below. Because the latch levers, not the operation lever, is inserted into the LC duplex adapter (EX2005), moving the operation lever from the top side of the connector to the bottom side of the connector has no effect on the polarity of the connector. As shown below, regardless of the position of the operation lever of the Uniboot LC Connector, the Uniboot LC Connector is still inserted into the LC duplex adapter in the same mating orientation, which the latch levers on the top side of the connector.



EX2002; EX2005.

114. Said another way, as demonstrated in the images below, the position of the Tx and Rx ferrules in the Uniboot LC Connector when the connector is in the mating orientation does not change just because the boot was rotated.



First Polarity

Second Polarity

EX2002; EX2005 (annotated).

115. Further evidence Nakagawa's operation lever 43 does not set the polarity of the optical connector is provided by both Raven and Veatch, other prior art references asserted by US Conec. Raven and Veatch both disclose the same type of LC duplex optical connector as Nakagawa, and both Raven and Veatch teach polarity change mechanisms that selectively set first and second polarities.

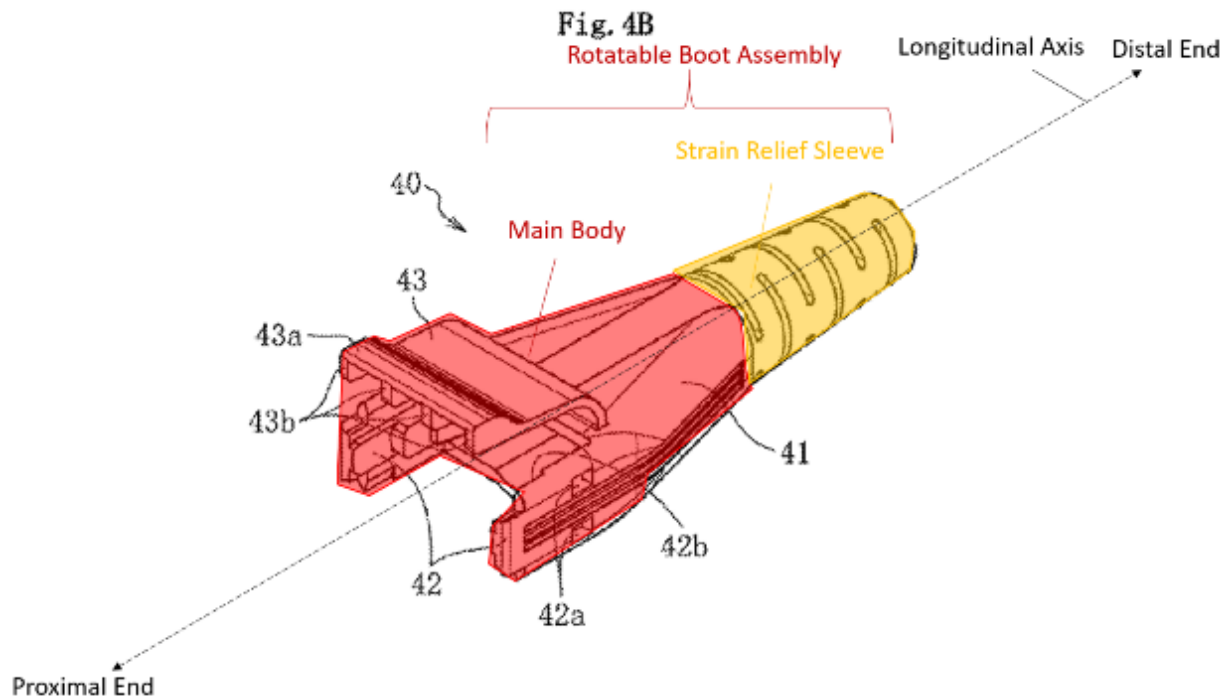
Paragraphs 49, 78-87; EX1004: Fig. 2, 6:65-7:1; EX1008: Fig. 1. Moreover, even though they do not have an operation lever like Nakagawa's, both Raven and Veatch have polarity change systems that selectively set first and second polarities. Paragraphs 78-87; EX1004: Fig. 2, 6:65-7:1; EX1008: Fig. 1. The simple conclusion is the person of ordinary skill in the art already understands, that the locking levers 24 of Nakagawa's LC duplex connector and their arrangement relative to the ferrules that set the polarity of the connector—not an external operation lever that never interacts with by entering an adapter. Thus, in Nakagawa, it is the step of rotating the connectors 20a, 20b to reposition the locking levers 24 from the top to the bottom that causes the positions of the two ferrules to switch (relative to the locking levers) and sets the polarity of the optical connector unit 1. EX1007: ¶[0017]. Because the operation lever 43 does not set polarity, the operation lever 43 does not meet the requirement for an elongate arm that sets polarity as claimed.

116. Accordingly, in my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses an “elongate arm being configured for *selectively setting* the optical fiber connector to each of *a first polarity and a second polarity*” as recited by claim 1.

3. The Nakagawa/Raven Combination Does Not Teach “the Inner Round Surface [of the Main Body of the Rotatable Boot Assembly] Defining a Proximal End Portion of the Boot Passageway” (Limitation 1.3.3)

117. Independent claim 1 recites that “the rotatable boot assembly compris[es] a boot passageway extending from the distal end portion through the main body, the main body comprising an inner round surface extending along the longitudinal axis, *the inner round surface defining a proximal end portion of the boot passageway.*” EX1001: 11:21-27 (emphasis added). In my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses an “inner round surface [that] define[s] a proximal end portion of the boot passageway.”

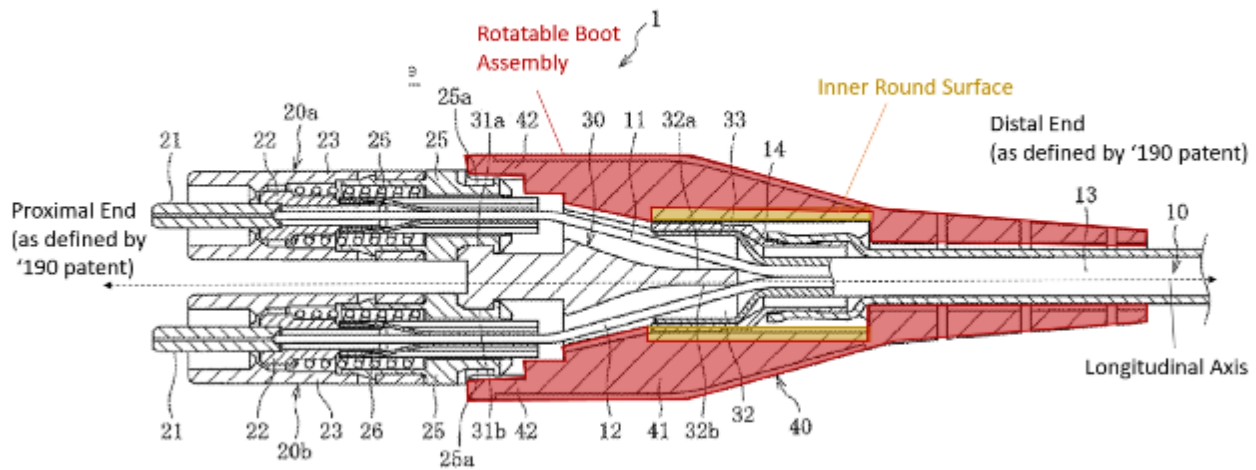
118. In the Petition, US Conec identifies the indicated portion of Nakagawa’s boot 40 below to the claimed “main body” of the “rotatable boot assembly.”



Petition: 39 (EX1007: Fig. 4B (annotated by US Conec)).

119. US Conec states that the indicated “main body” portion of Nakagawa’s boot 40 includes an “inner round surface [that] defin[es] a proximal end portion of the boot passageway” as recited by claim 1. Petition: 41-42. To support this position, US Conec annotates Nakagawa’s Fig. 2 (reproduced below) to identify the claimed “inner round surface.”

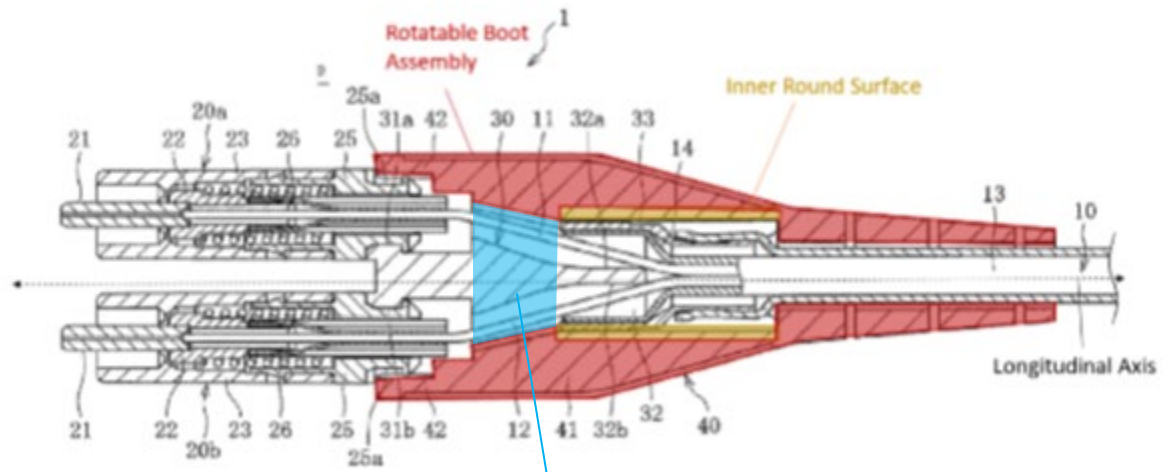
Fig. 2



Petition: 42 (EX1007: Fig. 2 (annotated by US Conec)).

120. However, as shown below in US Conec’s annotated Fig. 2 of Nakagawa, the indicated “inner round surface” does *not* “defin[e] a proximal end portion of the boot passageway” as recited by claim 1. Instead, the indicated “inner round surface” defines an *intermediate* portion of a boot passageway, that is distal of the proximal end portion of the boot passageway. The proximal and distal ends or directions relative to the optical connector and therefore the boot passageway are defined earlier in claim 1—see limitations 1.3.1 and 1.3.2—which US Conec identifies in their annotated Fig. 2 of Nakagawa above.

