UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SENKO ADVANCED COMPONENTS
Petitioner

v.

US CONEC LTD.
Patent Owner

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Case: IPR2024-00805
Patent No. 11,385,415

# DECLARATION OF EDWARD LURIE

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DECLARATION OF EDWARD LURIE

I, Edward Lurie, hereby declare as follows:

1. Although I continue to provide consulting, I retired from full time work in Sept. 2019, after a 36-year career in new product design & development in the field of optical fiber connectivity. I worked for 34 years for 3M in the Telecom, Interconnect Solutions (ISD), and Communication Markets (CMD) Divisions. I worked the last two years of my career for Corning in the Optical Connector Systems (OCS) Division, after 3M sold its CMD Division to Corning.

2. I currently have a number issued US Patents in fiber optics, in both discrete and multi-fiber interconnects. I also developed dozens of proprietary processes that are held confidentially as trade secrets.

3. I received a BS Degree from Franklin & Marshall College in 1980, and did post graduate study at the Institute of Optics in Rochester, NY. My qualifications are enumerated in detail in my curriculum vitae, along with a list of issued patents, which is attached as Appendix A to this declaration.

4. I have been a member of the Optical Society of America (OSA), and have contributed to Telcordia, IEC, and TIA/EIA Standards Bodies for Intermatability Standards for Discrete and Multi-Fiber Connectors. My research interests have included F.O. Connectors, Adapters, Field Installation Kits,



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Precision Cleaving Tools, and Cable Assembly. I have published papers on various topics related to all of the above.

5. Through many years of working and research, I have gained extensive knowledge, experience and expertise in the field of fiber optic connector design. Having worked on fiber optic connector design for most of my career, I have an extensive background and understanding of the principles and processes involved with the field of technology of U.S. Patent No. 11,385,415 ("the '415 patent").

6. I have gained general experience with patents as an inventor. I am a lead named inventor on a number of patents in fiber optic interconnects. I assisted in the prosecution of the aforementioned patents including writing the records of invention, assisting counsel in preparing the patent applications, and assisting counsel in responding to communications received from the U.S. Patent and Trademark Office.

7. I am being compensated at $450/hour. My compensation is in no way dependent on the outcome of this proceeding, and my compensation in no way affects the substance of my statements and opinions in this Declaration.

8. In providing the testimony set out in this declaration, I have reviewed the figures, specification, and claims of the '415 patent and the file history of the '415 patent. I have also reviewed the following documents attached as exhibits to the Petition for Inter Parties Review of U.S. Patent No. 11,385,415 ("Petition"):

| Exhibit No. | Description |
|---|---|
| 1001 | U.S. Patent No. 11,385,415 |
| 1002 | Expert Declaration |
| 1003 | U.S. Patent No. 6,220,762 (“Kanai”) |
| 1004 | U.S. Patent No. 5,222,168 (“Saito”) |
| 1005 | U.S. Publication No. 2012/0057824 (“Katoh”) |
| 1006 | U.S. Patent No. 5,673,346 (“Iwano”) |
| 1007 | U.S. Patent No. 6,929,406 (“Amorim”) |
| 1008 | U.S. Patent NO. 6,386,768 (“Yoon”) |
| 1009 | PCT Publication No. WO 2012/174227 (“Hodge”) |
| 1010 | U.S. Publication No. 2005/0135753 (“Eigenmann”) |
| 1011 | Provisional Application No. 61/789,499 |
| 1012 | Prosecution History of U.S. Application No. 14/214,931 |
| 1013 | Prosecution History of U.S. Application No. 15/855,750 |
| 1014 | Prosecution History of U.S. Application No. 15/855,788 |
| 1015 | Prosecution History of U.S. Application No. 16/214,317 |
| 1016 | Prosecution History of U.S. Application No. 17/145,864 |
| 1017 | Prosecution History of U.S. Application No. 17/857,300 |
| 1018 | Prosecution History of U.S. Application No. 18/483,949 |
| 1019 | U.S. Patent No. 6,146,023 |

| Exhibit No. | Description |
|---|---|
| 1020 | U.S. Patent No. 6,371,659 |
| 1021 | U.S. Patent No. 6,305,961 |
| 1022 | U.S. Publication No. 2005/0111796 |
| 1023 | U.S. Publication No. 2005/0281509 |
| 1024 | English Translation of Japanese Patent No. 2573482 |
| 1025 | SCHEDULING ORDER |
| 1026 | Claim Listing |

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

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

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

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

13. Grounds 1-7 of the Petition, which I have reviewed and which often cites to my opinions, assert that the claims of the '415 patent should be invalidated

as anticipated by one or more prior art references or obvious over one or more combinations of prior art references.

14. I understand that a claim is unpatentable as anticipated if the prior art reference teaches the claimed subject matter.

15. I understand that a claim is unpatentable as obvious if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious to a hypothetical person having ordinary skill in the art at the time of the invention and who is presumed to have known the relevant prior art.

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

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

18. I understand that a motivation to combine the teachings of the relevant references may come from, but is not limited to: teachings, suggestions, or

motivations found in the prior art; the nature of the problem; or the knowledge of a person having ordinary skill in the art.

19. I understand that the United States Patent and Trademark Office ("USPTO") will interpret the claims of the '415 patent as they would have been understood by those of ordinary skill in the art at the time of the invention in view of the claim language itself, the specification and figures of the '415 patent, the prosecution history of the '415 patent, and other relevant evidence showing how one of ordinary skill would have understood the language.

20. In forming my opinions, I have applied the understanding of one of ordinary skill in the art working at the time of the invention claimed in the '415 patent, i.e., shortly prior to March 15, 2013.

21. It is my opinion that a person having ordinary skill in the art ("POSA") at that time would have: (1) at least a bachelor's degree in mechanical engineering, electrical engineering, physics, or a related field and three years of experience in fiber optics and fiber optic connectors; (2) a master's degree in mechanical engineering, electrical engineering, physics, or a related field and at least one year of experience in fiber optics and fiber optic connectors; or (3) industry experience (at least three years) designing fiber optic connectors in lieu of a formal degree.

22. In my opinion, the level of ordinary skill is not determinative because those of less or more skill would also find the claims to be unpatentable.

## BACKGROUND OF THE ‘415 PATENT

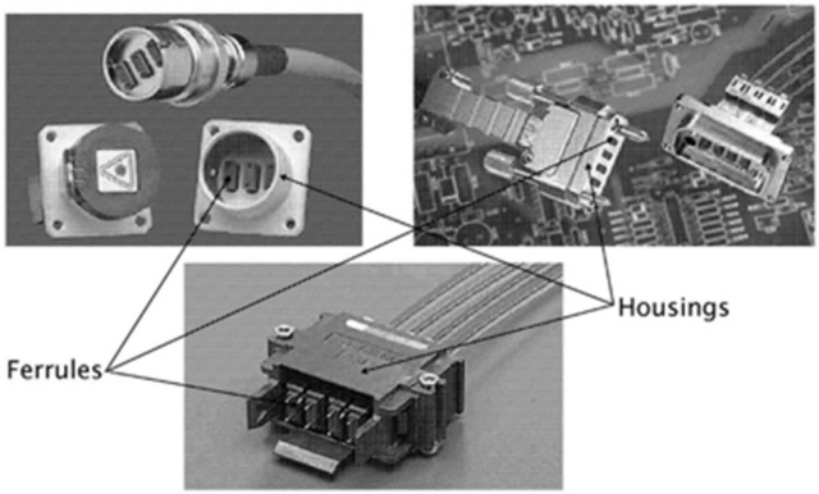
23. The ‘415 Patent pertains to a passive fiber optic connection for use with “fiber optic connectors with fiber optic ferrules that are ganged together with a tight pitch between those fiber optic ferrules.” EX1001: 1:22-24.

24. Notably, “pitch” as used in the ‘415 Patent is a common term within the fiber optic connection field for describing the distance between fiber optic ferrules.

25. The ‘415 Patent explains that ganged fiber optic connectors allow for simultaneous connection of multiple ferrules in a small footprint and predefined routing configuration. EX1001: 1:24-29.

26. “Ganged fiber optic connectors” were already well known in the art. For example, U.S. Provisional Patent Application No. 61/789,499 (“the ‘499 provisional application”)—which I have been informed to understand that the ‘415 Patent claims priority from—shows several examples of fiber optic connectors that were commercially available, which are ganged together within a plug housing:

Figure 1: Typical ganged ferrule connectors




EX1011 at p. 16.

27. Other examples of ganged fiber optic connectors that were known within the art include 3M's Optical Gateway Interface (OGI), and other backplane Connector systems by Molex, Tyco, and others.

28. According to the '415 patent, the prior art ganged fiber optic connectors were expensive to design, maintain, and scale because of the position tolerance required for every fiber optic ferrule in the housing. EX1001: 1:31-42.

29. The '415 Patent purports to address these alleged deficiencies of the prior art by holding the individual ferrule holders loosely within the ganged plug housing and aligning the individual ferrule holders using precision alignment features within a mating adapter. EX1001: 1:43-2:9.

30. Below is a composite of Figures 2, 3, 4, 5A, 5B, and 6C of the ‘415 Patent that demonstrates the ‘415’s Patent’s primary embodiment. The assembly (10) comprises an adapter (100) configured to mate with a fiber optic connector comprising a plug (200) that gangs a plurality of ferrules (12) held in individual ferrule holders (300). EX1001: 3:61-4:5.

