

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

US CONEC LTD,
Petitioner,

v.

SENKO ADVANCED COMPONENTS, INC.,
Patent Owner.

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

**DECLARATION OF JAMES F. BRENNAN III, Ph.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S.
PATENT 11,340,413**

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TABLE OF MATERIALS CONSIDERED

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.
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)
1010	U.S. Patent Application Publication No. 2021/0099229 (“Cox”)
1011	U.S. Patent Application Publication No. 2012/0082416 (“Katoh”)
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 2011/0019962A1 (“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,” Computer Networks, 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,” Optical Engineering 37(12):3129-33 (December 1998)
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, James F. Brennan III, Ph.D., hereby declare:

I. INTRODUCTION

A. Scope of Engagement

1. I have been retained as an expert witness by counsel for Petitioner US Conec Ltd. (“Petitioner”) in connection with the above-captioned inter partes review (“IPR”) proceeding.

2. I submit this Declaration in the above-captioned proceeding to provide my expert opinion in support of Petitioner’s Petition for *Inter Partes* Review of U.S. Patent No. 11,340,413 (the “’413 Patent”, EX1001).

3. The opinions to which I will testify, if asked, are set forth in this Declaration. My opinions in this Declaration are based upon the information that I have received to date. They may be supplemented or modified if additional information is received. They may also be supplemented to rely on additional information or opinions provided by the parties (or witnesses retained by the parties) and issues that may arise.

B. Compensation

4. I am being compensated at a rate of \$650 per hour for my time spent working on this IPR. My compensation is not in any way dependent on the statements I set forth herein or the outcome of this proceeding.

C. Professional Qualifications, Education and Experience

5. I am a Principal in Exponent's Electrical Engineering and Computer Science practice where I have consulted on numerous projects, many relating to opto-mechanical device development, implementation, and function. I have worked for Exponent since January 2012. Throughout my career, I have built and utilized hundreds of electrical, electromechanical, laser, optical, and LED systems for myriad applications.

6. I hold an S.B. in electrical engineering and an S.M. in electrical engineering and computer science from the Massachusetts Institute of Technology, granted in 1987 and 1989, respectively. I also hold an Electrical Engineer degree from the Massachusetts Institute of Technology, which was granted in 1991. Throughout my graduate studies, I taught courses concerning electromagnetic field and wave theory and applications, including optical systems.

7. In 1995, I was granted a Ph.D. in physics and electrical engineering from the Massachusetts Institute of Technology. During research for my Ph.D., I designed and built electro-optical instrumentation to diagnose and treat human pathologies, including various cancers and arterial diseases. During this work, I built several investigational medical devices that utilized optical catheters, the majority of which involved the use of optical fibers to deliver light to and collect light from locations within the body. I designed and manufactured custom optical

fiber connectors, which often held several optical fibers, to interface these optical catheters with various diagnostic and therapeutic equipment. These systems were used at several locations such as the Cleveland Clinic Foundation, Leonard Morse Hospital, Massachusetts General Hospital, Leiden Hospital in Leiden, The Netherlands, and Erasmus University Medical Center in Rotterdam, The Netherlands.

8. I was a Senior Research Specialist at 3M Company's Telecommunications Systems Division where I developed passive optical components that addressed the telecommunications and sensor industries, which became the cornerstone of the 3M Optical Components business unit. I invented a direct-write laser machining technology for producing fiber gratings of arbitrary reflectivity profiles and lengths and utilized the method to make chromatic dispersion compensators for use in long-haul optical communications systems. I led teams that developed and sold products throughout the world, such as specialty optical fibers, pump stabilizers, dispersion compensators, optical connectors, junction boxes, and Bragg gratings. Many of these components were tested extensively on our optical communications testbed, which I built and maintained. I was on the team that transferred the manufacturing of many of these devices to Singapore facilities.

9. I was Vice President of Research and Development at Raydiance, Inc., where I staffed and led the entire development team and designed and built high-power fiber laser systems capable of producing ultrashort pulses at ablation-level energies for use in laser machining and surgery. This work resulted in several recognitions and awards for the product and the corporation, including the Red Herring 100 North America Award and recognition as a finalist in the “Most Innovative Company” category in the 2008 American Business Awards. These laser systems utilized highly specialized optical fibers and optical fiber amplifiers that required innovative optical connections between the various optical fiber components.

10. I previously served as the Chief Science Officer at Prescient Medical, Inc., where I led the development of an optical catheter system for the diagnosis of coronary artery disease by utilizing Raman spectroscopy, which incorporated laser light sources. Commercial multi-fiber connectors (MTP/MPO) were adapted to interface these optical catheters with custom spectroscopic equipment.

11. I have been an active researcher with more than 75 journal and conference papers and 5 book chapters published. I have been granted 34 United States patents, with others pending. At various times in my career, I have been a member of the Optical Society of America (“OSA”), the International Society for Optics and Photonics, and the Institute for Electrical and Electronics Engineers

(“IEEE”). I was a committee member for OSA’s 2007 conference on optical fiber communications and also a committee member for OSA’s Bragg Gratings, Photosensitivity, and Poling topical conference for 1999, 2001, and 2003. I have been a regular reviewer for IEEE Photonics Technology Letters, as well as several other journals.

12. I am on the American National Standards Institute’s (“ANSI”) subcommittee for ANSI Z136.3 “Safe Use of Lasers in Health Care,” ANSI Z136.9, “Safe Use of Lasers in Manufacturing Environments,” and ANSI Technical Subcommittee 1 (TSC1), “Biological Effects and Medical Surveillance of the Accredited Standards Committee (ASC Z136) on Laser Safety.”

13. My *curriculum vitae* is filed herewith as EX1007.

D. Publications, Speeches, and Patents

14. A comprehensive list of publications and patents is included in my *curriculum vitae* filed herewith as EX1007.

15. On the basis of my education and the experience described above, I believe I am qualified to give the opinions set out herein.

E. Materials Considered

16. For purposes of this Declaration, I have reviewed and, where applicable, relied upon the information and/or teachings of the documents identified in the Table of Materials Considered following the Table of Contents

above. I have reviewed all of the listed documents and they appear to be true and correct copies of the listed documents.

17. I also base my opinions on my education and professional experience in the field of electrical engineering, electro-optics, and fiber optics.

18. I confirm that to the best of my knowledge the accompanying exhibits are true and accurate copies of what they purport to be, and that an expert in the field would reasonably rely on them to formulate opinions such as those set forth in this Declaration.

II. LEGAL STANDARDS FOR INVALIDITY

19. I understand that in *inter partes* review proceedings, a patent claim is construed using the same standard that would be used in a civil action, and that a claim should be construed in accordance with the ordinary and customary meaning of the claim as it would be understood by a person of ordinary skill in the art (“POSITA”).

20. While I am neither a patent lawyer nor an expert in patent law, I have been informed of the applicable legal standards for anticipation and obviousness. I have relied upon these legal principles, as explained to me by counsel, in forming my opinions set forth in this Declaration.

21. I understand that a patent may be deemed invalid based on anticipation or obviousness over the prior art. I understand that to anticipate a

claim under 35 U.S.C. § 102, a prior art reference must disclose each and every element of the claim.

22. It is my understanding that a patent can be found invalid for several reasons. It is my understanding that these reasons include, among others: (i) being anticipated by the prior art; or (ii) being obvious in view of the prior art. My understanding of each of these bases for invalidity is discussed in greater detail below.

23. In addition, I understand that objective evidence of non-obviousness such as (i) commercial success, (ii) long-felt but unresolved need, (iii) failure of others, (iv) skepticism by experts, and (v) unexpected results should also be considered in determining whether a claim would have been obvious, if relevant.

24. I understand that in undertaking an invalidity analysis, the claims are to be interpreted from the perspective of a POSITA.

A. Anticipation

25. I understand that one way to show that a patent claim is invalid is to show that the claim is anticipated by a prior art reference. I understand this to mean that the patent claim is not new or novel in view of the prior art.

26. I further understand that to determine whether a prior art reference anticipates a patent claim requires a comparison of the claim language to the prior art on a limitation-by-limitation basis. I have been informed that a prior art

reference “anticipates” under 35 U.S.C. § 102 and renders a patent claim invalid if all of the claim’s limitations are expressly or inherently disclosed in that single prior art reference. The disclosure in the prior art reference does not have to use the same words as the claim, but all of the requirements of the claim must be expressly or inherently present.

27. I have been informed of the scope of prior art that can be used in an anticipation analysis as set forth in 35 U.S.C. § 102. In particular, I understand that a patent or publication generally qualifies as prior art to an asserted patent claim if it was published prior to the invention of the asserted patent claim or more than one year before the filing date of the application of the asserted patent. I further have been informed that a patent issued on a patent application filed before the invention of the asserted patent claim also is generally prior art to the asserted patent claim. I am aware some exceptions may apply based on, e.g., the same inventors of the asserted patent being the inventors of a prior art reference.

28. I understand that a prior art reference anticipates a patent claim when the claim limitations not expressly found in that reference are nonetheless inherent in it. I understand that express disclosure means that the subject matter is clearly described in the prior art reference.

29. I understand that when a limitation is inherent in the prior art reference, that limitation is not clearly described in the prior art reference, but is

the natural result flowing from the explicit disclosure of the prior art. I understand that for a claimed element to be inherently present within a prior art document, it must be necessarily present. That is, the prior art reference must necessarily function in accordance with or include the claimed element. I understand that inherency may not be established by probabilities or possibilities—the mere fact that a certain thing may result from a given set of circumstances is not sufficient.

30. I understand that in some cases, the inherent property corresponds to a claimed new benefit or characteristic of a purported invention otherwise in the prior art. I further understand that when a prior art method is at issue, the inherent anticipation examines the natural and inherent results in that method without regard to the full recognition of those benefits or characteristics within the art field at the time of the prior art disclosure.

B. Obviousness

31. I have been informed that a patent claim is invalid as being obvious in view of the prior art if the differences between the patented subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person having ordinary skill in the art. *See* 35 U.S.C. § 103. In making a determination of obviousness, I understand that the following factors are analyzed: (i) the scope and content of the prior art; (ii) the differences,

if any, between the prior art and the claims at issue; (iii) the level of ordinary skill in the pertinent art; and (iv) objective evidence of non-obviousness, if any exists.

32. I have been informed that any of the following rationales are some of the acceptable bases for the conclusion that a claim is obvious: (i) the claimed invention is simply a combination of prior art elements according to known methods to yield predictable results; (ii) the claimed invention is a simple substitution of one known element for another to obtain predictable results; (iii) the claimed invention uses known techniques to improve similar devices (methods, or products) in the same way; (iv) the claimed invention was “obvious to try” because it was a choice from a finite number of identified, predictable solutions, with a reasonable expectation of success; (v) there is known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces, if the variations would have been predictable to a POSITA; or (vi) there is some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art references or to combine prior art reference teachings to arrive at the claimed invention.

33. I have been informed that in order for a patent claim to be considered obvious, at the time the invention was made, each and every limitation of the claim must be present within the prior art, or within the prior art in combination with the

general knowledge held by a POSITA, and that such a person would have a reasonable expectation of success in combining these teachings to achieve the claimed invention. I also understand that the reason to select and combine features, the predictability of the results of doing so, and a reasonable expectation of success of doing so may be found in the teachings of the prior art themselves, in the nature of any need or problem in the field that was addressed by the patent, in the knowledge of a POSITA in the field at the time, as well as in common sense or the level of creativity exhibited by a POSITA. There need not be an express or explicit suggestion to combine references.

34. I understand that substituting one known element for another known element would have been obvious when it leads to reasonably predictable results.

35. I understand that a combination of elements would have been obvious when a POSITA has a good reason to pursue the combination, which is among a finite number of known options within his or her technical grasp, and leads to reasonably expected results.

36. A prior art reference can be said to teach away when a POSITA would be discouraged from following the path set out in the reference or would be led in a direction divergent from the path that was taken in the claimed invention. The mere disclosure of more than one alternative does not constitute a teaching away from alternatives that are not disclosed when the prior art does not criticize,

discredit, or otherwise discourage the solution claimed in the alleged invention.

Similarly, a prior art reference that merely expresses a general preference for an alternative invention does not teach away.

37. I have relied upon this understanding of the applicable legal standards in reaching my opinion set forth in this Declaration.

C. Applicant Admitted Prior Art

38. I understand that a statement made by an applicant during prosecution identifying the work of another as prior art is an admission that can be relied upon for both anticipation and obviousness rejections, regardless of whether the admitted prior art would otherwise qualify as prior art. I also understand that these statements can be statements made by the applicant during prosecution, or can be part of the disclosure (including the specification and figures) originally filed by the applicant. The nature of the teachings and the scope of the admitted prior art depend on the statements made by the applicant.

D. Benefit of a Priority Document

39. I understand that a patent may claim the benefit of one or more documents that pre-date the filing date of the patent application that became the patent. I am informed that these documents are called priority documents. I further understand that the claims of the patent may be entitled to a priority date from one of the earlier-filed priority documents. I have been informed that determining the

priority date of the claims of the patent is determined on a claim-by-claim basis.

Therefore, different claims may be entitled to a different priority date.

40. I understand that determining if a claim is entitled to the date of a priority document requires analyzing the document to determine if it provides sufficient written description support for all elements of the claim. I have been informed that the test for determining if sufficient written description support exists is to determine if the document describes the claimed invention in sufficient detail that a POSITA can reasonably conclude that the inventor had possession of the claimed invention based on the document. I understand that possession can be shown in several different ways. For example, a description describing all of the claimed limitations using words, figures, diagrams, or formulas can show possession. Another example that can show possession is a discussion that shows the claimed invention was prototyped or otherwise constructed and tested, which I understand is termed an actual reduction to practice. In any case, the analysis is undertaken from the viewpoint of a POSITA reviewing the disclosure of the priority document.

E. Miscellaneous

41. I understand that Petitioner has the burden of proving unpatentability by a preponderance of evidence, which means that the claims are more likely than not to be unpatentable.

42. I also understand that the claims are to be construed according to the same claim construction standard that district courts use wherein claim terms are given their ordinary and customary meaning from the perspective of a POSITA at the time of the invention.

43. The analysis in this Declaration is in accordance with the above-stated legal principles.

III. LEVEL OF ORDINARY SKILL IN THE ART

44. I understand that the level of ordinary skill may be reflected by the prior art of record and that a POSITA to which the claimed subject matter pertains would have the capability of understanding the scientific and engineering principles applicable to the pertinent art.

45. I understand that there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

46. I am very familiar with the knowledge and capabilities that a POSITA would have possessed in the subject area in fiber optics. Specifically, my education and experience in the industry and with engineers practicing in the industry during the relevant time period allowed me to become personally familiar with the

knowledge and capabilities of a person of ordinary skill in the area of fiber optics.

Unless otherwise stated, my testimony below refers to the knowledge of a POSITA in the field of fiber optics at the time of the priority date of the '413 Patent, which I understand is July 14, 2017.

47. In my opinion, a POSITA of the '413 Patent at the time of its earliest claimed priority date 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) at least five years industry experience designing fiber optic connectors in lieu of a formal degree.

48. I believe such a POSITA would have been capable of understanding the '413 Patent and the prior art references discussed herein. This level of skill in the art would apply at the earliest priority date of the '413 Patent, which I understand is July 14, 2017.

49. Based upon my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a POSITA at the time of the claimed invention. Additionally, although my qualifications exceed those of the hypothetical POSITA defined above, my

analysis and opinions regarding the '413 Patent have been rendered from the perspective of a POSITA at the time of the invention.

50. My analysis is intended to reflect how a POSITA would have understood the '413 Patent claims as of the priority date, even if I use the present tense.

IV. BACKGROUND OF THE TECHNOLOGY

51. My discussion of the background of the technology is intended to provide some context for my later analysis of the '413 Patent and prior art. This discussion provides a high-level overview of the components, but it is not intended to reflect the meaning of any particular claim term in a patent, which must be assessed in view of the specification and the context of the claim language. Rather, this is a general overview of fiber optic cables, connectors, adapters, and other components. The technology at issue generally relates to fiber optic connectors of the type commonly used in data centers. Optical fiber has been used for a variety of applications, including but not limited to, broadband voice, video, and data transmission.

A. Data Centers

52. Public and private fiber optic networks used for, e.g., voice, video, and data transmissions often include fiber optic equipment located in data distribution centers or central offices. The '413 Patent generally relates to details of

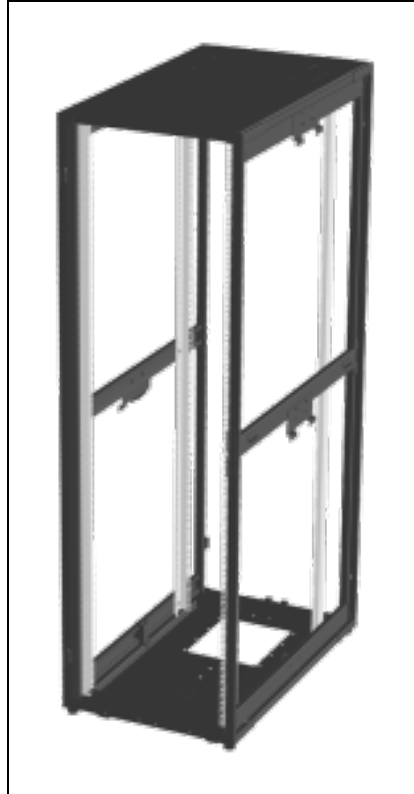
the optical fiber connectors, which are used to connect optical fibers to equipment or other optical fibers, thus creating an optical fiber interconnection.

53. A data center is a facility that houses data storage and/or communication equipment used to provide a variety of services, including, for example, digitally housing Internet sites. *See* EX1020, 2939.



Organization of an example data center. *See* EX1020, 2940.

54. Data centers use “racks” to mount electrical and optical fiber interconnection equipment, a row of which is shown above. *See* EX1020, 2940. A rack is an open structure for mounting electrical or electronic equipment, including servers, switches and storage “bricks.” Equipment is typically fastened to racks via mounting holes on the sides of the rack. The figure below shows a typical rack that may be found in a data center.



Example of a generic 19” rack that may be used in a data center. *See* EX1025.

55. A rack unit or a “U” is a measurement of vertical space within a rack. *See* EX1020, 2940. For example, a base rack unit (*i.e.*, the height measurement) is 44.45 millimeters (1.75”), and a standard rack can take 42 1U modules.

56. Enclosures, chassis, or frames that are mounted to a rack in a data center can aid in further compartmentalization of racks and can be configured to house equipment for connecting fiber optic cables. An example of an enclosure used to house equipment for connecting fiber optic cables is shown below.

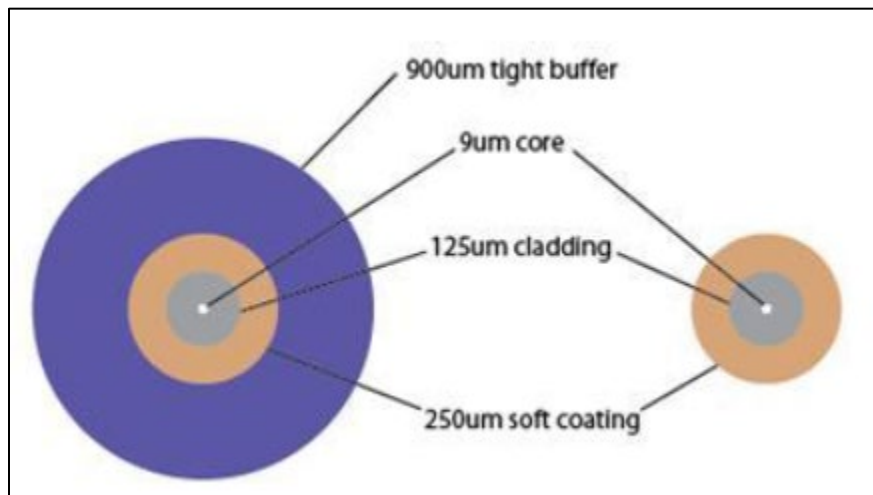


Example of an enclosure to house equipment for connecting fiber optic cables. *See* EX1026.

57. Maximizing use of physical space is important for optimizing costs of operating and maintaining data centers, and the fiber optic equipment typically included in housings that are mounted in equipment racks generally seek to provide a greater density of interconnections within a certain space to optimize use of space. When additional bandwidth is needed or desired, additional fiber optic equipment may be utilized in the data center to increase optical fiber port count, requiring more equipment rack space in a data center. Therefore, there is generally a desire to decrease the size (cross-sectional area) of the components that facilitate fiber optic connections. Certain types of optical connectors can aid in facilitating signal transmission while reducing physical space consumption.

B. Optical Fiber Connector Technology

58. In general terms, a fiber optic cable and assembly contain one or more optical fibers that are used to guide light signals through a silica glass fiber that is typically coupled to a transmitter on one end that converts electrical information into optical signals and a receiver on the other end that converts optical information into electrical information. The fiber itself is composed of a core that transmits light, a cladding, the next adjacent layer that confines the light within the core, and additional non-optical layers. The figure below shows examples of a common fiber core and cladding ratio, with and without a protective buffer used in optical communications.



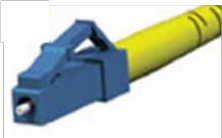
Examples of common fiber cores and cladding diameters coated or uncoated. *See* EX1021, 5.

59. Optical fibers and connectors themselves are generally small and compact. Additionally, fiber optic cables can include a varying number of optical fibers. Fiber optic connectors and adapters can be used to facilitate the connection

of two optical fibers. While there are several methods of connecting fiber optic cables, physical contact connectors are most relevant to the '413 Patent. Physical contact connectors employ a ferrule surrounding an embedded optical fiber. By physically pressing the ends of two ferrules together, an optical connection between two optical fibers can be created. A component, oftentimes a spring, is utilized to provide axial compliance when ferrules are pressed together and to ensure contact is maintained during use. *See* EX1019, 8. Fiber optic connectors and adapters can be a fast, efficient, and low-cost way to connect fiber optic cables, allowing for demountable connections. There are numerous options for fiber connectors, with variability in orientation, size, and mechanical components that engage the connection. *See* EX1019, 9.

60. In the context of this matter, fiber optic adapters (sockets) receive and mate those fiber optic connectors to support one or more fiber optic connections. Fiber optic adapters may come in different shapes, but they are all typically designed to achieve the same function—to join and align the connectors of two fiber optic cables. The two fiber optic cables may have one or more fiber ferrule(s) to house all the fibers in each cable; connecting the two fiber optic cables is accomplished by mating the respective ferrules. A fiber optic adapter allows fiber optic cables to be attached to each other through different interfaces, allowing many devices to communicate at once.

61. Fiber optic connectors and adapters come in different standard forms and can be used to support connections of different numbers of optical fibers. For example, LC connectors terminate one or more optical fibers each in individual ferrules whereas MPO (Multi-Fiber Push-On/Pull-Off) connectors can terminate a greater number of fibers in a single ferrule. *See* EX1019, 9. Both LC and MPO connectors are described in various recognized industry standards (e.g., IEC 61754-20 Fibre Optic Connector Interfaces – Part 20: Type LC Connector Family and IEC-61754-7, Fiber Optic Connector Interfaces – Part 7: Type MPO connector family). MTP® is a type of MPO connector developed by US Conec (Petitioner). Fiber optic adapters can also be designed to connect a plurality of discrete fiber optic adapters, or one or more multi-fiber connectors. The figure below shows some common connector types.

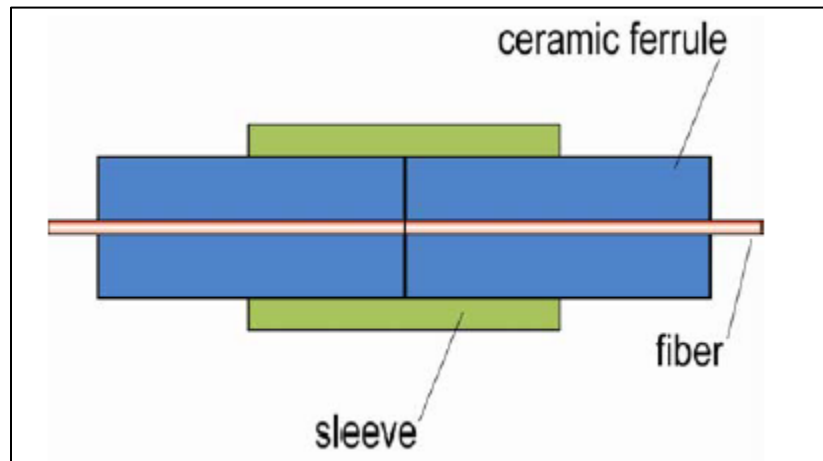
Common Connector Type	Diagram	Ferrule Size
FC - Ferrule Connector		2.5 mm
LC - Lucent Connector		1.25 mm
SC - Subscriber Connector		2.5 mm
ST – Straight Tip Connector		2.5 mm
MPO – Multi-Position Optical (also called MTP)		-

Common fiber optic connectors. *See* EX1019 9, *see also* EX1027.

62. The key aspect to a fiber connection is the precise alignment of each fiber core for proper light coupling. The fiber core itself is extremely small in diameter, often as small as or smaller than 10 μm . A fiber connector needs to provide precise alignment of the fiber cores to ensure proper signal coupling.

63. Alignment is often achieved using a “butt-joint alignment” mechanism in which the ferrule both secures and aligns the fiber. Inside each fiber optic adapter is typically an alignment sleeve that serves to bring together the mating single-fiber ferrules of the two connectors, as shown in the figure below.

Additionally, as mentioned previously, oftentimes springs are utilized to provide axial compliance when ferrules are pressed together and to apply a compressive force for ensuring contact is maintained during use.



Physical connection between two joined fibers. *See* EX1019, FIG. 8.

V. U.S. PATENT NO. 11,340,413

64. U.S. Patent No. 11,340,413 B2 (EX1001) (the “’413 Patent”), entitled “Ultra-Small Form Factor Optical Connectors Used As Part Of A Reconfigurable Outer Housing,” issued on May 24, 2022, was filed as U.S. Patent Application Serial No. 17/327,197 (the “’197 Application”) on May 21, 2021. The ’413 Patent is a continuation of U.S. Patent Application Serial No. 17/090,855 filed on November 5, 2020 (now U.S. Patent No. 11,487,067), which is a continuation of U.S. Patent Application Serial No. 16/414,546 filed on May 16, 2019 (now U.S. Patent No. 10,859,778), which is a continuation of U.S. Patent Application Serial No. 16/388,053 filed on April 18, 2019 (now U.S. Patent No. 11,169,338), which

is a continuation of U.S. Patent Application Serial No. 16/035,691 filed on July 15, 2018 (now U.S. Patent No. 10,281,668), which claims priority to U.S. Provisional Application No. 62/588,276 filed on November 17, 2017, U.S. Provisional Application No. 62/549,655 filed on August 24, 2017, and U.S. Provisional Application No. 62/532,710 filed on July 14, 2017. Based on the above, the earliest priority date for the '413 Patent is July 14, 2017.

65. The '413 Patent generally discloses a fiber optic connector for holding one or more optical ferrule assemblies. EX1001, Abstract. The '413 Patent explains that “[t]he prevalence of the Internet has led to unprecedented growth in communication networks,” and so “network providers [seek] to continuously find ways to improve quality of service while reducing cost.” EX1001, 1:37-41. The '413 Patent describes 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.

66. The '413 Patent admits “manufacturers of connectors and adapters are always looking to reduce the size of the devices, while increasing each of deployment, robustness, and modifiability after deployment.” EX1001, 1:51-54. It explains that “more optical connectors may need to be accommodated in the same footprint previously used for a smaller number of connectors in order to provide backward compatibility with existing data center equipment.” EX1001, 1:55-58.

The background of the '413 Patent further describes “numerous interconnections between mating connectors may be compacted into high-density panels” and that “producers may optimize for such high densities by shrinking the connector size and/or the spacing between adjacent connectors on the panel.” EX1001, 2:5-9.

67. The '413 Patent explains that reducing the size of the connectors and/or spacing between adjacent connectors can create problems such as increasing the support cost, diminishing the connection quality, obstructing the release mechanisms of the connectors, and increasing the stress to the fiber optic cables. EX1001, 2:9-36. The '413 Patent thus generally discloses connectors, adapters, and other assemblies that are asserted to address these problems. *See, e.g.*, EX1001, 2:40-55.

A. Overview and Background

68. The '413 Patent, titled “Ultra-Small Form Factor Optical Connectors Used As Part Of A Reconfigurable Outer Housing,” was issued on May 24, 2022. It was filed as U.S. Patent Application Serial No. 17/327,197 (the “'197 Application”) on May 21, 2021. The '413 Patent is a continuation of U.S. Patent Application Serial No. 17/090,855 filed on November 5, 2020, which is a continuation of U.S. Patent Application Serial No. 16/414,549 filed on May 16, 2019 (now U.S. Patent No. 10,859,778), which is a continuation of U.S. Patent Application Serial No. 16/388,053 filed on April 18, 2019 (now U.S. Patent No.

11,169,338), which is a continuation of U.S. Patent Application Serial No.

16/035,691 filed on July 15, 2018 (now U.S. Patent No. 10,281,668), which claims priority to U.S. Provisional Application No. 62/588,276 filed on November 17, 2017, which claims priority to U.S. Provisional Application No. 62/549,655 filed on August 24, 2017, which claims priority to U.S. Provisional Application No. 62/532,710 filed on July 14, 2017. Based on the above, the earliest possible priority date for the '413 Patent is July 14, 2017.

69. For purposes of this declaration, counsel has asked me to apply July 14, 2017 as the earliest possible priority date for all claims with the exception of Claim 9. As I discuss below, Claim 9 is only supported as of the filing of the original claims of the '197 Application on May 21, 2021, and thus I use May 21, 2021 as the priority date for Claim 9.

70. The '413 Patent generally discloses “ultra-small form factor optical connectors and related connections within adapters and optical transceivers.” EX1001, 1:31-33. The '413 Patent explains that “[t]he prevalence of the Internet has led to unprecedented growth in communication networks” causing “network providers to continuously find ways to improve quality of service while reducing cost.” EX1001, 1:37-41. The '413 Patent admits that “[c]ertain solutions have included deployment of high-density interconnect panels” which “may be designed to consolidate the increasing volume of interconnections necessary to support the

fast-growing networks into a compacted form factor, thereby increasing quality of service and decreasing costs such as floor space and support overhead.” EX1001, 1:42-48.

71. The ’413 Patent describes that “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. In particular, more optical connectors may need to be accommodated in the same footprint previously used for a smaller number of connectors in order to provide backward compatibility with existing data center equipment.” EX1001, 1:50-57. The ’413 Patent provides examples of current footprints, including “the small form-factor pluggable transceiver footprint (SFP)” which “currently accommodates two LC-type ferrule optical connections”, “the quad small form-factor pluggable (QSFP) transceiver footprint” which “currently accommodates four LC-type ferrule optical connectors.” EX1001, 1:58-67.

72. Additionally, the ’413 Patent describes that “[i]n communication networks, such as data centers and switching networks, numerous interconnections between mating connectors may be compacted into high-density panels[,]” and that “[p]anel and connector producers may optimize for such high densities by shrinking the connector size and/or the spacing between adjacent connectors on the panel.” EX1001, 2:4-9. The ’413 Patent recognizes of course, that reducing the

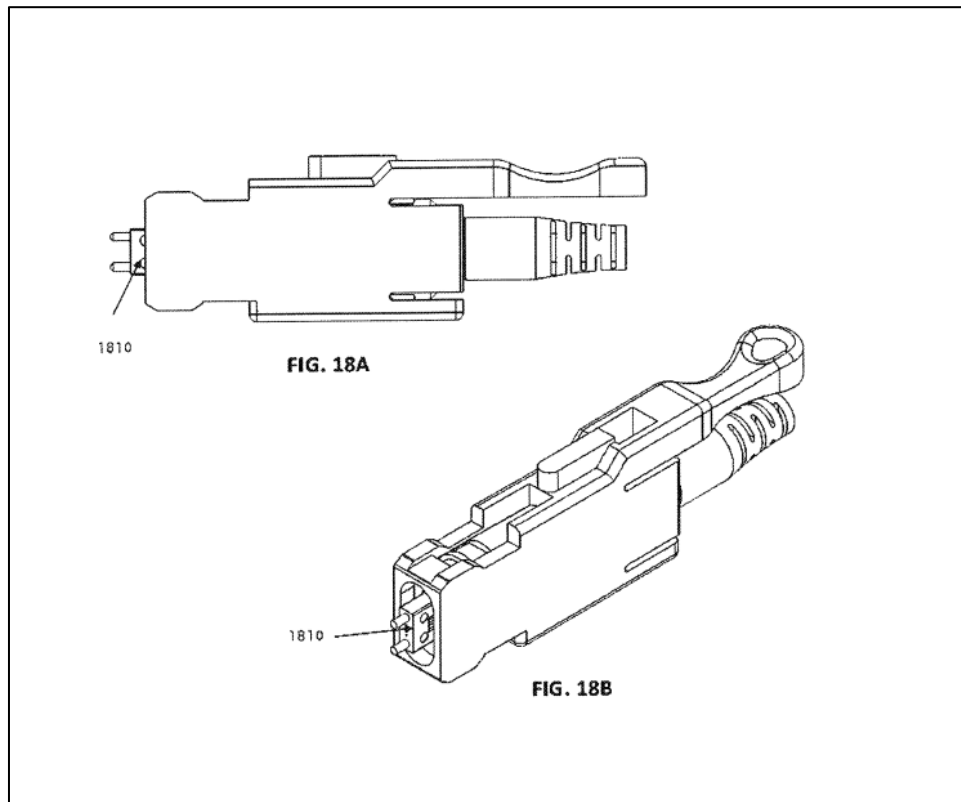
size of the connectors and/or spacing between adjacent connectors can create problems such as increasing the support costs, diminishing the quality of service, obstructing the release mechanisms of the connectors, overstressing the cables and connectors, “compromising the integrity and/or reliability of the terminations, and potentially causing serious disruptions to network performance.” EX1001, 2:9-26.

73. Another solution to optimizing connectors for high density panels known in the art, which is also disclosed in the '413 Patent, is the incorporation of a remote release mechanism that allows a user to remove connectors “that are closely spaced together on a high density panel without damaging surrounding connectors, accidentally disconnecting surrounding connectors,” or “disrupting transmissions through surrounding connectors.” EX1001, 5:46-52, 6:12-15. I note that remote releases are well-known in the art, as shown by the examples I cite here. EX1006, ¶26, FIG. 1; EX1013, ¶¶29, 32, FIG. 1; EX1014, ¶49, FIGs. 1-2. I have chosen to reference U.S. Patent Application Publication No. 2017/0227720 A1 (“Lin”) as prior art below in Ground 2. *See* EX1006; *see also* Section X.

B. Discussion of Certain Embodiments

74. The '413 Patent includes over 50 figures, many of which are directed to entirely different embodiments of fiber optic connectors, adapters, aspects of the release assembly, and the fiber optic cable assemblies. *See* generally EX1001, 2:59-5:4, FIGs. 1-52.

75. I have reviewed and considered the full specification and each of the disclosed embodiments in the '413 Patent, and it appears to me the embodiments in Figures 18A-18B are generally more pertinent for the claims in the '413 Patent, and so I will discuss the embodiments shown in these figures in more detail. Figures 18A-18B are reproduced here for convenience.



EX1001, FIGs. 18A-18B.

76. Figures 18A-18B show an optical connector including an MT ferrule. EX1001, 11:60-61. FIGs. 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.

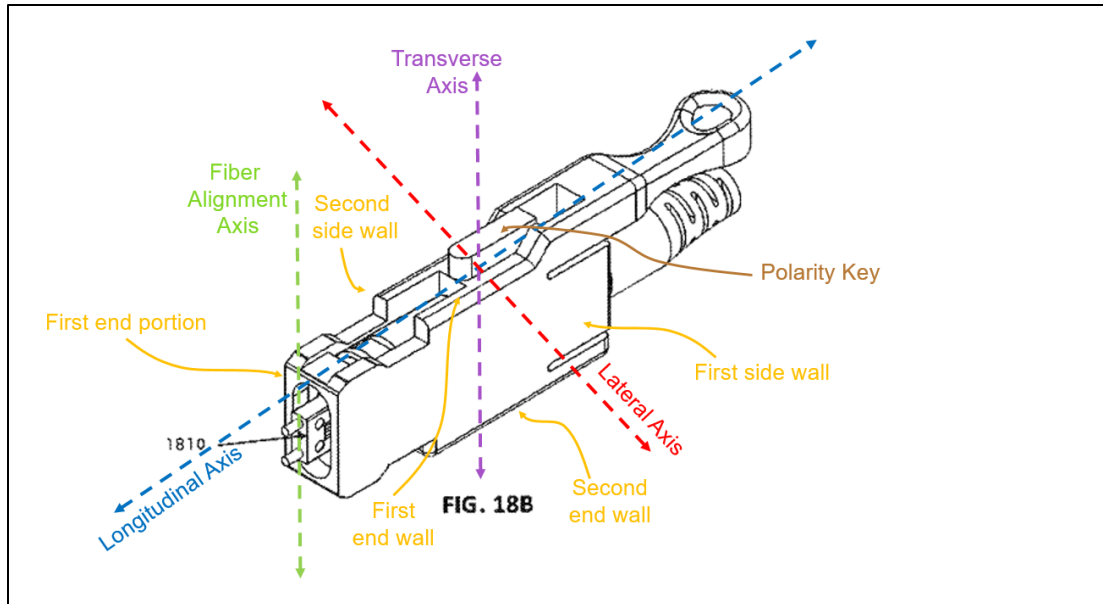
77. I know that the MT ferrule is a product made by Petitioner (US Conec) that certainly pre-dated the '413 Patent, as I recall MT ferrules at least in the mid-1990s, as shown by the Sayegh reference I cite here. EX1022, 4:55-58 (“An example of a suitable multi-fiber connector is an MT ferrule type connector that may be obtained from U.S. Conec Ltd. of Hickory, N.C.”). For another example, authors from US Conec and Tyco Electronics released a white paper about MT ferrules in 2006, illustrating they were well-known over a decade prior to the '413 Patent. *See* EX1008. There are several other prior art references in this declaration that also disclose using MT ferrules in fiber optic connectors. EX1005, ¶¶36-37; EX1006, ¶28; EX1011, ¶89.

78. 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 Figure 3, the '413 Patent discloses that the optical connect “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.

79. Figure 3 of the '413 Patent discloses an exploded embodiment of an optical connector and Figure 4 of the '413 Patent discloses a perspective view of the assembled optical connector of the embodiment of Figure 3 of the '413 Patent.

See EX1001, 3:7-10, FIGs. 3-4. The '413 Patent explains with reference to Figure 4 that the optical connector in this embodiment can include, inter alia, a push-pull tab, a “recess 411 to receive a locking tab or locking mechanism from an adapter,” and 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.

80. While I do not take a position here about whether the claims of the '413 Patent are supported by the written description of the '413 Patent, nor a position about whether the claims are enabled, it appears to me that Figure 18B aligns with some of the components recited in Claim 1 of the '413 Patent as illustrated below:



EX1001, FIG. 18B (annotated¹).

C. Summary of Relevant Prosecution History

81. I have reviewed the file history of the '413 Patent. For purposes of this Declaration, I summarize below certain parts of the file history that I reviewed. I also received input of counsel in conjunction with this review, who explained the relevant patent law.

82. U.S. Patent Application Serial No. 17/327,197 (the "'197 Application") was filed on May 21, 2021. As filed, the '197 Application included twenty-four (24) claims, with Claims 1 and 17 as the only independent claims. *See* EX1002, 0018-22. A Track One request for accelerated examination was filed with the '197 Application. EX1002, 0001.

¹ All color annotations to figures in this declaration are added unless otherwise noted.

83. The Applicant appears to have cited hundreds of references in Information Disclosure Statements (IDSs) before any Office Actions were issued. EX1002, 0219, 0223-61.

84. The first, and only, Office Action issued on October 20, 2021. *See* 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 to Cooke *et al.* (“Cooke”). EX1002, 209-218.

85. On January 20, 2022, the 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. Specifically, I note that Claim 1 was amended to introduce element [1.10]-[1.11] and Claim 17 was amended to introduce element [17.6]-[17.7]. EX1002, 0290-301.

86. On February 9, 2022, a Notice of Allowability was mailed allowing pending Claims 1-28. EX1002, 0304-309. The Examiner of the ’197 Application asserted in the Notice of Allowability that, “[a]lthough Cooke does teach displacement of a latching feature in order to secure the polarity key to the connector, Cooke fails to disclose or reasonably suggest any movement or displacement of the polarity key during the mating of the connector and the adapter.” EX1002, 0307. Thus, the Notice of Allowability noted that the following

limitation of independent Claims 1 and 17 was 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.

87. Subsequently, on February 25, 2022, the Examiner mailed a Corrected Notice of Allowability amending the '197 Application to correct the dependency of Claim 11. EX1002, 0329-332. The '197 Application then issued as the '413 Patent on May 24, 2022. EX1001, Cover.

D. Claims of the '413 Patent

88. The '413 Patent issued with 28 claims, of which claims 1 and 17 are independent claims. I reproduce the independent claims below for reference.

a. Independent Claim 1 of the '413 Patent

89. **Claim 1** recites:

[1pre] 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; and

[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.

EX1001, 20:32-64.

b. Independent Claim 17 of the '413 Patent

90. **Claim 17** recites:

[17pre] 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.

EX1001, 21:57-22:10.

VI. CLAIM INTERPRETATION

91. I understand that in interpreting claims, I should consider the literal language of the claim at issue, as well as the language of other claims, the specification, and the prosecution history of the underlying claims.

92. I also understand that the words of a claim should be given their plain and ordinary meaning as understood by those of skill in the art, unless it is clear from the specification or prosecution history (or both) that a different meaning was intended.

93. I understand that Petitioner does not propose any claim constructions. I agree that no constructions are necessary to determine whether the prior art discussed below establishes the elements recited in the claims.

VII. PRIOR ART

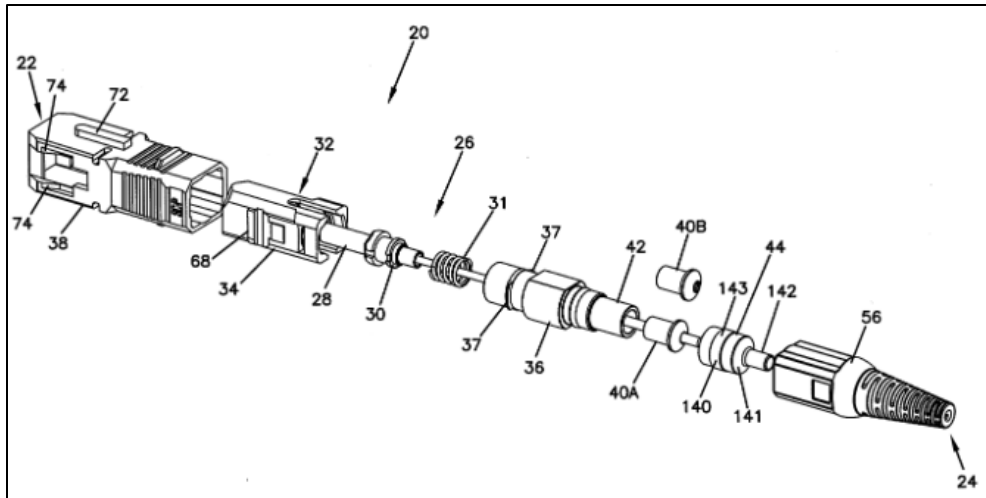
A. Overview of Nhep

94. U.S. Patent Application Publication No. 2016/0178850 (“Nhep”) is titled “Fiber Optic Connector.” EX1004, Cover. Nhep was published on June 23, 2016. EX1004, Cover. This patent publication is based on U.S. Application No. 14/858,900, which was filed on September 18, 2015. EX1004, Cover. This application is a continuation of U.S. Application No. 13/420,286, filed on March 14, 2012, and ultimately claims benefit to U.S. Provisional Application No. 61/452,953 filed on March 15, 2011.

95. I understand that Nhep is prior art to the '413 Patent based on my education, experience, discussion of the legal standards above and discussions with counsel. In particular, I understand that Nhep has a publication date prior to the earliest possible priority date of the '413 Patent (July 14, 2017), therefore Nhep qualifies as prior art at least for this reason.

96. Like 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.

97. Specifically, Nhep discloses a “first fiber optic connector 20” as shown below in Figure 1. EX1004, ¶76. As Nhep explains: “fiber optic connector 20 has a total length L_1 that extends from a distal end 22 of the fiber optic connector 20 to a proximal end 24 of the fiber optic connector 20. The fiber 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.

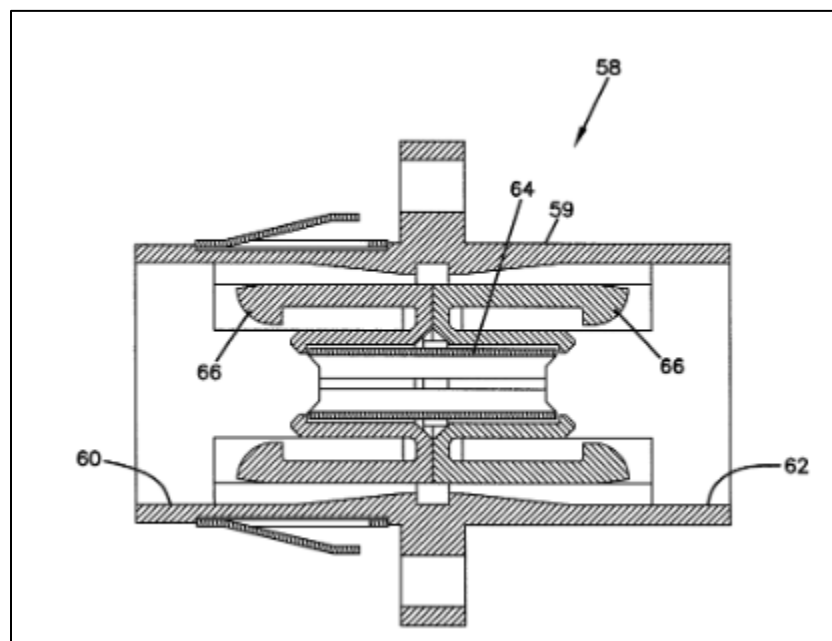


EX1004, FIG. 1.

98. Nhep's connector 20 latches and unlatches by means of movable release sleeve 38, which is pulled rearwards (towards boot 24) to unlatch connector 20. EX1004, ¶78. As Nhep explains: "When 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 to prevent the fiber optic connector 20 from being proximally withdrawn from the port 60, 62." EX1004, ¶78. In turn, "pulling the release sleeve 38 in a proximal direction, ramps 74 of the release sleeve disengage the latches 66 of the fiber optic adapter 58 from the shoulders 68 of the fiber optic connector 20 thereby allowing the fiber optic connector 20 to be proximally withdrawn from its respective port 60, 62." EX1004, ¶78. A "keying rail 72" is placed on release sleeve 38 to orient the connector in the receptacle, and thus acts to maintain the polarization of the fiber housed in Nhep's connector 20, or set a unique orientation of the fiber with

respect to the connector housing. EX1004, ¶78. I note that 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.

99. Nhep also discloses a “fiber optic adapter 58 that can be used to couple two of the fiber optic connectors 20 together.” EX1004, ¶77. Figure 25 below is a cross-section of adapter 58 that shows latches 66 prior to a connector 20 being engaged or latched in adapter 58.



EX1004, FIG. 25.

100. Finally, I note that 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.

B. Overview of Watanabe

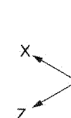
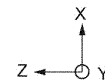
101. U.S. Publication No. 2017/0351037 (“Watanabe”) is titled “Receptacle connector and optical coupling structure.” EX1005, Cover. Watanabe was published on December 7, 2017. EX1005, Cover. Watanabe is based on International Application No. PCT/JP2015/084324, which was filed on December 7, 2015.

102. I understand that Watanabe is prior art to the ’413 Patent based on my discussion of the legal standards above and discussions with counsel. In particular, I understand that Watanabe has a filing date prior to the earliest possible priority date of the ’413 Patent (July 14, 2017), and so Watanabe qualifies as prior art at least for this reason.

103. Like Nhep, 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.

104. Watanabe discloses a fiber optic connector called a “plug connector” that holds an end of the second optical fiber. EX1005, ¶¶33-37. “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

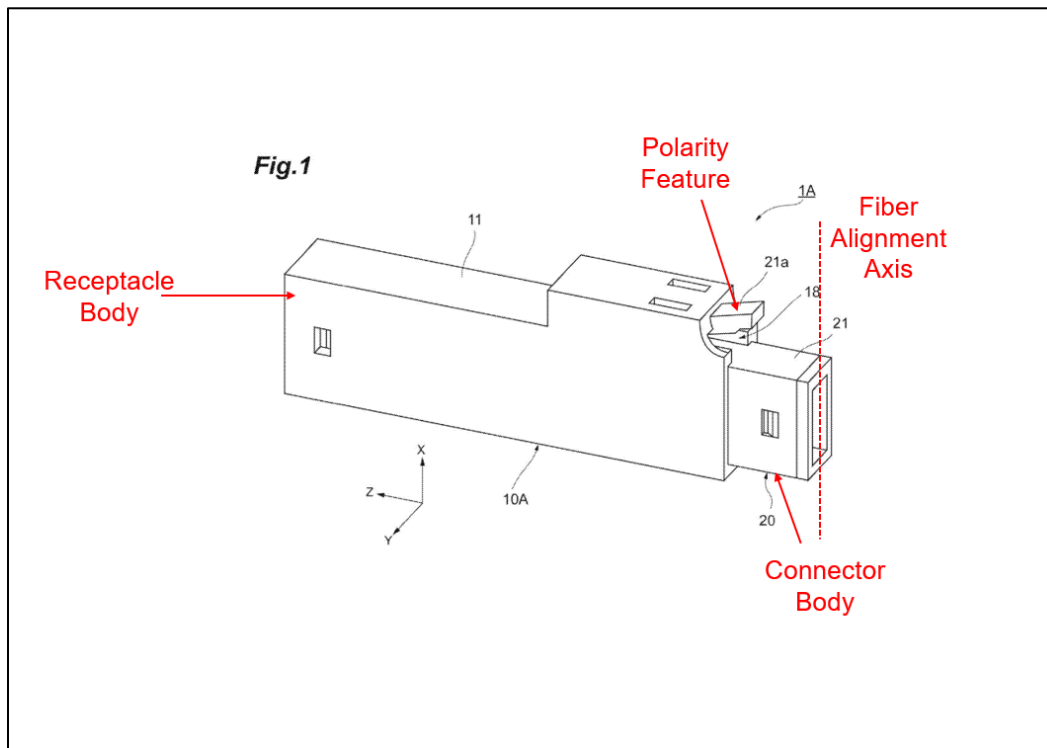
shows Watanabe's MT ferrule. EX1005, ¶36.



EX1005, FIGs. 2, 4.

receptacle connector 10A. EX1005, ¶33. As Watanabe explains, latching is

achieved by “latch lever 21a [that] is provided on one outer side face of the plug housing 21... [w]hen the plug connector 20 is inserted into the cavity 18, the latch lever 21a and the latch engaging part engage with each other and thus, getting-out of the plug connector 20 is prevented.” EX1005, ¶33. I note that latch lever 21a also acts as a polarity key because it only allows one latching orientation.



EX1005, FIG. 1 (annotated).

C. Overview of Lin

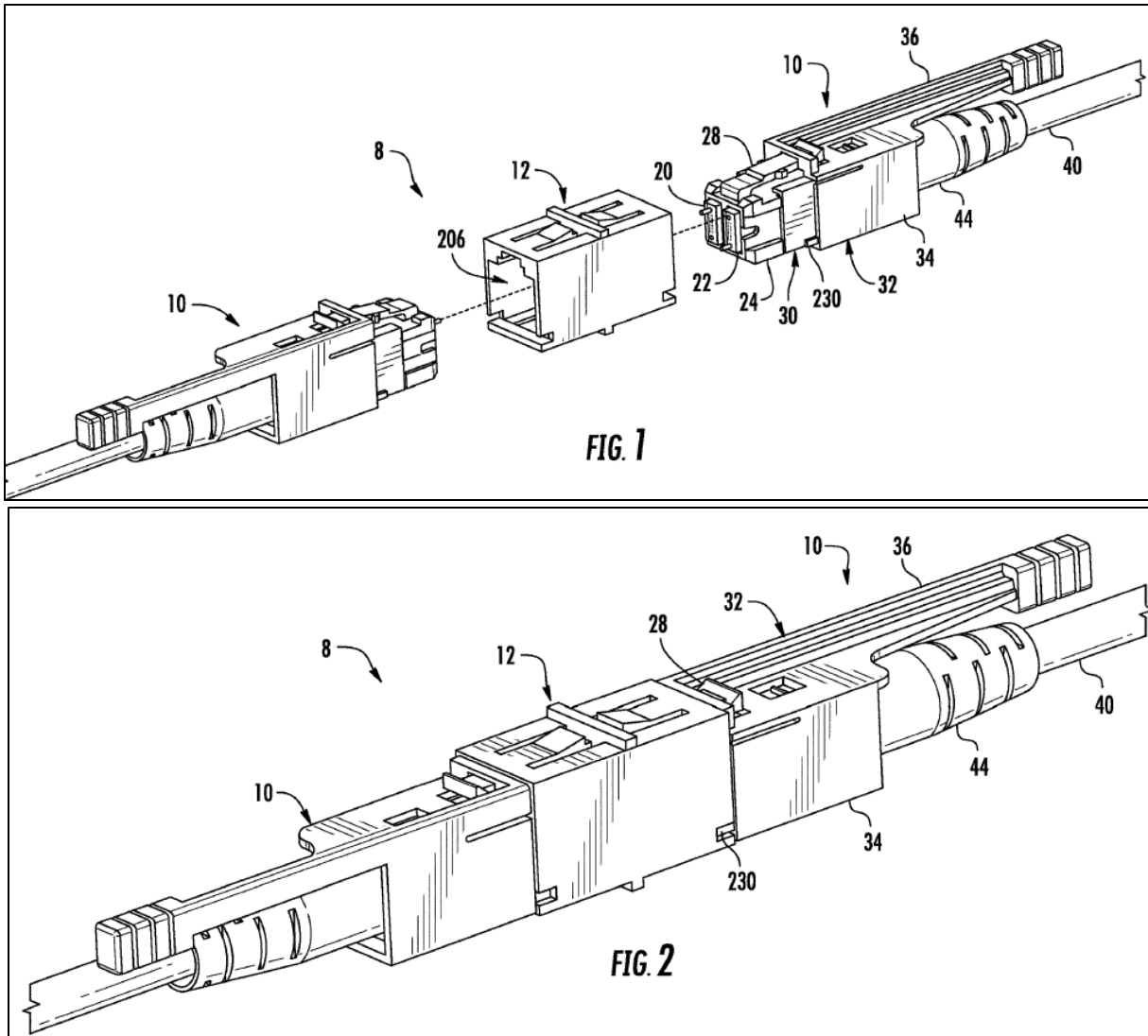
106. U.S. Patent Application Publication No. 2017/0227720 A1 (“Lin”) is titled “Fiber Optic Connector with Dual Multi-fiber Ferrules, and Cable Assemblies and Systems Including the Same.” EX1006, Cover. Lin was published on August 10, 2017. EX1006, Cover. This patent publication is based on U.S.

Application No. 15/428,189, which was filed on February 9, 2017. EX1006, Cover. This application claims the benefit of U.S. Provisional Application No. 62/389,436 filed on February 9, 2016. EX1006, Cover

107. I understand that Lin is prior art to the '413 Patent based on my education, experience, discussion of the legal standards above and discussions with counsel. In particular, I understand that Lin has a filing date prior to the earliest possible priority date of the '413 Patent (July 14, 2017), and so Lin qualifies as prior art at least for this reason.

108. Lin explains that its “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.

109. Lin discloses a fiber optic connector system 8 that includes at least one fiber optic connector 10 and an adapter 12. EX1006, ¶25. “The adapter 12 may be used to mate two of the connectors 10, as shown in FIG. 2.” EX1006, ¶25. Figures 1 and 2 of Lin, reproduced below, 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).



EX1006, FIGs. 1-2.

110. Lin's fiber optic connector 10 includes a latch arm 28 that extends outwardly from an inner connector body 24. EX1006, ¶26. 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.

designs. EX1006, ¶28. Lin discloses that “[f]or example, the first and second ferrules 20, 22 may each be a mechanical transfer (MT) ferrule like those used in known multi-fiber push-on (MPO) connectors.” EX1006, ¶28.