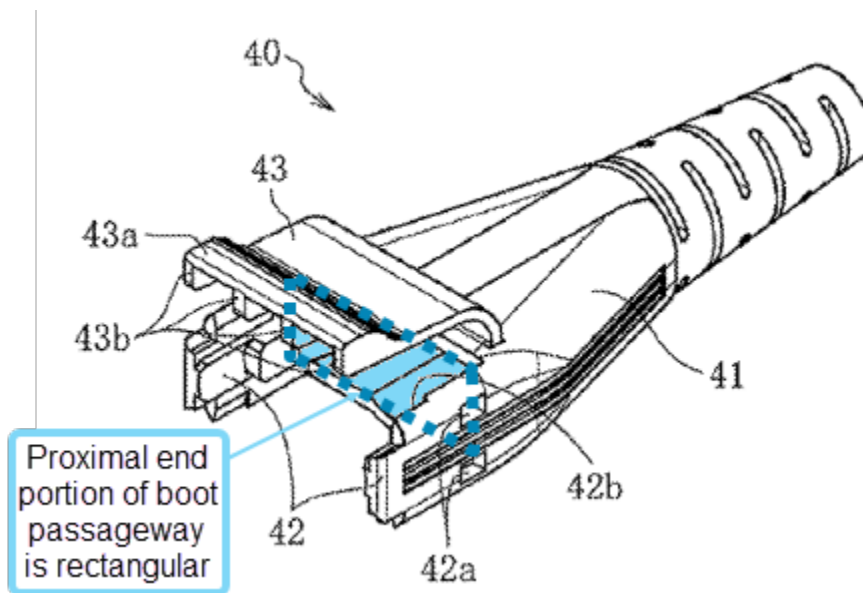
Fig. 2



Portion of Boot Passageway Proximal of the Portion of the Boot Passageway Defined by the Inner Round Surface

Petition: 42 (EX1007: Fig. 2 (annotated by US Conec, further annotated by Senko (blue))).

121. The non-round rectangular shape of the proximal end portion of Nakagawa's boot passageway is apparent in Fig. 4B below.



EX1007: Fig. 4B (annotated).

122. As is apparent from annotated Figs. 2 and 4B above, the inner round surface identified by US Conec does not define the proximal end portion of the boot passageway because there is another (non-round) portion of the boot passageway more proximal than the identified inner round surface.

123. As mentioned above, Nakagawa was applied by the Examiner during the prosecution of the '190 Patent. EX1003: 88-89. Upon reviewing the file history, I note that this limitation—limitation 1.3.3—was specifically added and argued by Senko as distinguishing Nakagawa. EX1003: 141, 146. Further, after limitation 1.3.3 was added and the corresponding arguments were made during prosecution, the Examiner issued the notice of allowance. EX1003: 216-220. This leads me to conclude that the Examiner agreed with Senko's arguments that Nakagawa does not disclose limitation 1.3.3. For the reasons stated herein, I agree with the Examiner.

124. Accordingly, in my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses the claimed “inner round surface *defining a proximal end portion* of the boot passageway.”

4. The Nakagawa/Raven Combination Does Not Teach “a Front Body Configured to Hold First and Second Ferrules” (Limitation 1.1)

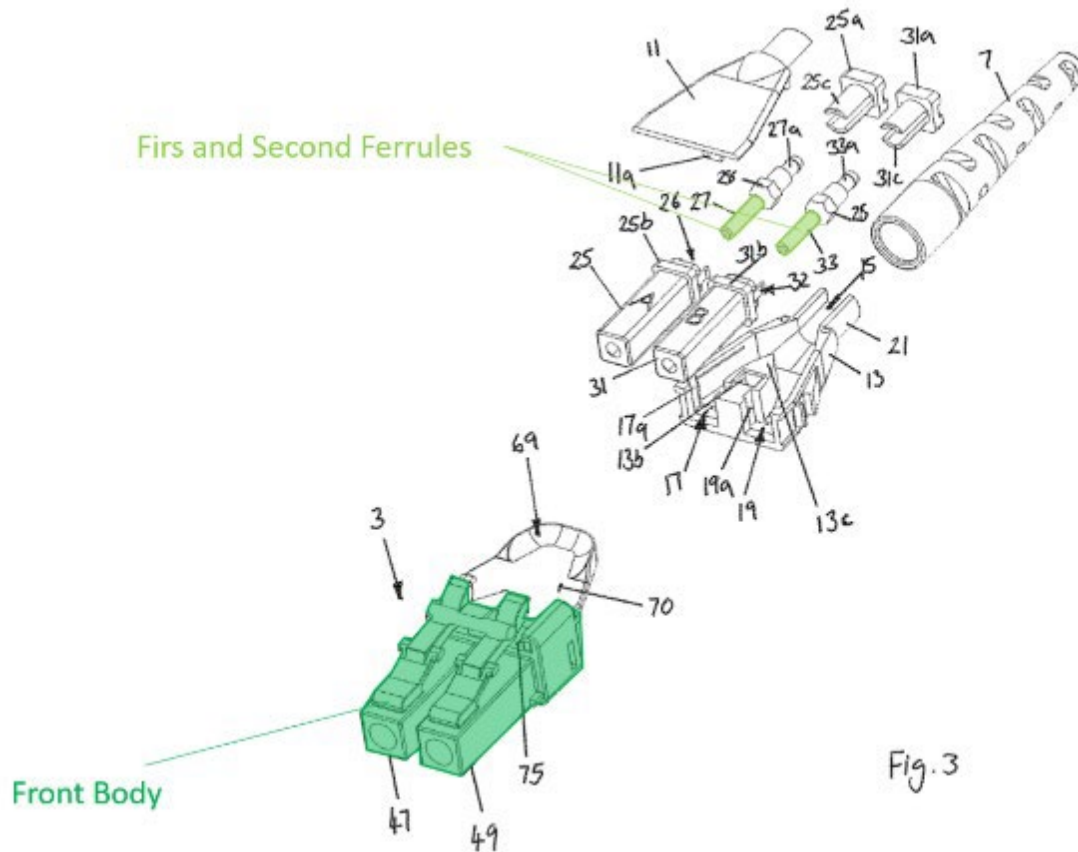
125. Independent claim 1 recites that the optical fiber connector comprises “a front body configured to hold first and second ferrules.” EX1001: 11:6. In my

opinion, US Conec has failed to show the Nakagawa/Raven combination discloses a “front body” that holds first and second ferrules as claimed.

126. Initially, I agree with US Conec that Nakagawa does not disclose this claim limitation as each ferrule 21 of Nakagawa is individually held by one of the two connectors 20a, 20b of the optical connector unit 1. Petition: 31; EX1007: Figs. 1 and 2, ¶[0047] (“connectors 20a, 20b each include a ferrule 21”).

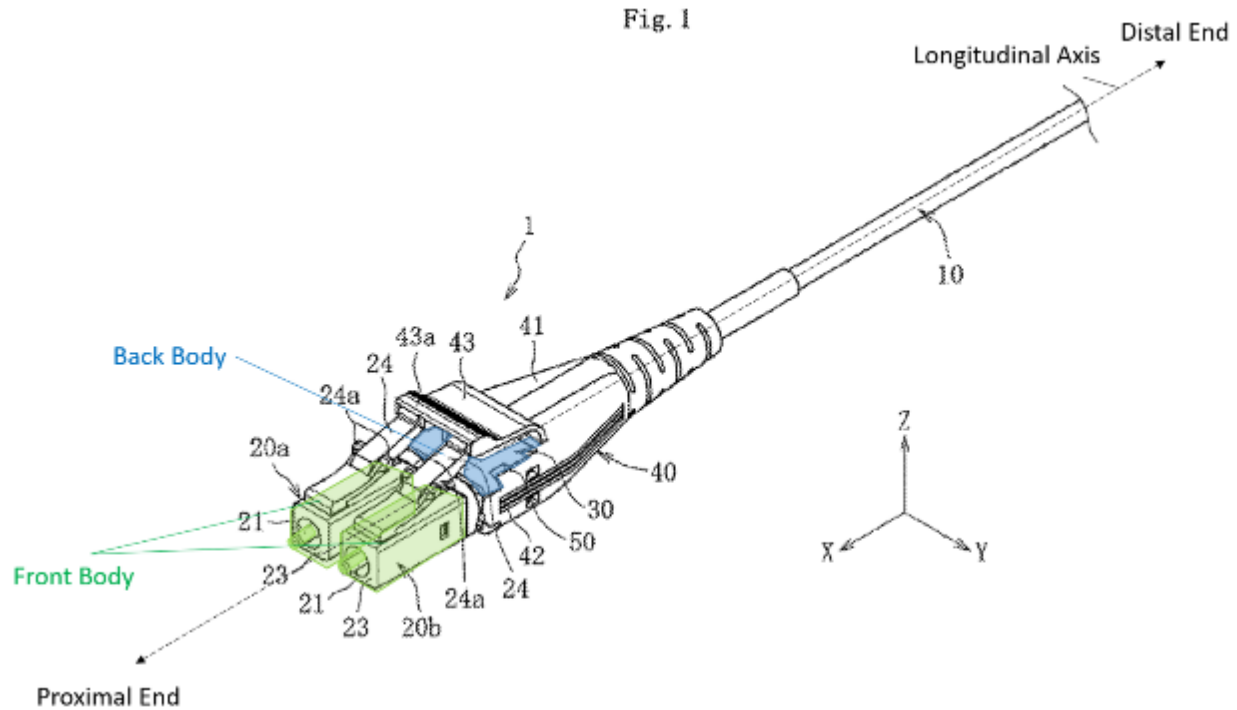
127. Because of this deficiency, US Conec modifies Nakagawa’s optical connector unit 1 to include Raven’s leading end unit 3. Petition: 26-28, 31-34. Raven’s end unit 3 is a one-piece molding that covers the two LC plug frames and mounts two latch levers of an LC duplex connector.