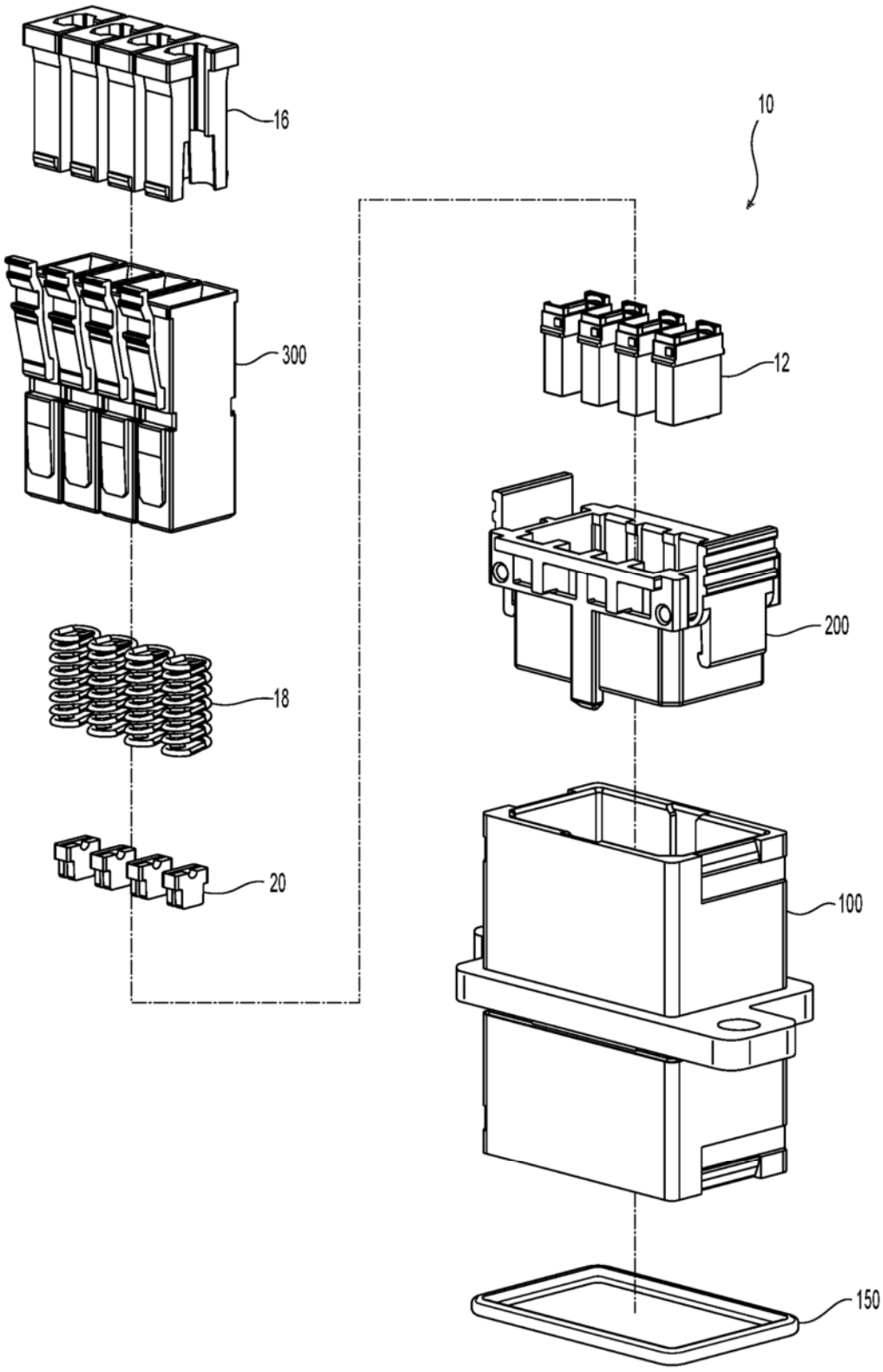



*Fig. 2*



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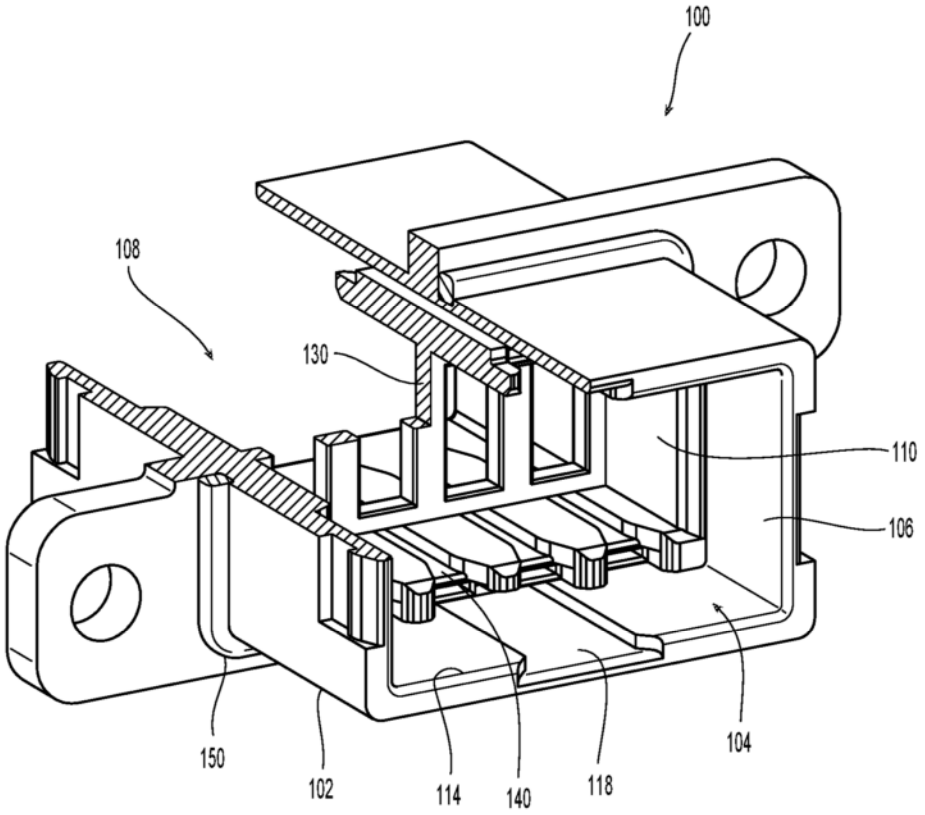
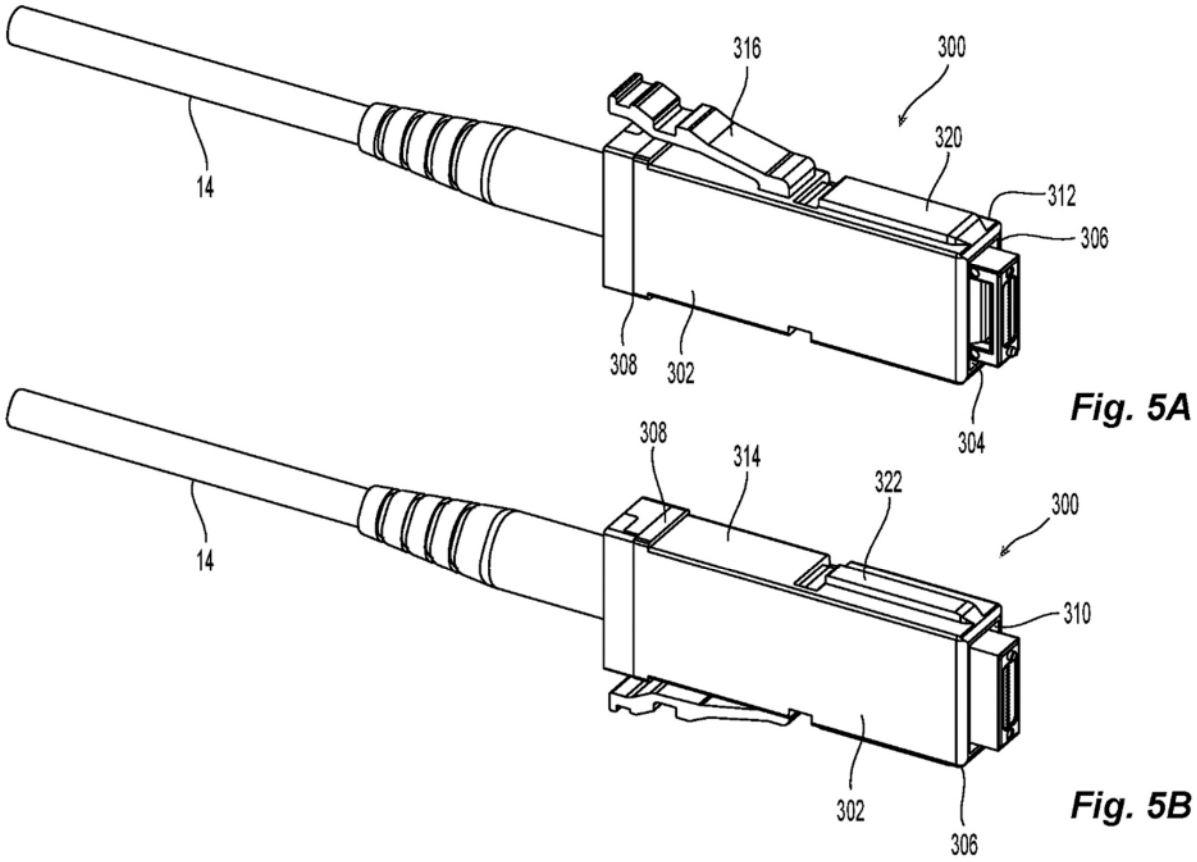



*Fig. 3*



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EX1001: Figs. 2, 3, 5A, 5B.

