

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 No. IPR2024-00118
U.S. Patent No. 11,340,413

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,340,413**

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PETITIONER'S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,340,413 to Takano et al. (“’413 patent”)
1002	Patent Prosecution History of U.S. Patent No. 11,340,413 to Takano et al.
1003	Declaration of James F. Brennan III, Ph.D.
1004	U.S. Patent Application Publication No. 2016/0178850 (“Nhep”)
1005	U.S. Patent Application Publication No. 2017/0351037 (“Watanabe”)
1006	U.S. Patent Application Publication No. 2017/0227720 to Lin (“Lin”)
1007	<i>Curriculum Vitae</i> of James F. Brennan III, Ph.D.
1008	Childers, D., et al., “Multi-Fiber, MT Ferrule Endface Fiber Tip Displacement Model for Physical Contact Interconnects,” White Paper (2006)
1009	<i>Intentionally Left Blank</i>
1010	U.S. Patent Application Publication No. 2021/0099229 (“Cox”)
1011	U.S. Patent Application Publication No. 2012/0082416 (“Kato”)
1012	U.S. Patent Application Publication No. 2012/0099822 (“Kuffel”)
1013	International Patent Application Publication No. 2017/127208 (“Lee”)
1014	U.S. Patent Application Publication No. 2018/0252872 (“Chen”)
1015	U.S. Patent Application Publication No. 2011/0019962 A1 (“Childers”)
1016	Nishimura, N., et al., “High-Density Multi-Fiber Connectors for Optical Interconnection,” IEEE Xplore (August 2008).
1017	U.S. Patent No. 8,858,089 (“Bradley”)
1018	U.S. Publication No. 2013/0308916 (“Buff”)
1019	Curran, M. & Shirk, B., “Basics of Fiber Optics”, accessed at https://www.fibersystems.com/pdf/whitepapers/Basics-of-Fiber-Optics.pdf (May 2016)

Exhibit No.	Description
1020	Kant, K., “Data Center Evolution: A Tutorial on State of the Art, Issues, and Challenges,” <i>Computer Networks</i> , 53:2939-65 (2009)
1021	Wenke, I.G., “Report on Fiber Optic Cables,” accessed at https://www.researchgate.net/publication/308332946 (2015)
1022	U.S. Patent No. 5,615,293 (“Sayegh”)
1023	Wagner, K.M., et al., “SC-DC/SC-QC fiber optic connector,” <i>Optical Engineering</i> 37(12):3129-33 (December 1998)
1024	Complaint, <i>Senko Advanced Components, Inc. v. US Conec Ltd.</i> , Case No. 1:23-cv-00083 (D. Del.)
1025	"19-Inch Rack," Lite-On, accessed at https://liteon-cips.com/products/racks/19-inch-rack/
1026	"Fiber Optic Rack Mount Enclosure, 3-Panel 1 RMS," Computer Cable Store, accessed at https://www.computercablestore.com/fiber-optic-rack-mount-enclosure-3-panel-1-rms
1027	“Fiber Optic Connector Tutorial,” Fibermart, accessed at https://www.fiber-mart.com/news/fiber-optic-connector-tutorial-a-848.html

I. INTRODUCTION

Petitioner US Conec Ltd. (“Petitioner”) requests *inter partes* review (“IPR”) and cancellation of claims 1–28 of U.S. Patent No. 11,340,413 (“the ’413 patent”) to Takano *et al.*, which is assigned to Senko Advanced Components, Inc. (“Patent Owner”). The claims recite a fiber optic connector having a polarity key that displaces with respect to the fiber optic ferrule during unlatching. EX1003, ¶¶88-90.

These claims do not, however, recite a patentable invention, as Petitioner’s expert Dr. Brennan agrees. EX1003, ¶¶1-43. The claimed structure includes basic, well-known features like a connector housing, MT ferrule, polarity key, and movable connector portions. Indeed, the allegedly allowable feature of a displacing polarity key is explicitly disclosed by references in this petition. EX1004; EX1012.

Accordingly, Petitioner respectfully requests that the Board institute trial on the Grounds herein and determine that claims 1–28 are unpatentable.

II. GROUNDS FOR UNPATENTABILITY

Petitioner requests *inter partes* review of claims 1–28 of the '413 patent and a determination that those claims are unpatentable based on the following grounds:

Ground	Basis	Prior Art	Claims Challenged
1	§103	Nhep and Watanabe	1–4, 7, 8, 10–14, 17–22, 25–28
2	§103	Nhep, Watanabe, and Lin	5 and 6
3	§103	Nhep, Watanabe, and Cox	9
4	§103	Nhep, Watanabe, and Applicant Admitted Prior Art	15, 16, 23, 24
5	§103	Katoh and Kuffel	1–4, 7, 8, 10–14, 17–22, 25–28
6	§103	Katoh, Kuffel, and Lin	5 and 6
7	§103	Katoh, Kuffel, and Cox	9
8	§103	Katoh, Kuffel, and Applicant Admitted Prior Art	15, 16, 23, 24

The earliest priority date of the '413 patent, on its face, is July 14, 2017.

EX1001, (60). This priority date is assumed for all claims except claim 9.

A. Claim 9 is entitled to a priority date of no earlier than May 21, 2021.

Claim 9 recites “wherein the connector is an SN type connector.” The “SN” type connector referenced in claim 9 is mentioned only in claim 9 and is not discussed anywhere in the specification of the '413 patent. Claim 9 was one of the original claims filed with the application that matured into the '413 patent on May 21, 2021. EX1002, 22.

A review of the priority documents that the '413 patent claims benefit to reveals no disclosure of an “SN” type connector, either in a claim or in the body of

the patent. Thus, as Dr. Brennan confirms, the “SN” type connector does not have written description support in any of the priority documents. EX1003, ¶¶328-333, 539-544. Claim 9 is therefore only entitled to a priority date as of the filing of the ’413 patent’s application on May 21, 2021.¹

B. Listing of the Prior Art

The prior art references cited in the grounds qualify as prior art to the ’413 patent for the following reasons:

- Nhep (EX1004) is prior art under at least AIA 35 U.S.C. §§ 102(a)(1)-(2) because it was filed on September 18, 2015 and published on June 23, 2016 both dates being before the earliest priority date of the ’413 patent.
- Watanabe (EX1005) is prior art under at least AIA 35 U.S.C. § 102(a)(2) because it was filed on December 7, 2015 and published on December 7, 2017 before the earliest priority date of the ’413 patent.
- Lin (EX1006) is prior art under at least AIA 35 U.S.C. § 102(a)(2) because it was filed on February 9, 2017 and published on August 10, 2017 before the earliest priority date of the ’413 patent.

¹ Petitioner does not take any position on whether claim 9 is supported by the specification of the ’413 patent.

- Cox (EX1010) is prior art under at least AIA 35 U.S.C. §§ 102(a)(1)-(2) because it was filed on September 24, 2020 and published on April 1, 2021 before the earliest priority date of claim 9 of the '413 patent.
- Katoh (EX1011) is prior art under at least AIA 35 U.S.C. §§ 102(a)(1)-(2) because it was filed on July 26, 2011 and published on April 5, 2012 before the earliest priority date of the '413 patent.
- Kuffel (EX1012) is prior art under at least AIA 35 U.S.C. §§ 102(a)(1)-(2) because it was filed on October 22, 2010 and published on April 26, 2012 before the earliest priority date of the '413 patent.

III. OVERVIEW OF THE '413 PATENT

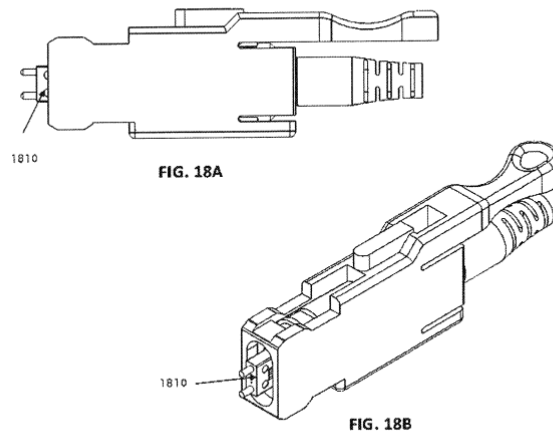
The '413 patent generally discloses a fiber optic connector for holding one or more optical ferrule assemblies. EX1001, Abstract. The '413 patent explains that while some developments have increased the volume of interconnections there is “room for improvement in the area of data centers, specifically as it relates to fiber optic connections.” EX1001, 1:49-51; EX1003, ¶¶64-73.

The '413 patent explains “manufacturers of connectors and adapters are always looking to reduce the size of the devices, while increasing ease of deployment, robustness, and modifiability after deployment.” EX1001, 1:50-57; EX1003, ¶¶66-67. The '413 patent provides examples of current footprints, including “the small form-factor pluggable transceiver footprint (SFP)” and “the

quad small form-factor pluggable (QSFP) transceiver footprint.” EX1001, 1:58-

67. The '413 patent thus generally discloses connectors, adapters, and other assemblies that are asserted to address these problems. EX1001, 2:40-55; EX1003, ¶67.

As Dr. Brennan confirms, the relevant portions of the '413 patent's lengthy disclosure for this proceeding are the embodiments in Figures 18A-18B. EX1003, ¶¶74-76.

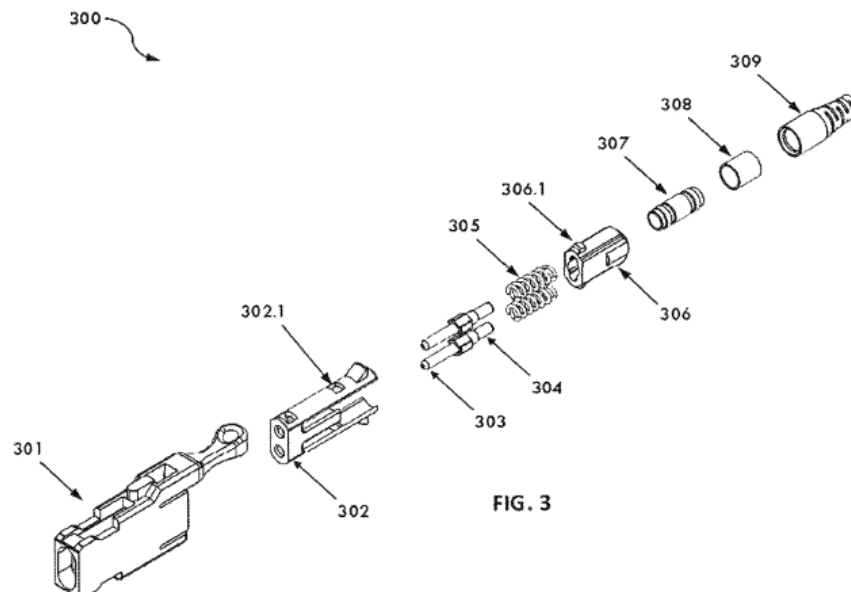


EX1001, FIGs. 18A-18B.

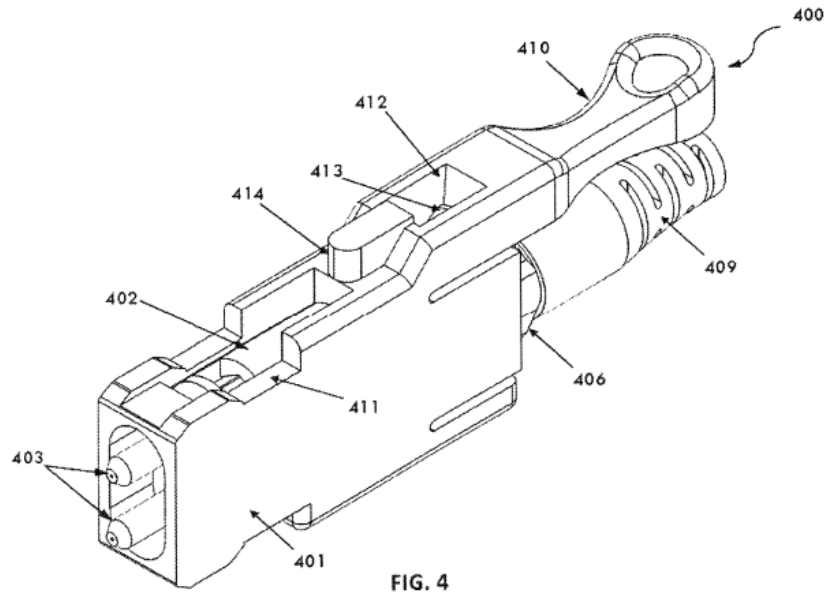
Figures 18A-18B show an optical connector including an MT ferrule. EX1001, 11:60-61. Figures 18A-18B are the only depictions in the '413 patent figures of an optical connector with an MT ferrule, which is an element required by each of the independent claims. EX1001, 20:41, 21:59; EX1003, ¶76. MT

ferrules are a known type of ferrule that holds multiple optical fibers in a connector. EX1003, ¶77; EX1005, ¶¶36-37; EX1006, ¶28; EX1011, ¶89; EX1008; EX1022, 4:55-58.

The '413 patent explains that the MT ferrule of the embodiment of Figures 18A-18B is “in a housing that is substantially similar to the housing 301 of FIG. 3.” EX1001, 11:60-62. Regarding the embodiment of FIG. 3, the '413 patent discloses that the optical connector “may have an outer housing 301, a front body 302, one or more ferrules 303, one or more ferrule flanges 304, one or more springs 305, a back body 306, a back post 307, a crimp ring 308, and a boot 309.” EX1001, 6:31-35; EX1003, ¶¶78-79.



EX1001, FIG. 3.



EX1001, FIG. 4.

The '413 patent explains with reference to FIG. 4 that the optical connector in this embodiment can include a “key 414 [that] may keep the connector in a given orientation when inserted into a receptacle such as an adapter or transceiver.” EX1001, 6:54-7:6; EX1003, ¶¶79-80.

A. Prosecution History

The only Office Action issued on October 20, 2021. EX1002, 0209-18. The Office Action rejected all pending independent and dependent claims under 35

U.S.C. § 103 as being obvious in view of U.S. Patent Application Publication No. 2013/0322825 (“Cooke”). EX1002, 0211-16.

Applicant filed a Response, which amended claims 1, 4, 6-7, 10-12, 17, 19, and 21 and added new claims 25-28. EX1002, 0290-301. Claim 1 was amended to introduce Element [1.10]-[1.11] and claim 17 was amended to introduce Element [17.6]-[17.7] discussed below. *Id.*; EX1003, ¶¶81-85.

A Notice of Allowability was mailed allowing pending claims 1-28. EX1002, 0304-09. The Notice of Allowability noted that the elements [1.11] and [17.7] of independent claims 1 and 17 were not present in the prior art of record: “wherein said displacing the first portion of the optical fiber connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the MT ferrule.” EX1002, 0307 (emphasis omitted); EX1003, ¶¶86-87.

IV. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”), at the time the ’413 patent was filed, would have been a person having: (1) at least a bachelor’s degree in mechanical engineering, electrical engineering, physics, or a related field and three years of experience in fiber optics and fiber optic connectors; (2) a master’s degree in mechanical engineering, electrical engineering, physics, or a related field and at least one year of experience in fiber optics and fiber optic connectors; or (3)

industry experience (at least three years) designing fiber optic connectors in lieu of a formal degree. EX1003, ¶¶44-50.

V. CLAIM CONSTRUCTION

Without waiver, Petitioner does not believe any claim terms require specific construction and thus should receive their plain and ordinary meaning, in the context of the '413 patent specification, under the *Phillips* standard.² EX1003, ¶¶91-93.

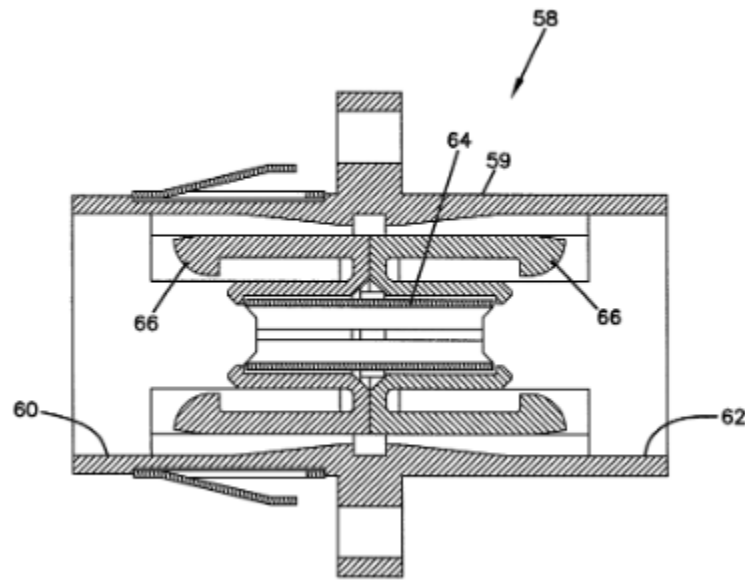
VI. GROUND 1: NHEP IN VIEW OF WATANABE RENDERS OBVIOUS CLAIMS 1–4, 7, 8, AND 10–14, 17–22, AND 25–28

A. Nhep

Similar to the '413 patent, Nhep “relates to fiber optic connectors used in optical fiber communication systems” and focuses on disclosing improvements to fiber optic connectors that ease connector assembly and increase connector durability. EX1004, ¶¶2, 8-9; EX1003, ¶¶94-96.

Specifically, Nhep discloses a “first fiber optic connector 20”. EX1004, ¶76. “[F]iber optic connector 20 includes a ferrule assembly 26 that mounts adjacent the distal end 22.” EX1004, ¶76. Nhep’s connector contains a single ferrule assembly 26 for a single fiber optic cable. EX1004, ¶76; EX1003, ¶97.

² Petitioner reserves the right to challenge the claims under 35 U.S.C. §112 in other forums.



EX1004, FIG. 25.

A “keying rail 72” is placed on release sleeve 38 to orient the connector in the receptacle, and thus acts to give Nhep’s connector 20 a set polarity. EX1004, ¶78; EX1003, ¶98. This arrangement is similar to the so-called SC type of fiber optic connector, also called Square Connector, Subscriber Connector, and Standard Connector, which Nhep acknowledges is the basis of some of its connectors. EX1004, ¶¶78, 112.

Nhep also includes a discussion of fiber optic connectors in its background section that discusses the known use of multi-fiber ferrules: “[t]he ferrule functions to support an end portion of at least one optical fiber (in the case of a multi-fiber ferrule, the ends of multiple fibers are supported).” EX1004, ¶4; EX1003, ¶100.

B. Watanabe

Like Nhep and the '413 patent, Watanabe is directed at fiber optic connectors. EX1005, ¶¶1, 4-5. Watanabe focuses on solving the issue of foreign particle contamination of open fiber optic receptacles. EX1005, ¶4; EX1003, ¶¶101-103.

Watanabe discloses a fiber optic connector called a “plug connector” that holds ends of optical fibers. EX1005, ¶¶33-38. “FIG. 2 illustrates a state (referred to as the first state, hereinafter) before the plug connector 20 is inserted into the receptacle connector 10A.” EX1005, ¶34. “The receptacle ferrule 13 and the plug ferrule 23 have the mutually same configuration” where the “ferrule main body part 31 is a so-called MT ferrule.” EX1005, ¶¶36-37. Figure 4 shows Watanabe’s MT ferrule. EX1005, ¶36; EX1003, ¶104.

Fig.2

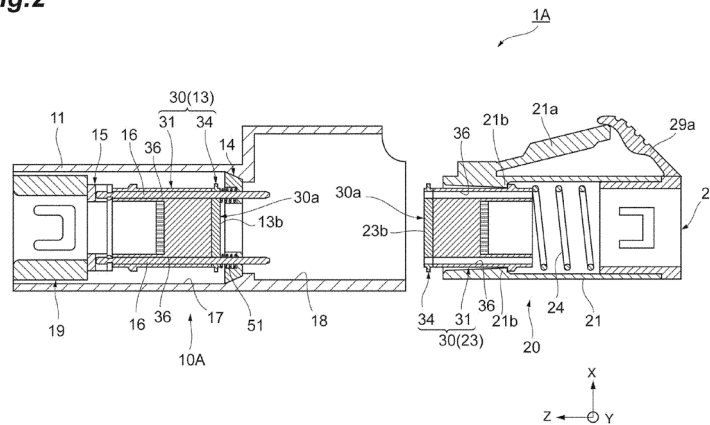
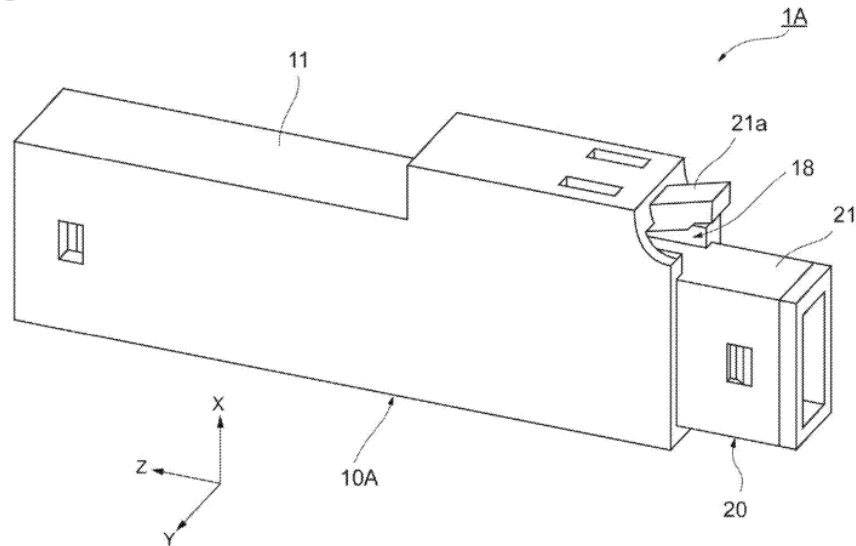


Fig.1

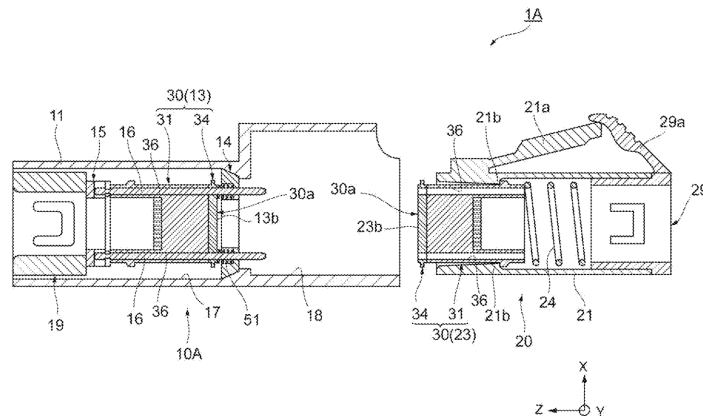


EX1005, FIG. 1.

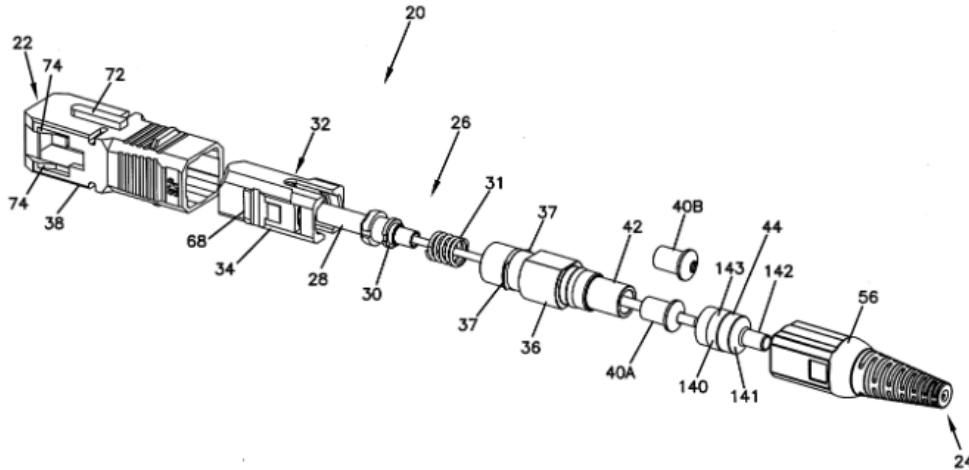
C. Motivation to Combine

Like the '413 patent, Nhep discloses fiber optic connectors. EX1004, ¶¶8-9; EX1003, ¶¶132, 134. Nhep's connector discloses using a single ferrule assembly 26 that contains a single fiber optic connection. EX1004, ¶76. Nhep does teach the existence of multi-fiber ferrules that allow for multiple fiber optic connections in a single connector. EX1004, ¶4. This express teaching in Nhep, along with the known desire to increase connector density, would have led a POSITA to search for references that teach techniques for achieving multiple fiber optic connections in a single connector. EX1003, ¶132.

This would have led a POSITA to Watanabe, which teaches a fiber optic connector with a multi-fiber ferrule. EX1005, ¶¶36-37; EX1003, ¶¶133, 134. A POSITA would have found it obvious to modify Nhep's connector 20 to accommodate an MT ferrule as taught by Watanabe to increase the number of fiber optic connections made in a single housing. EX1003, ¶135. These changes would require only dimensional changes to release sleeve 38 and connector housing 32 of Nhep to accommodate Watanabe's MT ferrule in place of Nhep's ferrule assembly 26. *Id.*



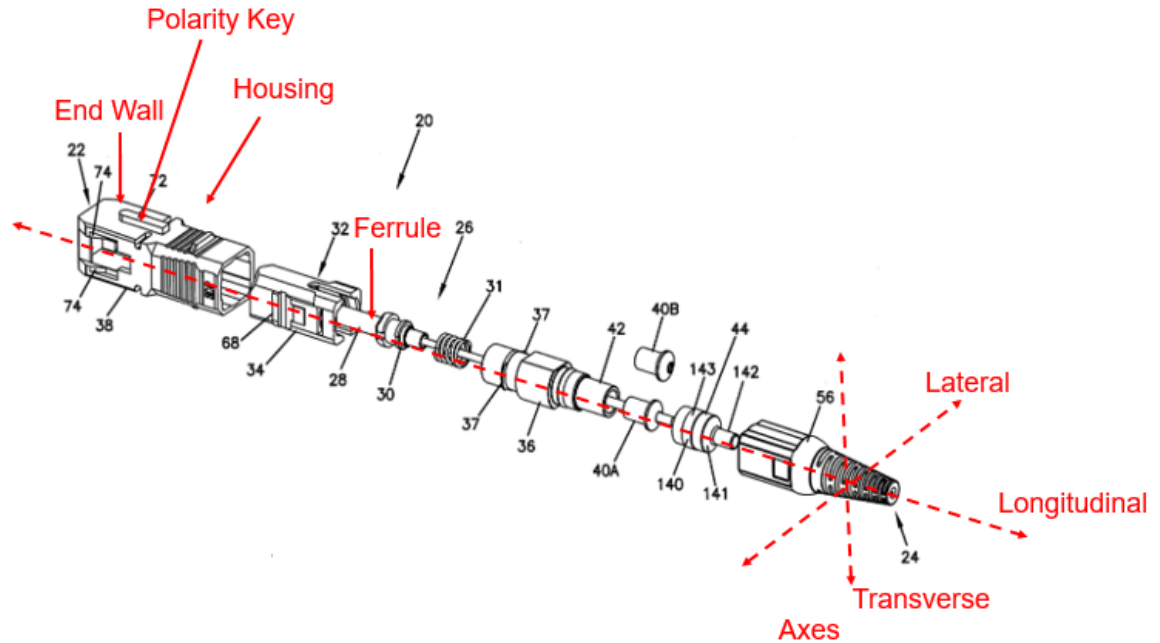
EX1005, FIG. 2.



EX1004, FIG. 1.

Indeed, similar types of modifications are known in the art. Nhep's connector is based on the well-known SC type connector, which is a single-fiber connector. EX1003, ¶136; EX1004, ¶¶78, 112. There are at least two real-world examples of SC-type connectors or designs based on SC-type connectors that were modified to accept multi-fiber ferrules in a similar manner. EX1016, 14; EX1023; EX1003, ¶136. Bradley also shows a modified SC-type connector to accommodate a ferrule housing a multicore fiber. EX1017, 12:36-13:43. Thus, the evidence shows that POSITAs actually made the type of modification being proposed here. EX1003, ¶137.

In making this change, a POSITA would have been motivated to align the fiber axis of the MT ferrule to be parallel with the transverse axis, annotated below. EX1003, ¶138. As Dr. Brennan explains, this aligns the fiber axis with the connector wall containing Nhep's keying rail 72 (i.e., Nhep's polarity key). *Id.*



EX1004, FIG. 1 (annotated).