128. US Conec equates Raven’s leading end unit 3 to the claimed front body (for limitation 1.1). Petition: 31-33.



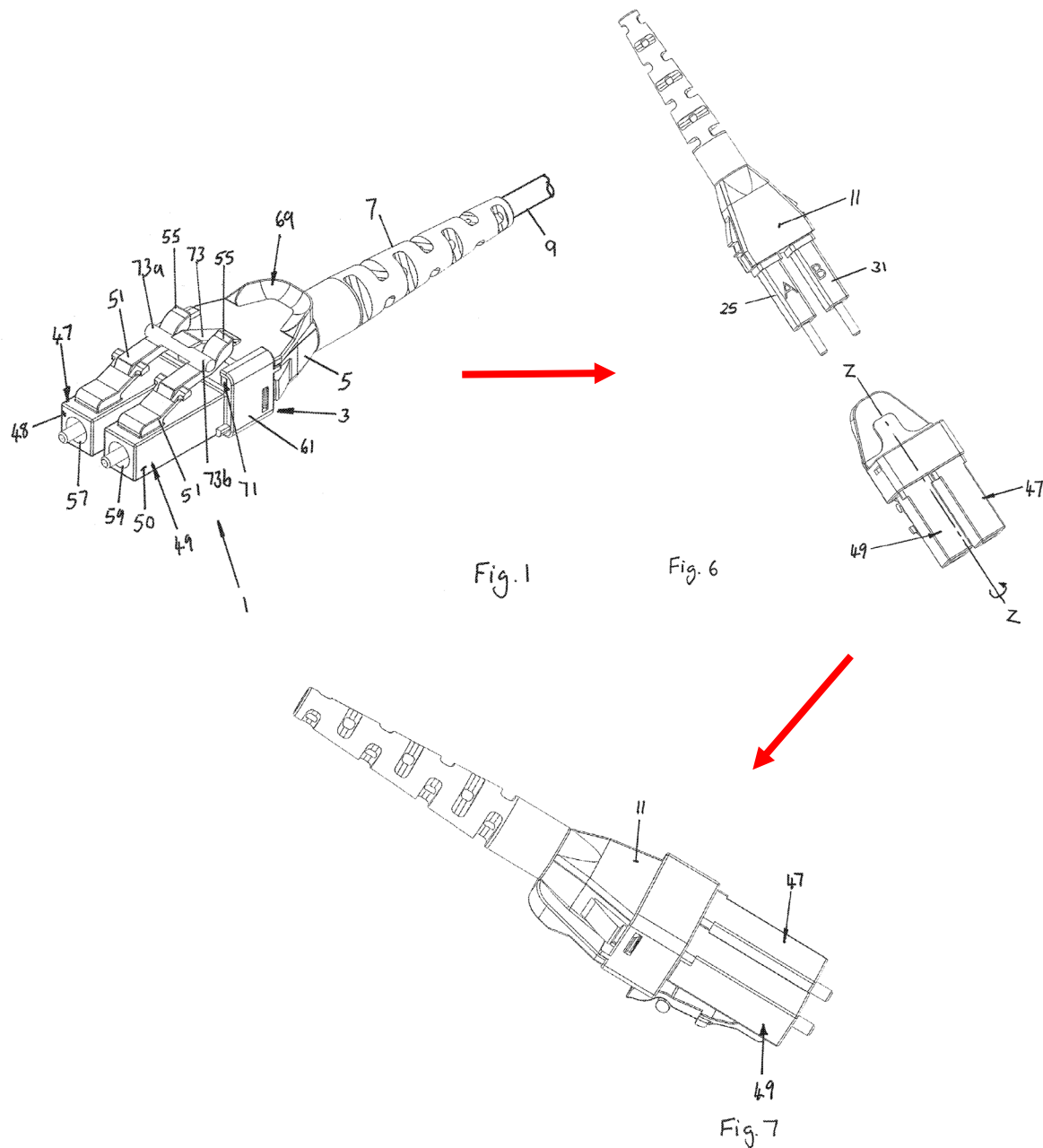
Petition: 32 (EX1008: Fig. 3 (annotated by US Conec)).

129. However, for limitation 1.2, US Conec points to Nakagawa's two separate connectors 20a, 20b as the front body. Petition: 34. These connectors 20a, 20b of Nakagawa correspond to the first and second inner bodies 25, 31 of Raven, not to the leading end unit 3.



Petition: 34 (EX1007: Fig. 1 (annotated by US Conec)).

130. Raven's leading end unit 3 does not hold the ferrules 27, 33. Instead, the ferrules 27, 33 are held by the first and second inner bodies 25, 31. EX1008: Figs. 3 and 5, 10:23-30, 10:42-44. Raven's leading end unit 3 does not hold the ferrules 27, 33 because Raven's leading end unit separates from the ferrules to change polarity, as shown below. Raven's ferrules 27, 33 would move with the leading end unit 3 if Raven's leading end unit held the ferrules. But because the ferrules 27, 33 are held by the inner bodies 25, 31—not the leading end unit 3—the ferrules do not move with the leading end unit during the polarity change operation. EX1008: 10:23-41.



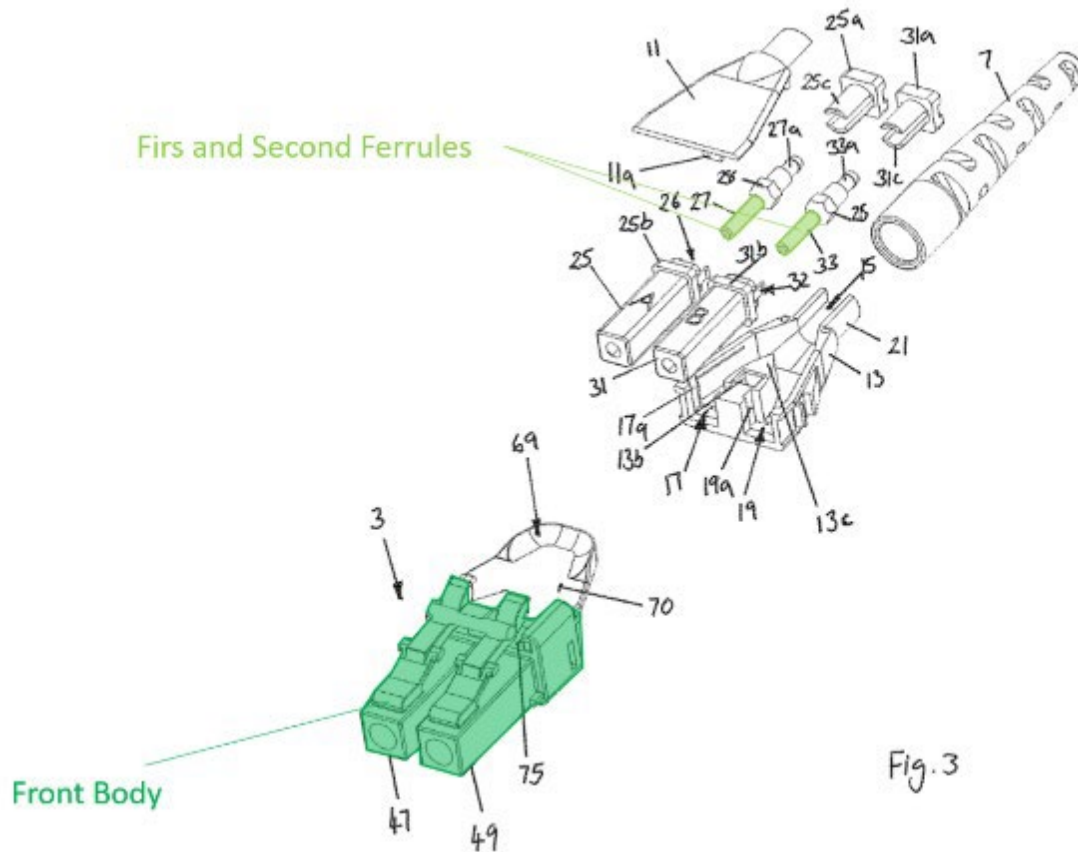
EX1008: Figs. 1, 6, and 7, 12:28-39.

131. Accordingly, in my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses “a front body configured to hold first and second ferrules” as recited by claim 1.

- i. *The Nakagawa/Raven Combination Does Not Teach “the Proximal End Portion of the Back Body Configured to Couple to the Front Body” (2nd Clause of Limitation 1.2)*

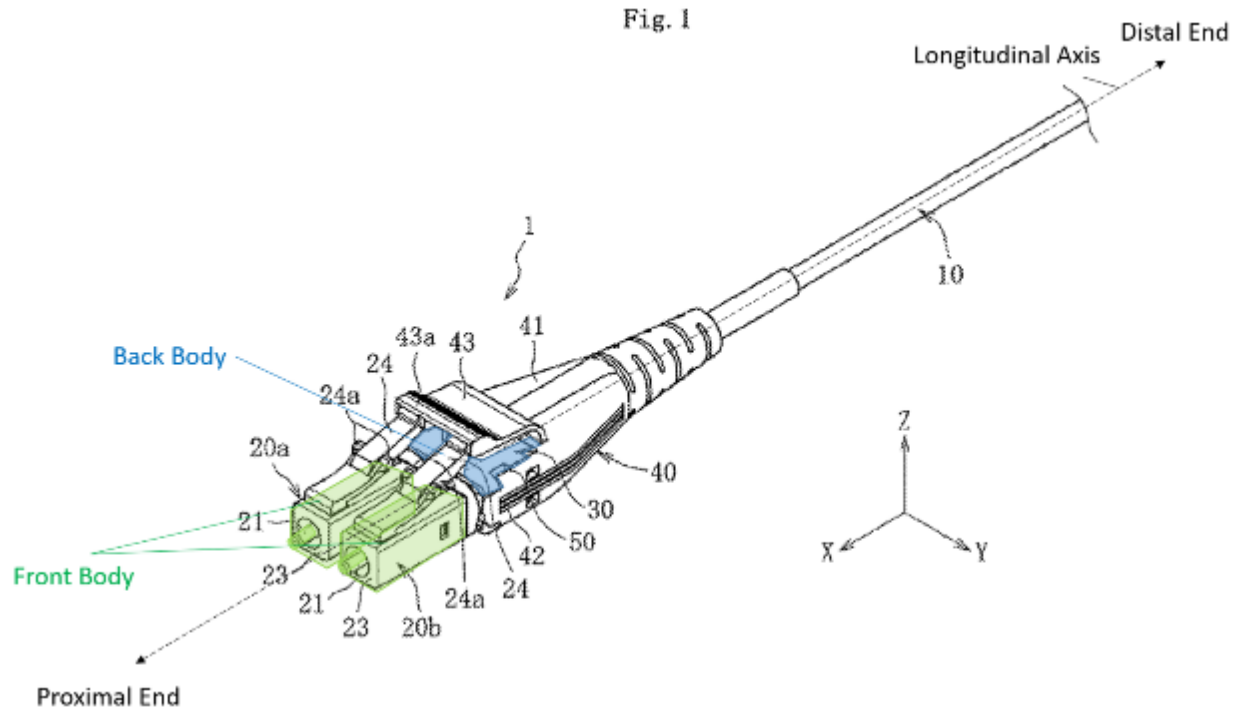
132. US Conec’s Nakagawa/Raven combination does not teach all of limitation 1.2, which recites “the proximal end portion of the back body [is] configured to ***couple to*** the front body.” EX1001: 11:8-10 (emphasis added). In summary, US Conec is changing what it calls the front body between limitation 1.1. and limitation 1.2 in an attempt to read the Nakagawa/Raven combination onto claim 1.

133. For limitation 1.1—“ a front body configured to hold first and second ferrules”—, US Conec points to Raven’s leading end unit 3 as the claimed front body, as shown below:



Petition: 31-33 (EX1008: Fig. 3 (annotated by US Conec)).

134. However, for limitation 1.2—“the proximal end portion of the back body configured to couple to the front body”—, US Conec no longer points to Raven’s leading end unit 3 as the claimed front body. Instead, US Conec points to Nakagawa’s connectors 20a, 20b as the front body, as shown below:



Petition: 34 (EX1007: Fig. 1 (annotated by US Conec)).