31. The adapter (100) of the ‘415 Patent comprises a main body (102) and a center portion (110) inside the main body. EX1001: 5:20-23; 30-33.

32. The adapter (100) has an opening (104) extending from a first side (106) of the main body (102), through the center portion (110), to a second side (108) of the main body. EX1001: 5:20-23; 30-33.

33. The adapter (100) can receive a first plug (200)—i.e. a ganged connector—through the first side (106) of the main body (102) and a second plug through the second side (108) of the main body. EX1001: 5:58-6:7.

34. The plug (200) is configured to loosely hold a plurality of ferrule holders (300). EX1001: 4:9-18; 5:58-6:3.

35. Each ferrule holder (300) is configured for holding an individual ferrule (12). EX1001: 4:1-9. The ferrule holder (300) has a main body (302) with external projections (320, 322) on the top and bottom surfaces (312, 314), respectively. EX1001: 4:19=45. The top projection (320) is wider than the bottom projection (322). EX1001: 4:39-41. Behind the upper projection (320), the holder (300) comprises a cantilevered latch (316) on the upper surface (312). EX1001: 4:29-31; 5:7-8.

36. The plug (200) defines an opening (206) for receiving the ferrule holders (300) and a plurality of latch receptacles (232) to latch with the cantilevered latches (316) and loosely secure the ferrule holders in the opening (206). EX1001: 4:29-57; 5:5-17.

37. The plug (200) is sized so that the ferrule holders (300) protrude forward from the plug with their projections (320, 322) exposed. EX1001, Figure 6A and 6B.

38. The exterior of the plug (200) includes projections (220, 222) for being received in the grooves (116, 118) in the top and bottom surfaces (112, 114) of the main body (102) of the adapter (100). EX1001: 4:49-5:4; 5:19-29; 5:58-6:3. The sides of the plug (200) comprise cantilevered latches (230) configured to latch

with corresponding latch structure on the sides of the adapter (100) and thereby secure the ganged fiber optic connector in the adapter. EX1001: 5:5-8.

39. Each of the sides (106, 108) of the adapter (100) has a top surface (112) and a bottom surface (114). Each of these top and bottom surfaces has a single respective groove (116, 118) for receiving a corresponding projection of the plug (200). EX1001: 5:18-29.

40. The adapter (100) has a center portion (110) with a raised bottom portion (132) and a dropped top portion (134) that narrow the opening (104) through the adaptor. EX1001: 5:30-36.

41. These raised bottom and lowered top portions (132, 134) define sets of grooves (140, 142) for receiving corresponding projections (320, 322) on each ferrule holder (300) when the ganged fiber optic connector is mated with the adapter (100). EX1001:5:48-57.

42. Each groove (140, 142) extends along the entire length of the center portion (110), across the optical reference plane. EX1001: 5:53-57.

43. The adapter can further include an optional center wall (130) extending across the opening (104) in the center portion (110), dividing the center portion in half. EX1001: 5:30-33.



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44. When present, the center wall (130) defines openings (136) for receiving the tips of ferrules (12) or ferrule holders (300) at the optical reference plane. EX1001: 5:30-47.

45. To use the connection system (10), the ferrules (12) are assembled in the ferrule holders (300), and the ferrule holders are loaded into a plug (200) and are loosely secured to form a ganged fiber optic connector. EX1001: 2:54-3:2; 3:61-4:18.

46. Two such ganged fiber optic connectors are inserted into opposite sides of the adapter (100) to make an optical connection between the opposing sets of ferrules. EX1001: 5:58-6:3.

47. According to the specification, because grooves (140, 142) extend the entire length of the center portion (110), when the ganged connectors are inserted into the opposing sides of the adapter (100) both ferrules (12) of each mating pair of ferrules is aligned by the same grooves. EX1001: 5:48-57; 6:4-21.

48. The dependent claims recite additional features regarding the configuration of the adapter and its intended use, including the inclusion of gaskets for EMI shielding, and varying the size of the grooves to ensure proper polarity. EX1001: 7:33-8:3; 8:28-33.

## BACKGROUND OF THE PRIOR ART



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49. While there have been evolving standards for fiber optic connectors and increasing demands for higher pitch densities, fiber optic connection systems have been well known in the art for decades.

50. Fiber optic connectors now come in several common varieties and ferrule types, including FC, SC, ST, LC, MU (primarily in Japan), E-2000 (primarily in parts of Europe), MPO/MTP, and MTRJ/MT:



FC/UPC



ST Multi-mode



SC/APC




LC/UPC



LC/UPC Duplex



LC/APC



MT-RJ



MPO

51. The ceramic ferrule types listed are available in single fiber (simplex) and dual fiber (duplex) configurations. The MT ferrule types have been developed for higher density ribbon fiber (& cable) - from 2-fiber in the case of MT-RJ, to 8-fiber, 12-fiber, 24-fiber, 48-fiber, and up to 72-fiber ribbon in a single, rectangular MT ferrule that was first commercialized in the MPO/MTP connector footprint. The MT ferrules and MPO/MTP connectors are utilized in the highest



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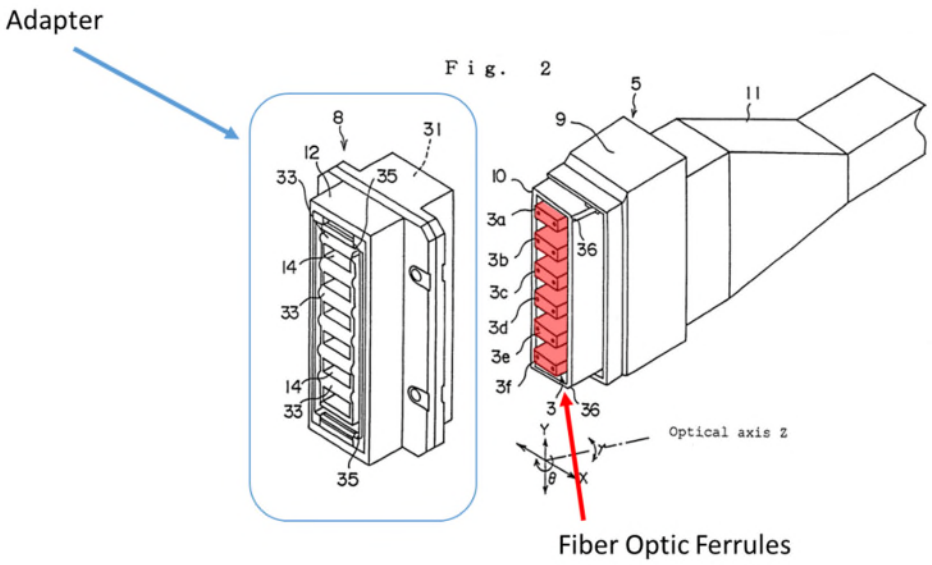
data/bandwidth applications, such as singlemode telephony, cell towers for mobile communications, and data centers that power the internet and the ever expanding broadband needs for on-demand 'video streaming' and 'big data.' Today's data center customers are pressing for even higher density, more compact connector designs.

52. The claims of the '415 Patent are not specific to a fiber optic connector or ferrule type, and in theory would be compatible with a number of the common fiber optic connector and ferrule types. EX1001: 3:66-4:1 ("The ferrules 12 are typically multi-fiber ferrules, particularly MT type ferrules, but the present invention may include other types of ferrules.").

53. The references outlined below, and other references elsewhere herein, disclose features of fiber optic connection systems, and those of ordinary skill in the art would consider them all to be in the same field of endeavor with each other and with the '415 patent.

### A. U.S. Patent 6,220,762 ("Kanai")

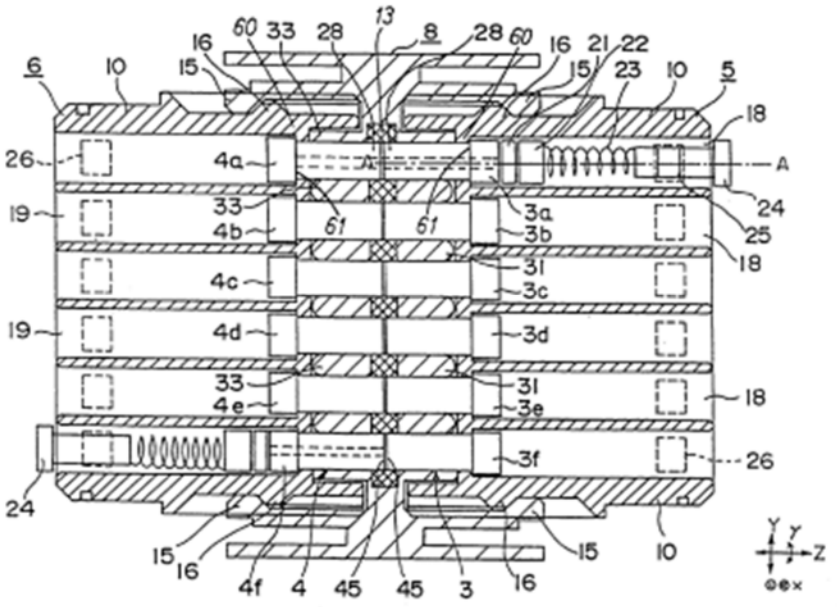
54. Kanai—issued in 2001—teaches an optical connector plug with ganged floating optical connectors/ferrules and a corresponding adapter. EX1003: Abstract, Fig. 2 (annotated below).