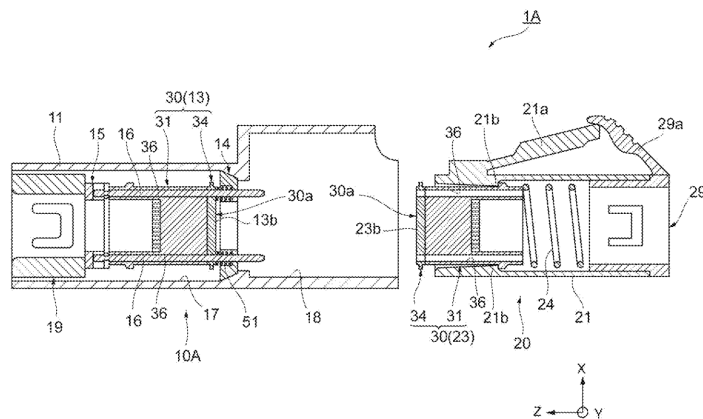
A POSITA would have been motivated to do so for several reasons.

EX1003, ¶139. First, this orientation optimizes the connector density by orienting the longest dimension of the MT ferrule with the polarity key. *Id.* This optimizes density because of the unused space found in typical fiber optic equipment. This unused space is typically above and below the connector recesses. *Id.* Orienting the MT ferrule in this way allows the groove accommodating the product key 72 to be placed into the unused space, thereby improving connector spacing. *Id.*

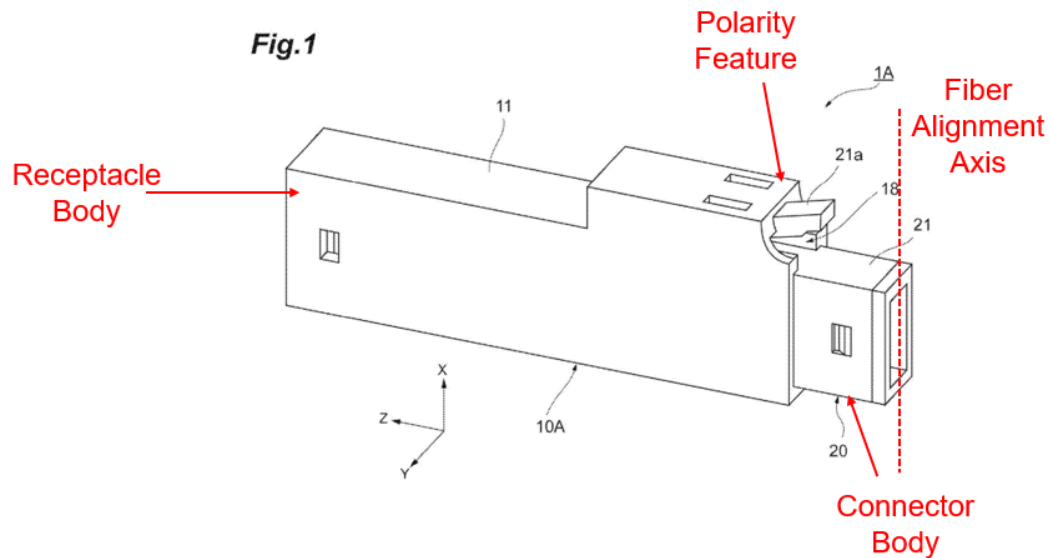
A second reason why this orientation would have been obvious is because this is the orientation shown in Watanabe. EX1003, ¶142. The longer axis of the MT ferrule is aligned with the “x” axis in Watanabe. This axis, e.g., the fiber

alignment axis, is aligned with Watanabe's actuation lever 21, which acts as a polarity key in Nhep in a manner equivalent to Nhep's keying rail 72. *Id.*

A POSITA motivated to add Watanabe's MT ferrule would have turned to Watanabe for any construction details to facilitate the modifications needed to be made to Nhep. EX1003, ¶143. One of those details is how exactly to modify Nhep's housing to accommodate the MT ferrule, which is a detail shown and taught by Watanabe. Orienting the fiber alignment axis with the wall that contains the polarity feature is also taught in other prior art references, further reinforcing this orientation. EX1006, FIG. 1; EX1003, ¶143.



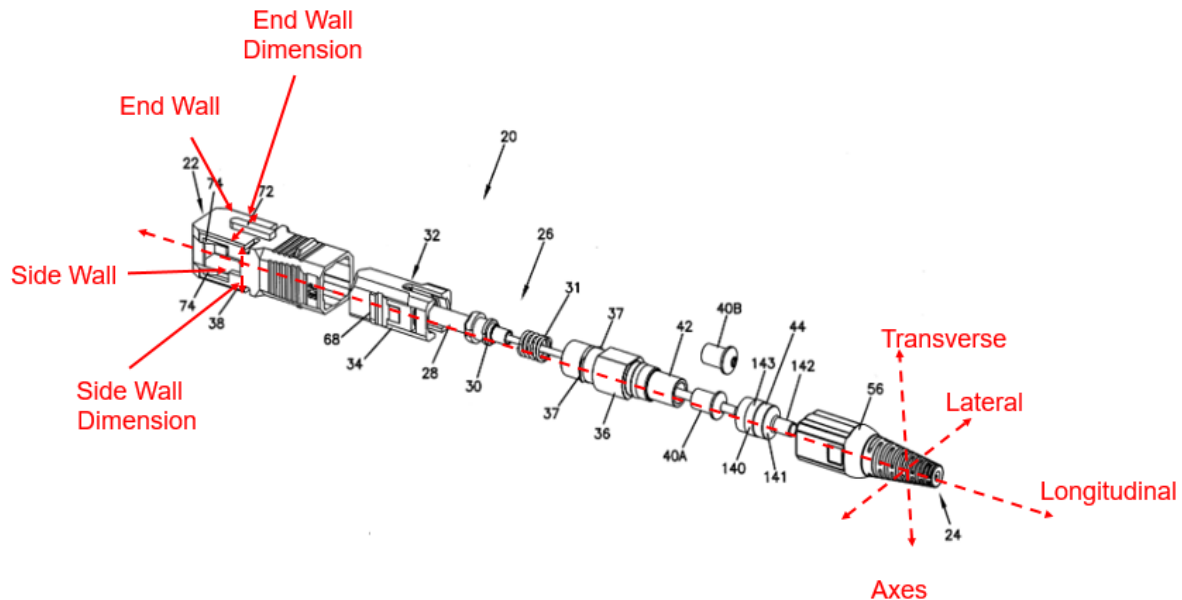
EX1005, FIG. 2.



EX1005, FIG. 1 (annotated).

Orienting the MT ferrule in this way in Nhep's housing is also obvious as a matter of being obvious to try. EX1003, ¶140. Here, there are only two possible orientation solutions to the MT ferrule. *Id.* First, the MT ferrule could be oriented such that the fiber alignment axis is parallel to the transverse axis. *Id.* Second, the MT ferrule could be rotated perpendicular to the first arrangement, such that the fiber alignment axis is parallel to the lateral axis. *Id.* Any other angled arrangement of the MT ferrule is not logical because the connectors would not maximize connector density in standard rectangular equipment racks. *Id.* Either orientation is equally achievable by a POSITA, and would not affect the functionality of the resulting connector. *Id.* Thus, the ferrule orientation proposed here would also have been obvious as a matter of being obvious to try. *Id.*

In making this modification, a POSITA would also have been motivated to shape Nhep's housing to conform closely to the MT ferrule for two reasons. EX1003, ¶¶144-145. First, adjusting Nhep's walls to conform to the MT ferrule would have been obvious as a way of maximizing connector density by minimizing the space needed between connectors, which is a known design concern. *Id.*; EX1018, Abstract, ¶¶12-13.



EX1004, FIG. 1 (annotated).

Second, this is the configuration shown in Watanabe, which a POSITA would have relied on for details relevant to the modification. EX1003, ¶¶146-147. Thus, the walls of Nhep's connector that intersect the transverse axis would have a shorter dimension in the lateral axis than the walls that intersect the lateral axis would have in the transverse axis. *Id.*

A POSITA would have had a reasonable expectation of success making these modifications at least because they have been able to make such modifications without undue experimentation. EX1003, ¶¶148-149. They would also have recognized that doing so would yield predictable results, because the changes would require only basic re-shaping of Nhep's components to accommodate the MT ferrule. *Id.* This type of redesign was well within the skill of a POSITA and is a highly predictable process. *Id.*

D. Claim 1³

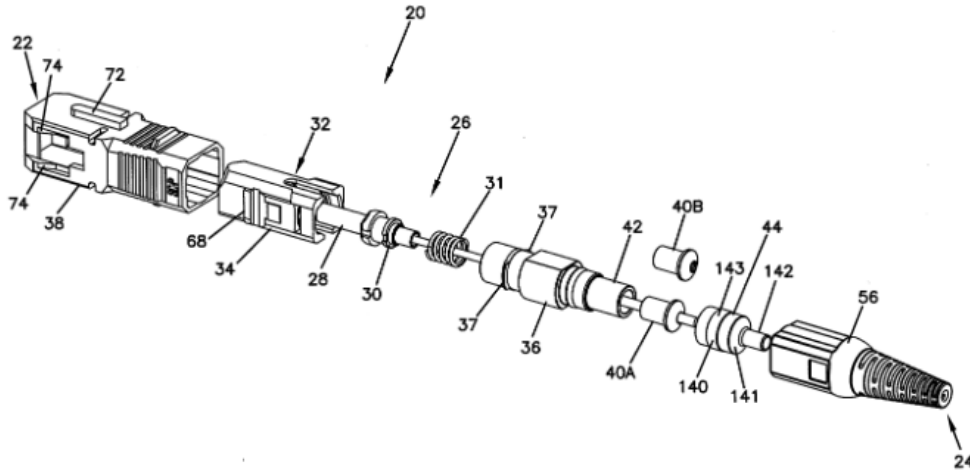
1. Preamble⁴

Nhep discloses the preamble. EX1003, ¶¶150-151. Nhep “relates to fiber optic connectors used in optical fiber communication systems.” EX1004, ¶2. Merely for context of later arguments, Watanabe also states that “one embodiment of the present invention is a receptacle connector holding an end of a first optical fiber and optically coupling the first optical fiber and a second optical fiber.” EX1005, ¶20.

³ Claim language is included in the attached claims appendix.

⁴ Petitioner does not concede that any preambles in the '413 patent are limiting.

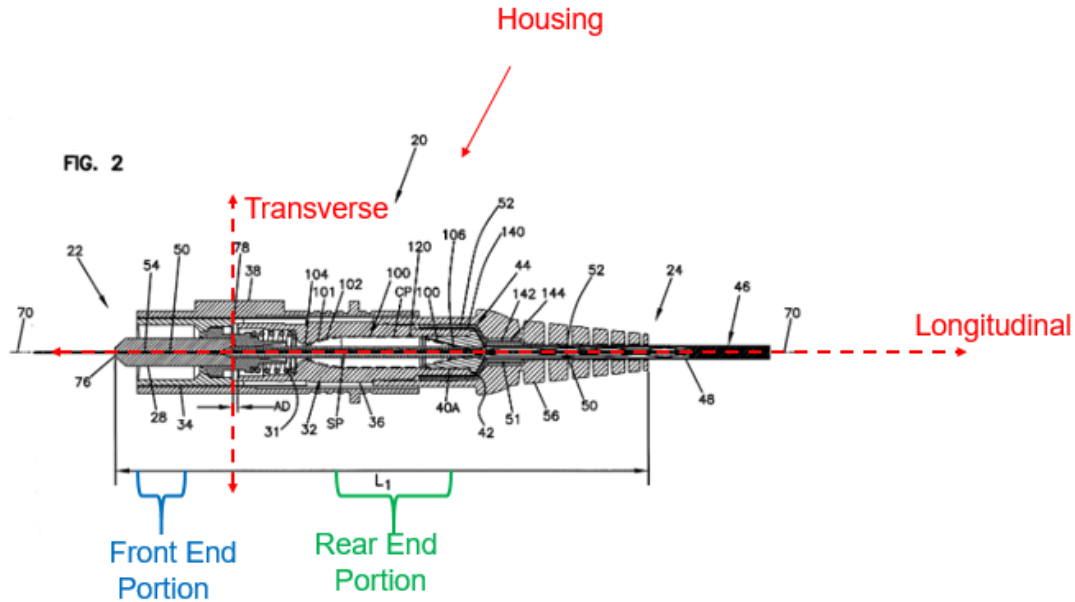
Nhep discloses “a first fiber optic connector 20” that includes “a ferrule assembly 26 that mounts adjacent the distal end 22 of the fiber optic connector 20.” EX1004, ¶76. Thus, Nhep discloses the preamble of claim 1. EX1003, ¶¶152-153



EX1004, FIG. 1.

2. [1.1]

Nhep discloses a housing as claimed in the combination of release sleeve 38 and connector housing 32, and corresponding supporting elements. EX1004, ¶¶76-77; EX1003, ¶154. The '413 patent does not define the orientation of the “longitudinal axis,” but the annotation shows a longitudinal axis as would have been understood by a POSITA. *Id.*

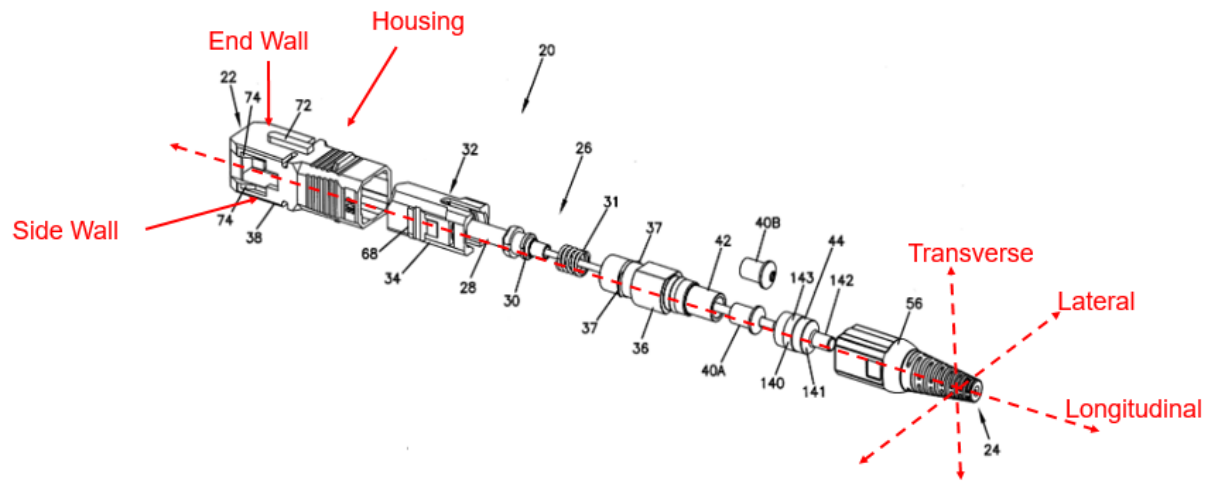


EX1004, FIG. 2 (annotated).

The claim terms “front end portion” and “rear end portion” are also not specifically defined by the claim or discussed in the specification. EX1003, ¶¶155-156. The labels above show examples of how these terms would apply to Nhep’s connector as they would have been understood by a POSITA. *Id.* Thus, Nhep discloses Element [1.1]. *Id.*

3. [1.2]

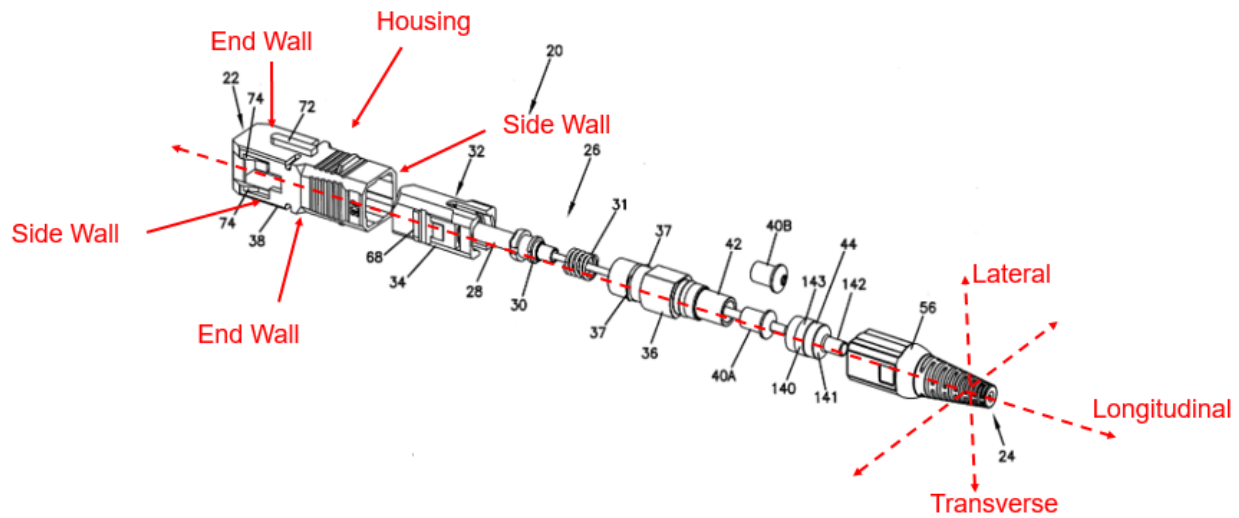
Nhep’s housing components include first and second end walls spaced apart along a transverse axis. EX1003, ¶¶157-161. The ’413 patent does not define the transverse axis, but the annotations show how the transverse axis would have been understood by a POSITA. *Id.* The first and second end walls are shown below. *Id.* Accordingly, Nhep discloses element [1.2]. *Id.*



EX1004, FIG. 1 (annotated).

4. [1.3]

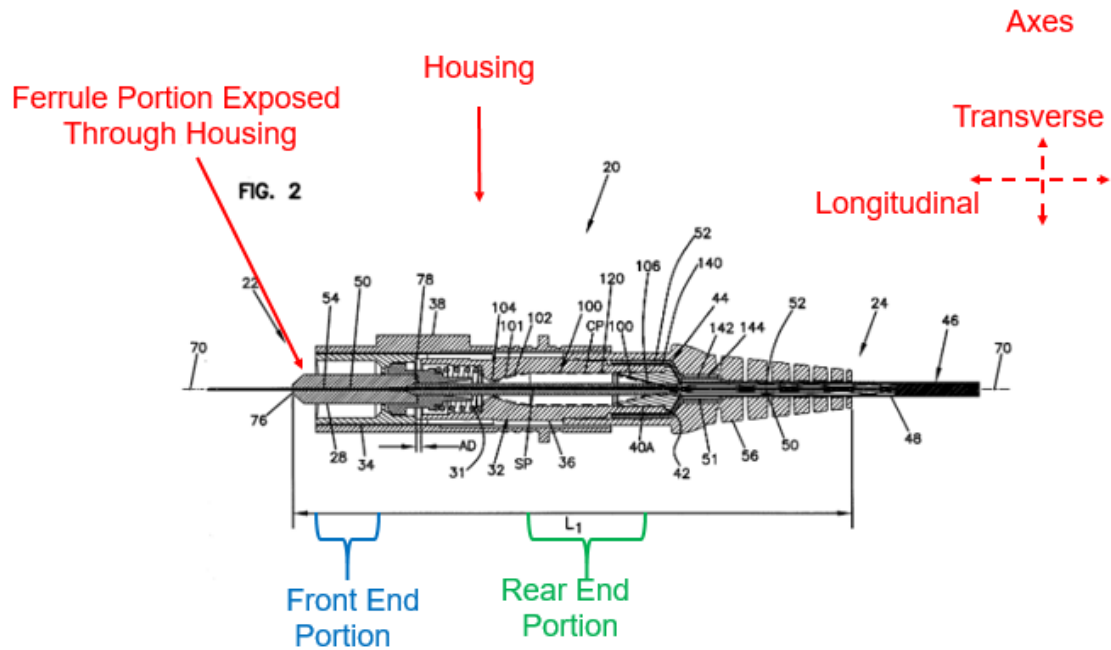
Nhep's housing also includes first and second side walls. EX1003, ¶¶162-164. The transverse and longitudinal axes defines the lateral axis, which must be perpendicular to those axes. *Id.* The side walls are therefore shown below. *Id.* Thus, Nhep discloses [1.3]. *Id.*



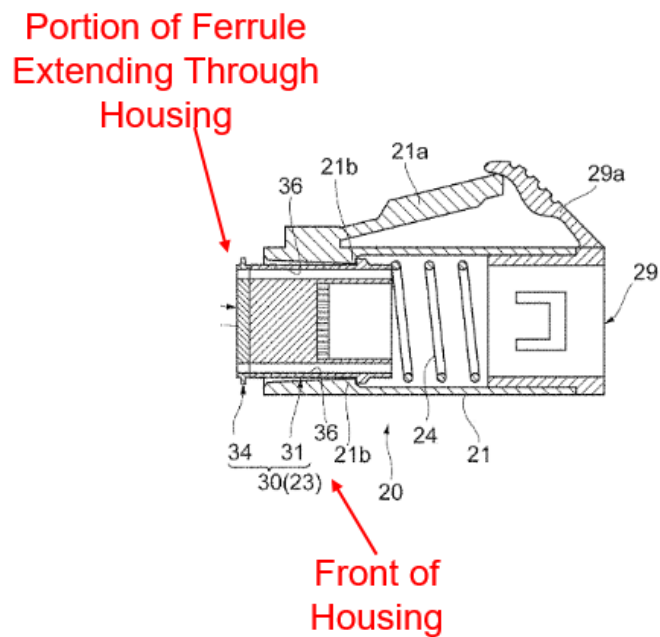
EX1004, FIG. 1 (annotated).

5. [1.4]

Patent Owner may allege Nhep does not expressly disclose an MT ferrule, but MT ferrules were well known in the prior art, for example, as explicitly taught in Watanabe. Sections VI.B, III; EX1003, ¶¶165-166. Watanabe discloses that its “ferrule main body part 31 is a so-called *MT ferrule*.” EX1005, ¶37; EX1003, ¶167.



EX1004, FIG. 2 (annotated).

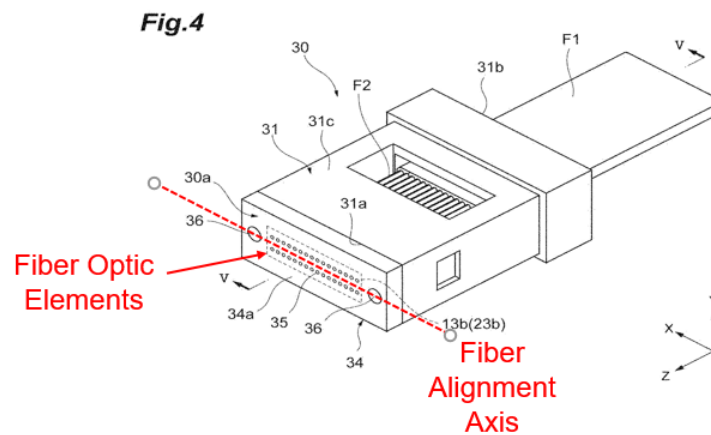


EX1005, FIG. 2 (excerpt, annotated).

6. [1.5]

Even if not express in Nhep, Watanabe's MT ferrule includes a plurality of fibers that are arranged in an array of two rows. EX1003, ¶¶171-172. Watanabe explains that the MT ferrule includes "a plurality of GRIN lenses (optical elements) 35 optically coupled with the plurality of optical fibers." EX1005, ¶41; EX1003, ¶173. The plurality of GRIN lenses 35 are arranged in an array of two rows EX1003, ¶¶173-174.

Accordingly, Nhep in view of Watanabe renders obvious element [1.5]. *Id.*; Section VI.C.



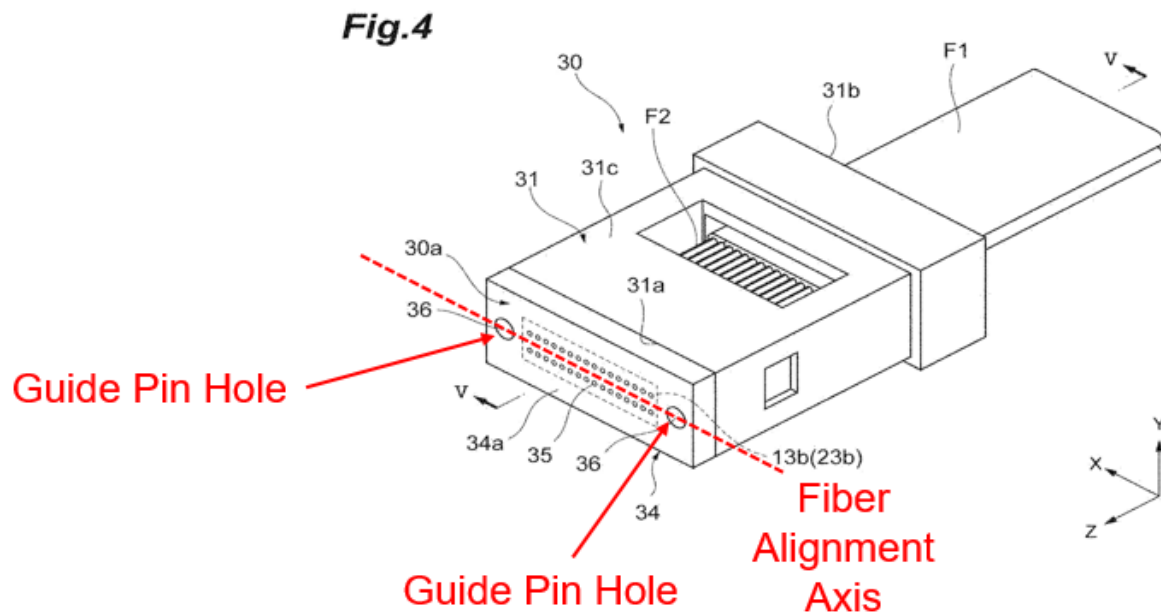
EX1005, FIG. 4 (annotated).

7. [1.6]

Even if not express in Nhep, MT ferrules with the claimed guide pin opening configuration were well known in the prior art, as explicitly taught in Watanabe. EX1003, ¶¶175-176; Section VI.B.

Watanabe's MT ferrule includes "two guide pin holes 36" that "extend in the Z direction, and are lined in an X direction and formed to hold the plurality of optical fibers F2 in between." EX1005, ¶43; EX1003, ¶¶177-178. Therefore, guide pin holes 36 are spaced apart along the fiber alignment axis with the fiber optic openings arranged in between the guide pin holes. EX1003, ¶¶177-178.

Accordingly, Nhep in view of Watanabe renders obvious Element [1.6]. *Id.*; Section VI.C.



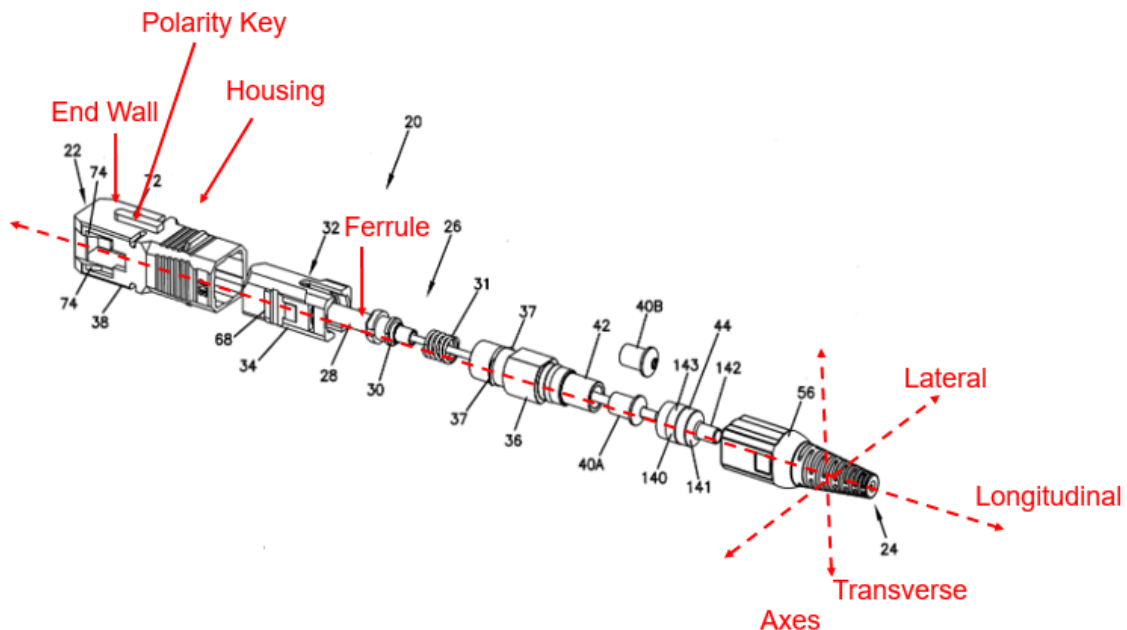
EX1005, FIG. 4 (annotated).

8. [1.7]

Nhep discloses that its remote sleeve 38 includes a “keying rail 72.”