135. By pointing to different elements of different prior art references for the same element—e.g., a front body—depending on which limitation the element is recited in, US Conec shows that the Nakagawa/Raven combination does not teach every element of claim 1. In other words, US Conec has not established that the same prior art front body (either Raven’s leading end unit 3 or Nakagawa’s connectors 20a, 20b) meets all the “front body” limitations recited in claim 1. I note that US Conec’s modification of Nakagawa in view of Raven is the wholesale **replacement** of Nakagawa’s connectors 20a, 20b, with Raven’s leading end unit 3.

Petition: 26 (“modify Nakagawa’s housing that includes two optical connectors

20a and 20b, *to instead include* unitary leading end unit 3, as disclosed in Raven”) (emphasis added).

136. In addition, US Conec does not assert that Raven’s leading end unit 3 (the “front body” according to limitation 1.1) would *couple to* Nakagawa’s holder 30 (which US Conec equates to the claimed back body). Petition: 34-37. Instead, US Conec only asserts that Nakagawa’s connectors 20a, 20b are coupled to Nakagawa’s holder 30. Petition: 34.

137. US Conec is trying to have it both ways by calling Raven’s leading end unit 3 the “front body” for limitation 1.1 and Nakagawa’s connectors 20a, 20b as the “front body” for limitation 1.2. But US Conec is unable to point to the *same* “front body” that meets both limitation 1.1 and limitation 1.2. Either:

- 1) Raven’s leading end unit 3 is the claimed front body, in which case US Conec’s Nakagawa/Raven combination fails to teach limitation 1.2, because US Conec has not shown how (or even whether) Raven’s leading end unit 3 would be coupled to Nakagawa’s holder 30; or
- 2) Nakagawa’s connectors 20a, 20b are the claimed front body, in which case US Conec’s Nakagawa/Raven combination fails to teach limitation 1.1 (Paragraphs 125-131 above), because Nakagawa does not teach *one* front body that holds two ferrules.

138. Accordingly, in my opinion, US Conec has failed to show the Nakagawa/Raven combination discloses that “the proximal end portion of the back body [is] configured to couple to the front body” as recited by claim 1.

B. Ground 2: Claim 20 is Not Obvious over Nakagawa, Raven, and Cline

139. US Conec argues that dependent claim 20 would have been obvious over the combination of Nakagawa and Raven in further view of Cline. Petition: 74-86. Dependent claim 20 depends from independent claim 1. The addition of Cline does not teach the limitations missing from the Nakagawa/Raven combination as discussed above. Therefore, I have been informed that Ground 2 also fails for the reasons discussed above in connection with Ground 1.

C. Ground 3: US Conec Has Failed to Show the Combination of Veatch and Connelly Teaches Every Limitation of Independent Claim 1 of the ‘190 Patent

140. Ground 3 of US Conec’s Petition asserts that independent claim 1 (and dependent claims 2, 3, 6-11, 13-16, and 19) are obvious over Veatch modified in view of Connelly. However, in my opinion, US Conec again has failed to demonstrate correspondence of the specific structural details recited in independent claim 1 to those details in Veatch modified by Connelly. This failure occurs in at least three limitations of claim 1, as I demonstrate below. Therefore, independent claim 1 is valid over the Veatch/Connelly combination.

1. The Veatch/Connelly Combination Does Not Teach “a Back Body Having a Proximal End Portion and a Distal End Portion Spaced Apart Along a Longitudinal Axis, the Proximal End Portion of the Back Body Configured to Couple to the Front Body” (First Two Clauses of Limitation 1.2)

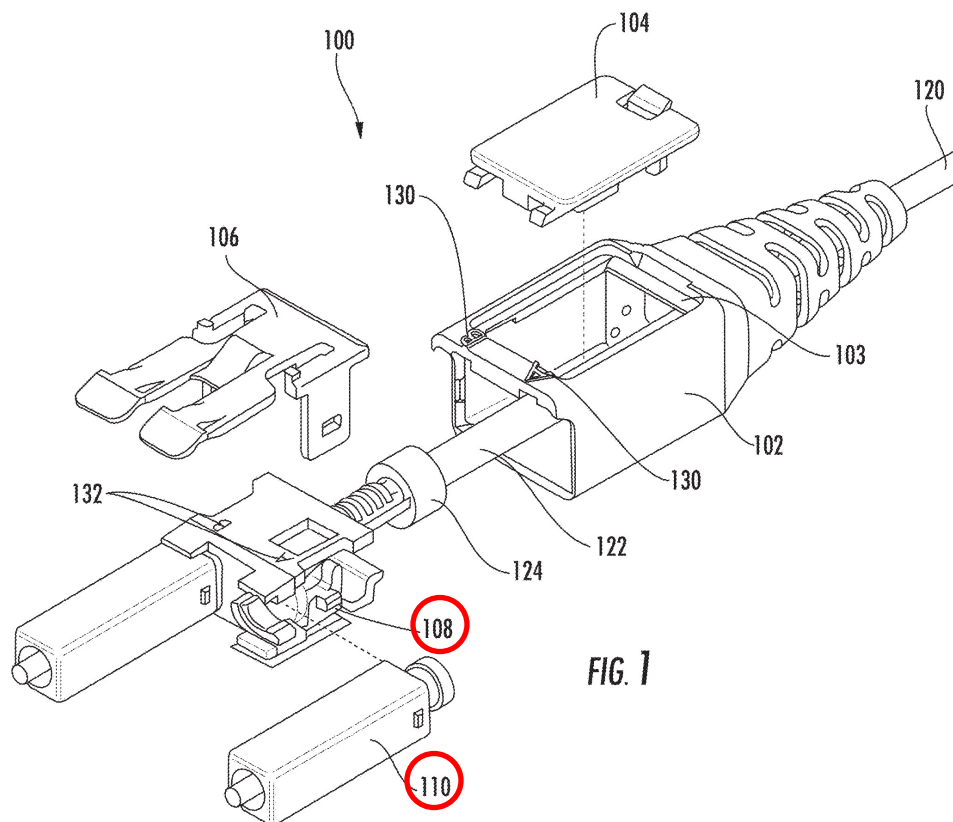
141. Independent claim 1 recites that the optical fiber connector comprises “a front body configured to hold first and second ferrules” (limitation 1.1.) *and* “a back body having a proximal end portion and a distal end portion spaced apart along a longitudinal axis, the proximal end portion of the back body configured to couple to the front body” (limitation 1.2). EX1001: 11:6-10 (emphasis added). US Conec’s articulated modification of Veatch’s connector 100 in view of Connelly’s fiber optic plug 34 does not result in an optical fiber connector that has both (1) a front body and (2) a back body as claimed. Therefore, in my opinion, US Conec has failed to show the Veatch/Connelly combination discloses an optical fiber connector as claimed.

142. Realizing Veatch does not have one “front body” that holds two ferrules, US Conec modifies Veatch in view of Connelly. Petition: 91. To achieve “a front body configured to hold first and second ferrules” as recited by limitation 1.1, US Conec states it would have been “obvious to modify Veatch’s housing configuration comprising *two separate connector bodies 110 and the fiber holder 108* to instead comprise *a unitary housing* 38 as disclosed by Connelly.” Petition: 86-87 (emphasis added).

143. The modification of Veatch in view of Connelly is further described by US Conec's Expert, which further states:

“a straightforward ***modification of the three components*** (i.e., fiber holder 108 and two connector bodies 110) that remain connected together would be in the form of ***creating a unitary housing*** that surrounds both ferrules. As such, by ***substituting the unitary housing 38 disclosed by Connelly for the fiber holder 108 and connector bodies 110*** in the polarity-reversible connector of Veatch, two ferrules may continue to be surrounded and maintain a lack of rotation during a polarity change while reducing the total number of components in the optical fiber connector.” EX1016: ¶286.

144. Thus, US Conec clearly states that it would be obvious to make a three-to-one substitution, replacing the two simplex LC connectors 110 and fiber holder 108 of Veatch with the single unitary housing 38 of Connelly.



EX1004: Fig. 1 (annotated).

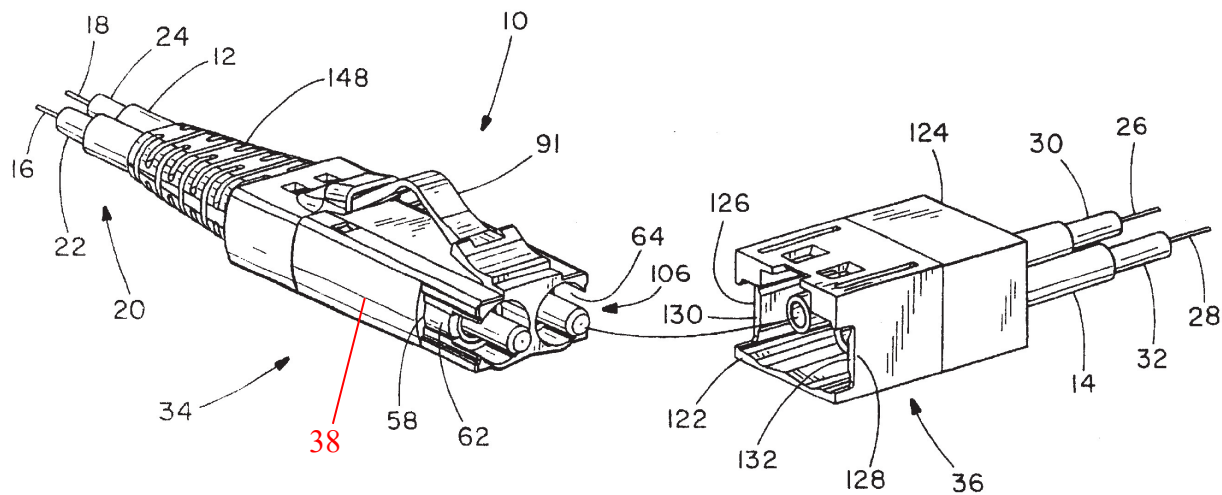


FIG. 1

EX1005: Fig. 1 (annotated).