EX1003: Fig. 2.

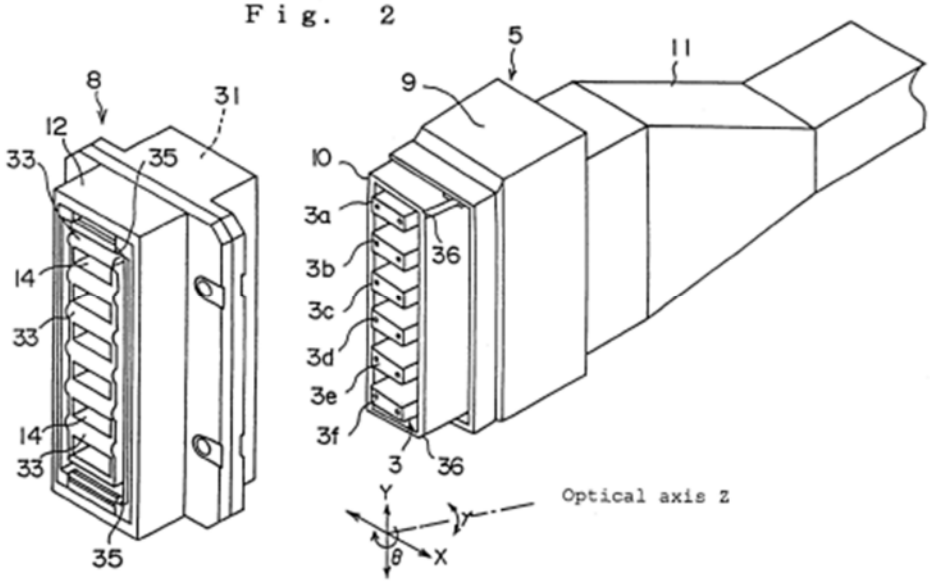
55. Referring to Figures 1 and 2, Kanai discloses first and second plugs (5, 6) with corresponding optical connectors (3a-3f, 4a-4f respectively). EX1003: 7:21-26 ("As shown in FIG. 1, a plurality of connector inserting holes 18 and 19, into which optical connectors (first and second optical connectors 3a through 3f, and 4a through 4f) corresponding to the first and second plugs 5 and 6 are inserted, are arrayed and formed in a stacked state in the first and second plugs 5 and 6.").

Fig. 1




EX1003: FIG. 1.

Fig. 2




EX1003: FIG. 2.



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56. Those of skill in the art would recognize that the ferrules depicted in Kanai are MT style ferrules, but that the concepts of Kanai could be implemented with other ferrule styles.

57. The optical connector plugs of Kanai are further designed to allow the individual optical connectors/ferrules to "float (in a free and idle state)" within the plugs. EX1003: 7:37-41.

58. One of ordinary skill in the art would recognize that the plugs (5,6) of Kanai correspond to the ganged fiber optic connectors of the '415 Patent.

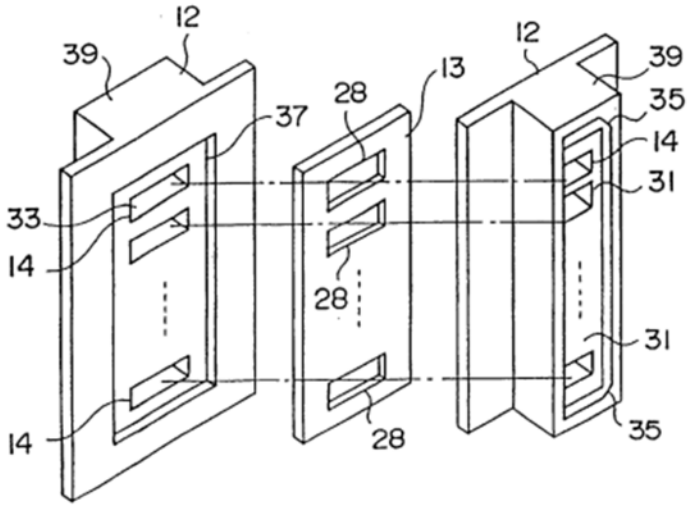
59. Kanai discloses an adapter (8) configured to receive the plugs (5,6) from opposing sides. EX1003: 7:8-11 ("The respective first and second optical connector groups 3 and 4 are collectively connected to each other by an adapter 8 with the connection end faces 45 thereof opposed to each other.").

60. As shown in Figure 4, the adapter is formed of two housing halves (12) and a metallic plate (13) between the two housing halves, with the two housing halves welded together by ultrasonic welding to form the frame portion (39) for accepting the plugs. EX1003: 8:22-26, Fig. 4.



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Fig. 4

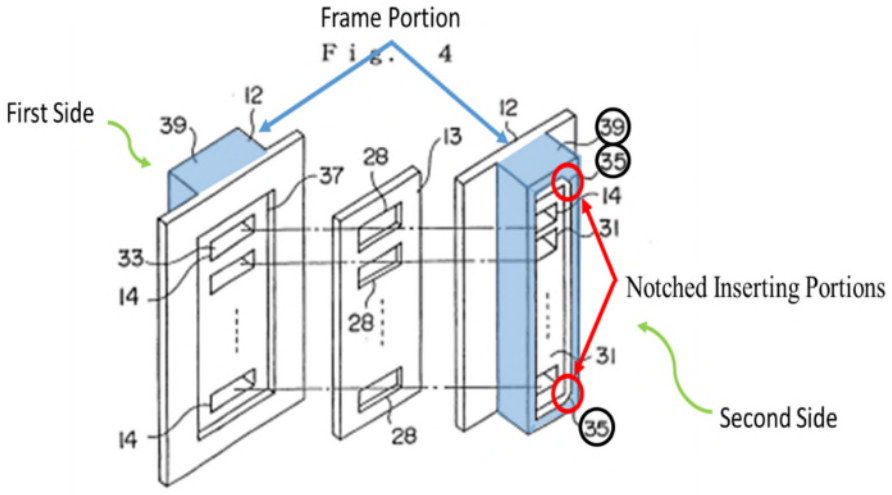



EX1003: Fig. 4.

61. The metallic plate is taught to provide shielding against electromagnetic interference. EX1003: 11:40-50 (". . . it is preferable that the adapter 8 is formed so as to include a conductive material or to have a metallic plate 13, in order to prevent any erroneous operation in the other measurement instruments, computer, etc., resulting from leakage of the abovementioned electromagnetic waves").

62. While acknowledging that other structures can be used, Kanai teaches that notched inserting portions (35) can be formed at the corners of the inner wall of the frame portion (39) for the purpose of providing the correct orientation or "polarity" of the plugs which would have a matching outer configuration. EX1003: 12:16-29 ("Further, in the abovementioned preferred embodiment, a notched inserting portion 35 is formed at two of the four corners of the frame

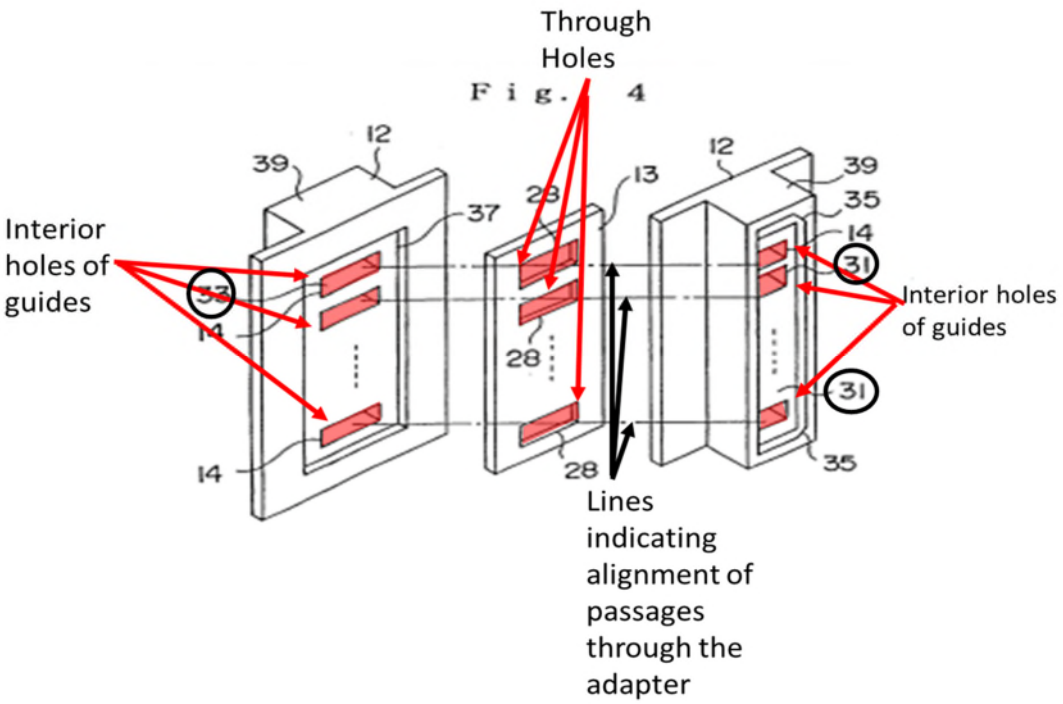
portion 39 of the adapter 8 and a notched part 36 is also formed at two of the respective four corners of the frame 10 of the first and second plugs 5 and 6. However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the second connector group 4 (so as not make any mistake in the mating of each connection pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6."); *see also* EX1003: Fig 4 (annotated below).