EX1004, ¶78. “When the fiber optic connector 20 is inserted within one of the ports 60, 62 of the fiber optic adapter 58, the keying rail 72 provided on the release sleeve 38 ensures that the fiber optic connector 20 is oriented at the appropriate rotational orientation relative to the fiber optic adapter 58.” EX1004, ¶78. Nhep’s keying rail therefore defines a polarity for Nhep’s connector. EX1003, ¶¶179-181.

Thus, a POSITA would have understood Nhep’s keying rail 72 to be equivalent to, and disclose, a polarity key as recited. *Id.* Keying rail 72 is disposed on the first end wall. *Id.* Therefore, Nhep discloses Element [1.7]. *Id.*

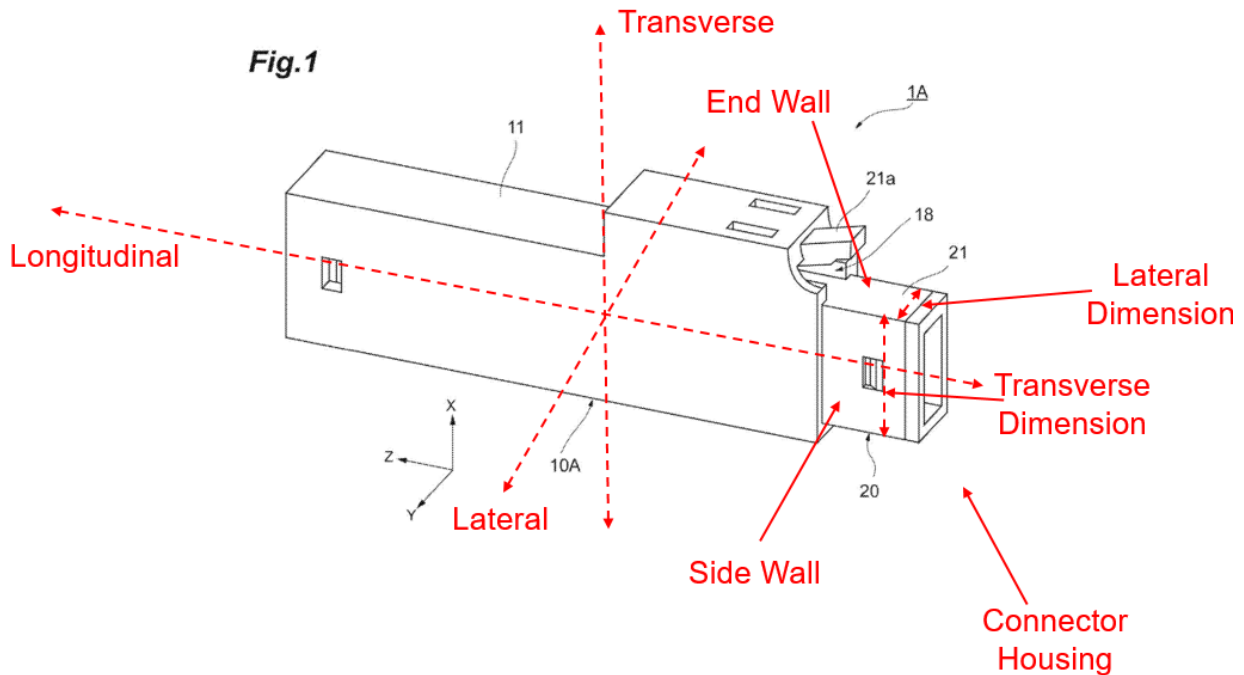


EX1004, FIG. 1 (annotated).

9. [1.8]

Element [1.8] is essentially requiring that the end wall lateral dimensions be less than the side wall transverse dimensions. EX1003, ¶¶182-184. Put differently, the housing extend less in the lateral dimension than in the transverse dimension. *Id.* Even if Nhap does not expressly teach, Watanabe discloses this configuration. *Id.* And a POSITA would have been motivated to modify Nhep's housing to match this configuration for at least the reasons discussed. Section VI.C.

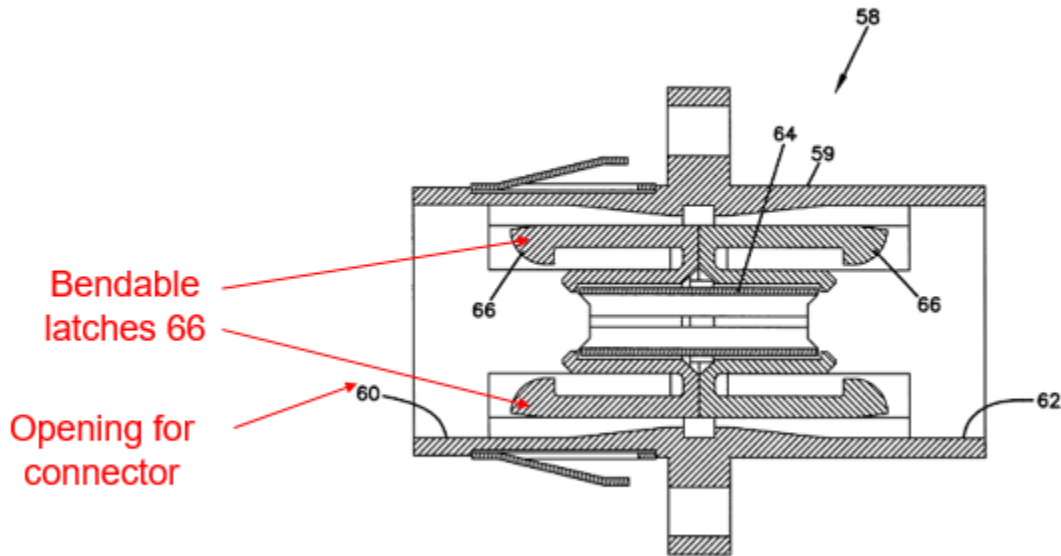
Specifically, this orientation optimizes the connector density by orienting the longest dimension of the MT ferrule with the polarity key. Section VI.C; EX1003, ¶¶185-187. In addition, this configuration is taught by Watanabe and is obvious to try due to the finite number of possible orientations. Section VI.C; EX1003, ¶¶185-187. Thus, modified Nhep would have a configuration similar to Watanabe's. *Id.* Accordingly, Nhep in view of Watanabe renders obvious Element [1.8]. *Id.*



EX1005, FIG. 1 (annotated).

10. [1.9]

Nhep explains, “[w]hen the fiber optic connector 20 is fully inserted within its corresponding port 60, 62, the latches 66 snap into a latching position in which the latches engage the shoulders 68 of the connector housing 32.” EX1004, ¶78. A cross-section of a mating adapter 58 is shown. EX1003, ¶¶188-189. Thus, Nhep discloses element [1.9]. *Id.*



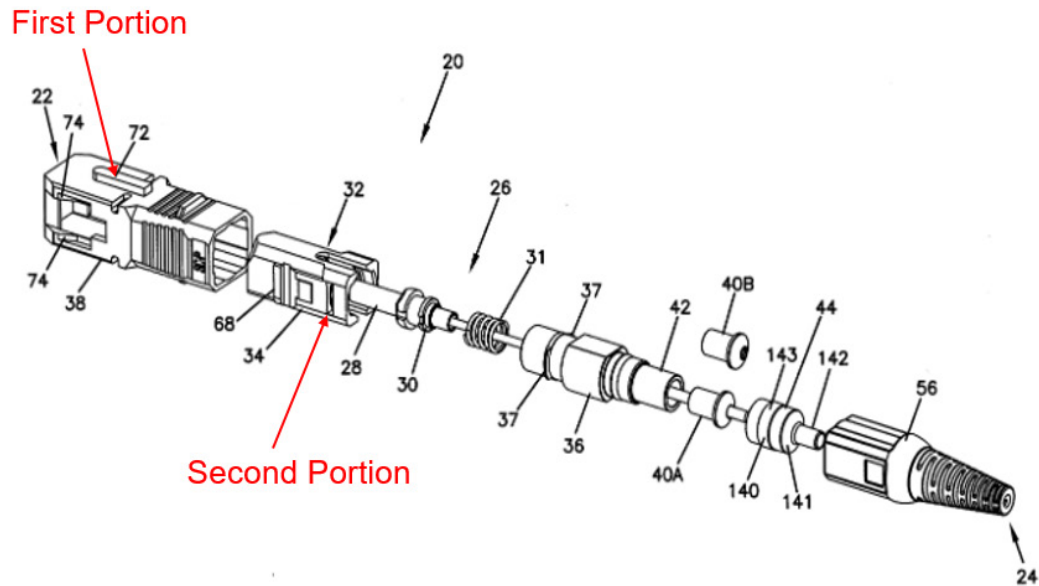
EX1004, FIG. 25 (annotated).

11. [1.10]

Nhep discloses that the movement of release sleeve 38 rearwards acts to unlatch the connector from the mating adapter. EX1004, ¶78; EX1003, ¶190. Specifically, Nhep states “release sleeve 38 is free to slide back-and-forth in distal and proximal directions relative to the connector housing 32” and that “by pulling the release sleeve 38 in a proximal direction, ramps 74 of the release sleeve disengage the latches 66...thereby allowing the fiber optic connector 20 to be proximally withdrawn from its respective port 60, 62.” EX1004, ¶78.

Thus, in Nhep a first portion of the connector (release sleeve 38) moves rearward relative to a second portion of the optical fiber connector (housing 32) to

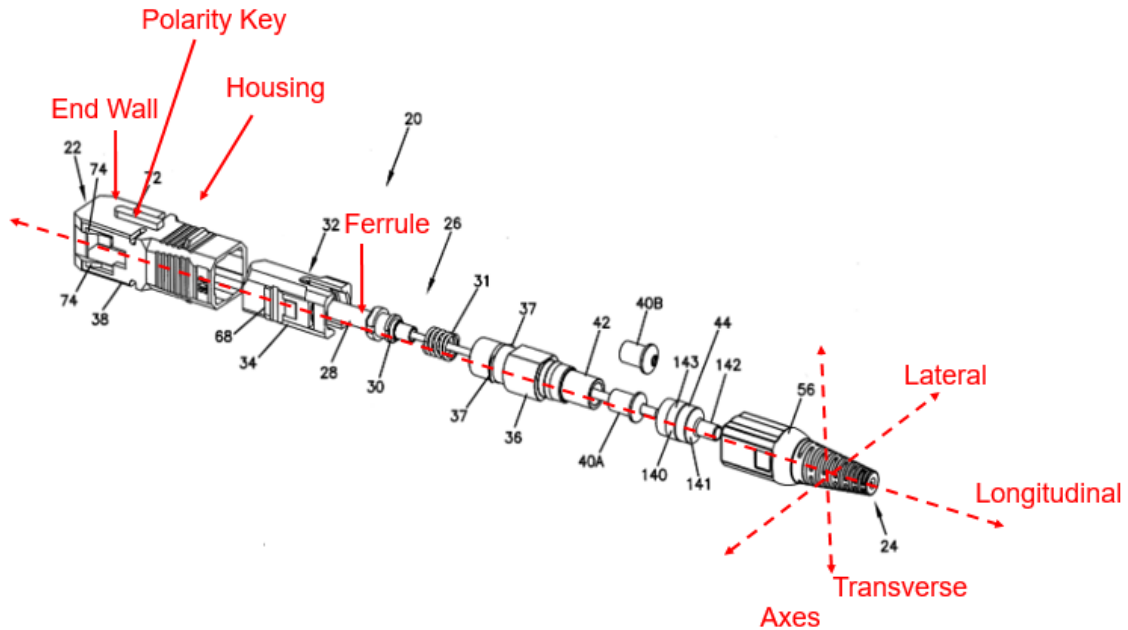
unlatch the connector. EX1003, ¶¶191-192. Accordingly, Nhep discloses element [1.10]. *Id.*



EX1004, FIG. 1 (annotated).

12. [1.11]

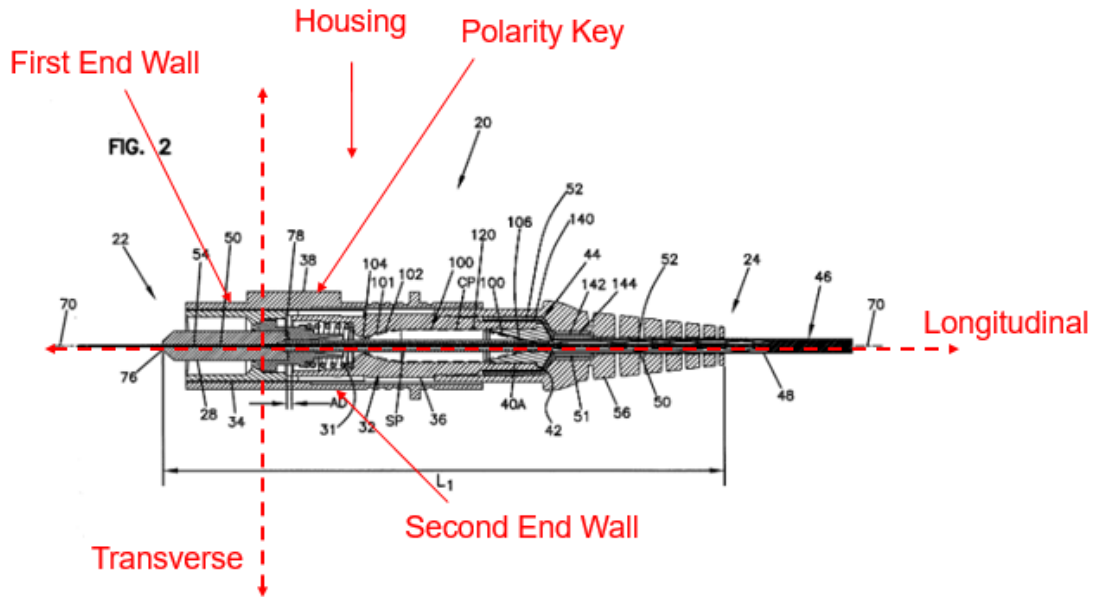
Nhep's release sleeve 38 is the first portion that is displaced rearwards. EX1004, ¶78; Section VI.D.11. Nhep's keying rail 72, which discloses the polarity key, is "provided on the release sleeve 38" and is a fixed element of release sleeve 38. EX1004, ¶78; EX1003, ¶193. Thus, Nhep's keying rail 72 moves with release sleeve 38 and is displaced rearwards with respect to the ferrule, which would be an MT ferrule held by housing 32 in Nhep modified by Watanabe. EX1003, ¶¶194-195; Section VI.C. Accordingly, Nhep in view of Watanabe renders obvious Element [1.11].



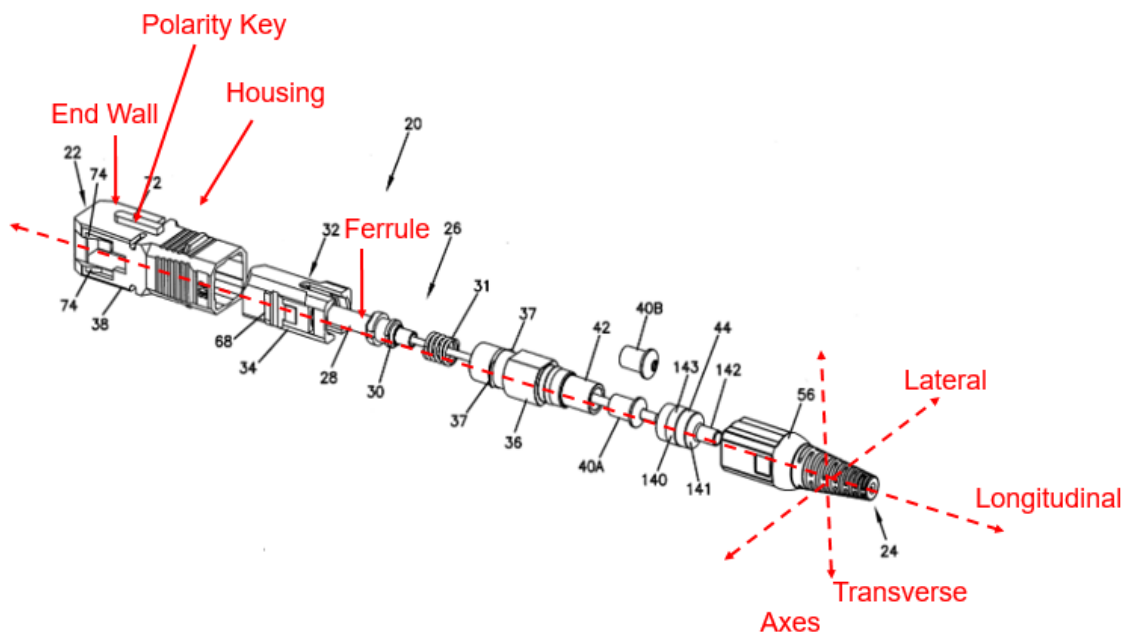
EX1004, FIG. 1 (annotated).

E. Claim 2

There is no second keying rail 72 on the second end wall. EX1003, ¶¶196-199. Nhep only mentions a single keying rail 72 (on the first end wall) and thus the second end wall is free of a polarity key. *Id.* Accordingly, Nhep discloses claim 2. *Id.*



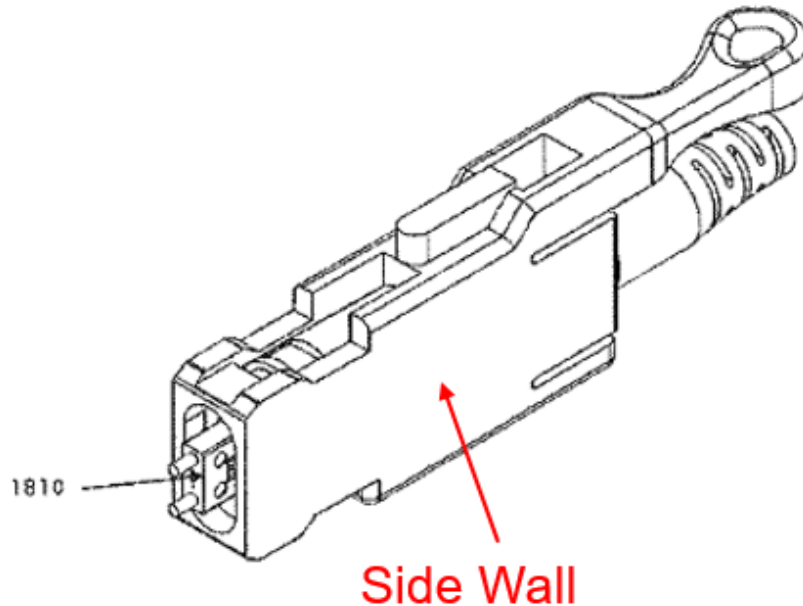
EX1004, FIG. 2 (annotated).



EX1004, FIG. 1 (annotated).

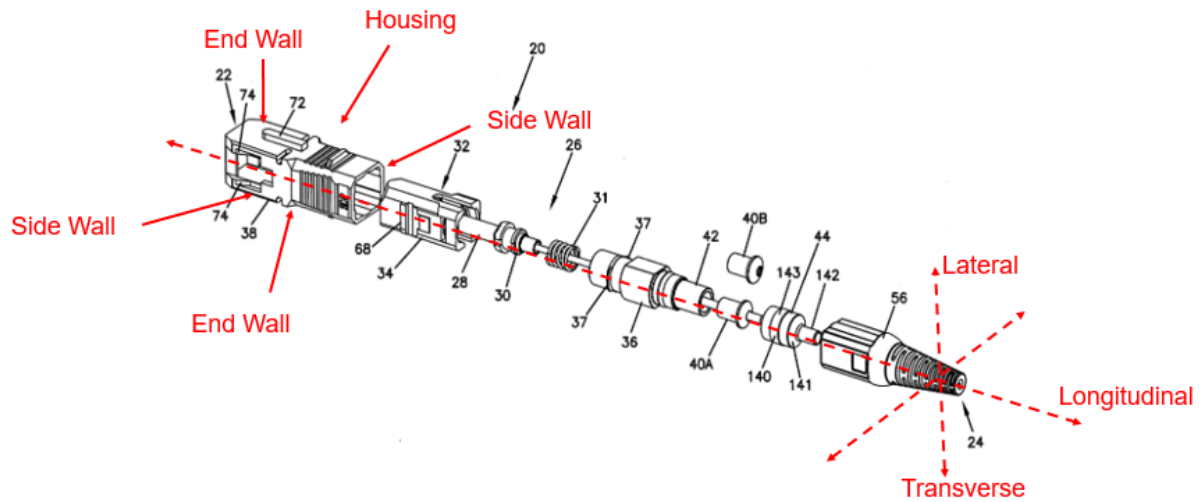
F. Claim 3

A POSITA would have understood the claim term “substantially” to expand the term flat to include first and second side walls that are not strictly flat or planar in nature, as shown in the ’413 patent’s Figures 18A-18B. EX1003, ¶¶200-201.



EX1001, FIG 18B (annotated).

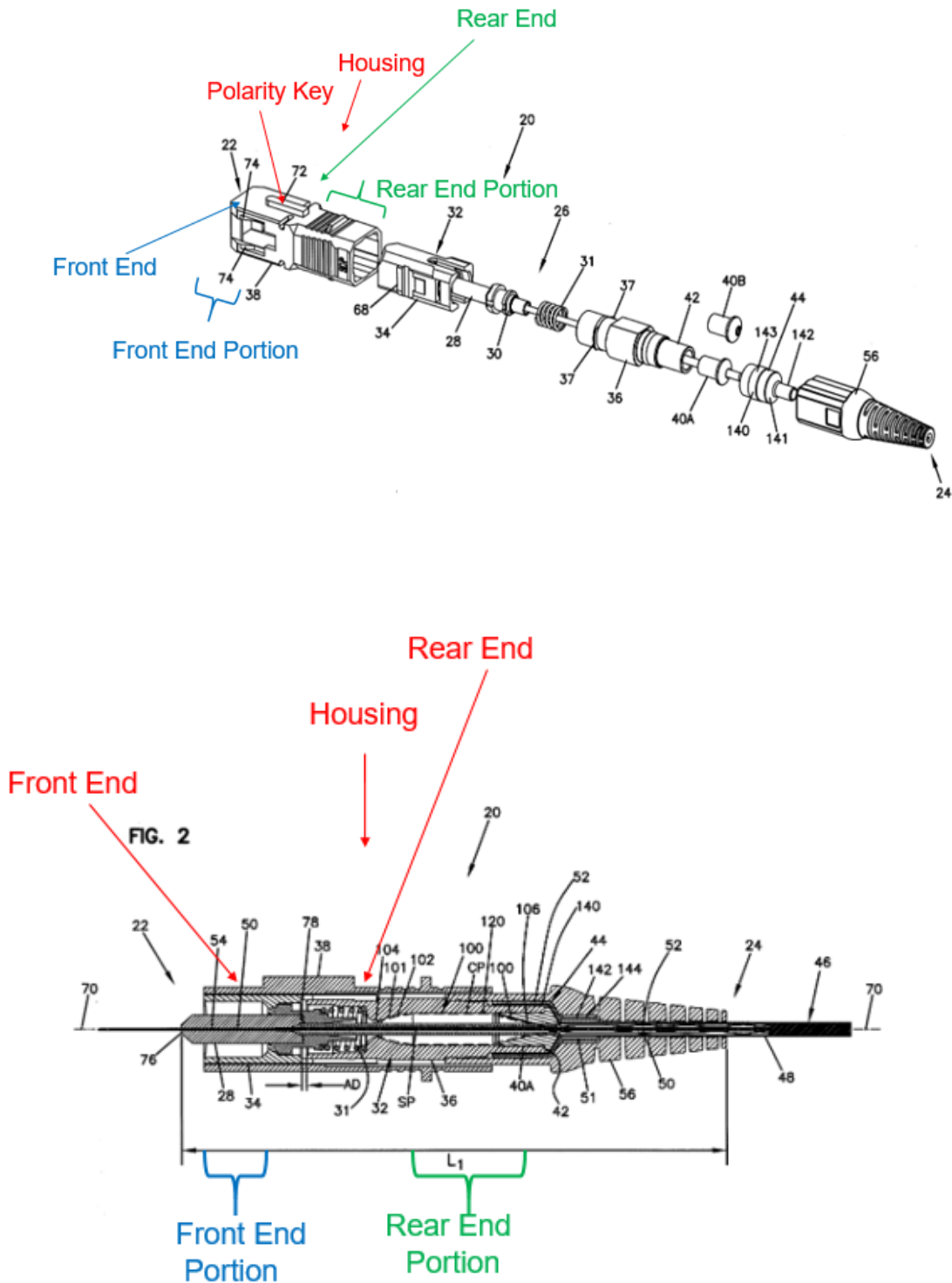
Nhep’s protrusions and other elements on the side walls are encompassed by this understanding of “substantially flat” because the walls of Nhep are generally flat with features like grooves and recesses, just like the embodiment of Figure 18B. EX1003, ¶¶202-203. Accordingly, Nhep discloses claim 3. *Id.*



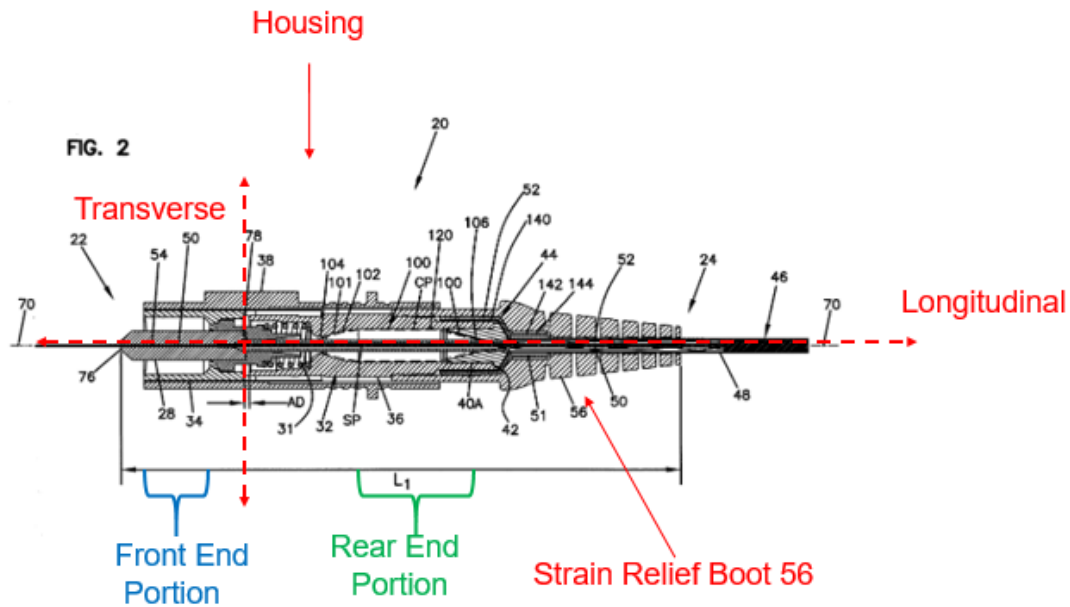
EX1004, FIG. 1 (annotated).

G. Claim 4

This claim feature requires that the polarity key extend in a direction spanning from a rear end towards a front end. EX1003, ¶¶204-206. A POSITA would have understood that Nhep discloses these front and rear ends. *Id.* Accordingly, Nhep discloses claim 4.



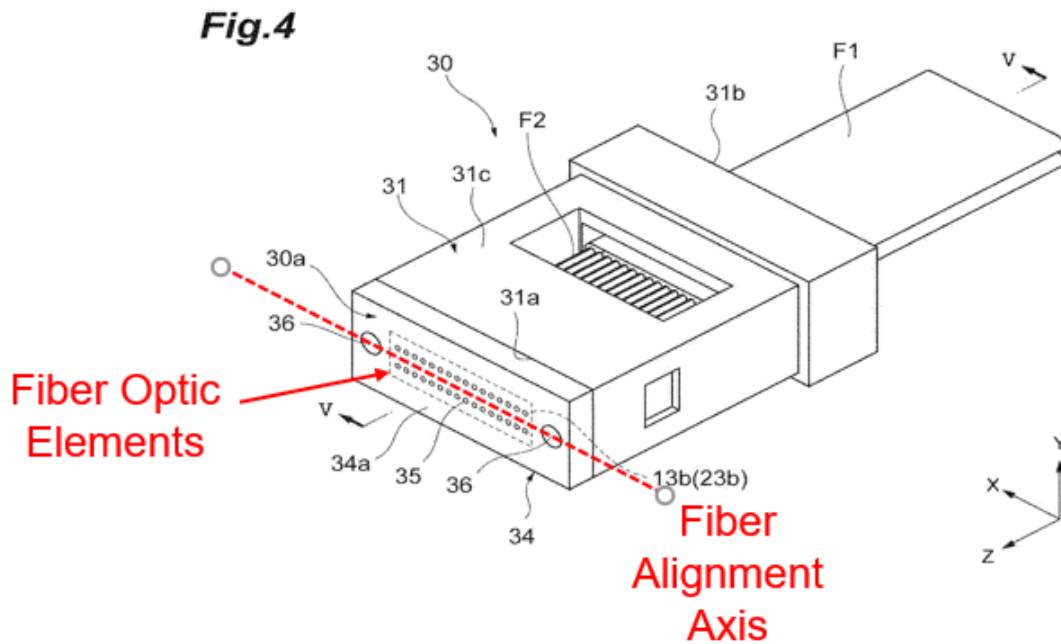
EX1004, FIGs. 1, 2 (annotated).