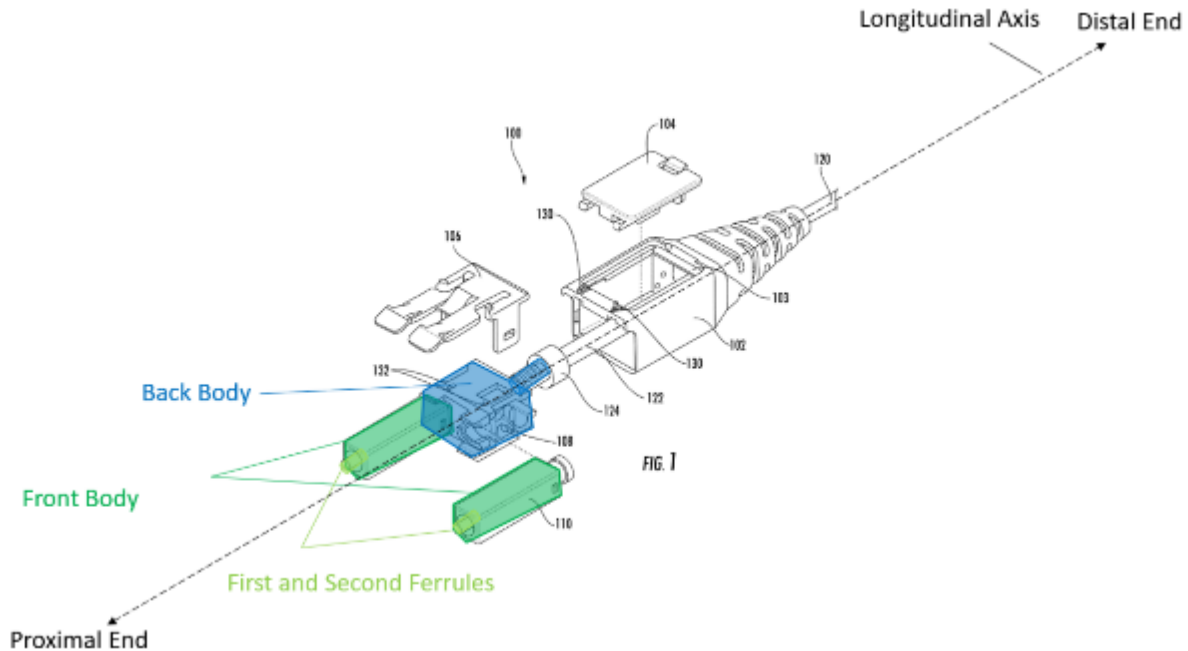
145. However, once Veatch is modified by replacing the two simplex LC connectors 110 *and* fiber holder 108 with the single “*unitary housing*” 38 in of Connelly, the resulting Veatch/Connelly combination does not meet the limitations of claim 1 because it lacks the back body required in limitation 1.2. For limitation 1.2, US Conec points to Veatch’s fiber holder 108 as the claimed back body.

Petition: 94-95. But in the proposed modification of Veatch in view of Connelly, the fiber holder 108 was eliminated as a separate component. By modifying

Veatch’s connector bodies 110 and fiber holder 108 to be a unitary housing,

Veatch/Connelly modification no longer has both a front body and a back body.

Instead, the Veatch/Connelly modification only has one body, which US Conec has equated to the front body that holds two ferrules. Petition: 91-94.



Petition: 94 (EX1004: Fig. 1 (annotated by US Conec)).

146. The distinction between the claim “front body” and “back body” is further defined by claim 1. Limitation 1.2 recites that “the proximal end portion of the back body [is] configured to *couple to* the front body.” US Conec does not explain how the “unitary housing” 38 of Connelly meets this portion of limitation 1.2 once it replaces the “two separate connector bodies 110 *and the fiber holder 108*” of Veatch. Petition: 86-87. This is because a “unitary housing” does not have separate bodies “configured to couple to” one another. A “unitary housing” is, by its own use of the word “unitary,” a single body. The premise of the Veatch/Connelly combination is that the three components of Veatch (e.g., the connector bodies 110 and fiber holder 108) are replaced by the single unitary housing 38 of Connelly, which means any coupling between the connector bodies

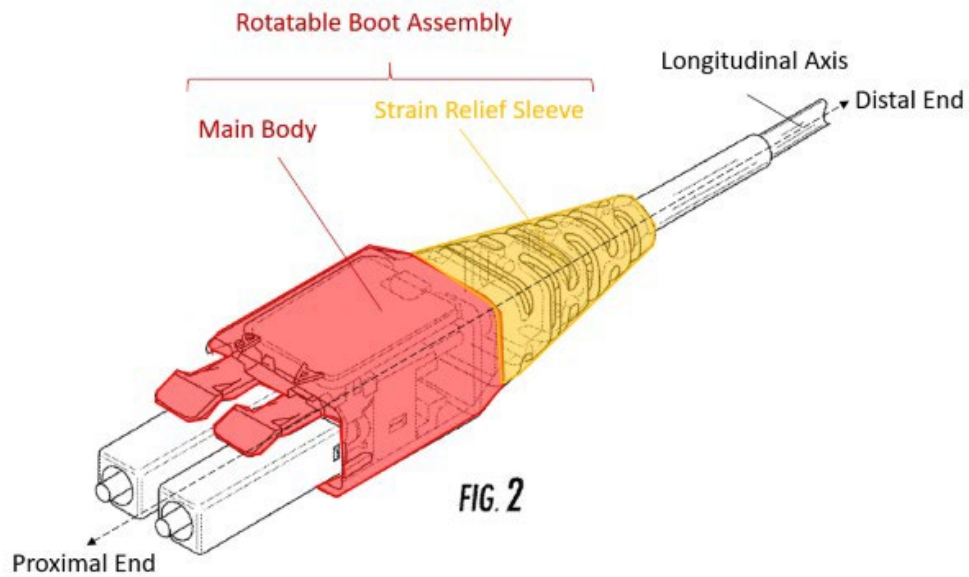
110 and fiber holder 108 of Veatch no longer exist in the combination being applied against claim 1. US Conec's use of the term "unitary housing" explicitly acknowledges the absence of a front body and a back body.

147. Accordingly, in my opinion, US Conec has failed to show the Veatch/Connelly combination discloses "a back body ..., the proximal end portion of the back body configured to couple to the front body" as claimed.

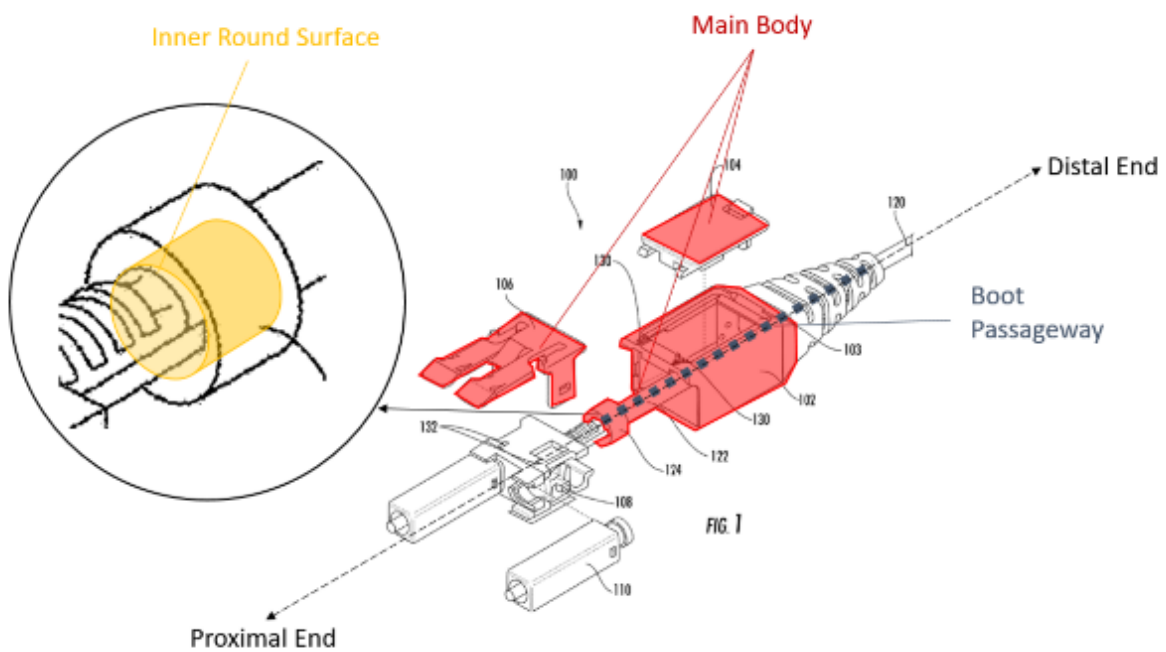
2. The Veatch/Connelly Combination Does Not Teach a "rotatable boot assembly comprising a main body ..., the main body comprising an inner round surface extending along the longitudinal axis" (Limitation 1.3.3)

148. Independent claim 1 recites a "rotatable boot assembly comprising a main body ..., the main body comprising an inner round surface extending along the longitudinal axis, the inner round surface defining a proximal end portion of the boot passageway." EX1001: 11:21-27. In my opinion, US Conec has failed to show the Veatch/Connelly combination discloses a "main body" of a rotatable boot assembly that has "an inner round surface" claimed.

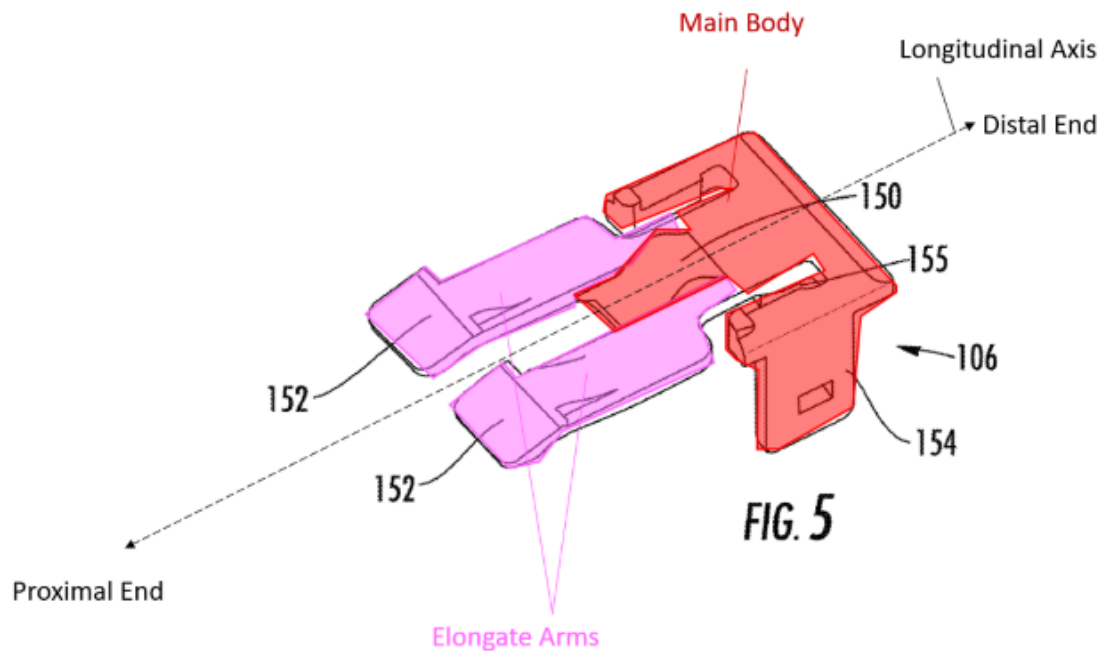
149. Through various annotated images of Veatch, US Conec equates some combination of the following Veatch elements with the claimed "main body" of the rotatable boot assembly: Veatch's latch 106 (at least a portion thereof), a portion of Veatch's boot 102 (the proximal portion thereof that forms the cutout 103), Veatch's cover 104, Veatch's crimp ring 124, and/or Veatch's heat shrink material 122, as shown below:



Petition: 98 (EX1004: Fig. 2 (annotated by US Conec)).