EX1003: Fig 4 (annotated).

63. One of skill in the art would recognize that the inner walls of the frame portion, including the notched inserting portions, inherently provide polarity keying and a course alignment of the plugs and ferrules—by virtue of being loosely carried by the plugs—within the adapter.

64. The adapter provides corresponding aligned guides (31) and (33) at both sides of the adapter (8) with corresponding interior openings and through holes to receive and provide positional regulation of the optical connectors (3a-3f and 4a-4f). EX1003: 8:26-36 ("At each of the housing halves 12, a plurality of the first and second guides 31 and 33 are formed to protrude in the direction (horizontal direction) along which the insertion of optical connectors is received, as a guide member which regulates the position of the first and second optical connector groups 3 and 4 inserted into the adapter 8 from both sides of the adapter 8 in the X direction and Y direction orthogonal to the optical axis of the optical connectors, the abovementioned 0 direction and Y direction with respect to the respective optical connectors 3a through 3f and 4a through 4f."); *see also* EX1003: Fig. 4 (annotated below).




EX1003: Fig. 4 (annotated).

65. The guides (31, 33) are shown above to be passageways of rectangular cross section that are sized close to the size of the exterior of the optical connectors (3a-3f, 4a-4f).

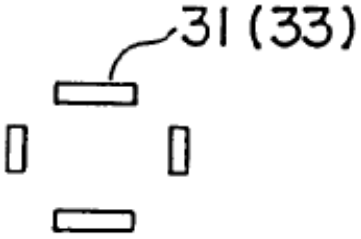
66. Those of skill in the art would recognize that the by sizing the guides (31, 33) to provide tight clearance for the optical connectors (3a-3f, 4a-4f), the guides are providing pre-alignment and positioning of the optical connectors each separately as they are inserted into the adapter so that the opposing optical ferrules will mate cleanly, allowing the guide pins in the ferrules to provide final submicron alignment. *See*, EX1003: 9:52-58 ("According to the preferred embodiment, as described above, by inserting the first and second plugs 5 and 6

from both sides of the adapter 8, the respective optical connectors 3 a to 3 f and 4 a to 4 f of the first and second optical connector groups 3 and 4 are position-regulated and aligned by the first and second guides 31 and 33 of the adapter 8 and connected to each other.").

67. The guides (31, 33) cause movement of the optical connectors (3a-3f, 4a-4f) with respect to each other and with respect to the plug. This is the same function performed by the grooves (140, 142) of the '415 Patent.

68. Notably, Kanai identifies a number of alternative designs for the guides (31, 33). EX1003: 11:59-12:3. For example, Kanai discloses another embodiment in which the guides are discontinuous, as shown in Fig. 9 (reproduced below), thus demonstrating that it is not necessary for all four sides of the guides to be continuous to accomplish their purpose. EX1003: Fig. 9 (depicting the guide as being comprised of four walls).

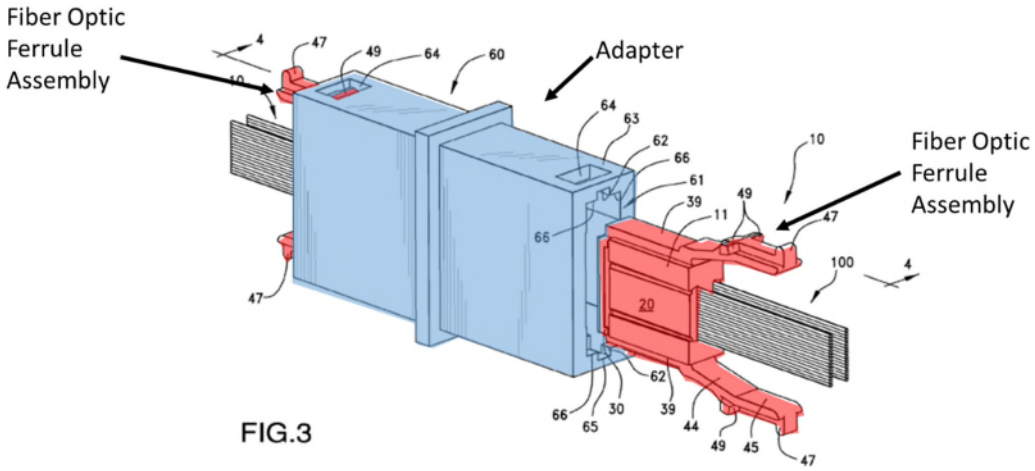
Fig. 9




EX1003: Fig. 9.

**B. WO 2012/174227 ("Hodge")**

69. Hodge—issued in 2012—teaches an optical connector system consisting of a pair of corresponding multi-fiber ferrule assemblies (10) and an adapter (60) for connecting them. EX1009: [0041] ("Referring to Figs. 3-4, an adapter 60 is depicted with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion."), Fig. 3 (annotated below).




EX1009: Fig. 3 (annotated).

70. The disclosed adapter has an opening (61) (green in the annotated figures below) from each side forming a passage for receiving the ferrule assemblies. See EX1009: [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."), Figs. 3 and 4 (annotated below).

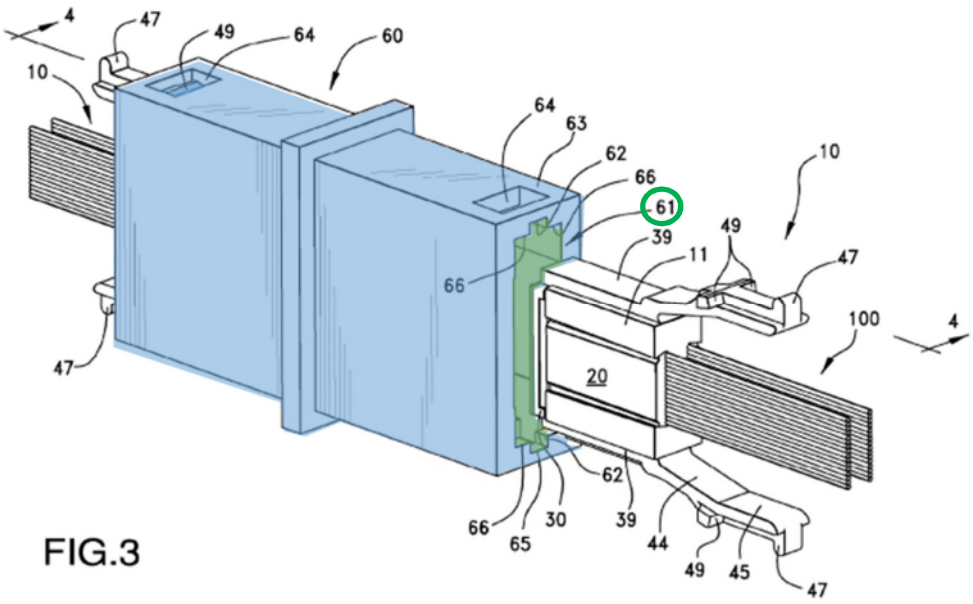



FIG.3

EX1009: Fig. 3 (annotated).

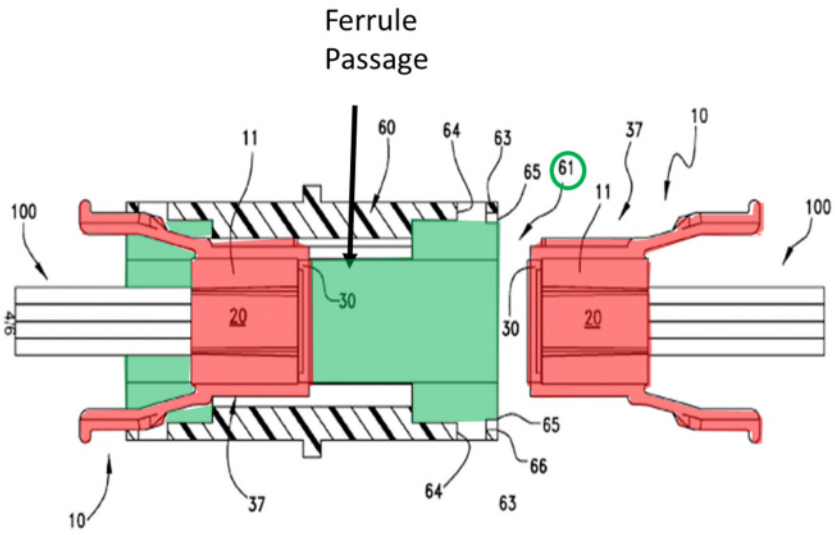
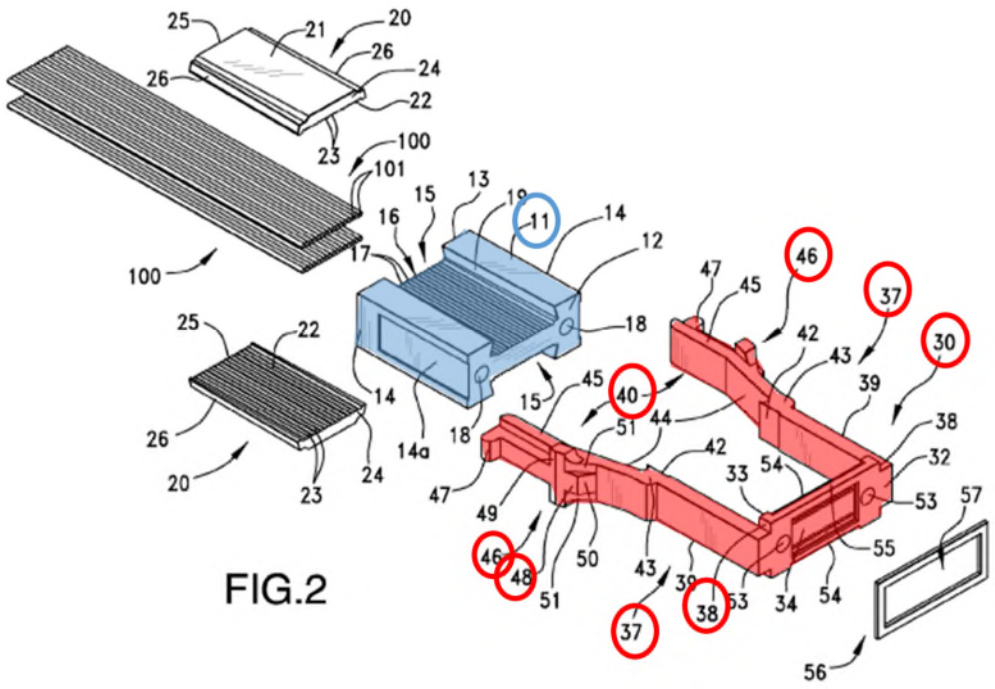