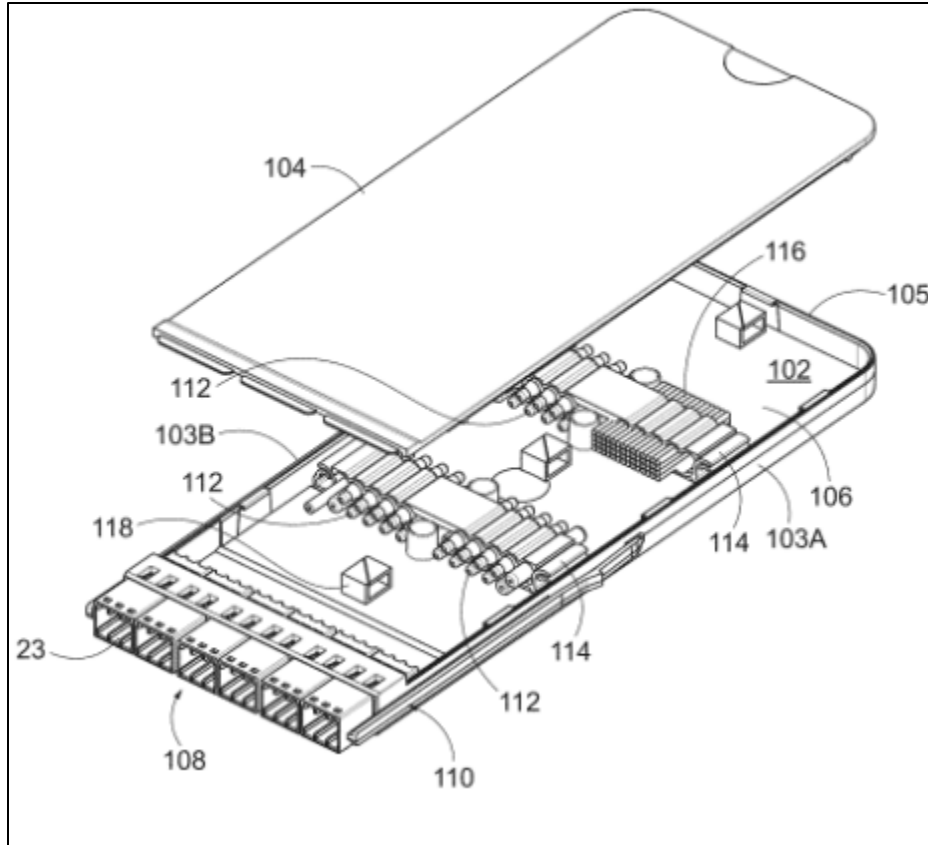
D. Overview of Cox

113. U.S. Patent Application Publication No. 2021/0099229 A1 (“Cox”) is titled “Dense wavelength division multiplexing fiber optic apparatuses and related equipment.” EX1010, Cover. Cox was published on April 1, 2021. EX1006, Cover. This patent publication is based on U.S. Application No. 17/031,088, which was filed on September 24, 2020. EX1010, Cover. This application claims the benefit of U.S. Provisional Application No. 62/389,436 filed on September 30, 2019. EX1010, Cover.

114. In this declaration, Cox is applied only in prior art combinations addressing Claim 9. As I discuss below, it is my opinion that Claim 9 has written description support as of the May 21, 2021 filing of the ’197 Application. Thus, I understand that Cox is prior art to Claim 9 of the ’413 Patent based on my education, experience, discussion of the legal standards above and discussions with counsel. Section II.D. In particular, I understand that Cox was published prior to the earliest possible priority date of Claim 9 of the ’413 Patent (May 21, 2021), and so Cox qualifies as prior art at least for this reason.

115. 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 facilitate at least a plurality of dense wavelength division multiplexing (DWDM) channels.” EX1010, ¶8. DWDM is a technique that increases fiber optic cable bandwidth by carrying data from multiple sources on a single fiber optic cable using different wavelengths of light.

116. An example of a fiber optic assembly is shown in Figure 4, reproduced below. EX1010, ¶¶39-43. A plurality of “fiber optic components 23” are disposed at “through a front side 108 of the main body and configured to receive fiber optic cables.” 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. (Hickory, N.C.), and SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.



EX1010, FIG. 4.

E. Overview of Katoh

117. U.S. Patent Application Publication No. 2012/0082416 A1 (“Katoh”) is titled “Optical connector, connector adapter, optical fiber line, and optical communication system.” EX1011, Cover. Katoh was published on April 5, 2012. EX1011, Cover. Katoh is based on U.S. Application No. 13/191,065, which was filed on July 26, 2011. EX1011, Cover.

118. I understand that Katoh is prior art to the '413 Patent based on my education, experience, discussion of the legal standards above and discussions with counsel. In particular, I understand that Katoh has a publication date prior to the

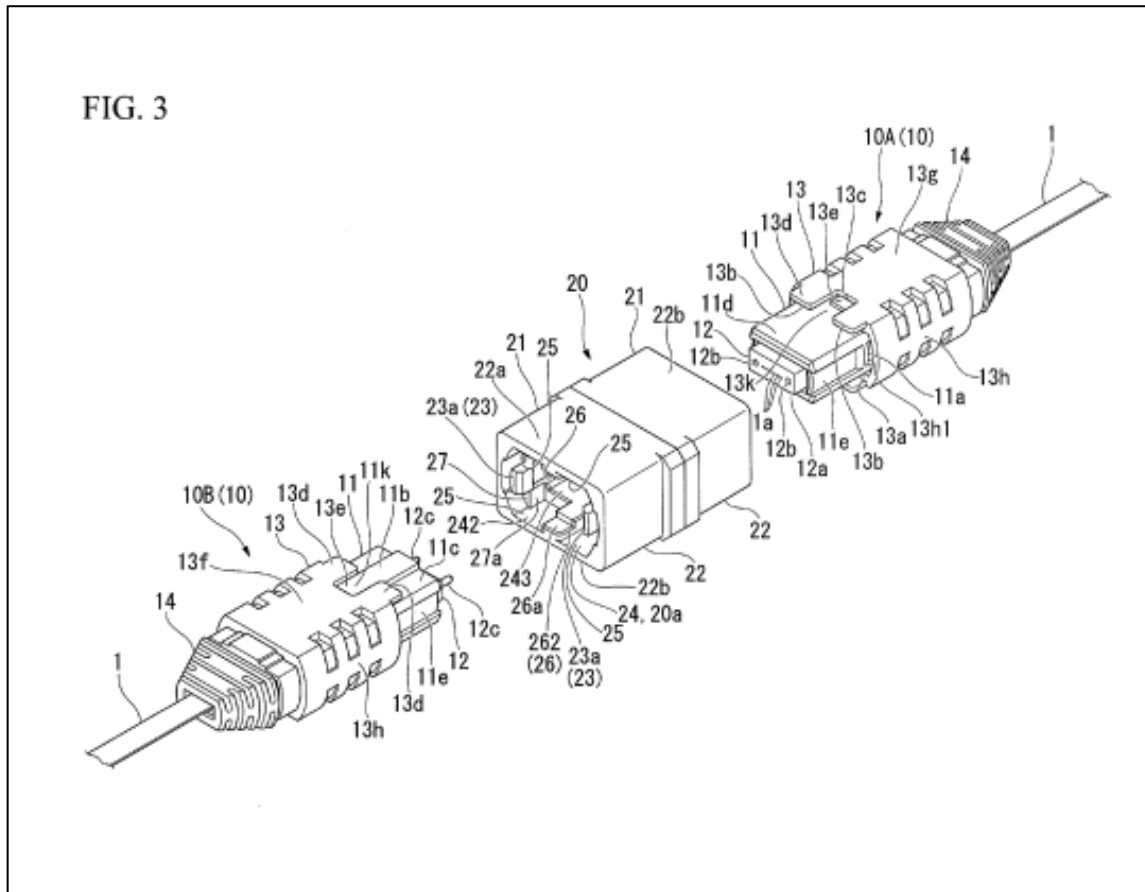
earliest possible priority date of the '413 Patent (July 14, 2017), and so Katoh qualifies as prior art at least for this reason.

119. Katoh “relates to an optical connector, an optical fiber line, and an optical communication system, and more particularly, to an optical connector that is inserted into an opening of a connector adapter and that is connected to another optical connector inserted into the other opening.” EX1011, ¶3. 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.

pair of “guide pin holes 12b” are disposed in the end face 12a of ferrule 12 for alignment of the MT ferrule during latching. EX1011, ¶¶94-99.

121. 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. Coupling 13 is “elastically impelled to the connector front side relative to the housing 11 by a coupling spring” and “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.

122. 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.



EX1011, FIG. 3.

123. Unlatching connector 10 is accomplished “by putting the coupling 13 to the connector rear side.” EX1011, ¶225. “[M]oving coupling 13 to the connector rear side...detach[es] the elastic engagement pieces.” EX1011, ¶226. This allows connector 10 to be removed from the adapter. Thus, movement of coupling 13 with respect to housing 11 is the mechanism that allows for latching and unlatching of connector 10. Specifically, rearwards movement of coupling 13 allows for unlatching of connector 10.

124. 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, 186. This “reverse-insertion preventing key 11b” can be interpreted to be a type of polarity key because it prevents the connector from latching in the wrong orientation. EX1011, ¶228.

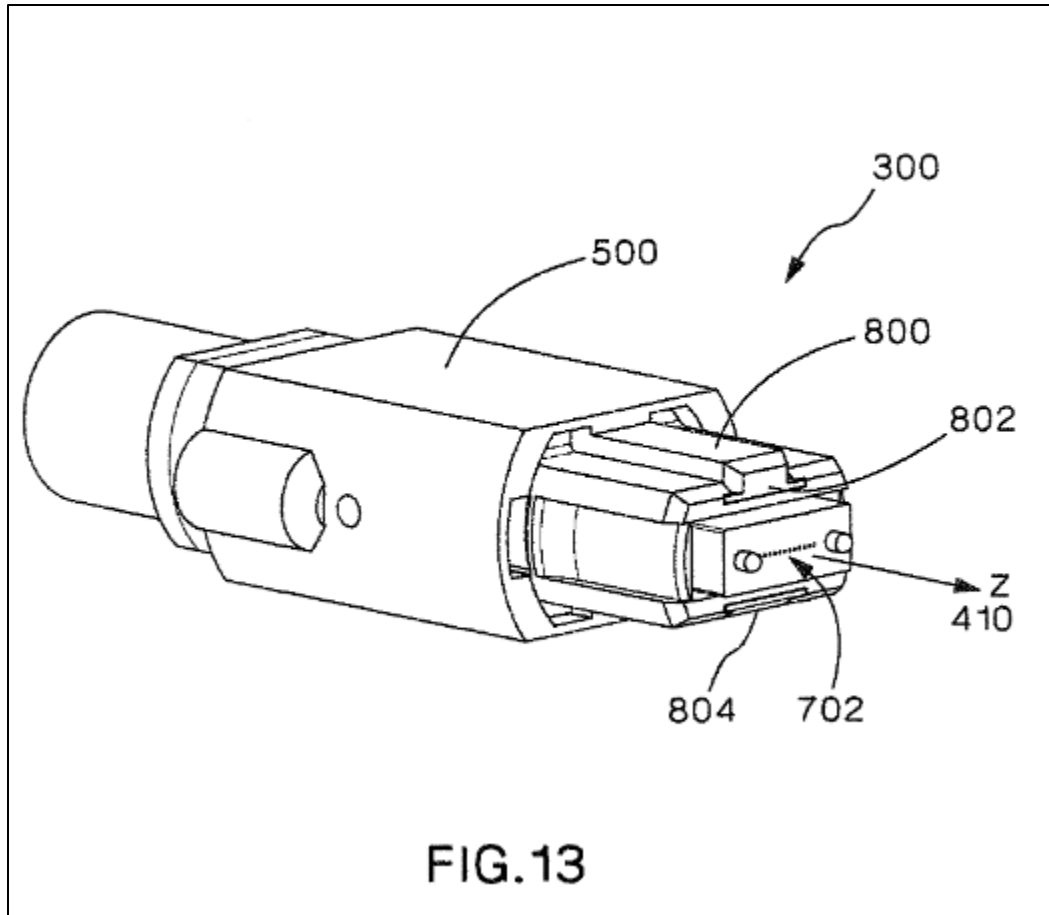
F. Overview of Kuffel

125. U.S. Patent Application Publication No. 2012/0099822 A1 (“Kuffel”) is titled “Optical Communication Connector.” EX1012, Cover. Kuffel was published on April 26, 2012. EX1012, Cover. Kuffel is based on U.S. Application No. 12/909,974, which was filed on October 22, 2010. EX1012, Cover.

126. I understand that Kuffel is prior art to the ’413 Patent based on my education, experience, discussion of the legal standards above and discussions with counsel. In particular, I understand that Kuffel has a publication date prior to the earliest possible priority date of the ’413 Patent (July 14, 2017), and so Kuffel qualifies as prior art at least for this reason.

127. Kuffel “relates generally to communication connectors, and more particularly, to an optical communication connector having a configurable polarity and/or gender.” EX1012, ¶1. Kuffel notes that its disclosure assumes the use of “MPO” type connectors. EX1012, ¶¶36-39. Kuffel focuses on improving efficiency, simplifying, and reducing costs associated with converting existing fiber optic networks to updated connectors (such as MPO connectors) in the field

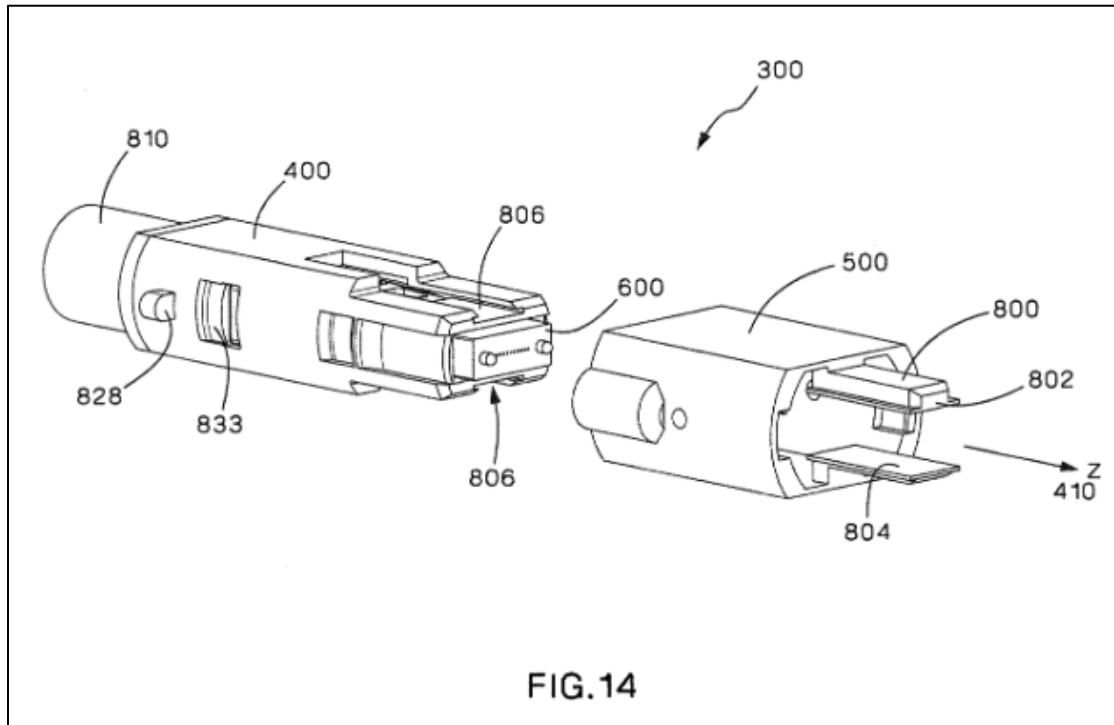
instead of during connector manufacturing. EX1012, ¶¶2-6. One aspect of Kuffel's disclosure "relates to changing the polarity of a connector" in the field to facilitate network assembly. EX1012, ¶¶10-11. An example connector 300 shown below in Figure 13 of Kuffel includes a "polarity key 800." EX1012, ¶¶59-62. As Kuffel explains, MPO networks require at least one "Type-B MPO-MPO patchcord" per the recognized standards. EX1011, ¶58. Further, Kuffel states the polarity keys "provide a mechanical means for identifying the polarity and for ensuring proper interfacing between adjoining connectors", and "[c]hanging the polarity of one connector in a patchcord effectively changes it from Type-A to Type-B, or vice versa." EX1011, ¶¶59-60. Thus, utilization of a polarity key for changing the polarity from a first polarity to a second polarity reduces the number of unique component types required for a typical installation, simplifies the bill of materials, makes installation of a fiber optic connector easier, and prevents exposing the connector interior (including the fiber and ferrule) to damage during the polarity changing operation. EX1011, ¶60.



EX1012, FIG. 13.

128. 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. "[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, reproduced below, shows outer housing 500 having been removed from inner housing assembly 400 prior to rotation and

reinstallation. EX1012, ¶¶61-64. Key 800 can be seen integrated into outer housing 500. EX1012, ¶62.



EX1012, FIG. 14.

129. Figure 18, reproduced below, depicts a flow diagram that explains the polarity-reversal process. EX1012, ¶67.

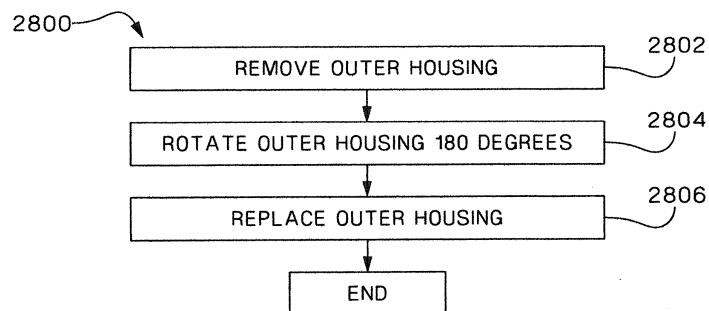


FIG. 18
EX1012, FIG. 18.

VIII. SUMMARY OF GROUNDS

130. In my opinion, the Challenged Claims (Claims 1-28) are invalid as obvious in view of the prior art. This table summarize the grounds that I believe show invalidity of Claims 1-28.

Ground	Basis	Reference(s)	Claims
1	§ 103	Nhep (EX1004) and Watanabe (EX1005)	1–4, 7, 8, 10–14, 17–22, 25–28
2	§ 103	Nhep, Watanabe, and Lin (EX1006)	5 and 6
3	§ 103	Nhep, Watanabe, and Cox (EX1010)	9
4	§ 103	Nhep, Watanabe, and Applicant Admitted Prior Art	15, 16, 23, 24
5	§ 103	Katoh (EX1011) and Kuffel (EX1012)	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

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

131. For at least the reasons below, it is my opinion that the combination of Nhep and Watanabe renders obvious independent claim 1 and independent claim

17 of the '413 Patent. Additionally, Nhep and Watanabe render obvious dependent claims 2–4, 7, 8, 10–14, 18–22, and 25–28.

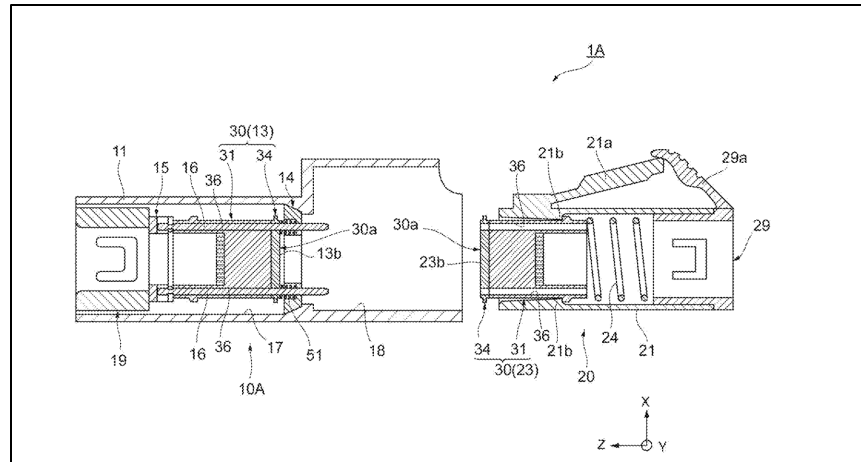
A. Motivation to Combine

1. Nhep

132. Nhep discloses fiber optic connectors. EX1004, ¶¶8-9. As discussed above, Nhep discloses a connector 20 that latches and unlatches by means of movable release sleeve 38, which is pulled rearwards (towards boot 24) to unlatch connector 20. EX1004, ¶78; Section VII.A. 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.

2. Watanabe

133. Similar to Nhep, Watanabe discloses fiber optic connectors. EX1005, ¶¶1, 4-5. Watanabe discloses a fiber optic connector called plug connector 20. EX1005, ¶34. Watanabe's connector differs from Nhep's connector because Watanabe teaches use of a "MT ferrule," which is a type of multi-fiber ferrule. EX1005, ¶37. Thus, Watanabe's connector 20 is able to connect multiple fiber optic strands in one connector body.



EX1005, FIG. 2.

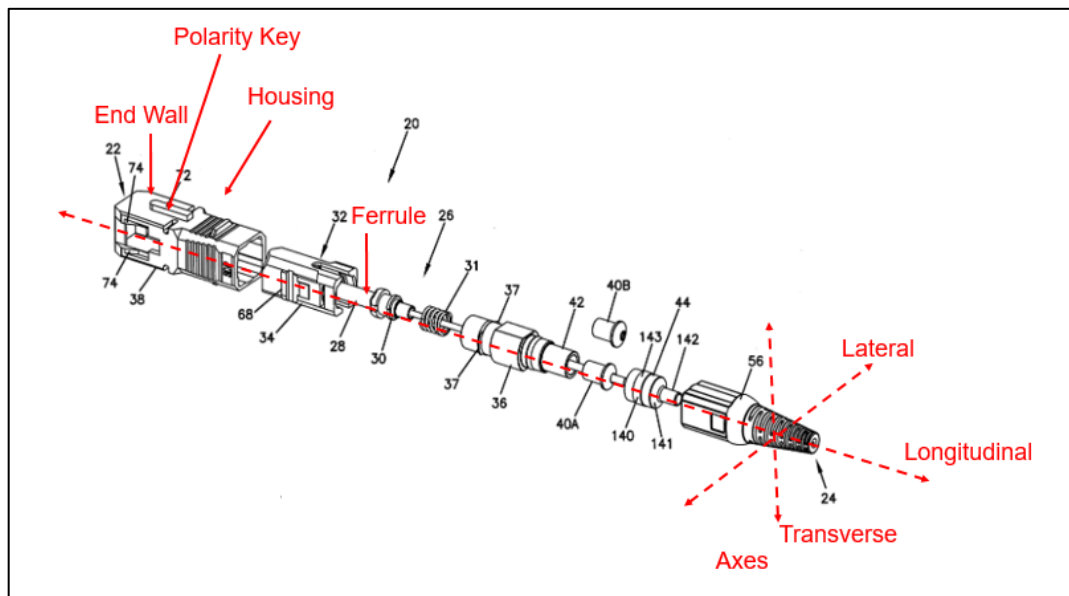
136. I note that Nhep's connector is based on the well-known SC type connector, which is a single-fiber connector. EX1004, ¶¶78, 112. I am aware of at least two examples of SC-type connectors, or designs based on SC-type connectors, that were modified to accept multi-fiber ferrules in a manner similar to what I propose here. First, the so-called "MU" connector is essentially a miniature SC-type connector that is available in duplex form with two fiber optic connections. An example of a MU connector is shown in Nishimura *et al.*, specifically Figures 2 and 4. EX1016, 14. The second example is the SC-DC or SC-QC connectors that are modified SC connectors with dual or quad fiber optic connections. *See* EX1023.

137. Finally, as corroborating evidence of my opinions, U.S. Patent 8,858,089 is a prior art patent that demonstrates the well-known concept of modifying an SC-type connector to accommodate a ferrule housing a multicore

fiber, which contains multiple fiber cores in a single ferrule. EX1017, 12:36-13:43.

Thus, this modification was not only obvious for the reasons I discuss above, but similar modifications were designed and marketed well before the relevant date here.

138. 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 of Nhep (annotated below in Nhep Figure 1). This aligns the fiber axis with the connector wall containing Nhep's keying rail 72 (*i.e.*, Nhep's polarity key).



EX1004, FIG. 1 (annotated).

139. A POSITA would have been motivated to do so for several reasons. First, this orientation optimizes the connector density by orienting the longest dimension of the connector housing (*i.e.*, the fiber axis of an MT ferrule) to be on the same axis as the polarity key (*i.e.*, Nhep's keying rail 72). This optimizes

density by placing the polarity key within what is typically the unused space that is allotted to allow for clearance between vertically adjacent rack mount units above and below the connector recesses within a fiber optic rack or enclosure. Orienting the MT ferrule in this way allows the groove in the connector receptacle accommodating the keying rail 72 to be placed into the unused space, thereby improving connector density.

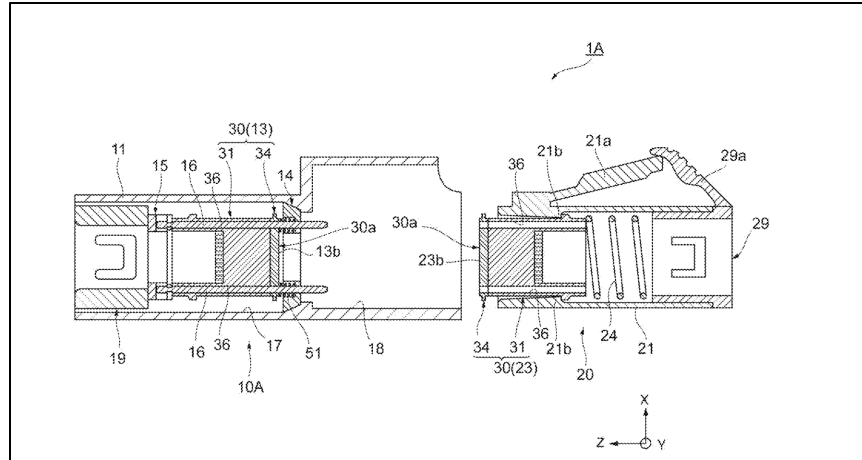
140. Second, this modification of orienting the longest dimension of the connector housing (*i.e.*, the fiber axis of an MT ferrule) to be on the same axis as the polarity key (*i.e.*, Nhep's keying rail 72) would have been obvious for a POSITA to try because it involves choosing from a finite number of identified, predictable solutions with a reasonable expectation of success. Here, there are only two possible orientation solutions with respect to the MT ferrule. First, the MT ferrule could be oriented as I discuss above, such that the fiber alignment axis is parallel to the transverse axis. Second, the MT ferrule could be rotated perpendicular to the first arrangement, such that the fiber alignment axis is parallel to the lateral axis. Any other angled arrangement of the MT ferrule is not logical because the connectors would not maximize connector density in the standard rectangular equipment racks that I discuss above in Section IV. Additionally, an angled MT ferrule orientation would also result in wasted space in the housing

because the housing would have to be enlarged from the configuration shown in Watanabe.

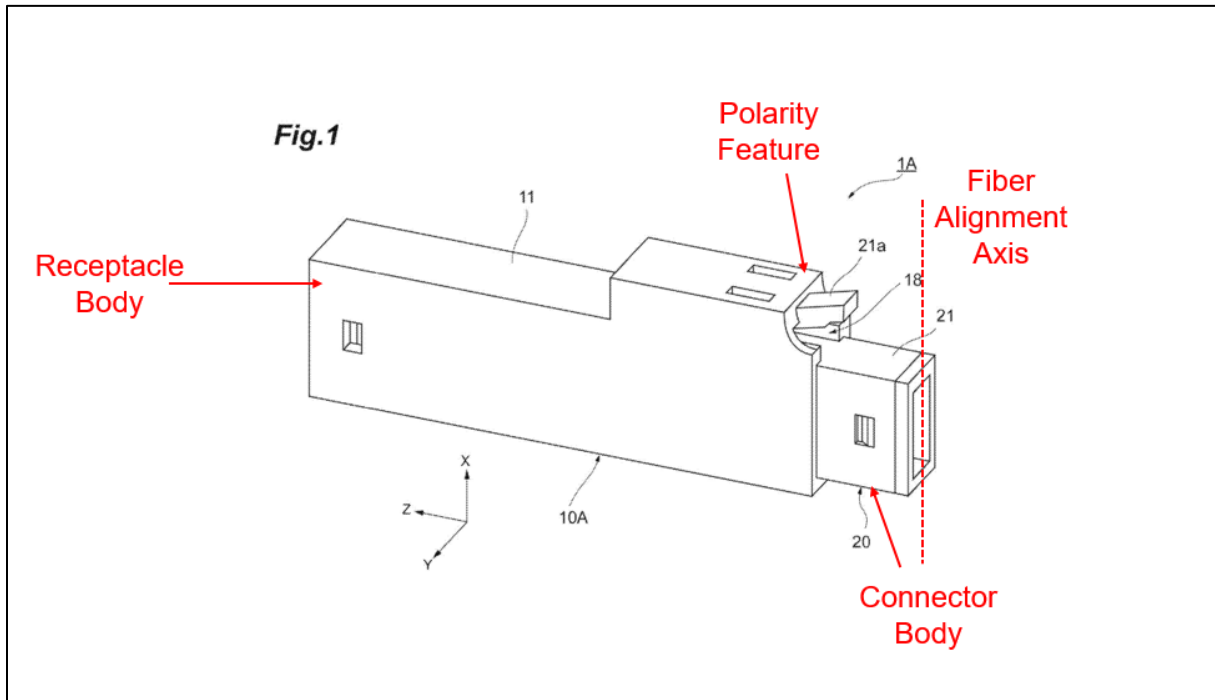
141. Either orientation I discuss above is equally achievable by a POSITA and would not affect the functionality of the resulting connector. Thus, in my opinion the ferrule orientation would also have been obvious as a matter of being obvious to try.

142. Third, this orientation would have been obvious to a POSITA because this is the orientation shown in prior art Watanabe. As seen below, the longer axis of the MT ferrule is aligned with the “x” axis in Watanabe. This axis, which I am terming the fiber alignment axis, is aligned with Watanabe’s actuation lever 21, which acts as a polarity key in a manner equivalent to Nhep’s keying rail 72.

143. A POSITA motivated to add Watanabe’s MT ferrule as I discussed above would have turned to Watanabe for any construction details to facilitate the modifications needed to be made to Nhep. 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. I note that orienting the fiber alignment axis in line with the wall that contains the polarity feature is also taught in other prior art references, further reinforcing this orientation. *See, e.g.,* EX1006, FIG. 1.



EX1005, FIG. 2.



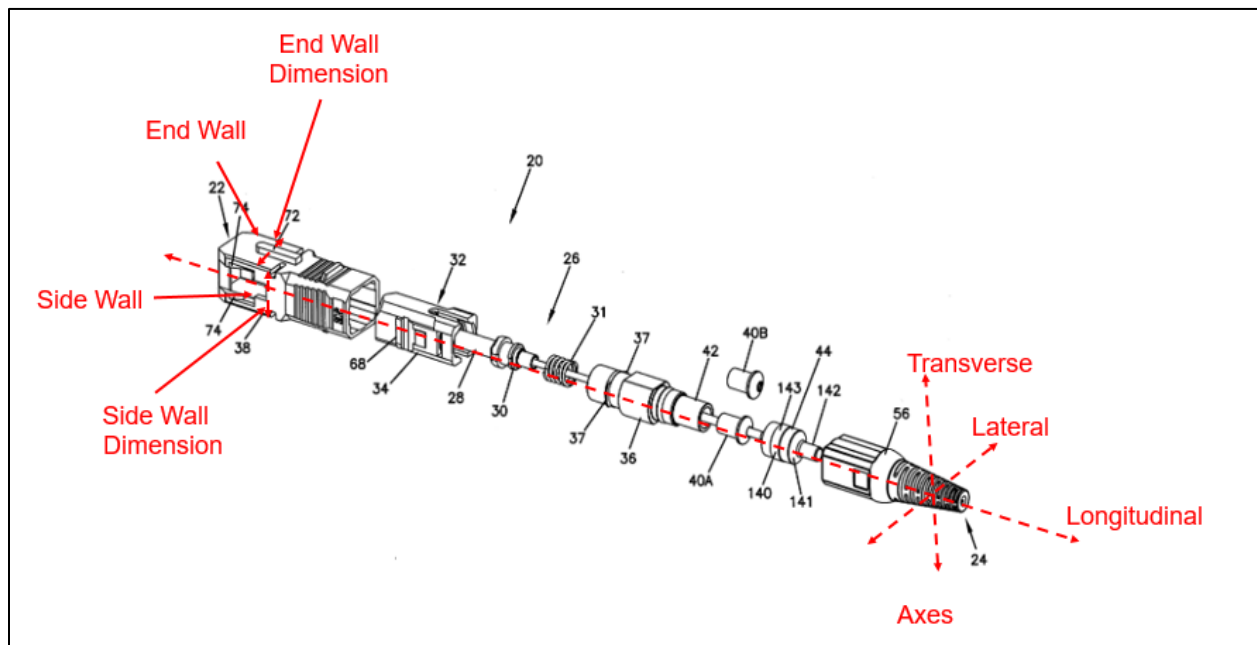
EX1005, FIG. 1 (annotated).

144. 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. 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.

145. As evidence corroborating my opinion that maximizing connector density is a known design motivation in the art, I refer to U.S. Publication No. 2013/0308916 at its abstract and paragraphs 12-13. EX1018, Abstract, ¶¶12-13. It would be known that designing the connectors to have the smallest external dimensions possible is a way of maximizing connector density.

146. Second, this is the configuration shown in Watanabe, which a POSITA would have relied on for details relevant to the modification. 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.

147. For convenience, I have annotated these dimensions below, using the terms end wall dimension for the shorter wall and side wall dimension for the longer wall.



EX1004, FIG. 1 (annotated).

148. A POSITA would have had a reasonable expectation of success making these modifications. 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, because the changes would require only basic re-shaping of Nhep's components to accommodate the MT ferrule. This type of redesign was well within the skill of a POSITA at the relevant time. I also note that the redesign of a connector to accommodate a known ferrule is a highly predictable process that would most likely result in a successful connector design.

149. As a final clarification, I note that in the combination of Nhep and Watanabe that a POSITA would be motivated to make, a POSITA would have

recognized that in adjusting the dimensions of the walls to conform to the MT ferrule each of the walls must maintain the same contours/notches to interact with an adapter. In other words, substituting the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe does not affect or hinder any of the latching and unlatching mechanisms of Nhep's connector with an adapter. Therefore, Nhep's fiber optic connector will continue to have the same fundamental principle of operation and the combination with Watanabe will not render Nhep unsatisfactory for its intended purpose. Throughout my analysis herein, when I refer to the combination of Nhep and Watanabe, it is the above-described particular combination to which I refer.

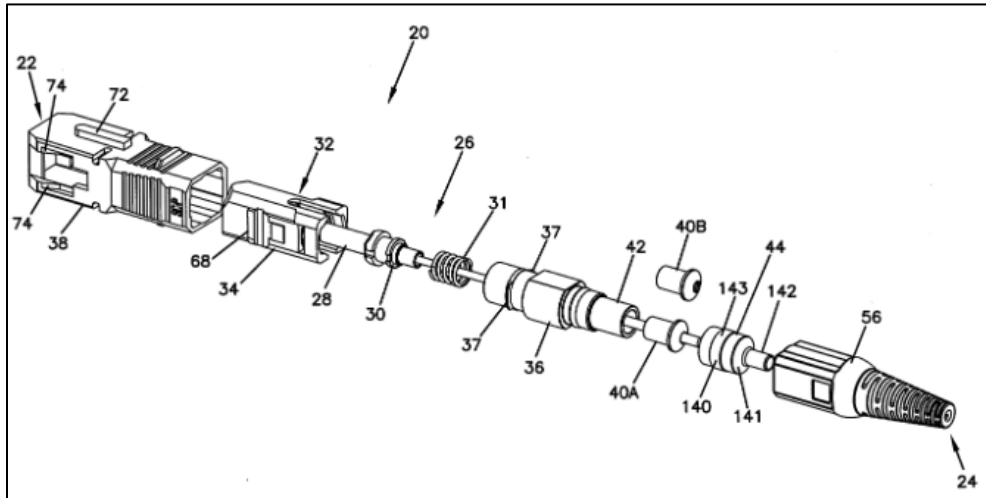
B. Claim 1

1. Preamble – “An optical fiber connector comprising”

150. I understand from counsel that a preamble is assumed to be non-limiting unless certain conditions are met, such as the preamble defining structure that is used in and necessary for the claimed invention. Here, in my opinion the preamble of claim 1 is not limiting because it does not define any necessary structure or otherwise serve to limit Claim 1.

151. Regardless, for at least the reasons below, it is my opinion that Nhep and Watanabe disclose the preamble. Nhep states that its “disclosure relates to fiber optic connectors used in optical fiber communication systems.” EX1004, ¶2.

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. An “optical fiber 50 extends through the total length L_1 of the fiber optic connector 20” and extends “proximally from the ferrule 28.” EX1004, ¶81.



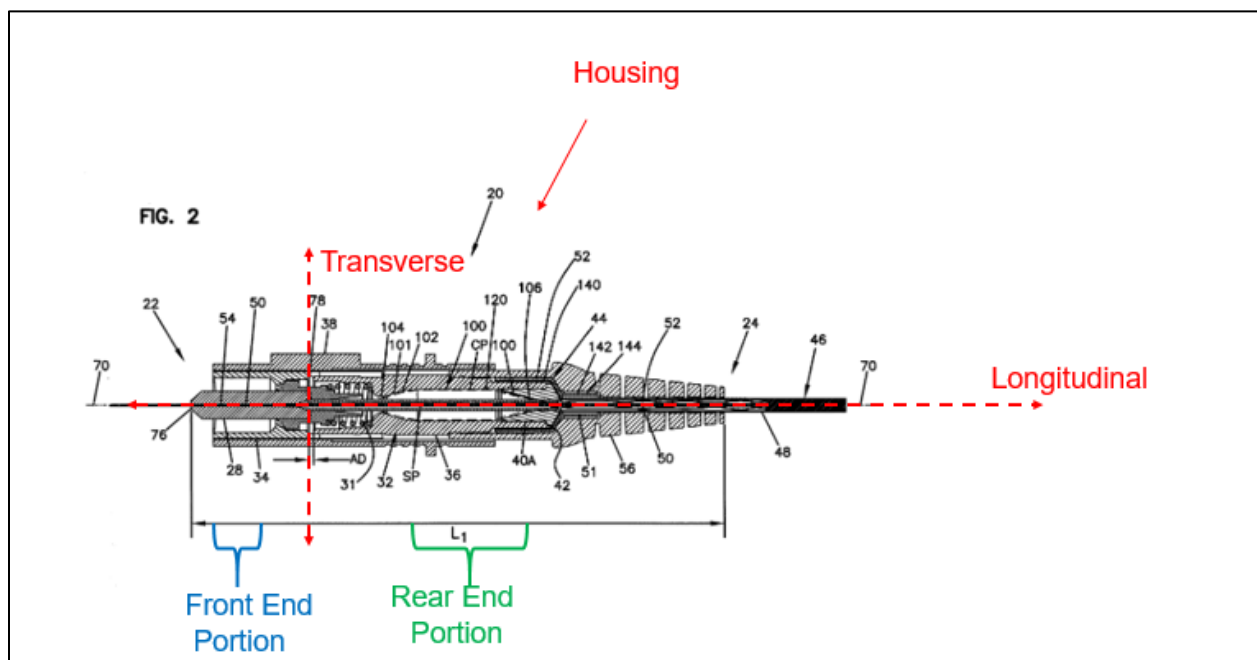
EX1004, FIG. 1

152. Additionally, Watanabe 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.

153. Accordingly, for at least these reasons, it is my opinion that a POSITA would have understood that both Nhep and Watanabe separately disclose the preamble of Claim 1 of the '413 Patent.

2. Element [1.1] – “a housing having a longitudinal axis and a front end portion and a rear end portion spaced apart along the longitudinal axis”

154. For at least the reasons below, it is my opinion that Nhep discloses claim element [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. I note that the claim does not define the orientation of the “longitudinal axis.” However, this term is used once in the specification of the ’413 Patent, where it appears to refer to the axis aligned with the path of the fiber optic cables running through the receptacle within a prior art connector housing. EX1001, 5:60-6:8. This definition comports with my general understanding of the term longitudinal axis, and thus I have annotated the longitudinal axis of the housing of Nhep’s connector 20 on the cross section below.



EX1004, FIG. 2 (annotated).

155. The terms front end portion and rear end portion are also not specifically defined by the claim or discussed in the specification. Thus, I have assigned these labels such that the front end portion is the portion closest to the end of the connector that is inserted to establish a fiber optic connection because in my opinion this end would more typically be considered the front of a connector housing. The rear end portion is therefore the opposite portion of the housing.

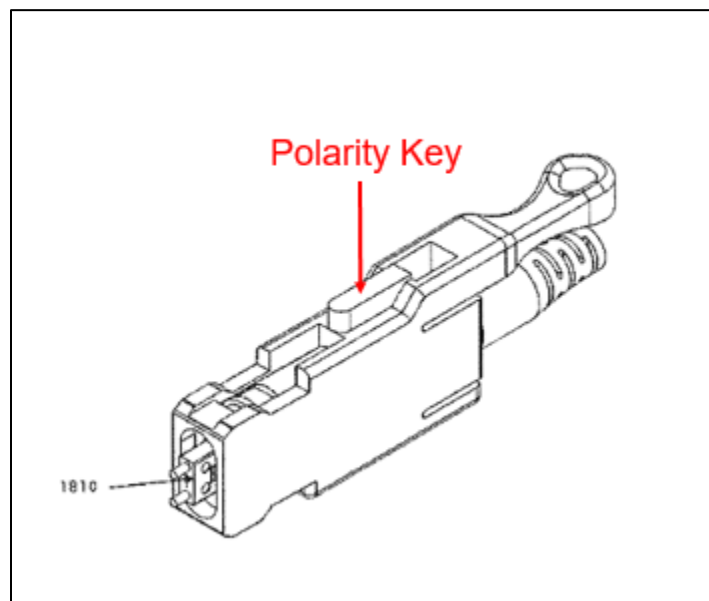
156. Thus, Nhep discloses claim element [1.1]. In addition to Nhep disclosing claim element [1.1], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious claim element [1.1]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.1] that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Nhep-Watanabe multi-fiber optical connector would render obvious claim element [1.1].

3. Element [1.2] – “the housing comprising opposite first and second end walls spaced apart along a transverse axis oriented perpendicular to the longitudinal axis”

157. For at least the reasons below, it is my opinion that Nhep discloses claim element [1.2]. As shown below, Nhep’s housing components include first and second end walls spaced apart along a transverse axis. I note that this claim does not specify the direction of the transverse axis beyond the requirement that it

be perpendicular to the longitudinal axis. However, as I discussed above, it is my opinion that the embodiment of Figure 18 is an example of a connector as recited in Claim 1.

158. Claim 1 also recites that the polarity key be disposed on the first end wall. As seen below, in Figure 18B, the polarity key is oriented on the upper wall of the connector housing.

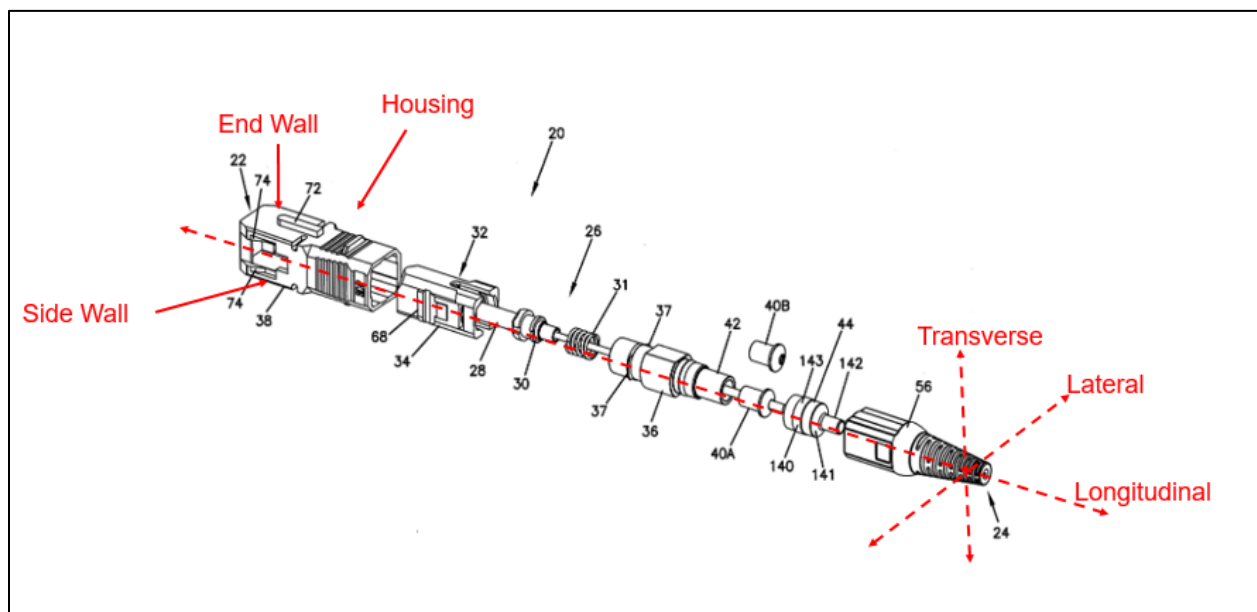


EX1001, FIG. 18B (annotated).

159. Thus, I have defined the transverse axis as the equivalent of the vertical axis that is aligned with the long axis of the ferrule and identified the corresponding end walls of Nhep's housing. Note that one of the end walls is below the connector and hidden in the view below.

160. A POSITA would have maintained these features in Nhep modified by Watanabe because doing so preserves Nhep's functionality.

161. Accordingly, Nhep discloses claim element [1.2]. In addition to Nhep disclosing claim element [1.2], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious claim element [1.2]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.2] that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Nhep-Watanabe multi-fiber optical connector would render obvious claim element [1.2].

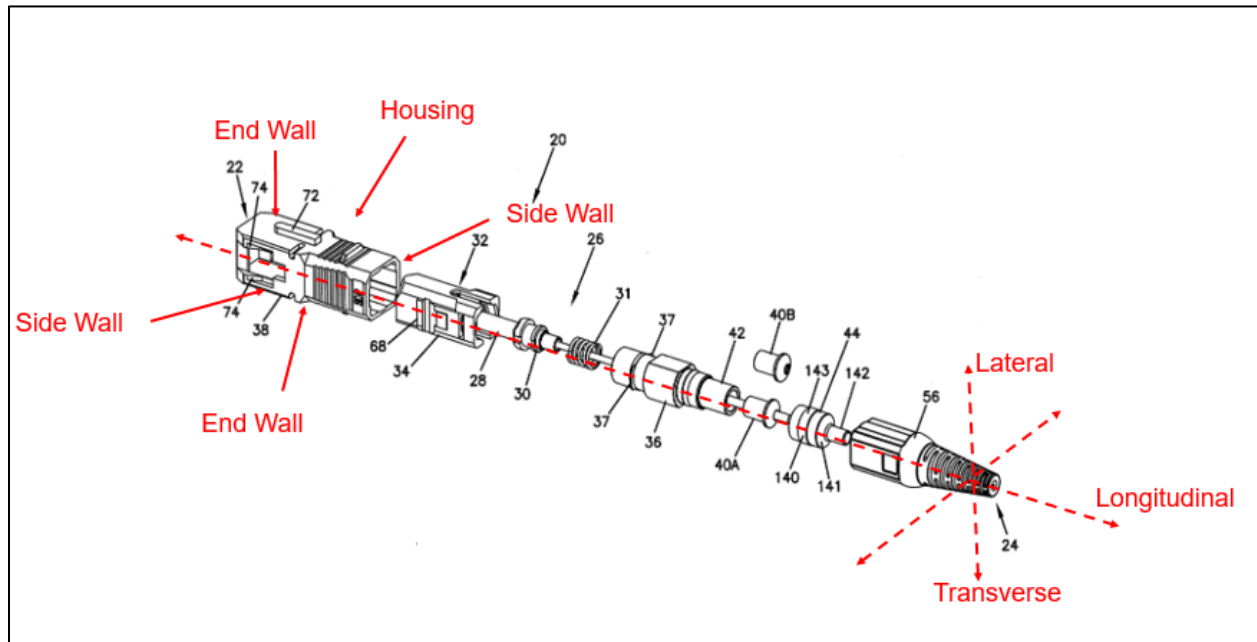


EX1004, FIG. 1 (annotated).

4. Element [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”

162. For at least the reasons below, it is my opinion that Nhep discloses claim element [1.3]. As shown below, Nhep’s housing also includes first and

second side walls as recited in the claim. Here, the definition of the transverse and longitudinal axes defines the lateral axis, which must be perpendicular to those axes. Similar to claim element [1.2], the view of the figure below hides one of the side walls.



EX1004, FIG. 1 (annotated).

163. A POSITA would have maintained these features in Nhep modified by Watanabe because doing so preserves Nhep's functionality.

164. Thus, Nhep discloses claim element [1.3]. In addition to Nhep disclosing claim element [1.3], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious claim element [1.3]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.3] that are disclosed by Nhep would be preserved in

the specific combination of the prior arts. Thus, it my opinion that the Nhep-

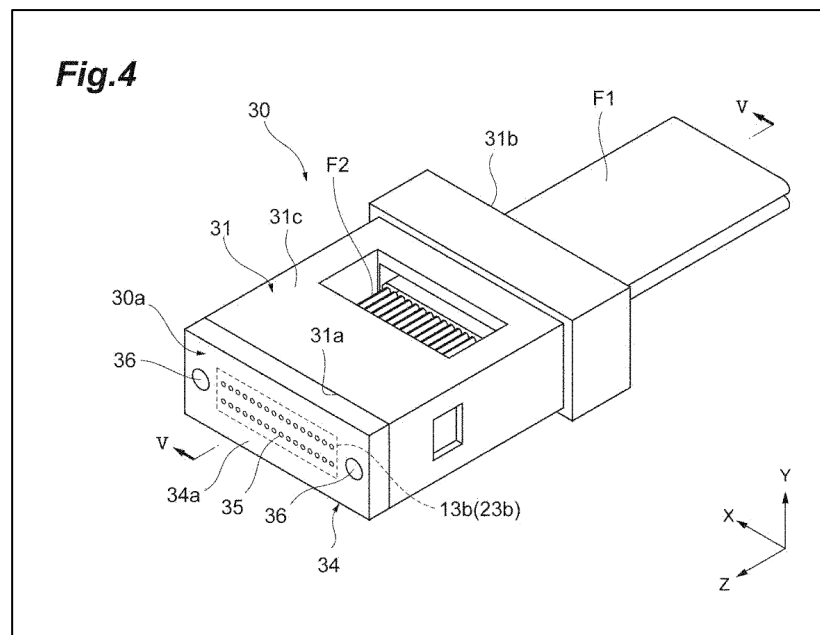
Watanabe multi-fiber optical connector would render obvious claim element [1.3].

5. Element [1.4] – “an MT ferrule received in the housing and exposed through the front end portion of the housing for making an optical connection”

165. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.4].

166. 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. *See* Sections V.B; VII.B.

167. Watanabe discloses that its “ferrule main body part 31 is a so-called MT ferrule.” EX1005, ¶37. An example of Watanabe’s MT ferrule is shown below.



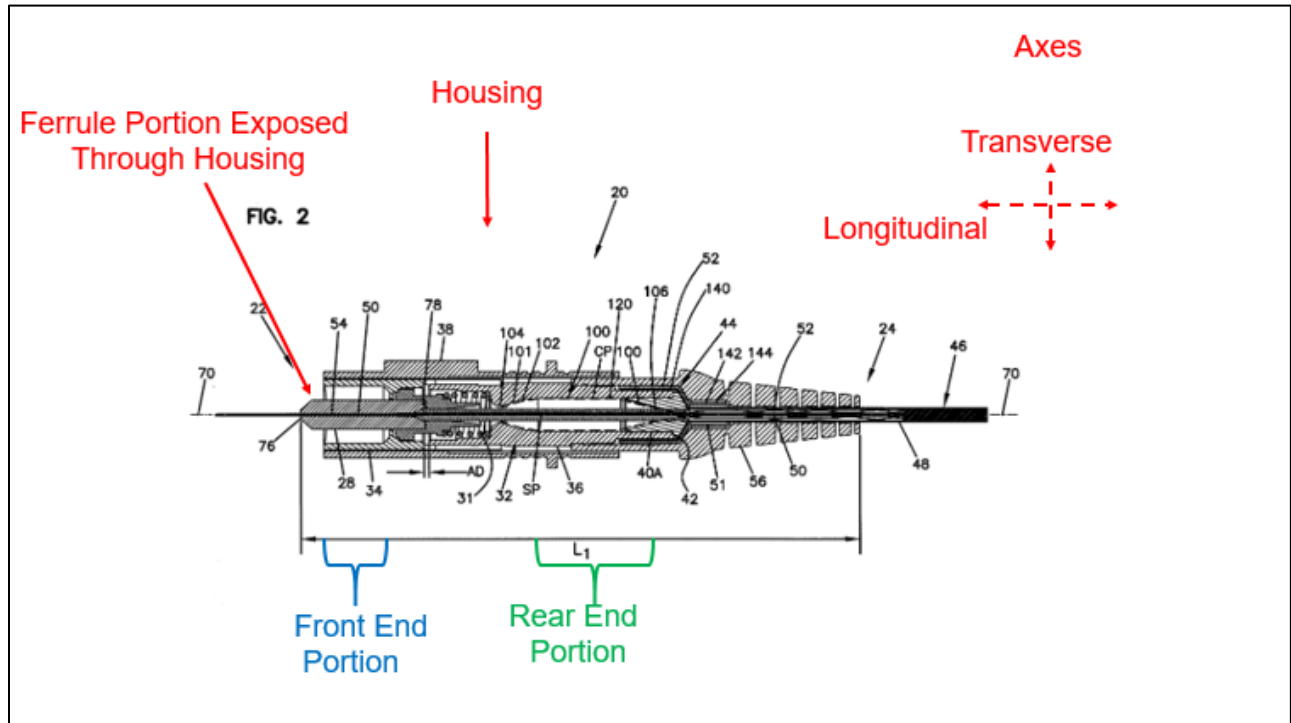
EX1005, FIG 4.

168. As discussed above, it is my opinion a POSITA would have found it obvious to modify Nhep to include an MT ferrule as disclosed by Watanabe. *See* Section IX.A. In summary, the well-known use of multi-fiber ferrules increases the number of fiber connections in a single connector, therefore improving efficiency. This would have motivated a POSITA to modify Nhep's connector to include an MT ferrule. 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, as discussed above. *See* Section IX.A.

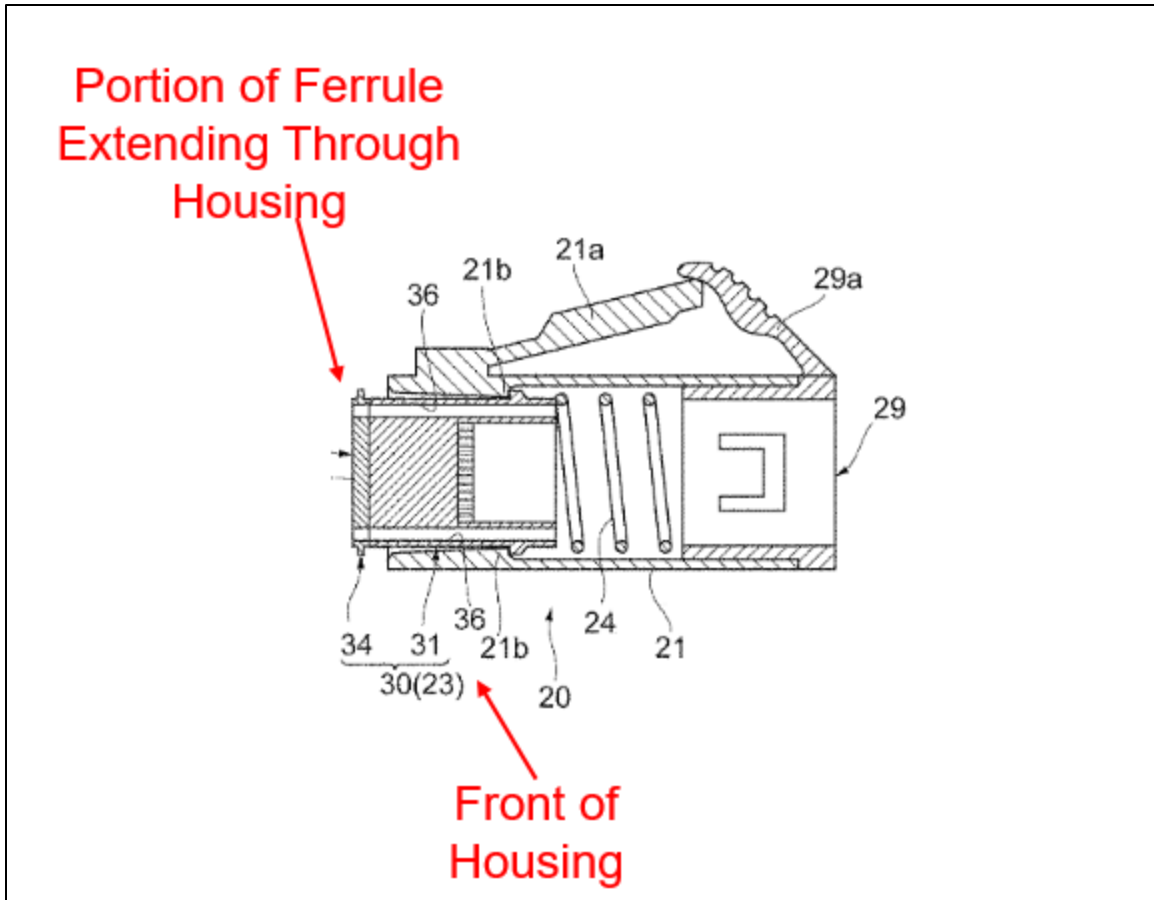
169. As seen below, both Nhep and Watanabe disclose their respective ferrules extending beyond a front portion of their housings. A POSITA would have been motivated to maintain these features in Nhep modified by Watanabe because this ensures connector compatibility and is the configuration taught by Watanabe, which provides construction details for the modification to Nhep.