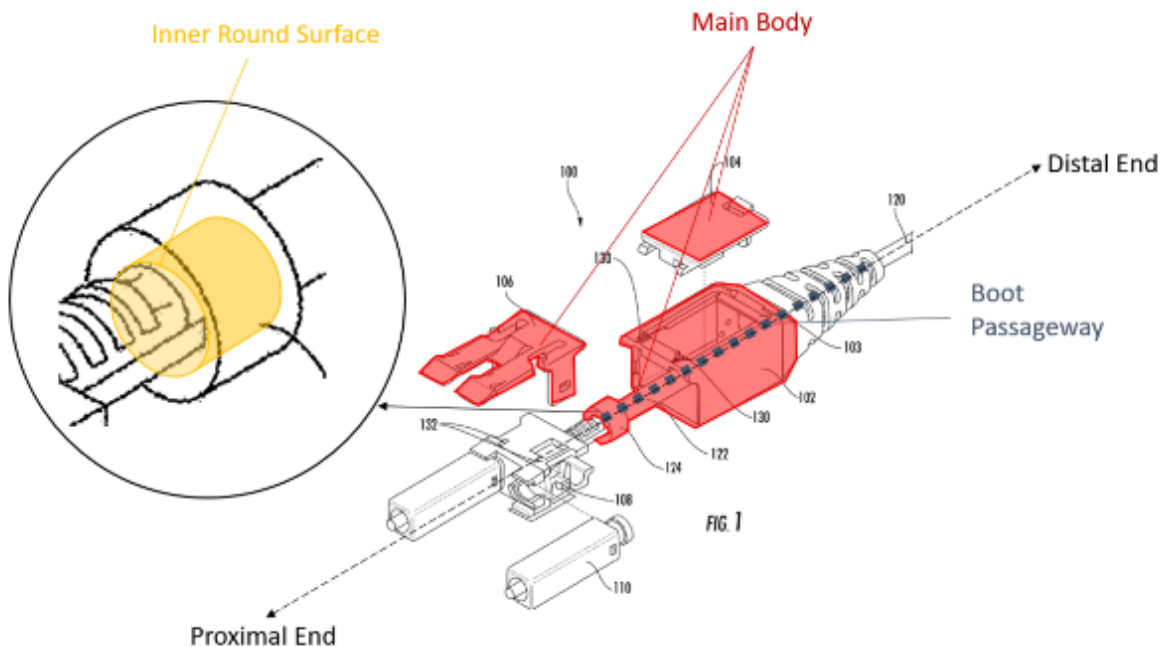
Petition: 99 (EX1004: Fig. 1 (annotated by US Conec)).



Petition: 108 (EX1004: Fig. 5 (annotated by US Conec)).

150. There is at least one discrepancy in US Conec’s annotated images in the Petition regarding what forms the “main body” of the rotatable boot assembly. For example, comparing US Conec’s annotated images on pages 98 and 104 of the Petition with the annotated image on page 108 of the Petition, US Conec has identified different portions of Veatch’s latch 106 as being part of the claimed main body.

151. US Conec relies on the indicated portion of Veatch’s crimp ring 124 for the teaching of an “inner round surface [that] defines the proximal end portion of the boot passageway” as recited by claim 1. Petition: 99. To support this assertion, US Conec blows up and annotates Veatch’s Fig. 1 (reproduced below) to identify the claimed “inner round surface.”



Petition: 99 (EX1004: Fig. 1 (annotated by US Conec)).

152. Under no reasonable interpretation would a person of ordinary skill in the art interpret Veatch's crimp ring 124 to be of the claimed "main body" of the "rotatable boot assembly." Veatch's crimp ring 124 does not move with its boot 102 in any respect, whether the boot 102 is pulled rearward to depress the latch 106 or the boot 102 is rotated during the change of polarity. In fact, a crimp ring prevents rotation, or any relative movement between the crimp ring and the structure to which the ring is crimped. There is simply no correlation of movement between Veatch boot 102 and the crimp ring 124. The boot 102 always moves (e.g., rotates or translates) relative to the crimp ring 124. The crimp ring 124 does not move with the boot 102 when the boot is being moved relative to the cable.

153. Further, the person of ordinary skill in the art knows that crimp rings like the one disclosed in Veatch are tubes of material that are compressed (i.e., crimped) onto a back post to firmly secure reinforcement strength members of a cable to the back post. EX2018: Fig. 4, ¶[0003]; EX2014: 2 (“a crimping tool is used to apply mechanical force to a crimp barrel (a small metal sleeve or ring), thus deforming it and forming a tight bond with the connector itself”); EX2015: 1 (“cable can be pulled without coming loose from the connector”); EX2016: 2 (“securing the cable jacket with a crimp helps prevent the jacket from detaching or twisting”). The purposes of the crimp ring is to fix the strength members of the cable to the structure to which the ring is crimped, thereby securing the cable to the structure. As a result, Veatch’s crimp ring 124 is fixed at its location on the fiber holder 108 such that it cannot move relative to the fiber holder. EX1004: 2:20-22.

154. Exhibit 2014 is a true and accurate copy of the Terminating and crimping for fiber optics: methods and tips.

155. A copy of Terminating and crimping for fiber optics: methods and tips is available at

<https://community.element14.com/products/manufacturers/bulgin/b/blog/posts/terminating-and-crimping-for-fiber-optics-methods-and-tips>.

156. A person of ordinary skill in the art would have considered Terminating and crimping for fiber optics: methods and tips to be pertinent,

relevant, and informative within the field of fiber optic connectors.

157. Exhibit 2015 is a true and accurate copy of the Proper Crimping Techniques are Critical When Terminating Fiber Optic Connectors published by the Fiber Optic Center.

158. A copy of Proper Crimping Techniques are Critical When Terminating Fiber Optic Connectors is available from the Fiber Optic Center at <https://focenter.com/blog/proper-crimping-techniques-are-critical-when-terminating-fiber-optic-connectors>.

159. A person of ordinary skill in the art would have considered Proper Crimping Techniques are Critical When Terminating Fiber Optic Connectors to be pertinent, relevant, and informative within the field of fiber optic connectors.

160. Exhibit 2016 is a true and accurate copy of The Importance of Proper Crimping in Fiber Optic Assemblies published by Senko, in February 2021.

161. A copy of The Importance of Proper Crimping in Fiber Optic Assemblies is available from Senko at <https://www.senko.com/wp-content/uploads/2021/09/The-Importance-of-Proper-Crimping-02192021.pdf>.

162. A person of ordinary skill in the art would have considered The Importance of Proper Crimping in Fiber Optic Assemblies to be pertinent, relevant, and instructional within the field of fiber optic connectors.

163. Veatch's crimp ring 124 is not rotatable like the boot 102. Moreover, when the boot 102 rotates relative to the fiber holder 108, it necessarily rotates relative to the crimp ring 124. Because of how the crimp ring 124 is crimped onto the fiber holder 108, it is not even possible to rotate the crimp ring 124 separately from the boot 102 in a way that would keep the two components rotationally aligned when a polarity change is made. Further, Veatch's crimp ring 124 and boot 102 are separate pieces that serve separate functions. Veatch's crimp ring 124 attaches the cable 120 to the fiber holder 108. Veatch's boot 102 houses the fiber holder 108 and extends along the cable 120 to provide strain relief. There is not even a direct connection between the boot 102 and the crimp ring 124. In my opinion, there is simply no reasonable interpretation of "rotatable boot assembly" that encompasses a combination of the rotatable boot 102 and the fixed crimp ring 124 relative to which the boot rotates when changing polarity.

164. This interpretation is supported by the specification of the '190 Patent. The specification of the '190 Patent states that a crimp ring is a distinct component, separate from *any* boot assembly, that is used to secure the fiber optic cable to the back body. EX1001: Figs. 1 and 38, 4:33-39. With respect to a connector having a "rotatable boot assembly" as claimed, the '190 Patent specifically states:

During rotation of the multi-purpose **rotatable boot assembly** 9209.1, boot wing 9209.5 operates as described above in FIGS. 25-33. This is accomplished by gap 9209.6 between **boot assembly** 9209.1 that allows "free-wheeling" about **crimp ring** 9207 as inner round 9409.4

engages back post face surface 9406.7 as described in FIGS. 26-27.
EX1001: 8:45-51 (emphasis added).

165. The ‘190 Patent explaining that the “boot assembly 9209.1” *rotates about* the “crimp ring 9207” confirms the crimp ring is not part of the rotatable boot assembly, let alone a main body thereof. Thus, a person of ordinary skill in the art after reading the specification would know that any inner round surface of the crimp ring is different from the inner round surface of the main body of the boot assembly.

166. Moreover, US Conec’s own patents and patent applications distinguish the crimp ring of a fiber optic connector from the boot or boot assembly of the fiber optic connector. For example, with reference to Fig. 8 below, in U.S. Patent No. 9,568,689, US Conec states that “a fiber optic connector 200 ... includes the connector housing 204, a ferrule 210, a spring 212, the spring push 110, and a *boot* 214. A *crimp ring* 216, disposed between the crimp portion 130 [of the spring push 100] and the *boot* 214, is also illustrated.” EX2017: 5:21-26 (emphasis added).