FIG.4

EX1009: Fig. 4 (annotated).

71. Those of skill in the art would recognize that the ferrules depicted in Hodge are multi-fiber ferrules, similar to MT type ferrules.

72. The disclosed ferrule assemblies (10) include a lens plate (30) and two cantilevered arm assemblies (37) which collectively hold the ferrule body (11). EX1009: [0028-0029], Fig. 2 (annotated below).




EX1009: Fig. 2 (annotated).

73. As shown in Figure 2 above, each cantilevered arm assembly further includes forward sections (39) and rearward latch arms (40). EX1009: [0029], Fig. 2. Each rearward latch arm (40) includes an alignment projection (48) for providing course alignment of the ferrule assembly within the adapter and a latch member (46) to lock the ferrule assembly to a mating component of the adapter. EX1009: [0029-0030], Fig. 2.

74. The adapter is internally configured to receive the features of the cantilevered arm assemblies (37) of the optical ferrule assembly. For example, the adapter is disclosed as having a "notch" or "recess" (62)—i.e. a groove to provide course alignment of the ferrule assembly by "receiv[ing] the alignment projections 48 … to align the ferrule assembly 10 with the adapter 60 during mating." EX1009: [0041], Figs. 3 & 4 (annotated below).

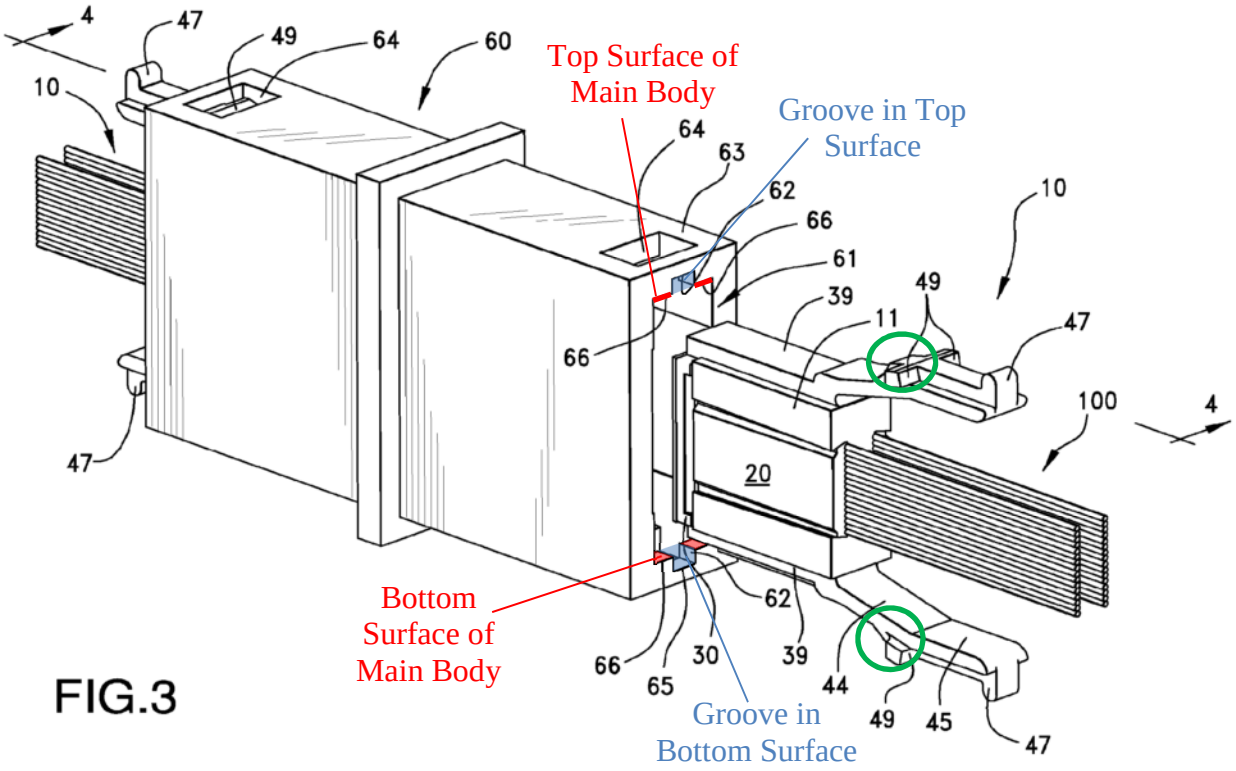
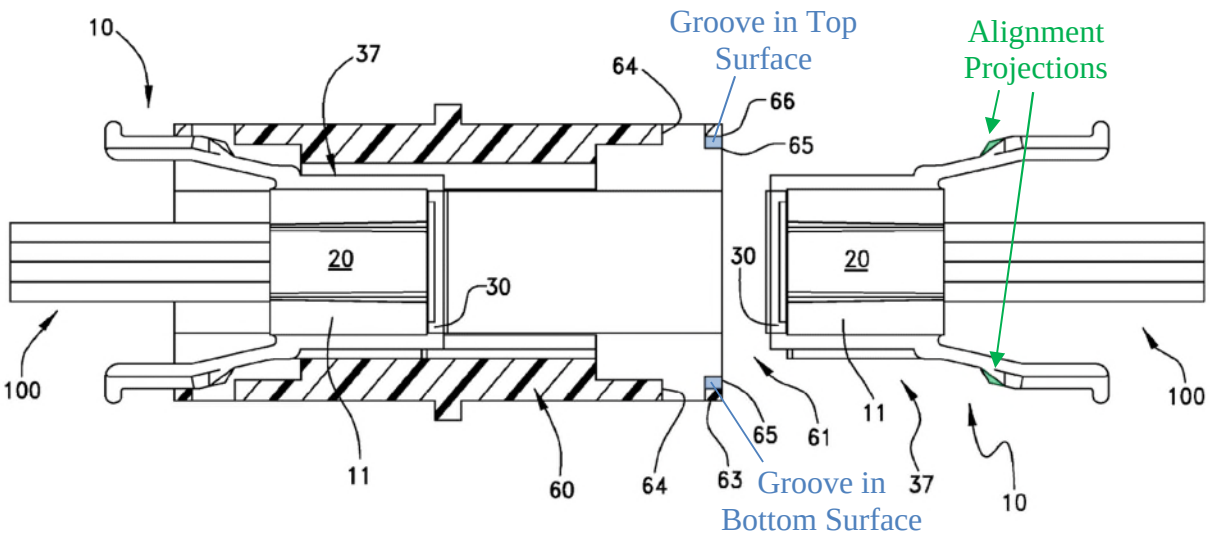



FIG.3

EX1009: Fig. 3 (annotated).




EX1009: Fig. 4 (annotated, flipped[1]).

[1] Based on the position of the key on the forward section of the ferrule assembly, the orientation of the connectors and adapter in Figure 4 of Hodge is upside down compared to Figure 3. Those of skill in the art would recognize that fiber optic connectors systems (i.e. the combination of fiber optic connectors and corresponding adapter) can be rotated to other orientations without departing from the teachings of the prior art. For the purpose of providing consistency in discussing certain aspects of the disclosures of Hodge, the reproductions of Figure 4 have been flipped with their numbering further edited (to maintain upright orientation) where noted throughout this declaration.

75. The adapter as depicted in Figure 4 (annotated below) has an internal step within the internal passage of the adapter to a shorter opening height at a distance interior to both the first side and the second side that would clear the rearward latch arms (40). EX1009: Fig. 4.