170. Accordingly, a POSITA would have understood that while Nhep presents an optical connector for housing a single fiber ferrule, it is obvious to modify this connector to accommodate multi-fiber ferrules, such as MT ferrules, as presented in Watanabe. *See* Section IX.A.3. Therefore, a POSITA would have been motivated to substitute the MT ferrule of Watanabe into the optical connector of Nhep, which would have resulted in a connector maintaining the functionality of Nhep that accommodates a multi-fiber ferrule, such as the MT ferrule disclosed in

Watanabe. Therefore, it is my opinion that Nhep in view of Watanabe render obvious claim element [1.4] and would have been obvious to combine as I discuss in Section IX.A.3.



EX1004, Fig. 2 (annotated).



EX1005, FIG. 2 (excerpt, annotated).

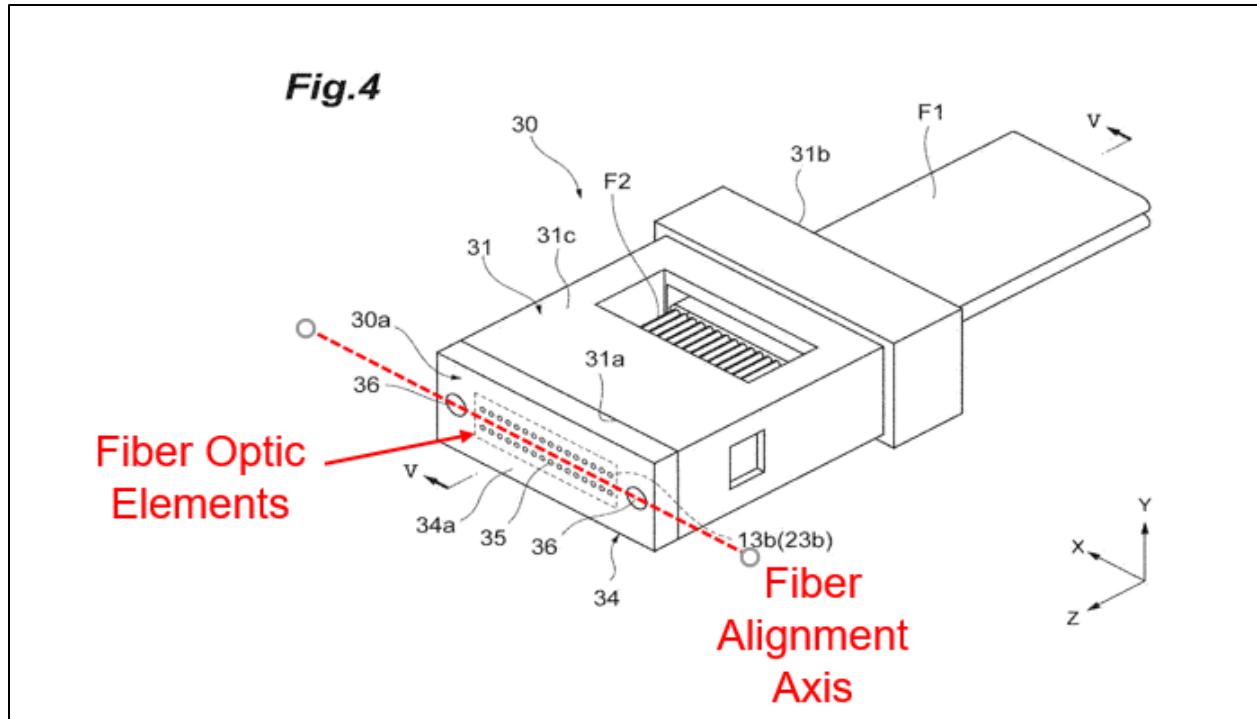
6. Element [1.5] – “the MT ferrule configured to receive plurality of fibers such that the fibers are spaced apart in a row that extends parallel to a fiber alignment axis”

171. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.5].

172. Patent Owner may allege that Nhep does not expressly disclose an MT ferrule with the claimed features. However, MT ferrules with the configuration recited in claim element [1.5] were well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

173. As shown below, Watanabe's MT ferrule includes a plurality of fibers that are arranged in an array of two rows. Watanabe explains that the MT ferrule includes "a plurality of GRIN lenses (optical elements) 35 optically coupled with the plurality of optical fibers F2 respectively. The plurality of GRIN lenses 35 are arranged in an array shape within the XY plane." EX1005, ¶41. I have annotated the fiber alignment axis defined by the rows of the MT ferrule below.

174. Accordingly, for at least the reasons described above and in Section IX.B.5 with respect to claim element [1.4], it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.5] and would have been obvious to combine as I discuss in Section IX.A.3.



EX1005, FIG. 4 (annotated).

7. Element [1.6] – “the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis”

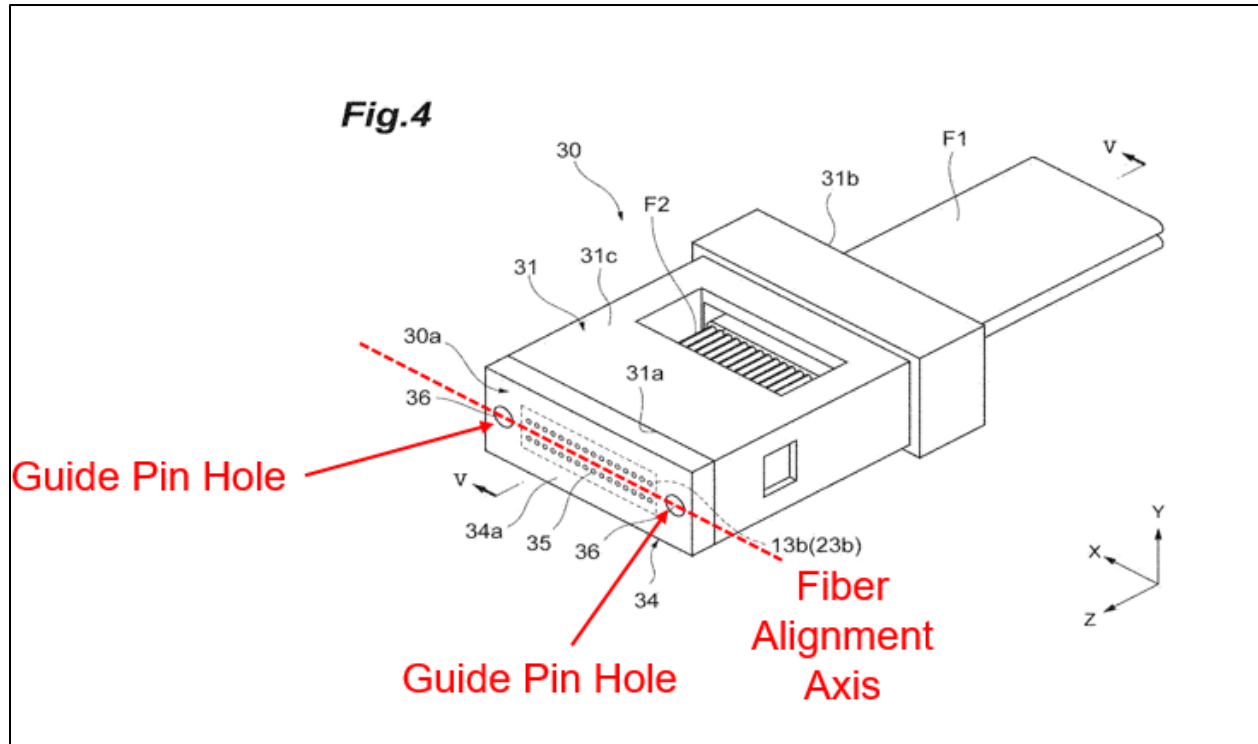
175. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.6].

176. Patent Owner may allege that Nhep does not expressly disclose an MT ferrule with the claimed features. But MT ferrules with the configuration recited in claim element [1.6] were well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

177. As I have annotated below, Watanabe’s MT ferrule includes “two guide pin holes 36.” EX1005, ¶43. Watanabe explains that “guide pin holes 36 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. 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.

178. Accordingly, for at least the reasons described above, and in Sections IX.B.5 and IX.B.6 with respect to claim elements [1.4] and [1.5], it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.6] and would have been obvious to combine as I discuss in Section IX.A.3.

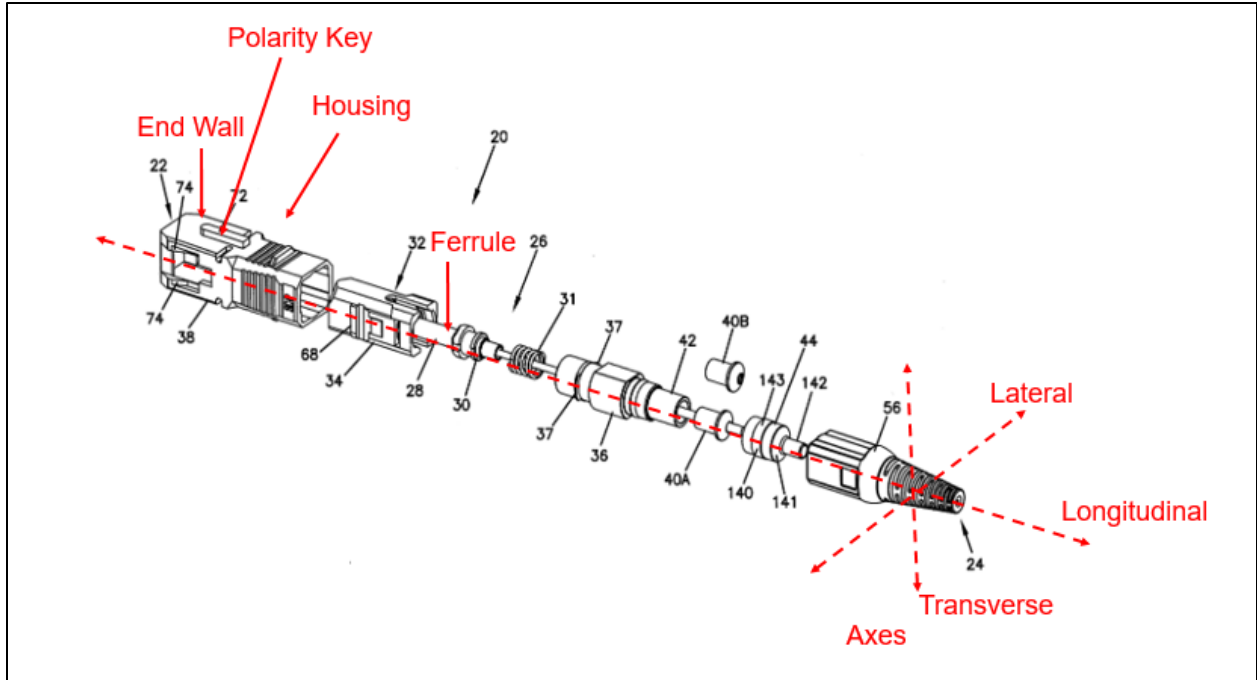


EX1005, FIG. 4 (annotated).

8. Element [1.7] – “a polarity key disposed on the first end wall”

179. For at least the reasons below, it is my opinion that Nhep discloses claim element [1.7]. Nhep discloses that its remote sleeve 38 includes a “keying rail 72.” EX1004, ¶78. As Nhep explains, “[w]hen 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. In other words, Nhep’s keying rail defines a polarity for Nhep’s connector.

180. In my opinion, a POSITA would have understood Nhep’s keying rail 72 to be equivalent to, and disclose, a polarity key as recited. As shown below, keying rail 72 is disposed on the first end wall.



EX1004, FIG. 1 (annotated).

181. Thus, Nhep discloses claim element [1.7]. In addition to Nhep disclosing claim element [1.7], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious claim element [1.7]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.7] that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Nhep-Watanabe multi-fiber optical connector would render obvious claim element [1.7].

9. **Element [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”

182. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.8].

183. Patent Owner may allege that Nhep does not expressly disclose the claimed dimensions of the first and second end walls and first and second side walls. But this configuration was well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

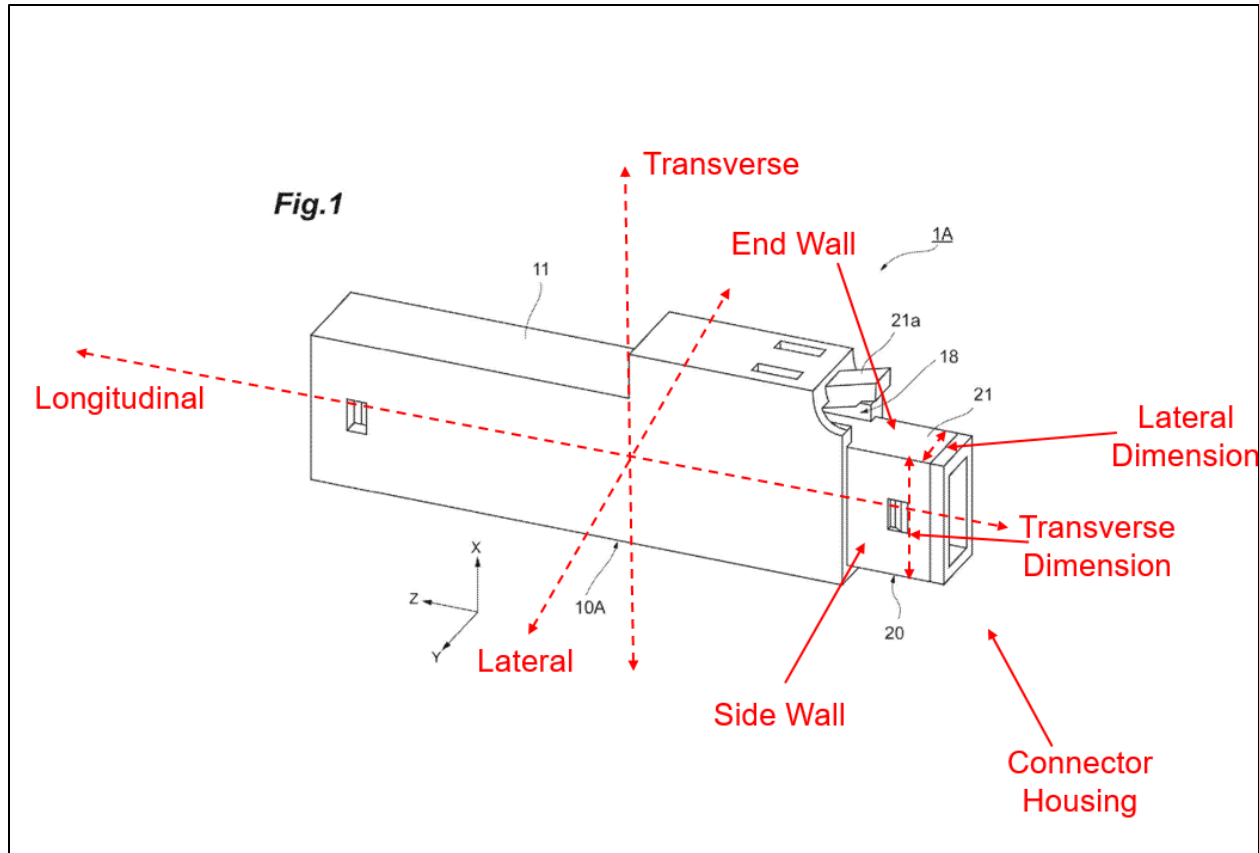
184. Claim element [1.8] is essentially requiring that the end wall lateral dimensions be less than the side wall transverse dimensions—in other words, that the housing extend less in the lateral dimension than in the transverse dimension. Watanabe discloses this configuration, as shown below. And a POSITA would have been motivated to modify Nhep’s housing to match this configuration for at least the reasons I have discussed above. *See* Section IX.A.

185. Specifically, this orientation optimizes the connector density by orienting the longest dimension of the connector housing (*i.e.*, the fiber axis of an MT ferrule) to be on the same axis as the polarity key (*i.e.*, Nhep’s keying rail 72). This optimizes density by placing the polarity key within the typical unused space that is allotted to allow for clearance between vertically adjacent rack mount units above and below the connector recesses within a fiber optic rack or enclosure. Orienting the MT ferrule in this way allows the groove in the connector receptacle

accommodating the keying rail 72 to be placed into the unused space, thereby improving connector density.

186. Second, this modification of orienting the longest dimension of the connector housing (*i.e.*, the fiber axis of an MT ferrule) to be on the same axis as the polarity key (*i.e.*, Nhep's keying rail 72) would have been obvious for a POSITA to try because it involves choosing from a finite number of identified, predictable solutions with a reasonable expectation of success. Third, a POSITA would have been motivated to orient the MT ferrule in modified Nhep such that the fiber alignment axis is parallel to the transverse axis because of the example of Watanabe. *See* Section IX.A.

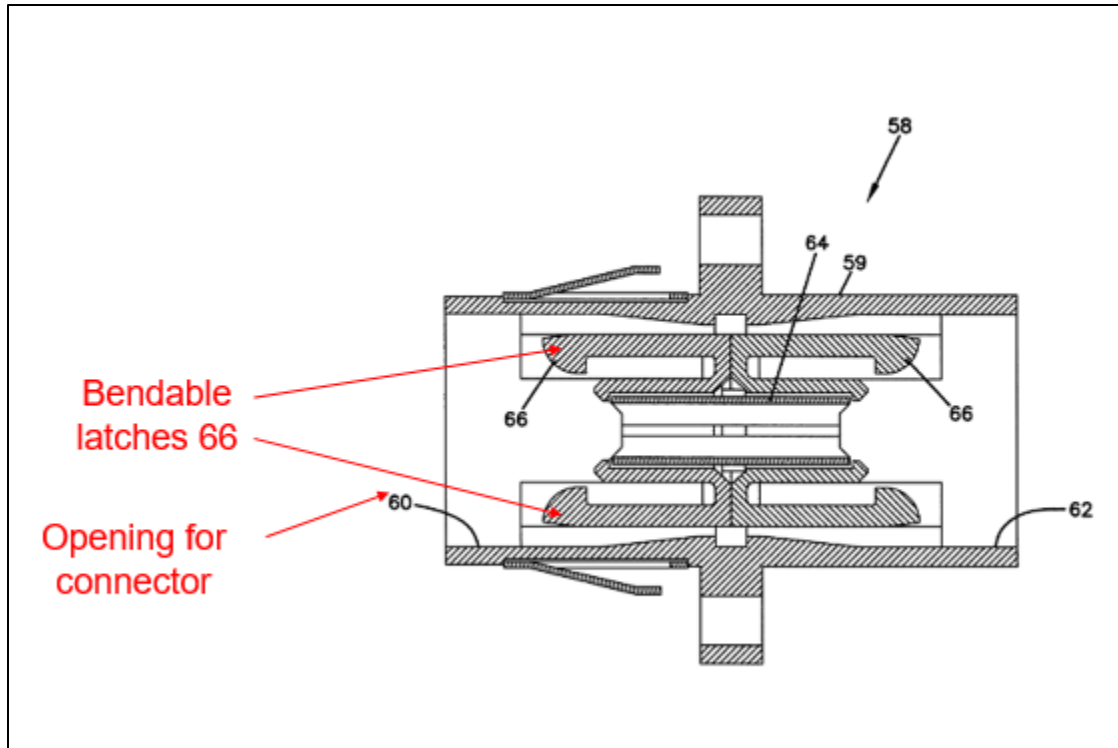
187. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious claim element [1.8]. That is, substituting the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would have resulted in a multi-fiber optical connector “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”, and would have been obvious to combine as I discuss in Section IX.A.3.



EX1005, FIG. 1 (annotated).

10. Element [1.9] – “wherein the optical fiber connector is configured to latch with a mating adapter and”

188. For at least the reasons below, it is my opinion that Nhep discloses claim element [1.9]. Nhep discloses that its connector is configured to latch with a mating adapter. Nhep explains that “[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 to prevent the fiber optic connector 20 from being proximally withdrawn from the port 60, 62.” EX1004, ¶78. A cross-section of a mating adapter 58 is shown below.



EX1004, FIG. 25 (annotated).

189. Thus, Nhep discloses claim element [1.9]. In addition to Nhep disclosing claim element [1.9], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious claim element [1.9]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.9] that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Nhep-Watanabe multi-fiber optical connector would render obvious claim element [1.9].

11. **Element [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**

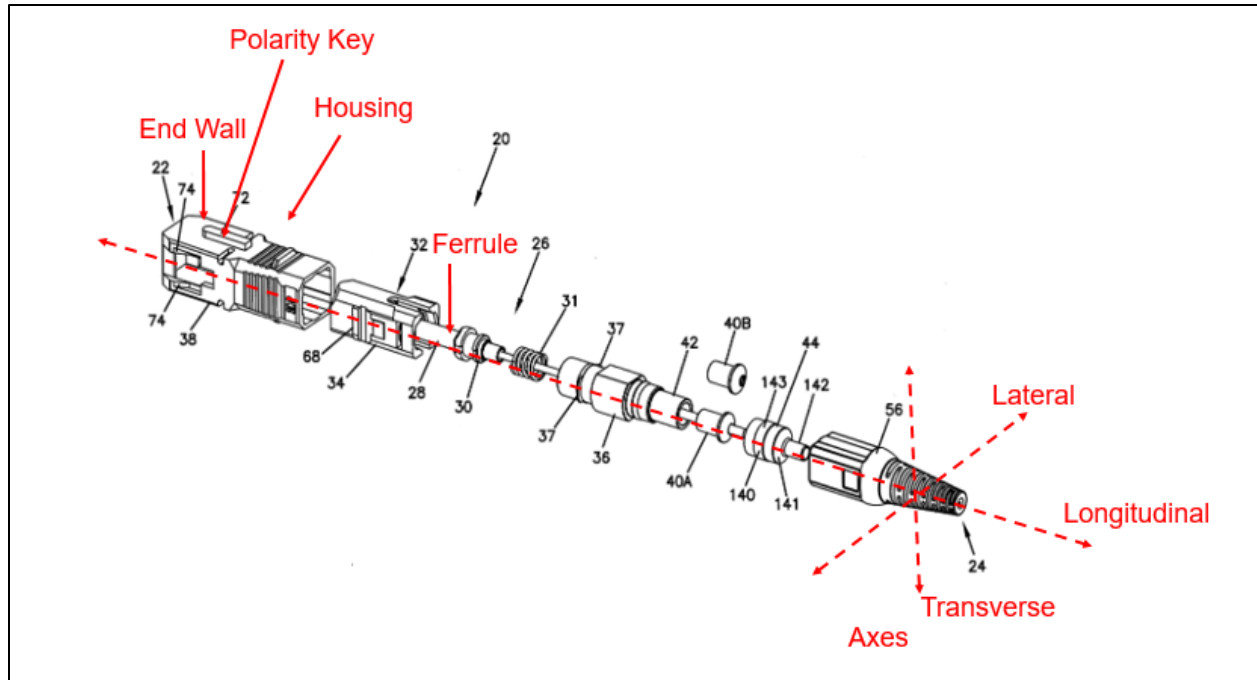
rearward relative to a second portion of the optical fiber connector”

190. For at least the reasons below, it is my opinion that Nhep discloses claim element [1.10]. Nhep discloses that the movement of release sleeve 38 rearwards acts to unlatch the connector from the mating adapter. EX1004, ¶78. Specifically, Nhep states that “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 of the fiber optic adapter 58 from the shoulders 68 of the fiber optic connector 20 thereby allowing the fiber optic connector 20 to be proximally withdrawn from its respective port 60, 62.” EX1004, ¶78.

191. I note that the terms first portion and second portion are not specifically defined by the claim or discussed in the specification. Thus, as I have annotated below, I have assigned these labels such that the first portion corresponds to Nhep’s release sleeve 38 and the second portion corresponds to Nhep’s housing 32. As such, 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.

12. Element [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.”

193. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [1.11]. As I discussed above, Nhep’s release sleeve 38 is the first portion that is displaced rearwards. EX1004, ¶78; *see* Section IX.B.11. As Nhep explains, and as is shown below, 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. *See* EX1004, ¶78. Thus, Nhep’s keying rail 72 moves with release sleeve 38, which corresponds to the claimed first portion, and is displaced rearwards with respect to the ferrule, which would be an MT ferrule held by housing 32, which corresponds to the claimed second portion, in Nhep modified by Watanabe.



EX1004, FIG. 1 (annotated).

194. Accordingly, a POSITA would have understood that while Nhep presents an optical connector for housing a single fiber ferrule, it is obvious to modify this connector to accommodate multi-fiber ferrules, such as MT ferrules, as presented in Watanabe. *See* Section IX.A.3. Therefore, a POSITA would have been motivated to substitute the MT ferrule of Watanabe into the optical connector of Nhep, which would have resulted in a multi-fiber optical connector maintaining the functionality of Nhep “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.” Therefore, it is my opinion Nhep in view of Watanabe render obvious claim

element [1.11] and would have been obvious to combine as I discuss in Section IX.A.3.

195. In summary, for at least the reasons discussed above, I believe a POSITA would have been motivated to make a combination of Nhep and Watanabe that renders obvious each of the features of Claim 1 of the '413 Patent. As such, it is my opinion that the entirety of Claim 1 of the '413 Patent is rendered obvious.

C. Claim 2

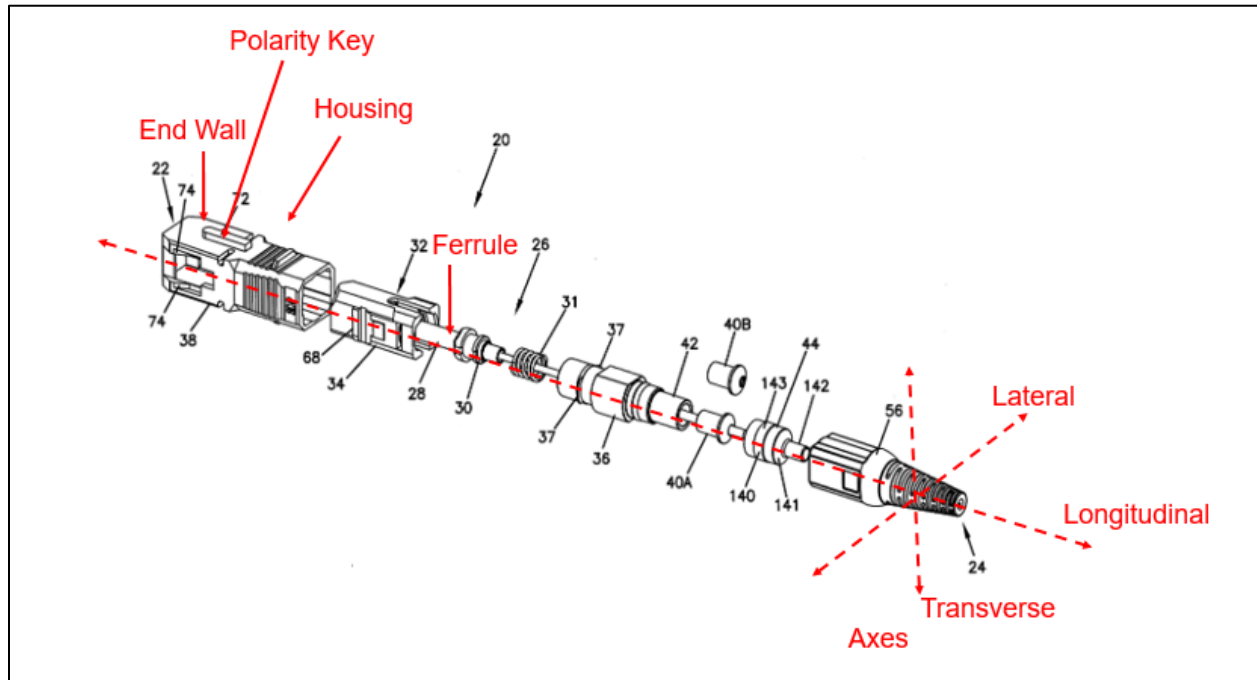
1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

196. Claim 2 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 2 of the '413 Patent.

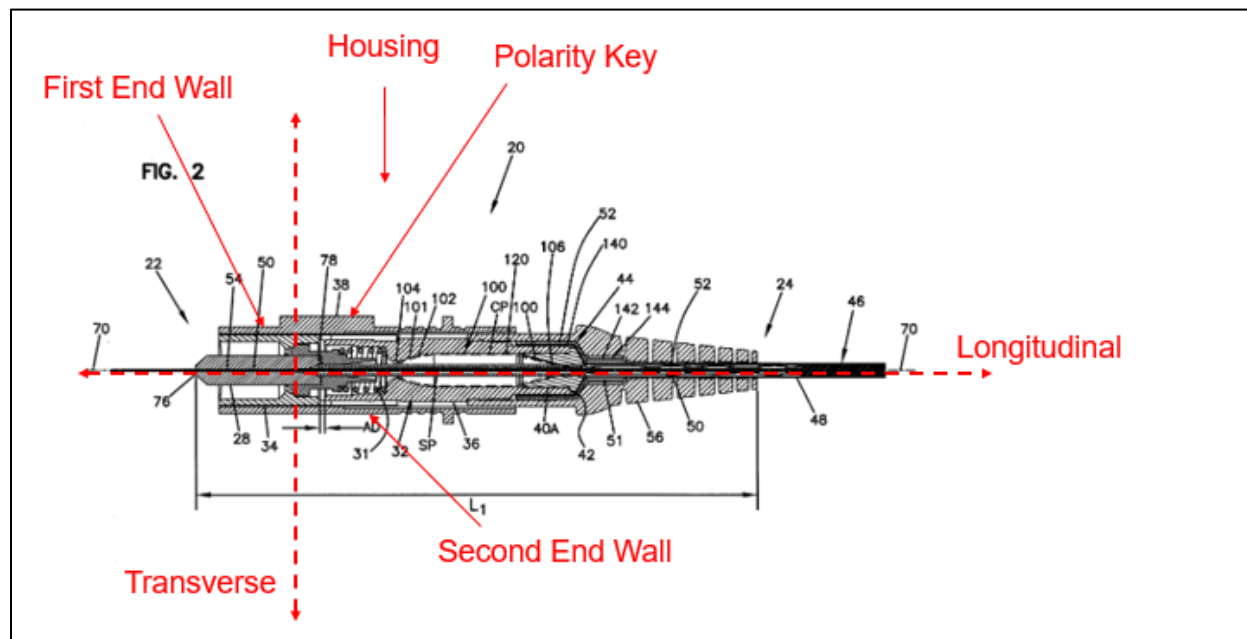
2. Element [2.1] – “the optical fiber connector is free of a polarity key disposed on the second end wall.”

197. As seen in the figure below, there is no second keying rail 72 on the second end wall. Nhep also only mentions a single keying rail 72 that is located on the first end wall, and thus does not disclose a second polarity key anywhere on the connector, much less on the second end wall.

198. A POSITA would have maintained these features in Nhep modified by Watanabe because doing so preserves Nhep's functionality.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

199. Accordingly, Nhep discloses Claim 2. In addition to Nhep disclosing Claim 2, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious Claim 2. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 2 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 2.

D. Claim 3

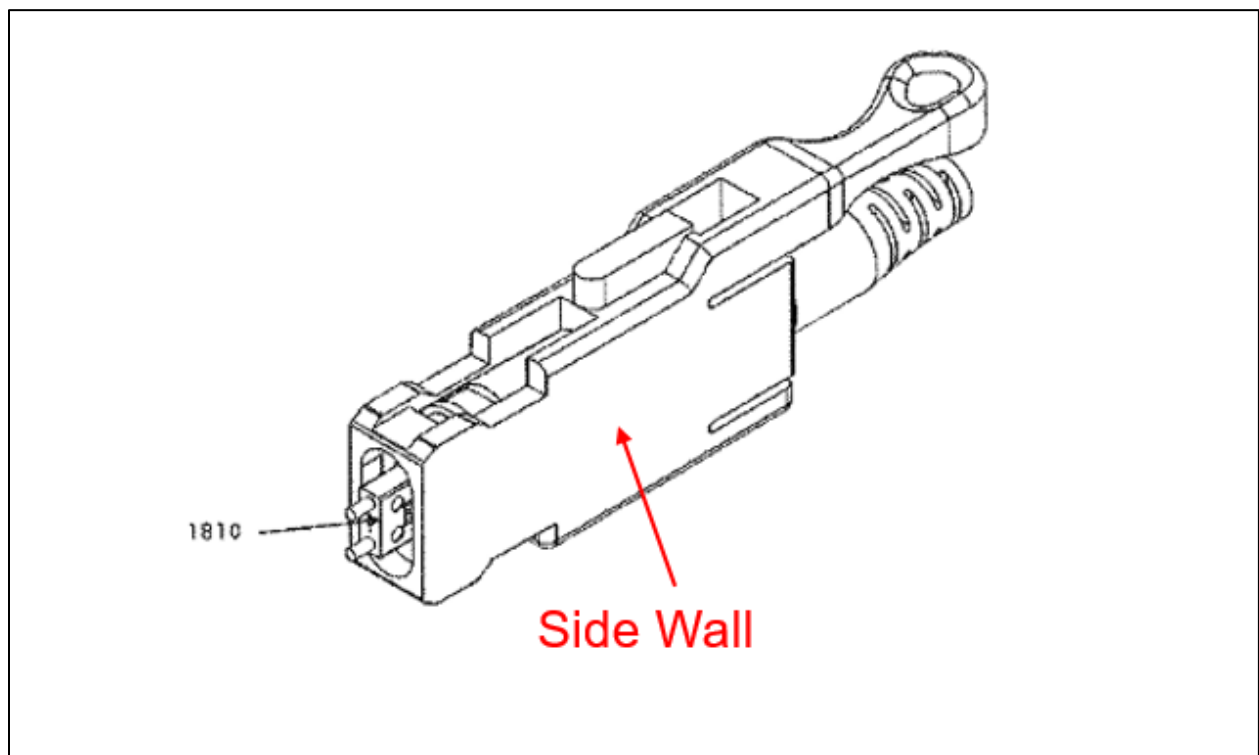
1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

200. Claim 3 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 3 of the '413 Patent.

2. Element [3.1] – “each of the first and second side walls is substantially flat.”

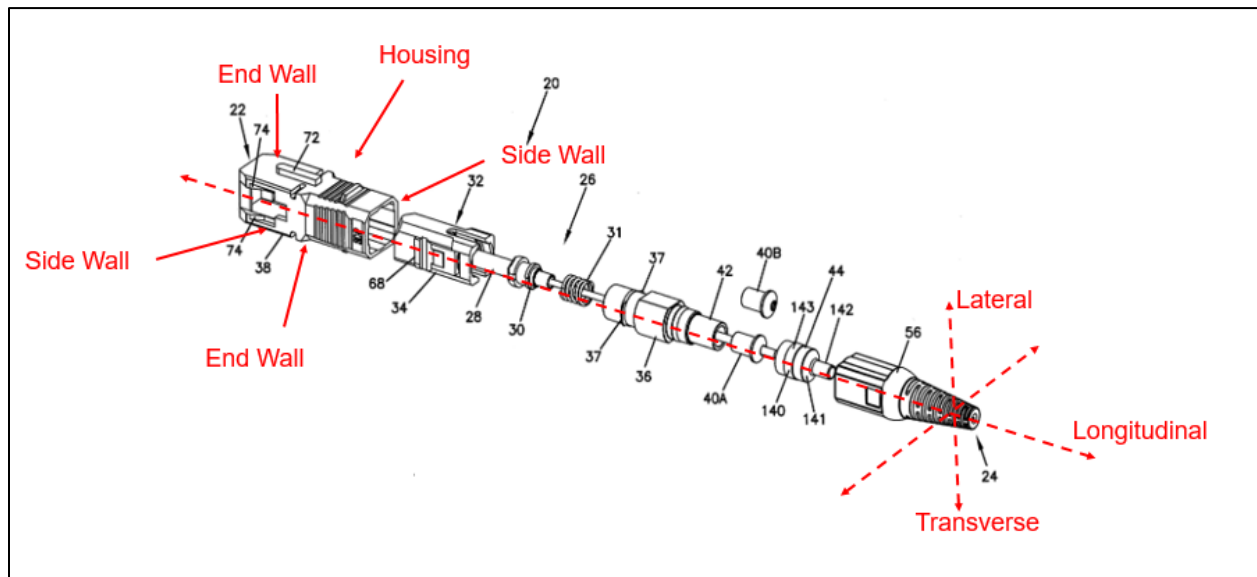
201. I note that the term “substantially” is not defined in the '413 Patent claims or specification. I understand from counsel that terms of degree such as substantially are interpreted from the viewpoint of a POSITA when read in context of the invention. I also am informed that every word in a claim must be given

meaning. In this case, the word substantially modifies “flat” by expanding the term flat to include first and second side walls that are not strictly flat or planar in nature. Looking at the side walls of the embodiment of Figures 18A and 18B in the ’413 patent, I note that these walls include at least two grooves or recesses. Thus, a POSITA would have understood that walls that are flat, but features such as grooves or recesses are included in the term “substantially flat.”



EX1001, FIG. 18B (annotated).

202. In my opinion, 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 (*see* EX1004, FIG.1), just like the embodiment of Figure 18B in the '413 Patent, reproduced and annotated above. For example, the front portion of the side walls are flat, as seen below.



EX1004, FIG. 1 (annotated).

203. A POSITA would have maintained the features in Nhep's side walls in the Nhep-Watanabe multi-fiber optical connector described above in Section IX.A.3 because doing so preserves Nhep's functionality. Accordingly, Nhep discloses Claim 3. In addition to Nhep disclosing Claim 3, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious Claim 3. That is, by modifying the single fiber ferrule

of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 3 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 3.

E. Claim 4

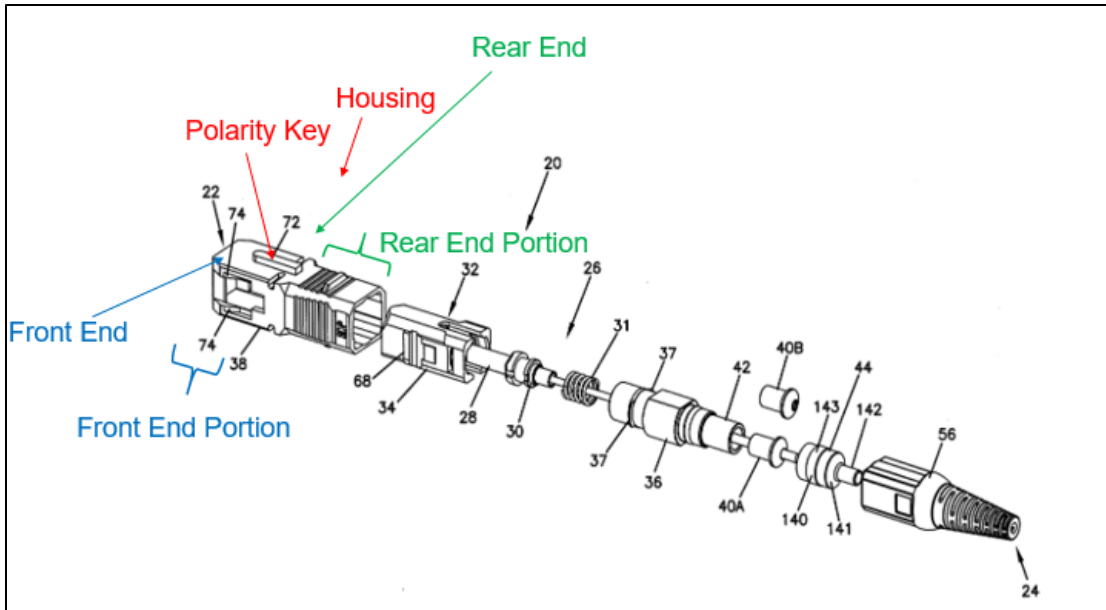
1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

204. Claim 4 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 4 of the '413 Patent.

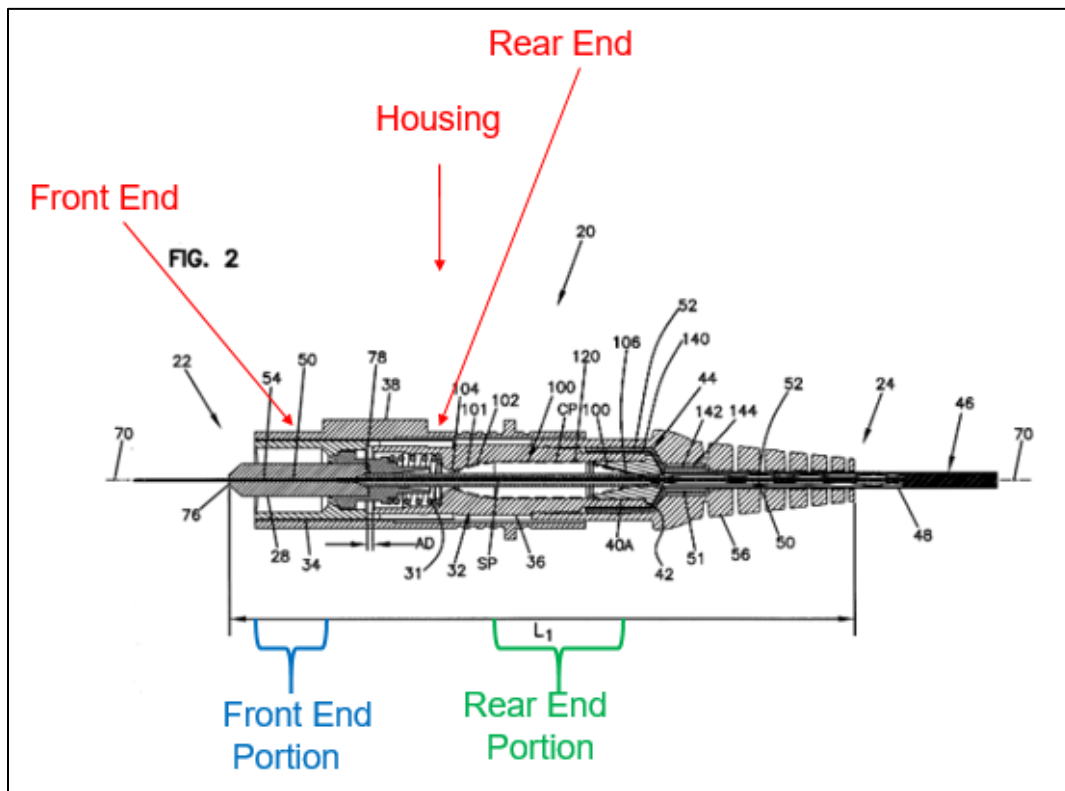
2. Element [4.1] – “the polarity key extends from a rear end adjacent the rear end portion of the housing to a front end rearwardly spaced apart from the front end portion of the housing.”

205. In my opinion, this claim feature requires that the polarity key extend in a direction spanning from a rear end towards a front end. These ends are not discussed or defined in either the '413 patent claims or the specification, thus I have defined ends of the Nhep housing as shown below. Therefore, a POSITA would have understood that Nhep discloses a polarity key that “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”, as depicted in the annotations of
Figures 1 and 2 of Nhep below.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

206. Accordingly, a POSITA would have understood Nhep discloses Claim 4. In addition to Nhep disclosing Claim 4, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious Claim 4. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 4 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 4.

F. Claim 7

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

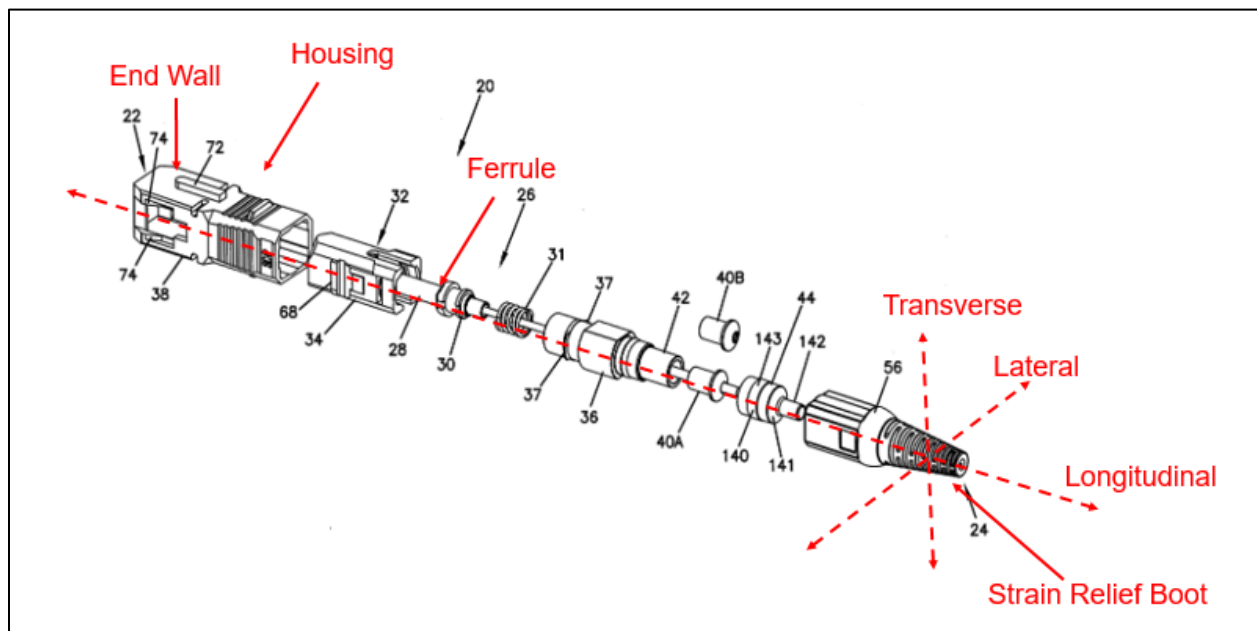
207. Claim 7 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 7 of the '413 Patent.

2. Element [7.1] – “further comprising a strain relief boot extending from the rear end portion of the housing.”

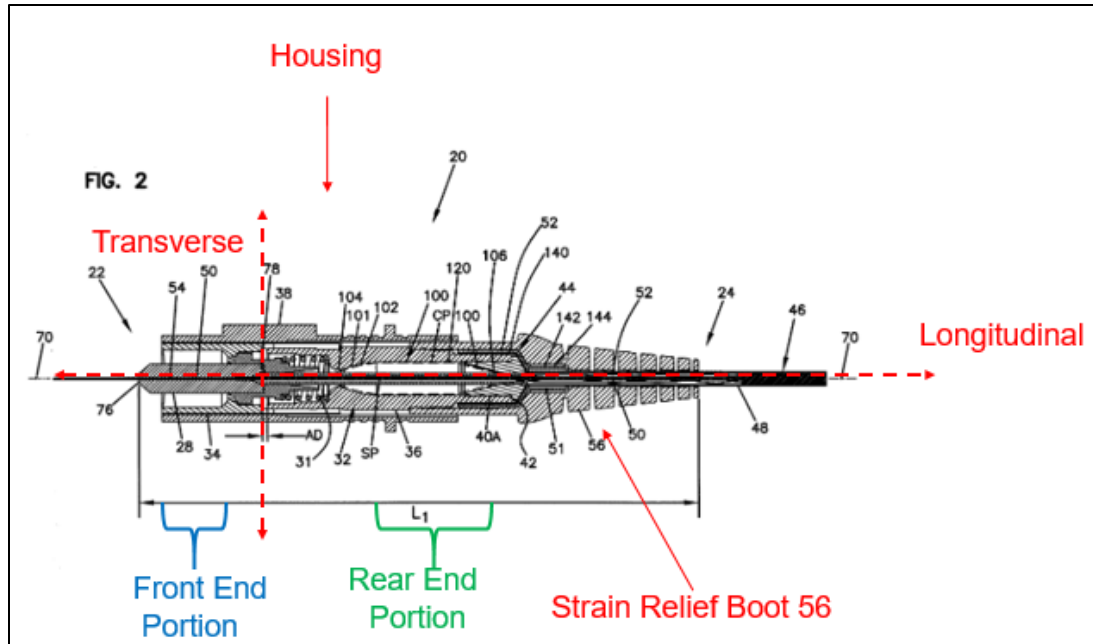
208. Nhep discloses that “[t]he fiber optic connector 20 further includes a strain relief boot 56 mounted at the proximal end 24 of the fiber optic connector 20 for providing strain relief and bend radius protection to the optical fiber 50.”

EX1004, ¶76. As seen below, boot 56 extends from the rear end portion of the housing.

209. Accordingly, Nhep discloses Claim 7. In addition to Nhep disclosing Claim 7, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) also renders obvious Claim 7. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 7 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 7.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

G. Claim 8

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

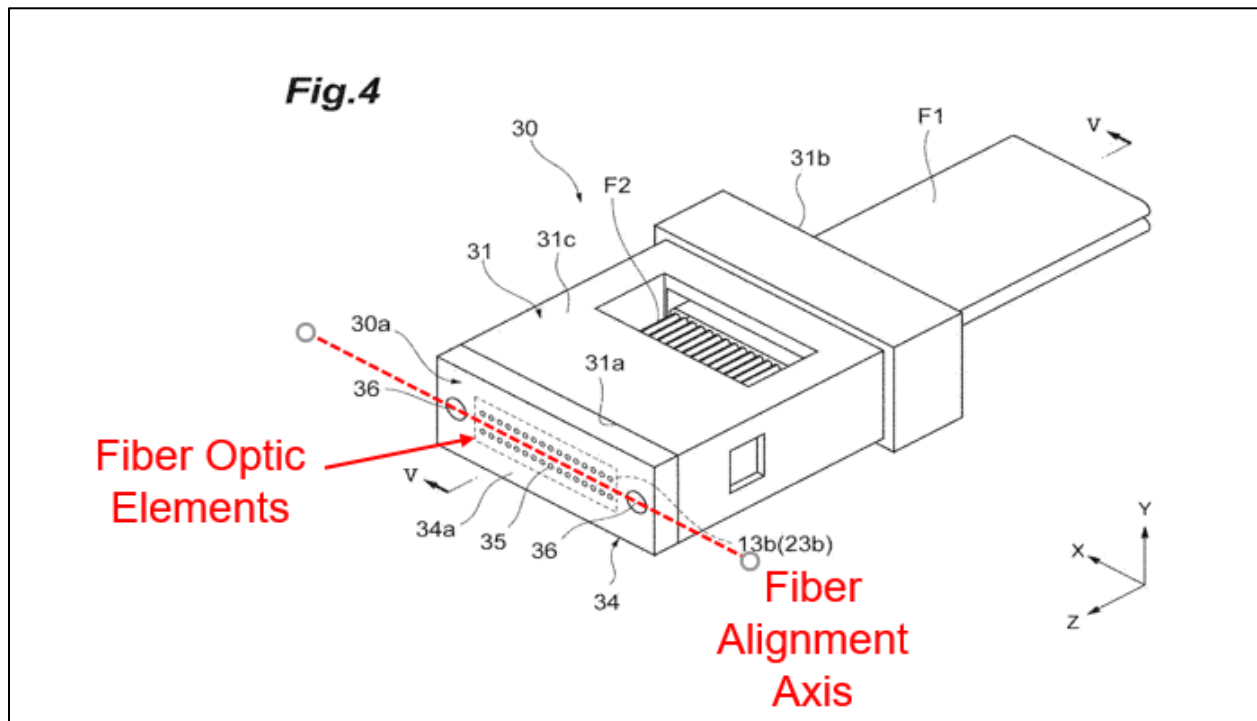
210. Claim 8 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 8 of the '413 Patent.

2. Element [8.1] – “the MT ferrule is configured to receive at least eight optical fibers in a row extending parallel to the fiber alignment axis.”

211. Patent Owner may allege that Nhep does not expressly disclose an MT ferrule with the claimed optical fiber configuration. But MT ferrules with the

configuration recited in Claim 8 were well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

212. Watanabe's MT ferrule includes a total of thirty-two optic fibers placed in two rows of sixteen. EX1005, FIG. 4, ¶¶37, 41. These rows both extend parallel to the fiber alignment axis.



EX1005, FIG. 4 (annotated).

213. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 8. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector wherein “the MT ferrule is configured to receive at least eight optical fibers in a row extending parallel to the fiber alignment axis.” Thus, it is my

opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 8.

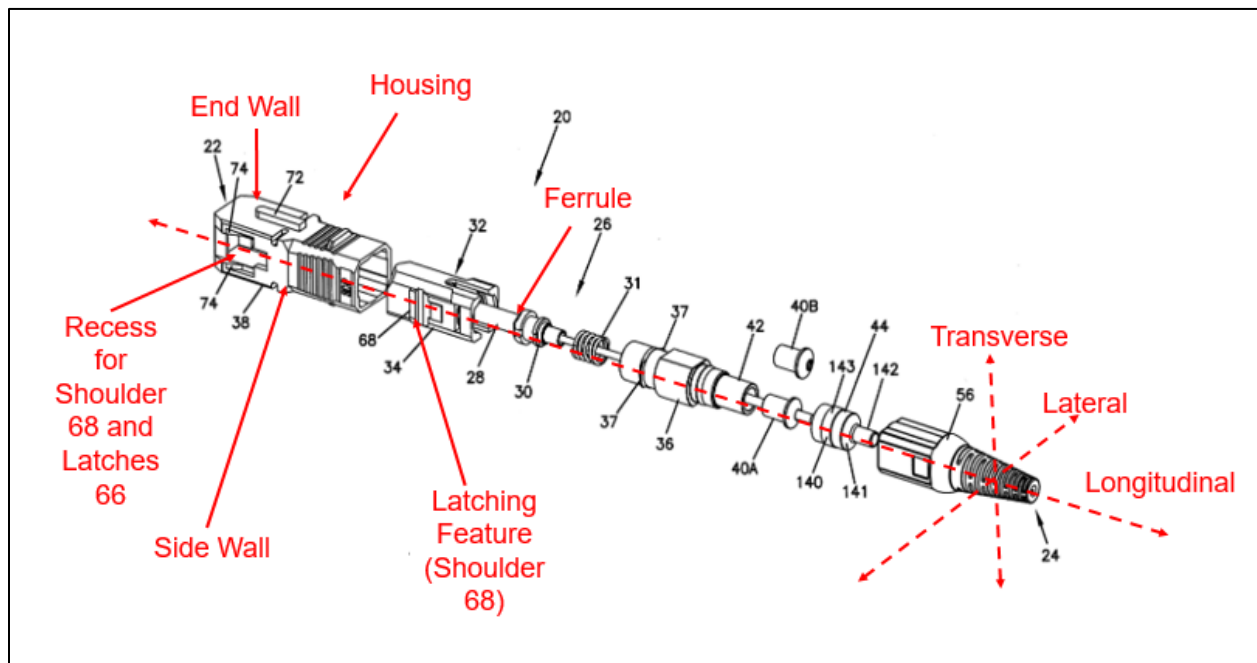
H. Claim 10

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

214. Claim 10 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 10 of the '413 Patent.

2. Element [10.1] – “the connector includes an adapter latching feature along the first end wall of the housing.”

215. As discussed above, 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. Thus, it is my opinion that “shoulders 68” of the connector housing 32 are the adapter latching features as claimed.

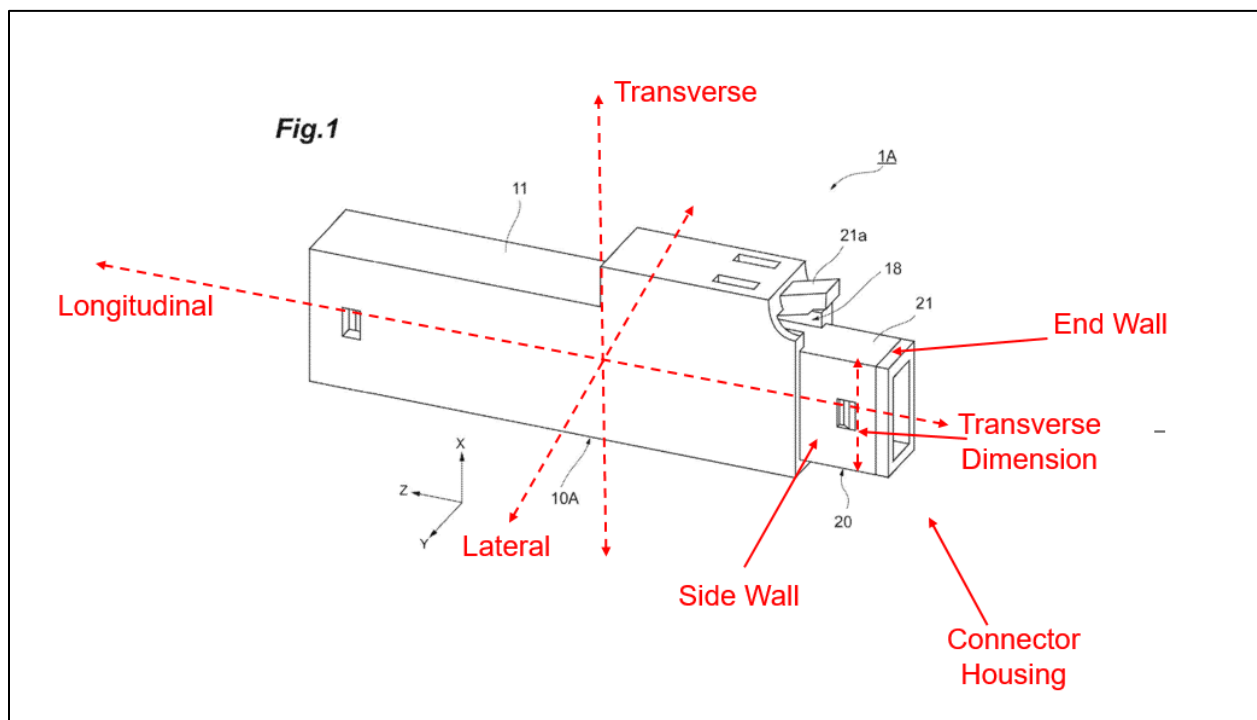


EX1004, FIG. 1 (annotated).