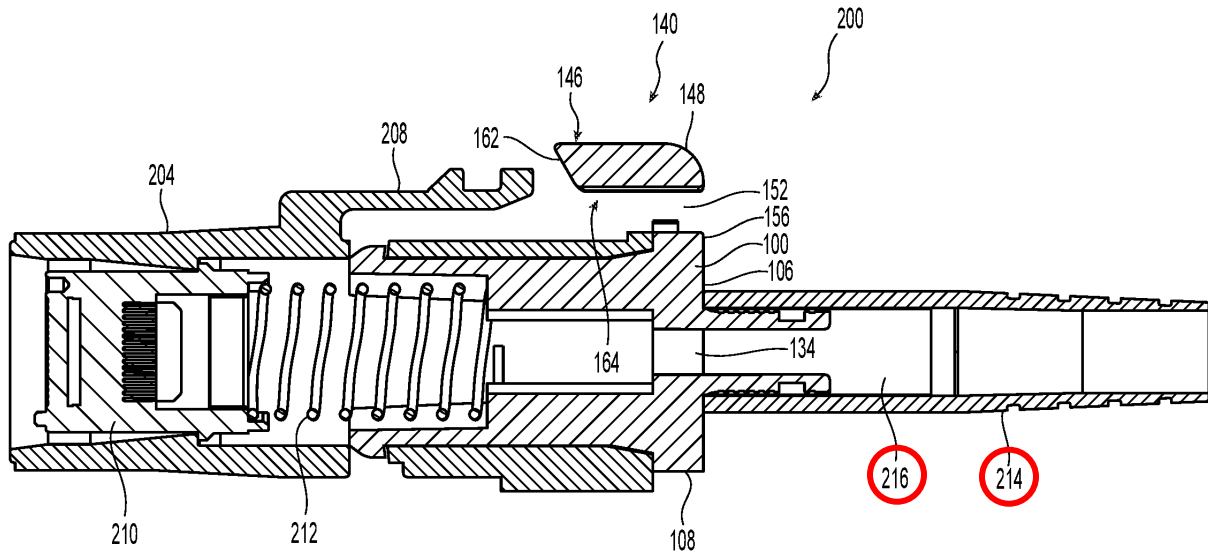
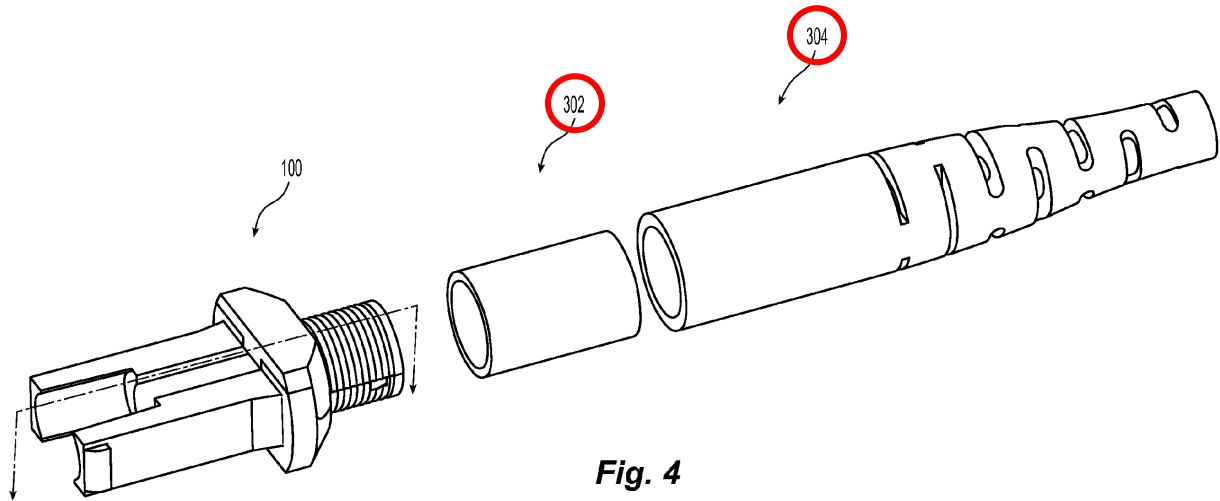


Fig. 8

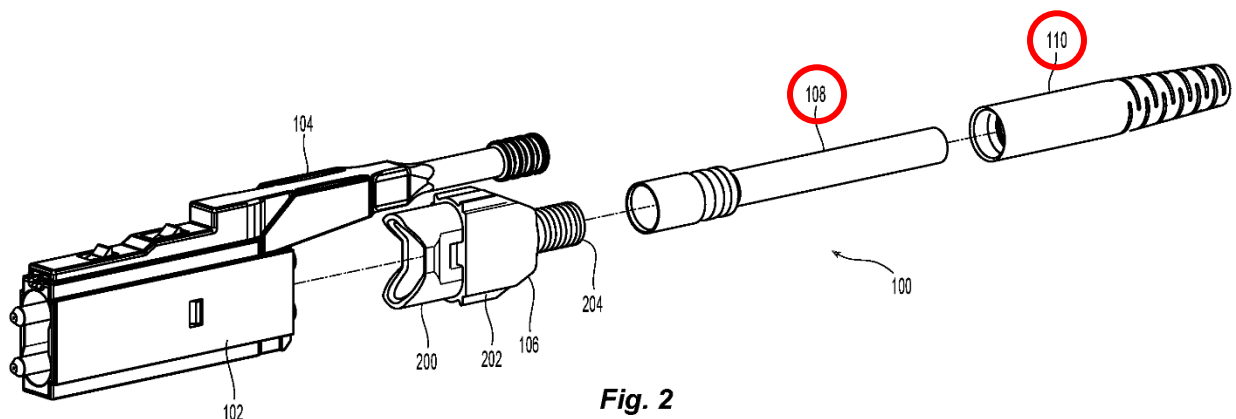
EX2017: Fig. 8 (annotated).

167. Similarly, with reference to Fig. 4 below, in U.S. Publication No. 2012/0213484, US Conec explains “a *crimp band* 302 and a *strain relief boot* 304 are then applied over the back end of the two-piece spring push 100.” EX2018: Fig. 4, ¶[0027] (emphasis added).



EX2018: Fig. 4 (annotated).

168. Likewise, with reference to Fig. 2 below, in U.S. Patent No. 11,525,965, US Conec states “[t]he fiber optic connector 100 ... include[s] a housing 102, a latch component (push-pull mechanism) 104, a crimp body 106, a *crimp ring* and heat shrink tube 108, and a *strain relief boot* 110.” EX2019: 4:43-47 (emphasis added).



EX2019: Fig. 2 (annotated).

169. Lastly, with reference to Fig. 6 below, in U.S. Patent No. 11,719,893, US Conec explains “[t]he fiber optic connector 100 ... include[s] a housing 102, fiber optic ferrules 104 ..., a crimp body 106, a *crimp ring* and heat shrink tube 108, a front extension 110 that is a part of *strain relief boot* 112.” EX2020: 3:63-4:2 (emphasis added).

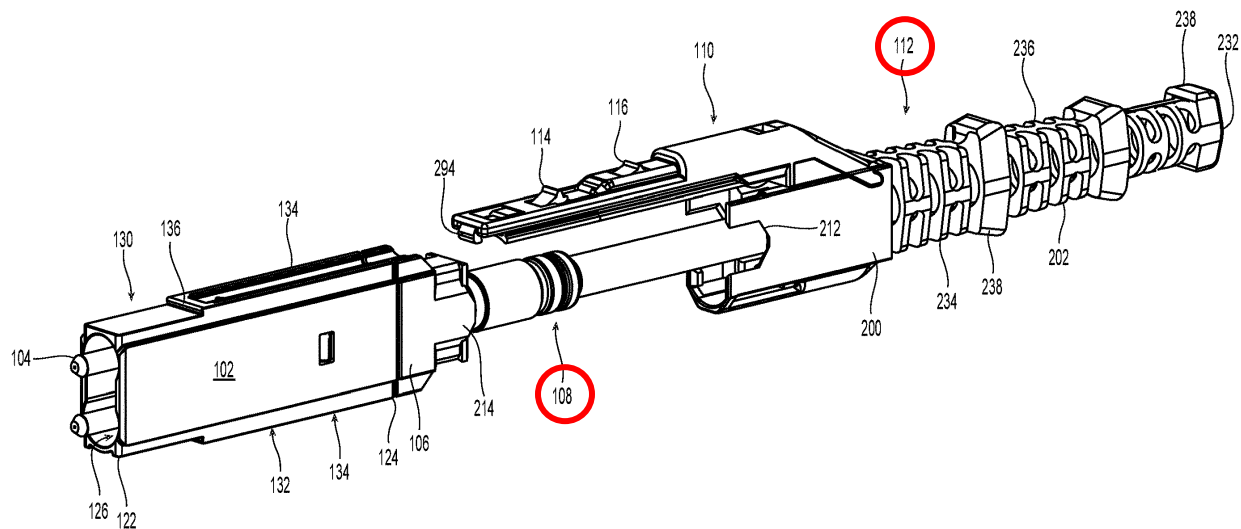


Fig. 6

EX2020: Fig. 6 (annotated).

170. In each example above, US Conec identifies and describes the crimp ring independent of any boot or boot assembly. This is consistent with the plain and ordinary meaning understood by a person having ordinary skill in the art, that a crimp ring is not a part of a boot or boot assembly.

171. Further, I note that US Conec changes its characterization of which part of the connector the crimp ring is a part of from ground-to-ground in the

Petition. In Ground 1, US Conec asserts Nakagawa’s caulking member 33—which is a crimp ring—is applied as part of the claimed “back body.” *Petition*: 34-36. As understood by those having ordinary skill in the art, Nakagawa’s caulking member 33 is a crimp ring because (1) its illustration in the figures is the same as a crimp ring and (2) it is described as securing the cable to the connector in the same manner as a crimp ring by being “placed over the [] cable fixing portion [of the holder 30] and the reinforcement fiber 14 [of the cable 10]” to “fix[] the duplex cable 10 to the holder 30.” EX1007: Fig. 2, ¶[0055]; *see also* EX1001: Figs. 1 and 38, 9:37-40; EX1004: Figs. 1 and 20, 2:20-22, 4:36-37; EX1005: Figs. 2 and 5, 4:24-34; EX1006: Fig. 2, 6:21-25; EX1009: Fig. 14, 3:51-53, 3:59-63; EX1012: Fig. 2, ¶[0040]. However, in Ground 3, US Conec asserts Veatch’s crimp ring 124 is part of the “main body” of the “rotatable boot assembly.” *Petition*: 98-99.

172. In my opinion, US Conec is failing to consider how one skilled in the art would interpret the prior art, as exemplified by the inconsistencies in the part of the connector of which the crimp ring is a part. US Conec asserts a crimp ring is part of a “back body” in the Nakagawa grounds but asserts a crimp ring is part of a “rotatable boot assembly” in the Veatch grounds.