EX1004, FIG. 2 (annotated).

I. Claim 8

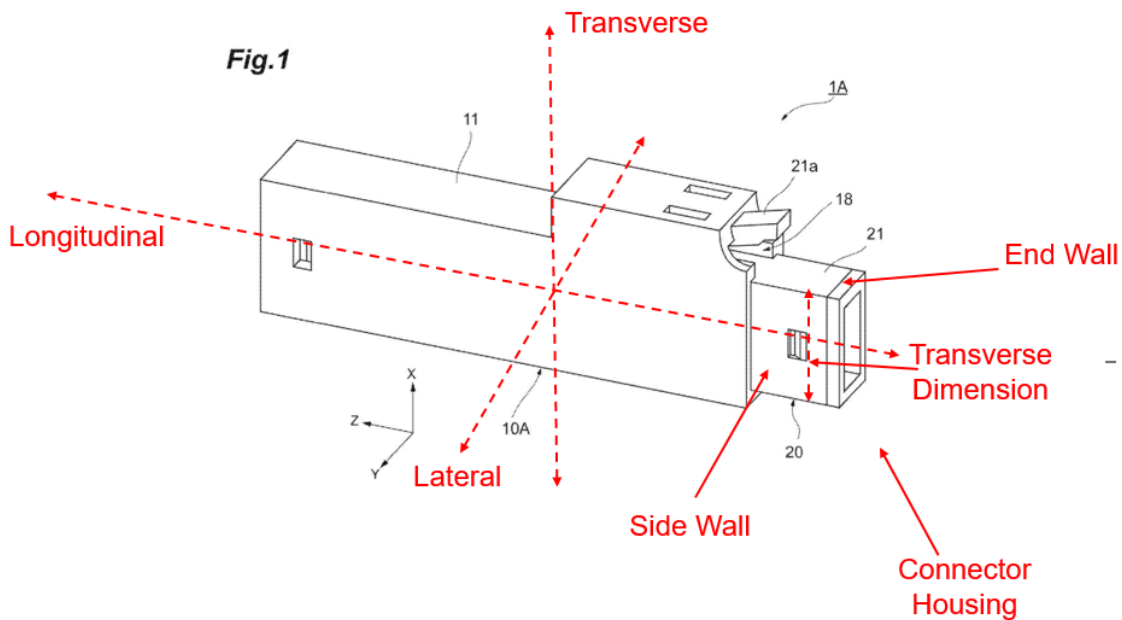
Even if not express in Nhep, MT ferrules with the configuration recited in claim 8 were well known in the prior art, as explicitly taught in Watanabe. Section VI.B. Watanabe's MT ferrule includes a total of thirty-two optical fibers placed in two rows of sixteen. EX1005, FIG. 4, ¶¶37, 41; EX1003, ¶¶210-213. These rows both extend parallel to the fiber alignment axis. *Id.* Accordingly, Nhep in view of Watanabe renders obvious claim 8. *Id.*; Section VI.C.



EX1005, FIG. 4 (annotated).

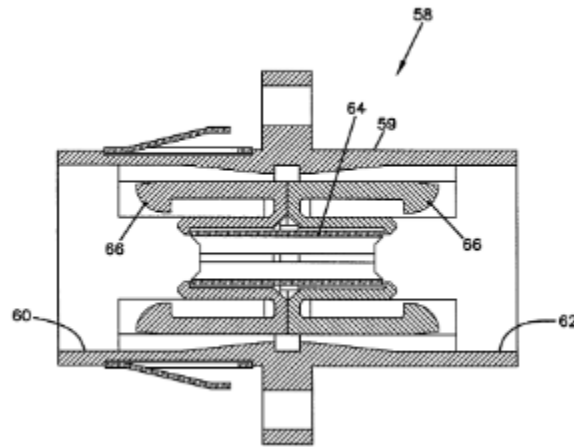
J. Claim 10

Nhep's latching occurs when "latches 66 [that] snap into a latching position in which the latches engage the shoulders 68 of the connector housing 32 to prevent the fiber optic connector 20 from being proximally withdrawn from the port 60, 62." EX1004, ¶78. Thus, "shoulders 68" of the connector housing 32 are the adapter latching features as claimed. EX1003, ¶¶214-215.



EX1005, FIG. 1 (annotated).

Third, moving Nhep's latching feature on the side wall to the first end wall would have been obvious as a matter of being obvious to try. EX1003, ¶¶218-219. There are only two options for configuring the pair of latching features because the latch pair is placed on opposite walls, as shown in Figure 25. *Id.* Thus, modifying Nhep-Watanabe to have the disclosed latching features on the end walls would have been obvious to try.



EX1004, FIG. 25.

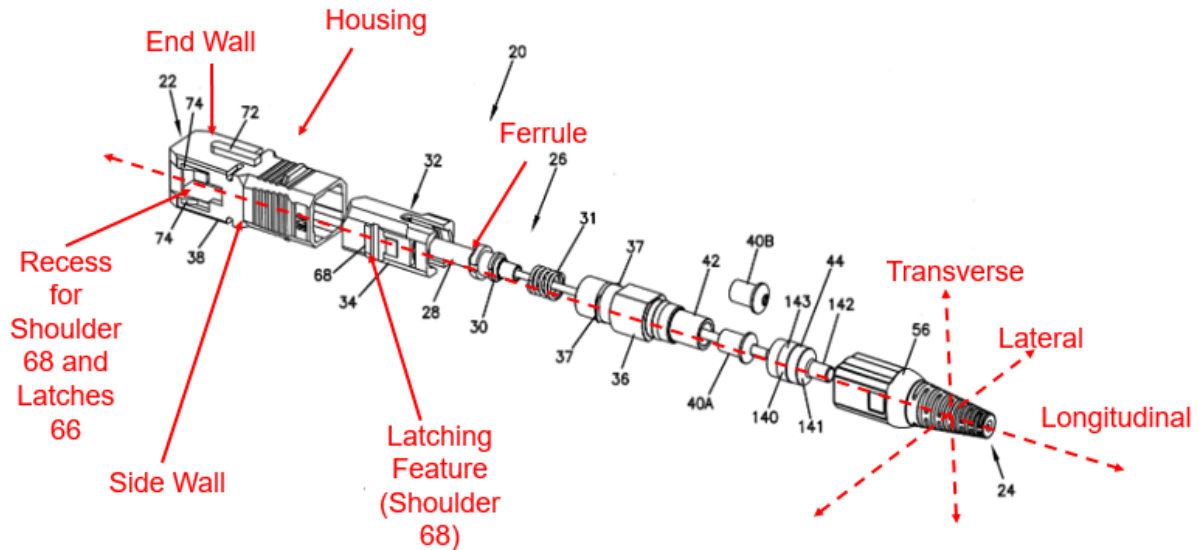
Accordingly, Nhep in view of Watanabe renders obvious claim 10. EX1003, ¶220.

K. Claim 11

The term “adapter latching feature” is not present in claim 1, but is present in claim 10. This is likely a typographical error and claim 11 should depend from claim 10. EX1003, ¶¶221-222. The analysis below does not change regardless of the dependency of claim 11. *Id.*

Nhep’s latching mechanism is accomplished by “latches 66 [that] snap into a latching position in which the latches engage the shoulders 68 of the connector housing 32 to prevent the fiber optic connector 20 from being proximally withdrawn from the port 60, 62.” EX1004, ¶78. Recesses in release sleeve 38 allow latches 66 to access the shoulders. EX1004, ¶78; EX1003, ¶¶223-224. Thus, the adapter latching feature includes a recess configured to latch with a bendable latch

hook of the mating adapter as claimed. EX1003, ¶¶223-224. Accordingly, Nhep discloses claim 11. *Id.*



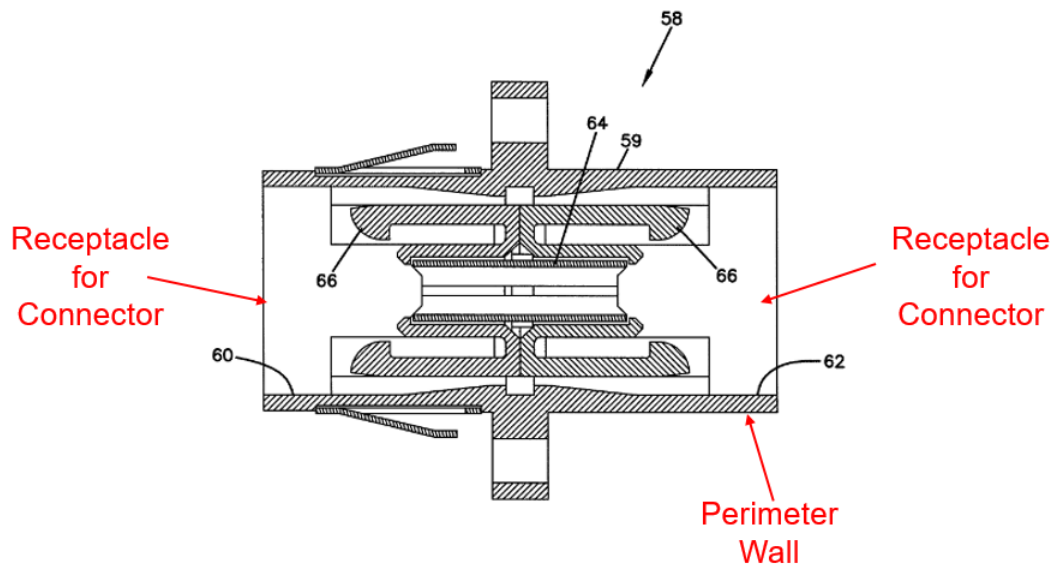
EX1004, FIG. 1 (annotated).

L. Claim 12

Claim 12 is substantively similar to claim 11, but recites first and second latch recesses for each end wall, respectively. EX1003, ¶¶225-228. Nhep discloses two paired latch recesses in release sleeve 38 corresponding to the pair of latches 66. *Id.*; EX1004, ¶78. Rearranging the paired recesses (latch features) to the first and second end walls would have been obvious for the same reasons discussed above. Section VI.J; EX1003, ¶¶229-234. Accordingly, Nhep renders obvious claim 12. EX1003, ¶¶229-234.

M. Claim 13

Nhep discloses a “fiber optic adapter 58 that can be used to couple two of the fiber optic connectors 20 together.” EX1004, ¶77. Adapter 58 has a perimeter wall that defines a receptacle for the connector. EX1003, ¶¶235-236.



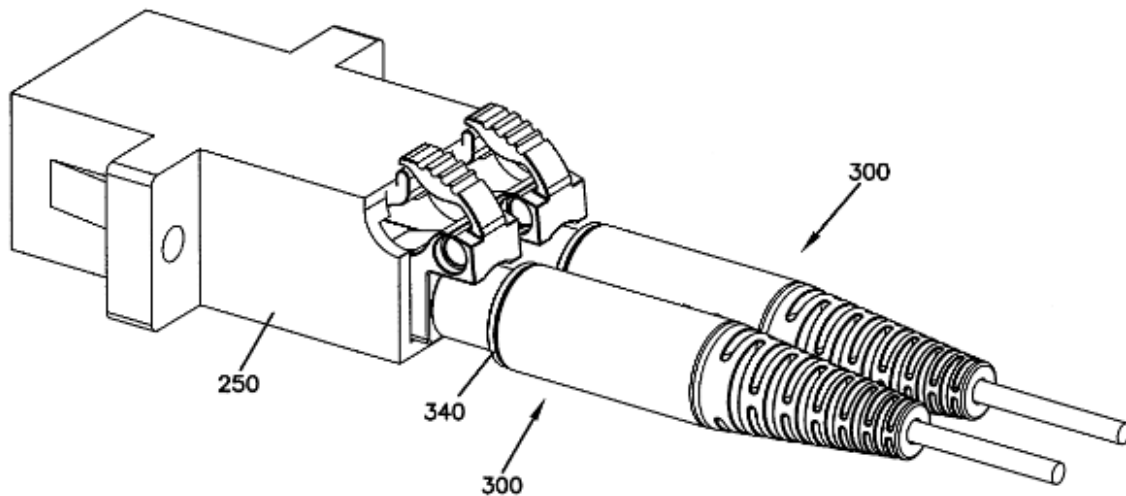
EX1004, FIG. 25 (annotated).

Adapter 58 also includes a second receptacle for receiving a second connector, but the orientation of the receptacles is such that the connectors are oriented with their front ends facing each other when mated. EX1003, ¶¶237-239.

A POSITA would have been motivated to modify adapter 58 to accommodate more than one pair of fiber optic connectors. *Id.* This would allow adapter 58 to serve to join multiple sets of fiber optic cables, improving

performance of the resulting system, and also reduce part count because a single adapter 58 can be used for multiple cable pairings. *Id.*

A POSITA would have made this modification by duplicating the receptacles in a side-by-side fashion at least because this is the orientation shown in the embodiment of Figure 34 of Nhep. *Id.*; EX1004, ¶110. This orientation matches the claimed side wall orientation. EX1003, ¶¶239-240. Accordingly, Nhep renders obvious claim 13. *Id.*



EX1004, FIG. 34.

N. Claim 14

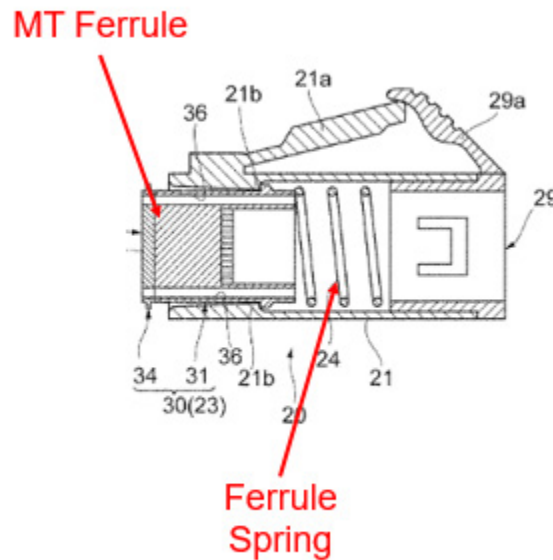
A POSITA would have understood that Nhep's adapter 58 includes a longitudinal keyway to accommodate keying rail 72. EX1003, ¶¶241-242; EX1004, ¶78. Otherwise, it would not be possible for connector 20 to mate with adapter 58. EX1003, ¶¶241-242. This keyway would be located in the perimeter

wall in a location corresponding to the location of keying rail 72 on the exterior of release sleeve 38. *Id.* In making the modification discussed above with respect to claim 13 (Section VI.M), a POSITA would have added a longitudinal keyway for each receptacle to ensure proper latching functionality. *Id.* Thus, there would be a plurality of longitudinal keyways in the perimeter wall, with one keyway for each receptacle to receive keying rail 72. *Id.* Accordingly, Nhep renders obvious claim 14. *Id.*

O. Claim 25

Watanabe discloses an “elastic member 24 [that] is, for example, a coil spring to be expanded and contracted in the Z direction, and is arranged between the plug ferrule 23 and the support member 29 inside the plug housing 21. The elastic member 24 urges the plug ferrule 23 to the front (direction to the receptacle ferrule 13).” EX1005, ¶51. Elastic member 24 is therefore the claimed ferrule spring that biases the MT ferrule forward and that would be compressed by a rearwards force on the MT ferrule. EX1003, ¶¶245-246.

Nhep also includes a “spring 31 [that] is configured to bias the ferrule 28 in a distal direction relative to the connector housing 32.” EX1004, ¶79. A POSITA would have therefore been motivated to adapt Nhep’s existing spring to bias the MT ferrule forward, as taught by Watanabe, to ensure full functionality of modified Nhep. EX1003, ¶¶247-248.



EX1005, FIG. 2 (excerpt, annotated).

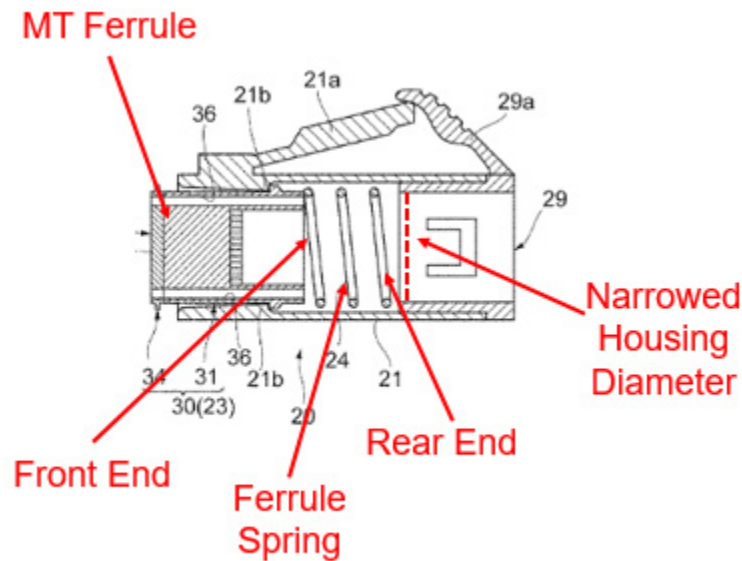
In both Nhep and Watanabe the movement of the ferrule by spring 31 inside housing 32 is completely independent of any movement of release sleeve 38.

EX1003, ¶¶249-250. Thus, movement of release sleeve 38, which is the first portion, displaces keying rail 72 (the polarity key) rearwards without any movement of the MT ferrule, as claimed. *Id.* Accordingly, Nhep and Watanabe render obvious claim 25. *Id.*; Section VI.C.

P. Claim 26

Claim 26 is identical to claim 25 with the exception of the addition of “the rear end of the ferrule spring being supported in the housing such that the rear end is stationary in the housing and the front end moves toward the rear end when the ferrule spring is compressed.” EX1003, ¶¶251-257. Nhep-Watanabe discloses this

element in addition to the other elements discussed above in claim 25 because elastic member 24 in Watanabe has front and rear ends, with rear end 24 supported by Watanabe's housing and the front end being the end that moves under compression. *Id.*; Section VI.O. This is apparent based on the narrower diameter in Watanabe's housing that supports the rear end. EX1003, ¶254.



EX1005, FIG. 2 (excerpt, annotated).

Accordingly, Nhep and Watanabe render obvious claim 26. EX1003, ¶257; Section VI.C.

Q. Claim 17

1. Preamble

The preamble of claim 17 is identical to the preamble of claim 1 and is disclosed for the reasons discussed above. EX1003, ¶258; Section VI.D.1.

2. [17.1]

Element [17.1] is identical to portions of Element [1.1] and is disclosed for the reasons discussed above. EX1003, ¶¶259-261; Section VI.D.2.

3. [17.2]

Element [17.2] is identical to portions of Element [1.4] and Element [1.5] and is rendered obvious for the reasons discussed above. EX1003, ¶¶262-267; Sections VI.D.5-6.

4. [17.3]

Element [17.3] is identical to Element [1.6] and is rendered obvious for the reasons discussed above. EX1003, ¶268; Section VI.D.7.

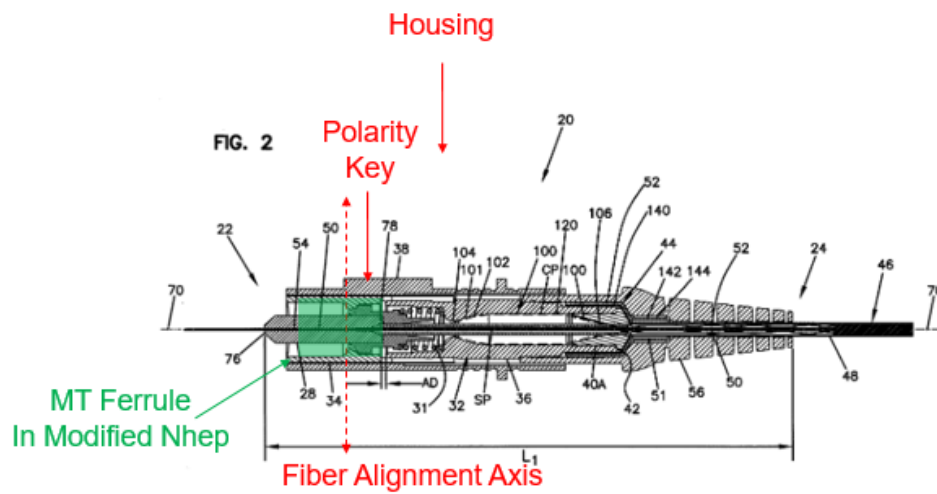
5. [17.4]

Patent Owner may allege Nhep does not expressly disclose the claimed polarity key orientation, but this orientation was well known in the prior art, as explicitly taught in Watanabe. EX1003, ¶¶269-270.

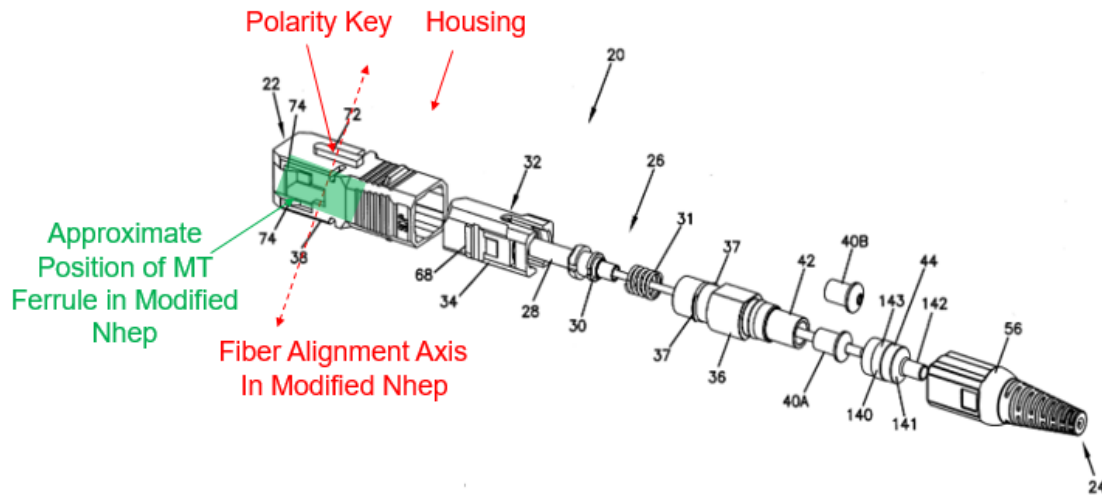
Nhep disclose that its remote sleeve 38 includes a “keying rail 72.” EX1004, ¶78. Nhep’s keying rail defines a polarity for Nhep’s connector, and thus a POSITA would have understood Nhep’s keying rail 72 to be equivalent to, and disclose, a polarity key as recited. EX1003, ¶¶271-272. Keying rail 72 is disposed on the top wall of release sleeve 38 in the view of Figure 1 of Nhep. *Id.*

In modified Nhep, it would have been obvious to arrange the fiber alignment axis of the MT ferrule, which is the longer axis of the MT ferrule, to intersect the

first end wall. *Id.*; Sections VI.D.8, VI.D.9. This arrangement improves connector spacing density, is modeled after Watanabe, and is obvious to try. EX1003, ¶¶272-273. This results in the polarity key (keying rail 72) being spaced apart above the MT ferrule along the fiber alignment axis. *Id.* Accordingly, for at least the reasons discussed above, Nhep in view of Watanabe renders obvious Element [17.4]. *Id.*



EX1004, FIG. 2 (annotated).



EX1004, FIG. 1 (annotated).

6. [17.5]

Element [17.5] is identical to Element [1.9] and is disclosed for the reasons discussed above. EX1003, ¶274; Section VI.D.10.

7. [17.6]

Element [17.6] is identical to element [1.10] and is disclosed for the reasons discussed above. EX1003, ¶275; Section VI.D.11.

8. [17.7]

Element [17.6] is identical to element [1.11] and is disclosed for the reasons discussed above. EX1003, ¶276; Section VI.D.12.

R. Claim 18

Claim 18 is similar to claim 10, except it recites that the adapter latching feature be spaced apart along the fiber alignment axis above the MT ferrule.

EX1003, ¶¶278-287. Claim 18 is obvious in view of the analysis of claim 10 as modified by the discussion of element [17.4] above because the placement adapter latch feature in claim 10 is “spaced part along the fiber alignment axis above the MT ferrule” as claimed. *Id.*; Sections VI.E, VI.Q.5.

S. Claim 19

Claim 19 is identical to claim 11 and is obvious for the reasons discussed above. Section VI.K; EX1003, ¶¶288-289.

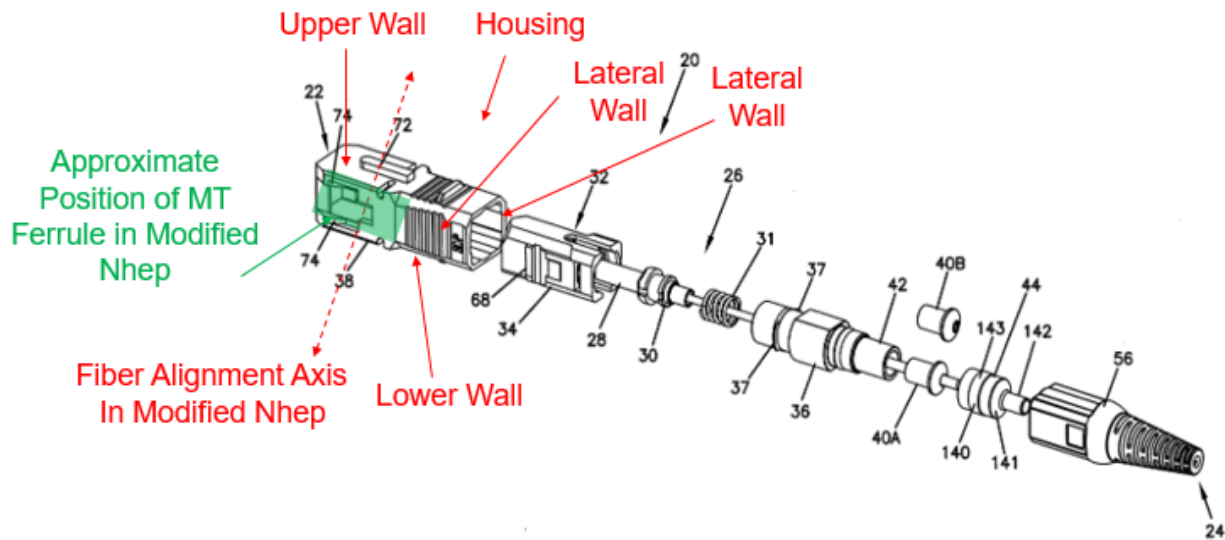
B. Claim 20

Claim 20 is similar to claim 2, but references the fiber alignment axis and the polarity key being below the MT ferrule. EX1003, ¶¶290-293. Claim 20 is obvious for the same reasons discussed above in claim 2 as modified by the discussion of element [17.4] above. *Id.*; Sections VI.E, VI.Q.5.

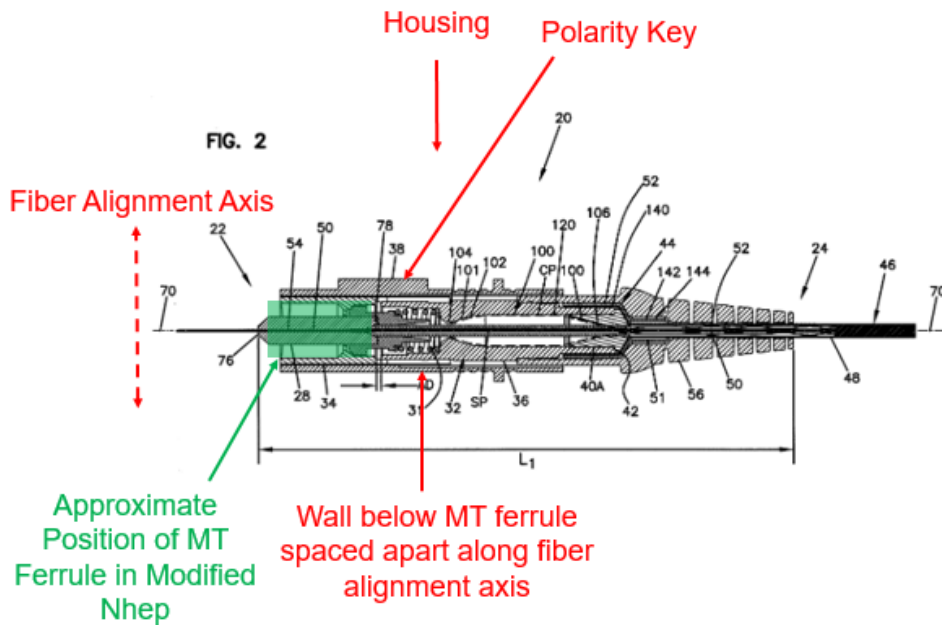
C. Claim 21

The term “substantially flat” would have been understood to include walls that are flat but include features such as grooves or recesses. Section VI.F; EX1003, ¶¶294-296.