216. Patent Owner may allege these latching features are located on the side wall, not the first end wall, as claimed.

217. In my opinion having latching features located on the first end wall is obvious for at least three reasons. First, this arrangement maximizes connector density by placing the latches features on the walls oriented towards the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section IX.A. The structure needed to accommodate the latches (e.g., latch hooks) in an adapter or equipment receptacle will be placed above and below the connector after this modification, which is where the unused space in an equipment receptacle or rack is located. In placing the connector latch features and adapter latch hooks within the unused space above

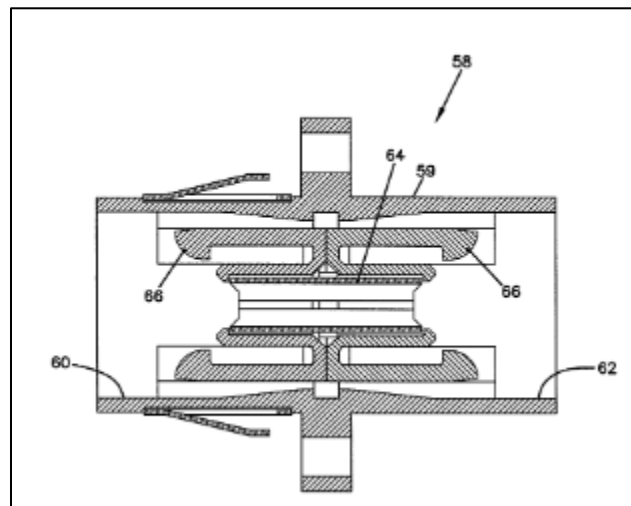
and below a row of optical fiber connectors, the accessibility of these features is improved for the possible need to disconnect the fiber optic connector from the adapter or equipment receptacle and allows for the lateral spacing between connectors to be reduced to optimize the density of connectors within an equipment receptacle or rack. Second, Watanabe is configured with its latching feature (latch lever 21a) disposed on the equivalent of its first end wall. This would have motivated a POSITA to modify Nhep's latching features to match Watanabe because the POSITA is modifying Nhep's housing in view of Watanabe.



EX1005, FIG. 1 (annotated).

218. 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. In this situation, there are only two options for configuring the pair of latching features because the

pair of latching features must be placed on opposite walls to engage with an adapter, as shown in Figure 25 of Nhep, reproduced below. Therefore, the two options are to place the latches either on the side walls or on the end walls. Either option would work equally well and would not affect the functionality of the connector.



EX1004, FIG. 25.

219. Thus, modifying Nhep’s connector to have the disclosed latching features on the end walls would have been obvious as a matter of being obvious to try.

220. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 10. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector that “includes an adapter latching feature along the first end wall of the

housing.” Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 10 and would have been obvious to combine as I discuss in Section IX.A.

I. Claim 11

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

221. Claim 11 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 11 of the ’413 Patent.

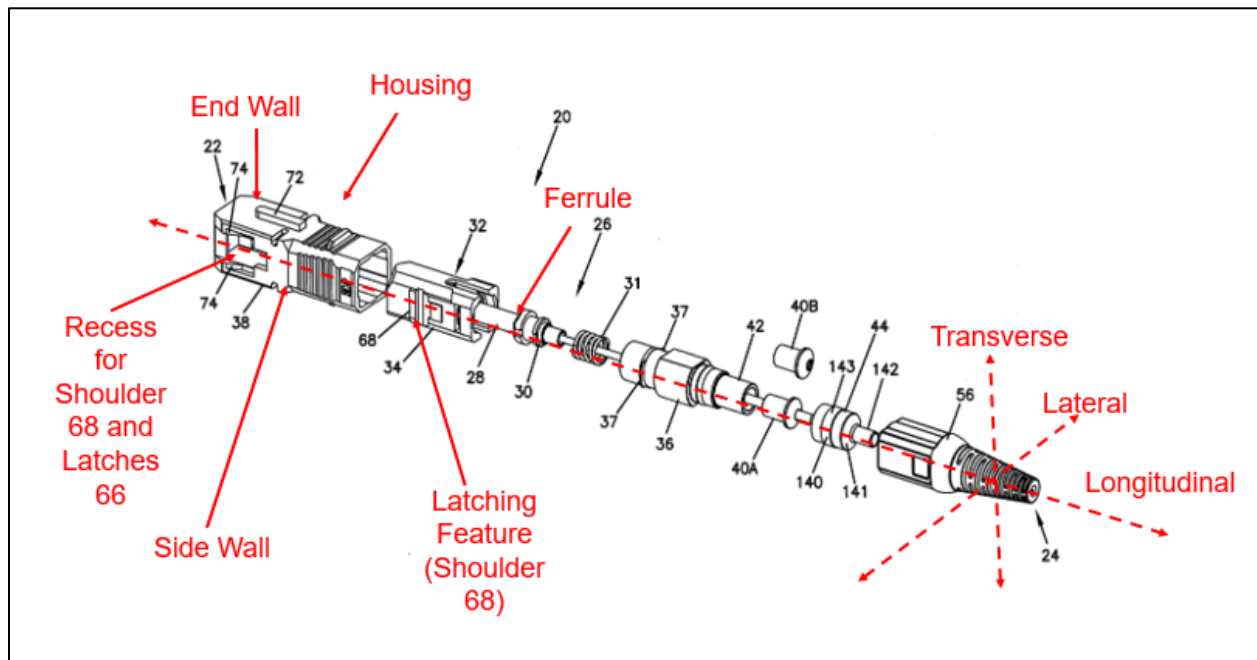
2. Element [11.1] – “the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.”

222. I note that the term “adapter latching feature” is not present in Claim 1 but is present in Claim 10. In my opinion, this lack of antecedent basis is a typographical error and Claim 11 should depend from Claim 10. My opinion here does not change regardless of the dependency of Claim 11.

223. As discussed above, 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. As shown

below, recesses in release sleeve 38 allow latches 66 to access the shoulders.

EX1004, ¶78. Thus, the adapter latching feature includes a recess configured to latch with a bendable latch hook of the mating adapter as claimed. Latches 66 are “bendable” as claimed because they “snap into a latching position,” which requires bending of the latch hooks to engage shoulders 68. EX1004, ¶78.



EX1004, FIG. 1 (annotated).

224. Accordingly, Nhep discloses Claim 11. Further, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 11. That is, in modifying the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 11 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Therefore, for at least the

reasons described above and in Section IX.H with respect to Claim 10, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 11 and would have been obvious to combine as I discuss in Section IX.A.

J. Claim 12

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

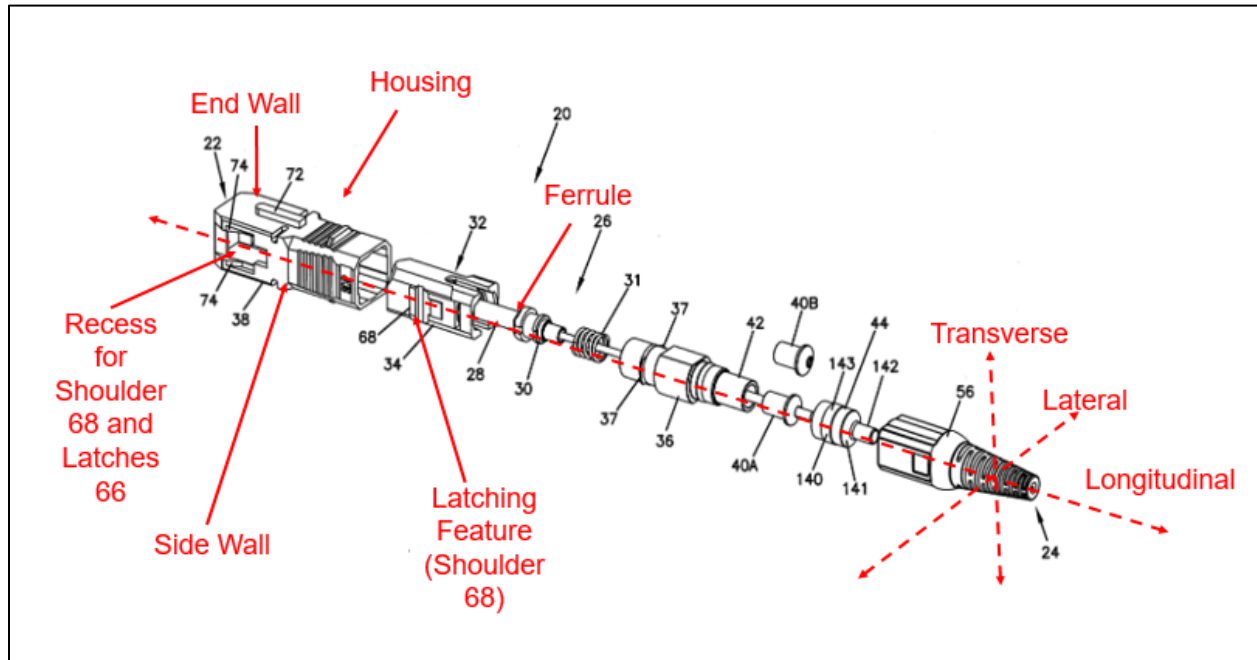
225. Claim 12 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 12 of the '413 Patent.

2. Element [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.”

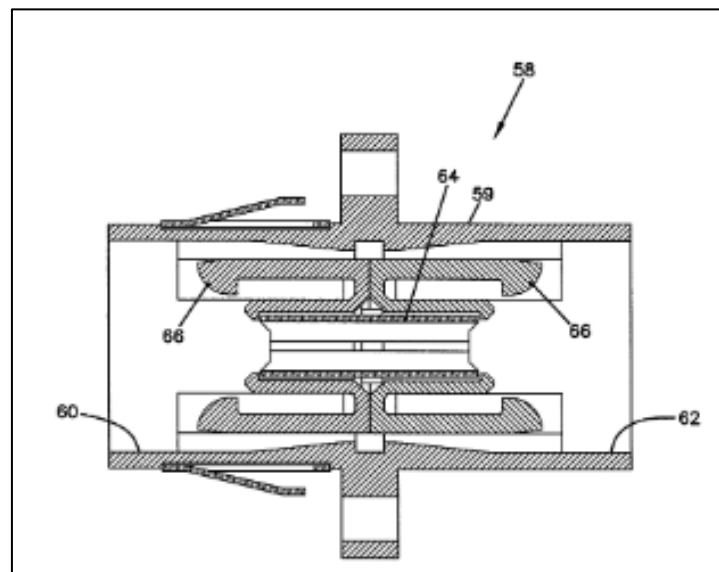
226. I note that this claim is substantively similar to Claim 11, assuming Claim 11 depends from Claim 10. The difference is Claim 12 recites first and second latch recesses for each end wall, respectively.

227. Nhep modified by Watanabe (described above in Sections IX.A.3 and in Section IX.H with respect to Claim 10), discloses this element because it includes two paired latch recesses in release sleeve 38 that are configured to latch

with respective bendable latch hooks 66 of the mating adapter depicted in Figure 25 of Nhep, reproduced below. The corresponding pair of latches 66 are seen below in the cross-section of the adaptor.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 25.

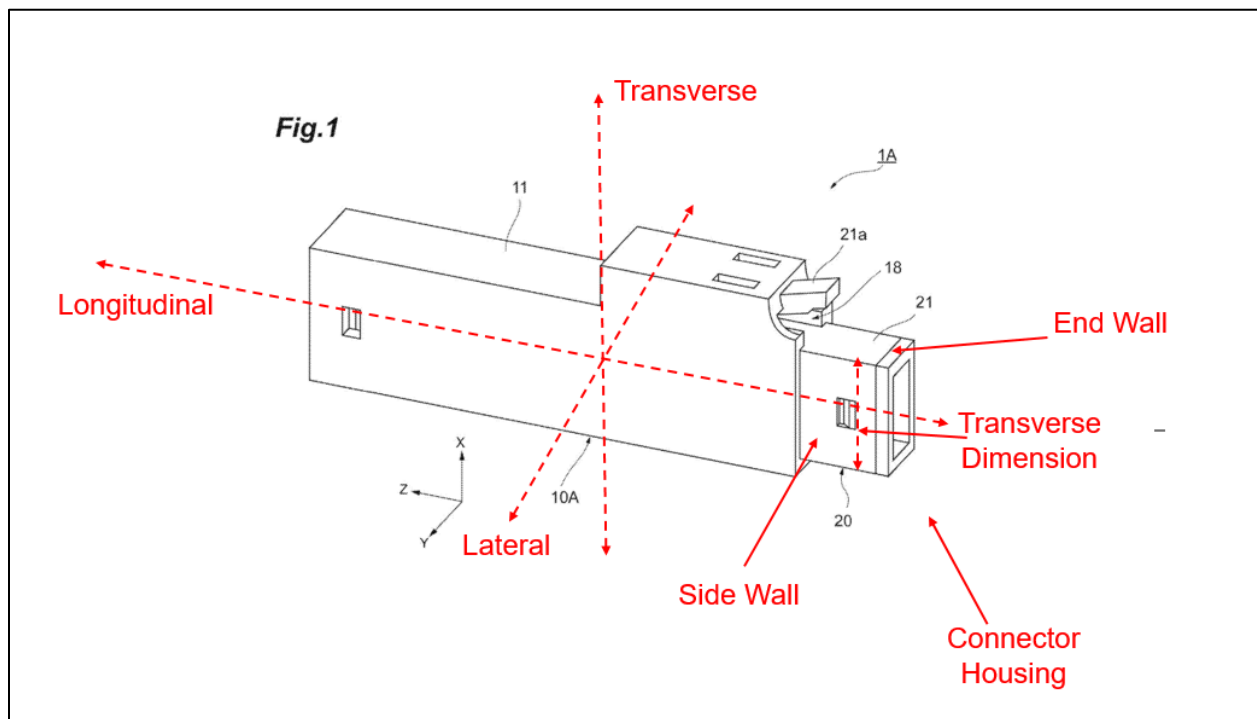
228. Nhep's latching mechanism is accomplished by "latches 66 [that] snap into a latching position in which the latches engage the shoulders 68 of the connector housing 32 to prevent the fiber optic connector 20 from being proximally withdrawn from the port 60, 62." EX1004, ¶78. As shown below, recesses in release sleeve 38 allow latches 66 to access the shoulders. EX1004, ¶78. Thus, the adapter latching feature includes a recess configured to latch with a bendable latch hook of the mating adapter as claimed.

229. As shown above, these recesses are located on the side wall, not the first and second end wall as claimed. However, in my opinion, having the recesses (and corresponding latching features such as shoulders 68) located on the first and second end walls is obvious for at least three reasons.

230. First, this arrangement maximizes connector density by placing the latches features on the walls oriented towards the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section IX.A. The structure needed to accommodate the latches (e.g., latch hooks) in an adapter or equipment receptacle will be placed above and below the connector after this modification, which is where the unused space in an equipment receptacle or rack is located. In placing the connector latch features and adapter latch hooks within the unused space above and below a row of optical fiber connectors, this improves accessibility of these features for the

possible need to disconnect the fiber optic connector from the adapter or equipment receptacle, and allows for the lateral spacing between connectors to be reduced to optimize the density of connectors within an equipment receptacle or rack.

231. Second, Watanabe is configured with its single latching feature (latch lever 21a) disposed on the equivalent of its first end wall. This would have motivated a POSITA to modify Nhep's pair of latching features to have one of the pair match the position of Watanabe's latching feature because the POSITA is modifying Nhep's housing in view of Watanabe to accommodate an MT ferrule.



EX1005, FIG. 1 (annotated).

232. Third, moving Nhep's pair of symmetrical recesses and latching features to the first and second end walls would have been obvious as a matter of

being obvious to try. In this situation, there are only two options for configuring the symmetrical pair of latching features: either on the side walls or on the end walls. Either option would work equally well and would not affect the functionality of the connector.

233. Thus, modifying Nhep's connector to have the disclosed latching features on the first and second end walls would have been obvious as a matter of being obvious to try.

234. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 10. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector that “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.” Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 12 and would have been obvious to combine as I discuss in Section IX.A.

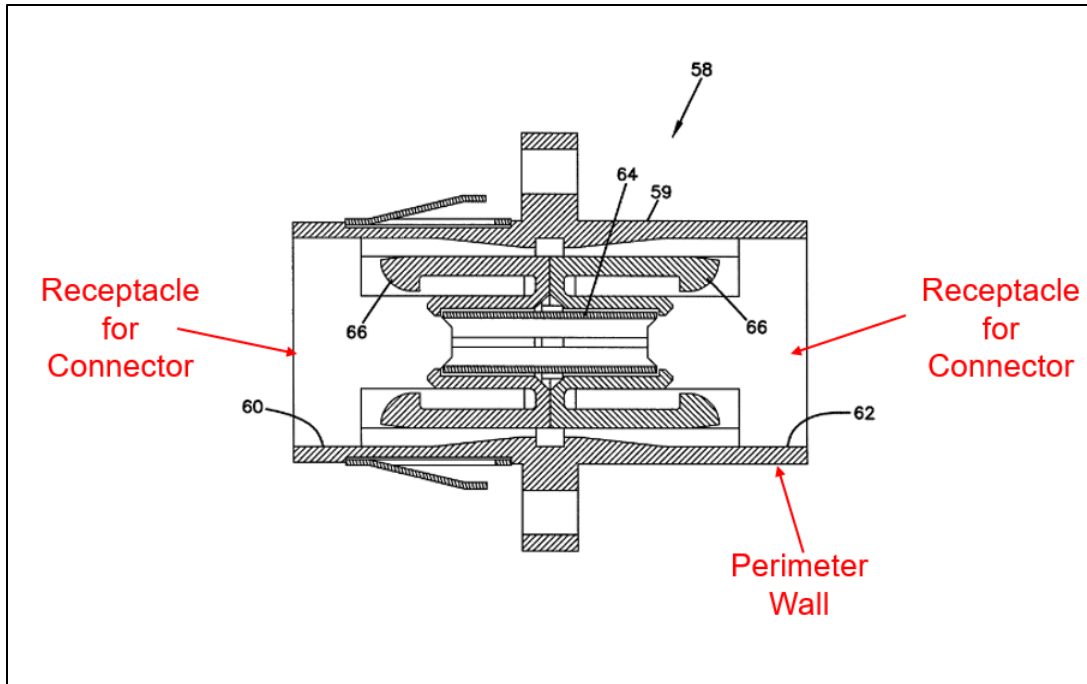
K. Claim 13

1. Preamble – “A connection system comprising the optical fiber connector of claim 1”

235. Claim 13 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 13 of the '413 Patent.

2. Element [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.”

236. Nhep discloses a “fiber optic adapter 58 that can be used to couple two of the fiber optic connectors 20 together. The fiber optic adapter 58 includes an adapter housing 59 defining opposite, coaxially aligned ports 60, 62 for receiving two of the fiber optic connectors desired to be coupled together.” EX1004, ¶77. As shown below, adapter 58 has a perimeter wall that defines a receptacle for the connector.



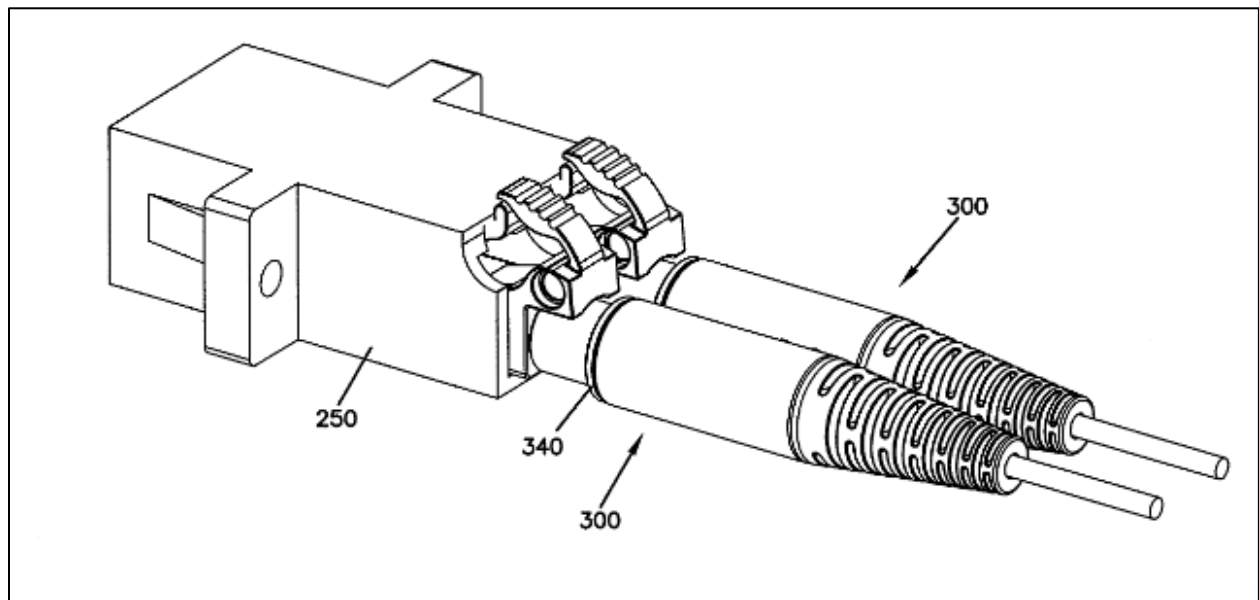
EX1004, FIG. 25.

237. 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.

238. However, for at least the reasons described below, it is my opinion a POSITA would have been motivated to modify adapter 58 to accommodate more than one pair of fiber optic connectors. This would allow adapter 58 to serve to join multiple sets of fiber optic cables, improving performance of the resulting system. It also reduces part count because a single adapter 58 can be used for multiple cable pairings.

239. 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. EX1004, ¶110. In Figure 34 an adapter 250 is arranged to receive two connectors in a side-by-side configuration. EX1004, ¶110. Thus, a POSITA would have used this adapter as guidance for modifying adapter 58 to have side-by-side receptacles. This orientation matches the claimed side wall orientation.



EX1004, FIG. 34.

240. Accordingly, Nhep renders obvious Claim 13. Additionally, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 13. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 13 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my

opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 13.

L. Claim 14

1. Preamble – “The connection system of claim 13, wherein”

241. Claim 14 depends upon Claim 13 and Claim 1, and for at least the reasons discussed above in reference to Claim 1 and Claim 13, the combination of Nhep and Watanabe renders obvious Claim 1 and Claim 13. *See* Section IX.B; *see also* Section IX.K. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 14 of the '413 Patent.

2. Element [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.”

242. Although not visible in Figure 25, a POSITA would have understood that Nhep's adapter 58 includes a longitudinal keyway to accommodate keying rail 72. Otherwise, it would not be possible for connector 20 to mate with adapter 58. Specifically, Nhep describes that “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. 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.

243. In making the modification discussed above with respect to Claim 13, a POSITA would have added a longitudinal keyway for each receptacle to ensure proper latching functionality. Thus, there would be a plurality of longitudinal keyways in the perimeter wall, with one keyway for each receptacle to receive keying rail 72.

244. Accordingly, Nhep renders obvious Claim 14. Additionally, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 14. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of Claim 14 that are disclosed by Nhep would be preserved in the specific combination of the prior arts. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 14.

M. Claim 25

1. Preamble – “The optical fiber connector as set forth in claim 1, further comprising”

245. Claim 25 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 25 of the '413 Patent.

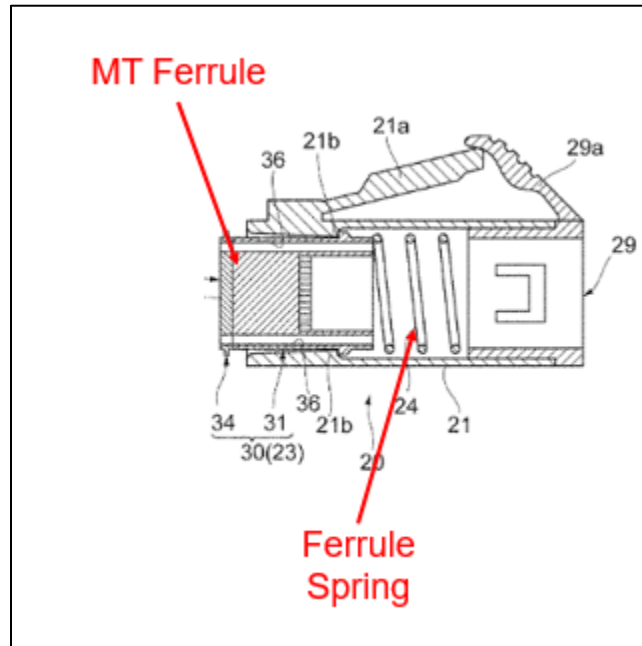
2. **Element [25.1] – “a ferrule spring yieldably biasing the MT ferrule forward in the housing, the ferrule spring configured to be compressed by a force urging the MT ferrule rearward in relation to the housing, wherein said displacing the first portion of the fiber optic connector rearward relative 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.”**

246. Patent Owner may allege that Nhep does not expressly disclose a ferrule spring for biasing the MT ferrule as claimed. But ferrule springs with the configuration recited in Claim 25 were well known in the prior art, e.g., as explicitly taught in Watanabe. *See* Section VII.B.

247. 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 a ferrule spring that biases the MT ferrule forward and would be compressed by a rearwards force on the MT ferrule.

248. I note that 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.



EX1005, FIG. 2 (excerpt, annotated).

249. I note that in Nhep the movement of the ferrule by spring 31 inside housing 32 is completely independent of any movement of release sleeve 38. A POSITA would not have altered this configuration in modifying Nhep because doing so would change Nhep's functionality. Thus, Nhep's keying rail 72 moves with release sleeve 38, which corresponds to the claimed first portion, and is displaced rearwards with respect to the ferrule, which would be an MT ferrule held by housing 32, which corresponds to the claimed second portion, in Nhep modified by Watanabe without any movement of the MT ferrule, as claimed.

250. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 25. That

is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector as recited in Claim 25. Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 25 and would have been obvious to combine as I discuss in Section IX.A.

N. Claim 26

1. Preamble – “The optical fiber connector as set forth in claim 1, further comprising”

251. Claim 26 depends on Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 26 of the '413 Patent.

2. Element [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.”

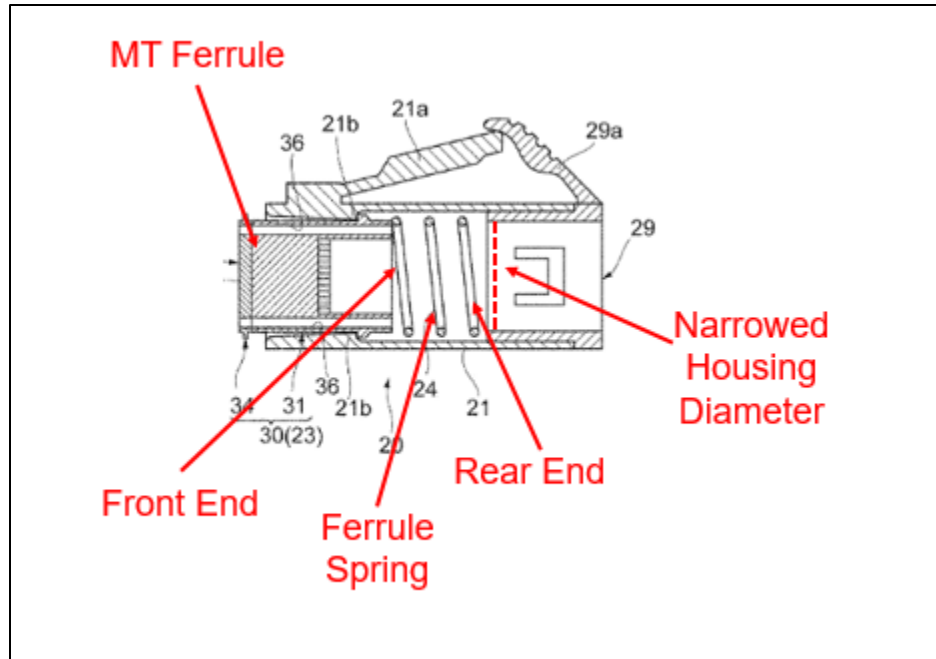
252. Patent Owner may allege that Nhep does not expressly disclose a ferrule spring for biasing the MT ferrule as claimed. But ferrule springs with the

configuration recited in claim 26 were well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

253. As shown below, 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 a ferrule spring that biases the MT ferrule forward and would be compressed by a rearwards force on the MT ferrule.

254. As shown below, elastic member 24 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. This is apparent based on the narrower diameter in Watanabe’s support member 29 that supports the rear end.

255. I note that 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.



EX1005, FIG. 2 (excerpt, annotated).

256. Additionally, I note that in Nhep the movement of the ferrule by spring 31 inside housing 32 is completely independent of any movement of release sleeve 38. A POSITA would not have altered this configuration in modifying Nhep because doing so would change Nhep's functionality. 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.

257. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 26. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector as recited in Claim 26. Thus, it is my opinion that the Nhep-Watanabe

multi-fiber ferrule optical connector renders obvious Claim 26 and would have been obvious to combine as I discuss in Section IX.A.

O. Claim 17

1. Preamble – “An optical fiber connector comprising”

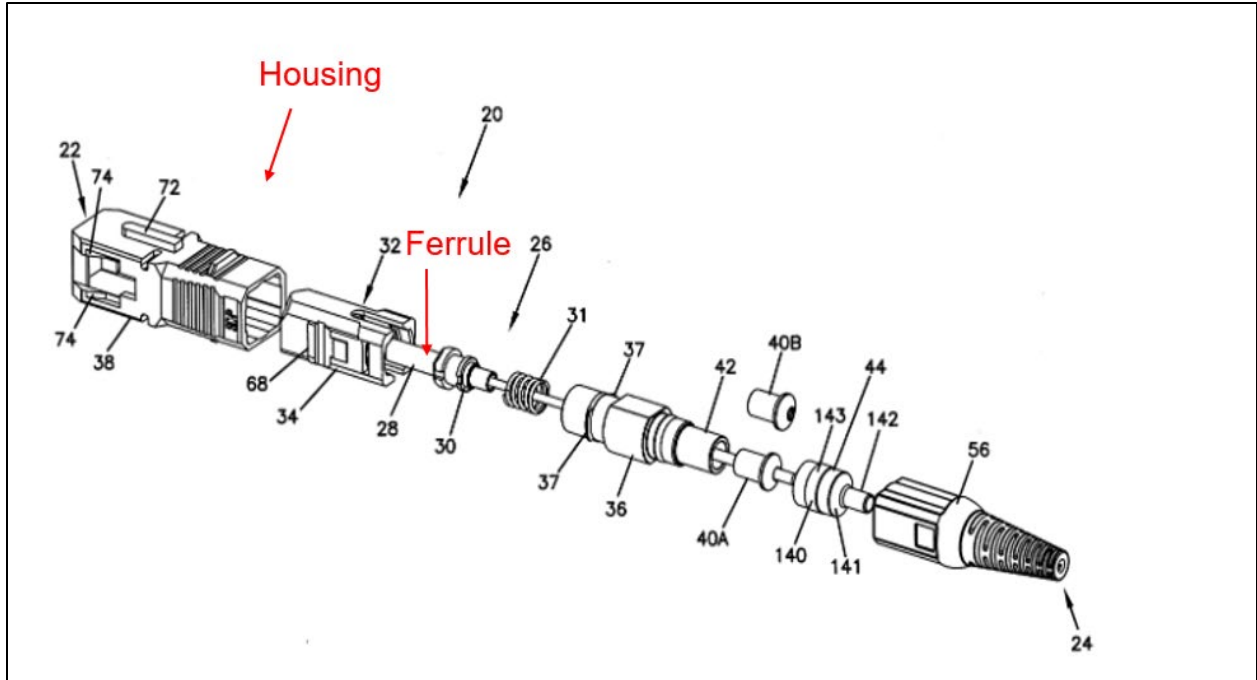
258. The preamble of Claim 17 is identical to the preamble of Claim 1.

Thus, my discussion above applies equally here, and it is my opinion that a POSITA would have understood that both Nhep and Watanabe separately disclose the preamble of Claim 17 of the '413 Patent. *See* Section IX.B.1.

2. Element [17.1] – “a housing”

259. Element [17.1] is identical to portions of claim element [1.1]. Thus, my discussion above applies equally here, and for at least the reasons below, it is my opinion that Nhep discloses claim element [17.1]. *See* Section IX.B.2.

260. Nhep discloses a housing as claimed in the combination of release sleeve 38 and connector housing 32, and corresponding supporting elements. These elements are a housing at least because they house the fiber optic ferrule. EX1004, ¶¶76-77.



EX1004, FIG. 1 (annotated).

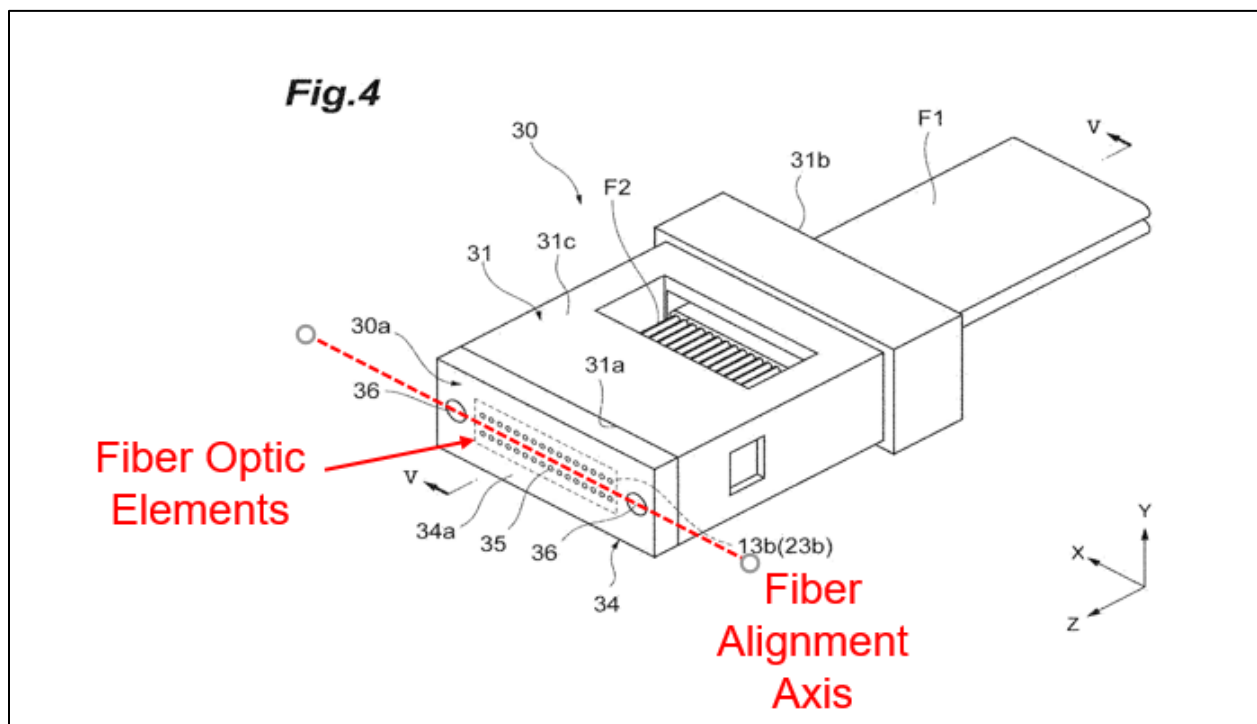
261. Accordingly, Nhep discloses [17.1]. Additionally, for at least the reasons set forth above with respect to claim element [1.1], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious claim element [17.1].

3. Element [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;”

262. Element [17.2] is identical to portions of claim element [1.4] and claim element [1.5] Thus, my discussion above applies equally here, and for at least the reasons discussed below Nhep in view of Watanabe render obvious [17.2]. *See* Sections IX.B.5-IX.B.6.

undue experimentation and would have recognized that doing so would yield predictable results, as discussed above. *See* Section IX.A.

266. As shown below, Watanabe's MT ferrule includes a plurality of fibers that are arranged in an array of two rows. Watanabe explains that the MT ferrule includes "a plurality of GRIN lenses (optical elements) 35 optically coupled with the plurality of optical fibers F2 respectively. The plurality of GRIN lenses 35 are arranged in an array shape within the XY plane." EX1005, ¶41. I have annotated the fiber alignment axis defined by the rows of the MT ferrule below.



EX1005, FIG. 4 (annotated).

267. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious claim element [17.2]. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber

ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector “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.” Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious claim element [17.2] and would have been obvious to combine as I discuss in Section IX.A.

4. Element [17.3] – “the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis; and”

268. Element [17.3] is identical to claim element [1.6]. Thus, my discussion above applies equally here, and for at least the reasons set forth above with respect to claim element [1.6], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious claim element [17.3]. *See* Section IX.B.7.

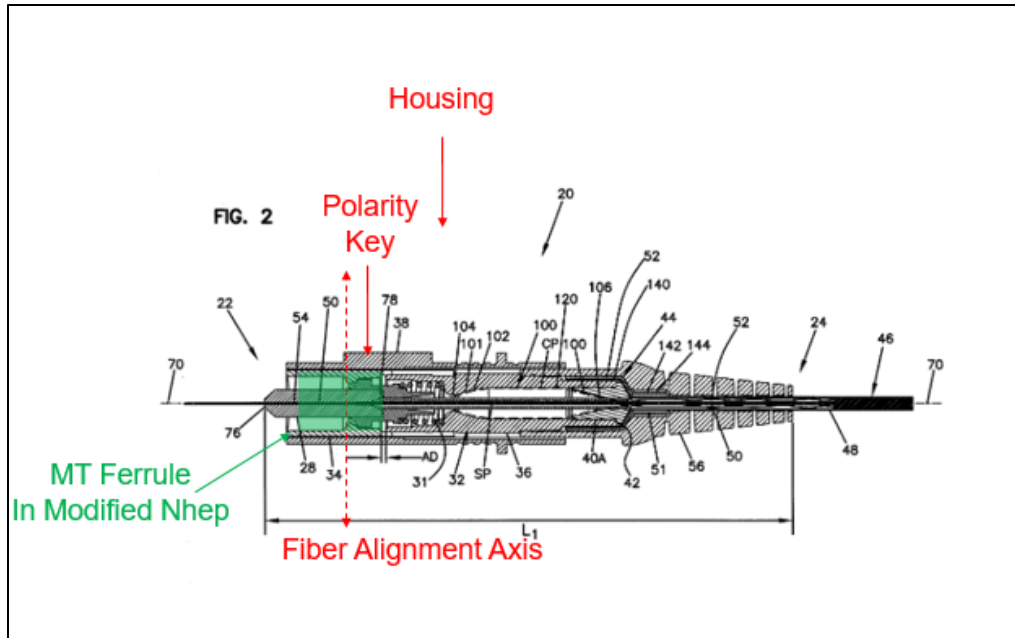
5. Element [17.4] – “a polarity key disposed on the housing such that the polarity key is configured to be spaced apart along the fiber alignment axis above the MT ferrule;”

269. For at least the reasons below, it is my opinion that Nhep in view of Watanabe renders obvious claim element [17.4].

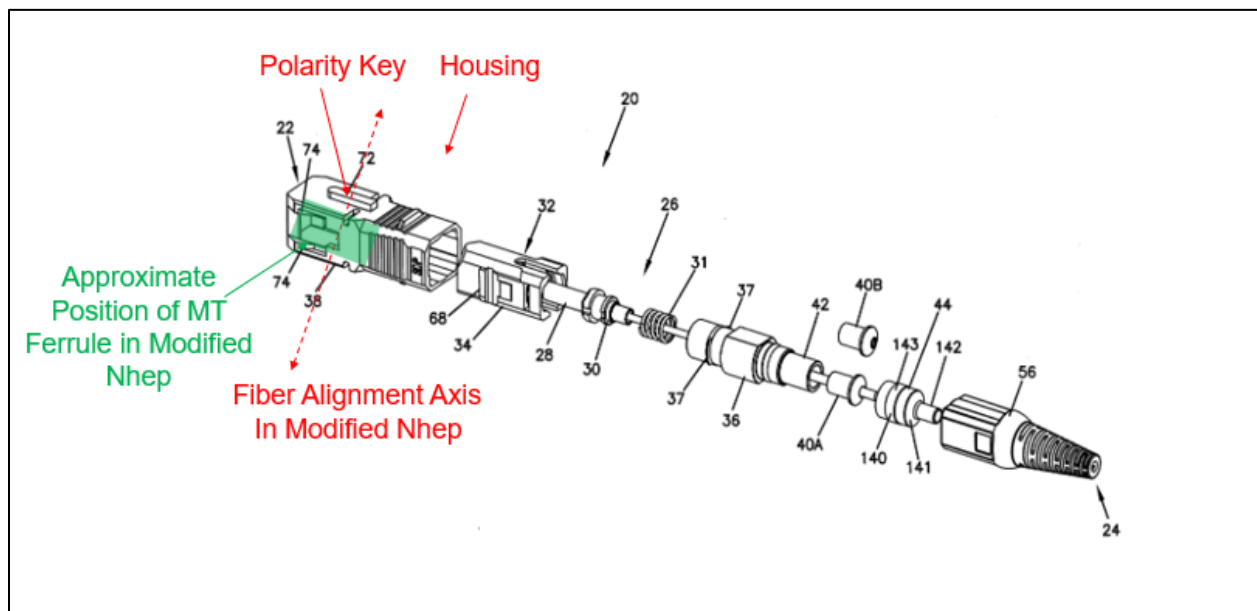
270. Patent Owner may allege Nhep does not expressly disclose the claimed polarity key orientation, but this orientation was well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B; VII.B.

271. Nhep disclose that its remote sleeve 38 includes a “keying rail 72.” EX1004, ¶78. As Nhep explains, “[w]hen 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. In other words, Nhep’s keying rail defines a polarity for Nhep’s connector. Thus, in my opinion a POSITA would have understood Nhep’s keying rail 72 to be equivalent to, and disclose, a polarity key as recited. As shown below, keying rail 72 is disposed on the top wall of release sleeve 38 in the view of Figure 1 of Nhep.

272. 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 with the first end wall. *See* Sections IX.A, IX.B.9. This arrangement is modeled after the known arrangement in Watanabe and improves connector spacing density. As shown below, this results in the polarity key (keying rail 72) being spaced apart above the MT ferrule along the fiber alignment axis.



EX1004, FIG. 2 (annotated).



EX1004, FIG. 1 (annotated).

273. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious claim element [17.4]. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber

ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector wherein “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.” Thus, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious claim element [17.4] and would have been obvious to combine as I discuss in Section IX.A.

6. Element [17.5] – “wherein the optical fiber connector is configured to latch with a mating adapter and

274. Element [17.5] is identical to claim element [1.9]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [1.9], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious claim element [17.5]. *See* Section IX.B.10.

7. Element [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,

275. Element [17.6] is identical to claim element [1.10]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [1.10], it is my opinion Nhep discloses claim element [17.5]. In addition to Nhep disclosing claim element [17.5], it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section

IX.A.3) also renders obvious claim element [17.5]. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe, the additional claimed features of claim element [1.10] that are disclosed by Nhep would be preserved in the specific combination of the prior arts. *See* Section IX.B.11.

8. Element [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.”

276. Element [17.7] is identical to claim element [1.11]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [1.11], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious claim element [17.7]. *See* Section IX.B.12.

277. In summary, for at least the reasons discussed above, I believe a POSITA would have been motivated to make a combination of Nhep and Watanabe that renders obvious each of the features of Claim 17 of the '413 Patent. As such, it is my opinion that the entirety of Claim 17 of the '413 Patent is rendered obvious.

P. Claim 18

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

278. Claim 18 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 18 of the '413 Patent.

2. Element [18.1] – “the connector includes an adapter latching feature spaced apart along the fiber alignment axis above the MT ferrule.”

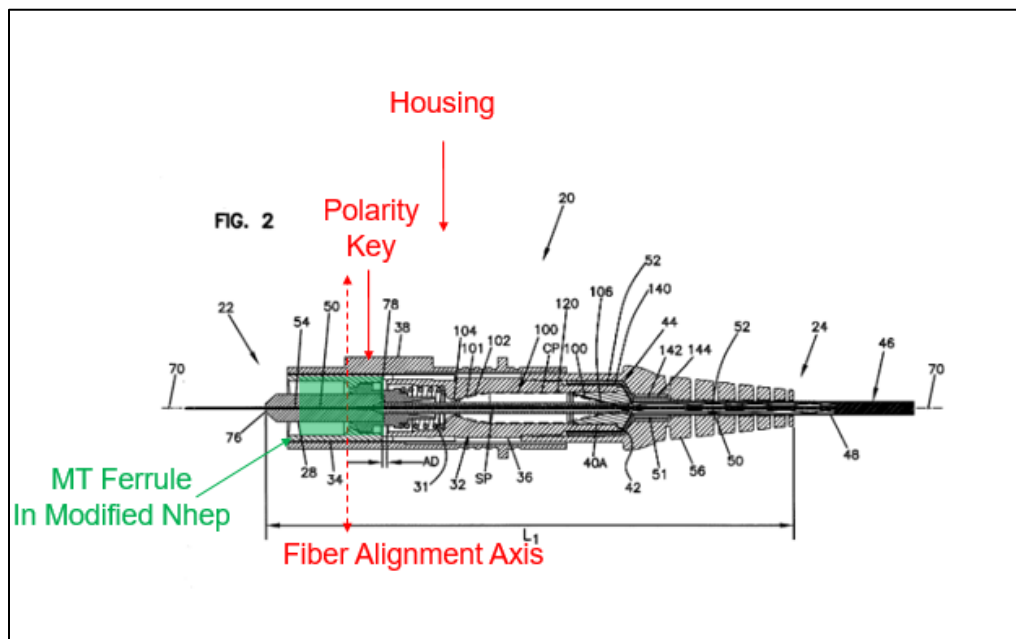
279. Claim 18 is similar to Claim 10, except it requires that the adapter latching feature be spaced apart along the fiber alignment axis above the MT ferrule. This claim is obvious for the same reasons discussed above with respect to Claim 10, as modified to account for the reference to the fiber alignment axis. Section IX.H.

280. For at least the reasons explained below, it is my opinion a POSITA would have been motivated to modify Nhep in view of Watanabe to place the latching feature in the location along the fiber alignment axis above the MT ferrule.

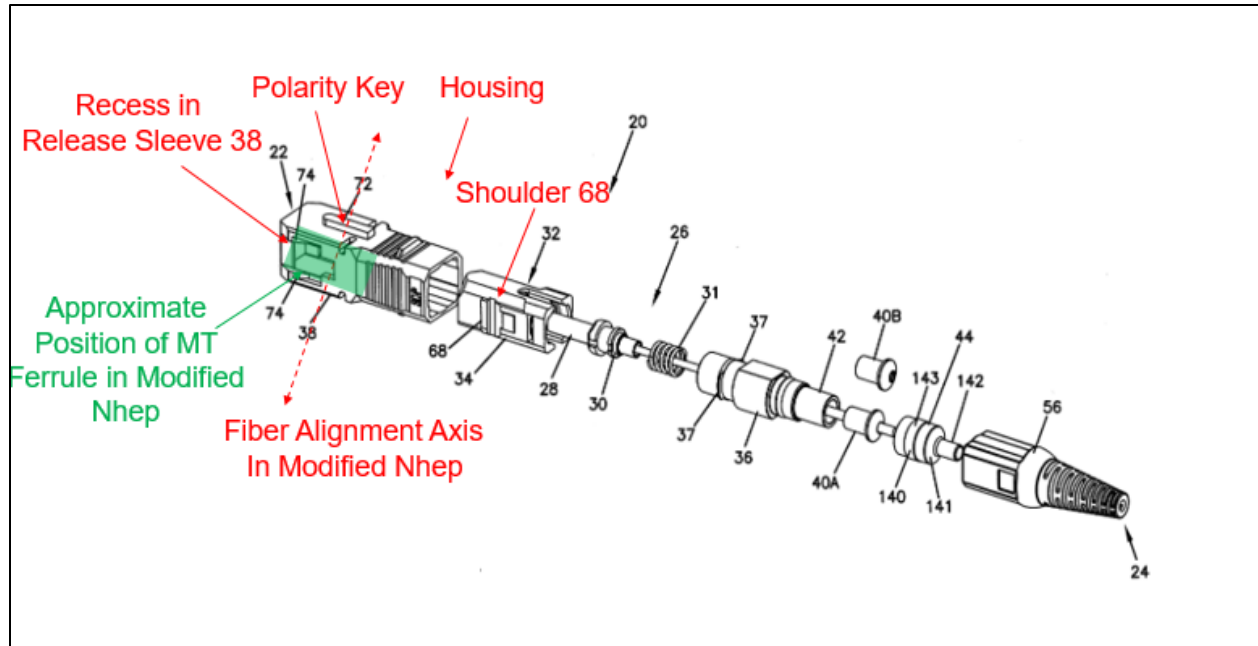
281. Patent Owner may allege Nhep does not expressly disclose the claimed latching feature placement with respect to the MT ferrule, but this

placement is both obvious and was well known in the prior art, for example, as explicitly taught in Watanabe. *See* Sections V.B, VII.B.

282. As discussed above, 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. These shoulders are accessed through recesses in release sleeve 38. Thus, it is my opinion that "shoulders 68" and the recesses in the release sleeve are latching features as claimed.



EX1004, FIG. 2 (annotated).

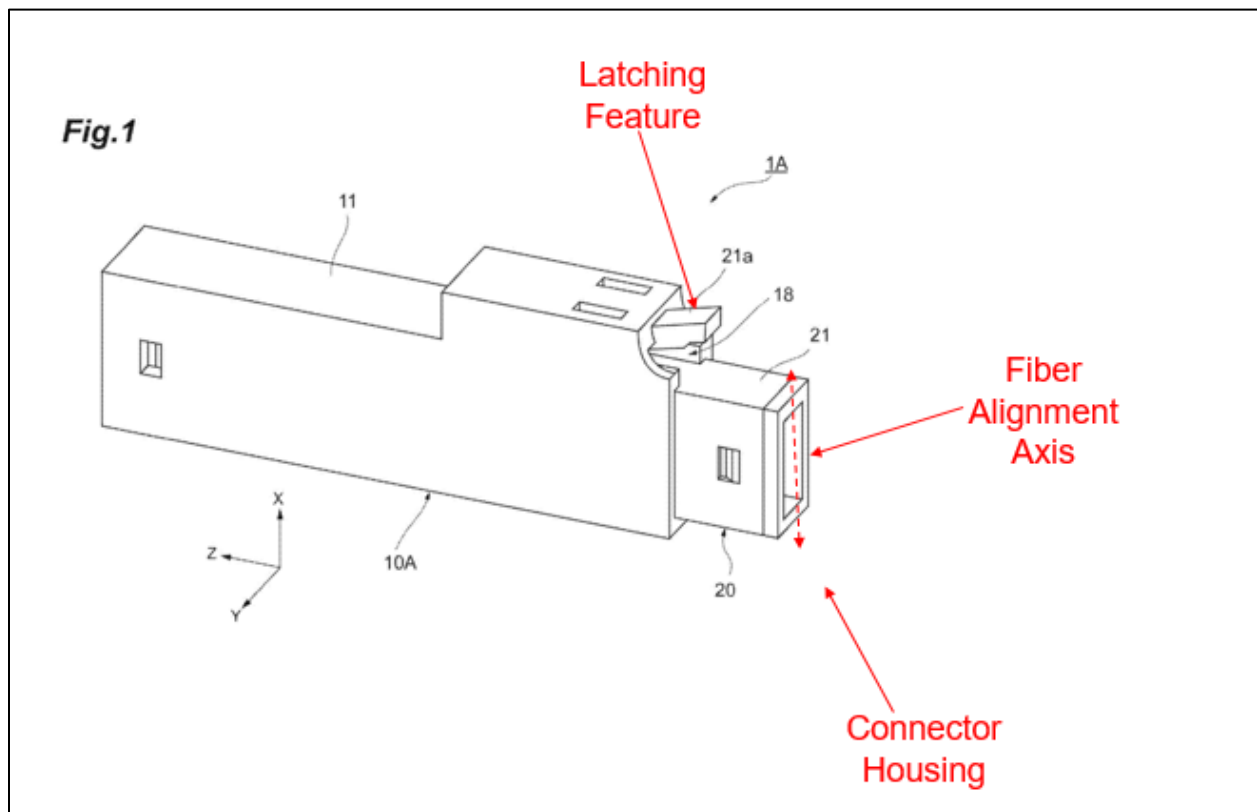


EX1004, FIG. 1 (annotated).

283. As shown above, these latching features are located on the wall perpendicular to the fiber alignment axis, and thus are not spaced apart above the fiber alignment axis of the MT ferrule as claimed. However, in my opinion having latching features located above the fiber alignment axis of the MT ferrule is obvious for at least three reasons. First, this arrangement maximizes connector density by placing the latches features on the walls oriented towards the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section IX.A. The structure needed to accommodate the latches (e.g., latch hooks) in an adapter or equipment receptacle will be placed above and below the connector after this modification, which is where the unused space in an equipment receptacle or rack is located. In placing the connector latch features and adapter latch hooks within the unused space above

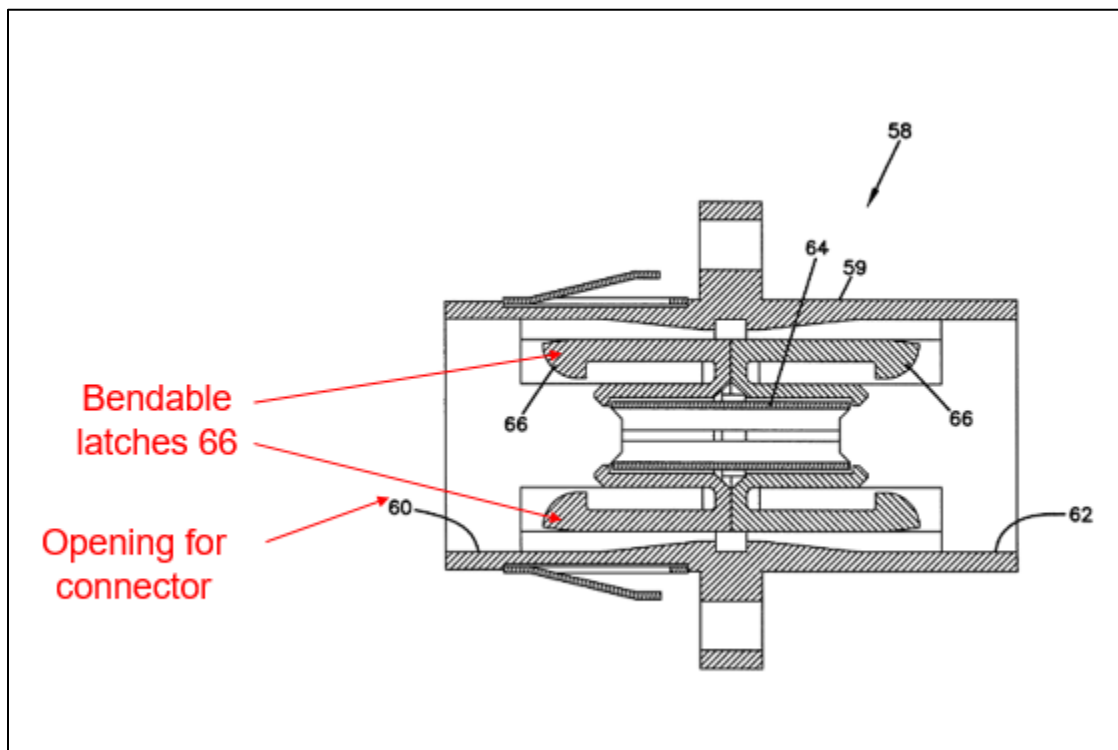
and below a row of optical fiber connectors, this improves accessibility of these features for the possible need to disconnect the fiber optic connector from the adapter or equipment receptacle, and allows for the lateral spacing between connectors to be reduced to optimize the density of connectors within an equipment receptacle or rack.

284. Second, Watanabe is configured with its latching feature (latch lever 21a) disposed on the wall that is spaced apart above the MT ferrule along the fiber alignment axis. This would have motivated a POSITA to modify Nhep's latching features to match Watanabe because the POSITA is modifying Nhep's housing in view of Watanabe.



EX1005, FIG. 1 (annotated).

285. Third, moving Nhep's latching feature on the side wall to the wall above the fiber alignment axis of the MT ferrule would have been obvious as a matter of being obvious to try. In this situation, there are only two options for configuring the pair of latching features because the pair of latching features must be placed on opposite walls to engage with an adapter, as shown below in Figure 25 of Nhep. Therefore, the two options are to place the latches either on the walls perpendicular to the fiber alignment axis or the walls aligned with the fiber alignment axis. Either option would work equally well and would not affect the functionality of the connector.



EX1004, FIG. 25 (annotated).

286. Thus, modifying Nhep's connector to have the disclosed latching features on the walls aligned with the fiber alignment axis of the MT ferrule would have been obvious as a matter of being obvious to try.

287. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 18. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector "wherein the connector includes an adapter latching feature spaced apart along the fiber alignment axis above the MT ferrule includes an adapter latching feature along the first end wall of the housing." Therefore, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 18 and would have been obvious to combine as I discuss in Section IX.A.