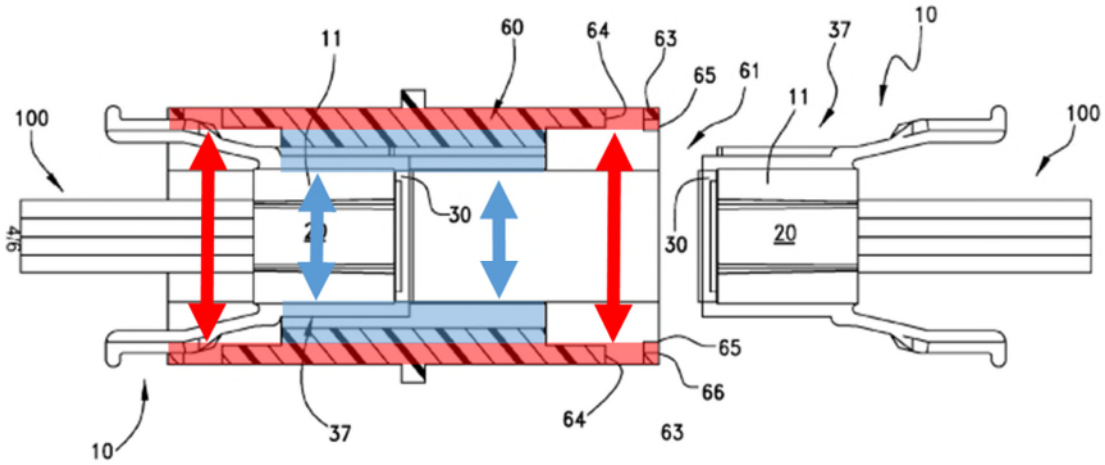
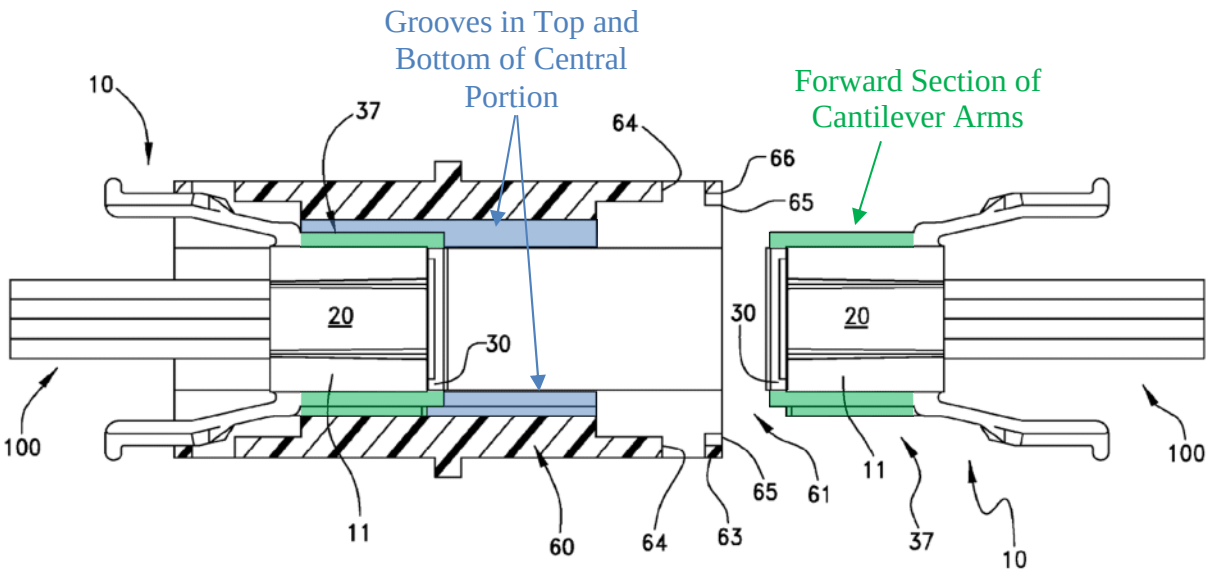



FIG.4

EX1009: Fig. 4 (annotated).

76. Although not described in detail, Figure 4 depicts that the stepped up bottom surface and stepped down top surface of the center portion provides ledges to engage the sidewalls (14) of the ferrule body and includes alignment slots (i.e., grooves) to receive the forward sections (39) of the cantilever arms (37). EX10




EX1009: Fig. 4 (annotated, flipped).

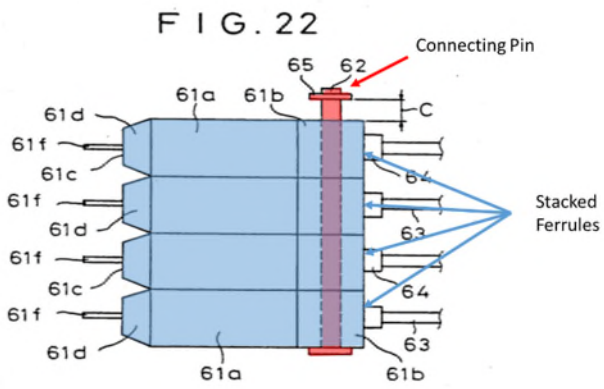
### C. U.S. Patent 5,222,168 ("Saito")

77. Saito—issued in 1993— teaches an optical connector system. EX1004: Abstract.

78. While an adapter is disclosed (see e.g., EX1004: 10:31-34, Fig. 23), Saito's teachings are largely directed to stacked-type multiple ferrule optical connector assemblies and their ferrules. EX1004: Abstract.

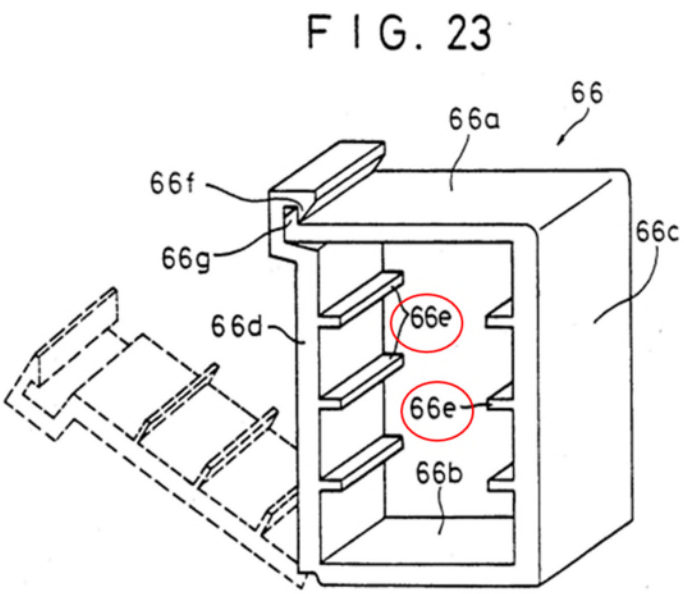
79. Saito teaches stacking a plurality of optical connector ferrules (61) together and connecting them with either stacking/connecting pins (shown in Fig. 22 below) or a coupling clip such that the plurality of ferrules are allowed to float within some degree of freedom when butt-connecting with a similarly stacked multiple ferrule connector. EX1004: 9:43-48 ("A stacked-type optical connector 60 consists of a plurality of optical connectors 61 shown in FIG. 20 which are

stacked with stacking pins 62 so that they can float in the axial direction of the pins with a specific degree of freedom to allow a gap between the individual ferrules as shown in FIG. 21 and FIG. 22."), 7:6-29 (describing the use of coupling clips to connect the stacked ferrules).




EX1004: Fig. 22 (annotated).

80. The corresponding adapter (66) disclosed by Saito includes a plurality of internal "partitioning pieces" (66e)—i.e. ribs—that divide the interior of the adapter into distinct grooves for receiving the optical connectors. EX1004: 10:31-34.




EX1004: Fig. 23 (annotated).

81. The ganged connectors are collectively inserted into one side of the adapter, with the grooves defined by the adjacent ribs (and between a rib and an adjacent side wall (66a)) receiving the ferrules. EX1004:10:41-45 ("When the stacked-type optical connector 60 is attached to the adapter, the individual optical connectors 61 vertically move with its tapered surfaces 61d being guided by the partitioning pieces 66e, and they are separately housed in the respective spaces formed by the side piece 66c, the flap 66d, and the individual partitioning pieces 66e.").

82. As the connectors (61) have the ability to float, the complementary shapes of the leading ends of the ferrule and the ribs (66e) guide each connector into pre-alignment for mating engagement with a corresponding connector inserted



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from the other side as shown in Figs. 24-26. The individual connecting pins (61f) of one optical connector (61) are thus pre-aligned for insertion into the individual guide-pin holes (61e) of the corresponding optical ferrule. EX1004:10:41-45 ("When the stacked-type optical connector 60 is attached to the adapter, the individual optical connectors 61 vertically move with its tapered surfaces 61d being guided by the partitioning pieces 66e, and they are separately housed in the respective spaces formed by the side piece 66c, the flap 66d, and the individual partitioning pieces 66e."), 10:58 – 11:35 (". . . [W]hen the individual stacked-type optical connectors 60 are pushed into the adapter 66, the tapered surfaces 61d are guided by the individual partitioning pieces 66e of the adapter 66, the individual optical connectors 61 vertically float. . . . When both stacked-type optical connectors 60 are further pushed into the adapter 66, the individual connecting pins 61f of one optical connector 61 are inserted in the individual pin holes 61e of the other optical connector 61 while they are guided by the tapered ends, thereby butting the butting end surfaces 61c and 61c of the two optical connectors 61 and 61 as shown in FIG. 26. . . ."), Figs. 24-26 (showing optical connectors (61) at separate stages of being pushed into the adapter (66) and mating).