In modified Nhep, connector 20 includes upper and lower walls spaced apart above and below the MT ferrule along the fiber alignment axis. *Id.* First and second lateral walls are spaced apart on opposite lateral sides of the MT ferrule. *Id.* These walls are all substantially flat because the walls of Nhep are generally flat with features like grooves and recesses. *Id.*



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

In modified Nhep, this arrangement is maintained with the shape being conformed to an MT ferrule with a fiber alignment axis extending as shown, which

would result in a rectangular cross section. EX1003, ¶¶297-298; Sections VI.C, VI.Q.5. Thus, Nhep in view of Watanabe renders obvious claim 21. EX1003, ¶298.

D. Claim 22

Claim 22 is substantively identical to claim 13, except for the reference to the optical fiber connector of claim 17 and reference to the fiber alignment axis, and is obvious for the same reasons discussed above as modified by [17.4].

EX1003, ¶¶299-304; Section VI.M.

E. Claim 27

Claim 27 is identical to claim 25 and is obvious for the reasons discussed above. EX1003, ¶¶305-306; Section VI.O.

T. Claim 28

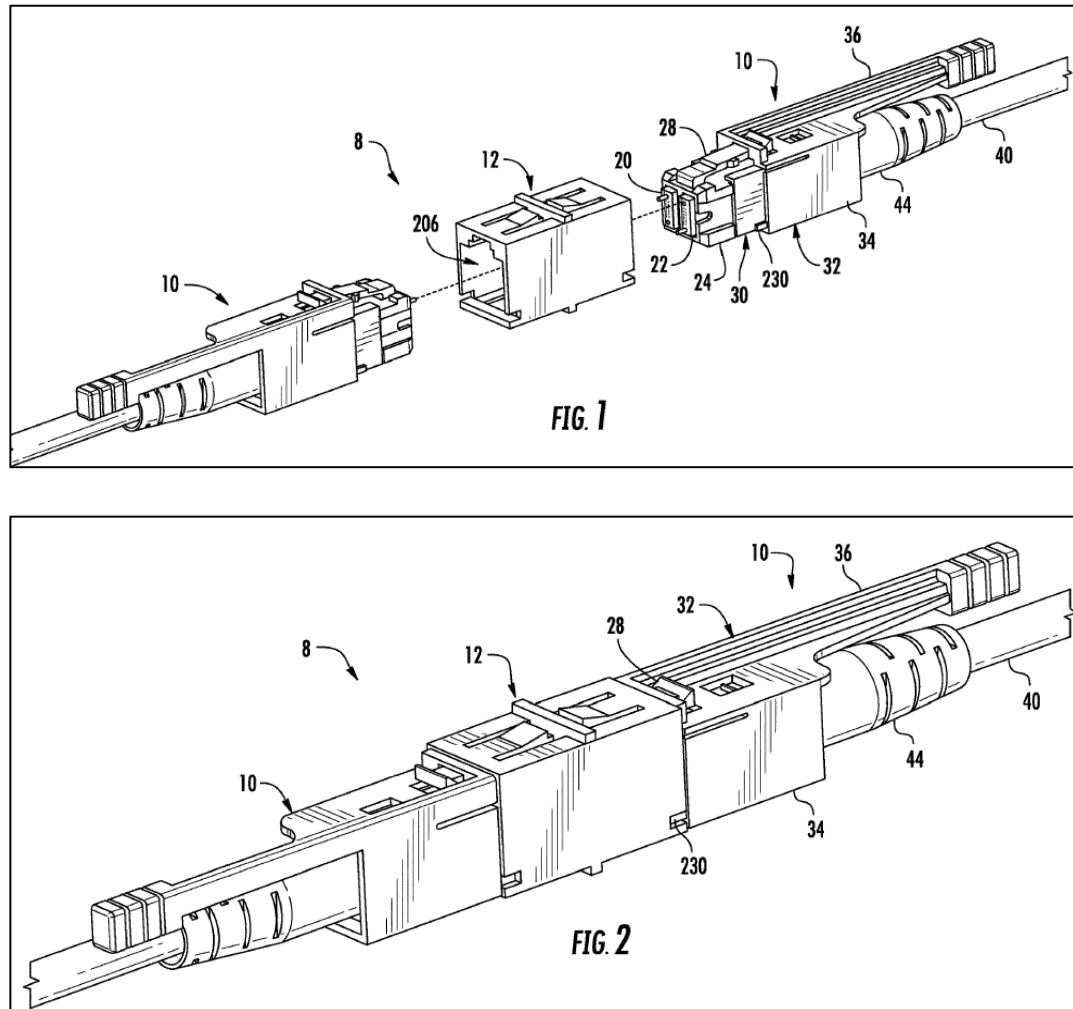
Claim 28 is identical to claim 26 and is obvious for the reasons discussed above. EX1003, ¶¶307-308; Section VI.P.

VII. GROUND 2: NHEP IN VIEW OF WATANABE AND FURTHER IN VIEW OF LIN RENDERS OBVIOUS CLAIMS 5 AND 6

A. Lin

Lin's "disclosure relates generally to fiber optic connectors, and more particularly to fiber optic connectors that include multiple, multi-fiber ferrules, such as MT ferrules." EX1006, ¶2. Lin discloses a fiber optic connector system 8 that includes at least one fiber optic connector 10 and an adapter 12. EX1006, ¶25; EX1003, ¶¶106-108. Figures 1 and 2 of Lin depict the fiber optic connector system

8, wherein two fiber optic connectors 10 are separated from the adapter 12 (FIG. 1) and then connected to the adapter 12 (FIG. 2). EX1003, ¶109.



EX1006, FIGs. 1-2.

Lin's fiber optic connector 10 includes a latch arm 28 that extends outwardly from an inner connector body 24. EX1006, ¶26; EX1003, ¶¶112. Lin discloses a handle 36 that is pulled rearward to depress the latch arm 28 toward the inner connector body 24. EX1006, ¶26. This operation allows the connector 10 to be removed from the adapter 12. EX1006, ¶26; EX1003, ¶¶110-112.

B. Motivation to Combine

In Nhep's connector modified by Watanabe actuation of unlatching the release sleeve 38 is accomplished by a user grasping the outer surface of release sleeve 38 or potentially using a tool to do the same. EX1004, ¶78; EX1001, 2:27-29; EX1003, ¶310; Section VI.C. Being able to grasp requires space to allow a user's fingers access to release sleeve 38 when the connector is in the latched position. EX1003, ¶310. In dense connections, this can lead to overstressing the cables and connected electronics, which can produce latent defects and compromise the integrity and/or reliability of the network performance. *Id.* Furthermore, leaving space to grasp around each connection would result in a reduction in connector spacing density and increase the cost of physical infrastructure. *Id.* The need to optimize connector spacing density would have led a POSITA to search for alternative actuation options for unlatching the Nhep-Watanabe modified connector.

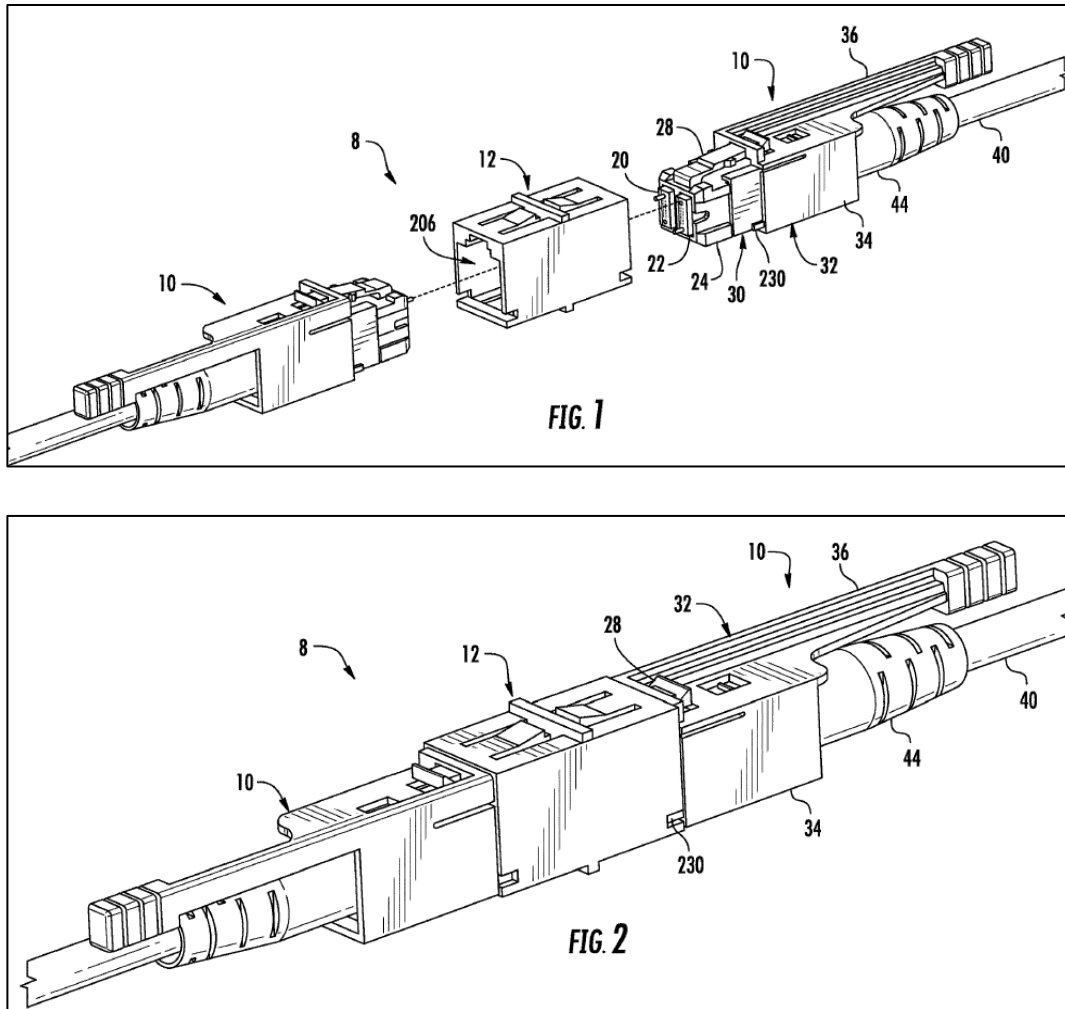
A POSITA would have been motivated to modify the Nhep-Watanabe connector to include a handle structure like Lin's handle 36 that allows for remote actuation of release sleeve 38. EX1003, ¶¶311-313. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance. *Id.* This problem, and the solution of using a remote release, is well known in the art. *Id.*; EX1015, ¶¶2-27.

A POSITA would have had a reasonable expectation of success making this modification. EX1003, ¶314. Specifically, a POSITA would have been able to make such a modification without undue experimentation and would have recognized that doing so would yield predictable results at least because the changes require only basic structural updates that are well within the skill of a POSITA. *Id.*

C. Claim 5

Patent Owner may allege Nhep-Watanabe does not expressly disclose the claimed remote release, but this feature was well known in the prior art, for example, as explicitly taught in Lin. Section VII.A; EX1003, ¶¶315-316.

Lin discloses an actuation technique for a connector similar to the movable release sleeve of Nhep. EX1004, ¶78; EX1003, ¶317. Lin's fiber optic connector 10 includes "a latch arm 28" with that "a handle 36 extending rearwardly from the housing portion 34" that is pulled rearward to "cause the latch arm 28 to flex toward the inner connector body 24." EX1006, ¶¶5, 26; EX1003, ¶317. Lin's handle 36 is a remote release as claimed at least because it allows for remote actuation or release of Lin's connector. EX1003, ¶318.



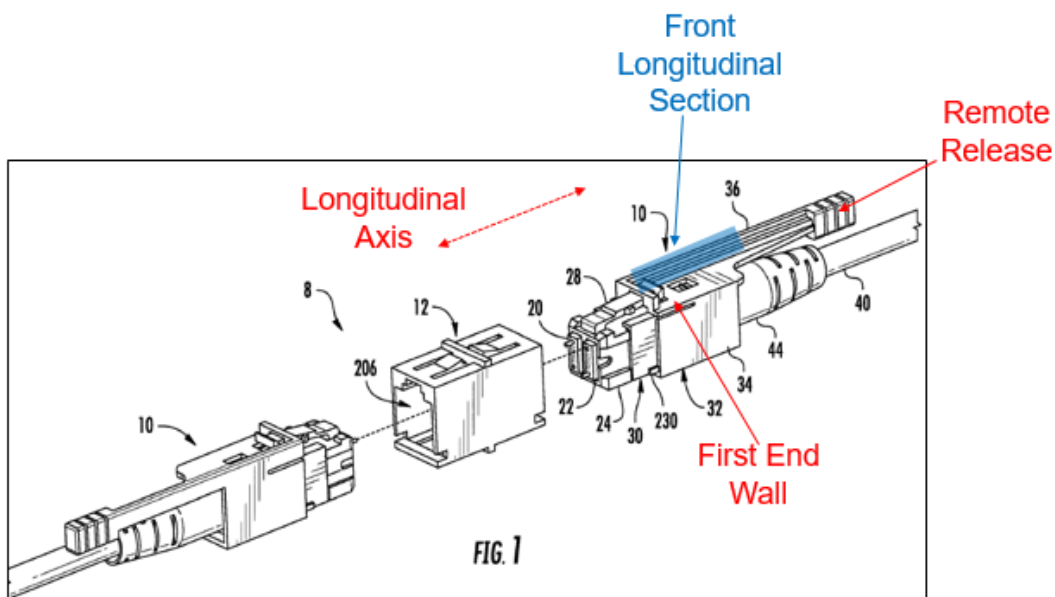
EX1006, FIGs. 1-2.

A POSITA would have been motivated to modify the Nhep-Watanabe connector to include a structure like handle 36 that allows for remote actuation of release sleeve 38. Section VII.B. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance. *Id.*; EX1003, ¶319. A POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a

POSITA. Section VII.B; EX1003, ¶320. Accordingly, Nhep-Watanabe in view of Lin renders obvious claim 5. EX1003, ¶321.

D. Claim 6

The claim term “front longitudinal segment” is not defined in the ’413 patent, but would have been understood as a longitudinally-oriented section of the remote release that is disposed at or near the front of the remote release. EX1003, ¶¶322-325. Lin’s handle 36 has a front longitudinal segment disposed on the equivalent of the first end wall, which is the top wall in the view below. *Id.*



EX1006, FIG. 1 (annotated).

In modifying the Nhep-Watanabe connector to include Lin’s remote release, a POSITA would have included a front longitudinal section connected to the first end wall as taught by Lin for at least two reasons. EX1003, ¶326; Section VII.B. First, a front longitudinal section is a logical structure to extend the remote release

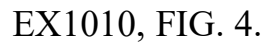
rearwards, and connecting that section to the first end wall allows for positioning the release towards the top of the connector, which is desirable for access to the handle. EX1003, ¶¶326-327. Second, this configuration is shown in Lin, which is being used to provide the structural teachings for this modification. *Id.* Thus, a POSITA would have implemented the same configuration to ensure the modification functions properly. *Id.* Accordingly, Nhep-Watanabe in view of Lin renders obvious claim 6. *Id.*

VIII. GROUND 3: NHEP IN VIEW OF WATANABE AND FURTHER IN VIEW OF COX RENDERS OBVIOUS CLAIM 9

A. Cox

Cox discloses “dense wavelength division multiplexing provided in fiber optic apparatuses and equipment.” EX1010, ¶2. In general, Cox’s systems and methods use “fiber optic assemblies” that connect a “plurality of optical filters [to] facilitate at least a plurality of dense wavelength division multiplexing (DWDM) channels.” EX1010, ¶8; EX1003, ¶¶113-116.

An example of a fiber optic assembly is shown. EX1010, ¶¶39-43. A plurality of “fiber optic components 23” are disposed “through a front side 108 of the main body 102 and configured to receive fiber optic connectors.” EX1010, ¶41. Examples of fiber optic component 23 configurations include “very-small form factor (VSFF) duplex connectors or adapters, such as MDC connectors or adapters (sometimes referred to as “mini duplex connectors”) offered by U.S. Conec Ltd.



Nhep-Watanabe's connector is based on a modified SC-type connector.

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1:51-58; EX1003, ¶337. Therefore, adapting a modified connector design to mate with a known type of connector improves compatibility and marketability of the modified connector design. EX1003, ¶¶337-338.

A POSITA would have been motivated to modify the Nhep-Watanabe connector to be compatible with a variety of standard or otherwise known connector formats, including the SN connector format disclosed by Cox, to improve marketability of the resulting connector. *Id.*

A POSITA would have had a reasonable expectation of success making this modification. *Id.* Specifically, a POSITA would have been able to make such a modification without undue experimentation and would have recognized that doing so would yield predictable results, at least because the changes require only basic structural updates that are well within the skill of a POSITA. *Id.* Redesign of a connector to a known format as taught by Cox is a highly predictable process that would most likely result in a successful connector design. *Id.*

C. Claim 9

Even if not express in Nhep-Watanabe, Cox discloses fiber optic connectors that include “*SN connectors* or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

A POSITA would have been motivated to modify the Nhep-Watanabe connector to an SN configuration to improve compatibility and marketability of the

resulting connector, and the modification would have been well within the skill possessed by a POSITA. Section VIII.B. Accordingly, Nhep-Watanabe further in view of Cox renders obvious Claim 9. EX1003, ¶¶339-343.

IX. GROUND 4: NHEP IN VIEW OF WATANABE AND FURTHER IN VIEW OF APPLICANT ADMITTED PRIOR ART RENDERS OBVIOUS CLAIMS 15, 16, 23, AND 24

A. Applicant Admitted Prior Art (“AAPA”)

The ’413 patent discloses several existing connector formats in its background section. EX1003, ¶¶334-335. For example, the ’413 patent states “[f]or example, one current footprint is known as the small form-factor pluggable transceiver footprint (SFP). This footprint currently accommodates two LC-type ferrule optical connections.” EX1001, 1:58-61. The ’413 patent’s background section also states “[a]nother current footprint is the quad small form-factor pluggable (QSFP) transceiver footprint. This footprint currently accommodates four LC-type ferrule optical connections.” EX1001, 1:63-67; EX1003, ¶335.

B. Motivation to Combine

A POSITA would have been motivated to modify the Nhep-Watanabe connector to fit into a small-form factor pluggable transceiver footprint configuration to improve compatibility and marketability based on the AAPA. EX1003, ¶346. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector. *Id.* The requirement that there are two connectors in claims 15/23 or four connectors

in claims 16/24 are obvious for at least two reasons. First, in view of the AAPA disclosure in the '413 patent, which specifically discusses two or four connectors. EX1001, 1:58-67; EX1003, ¶346. Second, adding additional connectors is a simple duplication of parts. EX1003, ¶346. A POSITA would have had a reasonable expectation of success making this modification because the structural changes needed were well within the skill of a POSITA. *Id.*

C. Claim 15

A POSITA would have been motivated to modify the Nhep-Watanabe connector to fit into the small-form factor configuration taught by the '413 patent to improve compatibility and marketability. EX1001, 1:58-67; Section IX.A; EX1003, ¶¶347-350. The requirement that there be two connectors in claim 15 is equally obvious in view of the AAPA disclosure in the '413 patent explaining the dual connector nature of this footprint. EX1003, ¶¶347-350; EX1001, 1:58-67. Accordingly, Nhep and Watanabe further in view of the AAPA render obvious claim 15. EX1003, ¶350.

D. Claim 16

A POSITA would have been motivated to modify the Nhep-Watanabe connector to fit into a quad small-form factor configuration as taught by the '413 patent to improve compatibility and marketability. EX1001, 1:58-67; Section IX.A; EX1003, ¶¶351-354. The requirement that there be four connectors in claim

16 is equally obvious in view of the AAPA disclosure in the '413 patent explaining the four-connector nature of this footprint. EX1001, 1:58-67. Accordingly, Nhep and Watanabe further in view of the AAPA render obvious claim 16. EX1003, ¶354.

E. Claim 23

This claim is substantively identical to claim 15 and is obvious for the same reasons. EX1003, ¶¶355-356; Section IX.C.

F. Claim 24

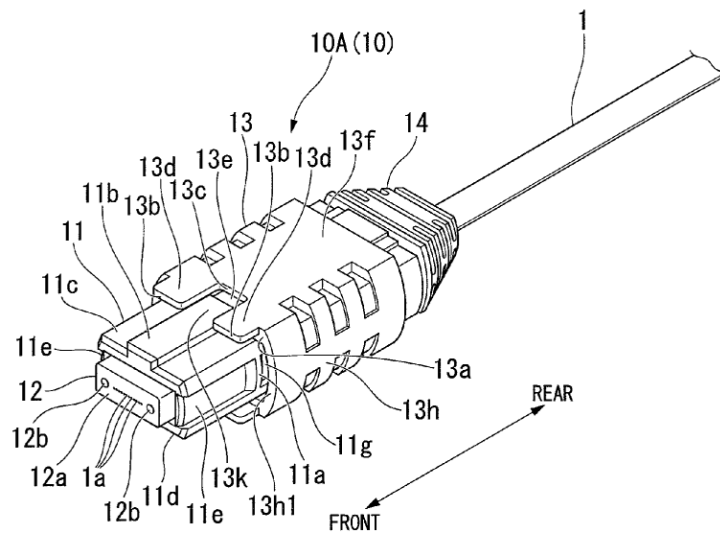
This claim is substantively identical to claim 16 and is obvious for the same reasons. EX1003, ¶¶357-358; Section IX.D.

X. GROUND 5: KATOH IN VIEW OF KUFFEL RENDERS OBVIOUS CLAIMS 1-4, 7, 8, 10-14, 17-22, 25-28

A. Katoh

Like the '413 patent, Katoh “relates to an optical connector.” EX1011, ¶117-119; EX1003, ¶¶. Figure 1A below shows an example of Katoh’s “optical connector 10.” EX1011, ¶¶74-76, FIGs. 1A-1B. Katoh notes that connector 10 has “the same configuration as an optical connector 50 (see FIGS. 19 and 20) to be described later which is a standardized MPO type optical connector.” EX1011, ¶¶74-79; EX1003, ¶119

FIG. 1A



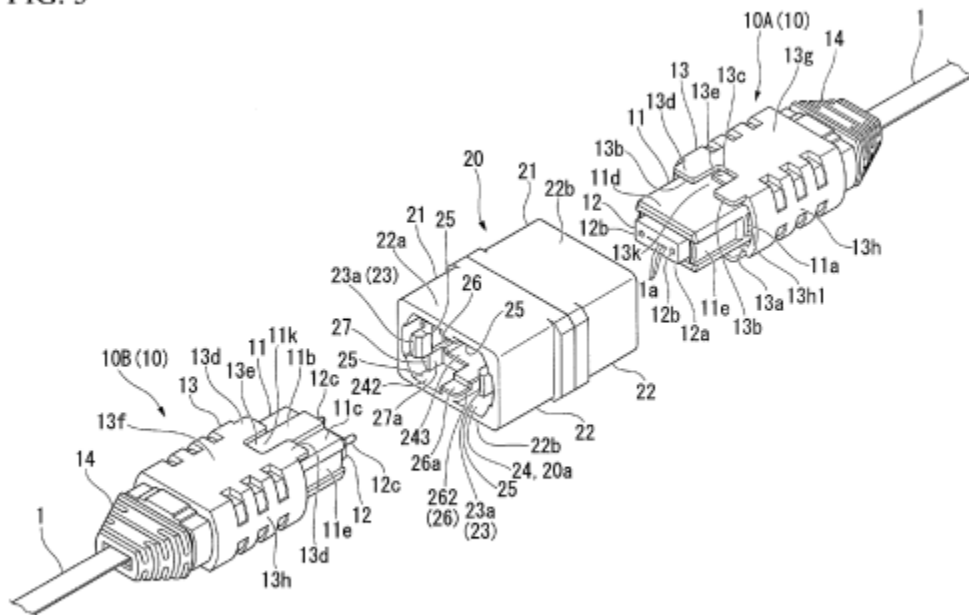
EX1011, FIG. 1A.

In optical connector 10, “the ferrule 12 [is] attached to an end of an optical fiber 1 [] received in an end (front end) of the sleeve-like housing 11.” EX1011, ¶79. “A spring 15 (see FIG. 5) elastically impel[s] the ferrule 12 to the front side of the connector.” EX1011, ¶80. Katoh explains “[t]he ferrule 12 employs an MT type optical connector.” EX1011, ¶89; EX1003, ¶120.

Katoh’s “housing 11 is inserted into the coupling [13],” with coupling 13 free to slide in the front to rear direction with respect to housing 11. EX1011, ¶¶118-144; EX1003, ¶121. Coupling 13 “can be manually moved to slide against the elastic impelling force of the coupling spring from the front movement limit position to the connector rear side relative to the housing 11.” EX1011, ¶¶135, 143.

Latching of Katoh's connector 10 into an adapter (such as adapter 20 below) is accomplished when “the end portions (the protruding claws 23a) of the elastic engagement pieces 23 go over the engagement protrusions 11a and go into the connector rear side (an engaging recessed portion 11g) of the engagement protrusions 11a.” EX1011, ¶193. This process involves coupling 13 first “slid[ing] back to the connector rear side” as the latch arms (engagement pieces 23) slide over engagement protrusion 11a, followed by “coupling 13 mov[ing] to the front movement limit position by means of the elastic impelling force of the coupling spring.” EX1011, ¶194; EX1003, ¶122.

FIG. 3



EX1011, FIG. 3.

Unlatching connector 10 is accomplished by “moving the coupling 13 to the connector rear side...detach[ing] the elastic engagement pieces.” EX1011, ¶226. Thus, rearward movement of coupling 13 with respect to housing 11 is the mechanism that allows for latching and unlatching of connector 10. EX1003, ¶123.

Housing 11 also includes “a reverse-insertion preventing key 11b protruding from the outer circumferential surface of the housing 11” that is configured to be received by a “key groove 24b formed in the inner surface” of the adapter. EX1011, ¶161. This key 11b is a type of polarity key because it prevents the connector from latching in the wrong orientation. EX1003, ¶124.

B. Kuffel

Kuffel “relates generally to communication connectors, and more particularly, to an optical communication connector having a configurable polarity and/or gender.” EX1012, ¶1. Kuffel assumes the use of “MPO” type connectors. EX1012, ¶¶36-39; EX1003, ¶. Kuffel focuses on improving efficiency of converting existing fiber optic networks to updated connectors (such as MPO connectors) in the field instead of during connector manufacturing. EX1012, ¶¶2-6; EX1003, ¶¶125-127. One aspect of Kuffel’s disclosure “relates to changing the polarity of a connector” in the field to facilitate network assembly. EX1012, ¶¶10-11. An example connector 300 shown below includes a “polarity key 800.” EX1012, ¶¶59-62; EX1003, ¶127.

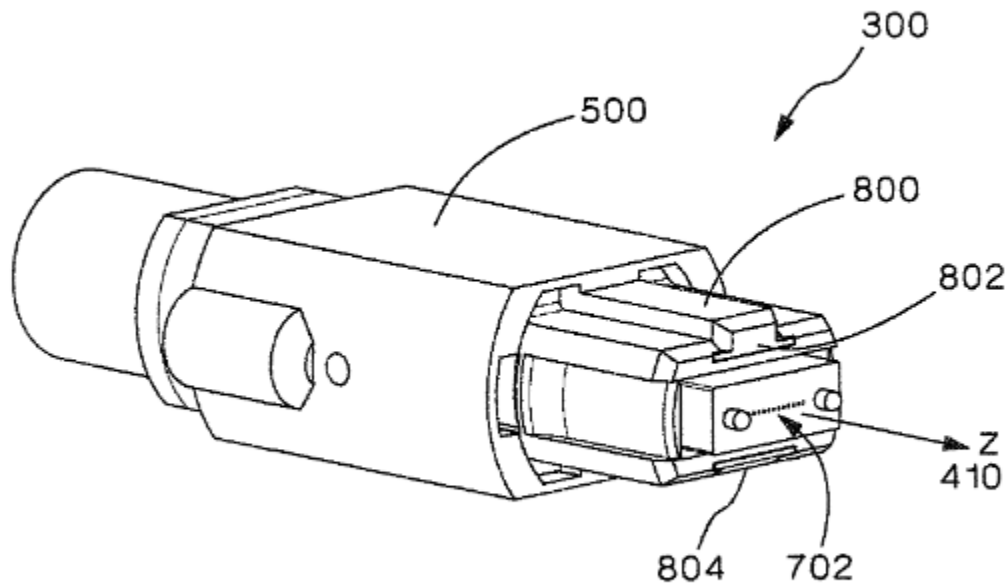


FIG. 13

EX1012, FIG. 13.