Q. Claim 19

1. Preamble – "The optical fiber connector as set forth in claim 18, wherein"

288. Claim 19 depends on Claim 18 and Claim 17, and for at least the reasons discussed above in reference to Claims 17 and 18, the combination of Nhep and Watanabe renders obvious Claims 17 and 18. *See* Section IX.Q; *see also* Section IX.R. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 19 of the '413 Patent.

2. Element [19.1] – “the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.”

289. Element [19.1] is identical to claim element [11.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to Claim 11, it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious Claim 19. *See* Section IX.I.2.

R. Claim 20

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

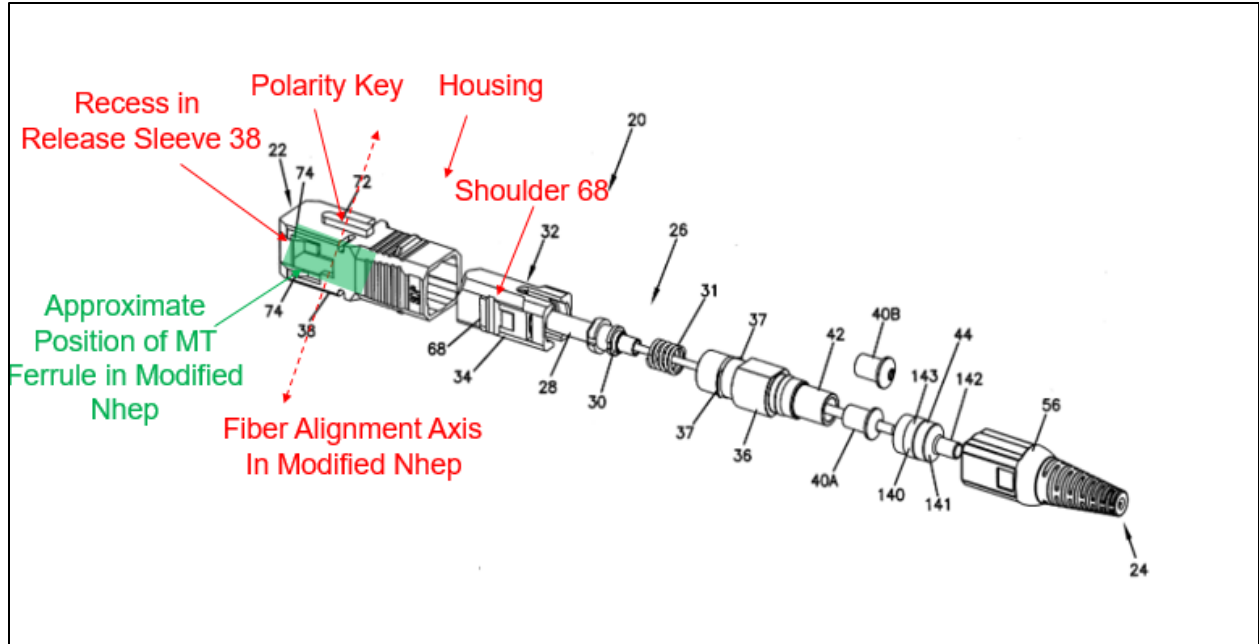
290. Claim 20 depends on Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 20 of the '413 Patent.

2. Element [20.1] – “the optical fiber connector is free of a polarity key spaced apart along the fiber alignment axis below the MT ferrule.”

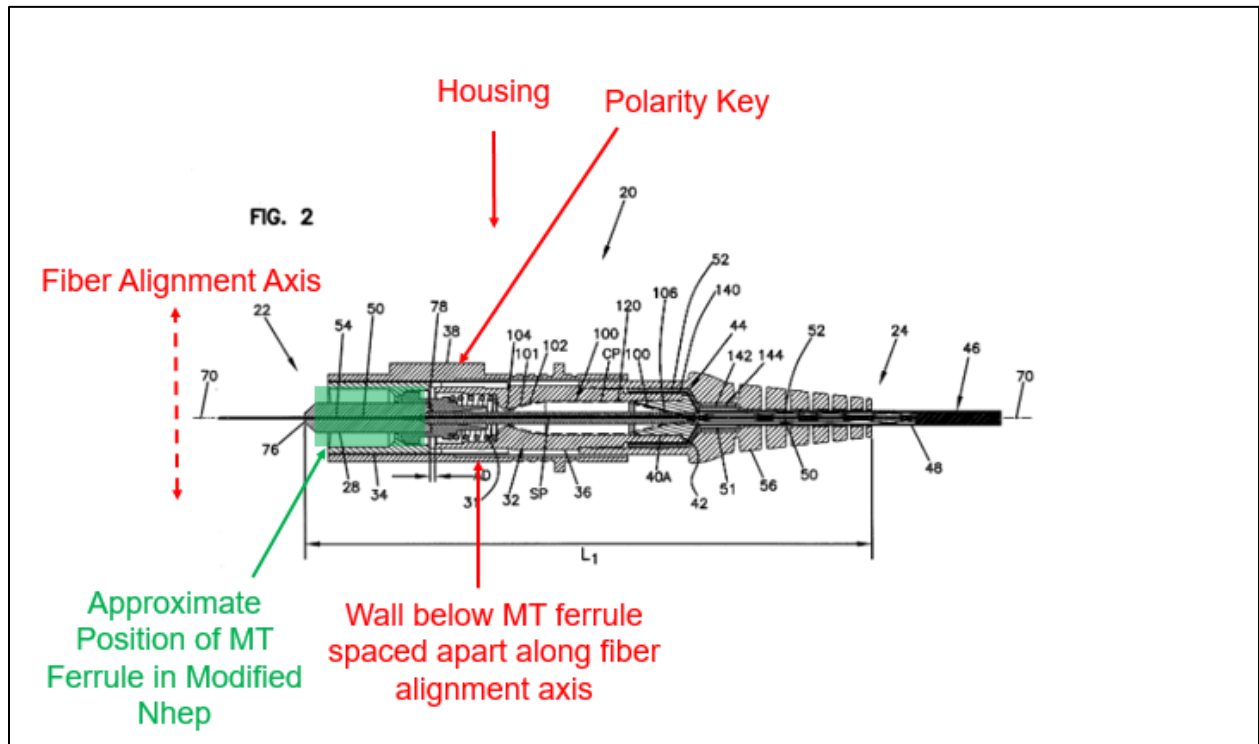
291. This claim element is similar to claim element [2.1] but references the fiber alignment axis and the connector being free of a polarity key below the MT ferrule. This claim is obvious for the same reasons discussed above with respect to

Claim 2, as modified to account for the reference to the fiber alignment axis. *See* Section IX.C.

292. As seen in the figures below, there is no other keying rail 72 positioned below the MT ferrule along the fiber alignment axis. Nhep also only mentions a single keying rail 72, and thus does not disclose a second polarity key anywhere on the connector. A POSITA would have maintained this configuration in modified Nhep because doing so preserves Nhep's functionality. Accordingly, Nhep and Watanabe render obvious Claim 20.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

293. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 20. That

is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector “wherein the optical fiber connector is free of a polarity key spaced apart along the fiber alignment axis below the MT ferrule.” Therefore, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 20 and would have been obvious to combine as I discuss in Section IX.A.

S. Claim 21

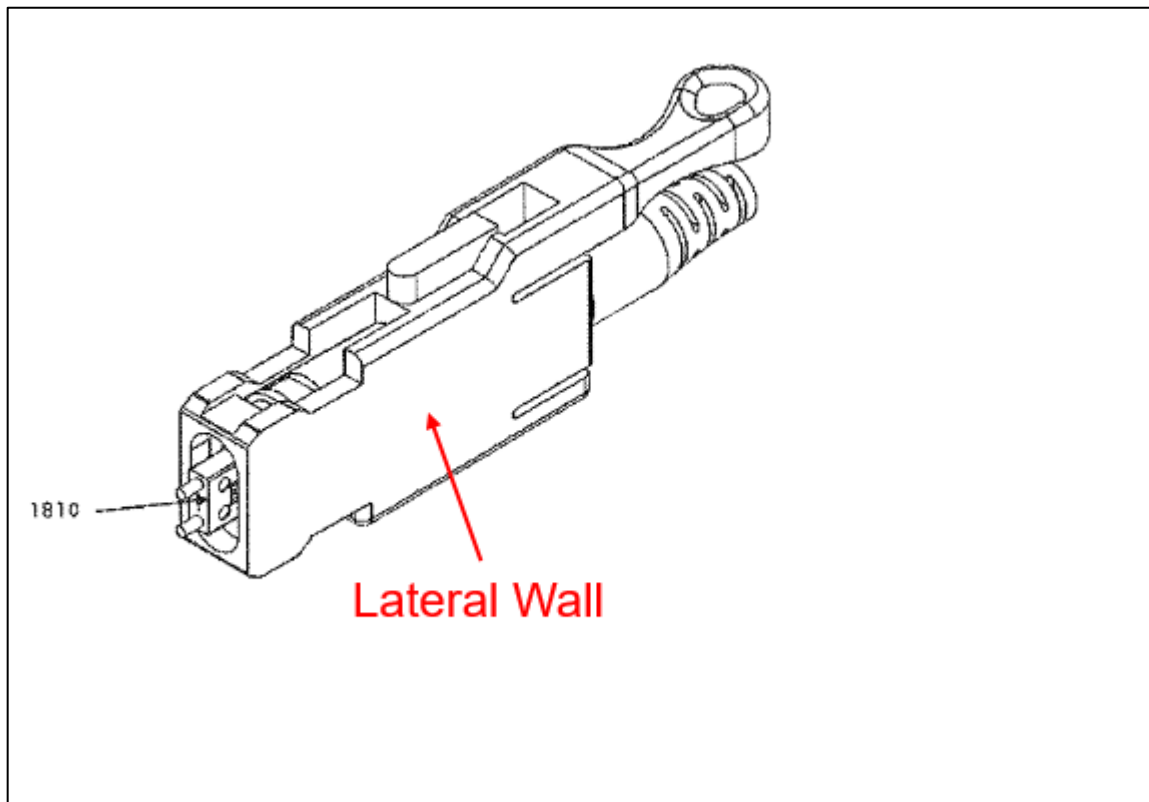
1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

294. Claim 21 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 21 of the ’413 Patent.

2. Element [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.”

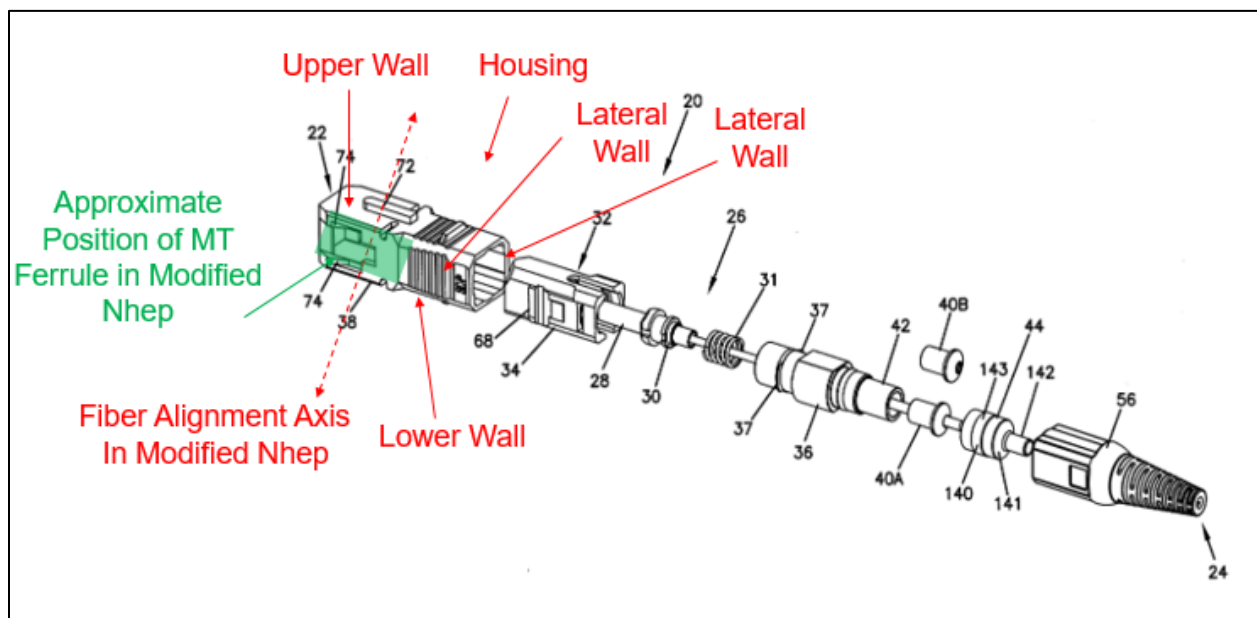
295. As discussed above in Section IX.D.2, I note that the term “substantially” is not defined in the ’413 Patent claims or specification. I note that the term “substantially” is not defined in the ’413 Patent claims or specification. I

understand from counsel that terms of degree such as substantially are interpreted from the viewpoint of a POSITA when read in context of the invention. I also am informed that every word in a claim must be given meaning. In this case, the word substantially modifies “flat” by expanding the term flat to include first and second side walls that are not strictly flat or planar in nature. Looking at the side walls of the embodiment of Figures 18A and 18B in the ’413 Patent, I note that these walls include at least two grooves or recesses. Thus, a POSITA would have understood that walls that are flat, but features such as grooves or recesses are included in the term “substantially flat.”

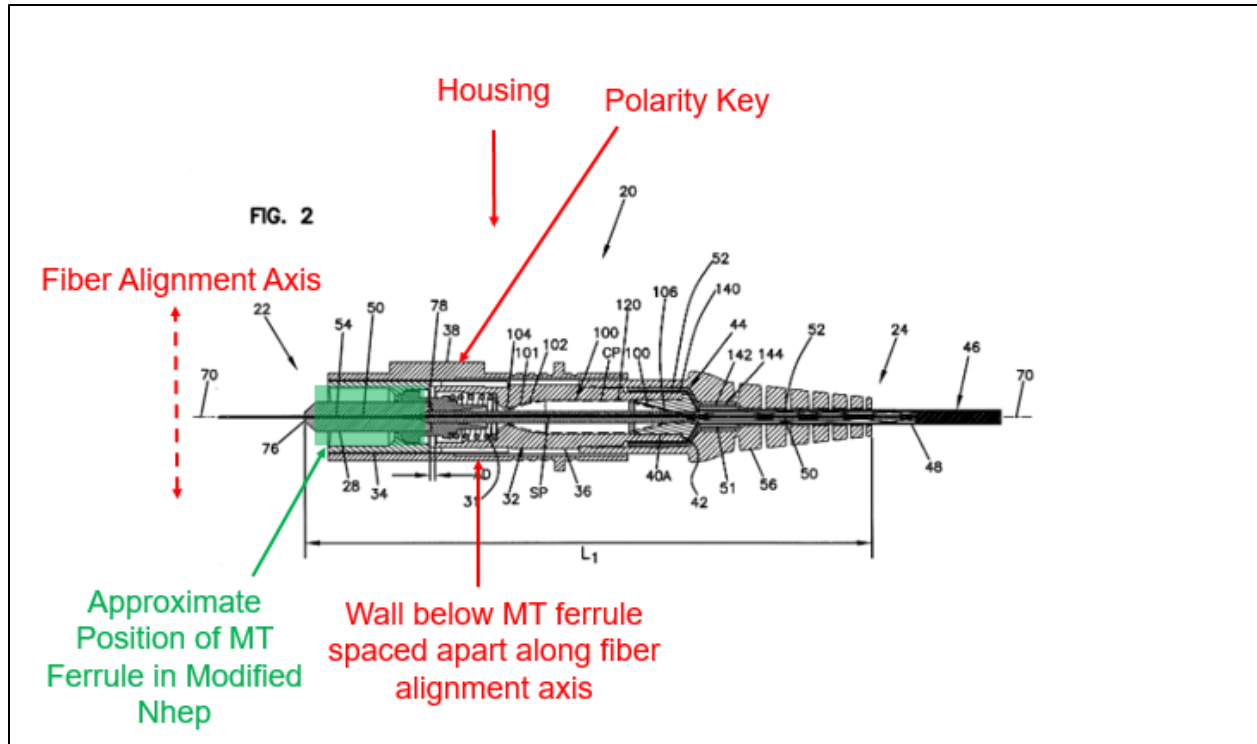


EX1001, FIG. 18B (annotated).

296. In modified Nhep, connector 20 includes upper and lower walls space apart above and below the MT ferrule along the fiber alignment axis, as shown below. First and second lateral walls are spaced apart on opposite lateral sides of the MT ferrule. These walls are all substantially flat according to my understanding of the claim term “substantially flat” because the walls of Nhep are generally flat with features like grooves and recesses, similar to the embodiment of Figure 18B shown above. For example, as seen below, the front portion of the lateral walls of release 38 are flat.



EX1004, FIG. 1 (annotated).



EX1004, FIG. 2 (annotated).

297. In modified Nhep, this arrangement is maintained with the shape being conformed to an MT ferrule with a fiber alignment axis extending as shown above, which would result in a rectangular cross section. *See* Section IX.A; *see also* Section IX.B.9.

298. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 21. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector “wherein 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.” Therefore, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 21 and would have been obvious to combine as I discuss in Section IX.A.

T. Claim 22

1. Preamble – “A connection system comprising the optical fiber connector of claim 17”

299. Claim 22 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 22 of the ’413 Patent.

2. Element [22.1] – “and an adapter comprising a perimeter wall defining a receptacle in which to matingly receive said optical fiber connector of claim 17 and another optical fiber connector such that said optical fiber connector of claim 17 and the other optical fiber connector are located side-by-side in the receptacle along a connector alignment axis perpendicular to the fiber alignment axis.”

300. This claim element is substantively identical to claim element [13.1], except for the reference to the optical fiber connector of Claim 17 and description of the side-by-side orientation along a connector alignment axis that is perpendicular to the fiber alignment axis. Therefore, this claim element is obvious

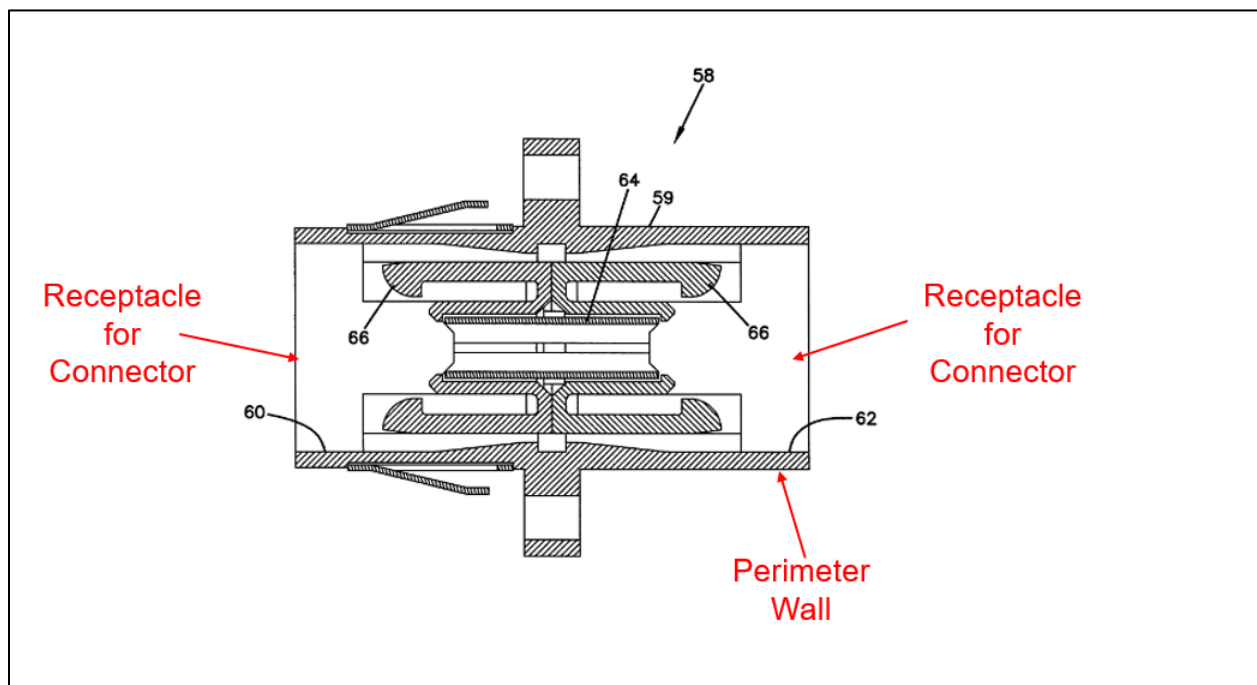
for at least the same reasons I discuss above in reference to claim element [13.1].

See Section IX.K.

301. Patent Owner may allege Nhep does not expressly disclose the claimed adapter configuration. But this configuration was well known in the prior art, e.g., as explicitly taught in various embodiments of Nhep. *See* Section VII.A.

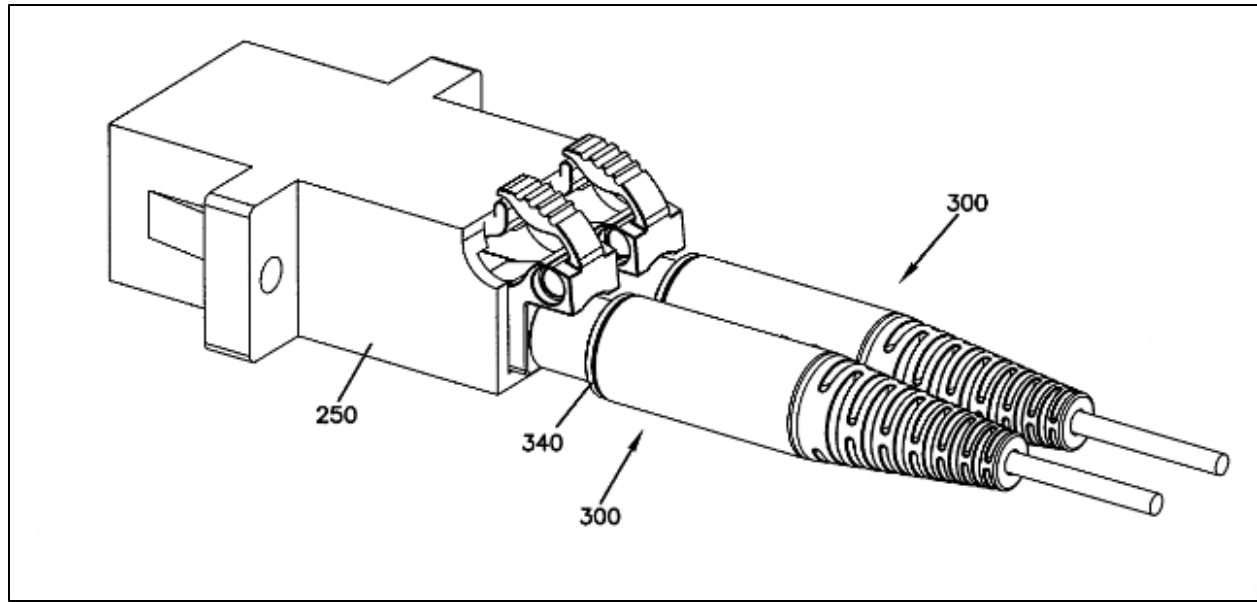
302. Nhep discloses a “fiber optic adapter 58 that can be used to couple two of the fiber optic connectors 20 together. The fiber optic adapter 58 includes an adapter housing 59 defining opposite, coaxially aligned ports 60, 62 for receiving two of the fiber optic connectors desired to be coupled together.”

EX1004, ¶77. As shown below, adapter 58 has a perimeter wall that defines a receptacle for the connector.



EX1004, FIG. 25 (annotated).

303. 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. However, in my opinion a POSITA would have been motivated to modify adapter 58 to accommodate more than one pair of fiber optic connectors. This would allow adapter 58 to serve to join multiple sets of fiber optic cables, improving performance and connection density of the resulting system. It also reduces part count because a single adapter 58 can be used for multiple cable pairings. 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. EX1004, ¶110. In Figure 34 an adapter 250 is arranged to receive two connectors in a side-by-side configuration. EX1004, ¶110. Thus, a POSITA would have used this adapter as guidance for modifying adapter 58 to have side-by-side receptacles. Further, in view of a POSITA modifying Nhep's connector to have the latching features aligned with the fiber alignment axis of the MT ferrule as described above in Section IX.P with reference to Claim 18, the side-by-side orientation of the corresponding adapter would match the claimed orientation aligned with a connector alignment axis that is perpendicular to the fiber alignment axis.



EX1004, FIG. 34.

304. Accordingly, it would be clear to a POSITA that the combination of Nhep and Watanabe (described in Section IX.A.3) renders obvious Claim 22. That is, the modification of the single fiber ferrule of Nhep to a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe would result in a multi-fiber optical connector “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.” Therefore, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector renders obvious Claim 22 and would have been obvious to combine as I discuss in Section IX.A.

U. Claim 27

1. Preamble – “The optical fiber connector as set forth in claim 17, further comprising”

305. Claim 27 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 27 of the '413 Patent.

2. Element [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.”

306. This claim element is identical to claim element [25.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [25.1], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious Claim 27. *See* Section IX.M.

V. Claim 28

1. Preamble – “The optical fiber connector as set forth in claim 17, further comprising”

307. Claim 28 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe also renders obvious Claim 28 of the '413 Patent.

2. Element [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.”

308. This claim element is identical to claim element [26.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [26.1], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) renders obvious Claim 28. *See* Section IX.N.

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

309. For at least the reasons below, it is my opinion that the combination of Nhep, Watanabe and Lin renders obvious dependent claims 5 and 6 of the '413 Patent.

A. Motivation to Combine

1. Nhep in view of Watanabe

310. In Nhep's connector modified by Watanabe, as discussed above for claim 1 in Ground 1 above, 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, e.g., a screwdriver, to reach into the dense group of connectors and activate the release mechanism. EX1004, ¶78; EX1001, 2:27-29; *See* Section IX.A. 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. In dense connections, this can lead to overstressing the cables and connected electronic components, which can produce latent defects and compromise the integrity and/or reliability of the network performance. EX1001, 2:9-26; *See* Section V.A. Furthermore, leaving space to grasp around each connection would result in a reduction in connector spacing density and increase the cost of physical infrastructure. *See* Section IV. Alternatively, guiding a tool to the release sleeve 38 may be a time-consuming process and "may not be effective at reducing support

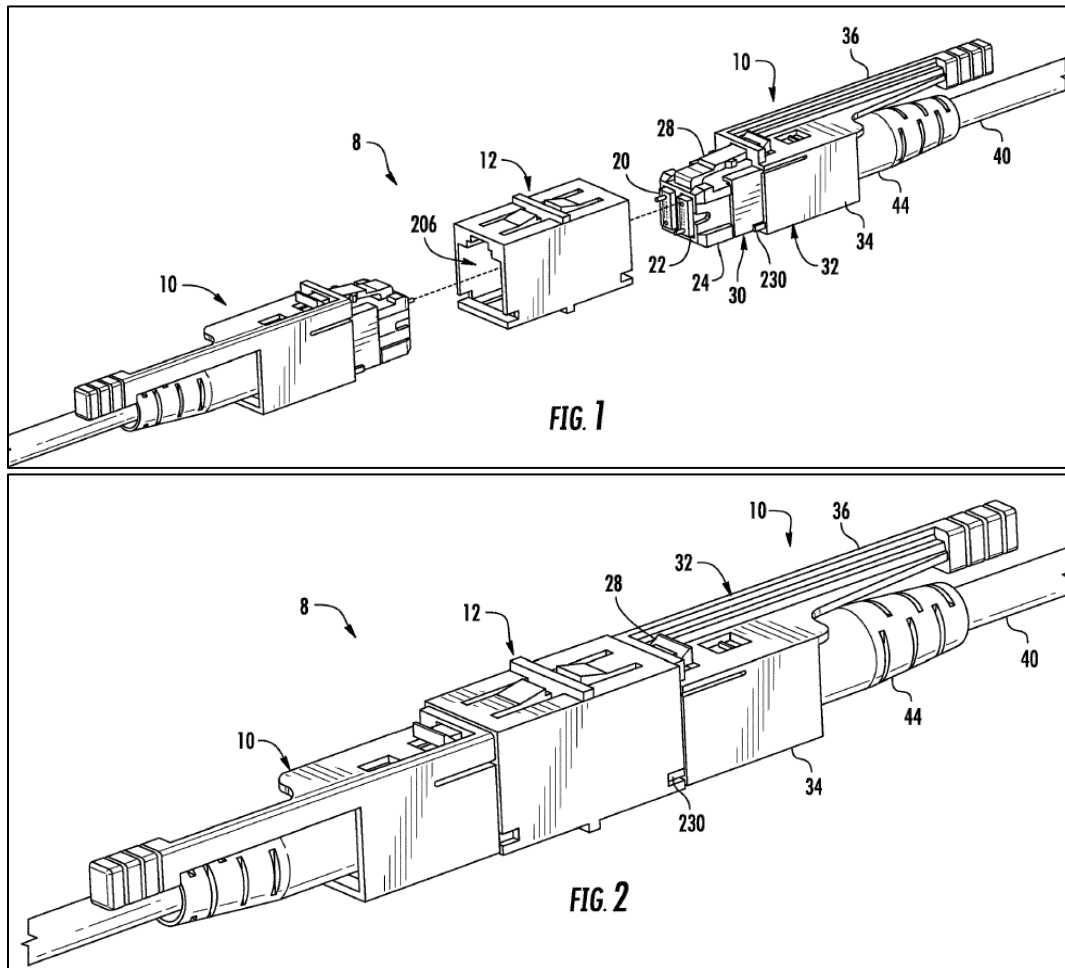
time and increasing the quality of service.” EX1001, 2:27-36. The need to optimize connector spacing density would have led a POSITA to search for alternative actuation options for unlatching the Nhep-Watanabe modified connector.

2. Lin

311. Lin discloses an actuation technique for a connector similar to the movable release sleeve of Nhep. EX1004, ¶78; *See* Section IX.A.1. Lin’s fiber optic connector 10 includes “a latch arm 28 extending outwardly from an inner connector body 24, a rear connector body 30 received over a back portion of the inner connector body 24, and an outer body 32 that cooperates with the inner connector body 24, latch arm 28, and rear connector body 30.” EX1006, ¶26. Additionally, Lin discloses “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. “Eventually engagement between the rear connector body 30 and outer body 32 prevents further relative movement of the outer body 32 in a rearward direction. Pulling the handle 36 of the outer body 32 at this point results in the rear connector body 30 (and the inner connector body 24 that is coupled to the rear connector body 30) moving with the outer body 32 so that the connector 10 can be removed from the adapter 12.” EX1006, ¶26.

312. Thus, like Nhep-Watanabe, Lin has a movable portion (outer body 32) that requires actuation rearwards for unlatching. Lin’s solution is to provide handle

36 that allows a user to actuate the moveable portion from a location displaced from the connector housing, eliminating the need to increase the space between fiber optic connectors or use a separate tool for actuation of the unlatching mechanism.



EX1006, FIGs. 1-2.

3. Reasons to Combine

313. A POSITA would have been motivated to modify the Nhep-Watanabe connector to include a structure like Lin's handle 36 that allows for remote actuation of release sleeve 38. Specifically, a POSITA would be motivated to

modify the Nhep-Watanabe multi-fiber optical connector further in view of Lin such that the housing of the Nhep-Watanabe connector would include a handle, similar to the handle 36 of Lin, such that when the handle is pulled, the latches 66 of the Nhep-Watanabe adapter would slide along the shoulders 68 of the connector housing 32 to release the connector from the adapter. Incorporating a handle similar to Lin's handle 36 for remote release of the Nhep-Watanabe multi-fiber optical connector from an adapter allows for increasing connector spacing density because less space is needed between connectors to allow a user to grasp the connector release sleeve, as well as optimizes operating costs while maintaining the integrity and reliability of the network performance. This problem, and the solution of using a remote release, is well-known in the art. *See, e.g.*, EX1016, ¶¶2-3.

314. A POSITA would have had a reasonable expectation of success making this modification. 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. I also note that the modification of a Nhep-Watanabe connector to accommodate a handle as shown in Lin is a highly predictable process that would most likely result in a successful connector remote actuation design.

B. Claim 5

1. Preamble – “The optical fiber connector as set forth in claim 1, further”

315. Claim 5 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep, Watanabe and Lin renders obvious Claim 5 of the '413 Patent.

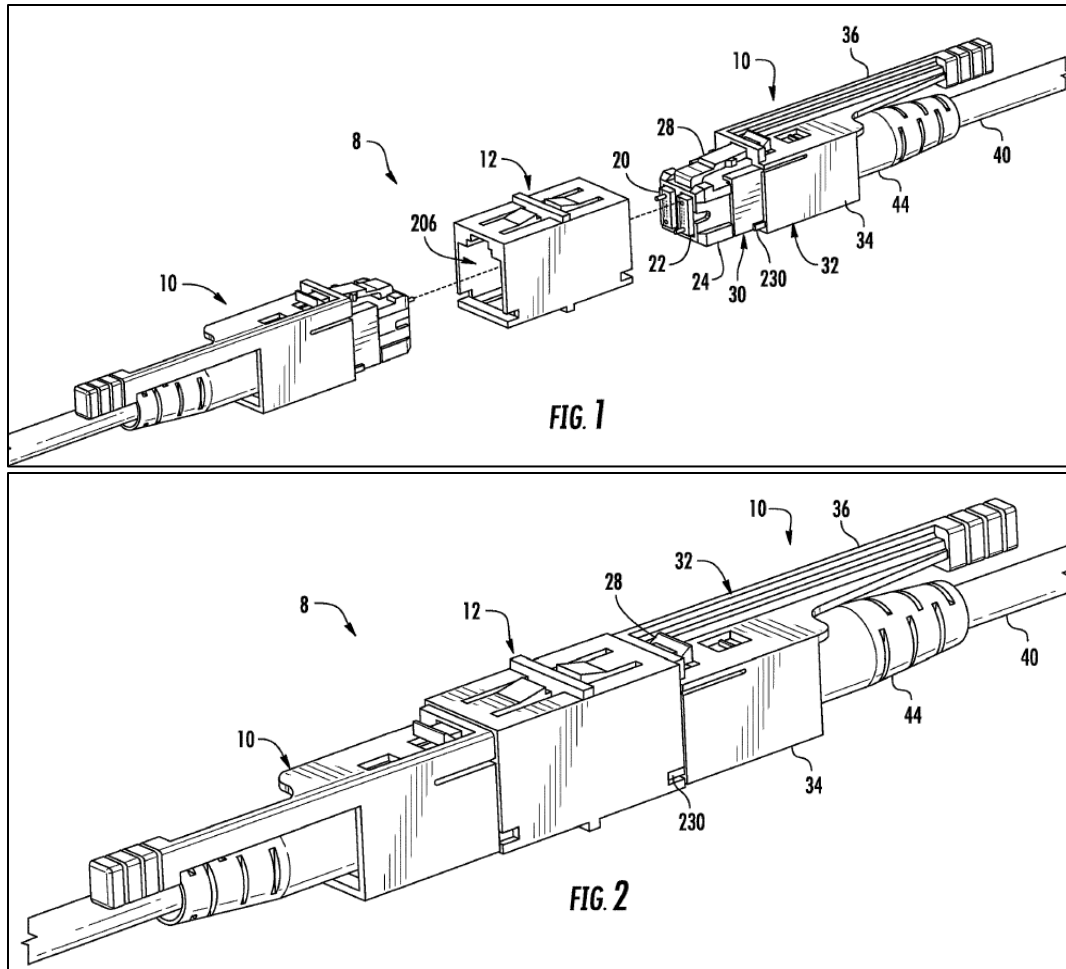
2. Element [5.1] – “comprising a remote release.”

316. 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. *See* Section V.A; *see also* Sections VII.C and X.A.

317. Lin discloses an actuation technique for a connector similar to the movable release sleeve of Nhep. EX1004, ¶78; *See* Section IX.A.1. Lin’s fiber optic connector 10 includes “a latch arm 28 extending outwardly from an inner connector body 24, a rear connector body 30 received over a back portion of the inner connector body 24, and an outer body 32 that cooperates with the inner connector body 24, latch arm 28, and rear connector body 30.” EX1006, ¶26. Additionally, Lin discloses “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. “Eventually engagement between the rear connector body 30 and outer body 32 prevents further relative movement of the outer body 32 in a rearward direction. Pulling the handle 36 of the outer body 32 at this point results in the rear connector body 30 (and the inner connector body 24 that is coupled to the rear connector body 30) moving with the outer body 32 so that the connector 10 can be removed from the adapter 12.” EX1006, ¶26.

318. Thus, Lin’s handle 36 is a remote release as claimed at least because it allows for remote actuation or release of Lin’s connector.



EX1006, FIGs. 1-2.

319. A POSITA would have been motivated to modify the Nhep-Watanabe connector discussed above to include a structure like handle 36 that allows for remote actuation of release sleeve 38. *See* Section X.A. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance.

320. 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. *See* Section X.A.

321. Accordingly, it would be clear to a POSITA that the combination of Nhep, Watanabe, and Lin (described in Section X.A) renders obvious Claim 5. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe with the remote release handle of Lin would result in a multi-fiber optical connector “further comprising a remote release.” Therefore, for at least the reasons discussed above, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector with remote release handle of Lin renders obvious Claim 5 and would have been obvious to combine for at least the reasons discussed in Section X.A.

C. Claim 6

1. Preamble – “The optical fiber connector as set forth in claim 5, wherein”

322. Claim 6 depends upon Claim 5 and Claim 1, and for at least the reasons discussed above in reference to Claim 5 and Claim 1, the combination of Nhep, Watanabe, and Lin renders obvious Claim 5 and Claim 1. *See* Section IX.B; *see also* Section X.A. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep, Watanabe, and Lin renders obvious Claim 6 of the ’413 Patent.

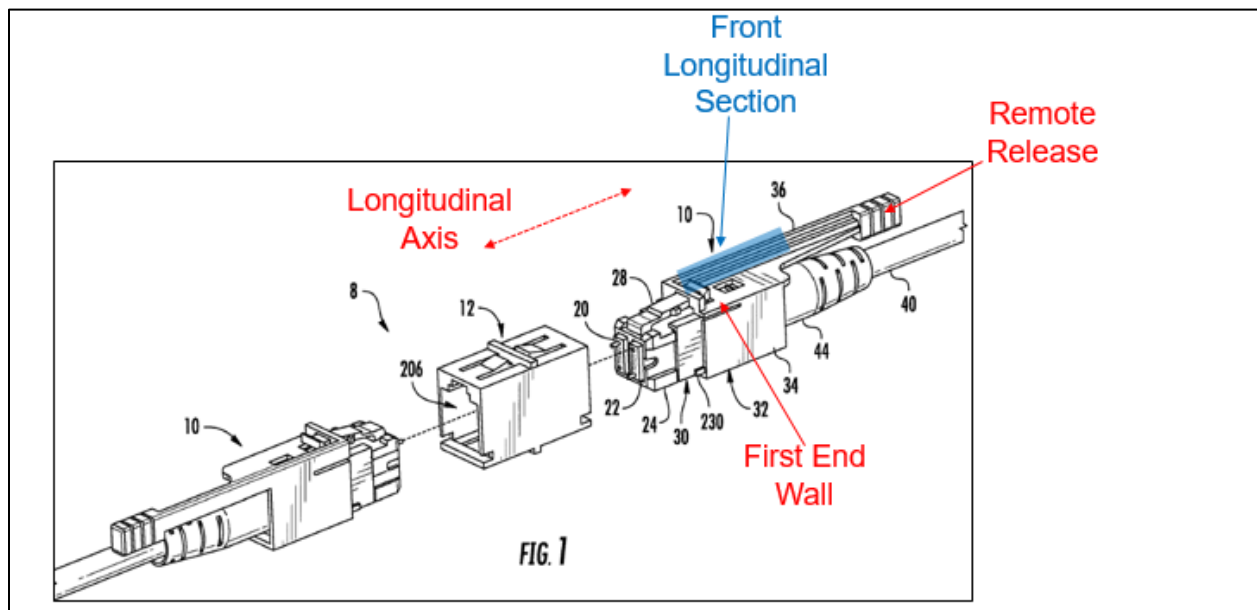
2. Element [6.1] – “the remote release includes a front longitudinal segment disposed on the first end wall of the housing.”

323. Patent Owner may allege Nhep-Watanabe does not expressly disclose the claimed remote release structural configuration, but this feature was well

known in the prior art, for example, as explicitly taught in Lin. *See* Section V.A; *see also* Sections VII.C and X.A.

324. I note that the term “front longitudinal segment” does not appear in the specification and is not otherwise defined in the claims. Thus, I am interpreting this term per its plain meaning, which is a longitudinally oriented section of the remote release that is disposed at or near the front of the remote release.

325. As shown below, 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. I note that I am applying the same longitudinal directionality below to annotate the front longitudinal segment.



EX1006, FIG. 1 (annotated).

326. As discussed above in Claim 5, a POSITA would have been motivated to modify the Nhep-Watanabe connector to include a remote release that allows for

remote actuation of release sleeve 38. *See* Section X.A. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance. In doing so, they would have included a front longitudinal section connected to the first end wall as taught by Lin for at least two reasons. First, a front longitudinal section is a logical structure to extend the remote release rearwards and connecting the front longitudinal section to the first end wall allows for positioning the release towards the top of the connector, which is aligned with the latching features of the connector and desirable for access to the handle within the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in an equipment receptacle or rack. Second, this configuration is shown in Lin, which is being used to provide the structural teachings for this modification. Thus, a POSITA would have implemented the same configuration to ensure the modification functions properly.

327. Accordingly, it would be clear to a POSITA that the combination of Nhep, Watanabe, and Lin (described in Section X.A) renders obvious Claim 6. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule (*i.e.*, MT ferrule) as described in Watanabe with the remote release handle of Lin would result in a multi-fiber optical connector “wherein the remote release includes a front longitudinal segment disposed on the first end wall of the

housing.” Therefore, for at least the reasons discussed above, it is my opinion that the Nhep-Watanabe multi-fiber ferrule optical connector with remote release handle of Lin renders obvious Claim 6 and would have been obvious to combine for at least the reasons discussed in Section X.A.

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

A. Claim 9 is only supported as of May 21, 2021.

328. I understand from counsel that determining the priority date for a patent is done on a claim-by-claim basis. *See* Section II.D. I further understand from counsel that the relevant priority document must fully support the elements of the claim for the claim to successfully gain the benefit of the document’s filing date.

329. Claim 9 depends from Claim 1 and recites “wherein the connector is an SN type connector.” A SN type connector is a type of fiber optic connector that was introduced by Patent Owner. EX1010, ¶35.

330. But before the ’197 Application, applications that the ’413 Patent claims benefit to only disclosed so-called LC, MT, SC, CS, and ST connectors, as well as the general categories of small form-factor pluggable (SFP) footprints or quad small form-factor pluggable (QSFP) footprints for connectors.

331. It is my opinion that Claim 9 is only supported as of the filing of the original claims of the ’197 Application. The filing of the ’197 Application is the

first instance that I find any disclosure of an SN type connector, and even then, an SN type connector is only disclosed in original Claim 9, which is identical to issued claim 9. EX1002, 0019.

332. Thus, my understanding is Claim 9 should gain the benefit of a filing date no earlier than May 21, 2021.

333. I take no position on whether the mention of the known SN type connector in Claim 9 is sufficient to support this claim.

B. Motivation to Combine

1. Nhep in view of Watanabe

334. Nhep-Watanabe's connector is based on a modified SC-type connector. EX1004, ¶¶78, 112.

335. SC connectors are a well-known fiber optic connector format. A POSITA would have been well aware that different connector formats are used in different situations, and as described in the background of the '413 Patent, "backward compatibility with existing data center equipment" is desirable to increase modifiability after deployment. EX1001, 1:51-58. Therefore, adapting a connector to mate with a different connector standard improves compatibility and marketability of the connector.

2. Cox

336. Cox discloses a variety of fiber optic connectors that are used, including "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. (Hickory, N.C.), and SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

3. Reasons to Combine

337. A POSITA would have been motivated to modify the Nhep-Watanabe connector to be compatible with a variety of standard connector formats, including the SN connector format, to improve marketability of the resulting connector.

338. A POSITA would have had a reasonable expectation of success making this modification. 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. I also note that the 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.

C. Claim 9

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

339. Claim 9 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it

is my opinion that the combination of Nhep, Watanabe and Cox renders obvious Claim 9 of the '413 Patent.

2. Element [9.1] – “the connector is an SN type connector.”

340. Patent Owner may allege Nhep-Watanabe does not expressly disclose the claimed SN connector type, but this feature was well known in the prior art, for example, as explicitly taught in Cox. *See* Section VII.D.

341. Cox discloses fiber optic assemblies, including a plurality of “fiber optic components 23” that are “disposed through a front side 108 of the main body 102 and configured to receive fiber optic connectors connected to fiber optic cables.” EX1010, ¶41. Examples of fiber optic component 23 configurations include “multi-fiber push-on/pull-off (MPO) connectors or adapters”, “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. (Hickory, N.C.), and SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

342. 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. *See* Section XI.B.

343. Accordingly, it would be clear to a POSITA that the combination of Nhep, Watanabe, and Cox (described in Section XI.B) renders obvious Claim 9. That is, by modifying the single fiber ferrule of Nhep with a multi-fiber ferrule as described in Watanabe to accommodate the features of Cox's SN type connector would result in a multi-fiber optical connector "wherein the connector is an SN type connector." Therefore, for at least the reasons discussed above, it is my opinion that the Nhep-Watanabe-Cox SN type multi-fiber ferrule optical connector renders obvious Claim 9 and would have been obvious to combine as I discuss in Section XI.B.

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

344. For at least the reasons below, it is my opinion that the combination of Nhep, Watanabe, and Applicant Admitted Prior Art renders obvious dependent claims 5, 6, 23, and 24 of the '413 Patent.

A. Applicant Admitted Prior Art

345. The '413 Patent discloses several existing connector formats in its background section. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. Section II.C. Here, the background section of the '413 Patent states that "[f]or example, one current footprint is known as the small form-factor pluggable

transceiver footprint. This footprint currently accommodates two LC-type ferrule optical connections.” EX1001, 1:58-61. The ’413 Patent’s background section also states that “[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. In my opinion, these statements are identifying the current, known prior art connector footprints, including the quad small form-factor pluggable footprint.

B. Motivation to Combine

346. A POSITA would have been motivated to modify the Nhep-Watanabe connector to fit into a small form-factor pluggable transceiver footprint and/or quad small form-factor pluggable transceiver footprint configuration to improve compatibility and marketability. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector. I note that requirement that there are two connectors in Claims 15 and 23 or four connectors in Claims 16 and 24. This element is obvious for at least two reasons. First, in view of the disclosure in the ’413 Patent, which specifically discusses the known small form-factor pluggable transceiver footprints for two or four connectors. EX1001, 1:58-67. Second, I understand from counsel that a simple duplication of components is generally considered obvious. Thus, duplicating the Nhep-Watanabe connector to meet the recited number of

connectors is obvious. 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.

C. Claim 15

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

347. Claim 15 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe further in view of the Applicant Admitted Prior Art also renders obvious Claim 15 of the '413 Patent.

2. Element [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.”

348. Patent Owner may allege that Nhep does not expressly disclose the claimed small form-factor pluggable footprint. However, as explicitly taught in the background of the '413 Patent, this footprint was well known in the prior art. *See* Section V.A.

349. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. *See* Section XII.A. Here, the background section of the '413 Patent states that “[f]or example, one current footprint is known as the small form-factor pluggable

transceiver footprint. This footprint currently accommodates two LC-type ferrule optical connections.” EX1001, 1:58-61. In my opinion, this statement is identifying the current, known prior art connector footprints, including the small form-factor pluggable footprint.

350. 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. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector to accommodate a known footprint. I note that 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. Accordingly, a POSITA would have understood that while Nhep presents an optical connector for housing a single fiber ferrule, it is obvious to modify this connector to accommodate multi-fiber ferrules, such as MT ferrules, as presented in Watanabe (*See* Section IX.A.3), and further it is obvious that when combined with a second identical connector, the two connectors the two connectors could be structured to fit into the known small form-factor transceiver footprint. Therefore, it is my opinion that Nhep and Watanabe further in view of the Applicant Admitted Prior Art renders obvious Claim 15 and would have been obvious to combine as I discuss in Section IX.A.

D. Claim 16

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

351. Claim 16 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Nhep and Watanabe renders obvious Claim 1. *See* Section IX.B. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe further in view of the Applicant Admitted Prior Art also renders obvious Claim 16 of the '413 Patent.

2. Element [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.”

352. Patent Owner may allege that Nhep does not expressly disclose the claimed quad small form-factor pluggable footprint. However, as explicitly taught in the background of the '413 Patent, this footprint was well known in the prior art. *See* Section V.A.

353. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. *See* Section XII.A. Here, the background section of the '413 Patent states that “[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. In my opinion, this statement is identifying

the current, known prior art connector footprints, including the quad small form-factor pluggable footprint.

354. A POSITA would have been motivated to modify the Nhep-Watanabe connector to fit into a quad small-form factor pluggable transceiver footprint configuration to improve compatibility and marketability. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector to accommodate a known footprint. I note that 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. Accordingly, a POSITA would have understood that while Nhep presents an optical connector for housing a single fiber ferrule, it is obvious to modify this connector to accommodate multi-fiber ferrules, such as MT ferrules, as presented in Watanabe (*See* Section IX.A.3), and further it is obvious that when combined with three additional identical connectors, the four connectors could be structured to fit into the known small form-factor transceiver footprint. Therefore, it is my opinion that Nhep and Watanabe further in view of the Applicant Admitted Prior Art renders obvious Claim 16 and would have been obvious to combine as I discuss in Section IX.A.

E. Claim 23

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

355. Claim 23 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe further in view of the Applicant Admitted Prior Art also renders obvious Claim 23 of the '413 Patent.

2. Element [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.”

356. This claim element is identical to claim element [15.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [15.1], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) further in view of the Applicant Admitted Prior Art (described in Section XII.A) renders obvious Claim 23. *See* Section XII.C.

F. Claim 24.

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

357. Claim 24 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Nhep and Watanabe renders obvious Claim 17. *See* Section IX.Q. Additionally, for at least the reasons below, it is my opinion that the combination of Nhep and Watanabe further in view of the Applicant Admitted Prior Art also renders obvious Claim 24 of the '413 Patent.

2. Element [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.”

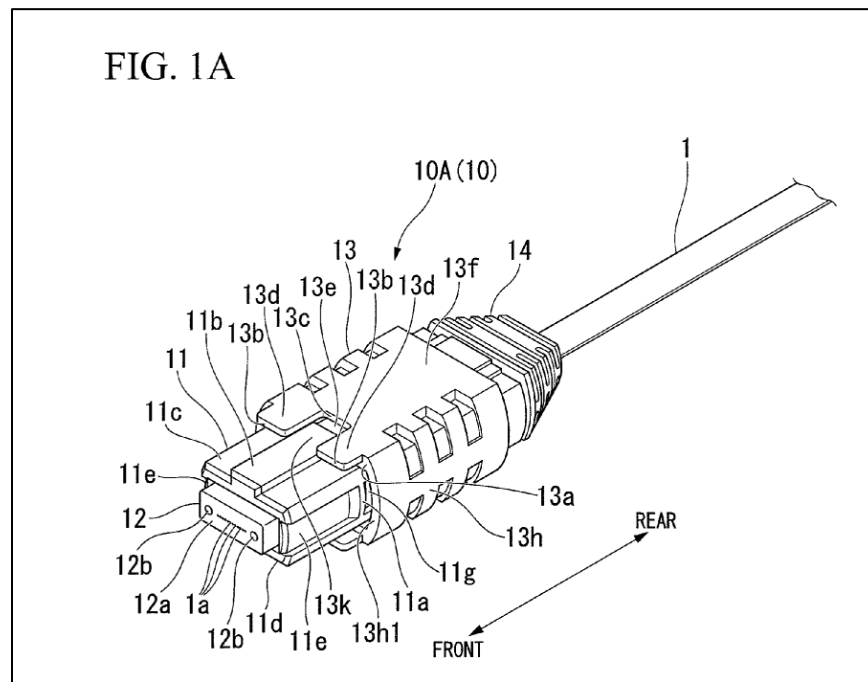
358. This claim element is identical to claim element [16.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [16.1], it is my opinion that a POSITA would have understood the combination of Nhep and Watanabe (described in Section IX.A) further in view of the Applicant Admitted Prior Art (described in Section XII.A) renders obvious Claim 24. *See* Section XII.D.

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

A. Motivation to Combine

1. Katoh

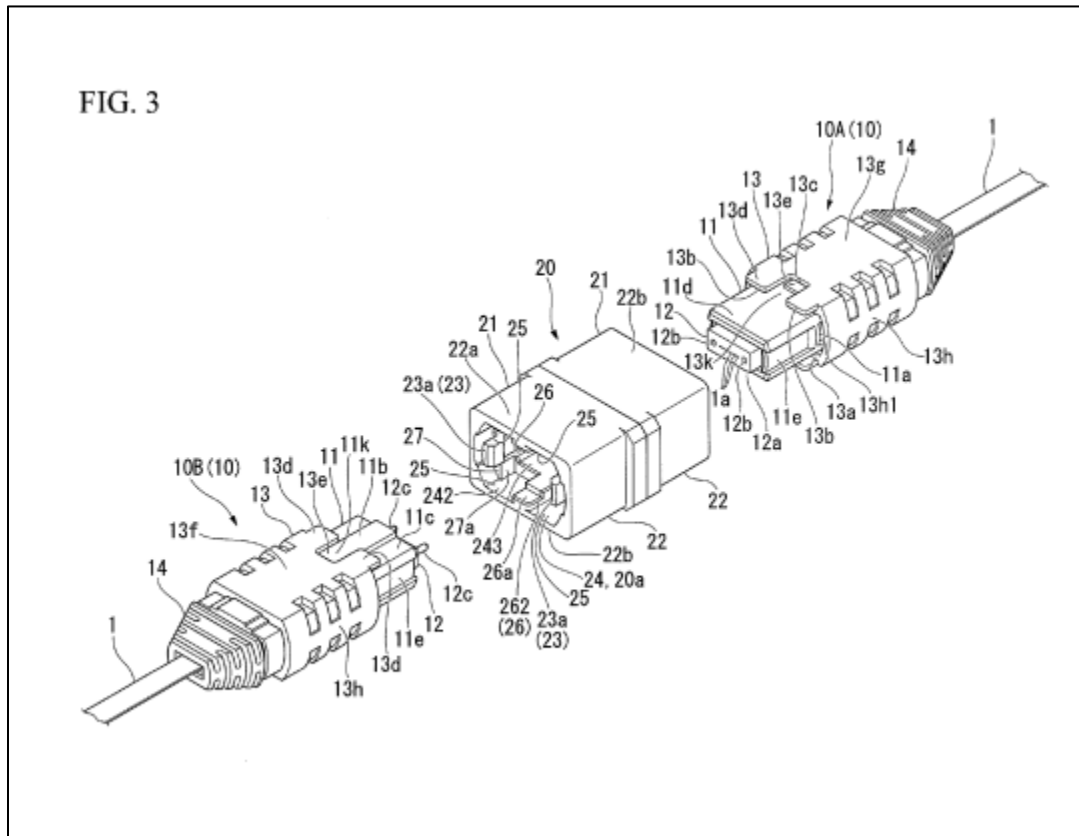
359. Katoh discloses a fiber optic connector labeled “optical connector 10.” EX1011, ¶¶74-76, FIGs. 1A-1B. Katoh’s connector is based on an MPO type optical connector, and includes a “ferrule 12 [that] employs an MT type optical connector.” EX1011, ¶¶74, 76, 77-79, 89.



EX1011, FIG. 1A.