173. Lastly, as mentioned above, Veatch was applied by the Examiner during the prosecution of the ‘190 Patent. EX1003: 88-89. Upon reviewing the file history, I note that this limitation—limitation 1.3.3—was specifically added

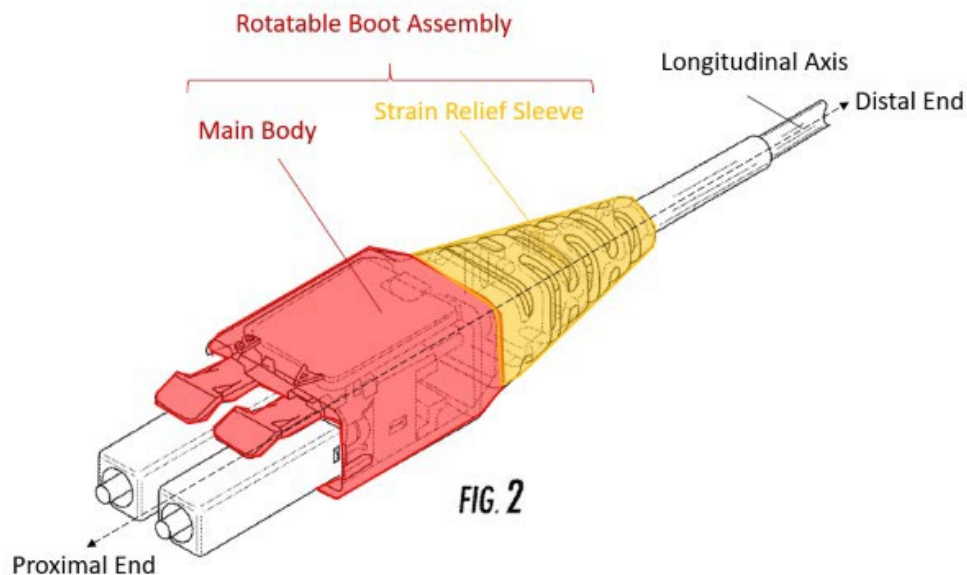
and argued by Senko as distinguishing Veatch. EX1003: 141, 146. Further, after limitation 1.3.3 was added and the corresponding arguments were made during prosecution, the Examiner issued the notice of allowance. EX1003: 216-220. This leads me to conclude that the Examiner agreed with Senko's arguments that Veatch does not disclose limitation 1.3.3. For the reasons stated herein, I agree with the Examiner.

174. Thus, in my opinion, Veatch's crimp ring 124 is not part of a "main body" of a "rotatable boot assembly." Accordingly, in my opinion, US Conec has failed to show the Veatch/Connelly combination discloses that "the rotatable boot assembly compris[es] a main body ..., the main body *comprising an inner round surface* extending along the longitudinal axis," as claimed.

3. The Veatch/Connelly Combination Does Not Teach "the inner round surface defining a proximal end portion of the boot passageway" (Limitation 1.3.3)

175. Independent claim 1 recites "the inner round surface defining a proximal end portion of the boot passageway." EX1001: 11:25-27. Again, US Conec states that the interior of Veatch's crimp ring 124 meets this limitation. Petition: 99. However, in my opinion, the "inner round surface" of Veatch's crimp ring 124 does *not* "defin[e] a proximal end portion of the boot passageway" as recited by claim 1.

176. US Conec is consistent in the Petition that the “main body” is predominantly formed by the rectangular shroud of boot 102, as shown in Fig. 2 below annotated by US Conec. As is readily apparent by looking at Fig. 2 below, it is this rectangular shroud of the boot 102 that defines the proximal end portion of the passage, not the crimp ring 124.



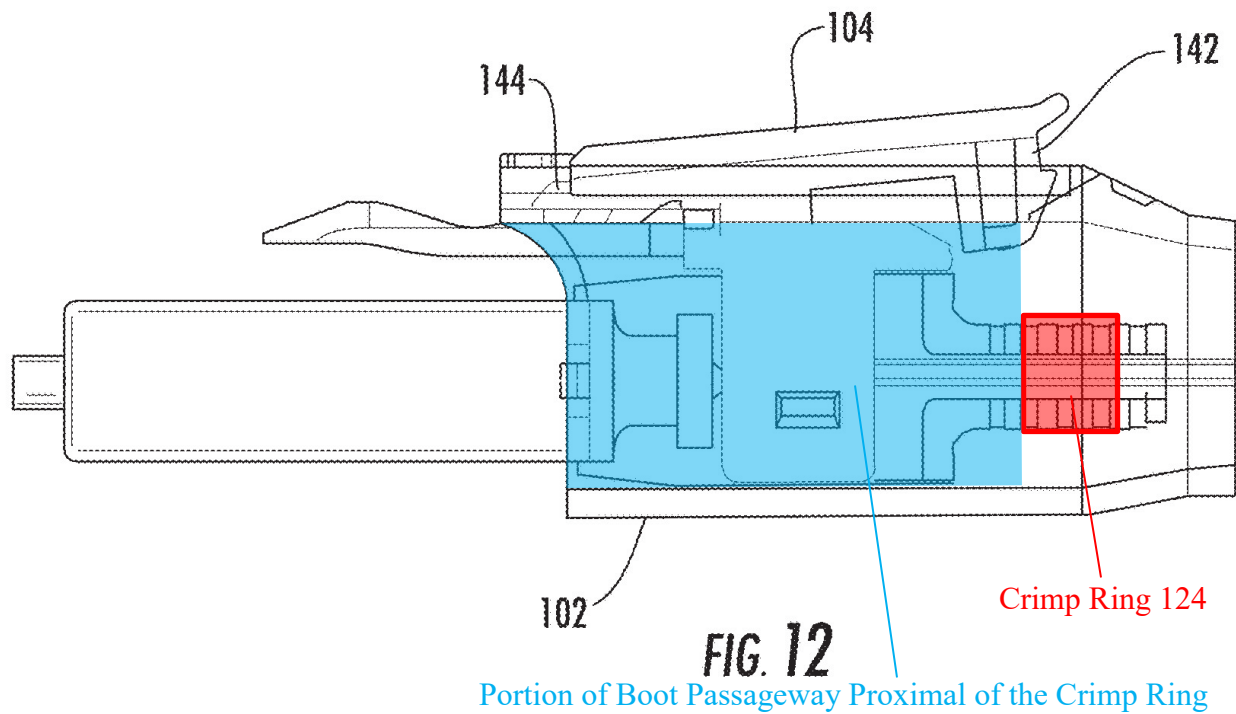
Petition: 98 (EX1004: Fig. 2 (annotated by US Conec)).

177. As shown in annotated Fig. 12 below, the “inner round surface” of the crimp ring 124 is located at an *intermediate* portion of a boot passageway, that is

substantially distal² of the proximal end portion of the boot passageway. Fig. 12 below is annotated to indicate the position of the crimp ring 124 when the crimp ring 124 is secured to the back post of the fiber holder 108 to attach the fiber optic cable to the fiber holder. EX1004: Figs. 1 and 20, 2:20-22, 4:36-37 (“a crimp ring 424 secures cable 420 to the fiber holder 408”); *see also* EX1005: Figs. 2 and 5, 4:24-34; EX1006: Fig. 2, 6:21-25; EX1009: Fig. 14, 3:51-53, 3:59-63; EX1012: Fig. 2, ¶[0040]. Again, the proximal and distal ends or directions relative to the optical connector and therefore the boot passageway are defined earlier in claim 1—see limitations 1.3.1 and 1.3.2—which US Conec identifies in their annotated Fig. 2 of Veatch above.

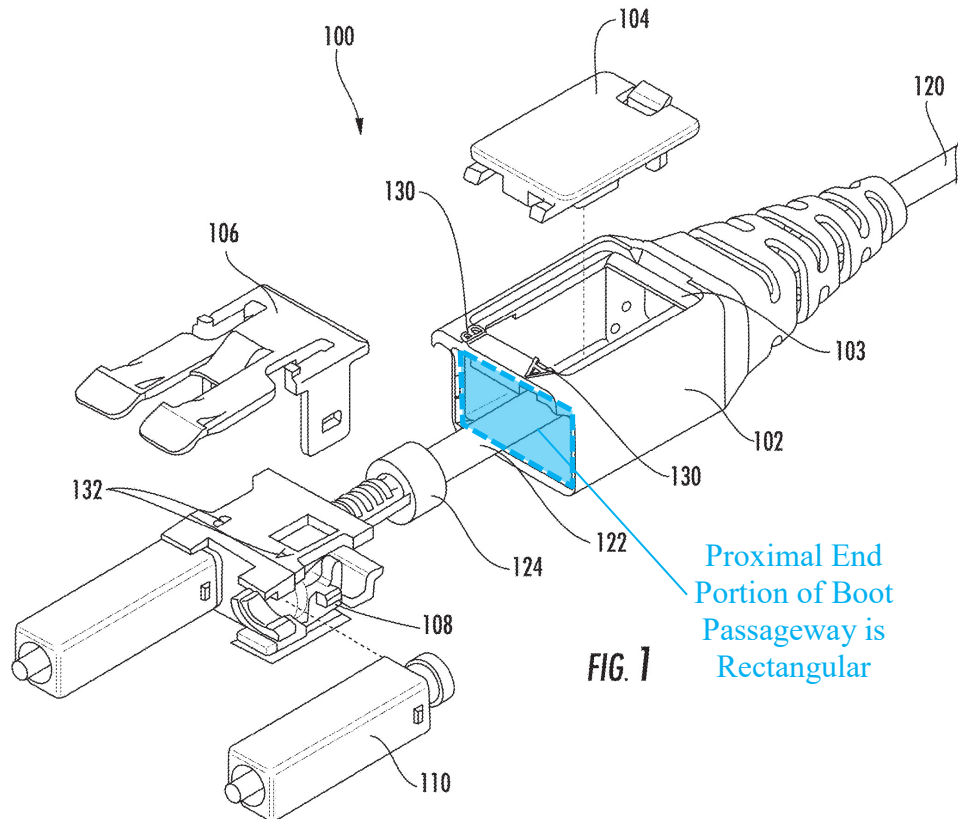
178. As shown below, the proximal end portion of the boot passageway of Veatch’s boot is the rectangular section shown in blue. By contrast, the inner surface of the crimp ring neither defines any portion of the passageway through boot 102 nor is located at the proximal end portion of the boot passageway of Veatch.

² Again, the proximal and distal relationship with regard to the rotatable boot assembly is defined earlier in the claim 1—see limitations 1.3.1 and 1.3.2—which US Conec identifies in their annotated Fig. 1 of Veatch above.



EX1004: Fig. 12 (annotated).

179. And the non-round rectangular shape of the proximal end portion of Veatch's boot passageway is apparent in Fig. 1 below.



EX1004: Fig. 1 (annotated).

180. Accordingly, in my opinion, US Conec has failed to show the Veatch/Connelly combination discloses an “the inner round surface *defining a proximal end portion* of the boot passageway” as claimed.

D. Ground 4: Claim 20 is Not Obvious over Veatch, Connelly, and Cline

181. US Conec argues that dependent claim 20 would have been obvious over the combination of Veatch and Connelly in further view of Cline. Petition: 122-129. Dependent claim 20 depends from independent claim 1. The addition of Cline does not teach the limitations missing from the Veatch/Connelly

combination as discussed above. Therefore, I have been informed that Ground 4 also fails for the reasons discussed above in connection with Ground 3.

182. Accordingly, in my opinion, independent claim 1 has not been shown to be rendered obvious by US Conec and, therefore, none of the challenged claims of the '190 Patent have been shown to be obvious by US Conec.

183. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in this post grant review and that cross examination will take place within the United States. If cross examination is required of me, I will be available for any such cross examination.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 26st day of March, 2024.

By Eric Pearson: 