In Kuffel's connector 300 "polarity key 800 is integrated into the outer housing 500. For example, the outer housing 500 may have the polarity key 800 integrally formed therein." EX1012, ¶62; EX1003, ¶128. "[T]he polarity of the connector 300 is reversed by removing and rotating the outer housing 500 180-degrees around the z-axis 410 of the ferrule 600 and reinstalling the outer housing 500 into the assembly 400." EX1012, ¶64. Figure 14 shows outer housing 500 with key 800 having been removed from connector 300 prior to rotation and reinstallation. EX1003, ¶¶128-129.

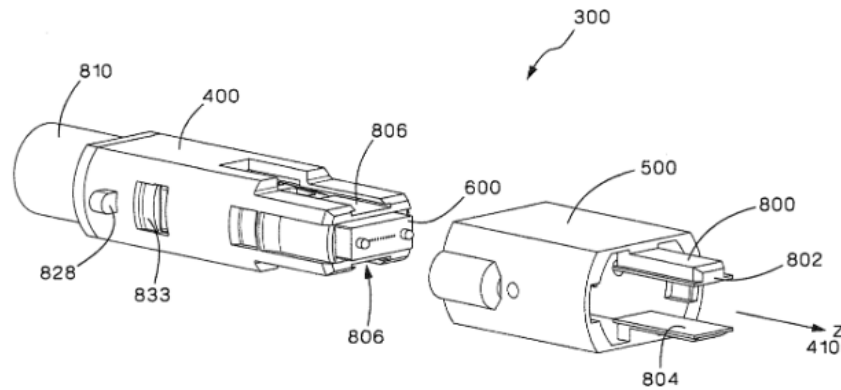


FIG. 14

EX1012, FIG. 14.

C. Motivation to Combine

A POSITA would have found it obvious to modify Katoh's connector 10 to include a swappable outer housing to allow for connector polarity swapping in the field, as taught by Kuffel. EX1003, ¶¶365. Kuffel provides a known motivation to make this modification: that different polarities are needed to define different connector types to complete a fiber optic cable network. EX1012, ¶¶58-60; EX1003, ¶365. Katoh and Kuffel both disclose MPO-type connectors that have slidable outer housings disposed around an inner housing that holds the ferrule. EX1003, ¶¶365-366. This means that the polarity motivation in Kuffel applies to Katoh, and also means that the modifications needed to be made to Katoh are straightforward in nature. *Id.*

This modification could be accomplished, for example, by modifying Katoh's key 11b to be integrated with Katoh's coupling 13 (Katoh's equivalent of Kuffel's outer housing), as taught in Kuffel. EX1012, ¶¶62-64, FIGs. 13-14; EX1003, ¶366.

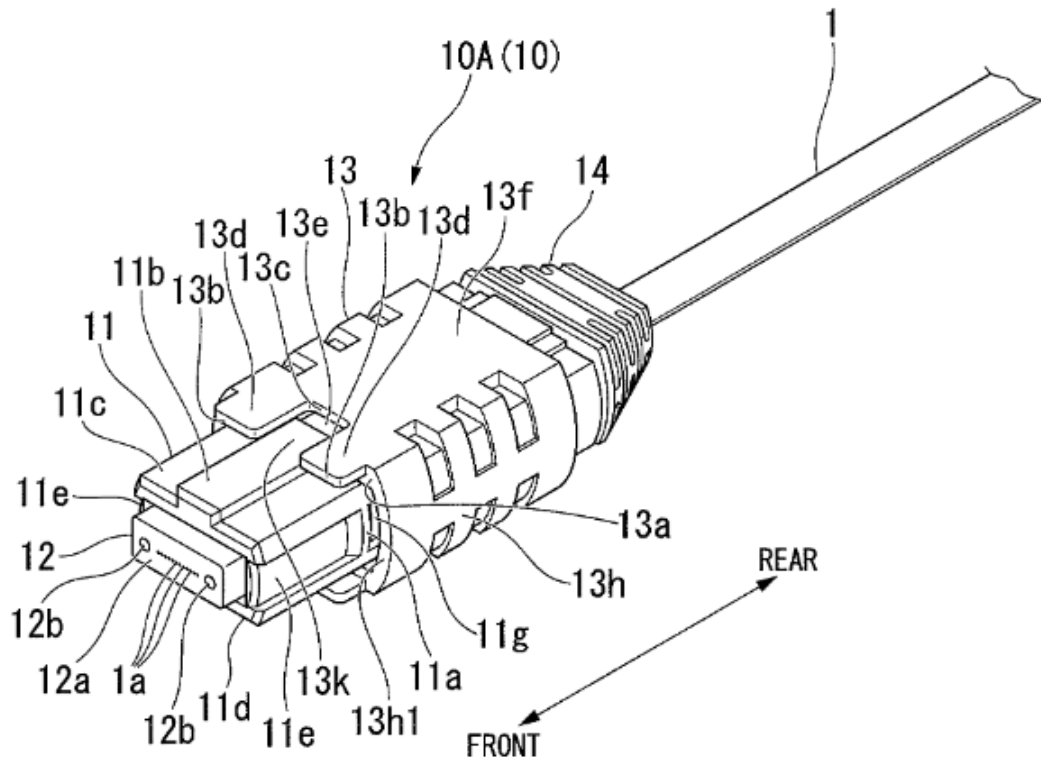
In making this modification, a POSITA would have also found it obvious to modify Katoh's coupling 13 to include an integrated polarity key positioned on one of the short walls of Katoh's rectangular connector for at least two reasons. EX1003, ¶¶367-370. First, this arrangement maximizes connector density by placing the polarity key on the walls typically oriented towards the unused space in typical fiber optic equipment. *Id.* Per this modification, the structure needed to accommodate the groove (key groove 24) in the equipment receptacle will be placed above and below the connector after this modification, which is where the unused space is located. *Id.*

Second, positioning the polarity key on one of the short walls of Katoh's connector is obvious as a matter of being obvious to try. Here, there are only four possible walls for polarity key placement with respect to Katoh's connector. *Id.* Thus, the positioning of the polarity key on one of the short walls would have been obvious as a matter to try. *Id.*

Patent Owner may argue that positioning the polarity key on one of the short walls of Katoh's connector may interfere with the latching mechanism of Katoh.

Id. This is incorrect because a POSITA would have been able to make basic structural modifications to accommodate both the latching features and the polarity key on the same wall. *Id.*

FIG. 1A



EX1011, FIG. 1A.

A POSITA would have had a reasonable expectation of success making this modification. EX1003, ¶369. Specifically, a POSITA would have been able to make such a modification without undue experimentation and would have recognized that doing so would yield predictable results at least because the

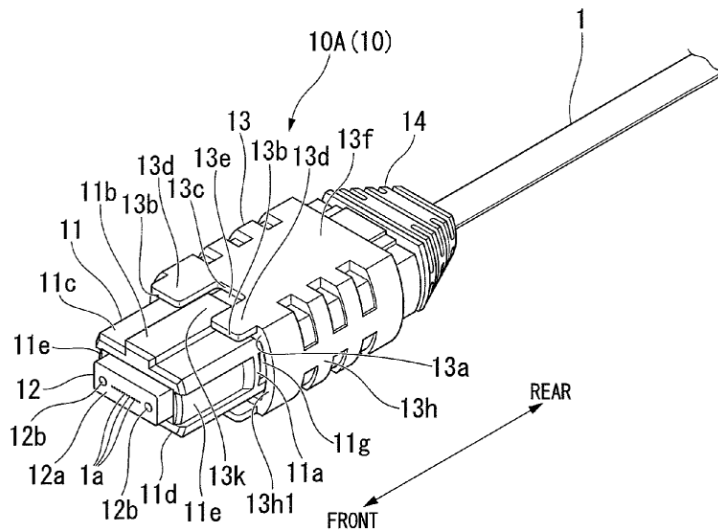
changes require only basic structural updates that are well within the skill of a POSITA. *Id.*

D. Claim 1

1. Preamble

Katoh discloses an “optical connector 10” that is based on an “MPO type” fiber optic connector. EX1011, ¶¶ 74-79, FIGs. 1A-1B; EX1003, ¶¶ 371-375.

FIG. 1A



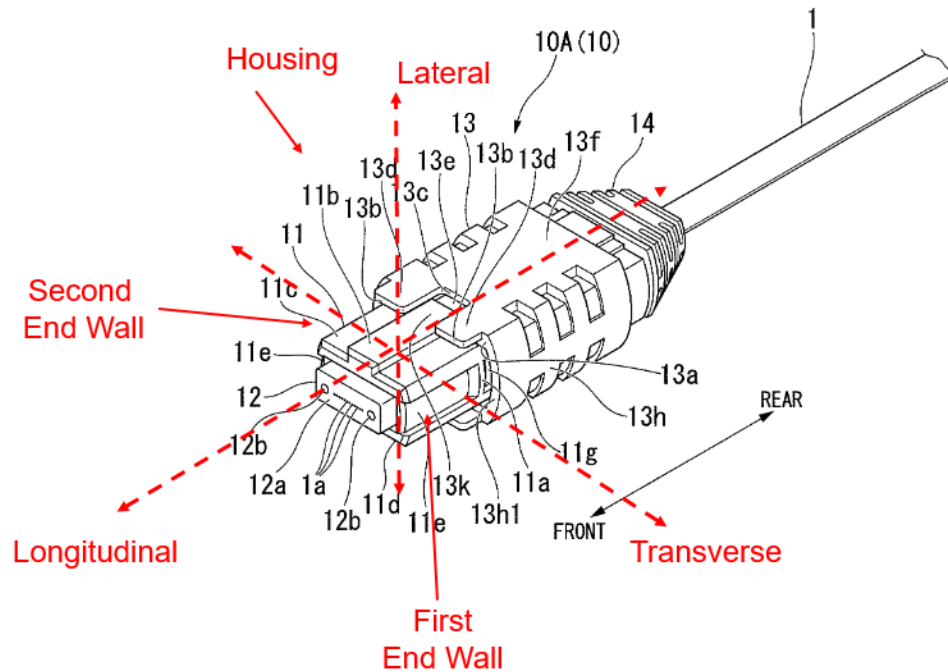
EX1011, FIG. 1A.

Thus, Katoh discloses the preamble of claim 1. EX1003, ¶375.

2. [1.1]

Katoh discloses a housing as claimed in the combination of housing 11 and coupling 13, and corresponding supporting elements. EX1011, ¶¶ 76-81; EX1003, ¶¶ 376-377. The annotation shows a longitudinal axis and front and rear ends as

FIG. 1A



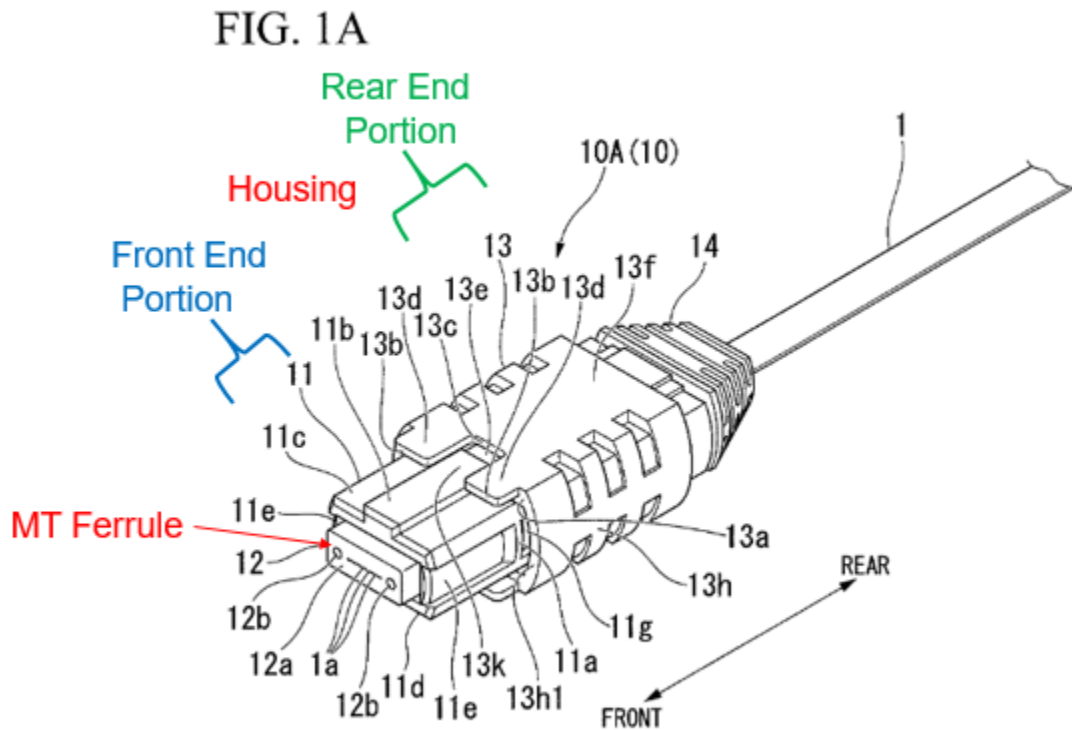
EX1011, FIG. 1A (annotated).

4. [1.3]

Katoh's housing includes first and second side walls as claimed. EX1003, ¶¶386-387. Here, the definition of the transverse and longitudinal axes defines the lateral axis, which must be perpendicular to those axes. *Id.* Thus, Katoh discloses [1.3].

configuration is seen, where MT ferrule 12 extends through the front-end portion.

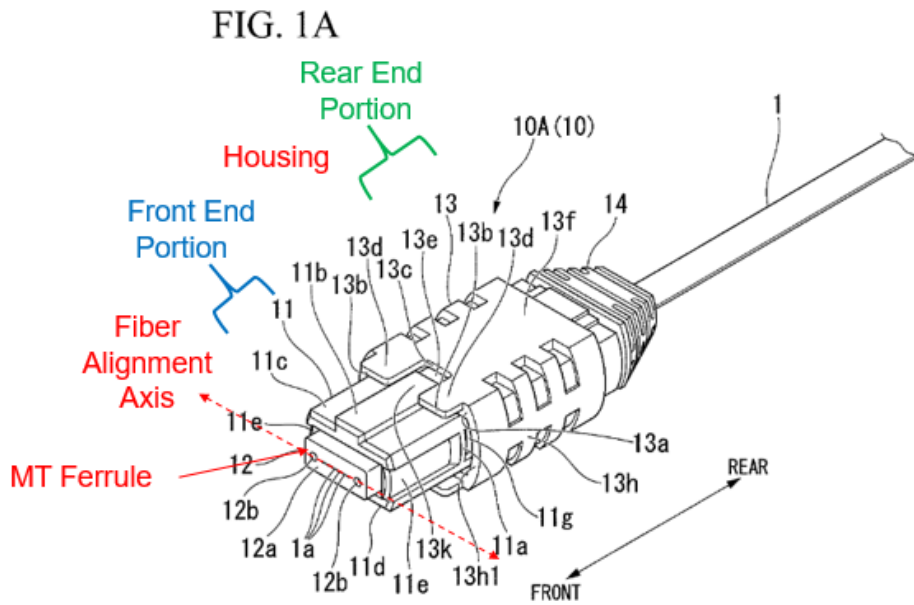
EX1003, ¶¶388-389. Thus, Katoh discloses element [1.4]. *Id.*



EX1011, FIG. 1A (annotated).

6. [1.5]

Katoh explains its MT ferrule 12 can be “a 12-core MT type optical connector” where “[t]he ends of the bare optical fibers 1a exposed from the end face 12a of the ferrule 12 are arranged in a line in the spacing direction of the pair of guide pin holes 12b.” EX1011, ¶¶89, 95, 96. Optical fibers 1a are arranged in a row that is parallel to the fiber alignment axis. EX1003, ¶¶390-393. Thus, Katoh discloses element [1.5]. *Id.*



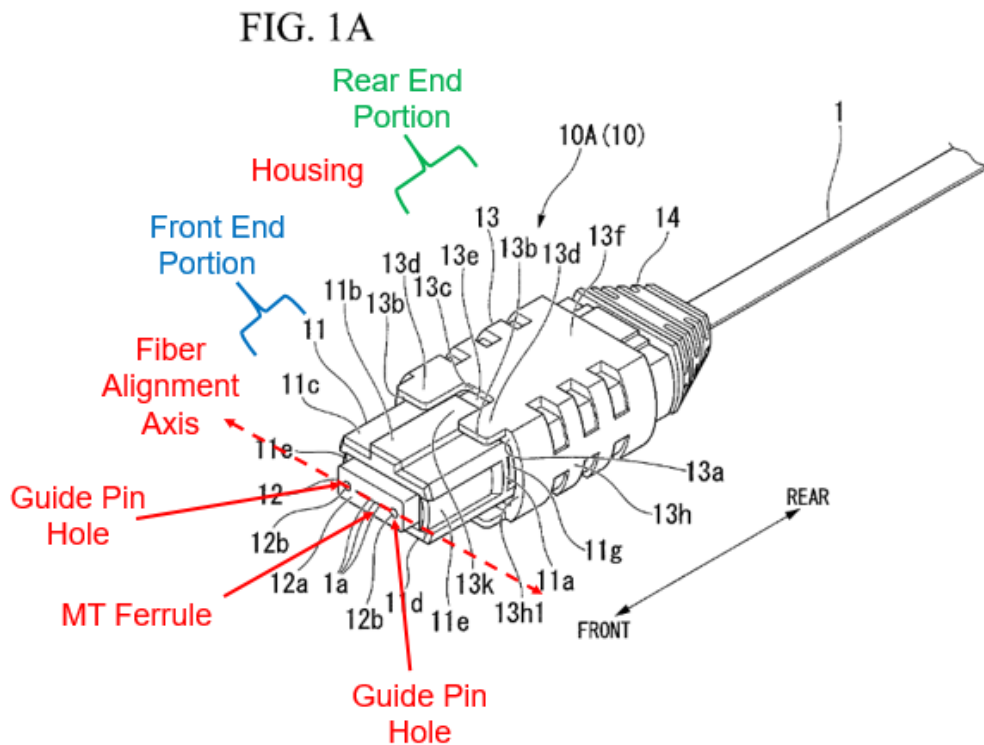
EX1011, FIG. 1A (annotated).

7. [1.6]

Katoh discloses that “a pair of *guide pin holes 12b* passing through the ferrule 12 from front to rear is formed at both end portions” of the MT ferrule and “the bare optical fibers 1a exposed from the end face 12a of the ferrule 12 are arranged in a line in the spacing direction of the pair of guide pin holes 12b.”

EX1011, ¶¶94, 96; EX1011, ¶¶95, 99. Thus, Katoh discloses element [1.6].

EX1003, ¶¶394-396.



EX1011, FIG. 1A (annotated).

8. [1.7]

Katoh discloses “a reverse-insertion preventing key 11b protruding from the outer circumferential surface of the housing 11” that is configured to be received by a “key groove 24b formed in the inner surface” of the adapter. EX1011, ¶161. Key 11b is a polarity key as claimed because it acts to prevent incorrect orientations of connector 10 when latched. EX1003, ¶¶397-398.

Patent Owner may argue that in Katoh, key 11b is not oriented on the first end wall as claimed.

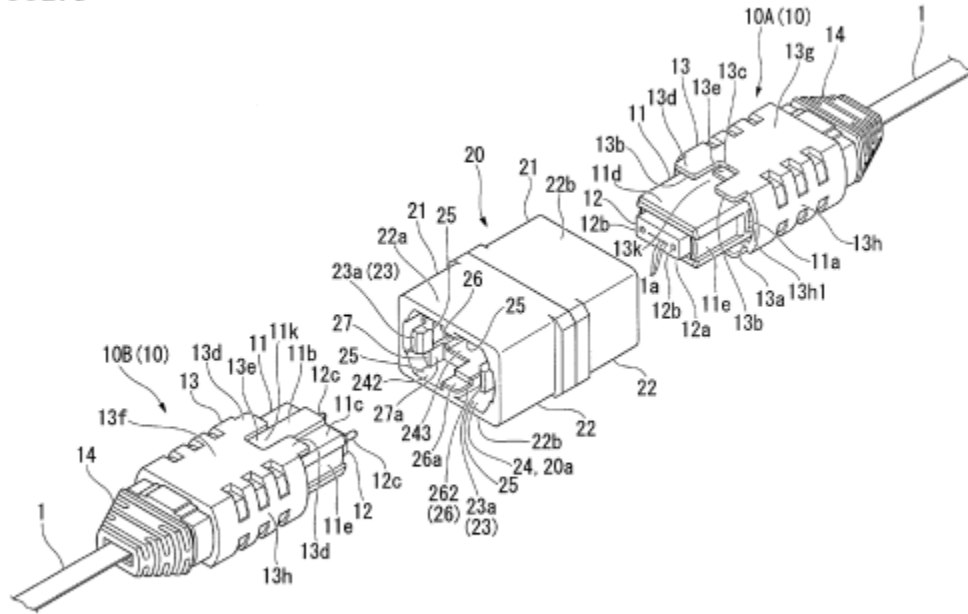
However, a POSITA would have been motivated to modify Katoh to integrate key 11b with coupling 13 in view of Kuffel's teachings. Section X.C. In making this modification, a POSITA would have also found it obvious to modify Katoh's coupling 13 to include an integrated polarity key positioned on Katoh's first end wall for at least two reasons. Section X.C.; EX1003, ¶¶399-401. First, this arrangement maximizes connector density by placing the polarity key on the walls typically oriented towards the unused space in typical fiber optic equipment. Section X.C; EX1003, ¶¶399-401. Second, the positioning of the polarity key on the first end wall is obvious to try due to the finite number of predictable places for the polarity key. Section X.C; EX1003, ¶¶399-401.

A POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a POSITA. Section X.C; EX1003, ¶¶399-401. Thus, Katoh in view of Kuffel renders obvious claim element [1.7]. EX1003, ¶¶399-401.

9. [1.8]

The lateral dimension of the end walls is less than the transverse dimension of the side walls. EX1003, ¶¶402-404. Thus, Katoh discloses element [1.8]. *Id.*

FIG. 3

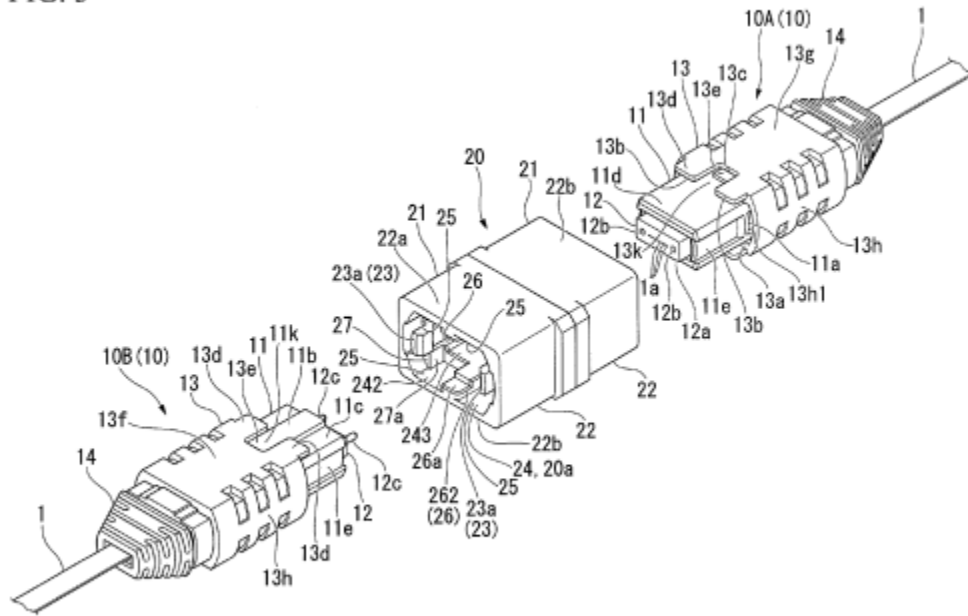


EX1011, FIG. 3.

11. [1.10]

Katoh's "housing 11 is inserted into the coupling [13]," which can slide in the front to rear direction with respect to housing 11. EX1011, ¶¶118-144; Section X.A; EX1003, ¶¶408-410.

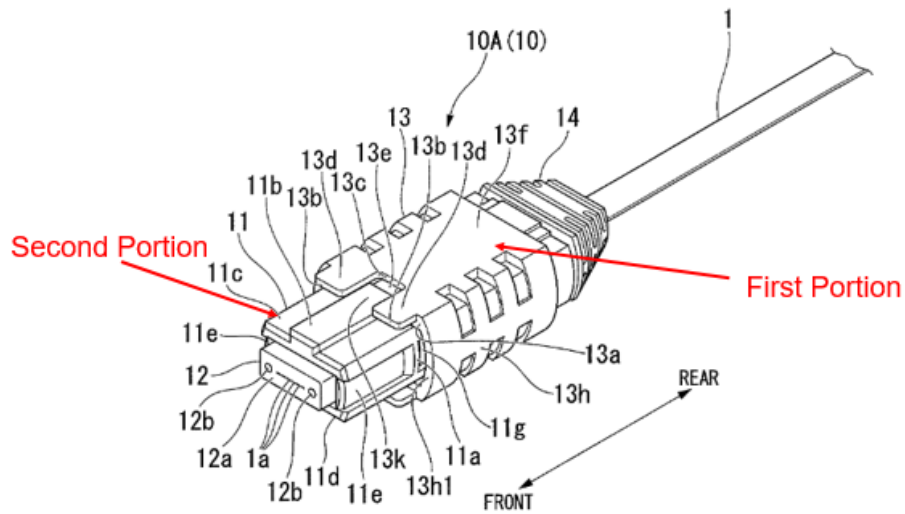
FIG. 3



EX1011, FIG. 3.

Unlatching connector 10 is accomplished by “moving the coupling 13 to the connector rear side [which] detach[es] the elastic engagement pieces.” EX1011, ¶226; EX1003, ¶411. This ejects the latches from the connector allowing connector 10 to be removed from the adapter. EX1003, ¶¶411-412. Thus, rearwards movement of coupling 13 (the claimed first portion) with respect to housing 11 (the claimed second portion) allows for unlatching of connector 10. *Id.* Thus, Katoh discloses element [1.10]. *Id.*

FIG. 1A



EX1011, FIG. 1A (annotated).

12. [1.11]

Patent Owner may argue that the displacing of the first portion of Katoh does not result in displacing the polarity key rearward relative to the MT ferrule as claimed.

It would have been obvious to modify Katoh in view of Kuffel to integrate Katoh's key 11b into coupling 13. Section X.C. This modification allows the polarity of Katoh's connector 10 to be changed in the field, which improves installation efficiency and connector flexibility. EX1003, ¶¶413-415. A POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a POSITA. *Id.*; Section X.C.

Integrating key 11b with coupling 13 in Katoh per this modification means that when coupling 13 is pulled rearwards to unlatch connector 10, key 11b also moves rearward with respect to the remainder of connector 10, including the MT ferrule. EX1003, ¶¶416-419. Below is a hypothetical figure showing one example of the Katoh-Kuffel connector with the integrated polarity key on one of the end walls. *Id.* Thus, Katoh in view of Kuffel renders obvious claim element [1.11]. *Id.*

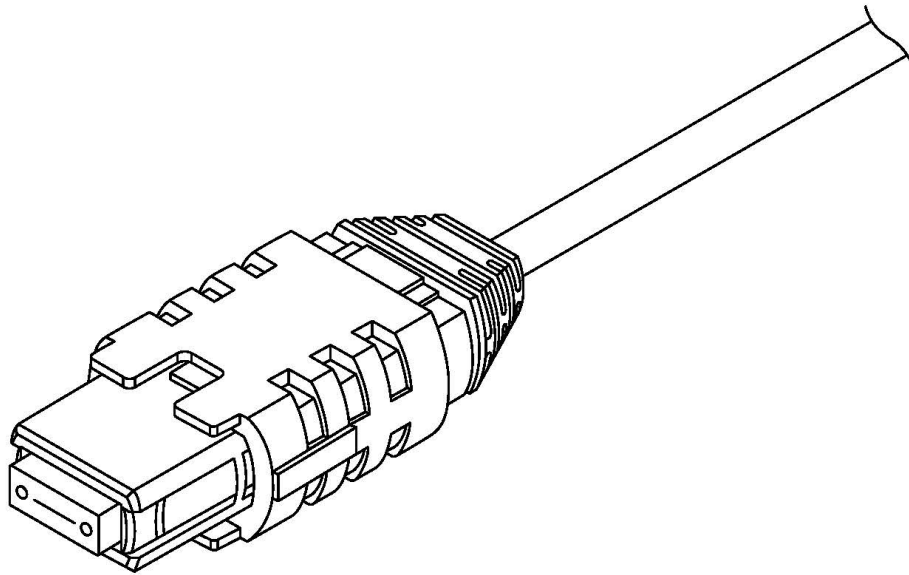


FIG. 1A

EX1011, FIG. 1A (as modified with Kuffel).