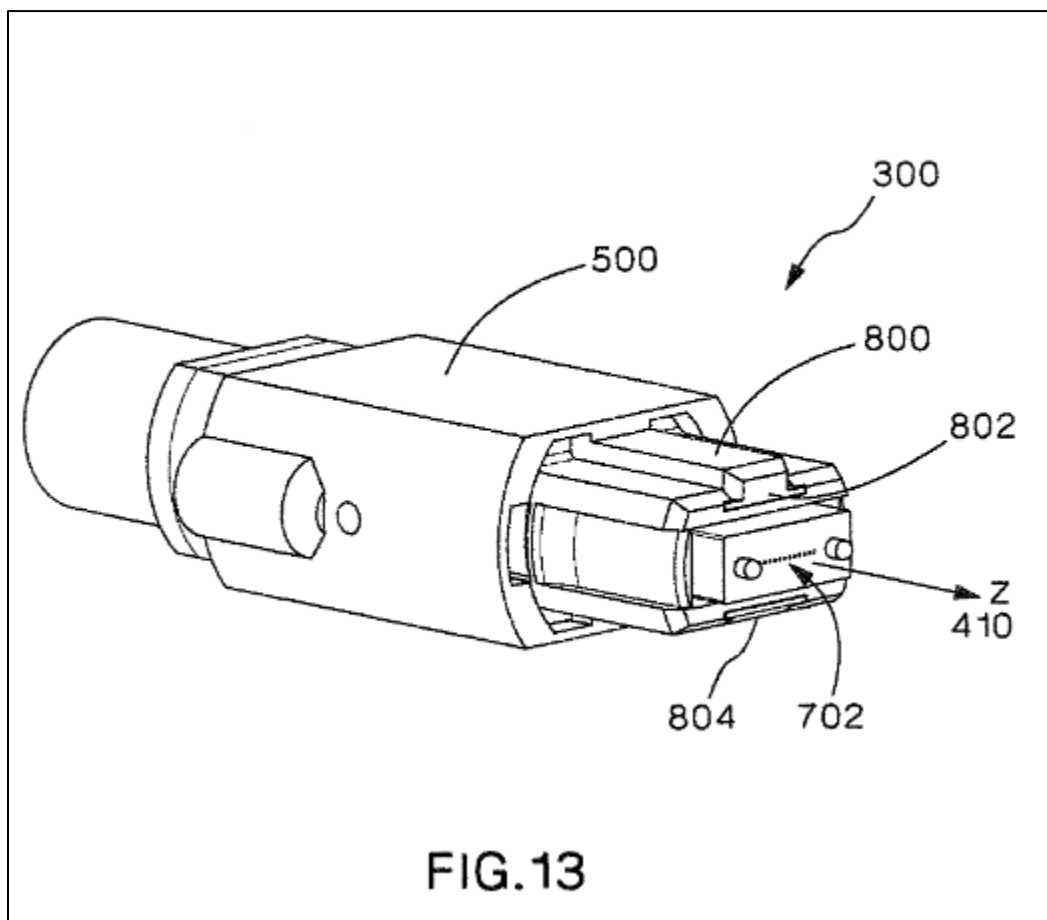
360. Katoh’s connector 10 is formed from a “housing 11 [that] is inserted into the coupling [13],” coupling 13 being free to slide in the front to rear direction with respect to housing 11. EX1011, ¶¶118-144. As discussed in detail above in Section VII.E, this sliding of coupling 13 relative to housing 11 is the mechanism

that acts to latch and unlatch connector 10. Section VII.F. Specifically, latching coupling 13 slides to reveal or cover the engagement protrusions 11a and engaging recessed portions 11g that receive the latches (engagement pieces 23) from the adapter. EX1011, ¶193; *See* Section VII.E.



2. Kuffel

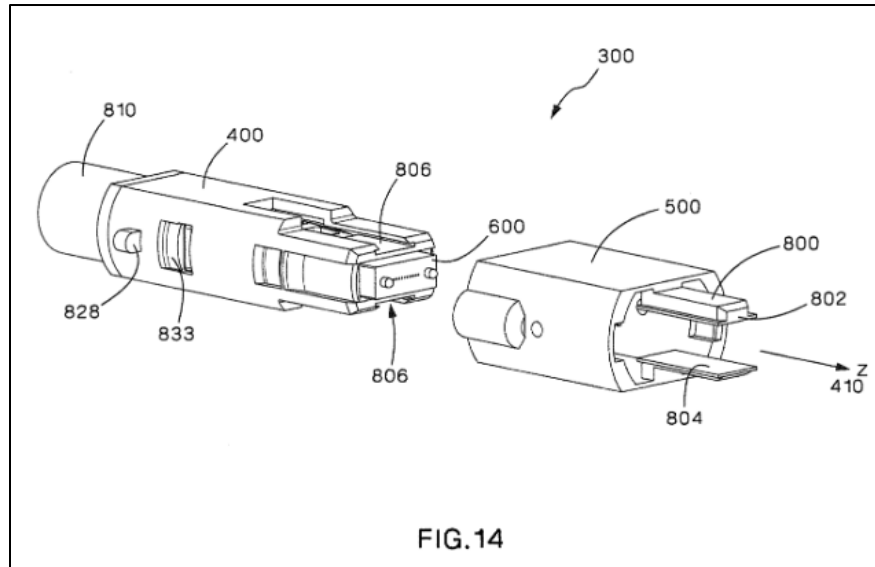
362. Like Katoh, Kuffel's fiber optic connectors are based on "MPO" type connectors. EX1012, ¶¶36-39. Kuffel focuses on improving efficiency, simplifying, and reducing costs associated with converting existing fiber optic networks to updated connectors (such as MPO connectors) in the field. EX1012, ¶¶2-6. One aspect of Kuffel's disclosure "relates to changing the polarity of a connector." EX1012, ¶¶10-11.



EX1012, FIG. 13.

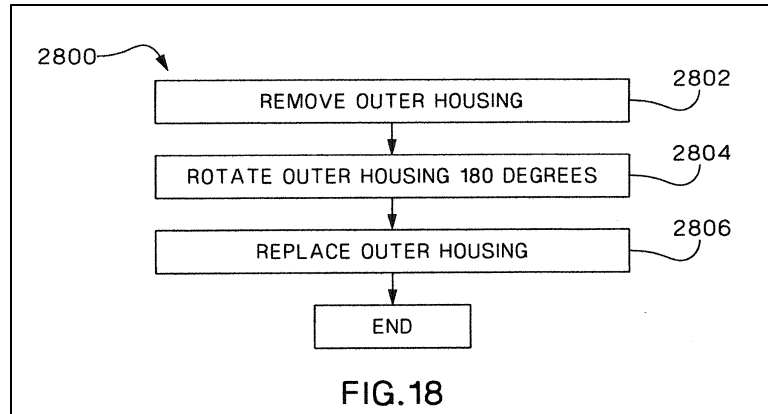
363. In Kuffel's connector 300 "polarity key 800 is integrated into the outer housing 500. For example, the outer housing 500 may have the polarity key

800 integrally formed therein.” EX1012, ¶62. “[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, reproduced below, shows outer housing 500 having been removed from inner housing assembly 400 prior to rotation and reinstallation. EX1012, ¶¶61-64. Key 800 can be seen integrated into outer housing 500. EX1012, ¶62.



EX1012, FIG. 14.

364. Figure 18, reproduced below, is a flow diagram that explains the polarity-reversal process. EX1012, ¶67, FIG. 18.



EX1012, FIG. 18.

3. Reasons to Combine

365. First, a POSITA would recognize that both Katoh and Kuffel are from the same field of endeavor as the '413 patent: that of fiber optic connectors.

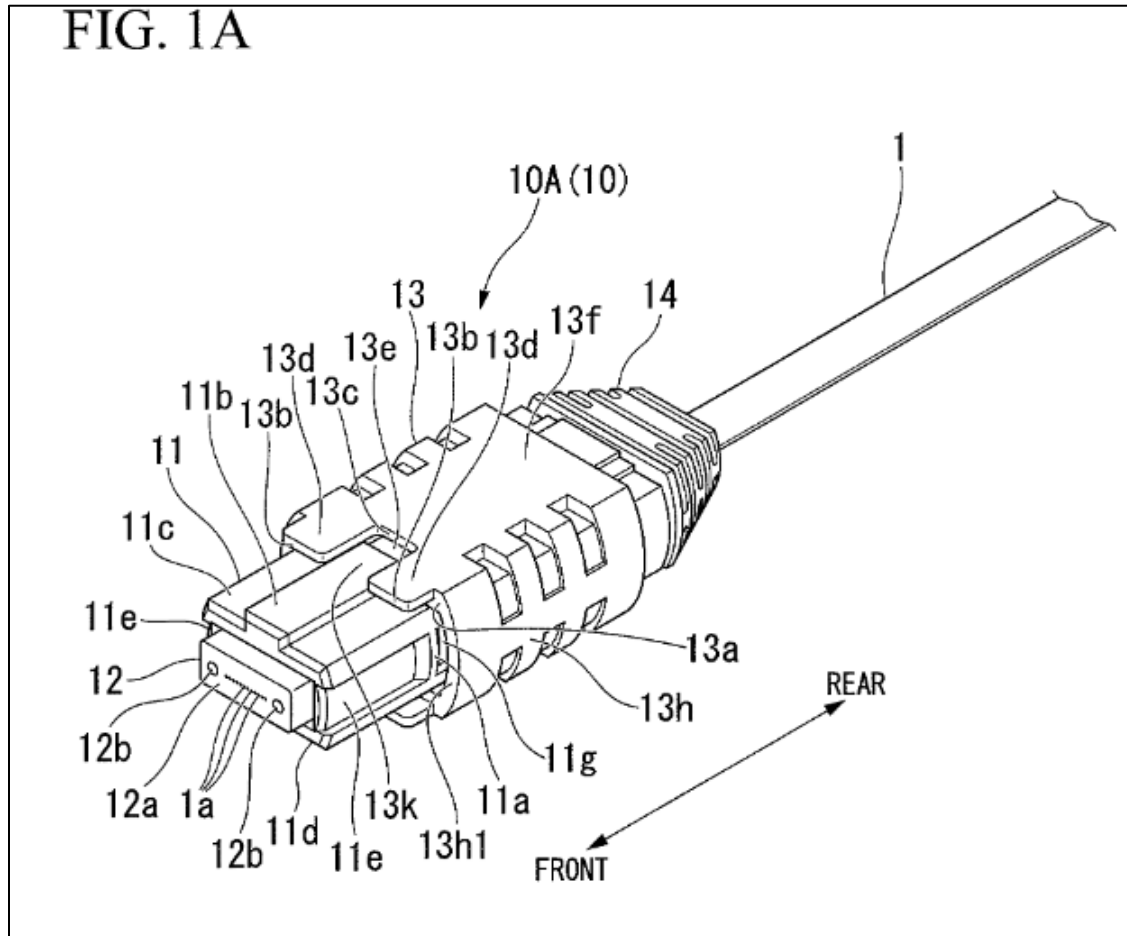
EX1011, ¶¶74-76; EX1012, ¶¶36-39. A POSITA would have found it obvious to modify Katoh's connector 10 to include a swappable outer housing to allow for connector polarity swapping in the field, as taught by Kuffel. In fact, Kuffel provides a known motivation to make this modification: that different polarities are needed to define different connector types to complete a fiber optic cable network. EX1012, ¶¶58-60. I note that both Katoh and Kuffel disclose MPO type connectors that have slidable outer housings disposed around an inner housing that holds the ferrule. As a result of this similarity, the motivation to allow for polarity swapping in the field described in Kuffel applies to Katoh, and further, the modifications required to achieve this in Katoh are straightforward in nature.

366. This modification could be accomplished, for example, by modifying Katoh's "reverse-insertion preventing key 11b" (*i.e.*, polarity key) to be integrated with Katoh's coupling 13 (Katoh's equivalent of Kuffel's outer housing 500), as taught in Kuffel. EX1011, ¶161; EX1012, ¶¶62-64, FIGs. 13-14.

367. 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. First, this arrangement maximizes connector density by placing the polarity key on the walls oriented towards what is typically the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section IX.A. 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, which is where the unused in an equipment receptacle or rack space is usually located.

368. Second, it is also my opinion that positioning the polarity key on one of the short walls is obvious as a matter of being obvious to try. Here, there are only four possible solutions to polarity key placement with respect to Katoh's connector. Specifically, the key can only be on one of the four walls of Katoh's rectangular connector to maintain functionality. The polarity key will function

equally well when placed on any of the four walls, and thus the positioning of the polarity key on one of the short walls would have been obvious as a matter to try.



EX1011, FIG. 1A.

369. A POSITA would have had a reasonable expectation of success making this modification. 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. I also note

that the modification of a Katoh's coupling 13 to include key 11b is a highly predictable process that would result in a successful connector design.

370. As a final clarification, I note that in the combination of Katoh and Kuffel that a POSITA would be motivated to make, a POSITA would have recognized that in modifying Katoh's "reverse-insertion preventing key 11b" (*i.e.*, polarity key) to be integrated with Katoh's coupling 13 (Katoh's equivalent of Kuffel's outer housing 500), as taught in Kuffel, each of the walls must maintain similar contours/notches to employ the latching mechanism with an adapter. In other words, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel does not affect or hinder any of the latching and unlatching mechanisms of Katoh's connector with an adapter. Therefore, Katoh's fiber optic connector will continue to have the same fundamental principle of operation and the combination with Kuffel will not render Katoh unsatisfactory for its intended purpose. Throughout my analysis herein, when I refer to the combination of Katoh and Kuffel, it is the above-described particular combination to which I refer.

B. Claim 1

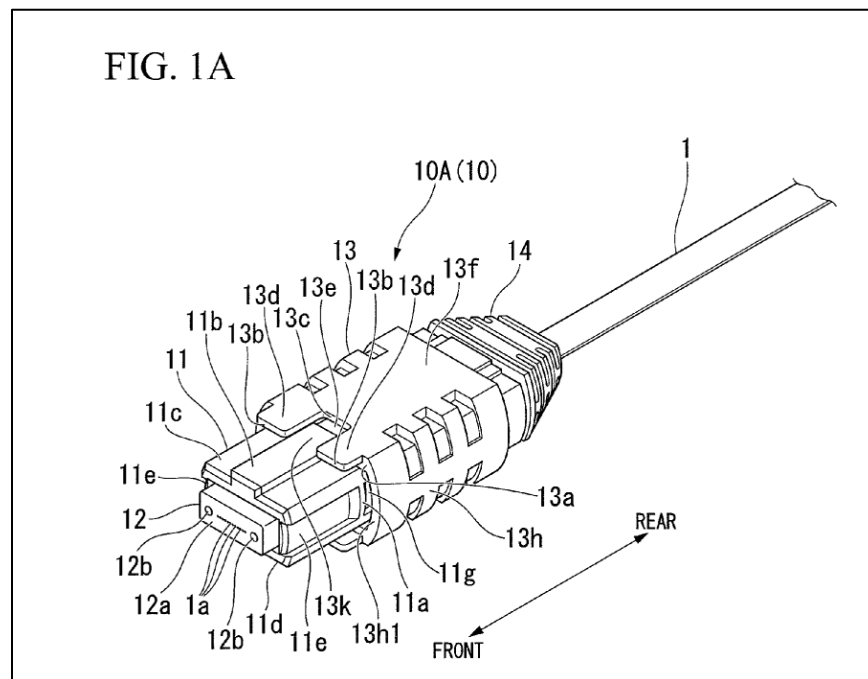
1. Preamble – "An optical fiber connector comprising"

371. I understand from counsel that a preamble is assumed to be non-limiting unless certain conditions are met, such as the preamble defining structure

that is used in and necessary for the claimed invention. Here, in my opinion the preamble of Claim 1 is not limiting because it does not define any necessary structure or otherwise serve to limit Claim 1.

372. Regardless, for at least the reasons below, it is my opinion that either of Katoh and Kuffel disclose the preamble, although I only rely on Katoh. I only discuss Kuffel to establish its teachings as it relates to other claim terms discussed below as Kuffel is not needed to meet this feature.

373. Katoh discloses an “optical connector 10” that is based on an “MPO type” fiber optic connector. EX1011, ¶¶28-31, 74-79, FIGs. 1A-1C.

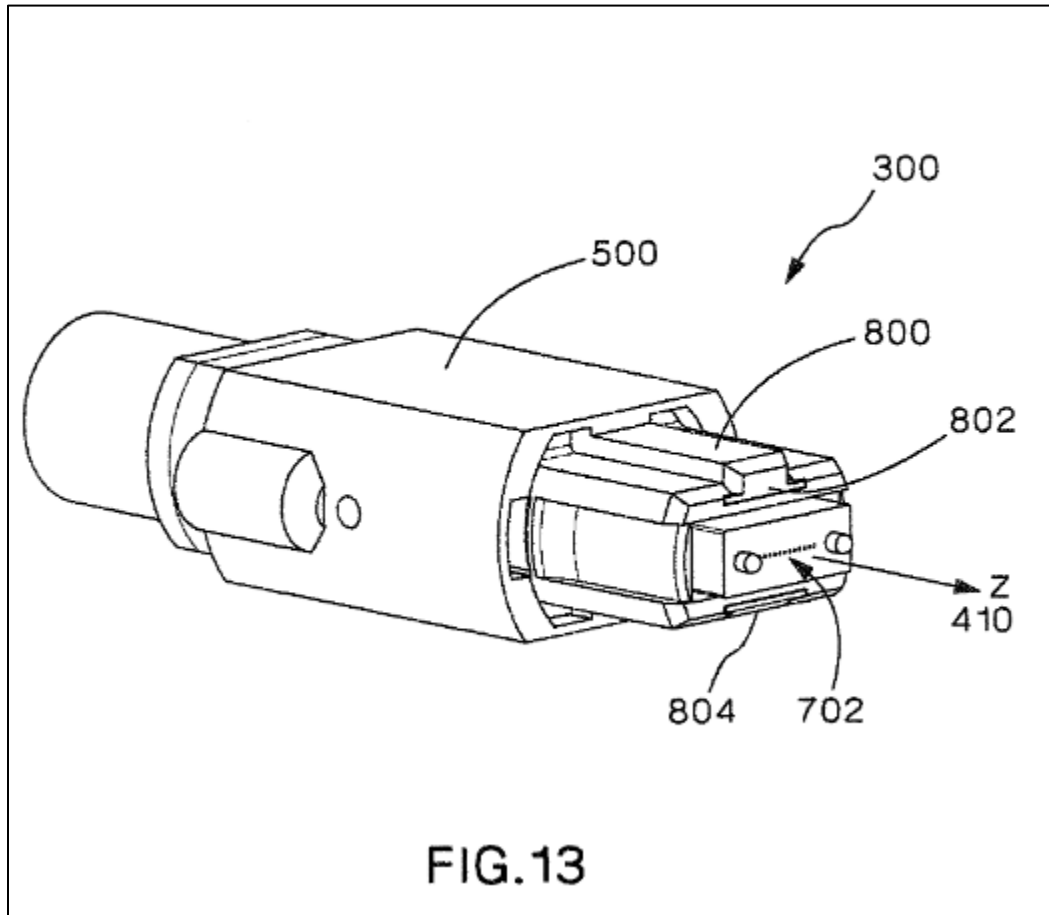


EX1011, FIG. 1A.

374. Similarly, Kuffel discloses “the use of ‘MPO’ type connectors.”

EX1012, ¶¶36-39. One example is “connector 300” as seen below in Figure 13.

EX1012, ¶61.



EX1012, FIG. 13.

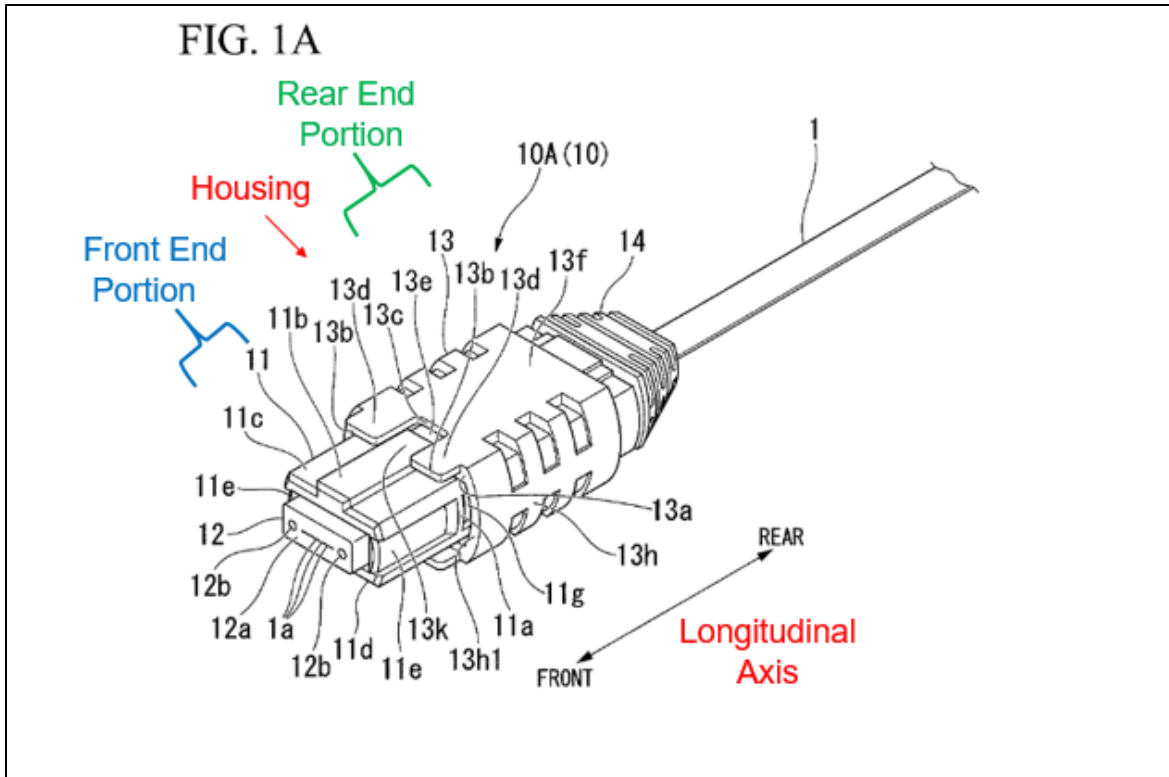
375. Thus, for at least these reasons, it is my opinion that a POSITA would have understood that both Katoh and Kuffel separately disclose the preamble of Claim 1 of the '413 Patent.

2. Element [1.1] – “a housing having a longitudinal axis and a front end portion and a rear end portion spaced apart along the longitudinal axis”

376. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.1]. Katoh discloses a housing as claimed in the combination of housing 11 and coupling 13, and corresponding supporting elements. EX1011, ¶¶76-81.

377. I note that this claim does not define the orientation of the “longitudinal axis.” However, this term is used once in the specification of the ’413 Patent, where it appears to refer to the axis aligned with the path of the fiber optic cables running through the receptacle within a prior art connector housing. EX1001, 5:60-6:8. This definition comports with my general understanding of the term longitudinal axis.

378. I note that Katoh defines a front to rear direction in its figures which is the same as the longitudinal axis I understand being defined here. Thus, I have annotated Katoh’s front to rear direction as the longitudinal axis of the housing of Katoh’s connector 10 in Figure 1A of Katoh below.



EX1011, FIG. 1A (annotated).

379. The terms front end portion and rear end portion are also not specifically defined by the claim or discussed in the specification. Thus, I have assigned these labels such that the front end portion is the portion closest to the end of the connector that is inserted to establish a fiber optic connection because in my opinion this end would more typically be considered the front of a connector housing. The rear end portion is therefore the opposite portion of the housing.

380. Thus, Katoh discloses element [1.1]. In addition to Katoh disclosing claim element [1.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.1]. That is, by modifying the polarity key of Katoh to be integrated with the

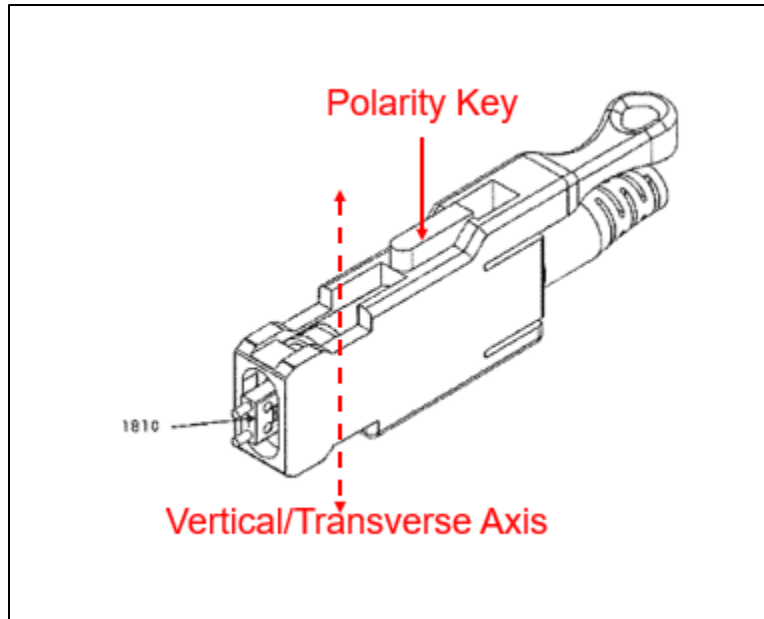
coupling as described in Kuffel, the additional claimed features of claim element [1.1] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.1].

3. Element [1.2] – “the housing comprising opposite first and second end walls spaced apart along a transverse axis oriented perpendicular to the longitudinal axis”

381. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.2]. As shown below, Katoh’s housing components include first and second end walls spaced apart along a transverse axis.

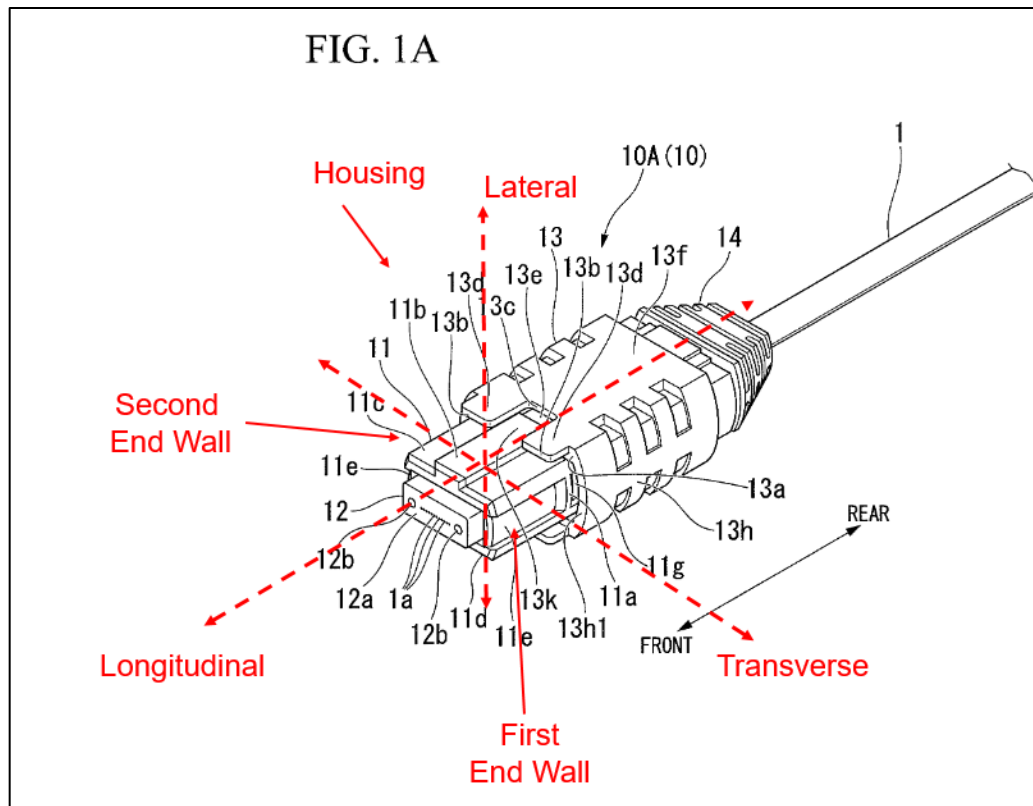
382. I note that this claim does not specify the direction of the transverse axis beyond the requirement that it be perpendicular to the longitudinal axis. However, as I discussed above, it is my opinion that the embodiment of ’413 Patent Figure 18 is an example of a connector as recited in Claim 1.

383. Claim 1 also recites that the polarity key be disposed on the first end wall. As seen below, in ’413 Patent Figure 18B, the relevant ’413 connector’s polarity key is oriented on the upper wall of the connector housing.



EX1001, FIG. 18B (annotated).

384. Thus, I have defined the transverse axis as the equivalent of the vertical axis in Figure 18B of the '413 Patent, reproduced and annotated above, and identified the corresponding transverse axis and end walls in Figure 1A depicting Katoh's housing. Choosing which end walls is the first or second is arbitrary and either end wall can be either first or second. Note that in Figure 1A below, Katoh's connector is rotated 90 degrees, so that the transverse axis is horizontal instead of vertical, and also note that one of the end walls is below the connector and hidden in the view below.



EX1011, FIG. 1A (annotated).

385. Accordingly, Katoh discloses claim element [1.2]. In addition to Katoh disclosing claim element [1.2], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.2]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.2] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, in my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.2].

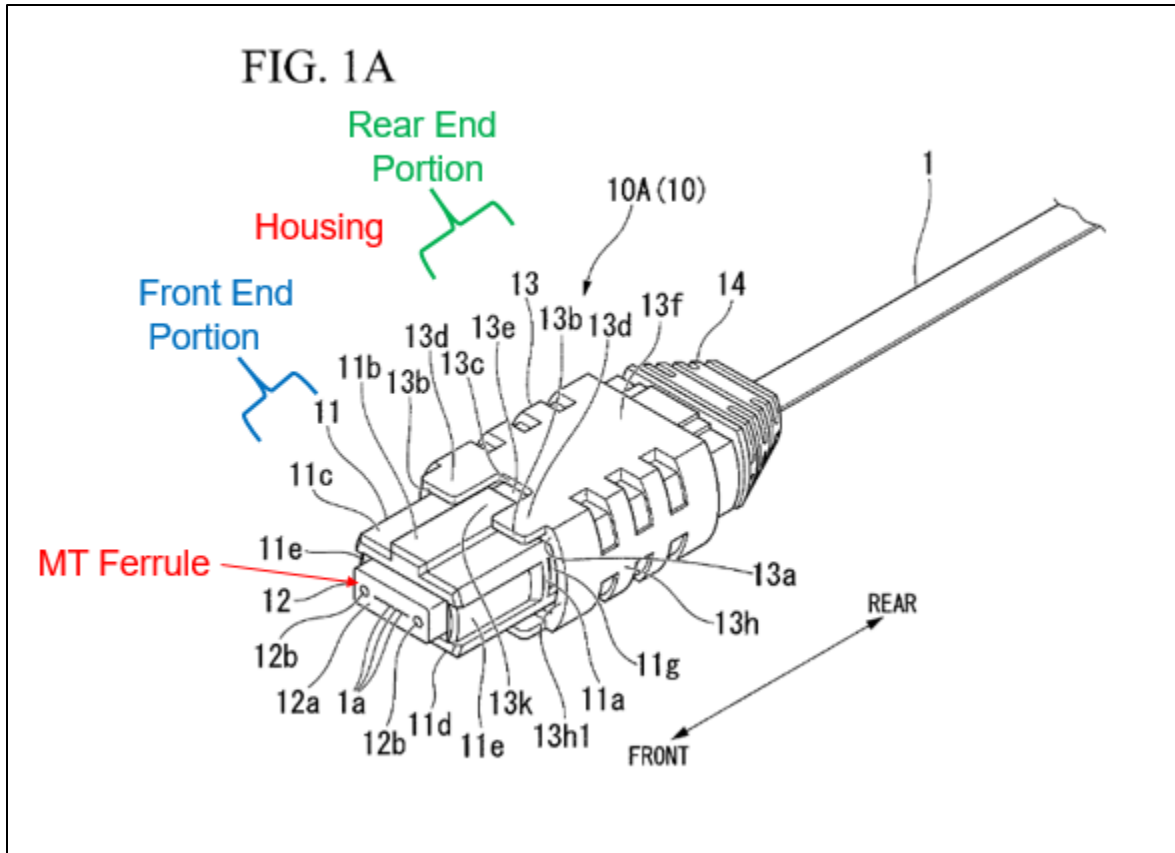
4. Element [1.3] – “the housing comprising opposite first and second side walls spaced apart along a lateral axis oriented

perpendicular to the longitudinal axis and the transverse axis”

386. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.3]. As shown below, Katoh’s housing includes first and second side walls as recited in the claim. Here, the definition of the transverse and longitudinal axes defines the lateral axis, which must be perpendicular to those axes. Similar to claim element [1.2], the view of the figure below hides one of the side walls (here, the second side wall).

5. Element [1.4] – “an MT ferrule received in the housing and exposed through the front end portion of the housing for making an optical connection”

388. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.4]. 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. Katoh explains that “[t]he ferrule 12 employs an MT type optical connector” that can be “a 12-core MT type optical connector attached to an end of the 12-core optical fiber tape (optical fiber 1).” EX1011, ¶¶89, 92. This configuration is seen below, where MT ferrule 12 extends through the front end portion.



EX1011, FIG. 1A (annotated).

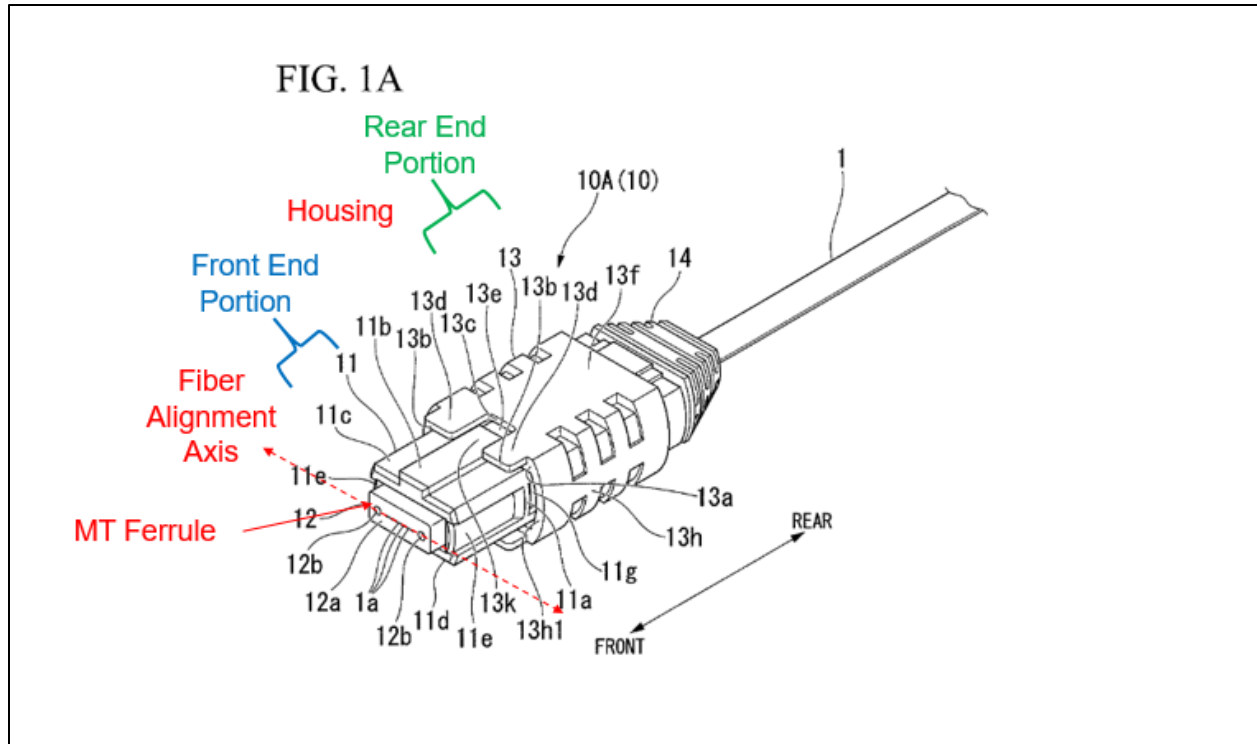
389. Thus, Katoh discloses claim element [1.4]. In addition to Katoh disclosing claim element [1.4], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.4]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.4] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.4].

6. Element [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”

390. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.5].

391. Katoh explains that “[t]he ferrule 12 employs an MT type optical connector” that can be “a 12-core MT type optical connector attached to an end of the 12-core optical fiber tape (optical fiber 1).” EX1011, ¶¶89, 92. “In the end face 12a of the ferrule 12, ends of 12 bare optical fibers 1a interfering with the end of the optical fiber 1 (optical fiber tape) and being fixed to the ferrule 12 are exposed between the pair of guide pin holes 12b.” EX1011, ¶95. “The 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, ¶96.

392. As seen below, optical fibers 1a are arranged in a row that is parallel to the fiber alignment axis.



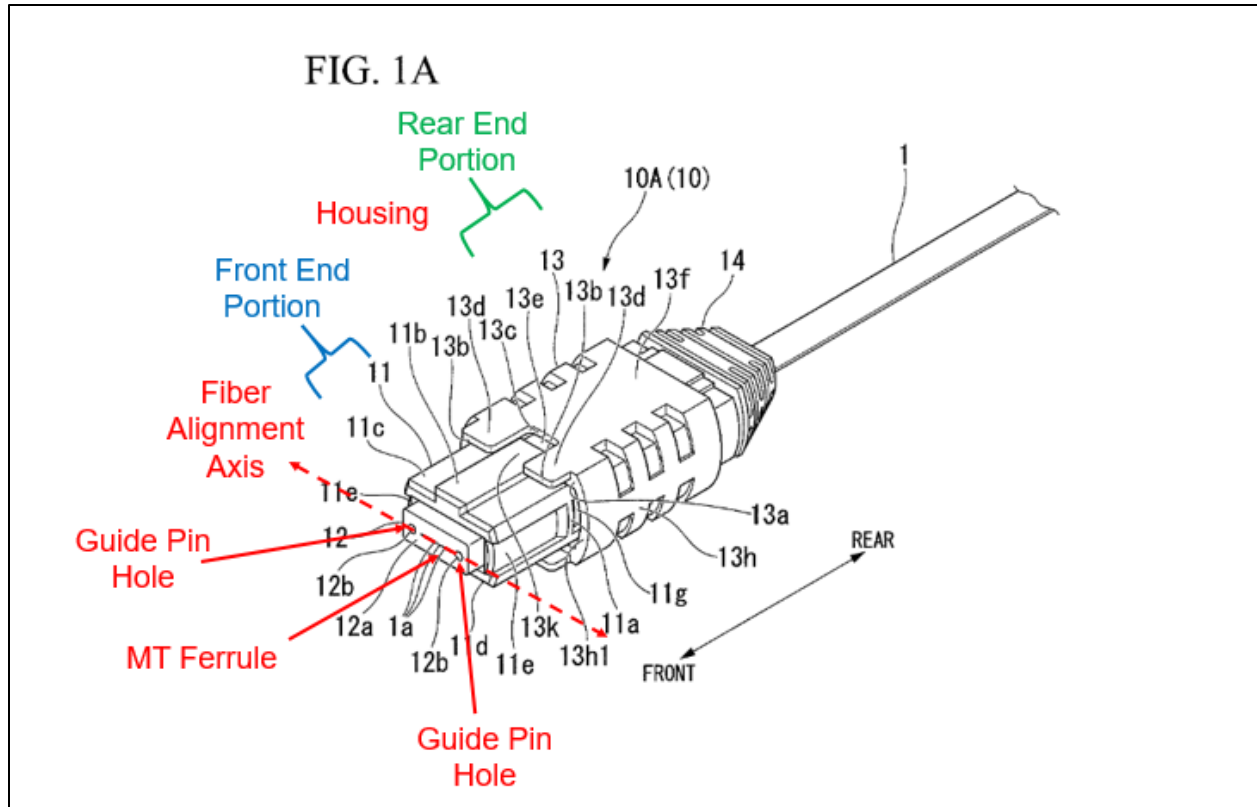
EX1011, FIG. 1A (annotated).

393. Thus, Katoh discloses claim element [1.5]. In addition to Katoh disclosing claim element [1.5], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.5]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.5] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, in my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.5].

7. Element [1.6] – “the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis”

394. For at least the reasons below, it is my opinion Katoh discloses claim element [1.6].

395. 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 in the width direction parallel to the length direction of the end face 12a of the ferrule 12.” EX1011, ¶94. Further, “[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, ¶96; *see also*, EX1011, ¶¶95, 99.



EX1011, FIG. 1A (annotated).

396. Thus, Katoh discloses claim element [1.6]. In addition to Katoh disclosing claim element [1.6], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.6]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.6] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, in my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.6].

8. Element [1.7] – “a polarity key disposed on the first end wall”

397. For at least the reasons below, it is my opinion that Katoh in view of Kuffel renders obvious claim element [1.7].

398. 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.

399. Patent Owner may argue that the reverse-insertion preventing key 11b (*i.e.*, polarity key) in Katoh is not oriented on the first end wall as claimed.

However, as I explained above, it is my opinion that a POSITA would have been motivated to modify Katoh to integrate polarity key 11b with coupling 13 in view of Kuffel’s teachings. *See* Section XIII.A. 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. First, this arrangement maximizes connector density by placing the polarity key on the walls oriented towards the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section XIII.A. 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.

See Section XIII.A.

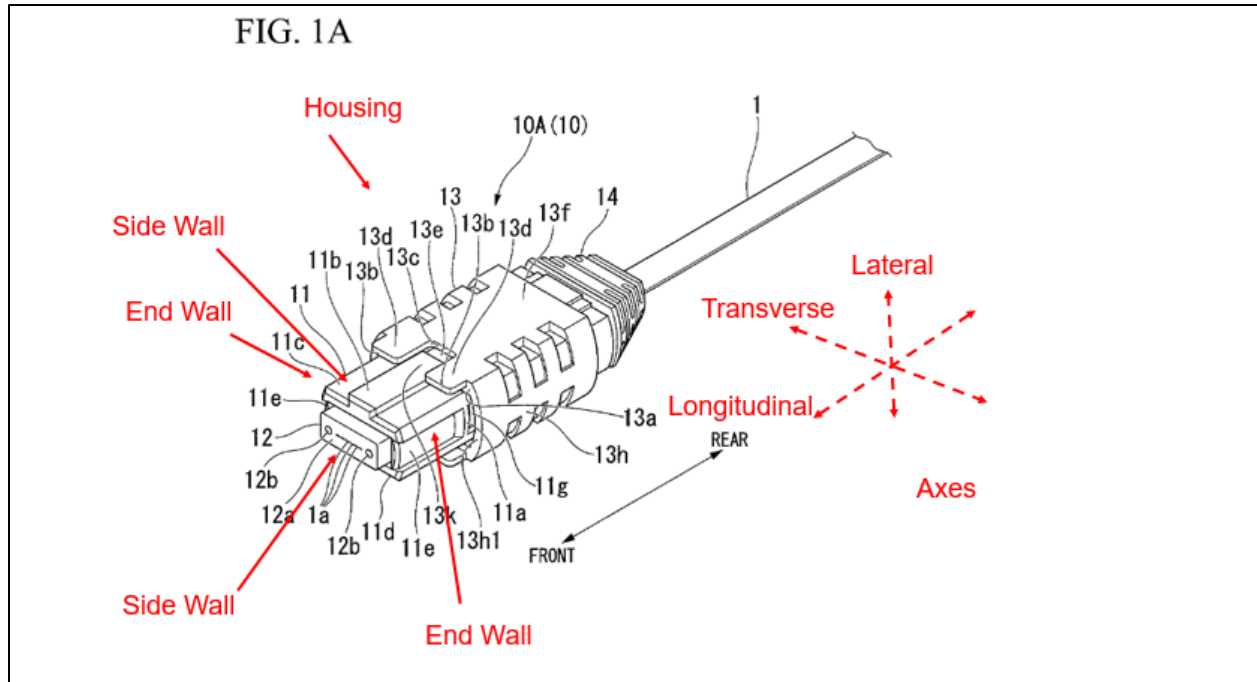
400. A POSITA would have had a reasonable expectation of success making this modification at least because the changes require only basic structural updates that are well within the skill of a POSITA. *See* Section XIII.A.3.

401. Thus, a POSITA would have understood that while Kuffel presents an optical connector with a polarity key, it is obvious to modify this connector to allow for a change in polarity by integrating the polarity key with Katoh's coupling 13, as taught in Kuffel. *See* Section XIII.A.3. Therefore, it is my opinion that Katoh in view of Kuffel renders obvious claim element [1.7] and would have been obvious to combine as I describe in Section XIII.A.

9. Element [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”

402. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.8].

403. The end walls and side walls of Katoh's connector housing are defined as shown in Figure 1A, reproduced below. *See* Sections XIII.B.3-4. As can be seen, the lateral dimension of the end walls is less than the transverse dimension of the side walls.



EX1011, FIG. 1A (annotated).

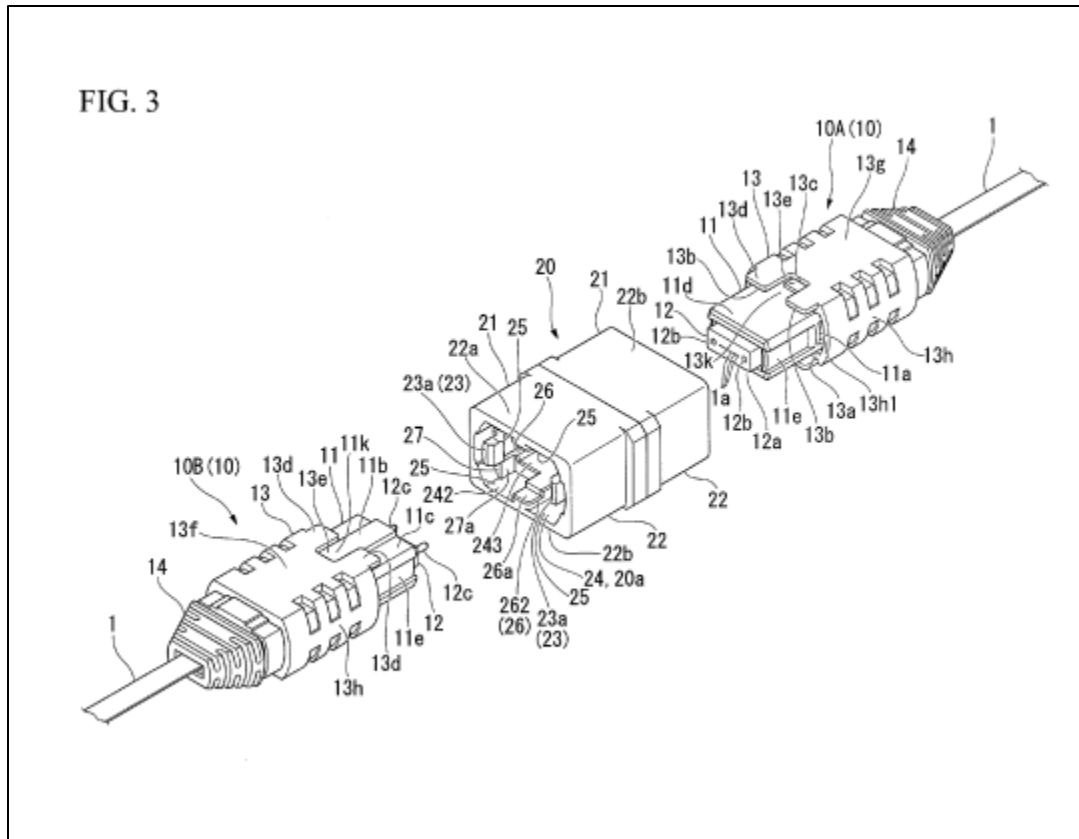
404. Thus, Katoh discloses element [1.8]. In addition to Katoh disclosing claim element [1.8], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.8]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.8] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.8].

10. Element [1.9] – “wherein the optical fiber connector is configured to latch with a mating adapter and”

405. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.9].

406. As can be visualized in Figure 3, reproduced below, Katoh explains that “the optical connectors 10 are inserted into the connector adapter 20 (hereinafter, also simply referred to as “adapter”) from both ends thereof, respectively, and the end faces 12a of the ferrules 12 are butt jointed to each other, whereby the connection coupling between the optical fibers 1 can be realized.”

EX1011, ¶102. I explained Katoh’s latching procedure in detail above in Section VII.E.



EX1011, FIG. 3.

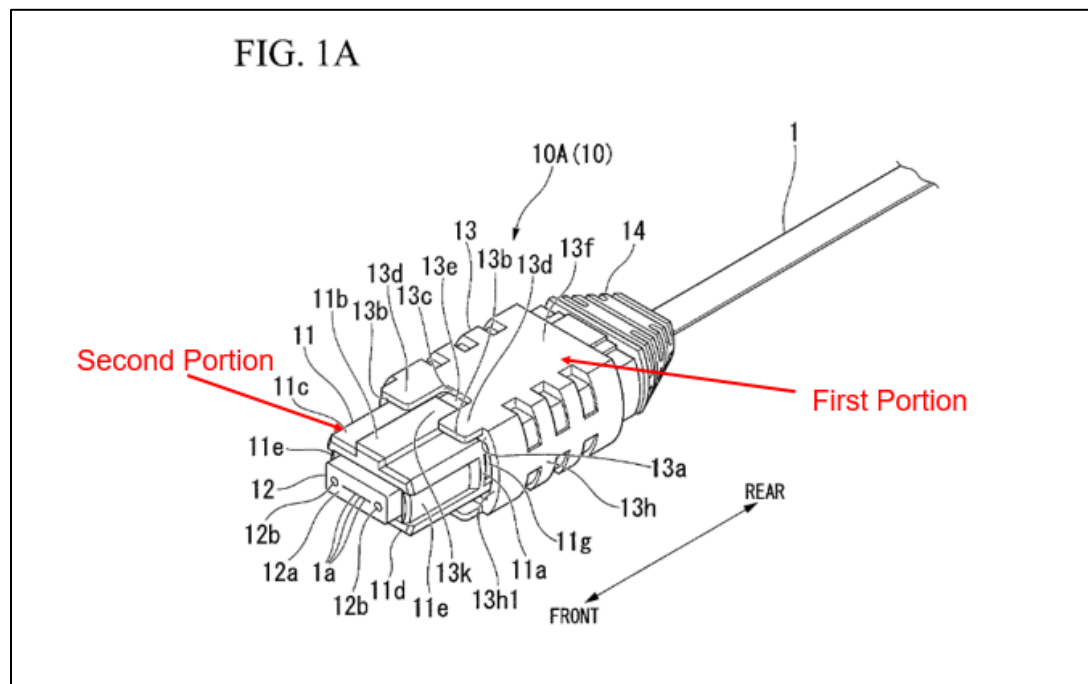
407. Thus, Katoh discloses element [1.9]. In addition to Katoh disclosing claim element [1.9], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.9]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.9] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.9].

11. Element [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”

408. For at least the reasons below, it is my opinion that Katoh discloses claim element [1.10].

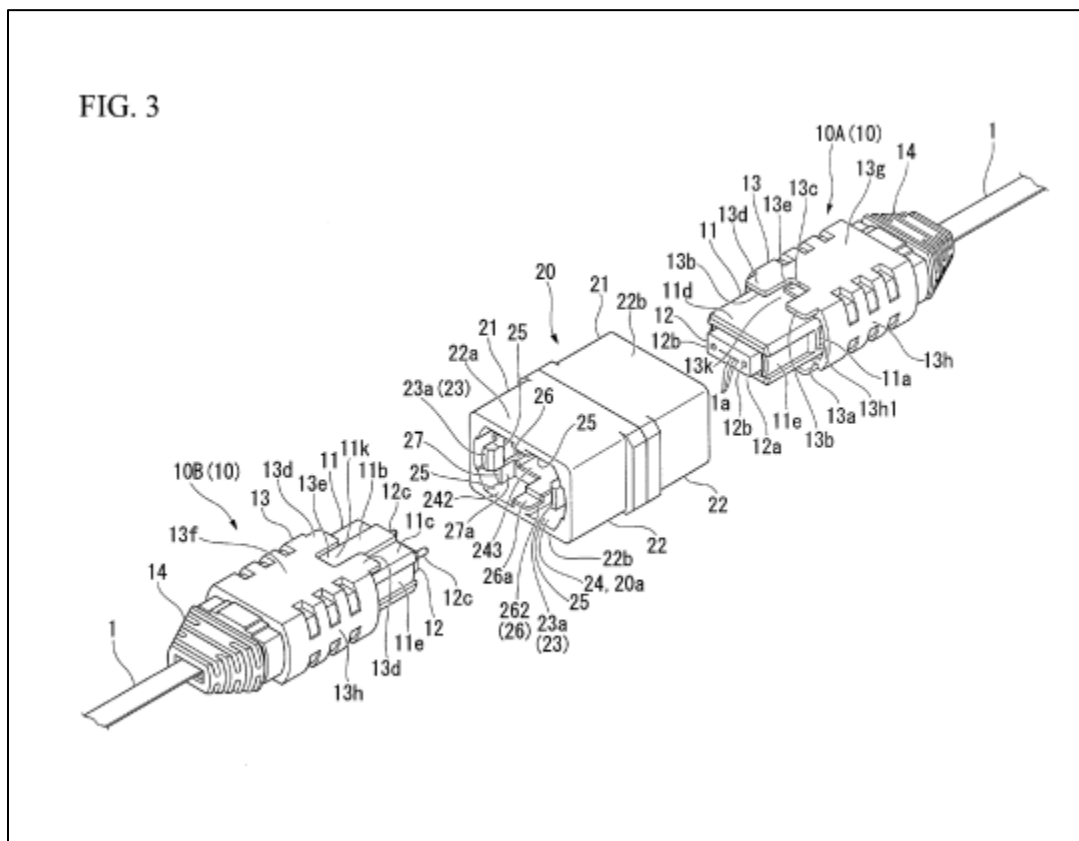
409. I note that the terms first portion and second portion are not specifically defined by the claim or discussed in the specification. Thus, as annotated below, I have assigned these labels such that the first portion corresponds to Katoh’s coupling 13 and the second portion corresponds to Katoh’s housing 11.



EX1011, FIG. 1A (annotated).

410. I explain Katoh’s latching and unlatching procedure in detail above in Section VII.E. Briefly, 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, ¶¶119-144. Coupling 13 is “elastically impelled to the connector front side relative to the housing 11 by a coupling spring” and “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.



EX1011, FIG. 3.

411. Unlatching connector 10 is accomplished by “moving the coupling 13 to the connector rear side [which] detach[es] the elastic engagement pieces.” EX1011, ¶226. This allows connector 10 to be removed from the adapter. Thus,

rearwards movement of coupling 13 (the first portion) with respect to housing 11 (the second portion) allows for unlatching of connector 10. Coupling 13 and housing 11 are equivalent to the recited the first and second portions of the housing, respectively.

412. Thus, Katoh discloses element [1.10]. In addition to Katoh disclosing claim element [1.10], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [1.10]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [1.10] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [1.10].

12. Element [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.”

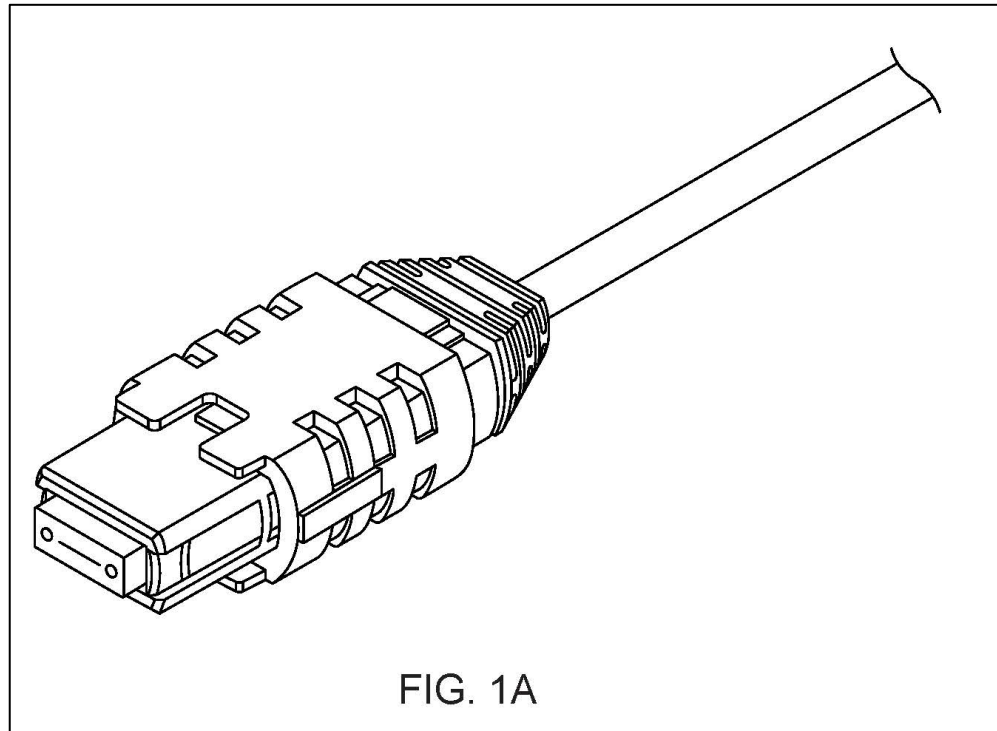
413. For at least the reasons below, it is my opinion that Katoh in view of Kuffel renders obvious claim element [1.11].

414. 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.

415. As discussed above in Sections XIII.A and XIII.B.8, however, it would have been obvious to modify Katoh in view of Kuffel to integrate Katoh's reverse-insertion preventing key 11b (*i.e.*, polarity key) into coupling 13. This modification allows the polarity of Katoh's connector 10 to be changed in the field, which improves installation efficiency and connector flexibility. *See* Section XIII.A. 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. *See* Section XIII.A.3.

416. Integrating polarity key 11b with coupling 13 in Katoh's fiber optic connector per this modification would result in the coupling 13 with a polarity key 11b disposed of on an end wall, and when coupling 13 is pulled rearwards to unlatch connector 10, polarity key 11b would also move rearward with respect to the housing 11, which includes the MT ferrule 12.

417. Below is a hypothetical figure showing one example of the Katoh-Kuffel connector with polarity key 11b on one of the end walls, and integrated with coupling 13.



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

418. Thus, a POSITA would have understood that while Kuffel presents an optical connector with a polarity key, it is obvious to modify this connector to allow for a change in polarity by integrating the polarity key with Katoh's coupling 13, as taught in Kuffel. *See* Section XIII.A.3. Further, integration of the polarity key on the coupling 13, would yield a fiber optic connector "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." Therefore, it is my opinion that Katoh in view of Kuffel renders obvious claim element [1.11] and would have been obvious to combine as I describe in Section XIII.A.