E. Claim 2

Katoh only mentions a single key 11b, and thus does not disclose a second polarity key anywhere on the connector. EX1003, ¶¶420-22. As Dr. Brennan explains, the figures show all four walls of Katoh's connector, meaning that an additional key 11b would be visible if one was present. *Id.* In Katoh-Kuffel, there

would therefore be no reason to add an additional polarity key to the second end wall. *Id.* Accordingly, Katoh-Kuffel renders obvious claim 2. *Id.*; Section X.C.

FIG. 1A

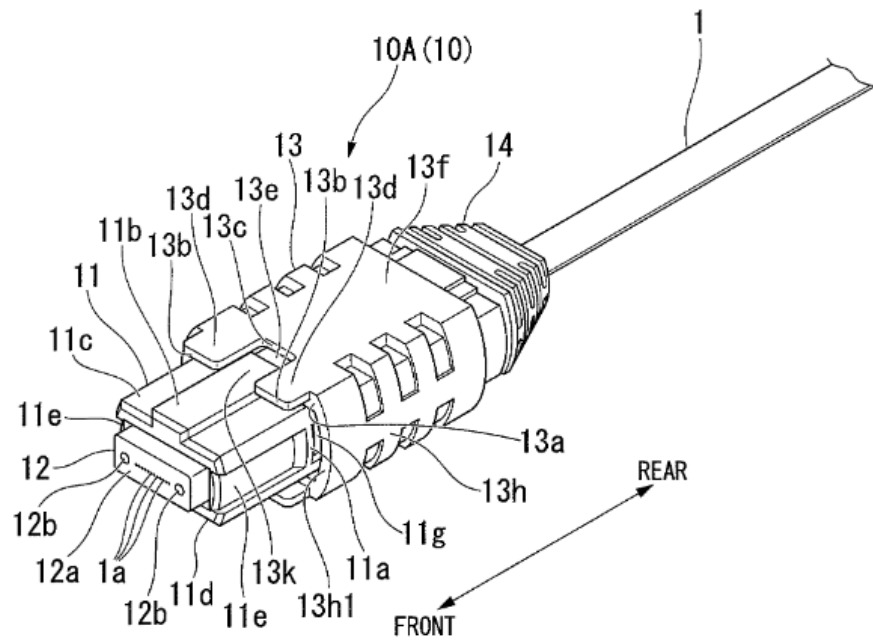
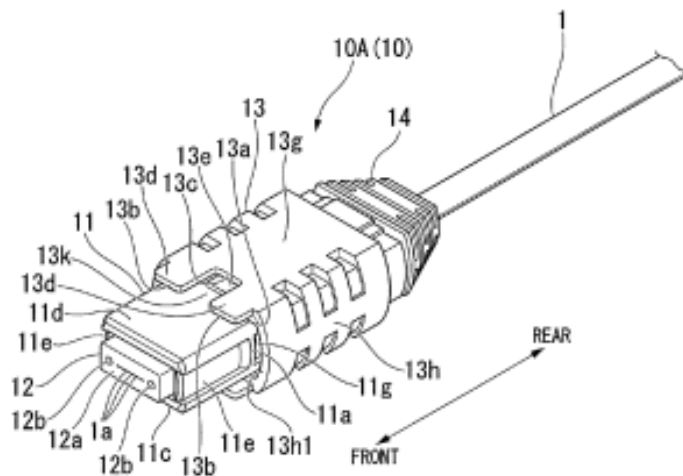


FIG. 1B



EX1011, FIGs. 1A, 1B.

F. Claim 3

The Katoh-Kuffel connector's side walls are “substantially flat” as claimed per the understanding of this term discussed above in Section VI.F. EX1003, ¶¶423-427. Specifically, the Katoh-Kuffel side walls are generally flat. *Id.* Below is an example of the Katoh-Kuffel connector showing the substantially flat side walls. *Id.* Accordingly, Katoh in view of Kuffel renders obvious claim 3. *Id.*; Section X.C.

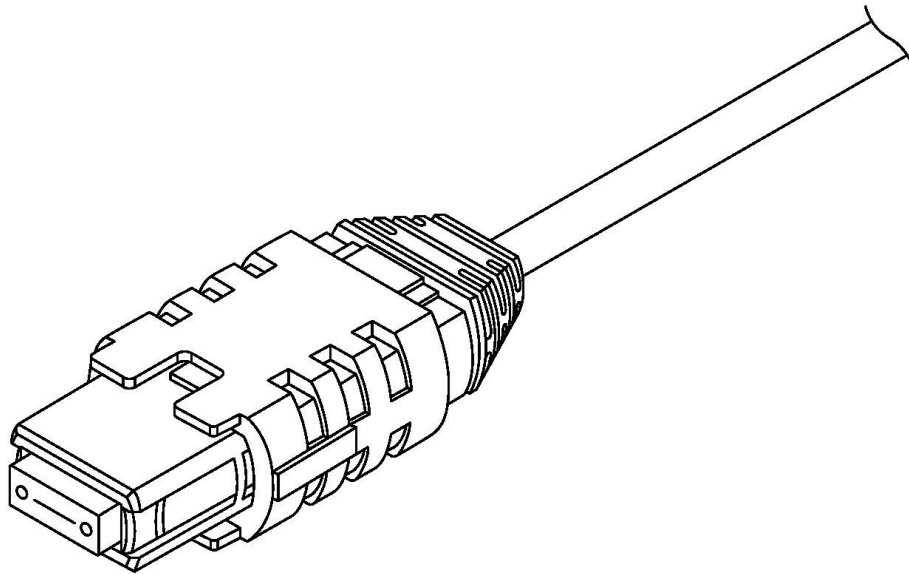


FIG. 1A

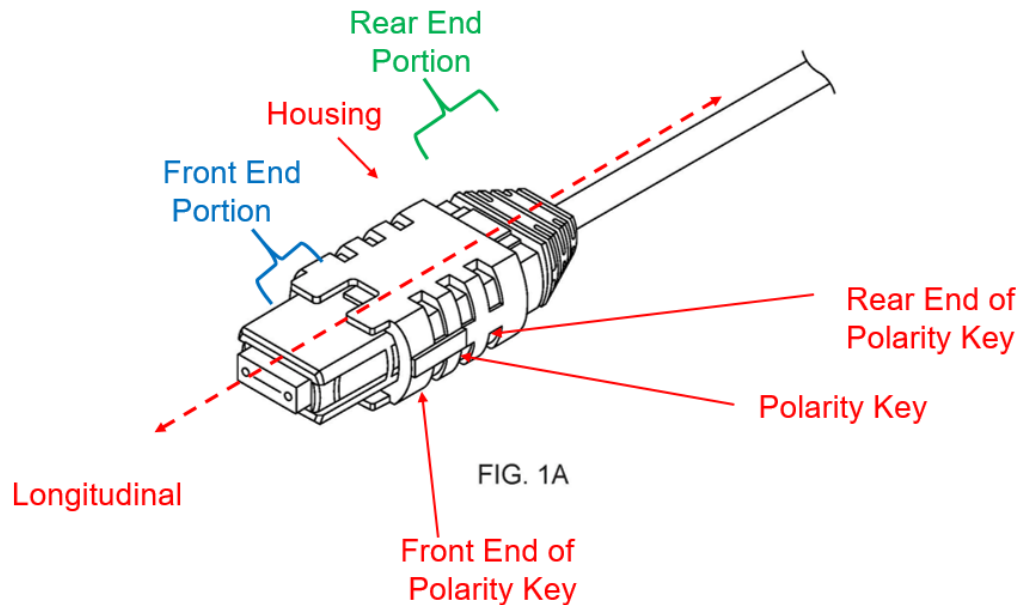
Example of Katoh-Kuffel Connector

G. Claim 4

This claim requires that the polarity key extend in a direction spanning from a rear end towards a front end. EX1003, ¶¶428-430. The example Katoh-Kuffel

connector includes a polarity key that extends in the claimed direction and having the claimed front and rear ends. *Id.*

Accordingly, Katoh-Kuffel renders obvious claim 4. *Id.*; Section X.C.

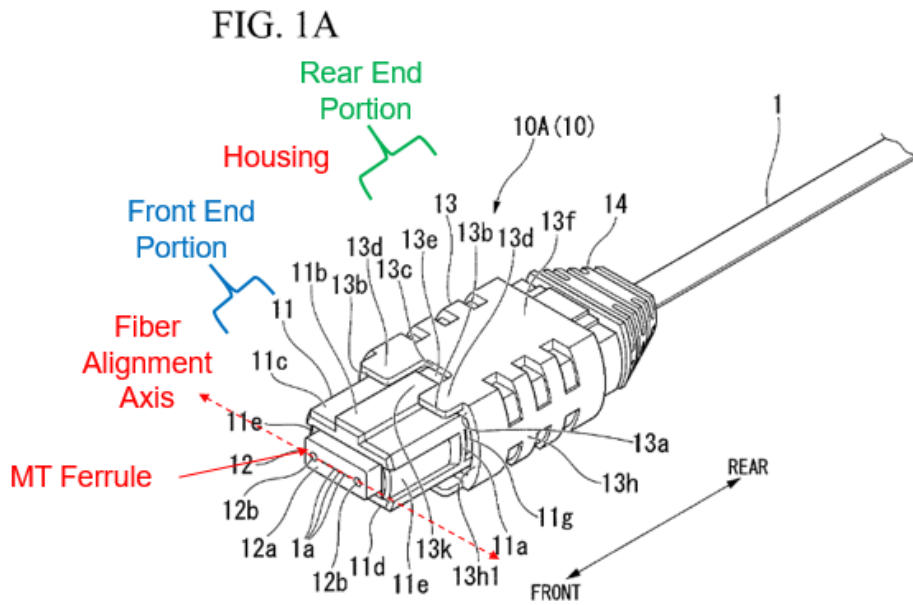


Example of Katoh-Kuffel Connector

H. Claim 7

Katoh discloses “a boot 14 that is attached to a rear-end portion opposite to the front-end portion of the housing 11 in which the ferrule 12 is disposed.”

EX1011, ¶81. A POSITA would have understood that boot 14 is a “strain relief boot” as claimed because of the use of similar, known terminology (boot), as well as the similarities between boot 14 and the strain relief boot shown in, for example, the ’413 patent’s Figure 18B . EX1003, ¶¶431-435. Accordingly, Katoh in view of Kuffel renders obvious claim 7. *Id.*; Section X.C.

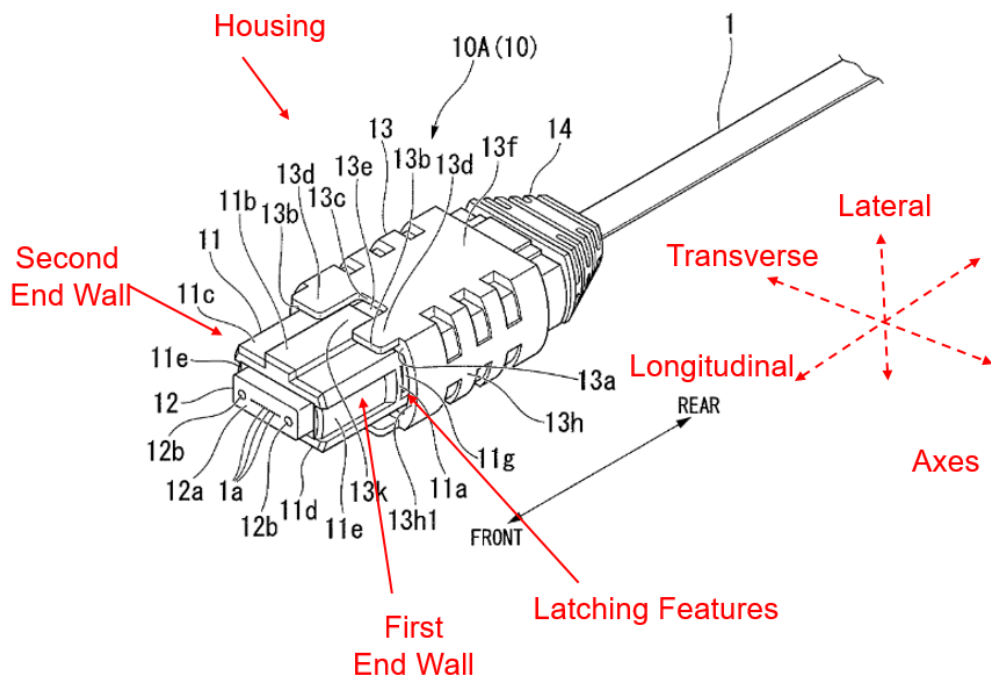


EX1011, FIG. 1A (annotated).

J. Claim 10

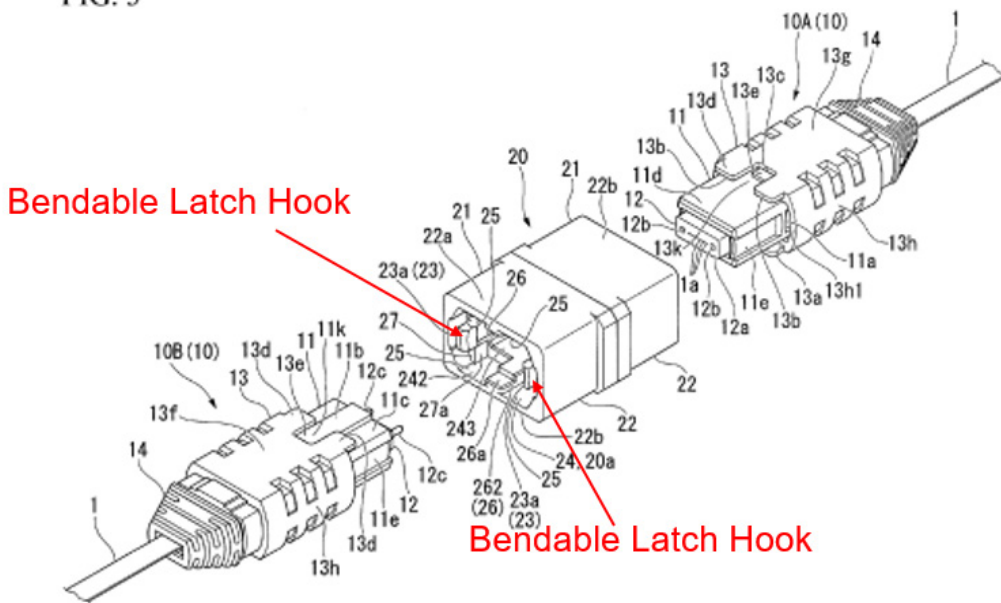
In Katoh, “the end portions (the protruding claws 23a) of the elastic engagement pieces 23 go over the engagement protrusions 11a and go into the connector rear side (an engaging recessed portion 11g) of the engagement protrusions 11a.” EX1011, ¶¶192-194; Section X.A. Thus, at least engagement protrusion 11a and engaging recessed portion 11g are “latching features” as claimed. EX1003, ¶¶439-442. These features are positioned along both the first and second end walls. *Id.* Accordingly, Katoh in view of Kuffel renders obvious claim 10. *Id.*

FIG. 1A



EX1011, FIG. 1A (annotated).

FIG. 3

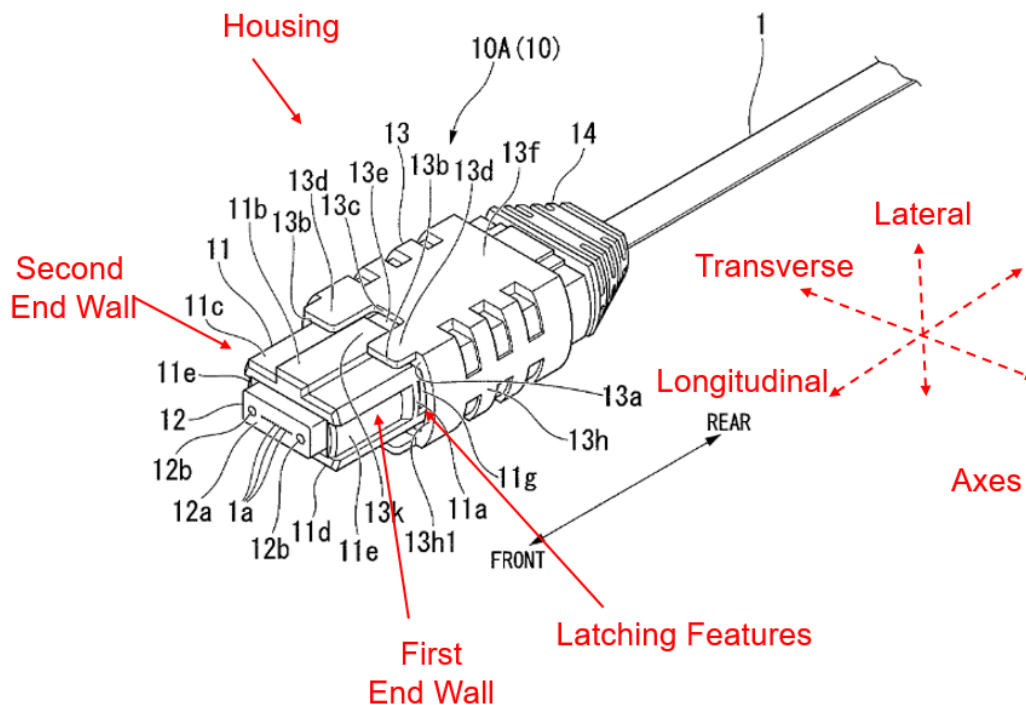


EX1011, FIG. 3 (annotated).

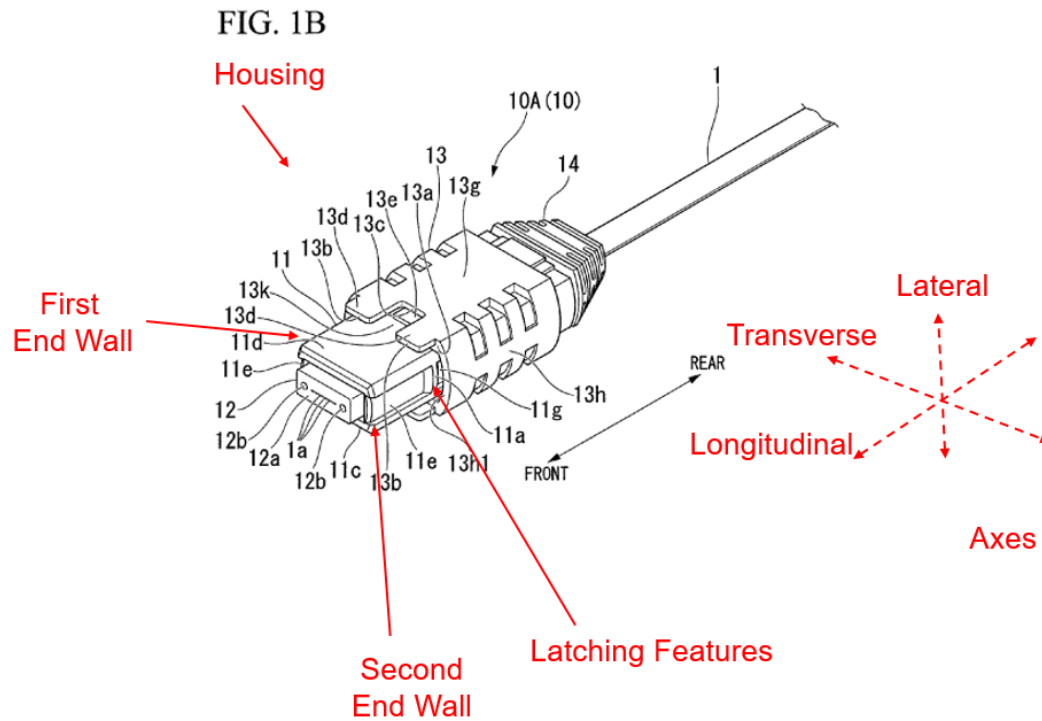
L. Claim 12

Claim 12 is substantively similar to claim 11, but recites first and second latch recesses for each end wall, respectively. EX1003, ¶¶448-449. Katoh discloses two paired latch recesses (recessed portion 11g) that correspond to each of end portions (the protruding claws 23a) of the elastic engagement pieces 23. *Id.*; Section X.K; EX1011, ¶¶193-194. These latching features can be seen. EX1003, ¶¶450-451. Accordingly, Katoh in view of Kuffel renders obvious claim 12. *Id.*

FIG. 1A



EX1011, FIG. 1A (annotated).

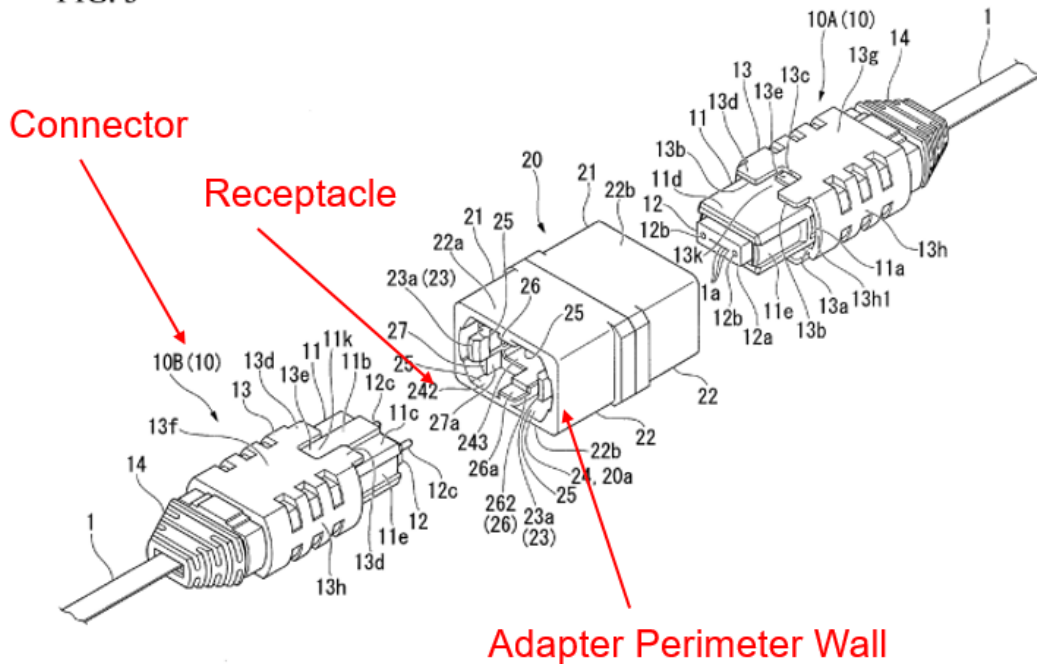


EX1011, FIG. 1B (annotated).

M. Claim 13

Katoh discloses that “the optical connectors 10 are inserted into the connector adapter 20.” EX1011, ¶102. Adapter 20 has a perimeter wall that defines a receptacle for the connector. EX1003, ¶¶452-453. Adapter 20 also includes a second connector and receptacle with a perimeter wall. *Id.*

FIG. 3

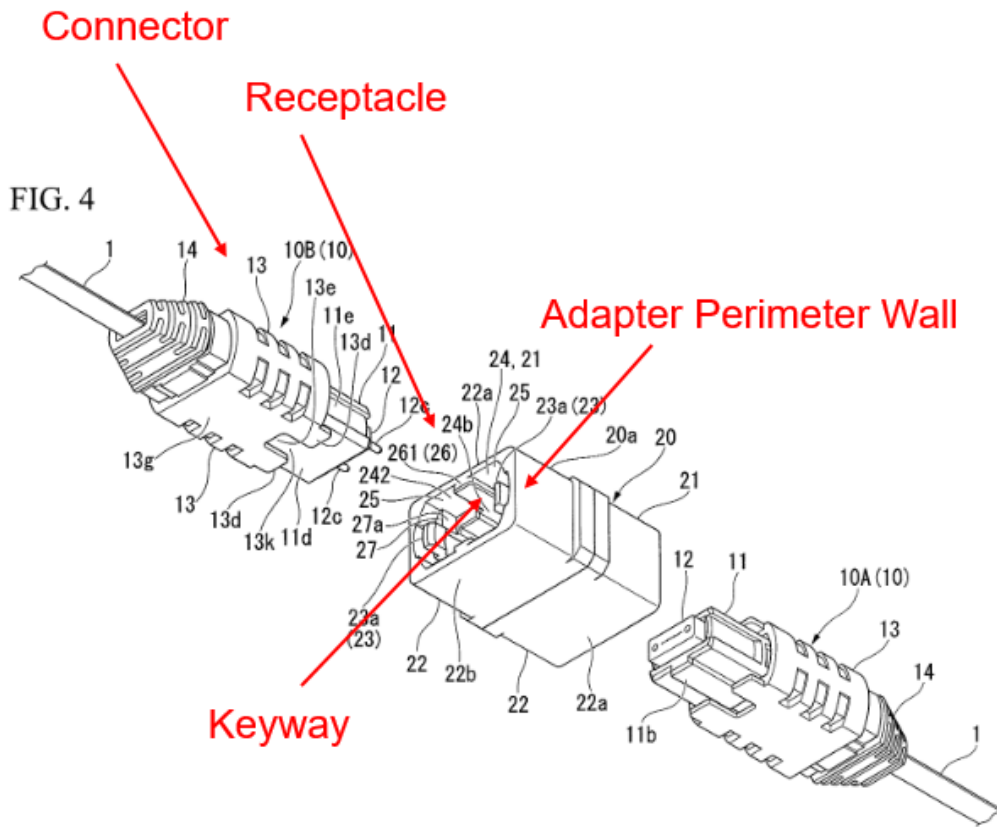


and is straightforward to implement because it requires simple structural duplication. *Id.*; EX1004, FIG. 34.

A POSITA would have had a reasonable expectation of success making this modification at least because these structural modifications are well within the skill of a POSITA. EX1003, ¶457. Accordingly, Katoh-Kuffel renders obvious claim 13. *Id.*

N. Claim 14

Katoh discloses that key 11b is received “into a key groove 24b formed in the inner surface of the half-body housing 22 of the adapter half body 21.” EX1011, ¶161. Key groove 24 is formed in the perimeter wall as a longitudinal keyway because it is oriented longitudinally and receives key 11b. EX1003, ¶¶458-461. When making the modifications to adapter 20 discussed in claim 13, a POSITA would have been motivated to keep key groove 24 present to ensure the functionality of the adapter. *Id.*; Section X.R. Accordingly, Katoh in view of Kuffel renders obvious claim 14. EX1003, ¶¶458-461.

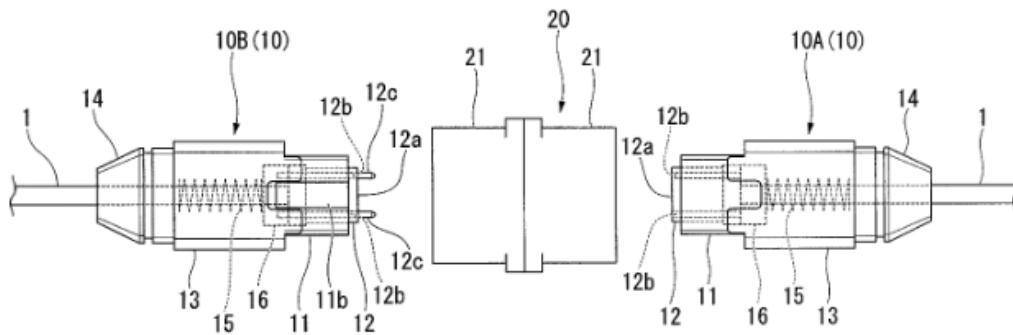


EX1011, FIG. 4 (annotated).

O. Claim 25

Katoh discloses “a spring 15 (see FIG. 5) elastically impelling the ferrule 12 to the front side of the connector is disposed in the housing 11.” EX1011, ¶¶80, 88. Spring 15 is a ferrule spring because it biases the MT ferrule forward. EX1003, ¶¶462-463. Further, “ferrule 12 can be pushed into the rear side of the housing 11 against the elastic impelling force of the spring in the housing 11,” which means that the spring is compressed by the rearwards force on the ferrule with respect to the housing, as claimed. *Id.*; EX1011, ¶88.

FIG. 5



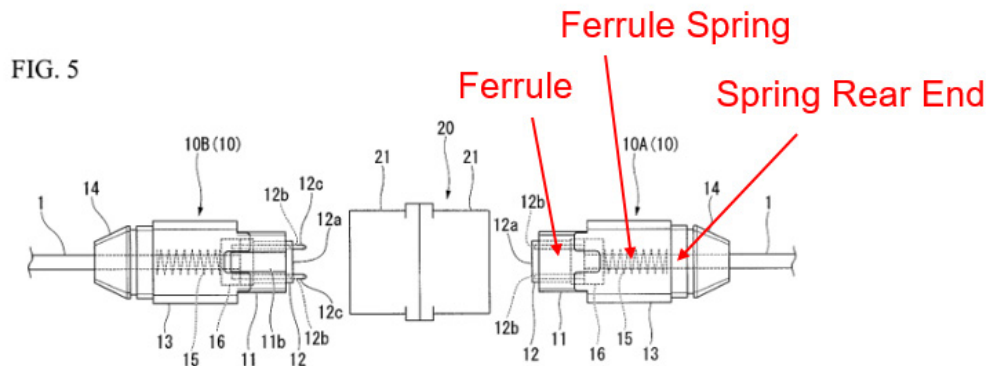
EX1011, FIG. 5.

As discussed in element [1.10], coupling 13 is the claimed first portion, and housing 11 is the claimed second portion. EX1003, ¶464; Section X.D.11. The MT ferrule spring 15, and MT ferrule movement, is structurally separate and independent from the movement of coupling 13, which is biased forward by its own spring. EX1011, ¶135; EX1003, ¶465. In Katoh-Kuffel key 11 b would be integrated into and thus would move with coupling 13, without resulting in or requiring any movement of the MT ferrule. EX1003, ¶¶466-467. Accordingly, Katoh in view of Kuffel renders obvious claim 25. *Id.*; Section X.C.

P. Claim 26

Claim 26 is identical to claim 25 with the exception of the addition of “the rear end of the ferrule spring being supported in the housing such that the rear end is stationary in the housing and the front end moves toward the rear end when the ferrule spring is compressed.” EX1003, ¶¶468-475. Katoh discloses this element in addition to the other elements discussed above in claim 25 because as seen, the

ferrule spring is supported in the housing such that the rear end is held stationary, while the front end of the spring (towards the ferrule) moves. *Id.*; Section X.O.



EX1011, FIG. 4 (annotated).

Accordingly, Katoh in view of Kuffel renders obvious claim 26. EX1003,
¶475.

Q. Claim 17

1. Preamble

The preamble of claim 17 is identical to the preamble of claim 1 and is disclosed for the reasons discussed above. EX1003, ¶476; Section X.D.1.

2. [17.1]

Element [17.1] is identical to portions of Element [1.1] and is disclosed for the reasons discussed above. EX1003, ¶¶477-479; Section X.D.2.

3. [17.2]

Element [17.2] is identical to portions of Element [1.4] and Element [1.5] and is rendered obvious for the reasons discussed above. EX1003, ¶¶480-483; Sections X.D.5-6.

4. [17.3]

Element [17.3] is identical to Element [1.6] and is rendered obvious for the reasons discussed above. EX1003, ¶¶484; Section X.D.7.

5. [17.4]

Katoh discloses a “a reverse-insertion preventing key 11b protruding from the outer circumferential surface of the housing 11” that is configured to be received by a “key groove 24b formed in the inner surface” of the adapter. EX1011, ¶161. Key 11b is a polarity key as claimed because it acts to prevent incorrect orientations of connector 10 when latched. EX1003, ¶¶485-486.

Patent Owner may argue that key 11b is not spaced apart along the fiber alignment axis above the MT ferrule.

However, a POSITA would have been motivated to modify Katoh to integrate key 11b with coupling 13 in view of Kuffel’s teachings. Section X.C. In making this modification, a POSITA would have also found it obvious to modify Katoh’s coupling 13 to include an integrated polarity key positioned on Katoh’s connector spaced apart along the fiber alignment axis above the MT ferrule (placed on one of Katoh’s shorter walls), for at least two reasons. *Id.*; EX1003, ¶¶487-488.

First, this arrangement maximizes connector density by placing the polarity key on the walls oriented towards the unused space in typical fiber optic equipment.

EX1003, ¶¶488-490. Second, the positioning of the polarity key on the first end wall is obvious as a matter to try. *Id.*

A POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a POSITA. *Id.* Thus, Katoh in view of Kuffel renders obvious claim element [17.4]. *Id.*

6. [17.5]

Element [17.5] is identical to Element [1.9] and is disclosed for the reasons discussed above. EX1003, ¶491; Section X.D.10.

7. [17.6]

Element [17.6] is identical to element [1.10] and is disclosed for the reasons discussed above. EX1003, ¶492; Section X.D.11.

8. [17.7]

Element [17.6] is identical to element [1.11] and is disclosed for the reasons discussed above. EX1003, ¶¶493-494; Section X.D.12.

R. Claim 18

Claim 18 is similar to claim 10, except it recites that the adapter latching feature be spaced apart along the fiber alignment axis above the MT ferrule.

EX1003, ¶¶495-498. Claim 18 is obvious in view of the analysis of claim 10 as modified by the discussion of element [17.4] above. *Id.*; Sections X.J, X.Q.5.

S. Claim 19

This claim is identical to claim 11 and is obvious for the reasons discussed above. Section X.K; EX1003, ¶¶499-500.

T. Claim 20

This claim is similar to claim 2, but references the fiber alignment axis and the polarity key being below the MT ferrule. EX1003, ¶¶501-504. This claim term is obvious for the same reasons discussed above in claim 2 as modified by the discussion of element [17.4] above. *Id.*; Sections X.E, X.Q.5.

U. Claim 21

The housing has a generally rectangular cross-sectional shape. EX1003, ¶¶505-507.

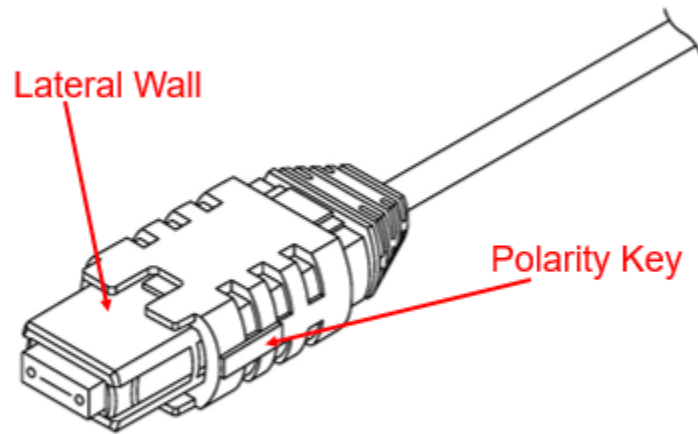


FIG. 1A

Example of Katoh-Kuffel Connector

The term “substantially flat” would have been understood to include walls that are flat but include features such as grooves or recesses. Section VI.G; EX1003, ¶¶505-507.

The Katoh-Kuffel connector’s lateral walls are encompassed by this understanding of “substantially flat” because the lateral walls are generally flat. *Id.* Accordingly, Katoh-Kuffel renders obvious claim 21. *Id.*

V. Claim 22

This claim is substantively identical to claim 13, except for the reference to the optical fiber connector of claim 17, and is obvious for the same reasons discussed above. EX1003, ¶¶509-515; Section X.M.

W. Claim 27

This claim is identical to claim 25 and is obvious for the reasons discussed above. EX1003, ¶¶516-517; Section X.O.

X. Claim 28

This claim is identical to claim 26 and is obvious for the reasons discussed above. EX1003, ¶¶518-519; Section X.P.

XI. GROUND 6: KATOH IN VIEW OF KUFFEL AND FURTHER IN VIEW OF LIN RENDERS OBVIOUS CLAIMS 5 AND 6

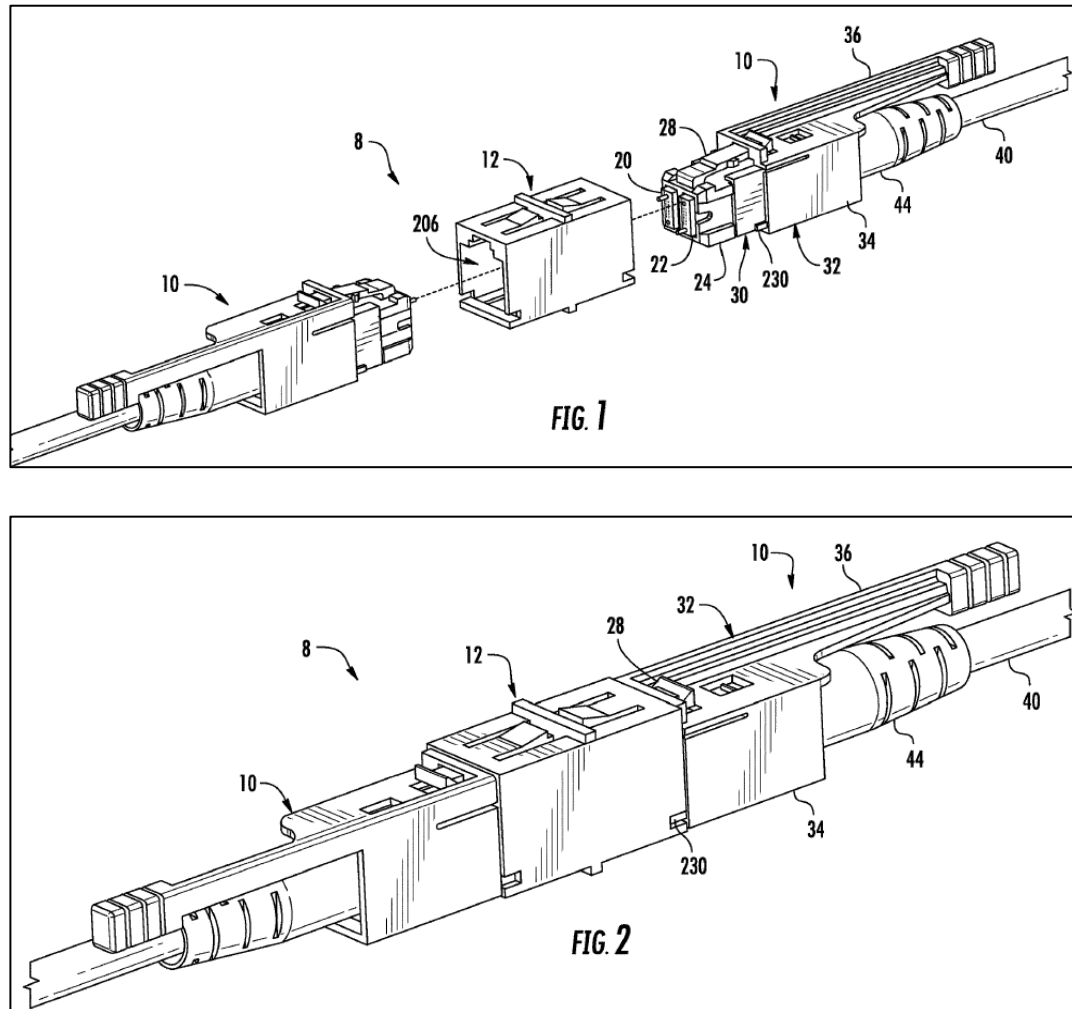
A. Motivation to Combine

The same motivations and reasonable expectation of success discussed with respect to modifying Nhep-Watanabe with Lin's remote release apply to Katoh-Kuffel because, like Nhep-Watanabe, Katoh-Kuffel relies on manual movement of a portion of its connector (coupling 13) for unlatching. Section VII.B; EX1003, ¶¶520-525.

B. Claim 5

Lin discloses an actuation technique for a connector similar to coupling 13 of Katoh. EX1006, ¶78; EX1003, ¶¶526-528. Lin's fiber optic connector 10 includes "a latch arm 28" with that "a handle 36 extending rearwardly from the housing portion 34" that is pulled rearward to "cause the latch arm 28 to flex toward the inner connector body 24." EX1006, ¶¶5, 26; EX1003, ¶528. Lin's

handle 36 is a remote release as claimed at least because it allows for remote actuation or release of Lin's connector. EX1003, ¶¶528-529.



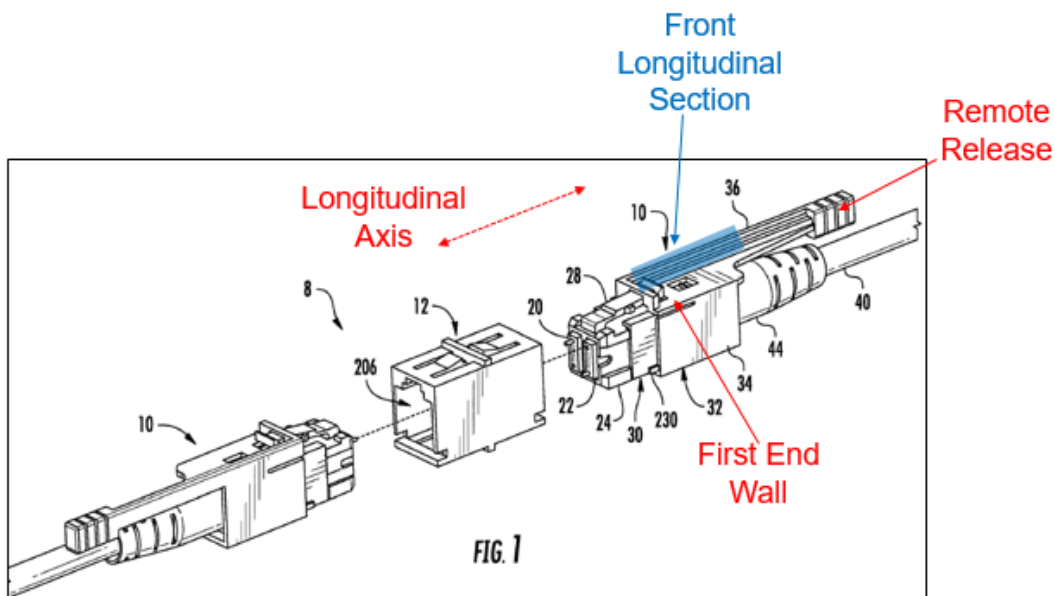
EX1006, FIGs. 1-2.

A POSITA would have been motivated to modify the Katoh-Kuffel connector to include a handle structure like handle 36 that allows for remote actuation of release sleeve 38. Section XI.A. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance. *Id.*; EX1003, ¶¶530-531. A

POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a POSITA. Section XI.A; EX1003, ¶531. Accordingly, Katoh-Kuffel in view of Lin renders obvious claim 5. EX1003, ¶532.

C. Claim 6

The claim term “front longitudinal segment” is a longitudinally-oriented section of the remote release that is disposed at, or near, the front of the remote release. EX1003, ¶¶553-536. Lin’s handle 36 has a front longitudinal segment disposed on the equivalent of the first end wall, which is the top wall in the view below. *Id.*



EX1006, FIG. 1 (annotated).

In modifying the Katoh-Kuffel connector to include Lin’s remote release, a POSITA would have included a front longitudinal section connected to the first

end wall as taught by Lin for at least two reasons. EX1003, ¶¶537-538. First, a front longitudinal section is a logical structure to extend the remote release rearwards, and connecting that section to the first end wall allows for positioning the release towards the top of the connector, which is desirable for access to the handle. *Id.* Second, this configuration is shown in Lin, which is being used to provide the structural teachings for this modification. *Id.* Thus, a POSITA would have implemented the same configuration to ensure the modification functions properly. *Id.* Accordingly, Katoh-Kuffel in view of Lin renders obvious claim 6. *Id.*

XII. GROUND 7: KATOH IN VIEW OF KUFFEL AND FURTHER IN VIEW OF COX RENDERS OBVIOUS CLAIM 9

A. Motivation to Combine

A POSITA would have been motivated to modify the Katoh-Kuffel for the same reasons discussed above with respect to the Nhep-Watanabe connector. Section VIII.B; EX1003, ¶¶545-549. The motivations and reasonable expectation of success discussed above apply equally here. EX1003, ¶¶545-549.

B. Claim 9

Cox discloses examples of fiber optic component 23 configurations including “SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

A POSITA would have been motivated to modify the Katoh-Kuffel connector to an SN configuration to improve compatibility and marketability of the resulting connector, and the modification would have been well within the skill possessed by a POSITA. Section XII.A. Accordingly, Katoh-Kuffel further in view of Cox renders obvious Claim 9. EX1003, ¶¶550-554.

XIII. GROUND 8: KATOH IN VIEW OF KUFFEL AND FURTHER IN VIEW OF APPLICANT AAPA RENDERS OBVIOUS CLAIMS 15, 16, 23, AND 24

A. Motivation to Combine

A POSITA would have been motivated to modify the Katoh-Kuffel connector for the same reasons discussed above with respect to the Nhep-Watanabe connector. Section IX.B; EX1003, ¶¶555-557. The motivations and reasonable expectation of success discussed above apply equally here. EX1003, ¶557.

B. Claim 15

A POSITA would have been motivated to modify the Katoh-Kuffel connector to fit into the small-form factor configuration taught by the '413 patent to improve compatibility and marketability. EX1001, 1:57-67; Section XIII.A; EX1003, ¶¶558-562. The requirement that there be two connectors in claim 15 is equally obvious in view of the disclosure in the '413 patent explaining the dual connector nature of this footprint. EX1003, ¶¶558-562; EX1001, 1:58-67.

Accordingly, Katoh-Kuffel further in view of the Applicant Admitted Prior Art renders obvious claim 15. EX1003, ¶562.

C. Claim 16

A POSITA would have been motivated to modify the Katoh-Kuffel connector to fit into a quad small-form factor as taught by the '413 patent configuration to improve compatibility and marketability. EX1001, 1:57-67; Section XIII.A; EX1003, ¶¶563-567. The requirement that there be four connectors in claim 16 is equally obvious in view of the disclosure in the '413 patent explaining the four-connector nature of this footprint. EX1001, 1:58-67. Accordingly, Katoh-Kuffel further in view of the AAPA renders obvious claim 16. EX1003, ¶567.

D. Claim 23

This claim is substantively identical to claim 15 and is obvious for the same reasons. EX1003, ¶¶568-569; Section XIII.B.

E. Claim 24

This claim is substantively identical to claim 16 and is obvious for the same reasons. EX1003, ¶¶570-571; Section XIII.C.

XIV. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION TO DENY THE PETITION.

A. The Board should not deny the Petition under *Fintiv*.

The '413 patent is in litigation that was filed on January 24, 2023. EX1024. However, the Board should not deny this Petition under *Fintiv* because the Petition sets forth a compelling unpatentability challenge to at least one claim. Further, if instituted, Petitioner stipulates not to pursue in the district court the grounds in the Petition or any ground that reasonably could have been raised in the Petition. Accordingly, *Fintiv* does not favor denial of institution. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (P.T.A.B. Mar. 20, 2020) (precedential).

XV. STANDING (37 C.F.R. § 42.104(a))

Petitioner certifies that the '413 patent is available for *inter partes* review, and that Petitioner is not barred or estopped from requesting an *inter partes* review of the '413 patent.

The assignee of the '413 patent, Senko, served a complaint against Petitioner in the District of Delaware (Case No. 1:23-cv-00083) on January 24, 2023, alleging infringement of the '413 patent. This petition is being filed within one year of the filing of that case.

XVI. MANDATORY NOTICES (37 C.F.R. § 42.8(a)(1))

A. Real Party In Interest (37 C.F.R. § 42.8(b)(1))

The real party-in-interest is Petitioner US Conec Ltd. Petitioner US Conec Ltd. states that the following entities each own 10% or more of its stock: Corning Optical Communications, LLC; Fujikura Ltd.; and NTT Advanced Technology Corporation. This statement should not be interpreted as an admission or concession that the above-listed parties are real parties-in-interest or in privity with US Conec Ltd.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

The '413 patent is currently involved in a district court litigation proceedings including *Senko Advanced Components, Inc. v. US Conec Ltd.*, Case No. 1:23-cv-00083 (D. Del.) filed January 24, 2023, stayed through at least December 20, 2023.

C. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Pursuant to 37 C.F.R. § 42.8(b)(3) and 42.10(a), Petitioner appoints **Jason D. Eisenberg** (Reg. No. 43,447) as lead counsel and **Trevor M. O'Neill** (Reg. No. 72,981) as back-up counsel, at the address: STERNE, KESSLER, GOLDSTEIN & FOX PLLC, 1101 K Street NW, 10th Floor, Washington, DC, 20005, phone number (202) 371-2600, and facsimile (202) 371-2540.

D. Service Information (37 C.F.R. § 42.8(b)(4))

Petitioner consents to electronic service by email at:

jasone-PTAB@sternekessler.com, **toneill-PTAB@sternekessler.com**, and
PTAB@sternekessler.com.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Jason D. Eisenberg/

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Counsel for Petitioner US Conec Ltd.

Date: December 21, 2023

1101 K Street, NW, 10th Floor
Washington, DC 20005
(202) 371-2600

APPENDIX A: CHALLENGED CLAIMS

[1.P]	An optical fiber connector comprising:
[1.1]	a housing having a longitudinal axis and a front end portion and a rear end portion spaced apart along the longitudinal axis
[1.2]	the housing comprising opposite first and second end walls spaced apart along a transverse axis oriented perpendicular to the longitudinal axis
[1.3]	the housing comprising opposite first and second side walls spaced apart along a lateral axis oriented perpendicular to the longitudinal axis and the transverse axis
[1.4]	an MT ferrule received in the housing and exposed through the front end portion of the housing for making an optical connection
[1.5]	the MT ferrule configured to receive plurality of fibers such that the fibers are spaced apart in a row that extends parallel to a fiber alignment axis
[1.6]	the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis
[1.7]	a polarity key disposed on the first end wall
[1.8]	wherein each of the first and second end walls has a lateral dimension along the lateral axis and each of the first and second side walls has a transverse dimension along the transverse axis, the lateral dimension being less than the transverse dimension
[1.9]	wherein the optical fiber connector is configured to latch with a mating adapter and
[1.10]	wherein the optical fiber connector is configured to be actuated to unlatch from the mating adapter by displacing a first portion of the optical fiber connector rearward relative to a second portion of the optical fiber connector
[1.11]	wherein said displacing the first portion of the optical fiber connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the MT ferrule.
[2.P]	The optical fiber connector as set forth in claim 1, wherein

[2.1]	the optical fiber connector is free of a polarity key disposed on the second end wall.
[3.P]	The optical fiber connector as set forth in claim 1, wherein
[3.1]	each of the first and second side walls is substantially flat.
[4.P]	The optical fiber connector as set forth in claim 1, wherein
[4.1]	the polarity key extends from a rear end adjacent the rear end portion of the housing to a front end rearwardly spaced apart from the front end portion of the housing.
[5.P]	The optical fiber connector as set forth in claim 1, further
[5.1]	comprising a remote release.
[6.P]	The optical fiber connector as set forth in claim 5, wherein
[6.1]	the remote release includes a front longitudinal segment disposed on the first end wall of the housing.
[7.P]	The optical fiber connector as set forth in claim 1, wherein
[7.1]	further comprising a strain relief boot extending from the rear end portion of the housing.
[8.P]	The optical fiber connector as set forth in claim 1, wherein
[8.1]	the MT ferrule is configured to receive at least eight optical fibers in a row extending parallel to the fiber alignment axis.
[9.P]	The optical fiber connector as set forth in claim 5, wherein
[9.1]	the connector is an SN type connector.
[10.P]	The optical fiber connector as set forth in claim 1, wherein
[10.1]	the connector includes an adapter latching feature along the first end wall of the housing.
[11.P]	The optical fiber connector as set forth in claim 1, wherein
[11.1]	the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.
[12.P]	The optical fiber connector as set forth in claim 1, wherein

[12.1]	the connector includes a first latch recess along the first end wall of the housing and second latch recess along the second end wall of the housing, each of the first and second latch recesses configured to latch with a respective bendable latch hook of the mating adapter.
[13.P]	A connection system comprising the optical fiber connector of claim 1
[13.1]	and an adapter comprising a perimeter wall defining a receptacle in which to matingly receive said optical fiber connector of claim 1 and another optical fiber connector such that the first side wall of said optical fiber connector of claim 1 is in side-by-side relation with an opposing side wall of the other optical fiber connector.
[14.P]	The connection system of claim 13, wherein
[14.1]	the perimeter wall includes a plurality of longitudinal keyways, each longitudinal keyway capable of receiving the polarity key of said optical fiber connector of claim 1 therein.
[15.P]	The optical fiber connector as set forth in claim 1, wherein
[15.1]	the optical fiber connector is configured such that said optical fiber connector and another identical optical connector can fit in a small form-factor pluggable transceiver footprint.
[16.P]	The optical fiber connector as set forth in claim 1, wherein
[16.1]	the optical fiber connector is configured such that said optical fiber connector and three other identical optical connectors can fit in a quad small form-factor pluggable transceiver footprint.
[17.P]	An optical fiber connector comprising:
[17.1]	a housing
[17.2]	an MT ferrule received in the housing, the MT ferrule configured to receive plurality of fibers such that the fibers are spaced apart in a row that extends parallel to a fiber alignment axis;
[17.3]	the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis; and
[17.4]	a polarity key disposed on the housing such that the polarity key is configured to be spaced apart along the fiber alignment axis above the MT ferrule
[17.5]	wherein the optical fiber connector is configured to latch with a mating adapter and

[17.6]	wherein the optical fiber connector is configured to be actuated to unlatch from the mating adapter by displacing a first portion of the optical fiber connector rearward relative to a second portion of the optical fiber connector,
[17.7]	wherein said displacing the first portion of the optical fiber connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the MT ferrule.
[18.P]	The optical fiber connector as set forth in claim 17, wherein
[18.1]	the connector includes an adapter latching feature spaced apart along the fiber alignment axis above the MT ferrule.
[19.P]	The optical fiber connector as set forth in claim 18, wherein
[19.1]	the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.
[20.P]	The optical fiber connector as set forth in claim 17, wherein
[20.1]	the optical fiber connector is free of a polarity key spaced apart along the fiber alignment axis below the MT ferrule.
[21.P]	The optical fiber connector as set forth in claim 17, wherein
[21.1]	the housing has a generally rectangular cross-sectional shape including upper and lower walls spaced apart above and below the MT ferrule along the fiber alignment axis and first and second lateral walls spaced apart on opposite lateral sides of the MT ferrule, each of the first and second lateral walls being substantially flat.
[22.P]	A connection system comprising the optical fiber connector of claim 17
[22.1]	and an adapter comprising a perimeter wall defining a receptacle in which to matingly receive said optical fiber connector of claim 1 and another optical fiber connector such that the first side wall of said optical fiber connector of claim 17 is in side-by-side relation with an opposing side wall of the other optical fiber connector.
[23.P]	The optical fiber connector as set forth in claim 17, wherein
[23.1]	the optical fiber connector is configured such that said optical fiber connector and another identical optical connector can fit in a small form-factor pluggable transceiver footprint.
[24.P]	The optical fiber connector as set forth in claim 17, wherein

[24.1]	the optical fiber connector is configured such that said optical fiber connector and three other identical optical connectors can fit in a quad small form-factor pluggable transceiver footprint.
[25.P]	The optical fiber connector as set forth in claim 1, further comprising
[25.1]	a ferrule spring yieldably biasing the MT ferrule forward in the housing, the ferrule spring configured to be compressed by a force urging the MT ferrule rearward in relation to the housing, wherein said displacing the first portion of the fiber optic connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the MT ferrule independently of any movement of the MT ferrule in relation to the housing caused by resilient extension of the ferrule spring.
[26.P]	The optical fiber connector as set forth in claim 1, further comprising
[26.1]	a ferrule spring yieldably biasing the MT ferrule forward in the housing, the ferrule spring having a front end and a rear end, the ferrule spring configured to be compressed by a force urging the MT ferrule rearward in relation to the housing, the rear end of the ferrule spring being supported in the housing such that the rear end is stationary in the housing and the front end moves toward the rear end when the ferrule spring is compressed, wherein said displacing the first portion of the optical fiber connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the rear end of the ferrule spring.
[27.P]	The optical fiber connector as set forth in claim 17, further comprising
[27.1]	a ferrule spring yieldably biasing the MT ferrule forward in the housing, the ferrule spring configured to be compressed by a force urging the MT ferrule rearward in relation to the housing, wherein said displacing the first portion of the fiber optic connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the MT ferrule independently of any movement of the MT ferrule in relation to the housing caused by resilient extension of the ferrule spring.
[28.P]	The optical fiber connector as set forth in claim 17, further comprising

[28.1]	a ferrule spring yieldably biasing the MT ferrule forward in the housing, the ferrule spring having a front end and a rear end, the ferrule spring configured to be compressed by a force urging the MT ferrule rearward in relation to the housing, the rear end of the ferrule spring being supported in the housing such that the rear end is stationary in the housing and the front end moves toward the rear end when the ferrule spring is compressed, wherein said displacing the first portion of the optical fiber connector rearward relative to the second portion of the optical fiber connector displaces the polarity key rearward relative to the rear end of the ferrule spring.
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CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

1. This Petition complies with the type-volume limitation of 14,000 words, comprising 13,623 words, excluding the parts exempted by 37 C.F.R. §42.24(a).

2. This Petition complies with the general format requirements of 37 C.F.R. §42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,

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CERTIFICATION OF SERVICE (37 C.F.R. §§ 42.6(e), 42.105(a))

I certify that the above-captioned **PETITION FOR *INTER PARTES***
REVIEW FOR U.S. PATENT NO. 11,340,413 and associated Exhibits 1001-
1008 and 1010-1027 were served in their entireties upon the Patent Owner on
December 21, 2023, via U.S.P.S. First-Class Mail at the following addresses:

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