419. In summary, for at least the reasons discussed above, I believe a POSITA would have been motivated to make a combination of Katoh and Kuffel that renders obvious each of the features of Claim 1 of the '413 Patent. As such, it is my opinion that the entirety of Claim 1 of the '413 Patent is rendered obvious.

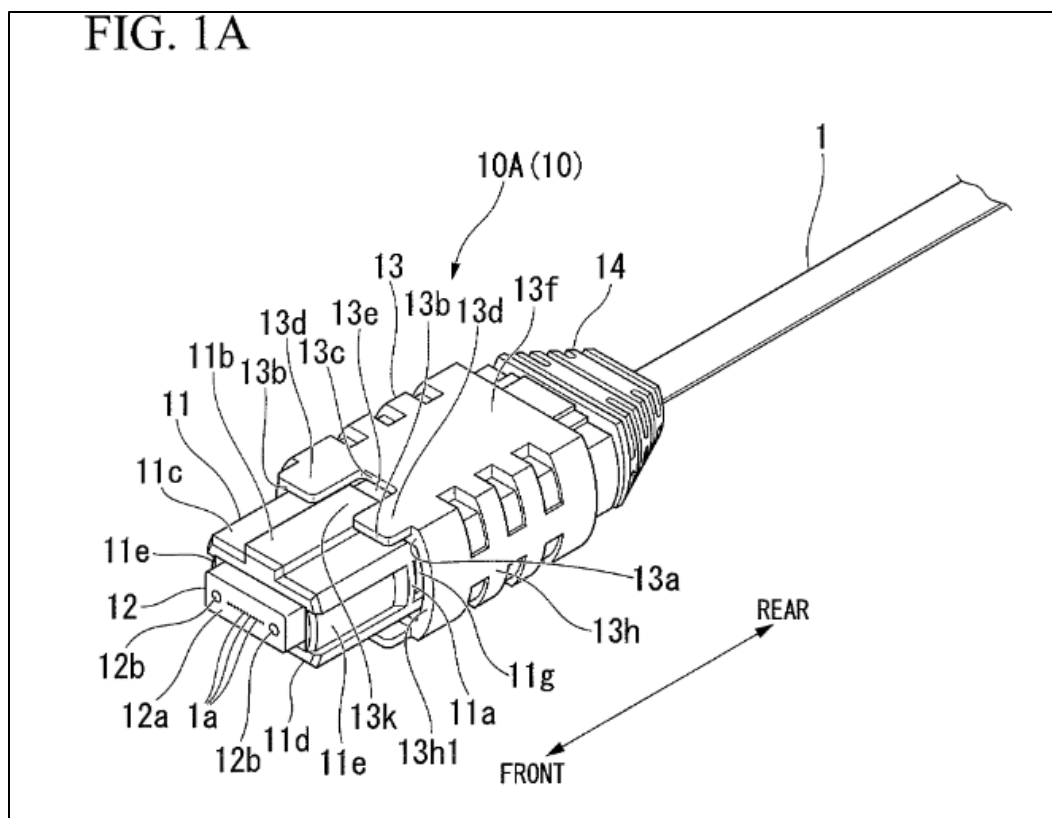
C. Claim 2

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

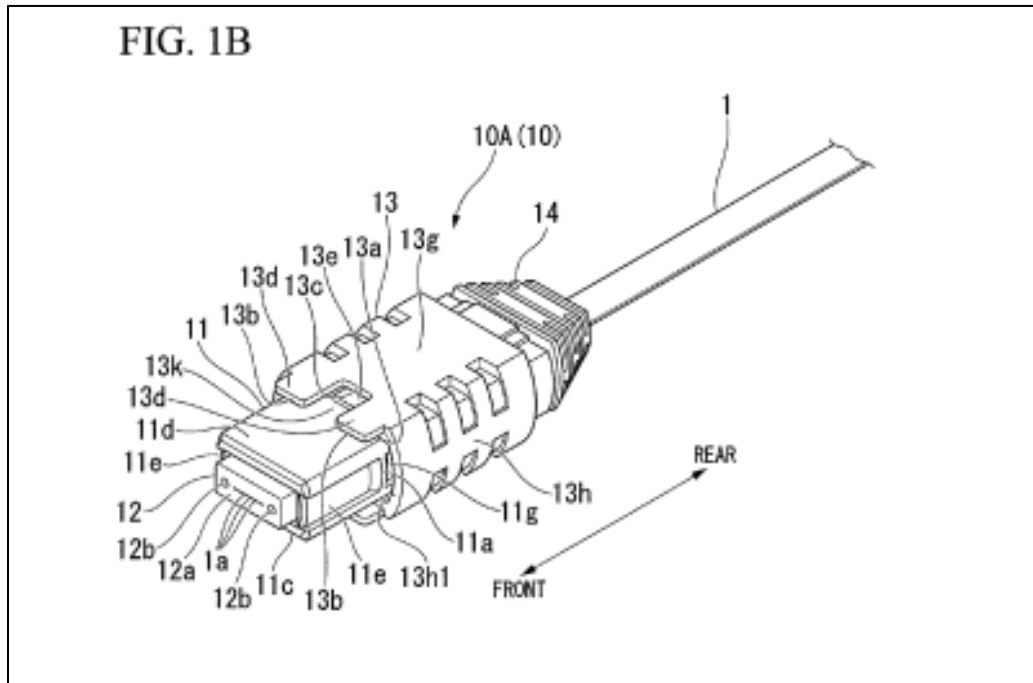
420. Claim 2 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 2 of the '413 Patent.

2. Element [2.1] – “the optical fiber connector is free of a polarity key disposed on the second end wall.”

421. Katoh only mentions a single reverse-insertion preventing key 11b (*i.e.*, polarity key), and thus does not disclose a second polarity key anywhere on the connector. I note that the figures below show all four walls of Katoh's connector, meaning that an additional polarity key 11b would be visible if one was present (which it is not).



EX1011, FIG. 1A.



EX1011, FIG. 1B.

422. Accordingly, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) renders obvious Claim 2. That is, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel would result in a fiber optic connector wherein “the optical fiber connector is free of a polarity key disposed on the second end wall.” Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector renders obvious Claim 2 and would have been obvious to combine as described in Section XIII.A.

D. Claim 3

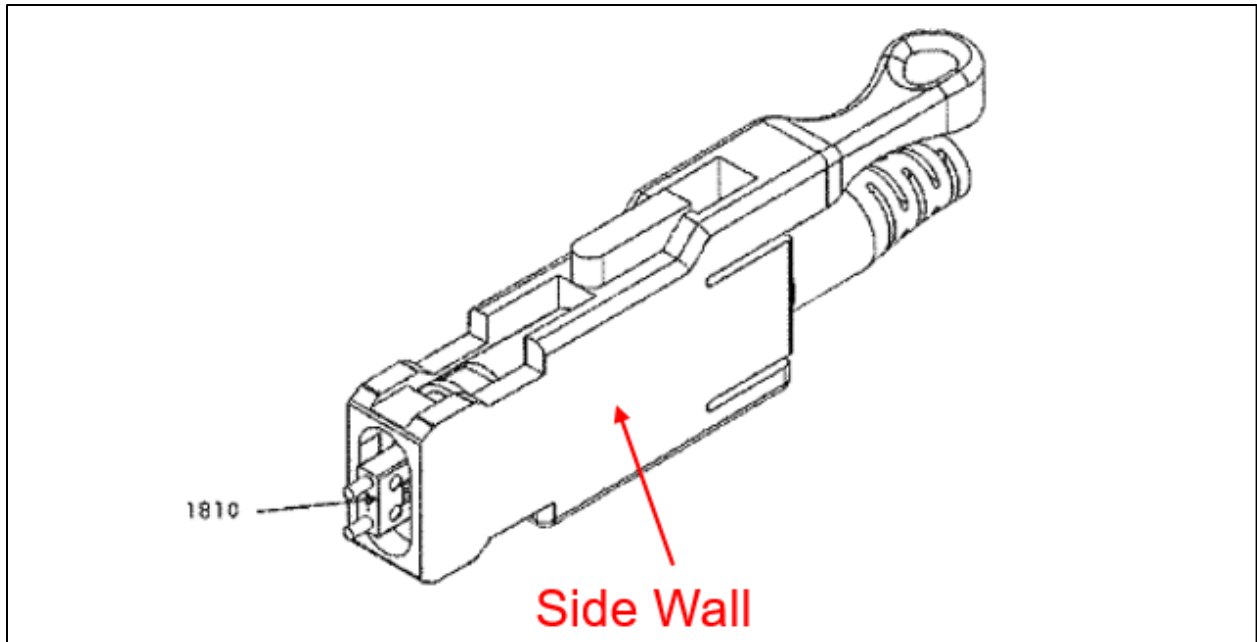
1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

423. Claim 3 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 3 of the '413 Patent.

2. Element [3.1] – “each of the first and second side walls is substantially flat.”

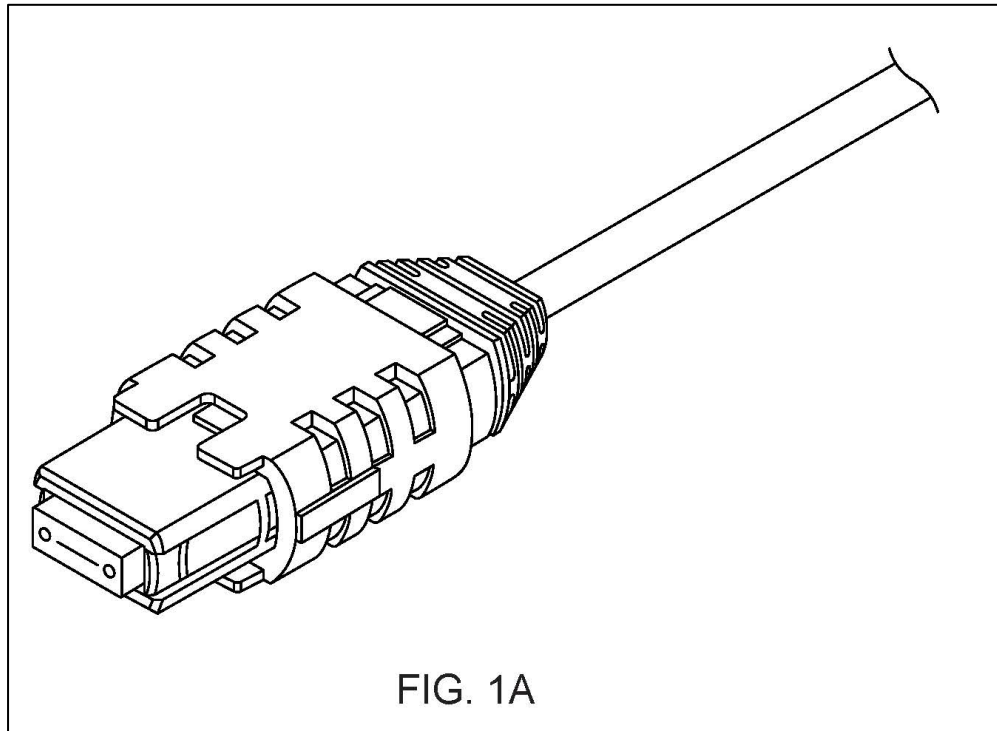
424. I note that the term “substantially” is not defined in the '413 Patent claims or specification. I understand from counsel that terms of degree such as substantially are interpreted from the viewpoint of a POSITA when read in context of the invention. I also am informed that every word in a claim must be given meaning. In this case, the word substantially modifies “flat” by expanding the term flat to include first and second side walls that are not strictly flat or planar in nature.

425. Looking at the side walls of the embodiment of '413 Patent Figures 18A and 18B, I note that these walls include at least two grooves or recesses. Thus, a POSITA would have understood that walls that are flat but include features such as grooves or recesses are included in the term “substantially flat.”



EX1001, FIG. 18B (annotated).

426. In my opinion, the Katoh-Kuffel fiber optic connector's side walls are encompassed by this understanding of “substantially flat” because the side walls are generally flat, similar the embodiment of '413 Patent Figure 18B shown above. A hypothetical example of the Katoh-Kuffel connector is shown below, depicting the substantially flat side walls. As seen below, this modification would not alter the side walls to no longer be “substantially flat.”



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

427. Accordingly, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) renders obvious Claim 3. That is, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel would result in a fiber optic connector wherein “each of the first and second side walls is substantially flat.” Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector renders obvious Claim 3 and would have been obvious to combine as described in Section XIII.A.

E. Claim 4

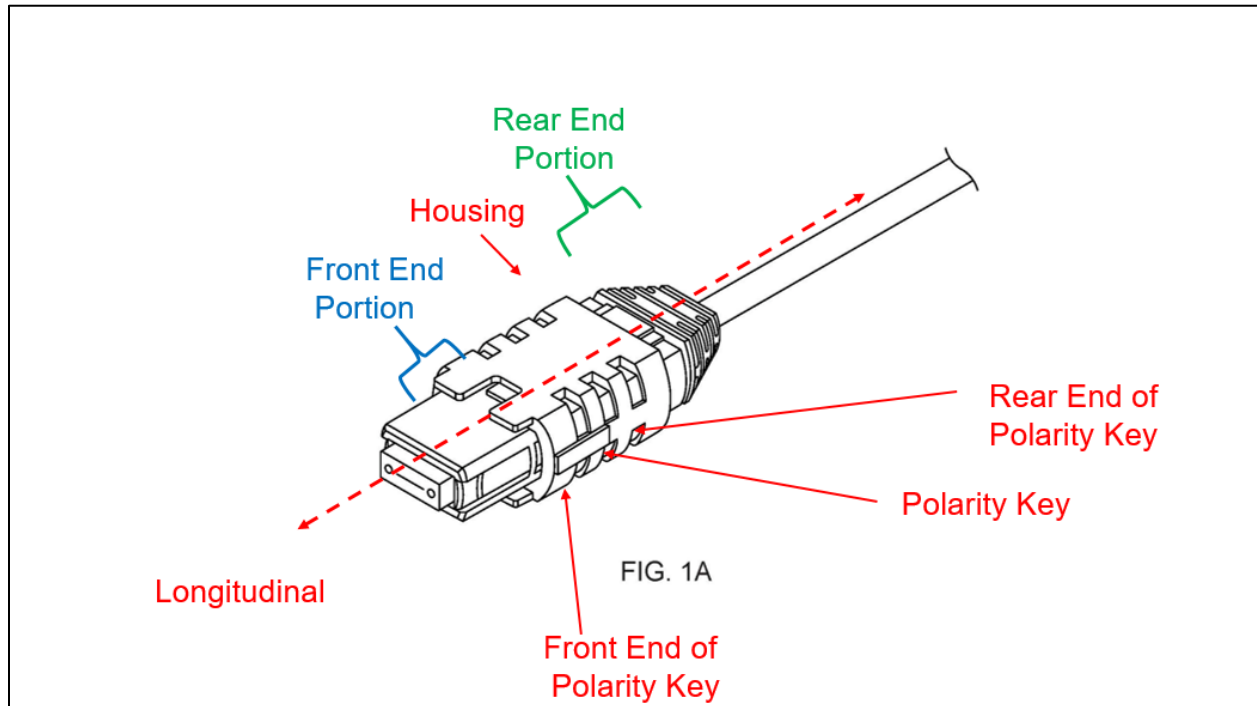
1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

428. Claim 4 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 4 of the '413 Patent.

2. Element [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.”

429. In my opinion, this claim feature requires that the polarity key extend in a direction spanning from a rear end towards a front end. These ends are not discussed or defined in either the '413 Patent claims or the specification, thus I have defined ends of the Katoh housing as shown below. As seen below Katoh's reverse-insertion preventing key 11b (*i.e.*, polarity key) is oriented in the claimed manner. However, in the combination of Katoh with Kuffel described above in Section XIII.A, the polarity key 11b would be integrated into coupling 13 and positioned on the first end wall, as shown below in the modified Figure 1A of Katoh. Therefore, as demonstrated by the modified Figure 1A of Katoh depicting the Katoh-Kuffel fiber optic connector, the polarity key extends in the longitudinal

direction, “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.”



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

430. Accordingly, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) renders obvious Claim 4. That is, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel would result in a fiber optic connector wherein “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.” Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector renders obvious Claim 4 and would have been obvious to combine as described in Section XIII.A.

F. Claim 7

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

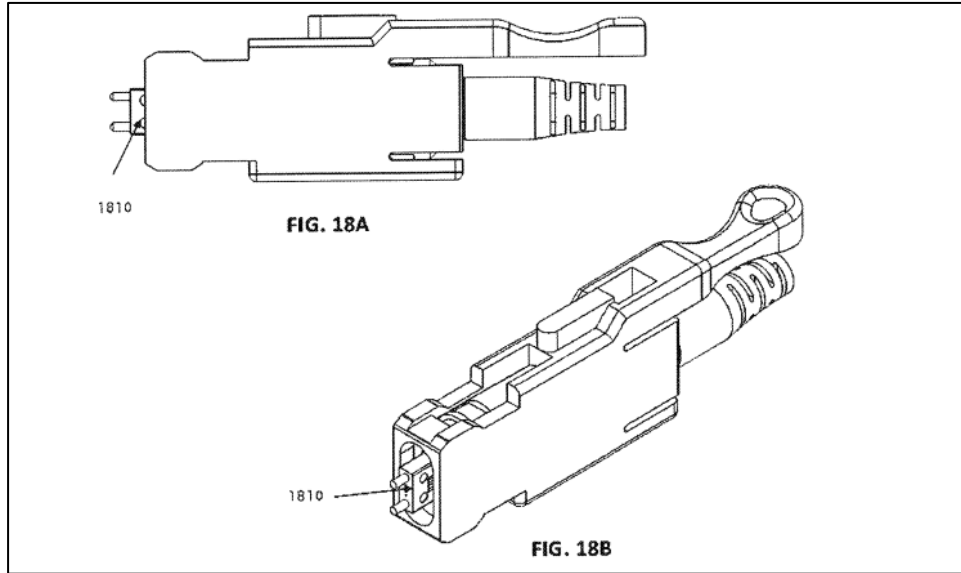
431. Claim 7 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 7 of the '413 Patent.

2. Element [7.1] – “further comprising a strain relief boot extending from the rear end portion of the housing.”

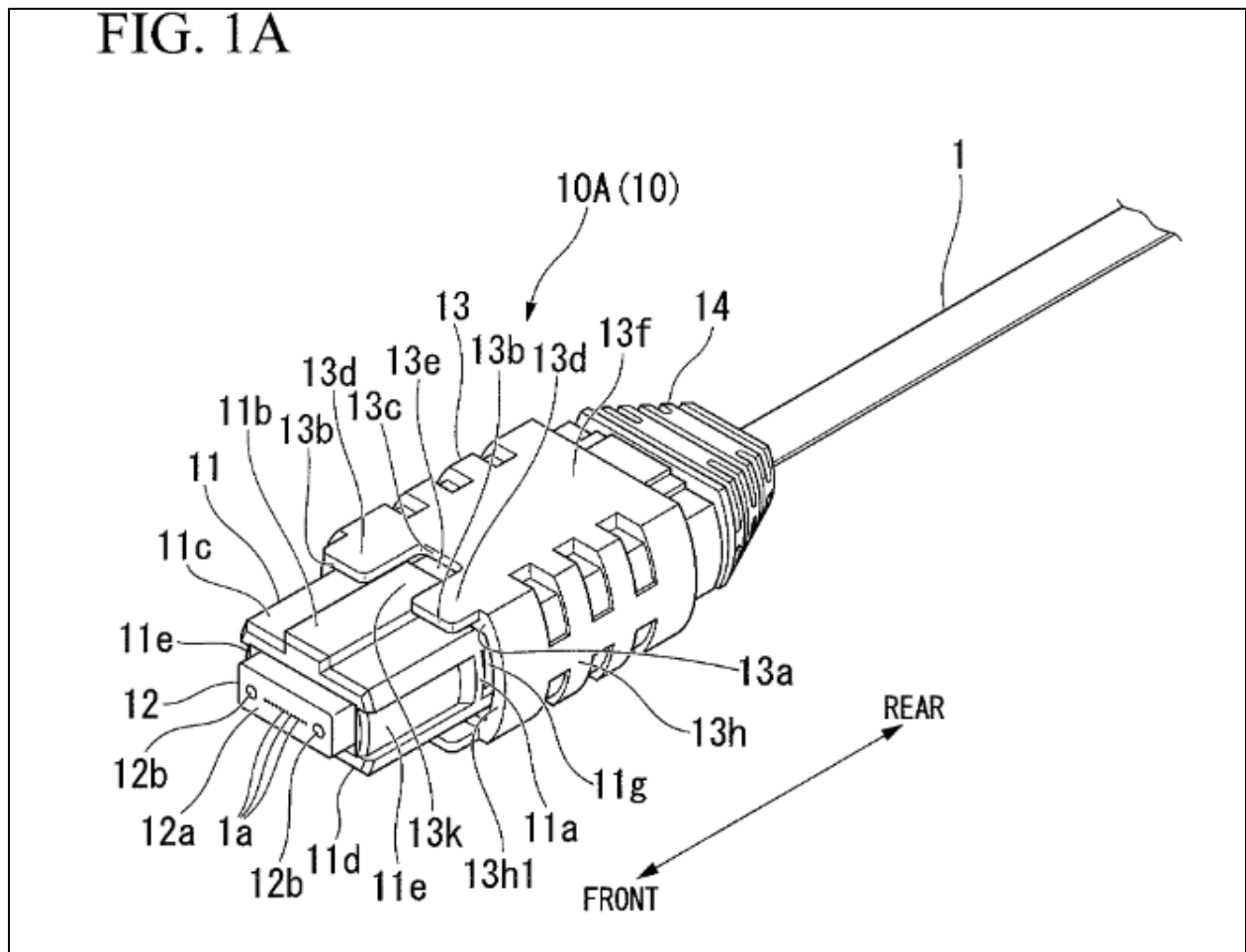
432. Katoh discloses this claim element. Katoh recites “a boot 14 that is attached to a rear end portion opposite to the front end portion of the housing 11 in which the ferrule 12 is disposed.” EX1011, ¶81.

433. 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, Figures 18A and 18B of the '413 Patent. As shown below, boot 14 extends from the rear end portion of the housing.

434. A POSITA would have included boot 14 in the Katoh-Kuffel connector to maintain the functionality of the resulting connector.



EX1001, FIGs. 18A-18B.



EX1011, FIG. 1A.

435. Accordingly, Katoh discloses claim element [7.1]. In addition to Katoh disclosing claim element [7.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 7. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 7 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 7 and would have been obvious to combine as described in Section XIII.A.

G. Claim 8

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

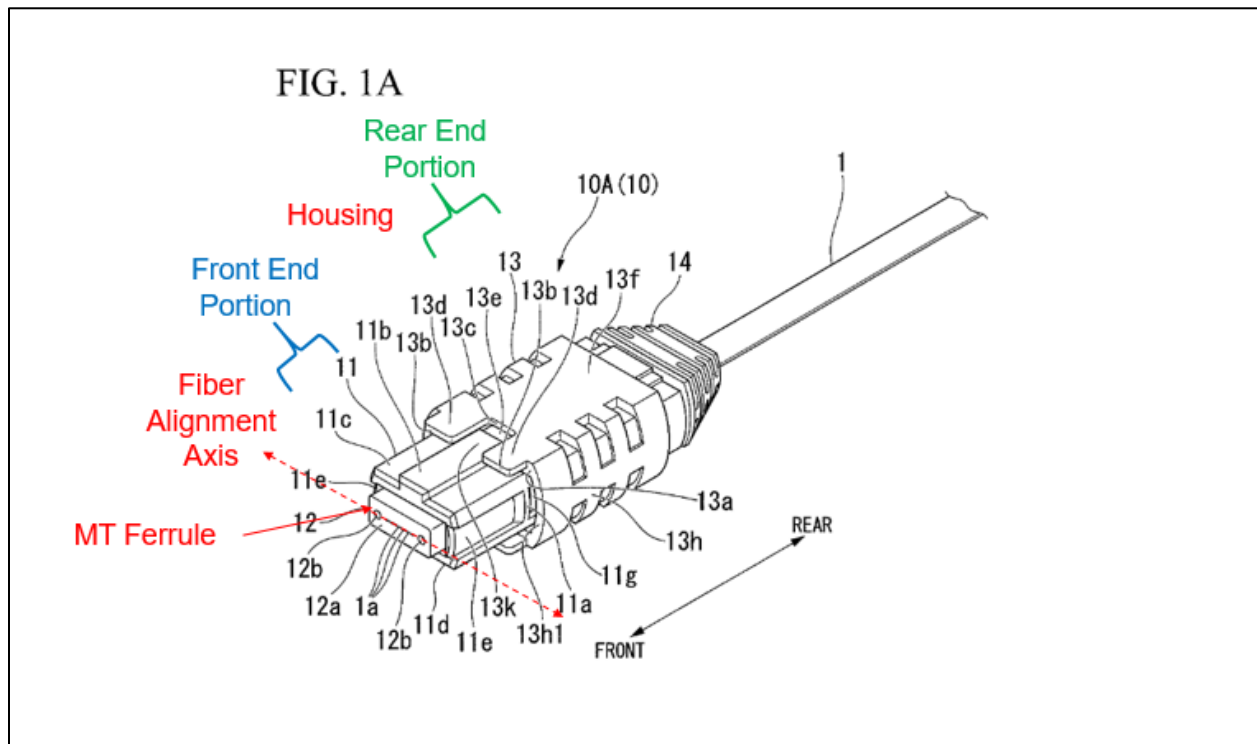
436. Claim 8 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 8 of the '413 Patent.

2. Element [8.1] – “the MT ferrule is configured to receive at least eight optical fibers in a row extending parallel to the fiber alignment axis.”

437. Katoh discloses claim element [8.1]. Katoh explains that “[t]he ferrule 12 employs an MT type optical connector” that can be “a 12-core MT type optical

connector attached to an end of the 12-core optical fiber tape (optical fiber 1).”

EX1011, ¶¶89, 92. “The 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, ¶96. As seen below, the twelve optical fibers 1a are arranged in a row that is parallel to the fiber alignment axis.



EX1011, FIG. 1A (annotated).

438. Accordingly, Katoh discloses claim element [8.1]. In addition to Katoh disclosing claim element [8.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 8. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 8

that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 8 and would have been obvious to combine as described in Section XIII.A.

H. Claim 10

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

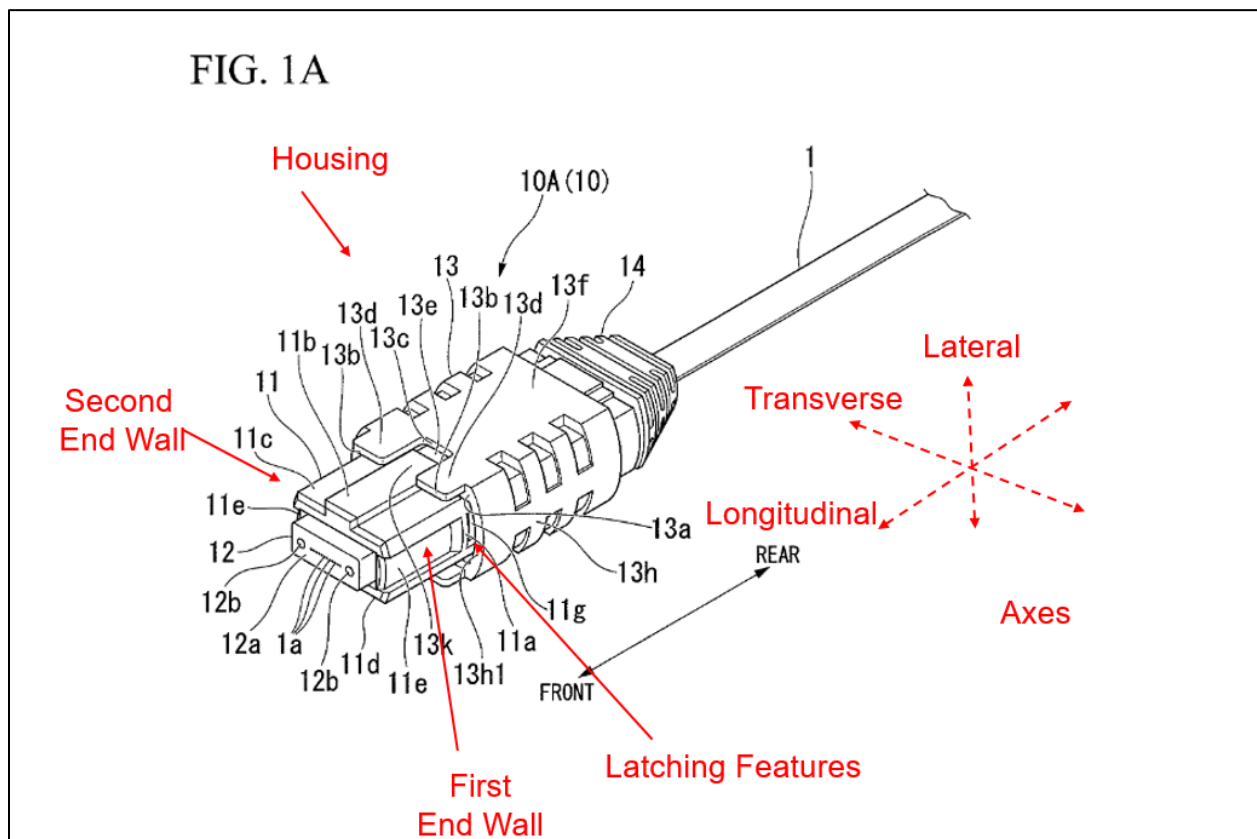
439. Claim 10 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 10 of the '413 Patent.

2. Element [10.1] – “the connector includes an adapter latching feature along the first end wall of the housing.”

440. Katoh discloses claim element [10.1]. Katoh's latching mechanism 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 latches or engagement pieces 23 slide over engagement protrusion 11a, and then “coupling 13 moves to the front movement limit position by means of the elastic impelling force of the coupling spring.”

EX1011, ¶¶192-194. Thus, at least engagement protrusion 11a and engaging recessed portion 11g are “latching features” as claimed. These features are positioned along both the first and second end walls.

441. A POSITA would have maintained the position of these latching features on the end walls in the Katoh-Kuffel connector to maintain the functionality of the resulting connector.



EX1011, FIG. 1A (annotated).

442. Accordingly, Katoh discloses claim element [10.1]. In addition to Katoh disclosing claim element [10.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders

obvious Claim 10. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 10 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 10 and would have been obvious to combine as described in Section XIII.A.

I. Claim 11

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

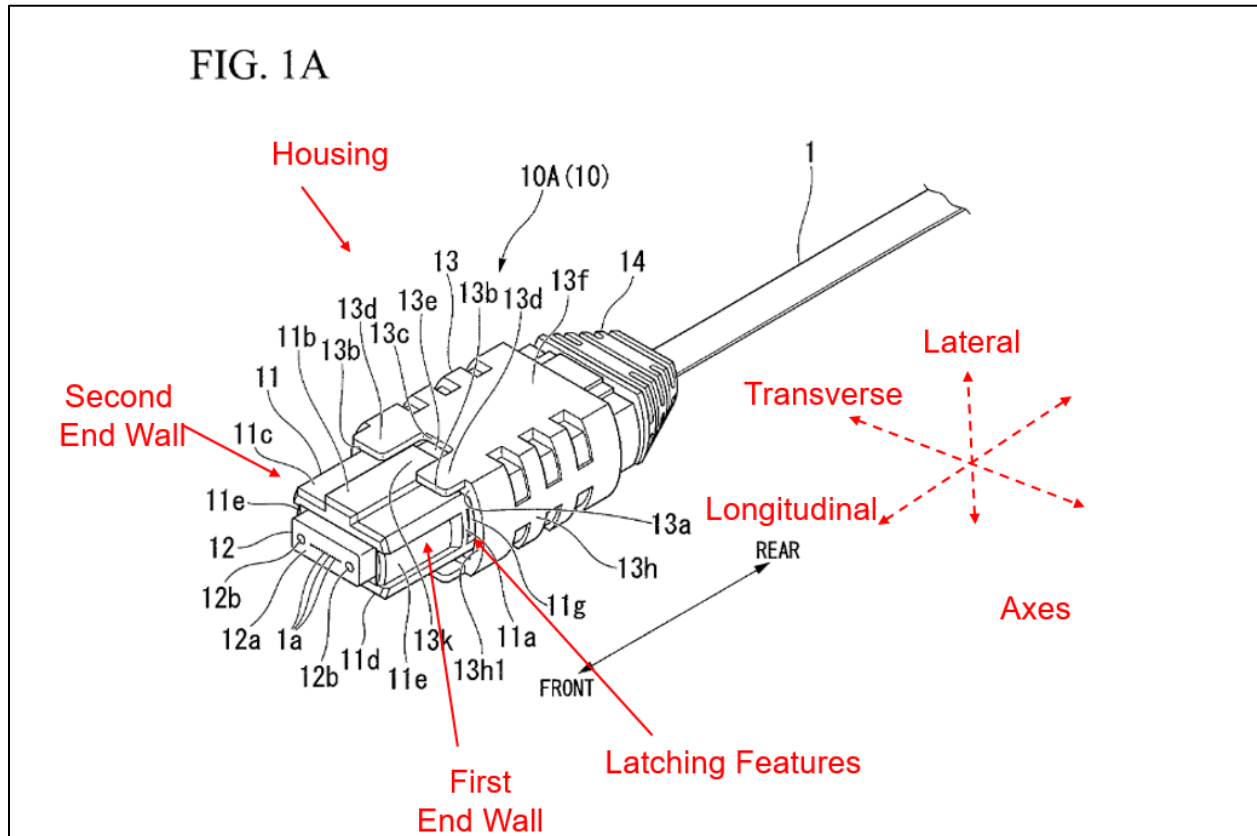
443. Claim 11 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 11 of the '413 Patent.

2. Element [11.1] – “the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.”

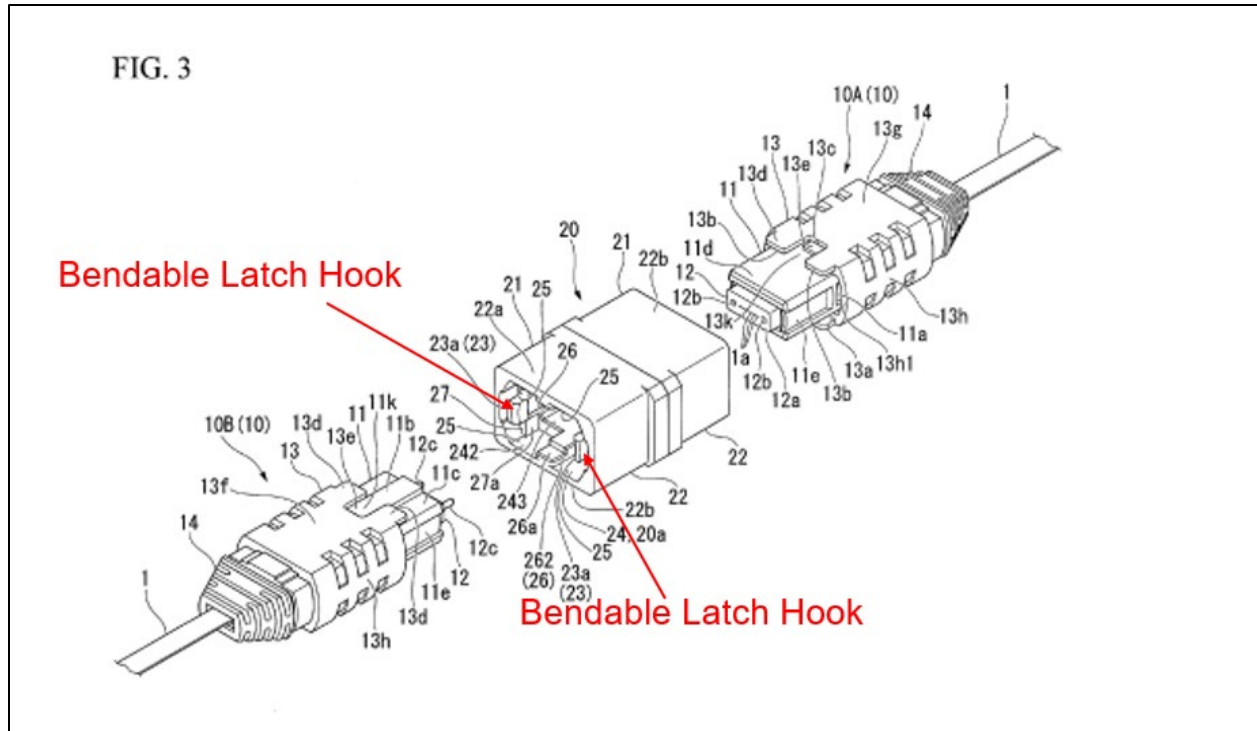
444. I note that the term “adapter latching feature” is not present in Claim 1 but is present in Claim 10. In my opinion, this lack of antecedent basis is a typographical error and Claim 11 should depend from Claim 10. My opinion here does not change regardless of the dependency of Claim 11.

445. As discussed above, Katoh's latching mechanism is accomplished by the latches (engagement pieces 23) moving over engagement protrusion 11a and resting in engaging recessed portion 11g. EX1011, ¶¶192-194, *See* Section XIII.H. Recessed portion 11g is a latch recess, as seen below, and is configured to receive the protruding claws 23a of the latch (engagement piece 23) of the adapter 20 in Katoh. EX1011, ¶¶193-194. *See* EX1011, FIG. 1A, FIG. 3. "The elastic engagement pieces are elastically deformed when the protruding claws 23a are placed on the engagement protrusions 11a of housing 11," EX1011, ¶190, implying that these are bendable latches.

446. A POSITA would have maintained these features in Katoh-Kuffel because doing so preserves Katoh's functionality.



EX1011, FIG. 1A (annotated).



EX1011, FIG. 3 (annotated).

447. Accordingly, Katoh discloses claim element [11.1]. In addition to Katoh disclosing claim element [11.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 11. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 11 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above and in Section XIII.H with respect to Claim 10, it is my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 11 and would have been obvious to combine as described in Section XIII.A.

J. Claim 12

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

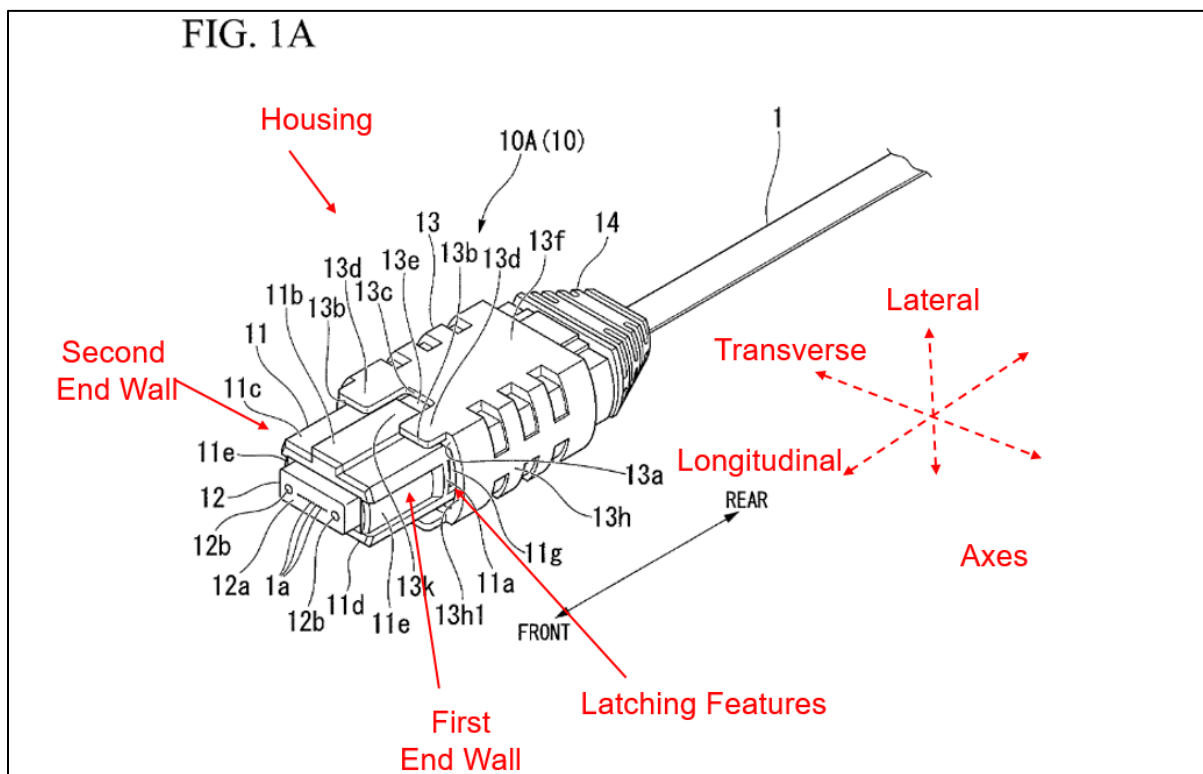
448. Claim 12 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 12 of the '413 Patent.

2. Element [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.”

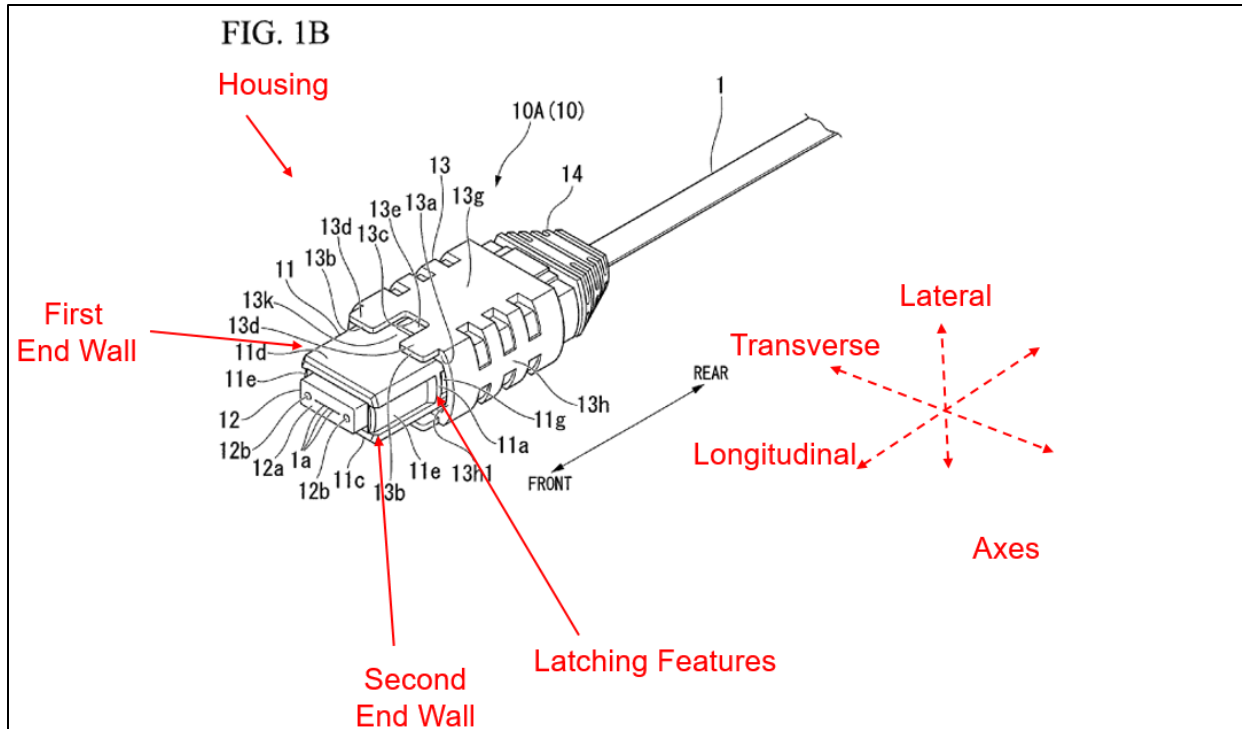
449. I note that this claim is substantively similar to Claim 11, assuming Claim 11 depends from Claim 10. The difference is Claim 12 recites first and second latch recesses for each end wall, respectively. Additionally, my discussion above in reference to Claim 11 applies equally here because Katoh's latching system includes a pair of latch hooks and recesses.

450. As shown below, Katoh's latching system 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

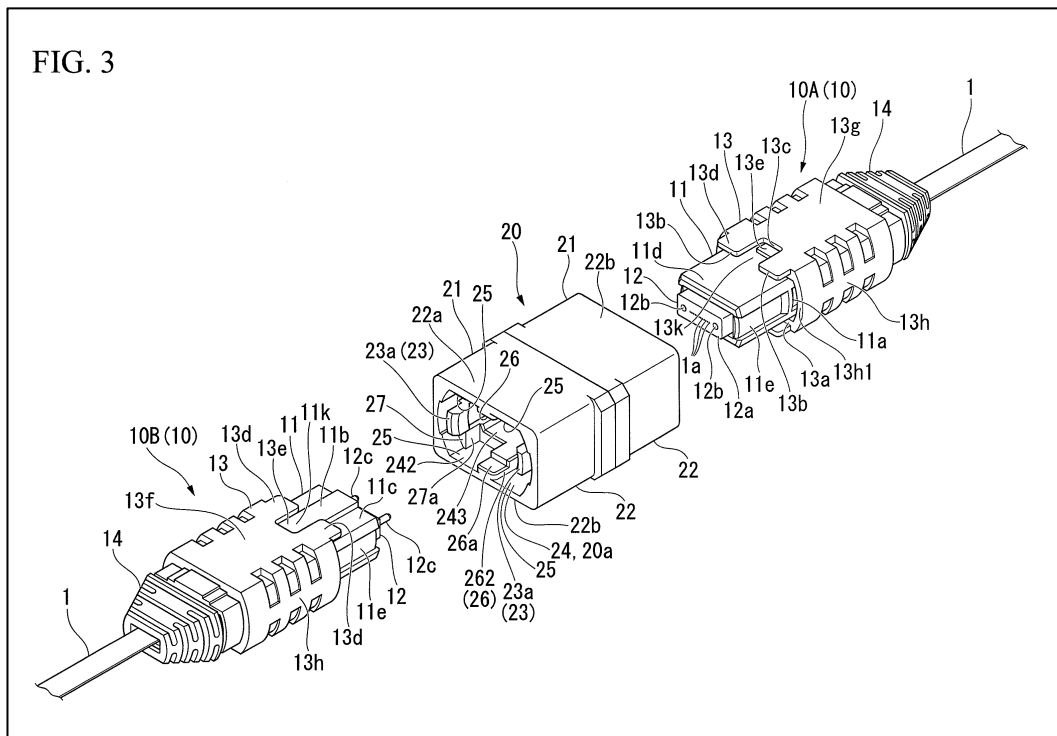
side” as the latches or engagement pieces 23 slide over engagement protrusion 11a, and then “coupling 13 moves to the front movement limit position by means of the elastic impelling force of the coupling spring.” EX1011, ¶¶192-194; As these descriptions indicate, there are multiple engagement protrusions 11a and engaging recessed portions 11g. In fact, there are two sets of these elements: one for each end wall. This can be seen in the top side and bottom side views presented by Figures 1A and 1B, respectively, reproduced below. EX1011, ¶49; *See* EX1011, FIGs. 1A-1B, FIG. 3.



EX1011, FIG. 1A (annotated).



EX1011, FIG. 1B (annotated).



EX1011, FIG. 3.

451. Accordingly, Katoh discloses claim element [12.1]. In addition to Katoh disclosing claim element [12.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 12. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 12 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 12 and would have been obvious to combine as described in Section XIII.A.

K. Claim 13

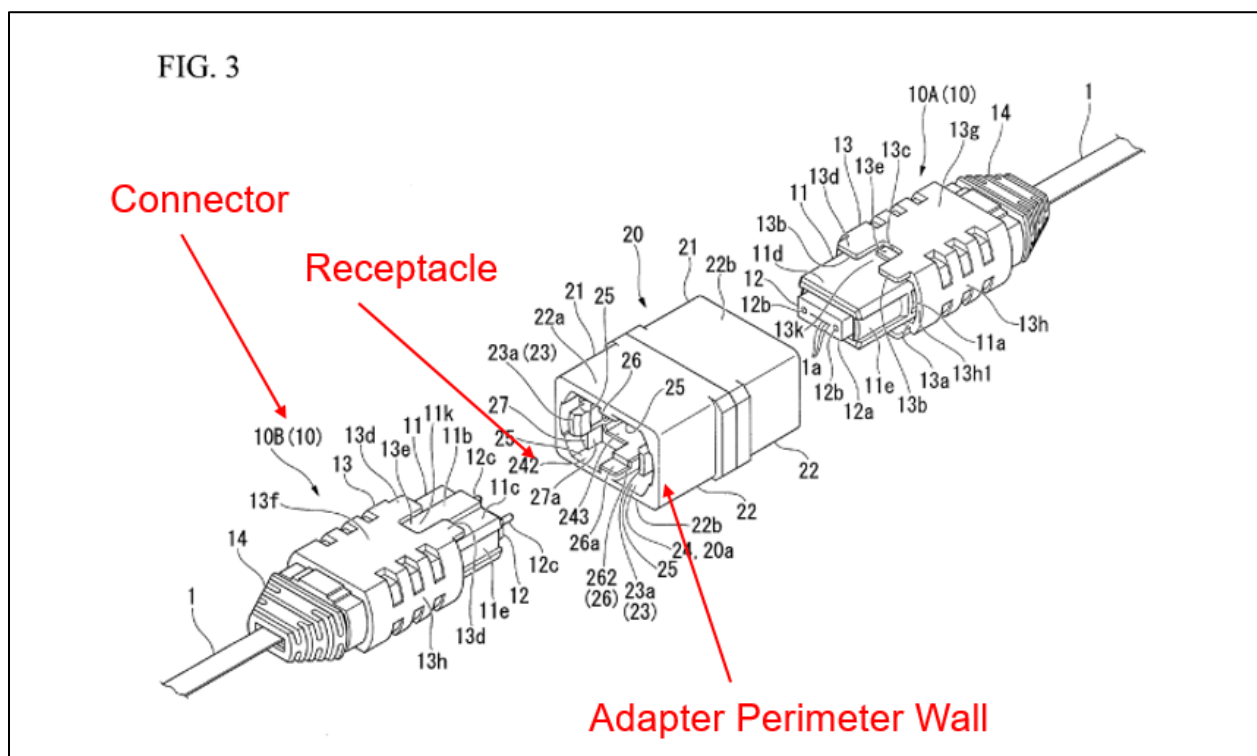
1. Preamble – “A connection system comprising the optical fiber connector of claim 1”

452. Claim 13 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 13 of the '413 Patent.

2. Element [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.”

453. Katoh discloses that “the optical connectors 10 are inserted into the connector adapter 20.” EX1011, ¶102. As shown below, adapter 20 has a perimeter wall that defines a receptacle in which to matingly receive the connector. Adapter 20 also includes a second connector and receptacle with a perimeter wall.



adapter 20 to serve to join multiple sets of fiber optic cables, improving performance of the resulting system. It also reduces part count because a single adapter 20 can be used for multiple cable pairings.

455. A POSITA would have made this modification by duplicating the receptacles in a side-by-side fashion. This is a known configuration in the art and is straightforward to implement because it requires simple structural duplication. *See, e.g.,* EX1004, FIG. 34.

456. 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. The resulting orientation matches the claimed side wall orientation.

457. Accordingly, Katoh renders obvious Claim 13. Additionally, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 13. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 13 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 13 and would have been obvious to combine as described in Section XIII.A.

L. Claim 14

1. Preamble – “The connection system of claim 13, wherein”

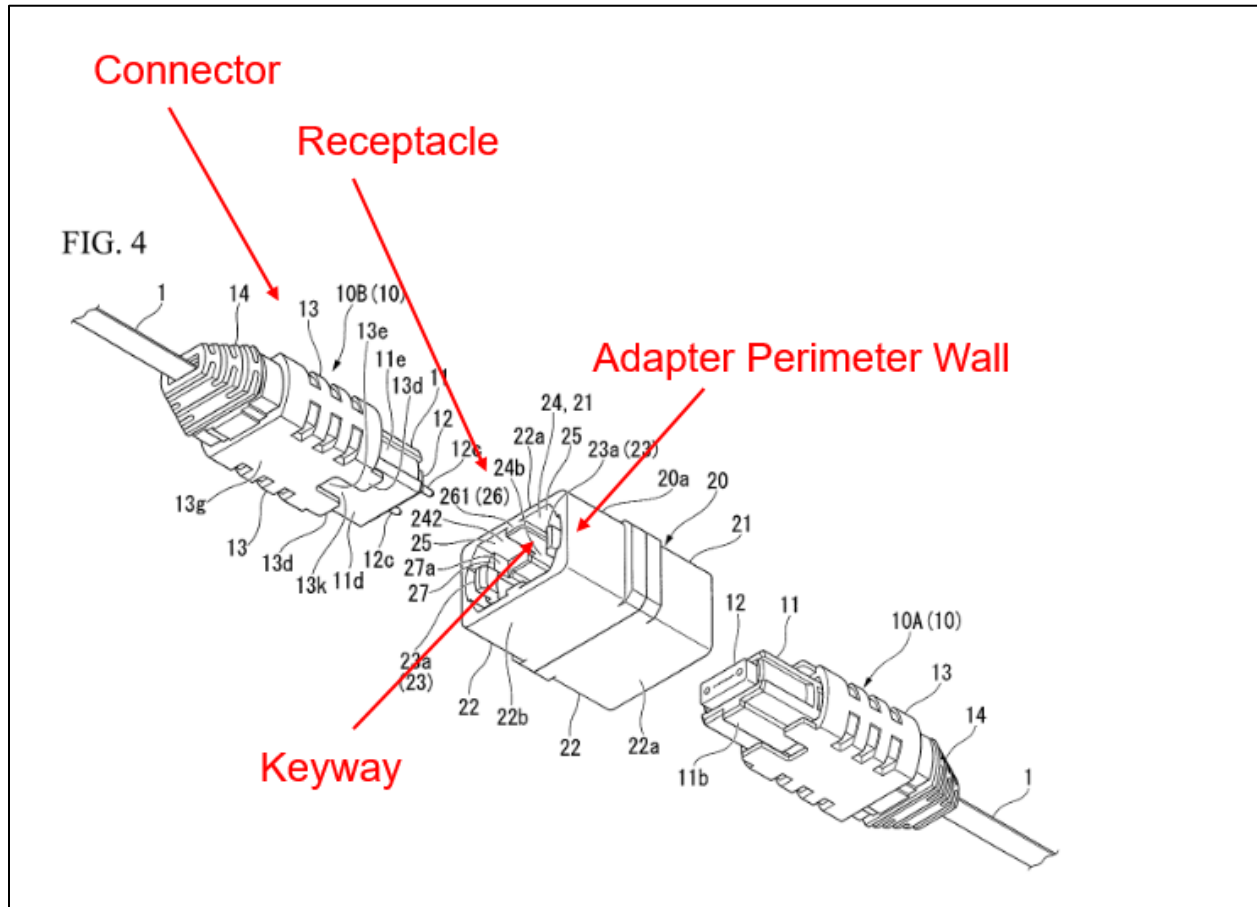
458. Claim 14 depends upon Claim 13 and Claim 1, and for at least the reasons discussed above in reference to Claim 1 and Claim 13, the combination of Katoh and Kuffel renders obvious Claim 1 and Claim 13. *See* Sections XIII.B and XIII.K. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 14 of the '413 Patent.

2. Element [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.”

459. Katoh discloses that reverse-insertion preventing key 11b (*i.e.*, polarity key) 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.

460. As seen in Figure 4, reproduced below, key groove 24 is formed as a longitudinal keyway because it is oriented longitudinally and receives key 11b. It is also formed in the perimeter wall. When making the modifications to adapter 20 discussed above in Section XIII.K, a POSITA would have been motivated to keep key groove 24 present to ensure the functionality of the adapter. Additionally, in making the modification discussed above with respect to Claim 13, from which Claim 14 depends, a POSITA would have added a longitudinal keyway for each receptacle to ensure proper latching functionality. Thus, there would be a plurality

of longitudinal keyways in the perimeter wall, with one keyway for each receptacle to receive key 11b (*i.e.* polarity key).



EX1011, FIG. 4 (annotated).

461. Accordingly, Katoh renders obvious Claim 14. Additionally, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 14. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 14 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above and in Section XIII.K with respect to Claim 13, it my opinion that

the Katoh-Kuffel fiber optic connector would render obvious Claim 14 and would have been obvious to combine as described in Section XIII.A.

M. Claim 25

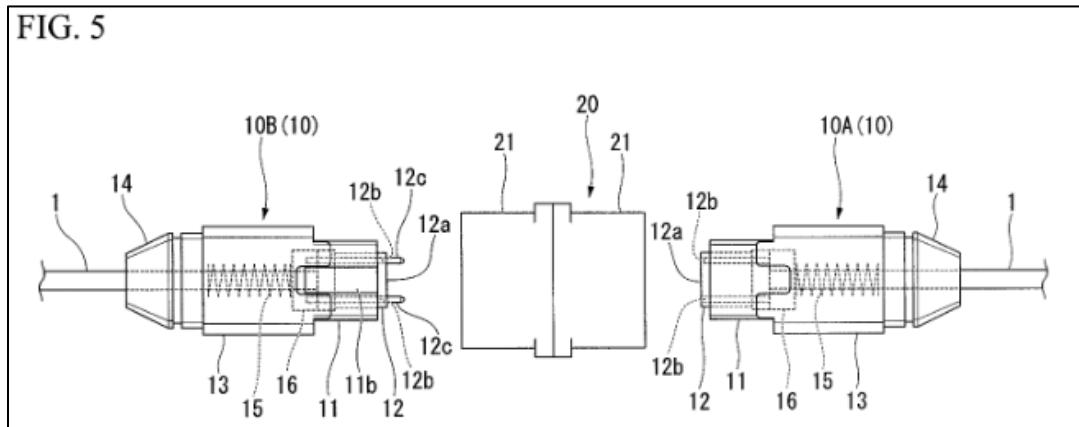
1. Preamble – “The optical fiber connector as set forth in claim 1, further comprising”

462. Claim 25 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 25 of the '413 Patent.

2. Element [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.”

463. Katoh discloses “[i]n the optical connector 10, 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. Spring 15 is a ferrule spring because it biases the MT ferrule forward. 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. EX1011, ¶88. For example, in latching the opposing connectors 10B and 10A with the adapter 20, shown below in Figure 5, the opposing ferrules 12 will push against one another, which then compresses the spring 15 rearward. EX1011, ¶¶88, 111.



EX1011, FIG. 5.

464. As discussed above with respect to claim element [1.10], coupling 13 is the claimed first portion and housing 11 is the claimed second portion. *See* Section XIII.B.11. The MT ferrule spring 15, and MT ferrule movement, is structurally separate and independent from the movement of coupling 13 (the claimed first portion) and the housing 11 (the claimed second portion). Indeed, the MT ferrule 12 moves within the space inside housing 11. This movement is further evidenced by Katoh’s disclosure of coupling 13 which has its own spring to bias it forwards: “coupling 13 is elastically impelled to the connector front side relative to the housing 11 by a coupling spring not shown but disposed inside the coupling.” EX1011, ¶135.

465. Thus, A POSITA would have understood that the MT ferrule 12 and coupling 13 move independent from each other at least because of their separate springs and how these elements are depicted in the figures.

466. Additionally, as I explained above in reference to claim element [1.7], in the combination of Katoh with Kuffel, the polarity key 11b of Katoh would be integrated with the coupling 13 as demonstrated in Kuffel. Therefore, movement of the polarity key 11b does not result in or require movement of the MT ferrule. For example, a user holding the modified Katoh-Kuffel connector in an unlatched state would be free to slide coupling 13 and the integrated polarity key 11b longitudinally without any movement of the MT ferrule.

467. Accordingly, Katoh discloses claim element [25.1]. In addition to Katoh disclosing claim element [25.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 25. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 25 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 25 and would have been obvious to combine as described in Section XIII.A.

N. Claim 26

1. Preamble – “The optical fiber connector as set forth in claim 1, further comprising”

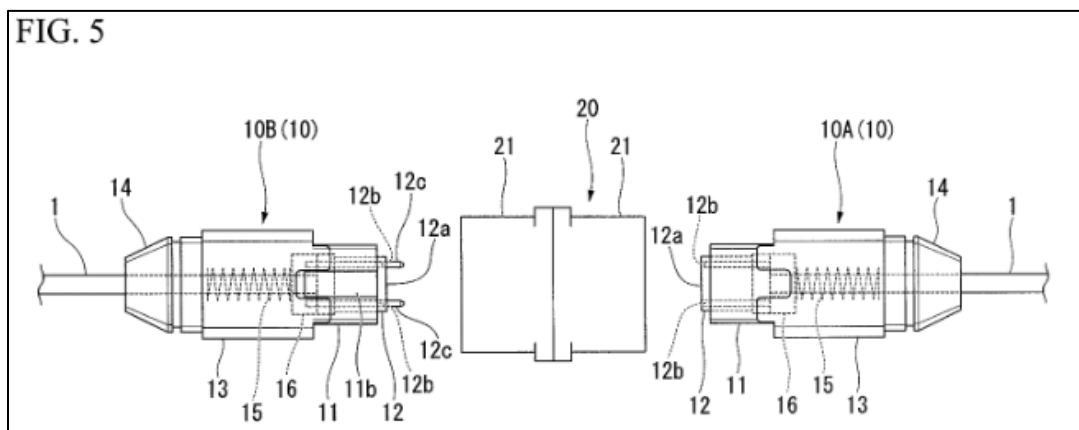
468. Claim 26 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 26 of the '413 Patent.

2. Element [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.”

469. Element [26.1] is identical to element [25.1] 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.” My analysis above applies equally here for the identical elements. *See* Section XIII.M.

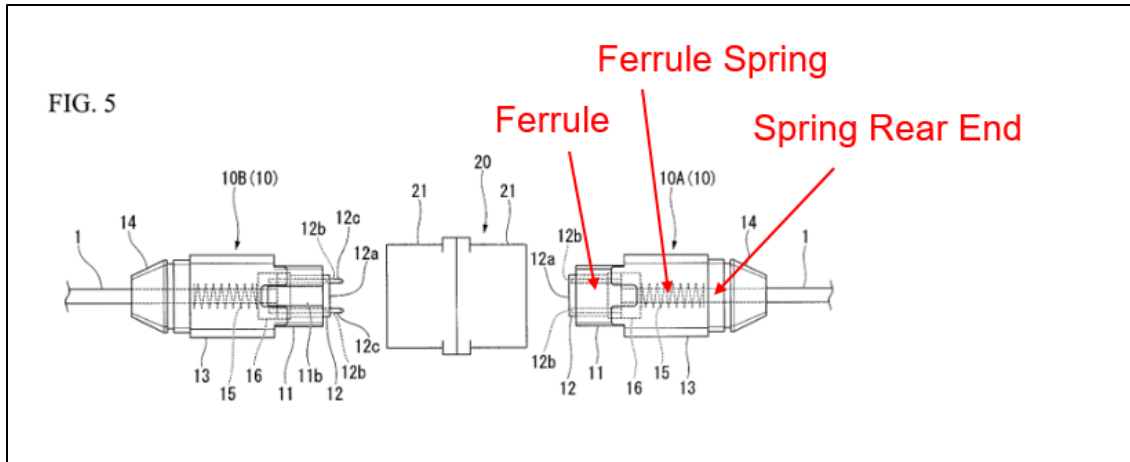
470. Katoh discloses “[i]n the optical connector 10, a spring 15 (see FIG. 5) elastically impelling the ferrule 12 to the front side of the connector is disposed

in the housing 11.” EX1011, ¶80. Spring 15 is a ferrule spring because it biases the MT ferrule forward. 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, as claimed. EX1011, ¶88. For example, in latching the opposing connectors 10B and 10A with the adapter 20, shown below in Figure 5, the opposing ferrules 12 will push against one another, which then compresses the spring 15 rearward. EX1011, ¶¶88, 111.



EX1011, FIG. 5.

471. As seen below, 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.



EX1011, FIG. 4 (annotated).

472. As discussed above with respect to claim element [1.10], coupling 13 is the claimed first portion and housing 11 is the claimed second portion. *See* Section XIII.B.11. The MT ferrule spring 15, and MT ferrule movement, is structurally separate and independent from the movement of coupling 13 (the claimed first portion) and the housing 11 (the claimed second portion). Indeed, the MT ferrule 12 moves within the space inside housing 11. This movement is further evidenced by Katoh's disclosure of coupling 13 which has its own spring to bias it forwards: "coupling 13 is elastically impelled to the connector front side relative to the housing 11 by a coupling spring not shown but disposed inside the coupling." EX1011, ¶135.

473. Thus, A POSITA would have understood that the MT ferrule 12 and coupling 13 move independent from each other at least because of their separate springs and how these elements are depicted in the figures.

474. Additionally, as I explained above in reference to claim element [1.7], in the combination of Katoh with Kuffel, the polarity key 11b of Katoh would be integrated with the coupling 13 as demonstrated in Kuffel. Therefore, movement of the polarity key 11b does not result in or require movement of the MT ferrule. For example a user holding the modified Katoh-Kuffel connector in an unlatched state would be free to slide coupling 13 and the integrated polarity key 11b longitudinally without any movement of the MT ferrule.

475. Accordingly, Katoh discloses claim element [26.1]. In addition to Katoh disclosing claim element [26.1], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 26. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 26 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 26 and would have been obvious to combine as described in Section XIII.A.

O. Claim 17

1. Preamble – “An optical fiber connector comprising”

476. The preamble of Claim 17 is identical to the preamble of Claim 1. Thus, my discussion above applies equally here, and it is my opinion that a

477. Element [17.1] is identical to portions of claim element [1.1]. Thus, my discussion above applies equally here, and for at least the reasons below, it is my opinion that Katoh discloses Element [17.1]. *See* Section XIII.B.2.

FIG. 1A

Housing

10A(10)

1

11b 13d 13e 13b 13d 13f 14

11 11c

11e 12

12b 12a 1a 11d 11e 13k 11a 13h1

13a 13h

FRONT

REAR

479. Accordingly, Katoh discloses claim element [17.1]. In addition to Katoh disclosing claim element [17.1], it would be clear to a POSITA that the

combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [17.1]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [17.1] that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [17.1] and would have been obvious to combine as described in Section XIII.A.

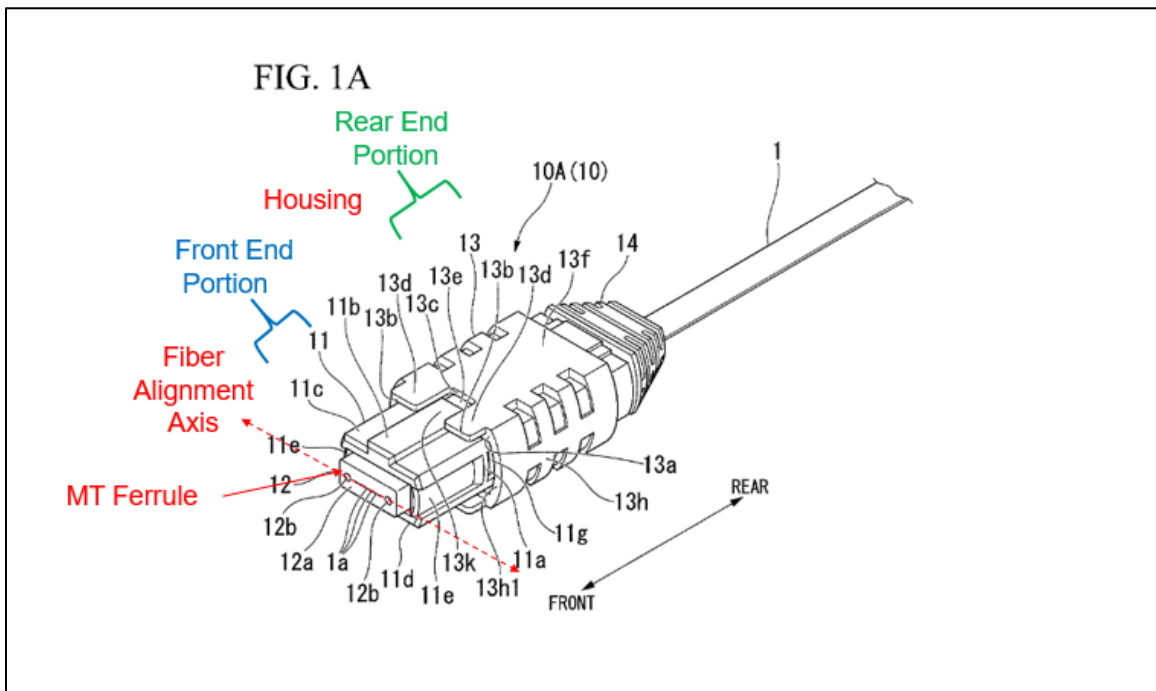
3. Element [17.2] – “an MT ferrule received in the housing, the MT ferrule configured to receive plurality of fibers such that the fibers are spaced apart in a row that extends parallel to a fiber alignment axis:”

480. Element [17.2] is identical to portions of claim element [1.4] and claim element [1.5] Thus, my discussion above applies equally here, and for at least the reasons discussed below Katoh discloses [17.2]. *See* Sections XIII.B.5-XIII.B.6.

481. 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. Katoh explains that “[t]he ferrule 12 employs an MT type optical connector” that can be “a 12-core MT type optical connector attached to an end of the 12-core optical fiber tape (optical fiber 1).” EX1011, ¶¶89, 92. This configuration is seen below, where MT ferrule 12 extends through the front end

portion. Katoh also discloses “[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, ¶96.

482. As seen below, optical fibers 1a are arranged in a row that is parallel to the fiber alignment axis.



EX1011, FIG. 1A (annotated).

483. Accordingly, Katoh discloses element [17.2]. In addition to Katoh disclosing claim element [17.2], it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious claim element [17.2]. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of claim element [17.2] that are disclosed by Katoh would be preserved in the

specific combination of the prior arts. Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector would render obvious claim element [17.2] and would have been obvious to combine as described in Section XIII.A.

4. Element [17.3] – “the MT ferrule further comprising first and second guide pin openings spaced apart along the fiber alignment axis; and”

484. Element [17.3] is identical to claim element [1.6]. Thus, my discussion above applies equally here, and for at least the reasons set forth above with respect to claim element [1.6], it is my opinion that a POSITA would have understood that Katoh discloses claim element [17.3]. And further, a POSITA would have understood that the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious claim element [17.3]. *See* Section XIII.B.7.

5. Element [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

485. For at least the reasons below, it is my opinion that Katoh in view of Kuffel renders obvious claim element [17.4].

486. 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 inserted into and latched with a mating adapter or receptacle.

487. Patent Owner may argue that the reverse-insertion preventing key 11b (*i.e.*, polarity key) in Katoh is not oriented on the first end wall as claimed.

However, as I explained above, it is my opinion that a POSITA would have been motivated to modify Katoh to integrate polarity key 11b with coupling 13 in view of Kuffel's teachings. *See* Section XIII.A.

488. In making this modification, a POSITA would have also found it obvious to modify Katoh's coupling 13 to position the polarity key along the fiber alignment axis above the MT ferrule (*i.e.*, on one of Katoh's shorter walls), for at least two reasons. First, this arrangement maximizes connector spacing density by placing the polarity key on the walls oriented towards the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in typical fiber optic equipment. *See* Section XIII.A. Second, positioning the polarity key along the fiber alignment axis above the MT ferrule is obvious as a matter to try. *See* Section XIII.A.

489. 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. *See* Section XIII.A.3.

490. Accordingly, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) renders obvious claim element [17.4]. That is, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel would result in a fiber optic connector wherein “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.” Thus, it is my opinion that the Katoh-Kuffel fiber optic connector renders obvious claim element [17.4] and would have been obvious to combine as I discuss in Section XIII.A.

6. Element [17.5] – “wherein the optical fiber connector is configured to latch with a mating adapter and

491. Element [17.5] is identical to claim element [1.9]. Thus, my discussion above applies equally here, and for at least the reasons set forth above with respect to claim element [1.9], it is my opinion that a POSITA would have understood that Katoh discloses claim element [17.5]. And further, a POSITA would have understood that the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious claim element [17.5]. *See* Section XIII.B.10.

7. Element [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,

492. Element [17.6] is identical to claim element [1.10]. Thus, my discussion above applies equally here and for at least the reasons set forth above

with respect to claim element [1.10], it is my opinion that a POSITA would have understood that Katoh discloses claim element [17.6]. And further, a POSITA would have understood that the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious claim element [17.6]. *See* Section XIII.B.11.

8. Element [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.”

493. Element [17.7] is identical to claim element [1.11]. Thus, my discussion above applies equally here, and for at least the reasons set forth above with respect to claim element [1.11], it is my opinion that a POSITA would have understood that the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious claim element [17.7]. *See* Section XIII.B.12.

494. In summary, for at least the reasons discussed above, I believe a POSITA would have been motivated to make a combination of Katoh and Kuffel that renders obvious each of the features of Claim 17 of the '413 Patent. As such, it is my opinion that the entirety of Claim 17 of the '413 Patent is rendered obvious.

P. Claim 18

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

495. Claim 18 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons

below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 18 of the '413 Patent.

2. Element [18.1] – “the connector includes an adapter latching feature spaced apart along the fiber alignment axis above the MT ferrule.”

496. Claim 18 is similar to Claim 10, except it requires that the adapter latching feature be spaced apart along the fiber alignment axis above the MT ferrule. This claim is obvious for the same reasons discussed above with respect to Claim 10, as modified to account for the reference to the fiber alignment axis. See Section XIII.H. For at least the reasons explained below, it is my opinion that Katoh discloses these features.

497. As shown below, Katoh's latching system 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 latches or engagement pieces 23 slide over engagement protrusion 11a, and then “coupling 13 moves to the front movement limit position by means of the elastic impelling force of the coupling spring.” EX1011, ¶¶192-194. Thus, at least engagement protrusion 11a and engaging recessed portion 11g are “latching

Katoh-Kuffel fiber optic connector would render obvious Claim 18 and would have been obvious to combine as described in Section XIII.A.

Q. Claim 19

1. Preamble – “The optical fiber connector as set forth in claim 18, wherein”

499. Claim 19 depends upon Claim 18 and Claim 17, and for at least the reasons discussed above in reference to Claims 17 and 18, the combination of Katoh and Kuffel renders obvious Claims 17 and 18. *See* Sections XIII.O and XIII.P. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 19 of the '413 Patent.

2. Element [19.1] – “the adapter latching feature is a latch recess configured to latch with a bendable latch hook of the mating adapter.”

500. Element [19.1] is identical to claim element [11.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to Claim 11, it is my opinion that a POSITA would have understood the combination Katoh and Kuffel (described in Section XIII.A) renders obvious Claim 19. *See* Section XIII.I.

R. Claim 20

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

501. Claim 20 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 20 of the '413 Patent.

2. Element [20.1] – “the optical fiber connector is free of a polarity key spaced apart along the fiber alignment axis below the MT ferrule.”

502. This claim element is similar to claim element [2.1] but references the fiber alignment axis and the connector being free of a polarity key below the MT ferrule. This claim is obvious for the same reasons discussed above with respect to Claim 2, as modified to account for the reference to the fiber alignment axis. *See* Section XIII.C.

503. Katoh only mentions a single reverse-insertion preventing key 11b (*i.e.*, polarity key), and thus does not disclose a second polarity key anywhere on the connector. I note that the figures below show all four walls of Katoh's connector, meaning that an additional polarity key 11b would be visible if one was present.

S. Claim 21

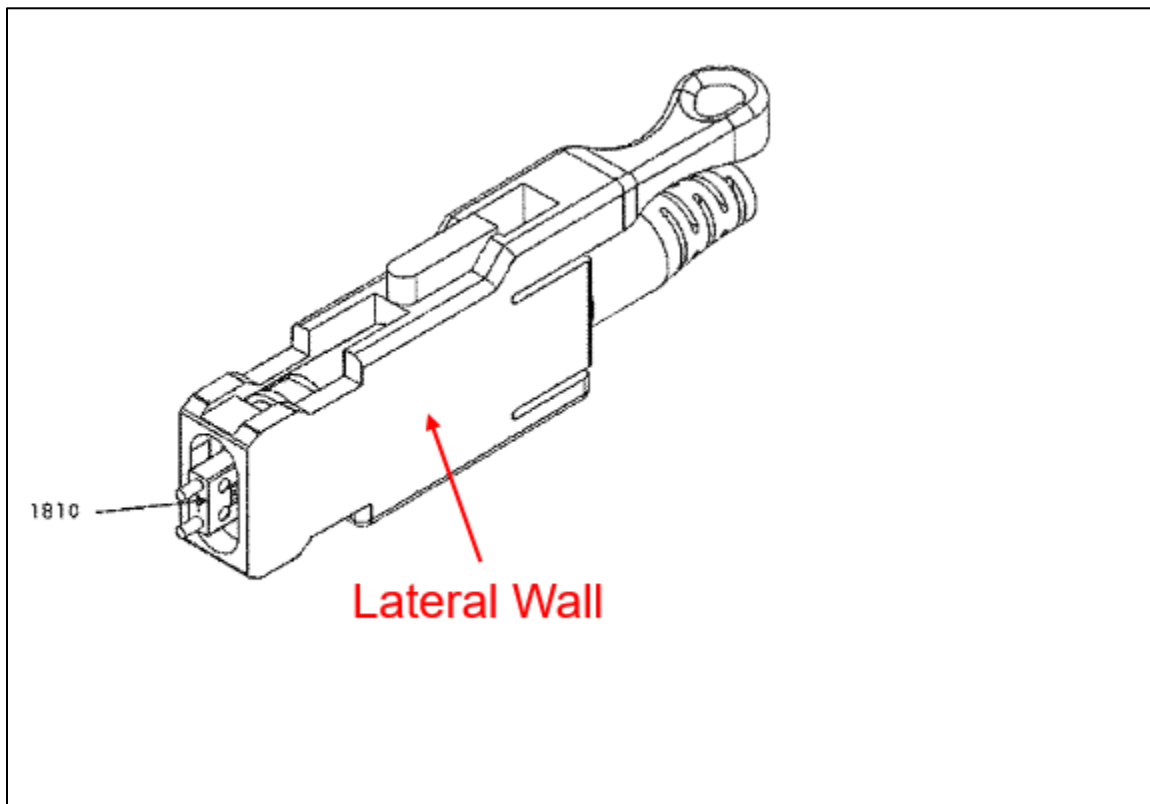
1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

505. Claim 21 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 21 of the '413 Patent.

2. Element [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.”

506. As discussed above in Section XIII.D.2, I note that the term “substantially” is not defined in the '413 Patent claims or specification. I note that the term “substantially” is not defined in the '413 Patent claims or specification. I understand from counsel that terms of degree such as substantially are interpreted from the viewpoint of a POSITA when read in context of the invention. I also am informed that every word in a claim must be given meaning. In this case, the word substantially modifies “flat” by expanding the term flat to include first and second side walls that are not strictly flat or planar in nature. Looking at the lateral wall spaced apart on the lateral side of the MT ferrule that is visible in the embodiment of Figure 18B in the '413 Patent, reproduced below, I note that these walls include

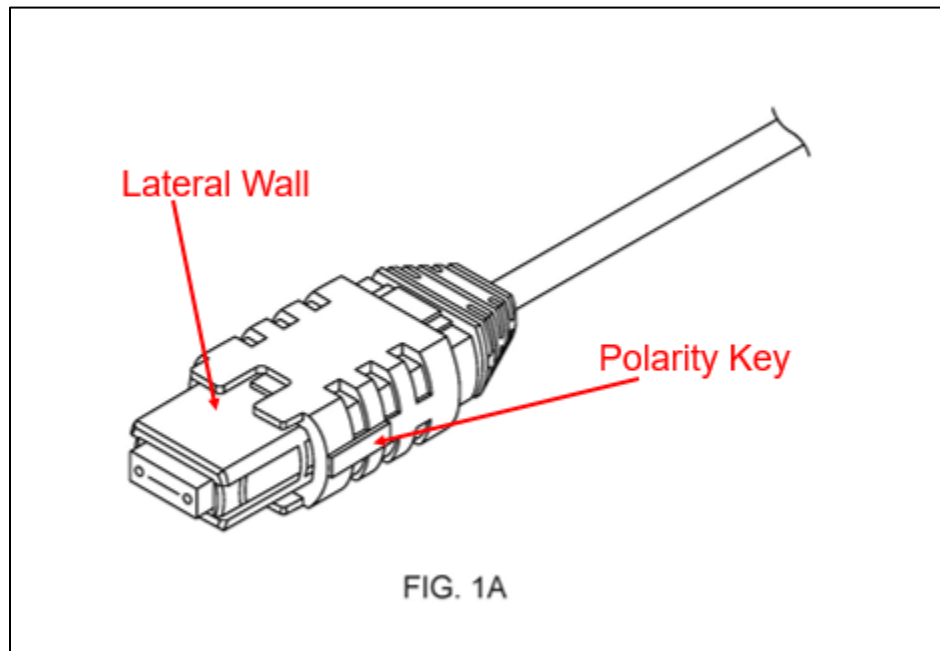
at least two grooves or recesses. While there is no view of the second lateral wall spaced apart on the opposite lateral side of the MT ferrule in any of the embodiments of the '413 Patent, I believe this wall would have similar grooves or recesses. Thus, a POSITA would have understood that the lateral walls are flat but features such as grooves or recesses are included in the term “substantially flat.”



EX1001, FIG. 18B (annotated).

507. In my opinion, the Katoh-Kuffel fiber optic connector’s side walls are encompassed by this understanding of “substantially flat” because the lateral walls are generally flat, similar the embodiment of '413 Patent Figure 18B shown above. Further, Katoh specifies that both the housing 11 and coupling 13 have “a long and thin (flat)” shape. EX1011, ¶¶115, 118. In the Katoh-Kuffel fiber optic connector,

depicted below, the polarity key 11b is disposed on the transverse wall of the coupling 13. It is my opinion that this modification would not alter the lateral walls to no longer be “substantially flat.”



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

508. Accordingly, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) renders obvious Claim 21. That is, modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel would result in a fiber optic connector wherein “each of the first and second lateral walls being substantially flat.” Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector renders obvious Claim 21 and would have been obvious to combine as described in Section XIII.A.

T. Claim 22

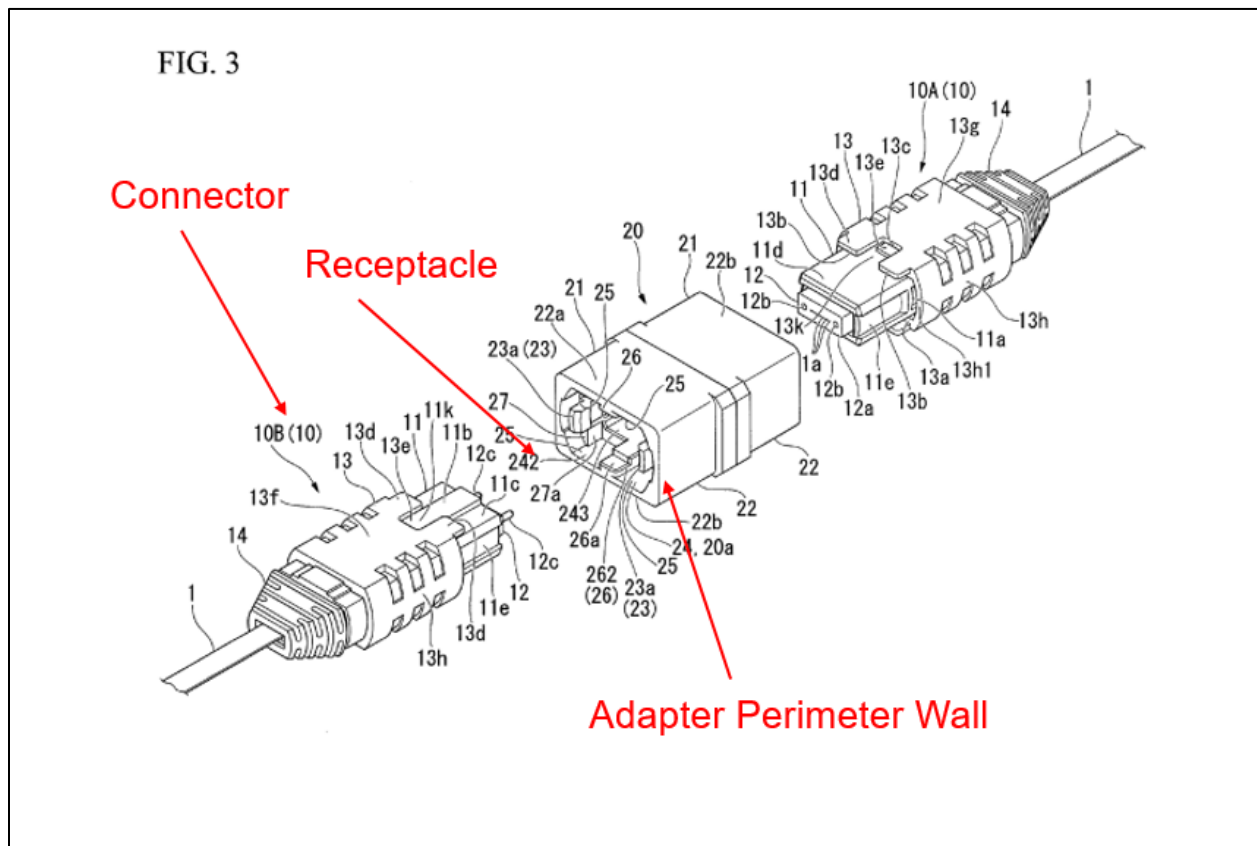
1. Preamble – “A connection system comprising the optical fiber connector of claim 17”

509. Claim 22 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel also renders obvious Claim 22 of the '413 Patent.

2. Element [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.”

510. This claim element is substantively identical to claim element [13.1], except for the reference to the optical fiber connector of claim 17 and description of the side-by-side orientation along a connector alignment axis that is perpendicular to the fiber alignment axis. Therefore, this claim element is obvious for the same reasons I discuss above in reference to claim element [13.1]. *See* Section XIII.K.

511. Katoh discloses that “the optical connectors 10 are inserted into the connector adapter 20.” EX1011, ¶102. As shown below, adapter 20 has a perimeter wall that defines a receptacle in which to matingly receive the connector. Adapter 20 also includes a second connector and receptacle with a perimeter wall.



EX1011, FIG. 3 (annotated).

512. Patent Owner may argue that the two receptacles in adapter 20 are not in a side-by-side arrangement. However, for at least the reasons described below, it is my opinion a POSITA would have been motivated to modify adapter 20 to accommodate more than one pair of fiber optic connectors. This would allow adapter 20 to serve to join multiple sets of fiber optic cables, improving performance of the resulting system. It also reduces part count because a single adapter 20 can be used for multiple cable pairings.

513. A POSITA would have made this modification by duplicating the receptacles in a side-by-side fashion. This is a known configuration in the art and is

straightforward to implement because it requires simple structural duplication. *See, e.g.,* EX1004, FIG. 34.

514. 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. The resulting orientation matches the claimed side wall orientation.

515. Accordingly, Katoh renders obvious Claim 22. Additionally, it would be clear to a POSITA that the combination of Katoh and Kuffel (described in Section XIII.A.3) also renders obvious Claim 22. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel, the additional claimed features of Claim 22 that are disclosed by Katoh would be preserved in the specific combination of the prior arts. Thus, for at least the reasons described above, it is my opinion that the Katoh-Kuffel fiber optic connector would render obvious Claim 22 and would have been obvious to combine as described in Section XIII.A.

U. Claim 27

1. Preamble – “The optical fiber connector as set forth in claim 17, further comprising”

516. Claim 27 depends on Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below,

it is my opinion that the combination of Katoh and Kuffel renders obvious Claim 27 of the '413 Patent.

2. **Element [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.”**

517. This claim element is identical to claim element [25.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [25.1], it is my opinion that a POSITA would have understood the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious Claim 27. *See* Section XIII.M.

V. Claim 28

1. **Preamble – “The optical fiber connector as set forth in claim 17, further comprising”**

518. Claim 28 depends on Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel renders obvious Claim 28 of the '413 Patent.

2. **Element [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.”**

519. This claim element is identical to claim element [26.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [26.1], it is my opinion that a POSITA would have understood the combination of Katoh and Kuffel (described in Section XIII.A) renders obvious Claim 28. *See* Section XIII.N.

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

520. For at least the reasons below, it is my opinion that the combination of Katoh, Kuffel, and Lin renders obvious dependent claims 5 and 6 of the '413 Patent.

A. Motivation to Combine

1. Katoh in view of Kuffel

521. In Katoh's connector modified by Kuffel, as discussed above for Claim 1 in Ground 5, actuation of unlatching coupling 13 is accomplished by a user grasping the outer surface of coupling 13 or potentially using a tool, e.g., a

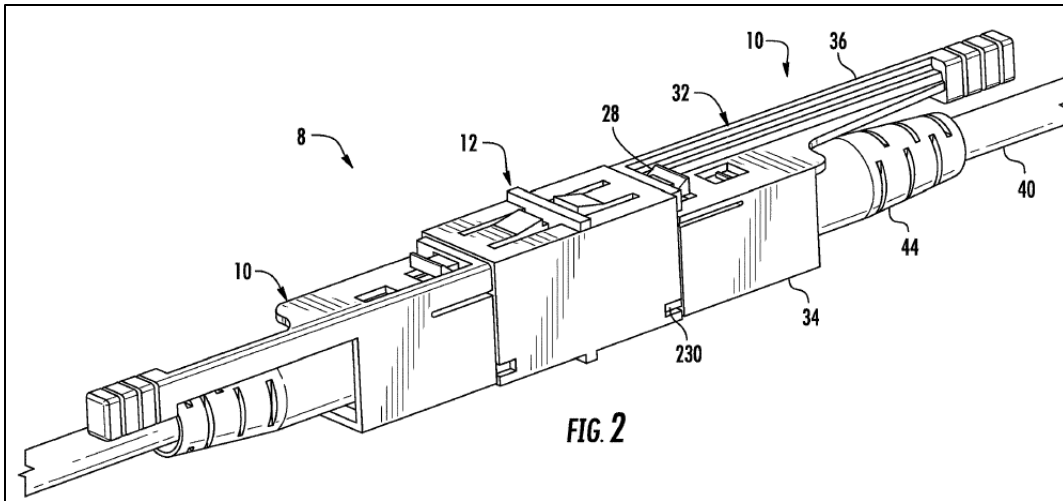
screwdriver, to reach into the dense group of connectors and activate the release mechanism. EX1011, ¶143; EX1001, 2:27-29; *see* Section XIII.B. Being able to grasp requires space to allow a user's fingers access to release coupling 13 when the connector is in the latched position. In dense connections, this can lead to overstressing the cables and connected electronic components, which can produce latent defects and compromise the integrity and/or reliability of the network performance. EX1001, 2:9-26; *see* Section V.A. Furthermore, leaving space to grasp around each connection would result in a reduction in connector density and increase the cost of physical infrastructure. *See* Section IV. Alternatively, guiding a tool to the release sleeve 38 may be a time-consuming process and “may not be effective at reducing support time and increasing the quality of service.” EX1001, 2:27-36. The need to optimize connector density would have led a POSITA to search for alternative actuation options for unlatching the Katoh-Kuffel modified connector.

2. Lin

522. Lin discloses an actuation technique for a connector similar to the movable coupling 13 of Katoh. EX1011, ¶¶118-144; *See* Sections VII.E and XIII.A.1. Lin's fiber optic connector 10 includes “a latch arm 28 extending outwardly from an inner connector body 24, a rear connector body 30 received over a back portion of the inner connector body 24, and an outer body 32 that

cooperates with the inner connector body 24, latch arm 28, and rear connector body 30.” EX1006, ¶26. Additionally, Lin discloses “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. “Eventually engagement between the rear connector body 30 and outer body 32 prevents further relative movement of the outer body 32 in a rearward direction. Pulling the handle 36 of the outer body 32 at this point results in the rear connector body 30 (and the inner connector body 24 that is coupled to the rear connector body 30) moving with the outer body 32 so that the connector 10 can be removed from the adapter 12.” EX1006, ¶26.

523. Thus, like Katoh-Kuffel, Lin has a movable portion (outer body 32) that requires actuation rearwards for unlatching. Lin’s solution is to provide handle 36 that allows a user to actuate the moveable portion from a location displaced from the connector housing, eliminating the need to increase the space between fiber optic connectors or use a separate tool for actuation of the unlatching mechanism.



EX1006, FIGs. 1-2.

3. Reasons to Combine

524. A POSITA would have been motivated to modify the Katoh-Kuffel connector to include a structure like Lin's handle 36 that allows for remote actuation of coupling 13. Specifically, a POSITA would be motivated to modify the Katoh-Kuffel fiber optic connector wherein the coupling of the Katoh-Kuffel fiber optic connector would include a handle, similar to the handle 36 of Lin, such that when the handle is pulled, the coupling 13 is slid to the connector rear side and "elastic engagement pieces 23 of the adapter half body 21 engaging with the

engagement protrusions 11a of the housing 11 of the optical connector 10 is forcibly disengaged from the engagement protrusions 11a by means of the detaching force for moving the coupling 13 to the connector rear side.” EX1011, ¶¶ 225-226. Incorporating a handle similar to Lin’s handle 36 for remote release of the Katoh-Kuffel fiber optic connector from an adapter allows for increasing connector spacing density, because less space is needed between connectors to allow a user to grasp the connector release sleeve, as well as optimizes operating costs while maintaining the integrity and reliability of the network performance. This problem, and the solution of using a remote release, is well-known in the art. *See, e.g.*, EX1016, ¶¶ 2-3.

525. A POSITA would have had a reasonable expectation of success making this modification. 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. I also note that the modification of a Katoh-Kuffel connector to accommodate a handle as shown in Lin is a highly predictable process that would most likely result in a successful connector remote actuation design.

B. Claim 5

1. Preamble – “The optical fiber connector as set forth in claim 1, further”

526. Claim 5 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh, Kuffel, and Lin renders obvious Claim 5 of the '413 Patent.

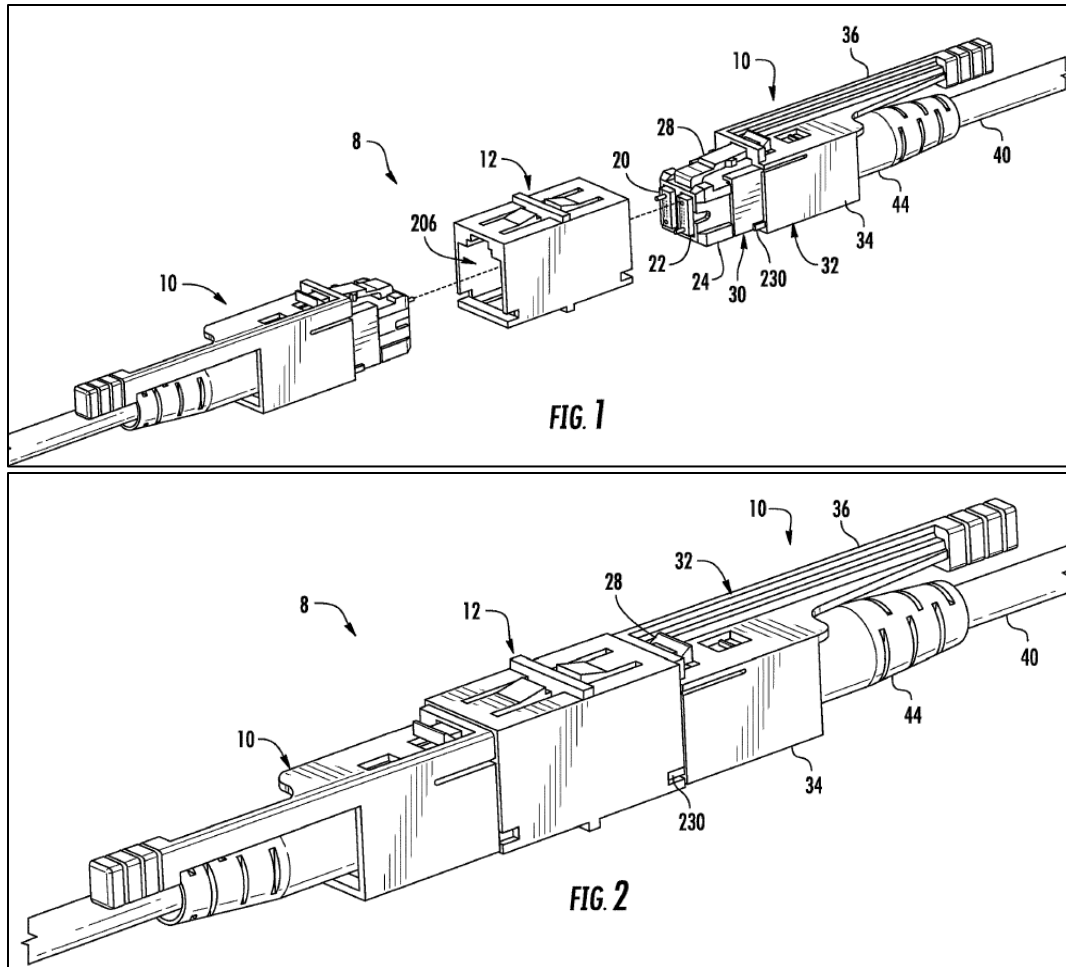
2. Element [5.1] – “comprising a remote release.”

527. Patent Owner may allege Katoh-Kuffel 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. *See* Section V.A, VII.C and XIV.A.

528. Lin discloses an actuation technique for a connector similar to the movable coupling 13 of Katoh. EX1011, ¶¶118-144; *see* Section XIV.A. Lin’s fiber optic connector 10 includes “a latch arm 28 extending outwardly from an inner connector body 24, a rear connector body 30 received over a back portion of the inner connector body 24, and an outer body 32 that cooperates with the inner connector body 24, latch arm 28, and rear connector body 30.” EX1006, ¶26. Additionally, Lin discloses “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. “Eventually engagement between the

rear connector body 30 and outer body 32 prevents further relative movement of the outer body 32 in a rearward direction. Pulling the handle 36 of the outer body 32 at this point results in the rear connector body 30 (and the inner connector body 24 that is coupled to the rear connector body 30) moving with the outer body 32 so that the connector 10 can be removed from the adapter 12.” EX1006, ¶26.

529. Thus, Lin’s handle 36 is a remote release as claimed at least because it allows for remote actuation or release of Lin’s connector.



EX1006, FIGs. 1-2.

530. A POSITA would have been motivated to modify the Katoh-Kuffel connector discussed above to include a structure like handle 36 that allows for remote actuation of coupling 13. *See* Section XIV.A. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance.

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. *See* Section XIV.A.

532. Accordingly, it would be clear to a POSITA that the combination of Katoh, Kuffel, and Lin (described in Section XIV.A) renders obvious Claim 5. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel with the remote release handle of Lin would result in a fiber optic connector “further comprising a remote release.” Therefore, for at least the reasons discussed above it is my opinion that the Katoh-Kuffel fiber optic connector with the remote release handle of Lin renders obvious Claim 5 and would have been obvious to combine for at least the reasons discussed in Section XIV.A.

C. Claim 6

1. Preamble – “The optical fiber connector as set forth in claim 5, wherein”

533. Claim 6 depends on Claim 5 and Claim 1, and for at least the reasons discussed above in reference to Claim 1 and Claim 5, the combination of Katoh, Kuffel, and Lin renders obvious Claim 1 and Claim 5. *See* Sections XIII.B. and XIV.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh, Kuffel, and Lin renders obvious Claim 6 of the ’413 Patent.

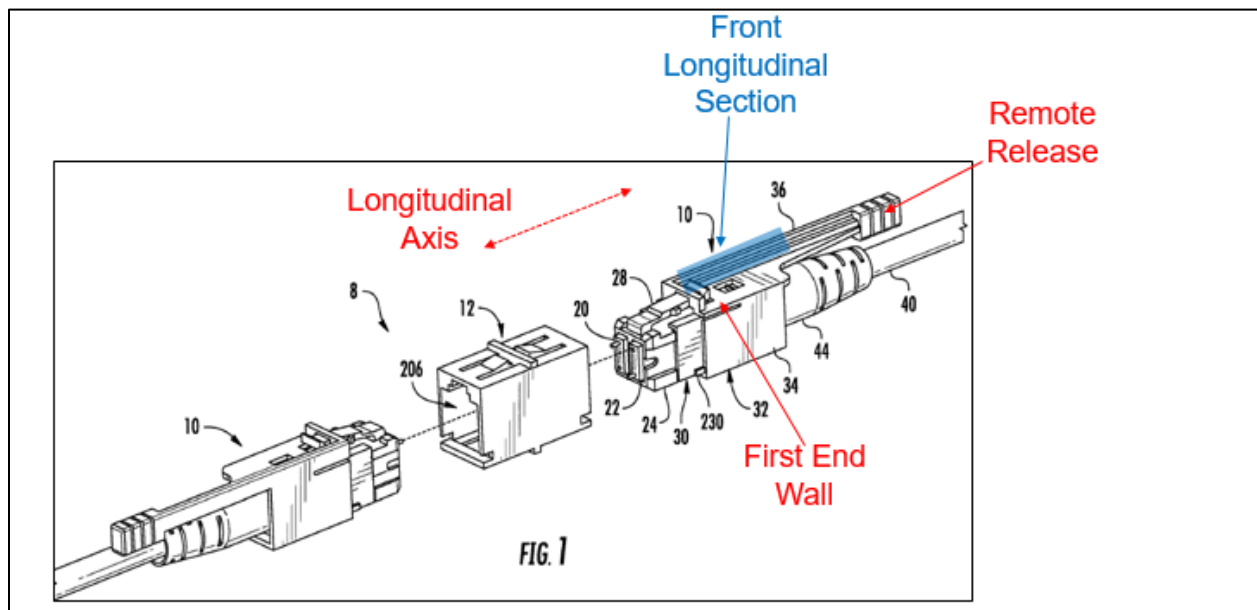
2. Element [6.1] – “the remote release includes a front longitudinal segment disposed on the first end wall of the housing.”

534. Patent Owner may allege Katoh-Kuffel does not expressly disclose the claimed remote release structural configuration, but this feature was well

known in the prior art, for example, as explicitly taught in Lin. *See* Section V.A, VII.C and XIV.A.

535. I note that the term “front longitudinal segment” does not appear in the specification and is not otherwise defined in the claims. Thus, I am interpreting this term per its plain meaning, which is a longitudinally oriented section of the remote release that is disposed at or near the front of the remote release.

536. As shown below, 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. I note that I am applying the same longitudinal directionality below to annotate the front longitudinal segment.



EX1006, FIG. 1 (annotated).

537. As discussed above in Claim 5, a POSITA would have been motivated to modify the Katoh-Kuffel connector to include a remote release that allows for

remote actuation of release sleeve 38. *See* Section XIV.A. Doing so allows for increasing connector spacing density while optimizing operating costs and maintaining the integrity and reliability of the network performance. In doing so, they would have included a front longitudinal section connected to the first end wall as taught by Lin for at least two reasons. 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 aligned with the latching features of the connector and desirable for access to the handle within the unused space that is allotted to allow for clearance between vertically adjacent rack mount units in an equipment receptacle or rack. Second, this configuration is shown in Lin, which is being used to provide the structural teachings for this modification. Thus, a POSITA would have implemented the same configuration to ensure the modification functions properly.

538. Accordingly, it would be clear to a POSITA that the combination of Katoh, Kuffel, and Lin (described in Section XIV.A) renders obvious Claim 6. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel with the remote release handle of Lin would result in a fiber optic connector “wherein the remote release includes a front longitudinal segment disposed on the first end wall of the housing.” Therefore, for at least the reasons

discussed above it is my opinion that the Katoh-Kuffel fiber optic connector with the remote release handle of Lin renders obvious Claim 6 and would have been obvious to combine for at least the reasons discussed in Section XIV.A.

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

A. Claim 9 is only supported as of May 21, 2021.

539. I understand from counsel that determining the priority date for a patent is done on a claim-by-claim basis. *See* Section II.D. I further understand from counsel that the relevant priority document must fully support the elements of the claim for the claim to successfully gain the benefit of the document’s filing date.

540. Claim 9 depends from Claim 1 and recites “wherein the connector is an SN type connector.” A SN type connector is a type of fiber optic connector that was introduced by Patent Owner. EX1010, ¶35.

541. But before the ’197 Application, applications that the ’413 Patent claims benefit to only disclosed so-called LC, MT, SC, CS, and ST connectors, as well as the general categories of small form-factor pluggable (SFP) footprints or quad small form-factor pluggable (QSFP) footprints for connectors.

542. It is my opinion that Claim 9 is only supported as of the filing of the original claims of the ’197 Application. The filing of the ’197 Application is the first instance that I find any disclosure of an SN type connector, and even then, an

SN type connector is only disclosed in original Claim 9, which is identical to issued claim 9. EX1002, 0019.

543. Thus, my understanding is Claim 9 should gain the benefit of a filing date no earlier than May 21, 2021.

544. I take no position on whether the mention of the known SN type connector in Claim 9 is sufficient to support this claim.

B. Motivation to Combine

1. Katoh in view of Kuffel

545. Katoh-Kuffel's fiber optic connector is based on a modified MPO-type connector. EX1011, ¶¶74-76.

546. MPO connectors are a well-known fiber optic connector format. A POSITA would have been well aware that different connector formats are used in different situations, and as described in the background of the '413 Patent, "backward compatibility with existing data center equipment" is desirable to increase modifiability after deployment. EX1001, 1:51-58. Therefore, adapting a connector design to mate with a different known type of connector improves compatibility and marketability of the modified connector.

2. Cox

547. Cox discloses a variety of fiber optic connectors that are used, including "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. (Hickory, N.C.), and SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

3. Reasons to Combine

548. A POSITA would have been motivated to modify the Katoh-Kuffel connector to be compatible with a variety of standard or known connector formats, including the SN connector format, to improve marketability of the resulting connector.

549. A POSITA would have had a reasonable expectation of success making this modification. 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. I also note that the 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.

C. Claim 9

1. Preamble – “The optical fiber connector as set forth in claim 5, wherein”

550. Claim 5 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it

is my opinion that the combination of Katoh, Kuffel, and Cox renders obvious
Claim 9 of the '413 Patent.

2. Element [9.1] – “the connector is an SN type connector.”

551. Patent Owner may allege Katoh-Kuffel does not expressly disclose the claimed SN connector type, but this feature was well known in the prior art, for example, as explicitly taught in Cox. *See* Section VII.D.

552. Cox discloses fiber optic assemblies, including a plurality of “fiber optic components 23” that are “disposed through a front side 108 of the main body 102 and configured to receive fiber optic connectors connected to fiber optic cables.” EX1010, ¶41. Examples of fiber optic component 23 configurations include “multi-fiber push-on/pull-off (MPO) connectors or adapters,” “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. (Hickory, N.C.), and SN connectors or adapters (sometimes referred to as a Senko Next-generation connectors).” EX1010, ¶35.

553. 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. *See* Section XV.B.

554. Accordingly, it would be clear to a POSITA that the combination of Katoh, Kuffel and Cox (described in Section XV.B) renders obvious Claim 9. That is, by modifying the polarity key of Katoh to be integrated with the coupling as described in Kuffel to accommodate the features of Cox's SN type connector would result in a fiber optic connector "wherein the connector is an SN type connector." Therefore, for at least the reasons discussed above, it is my opinion that the Katoh-Kuffel-Cox SN type fiber optic connector renders obvious Claim 9 and would have been obvious to combine as I discuss in Section XV.B.

XVI. GROUND 8: KATOH IN VIEW OF KUFFEL AND FURTHER IN VIEW OF APPLICANT ADMITTED PRIOR ART RENDERS OBVIOUS CLAIMS 15, 16, 23, AND 24

555. For at least the reasons below, it is my opinion that the combination of Katoh, Kuffel, and Applicant Admitted Prior Art renders obvious dependent claims 15, 16, 23, and 24 of the '413 Patent.

A. Applicant Admitted Prior Art

556. The '413 Patent discloses several existing connector formats in its background section. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. Section II.C. Here, the background section of the '413 Patent states that “[f]or example, one current footprint is known as the small form-factor pluggable transceiver footprint. This footprint currently accommodates two LC-type ferrule optical connections.” EX1001, 1:58-61. The '413 Patent’s background section also states that “[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. In my opinion, these statements are identifying the current, known prior art connector footprints, including the small and quad small form-factor pluggable footprint.

B. Motivation to Combine

557. A POSITA would have been motivated to modify the Kuffel-Katoh connector to fit into a small-form factor pluggable transceiver footprint and/or

quad small form-factor pluggable transceiver footprint configuration to improve compatibility and marketability. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector. I note that requirement that there be two connectors in Claims 15 and 23 or four connectors in Claims 16 and 24. This element is obvious for at least two reasons. First, in view of the disclosure in the '413 Patent, which specifically discusses the known small form-factor pluggable transceiver footprints for two or four connectors. EX1001, 1:58-67. Second, I understand from counsel that a simple duplication of components is generally considered obvious. Thus, duplicating the Katoh-Kuffel connector to meet the recited number of connectors is obvious. A POSITA would have had a reasonable expectation of success making this modification because the structural changes were well within the skill of a POSITA.

C. Claim 15

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

558. Claim 15 depends on Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons discussed below, it is my opinion that the combination of Katoh and Kuffel further

in view of the Applicant Admitted Prior Art also renders obvious Claim 15 of the '413 Patent.

2. Element [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.”

559. Patent Owner may allege that Katoh and Kuffel do not expressly disclose the claimed small form-factor pluggable footprint. However, as explicitly taught in the background of the '413 Patent, this footprint was well known in the prior art. *See* Section V.A.

560. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. *See* Section XVI.A. Here, the background section of the '413 Patent states that “[f]or example, one current footprint is known as the small form-factor pluggable transceiver footprint. This footprint currently accommodates two LC-type ferrule optical connections.” EX1001, 1:58-61. In my opinion, this statement is identifying the current, known prior art connector footprints, including the small form-factor pluggable footprint.

561. A POSITA would have been motivated to modify the Katoh-Kuffel connector to fit into a small form-factor pluggable transceiver footprint configuration to improve compatibility and marketability. Doing so would have been well within the skill of a POSITA because the modifications require only a

structural redesign of the connector to accommodate a known footprint. I note that the requirement that there be two connectors in Claim 15 is equally obvious in view of the disclosure in the '413 Patent explaining the four connector nature of this footprint.

562. Accordingly, a POSITA would have understood that while the Katoh-Kuffel optical connector houses a single MT ferrule, it is obvious that when combined with a second identical connectors, the two connectors could be structured to fit into the known small form-factor transceiver footprint. Therefore, it is my opinion that Katoh and Kuffel further in view of the Applicant Admitted Prior Art renders obvious Claim 15 and would have been obvious to combine as I discuss in Section XVI.B.

D. Claim 16

1. Preamble – “The optical fiber connector as set forth in claim 1, wherein”

563. Claim 16 depends upon Claim 1, and for at least the reasons discussed above in reference to Claim 1, the combination of Katoh and Kuffel renders obvious Claim 1. *See* Section XIII.B. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel further in view of the Applicant Admitted Prior Art also renders obvious Claim 16 of the '413 Patent.

2. Element [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.”

564. Patent Owner may allege that Katoh-Kuffel does not expressly disclose the claimed quad small form-factor pluggable footprint. However, as explicitly taught in the '413 Patent's background, this footprint was well known in the prior art. *See* Section V.A.

565. I understand from counsel that disclosure in a patent that identifies or describes the prior art can serve as prior art against the claims of that patent. *See* Section XVI.A. Here, the background section of the '413 Patent states that “[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. In my opinion, this statement is identifying the current, known prior art connector footprints, including the quad small form-factor pluggable footprint.

566. A POSITA would have been motivated to modify the Katoh-Kuffel connector to accommodate a quad small-form factor pluggable transceiver footprint configuration to improve compatibility and marketability. Doing so would have been well within the skill of a POSITA because the modifications require only a structural redesign of the connector. I note that the requirement that

there be a total of 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.

567. Accordingly, a POSITA would have understood that while the Katoh-Kuffel optical connector houses a single MT ferrule, it is obvious that when combined with three additional identical connectors, the four connectors could be structured to fit into the known small form-factor transceiver footprint. Therefore, it is my opinion that Katoh and Kuffel further in view of the Applicant Admitted Prior Art renders obvious Claim 16 and would have been obvious to combine as I discuss in Section XVI.B.

E. Claim 23

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

568. Claim 23 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel further in view of the Applicant Admitted Prior Art also renders obvious Claim 23 of the '413 Patent.

2. Element [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.”

569. This claim element is identical to claim element [15.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above

with respect to claim element [15.1], it is my opinion that a POSITA would have understood the combination of Katoh and Kuffel (described in Section XIII.A) further in view of the Applicant Admitted Prior Art (described in Section XVI.A-B) renders obvious Claim 23. *See* Section XVI.C.

F. Claim 24

1. Preamble – “The optical fiber connector as set forth in claim 17, wherein”

570. Claim 24 depends upon Claim 17, and for at least the reasons discussed above in reference to Claim 17, the combination of Katoh and Kuffel renders obvious Claim 17. *See* Section XIII.O. Additionally, for at least the reasons below, it is my opinion that the combination of Katoh and Kuffel further in view of the Applicant Admitted Prior Art also renders obvious Claim 24 of the '413 Patent.

2. Element [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.”

571. This claim element is identical to claim element [16.1]. Thus, my discussion above applies equally here and for at least the reasons set forth above with respect to claim element [16.1], it is my opinion that a POSITA would have understood the combination of Katoh and Kuffel (described in Section XIII.A) further in view of the Applicant Admitted Prior Art (described in Section XVI.A-B) renders obvious Claim 24. *See* Section XVI.D.

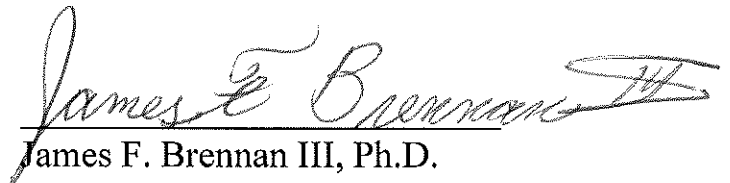
XVII.CONCLUSION

572. For at least the reasons set forth above, I am of the opinion the Challenged Claims would have been or obvious to a POSITA at the time of invention of the '413 Patent based at least on the discussed prior art.

573. I understand that this Declaration is to be filed as evidence in a contested IPR proceeding before the Patent Trial and Appeal Board. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I hereby declare under penalty of perjury that the foregoing is true and correct, that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and may jeopardize the validity of the application or any patent issuing thereon. If called to testify as to the truth of the matters stated herein, I could and would testify competently.

Date: December 21, 2023


James F. Brennan III, Ph.D.