FIG. 24

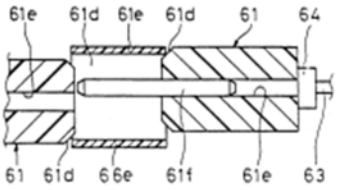



FIG. 25

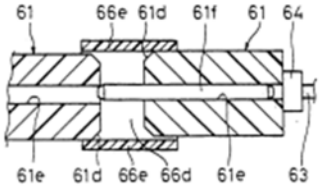
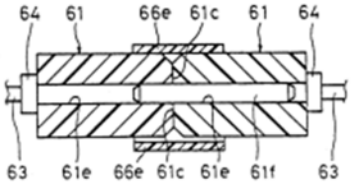



FIG. 26



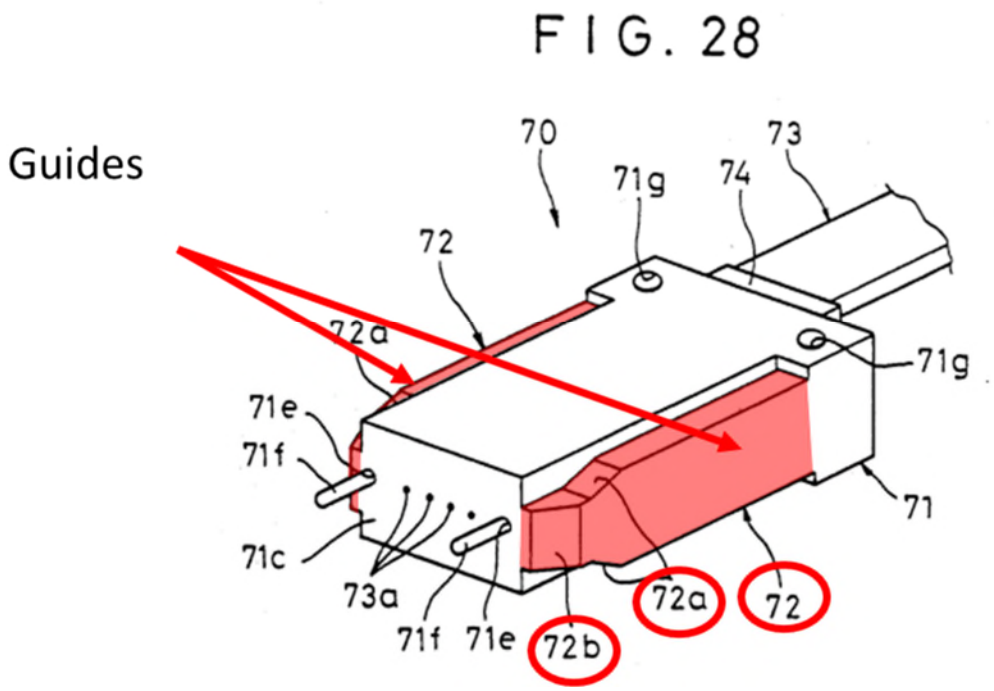

EX1004: Figs. 24-26.

83. Saito discloses a number of MT style ferrule embodiments for use in the multiple ferrule optical connector assemblies. EX1004: Figs. 2, 7, 12, 20, 28.

84. The ferrule embodiment depicted in Figure 28 includes guides (72) extending lengthwise along either side of the ferrules. EX1004: 11:56-60.



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EX1004: Fig. 28 (annotated).

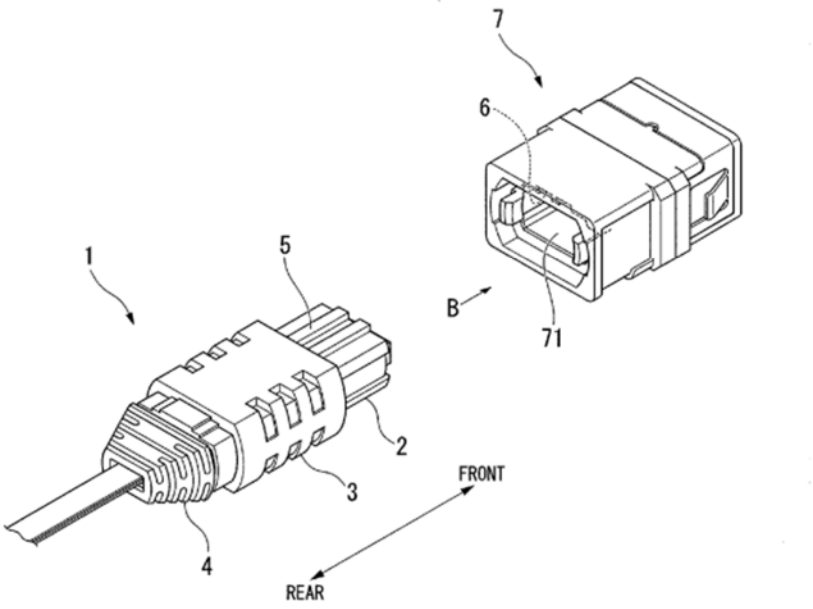
85. The guides use two sets of tapered surfaces (72a and 72b) which serve the purpose of positioning the ferrule in both the vertical and horizontal axes when first inserting the ferrule into an adapter. EX1004: 11:60-64 ("the guide 72 being provided, as shown in the drawing, with tapered surfaces 72a and 72a which serve as vertical guides and a tapered surface 72b which serves as a widthwise guide for butt-connecting the connectors via the adapter 66").

**D. Published Patent Application US2012/0057824A1 ("Katoh")**

86. Katoh—published in 2012—teaches an optical connector system consisting of a pair of optical connectors (1) and a corresponding connector

adapter (7). *See* EX1005: Abstract ("An optical connector that is optically connected to another optical connector inside a connector adapter . . . ."), Fig. 2.

FIG. 2



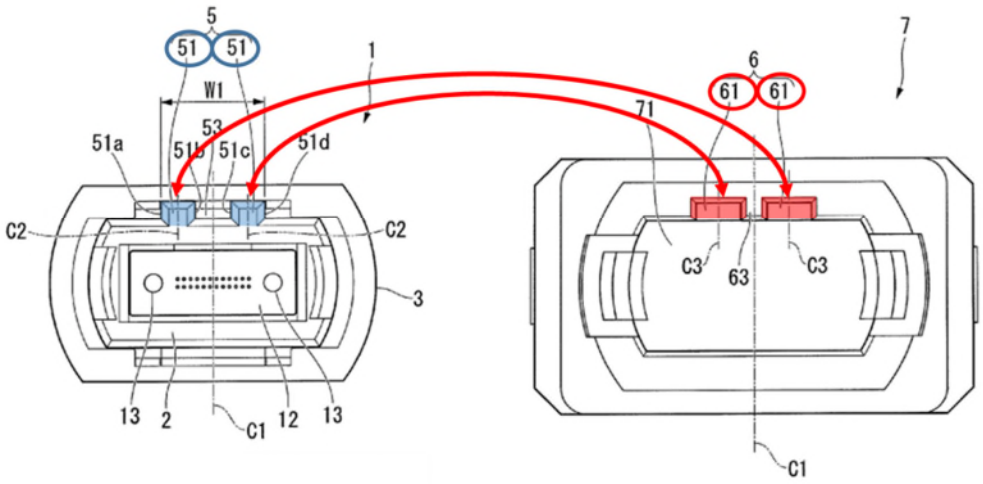

EX1005: Fig. 2.

87. One of skill in the art would recognize that the optical connectors disclosed by Katoh are of the MPO type with a housing that acts as a plug.

88. Referring to Figures 1 through 6, Katoh teaches the inclusion of two keys (55) formed on the upper outer surface of the connector housing and corresponding keyway grooves (61) formed on the top surface of the insertion hole of the adapter. EX1005: [45]-[46], Figs. 1-6.

FIG. 3

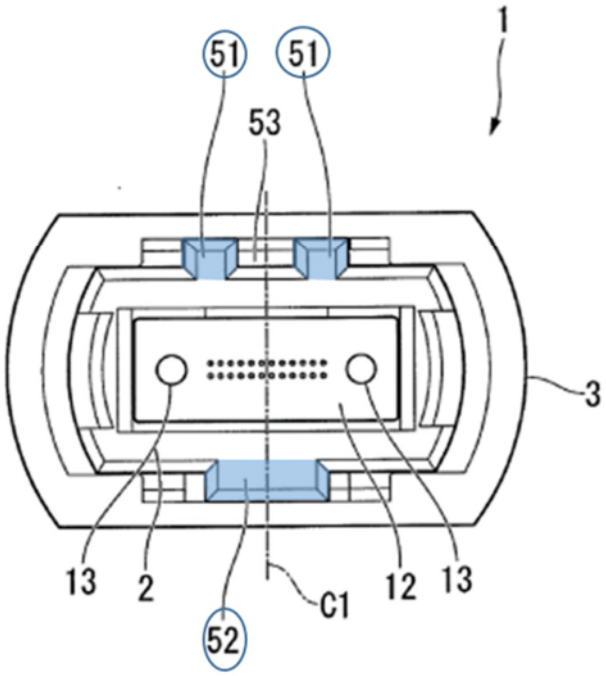
FIG. 5




EX1005: Figs 3 & 5 (annotated).

89. Referring to Figure 9, Katoh further teaches that an additional key may be added "on the outer surface opposite to the outer surface on which the first keys 51 are formed." EX1005: [0077] ("Plural first keys 51 may be formed on an outer surface of the housing and a second key 52 may be formed on the outer surface opposite to the outer surface on which the first keys 51 are formed. FIG. 9 shows a housing 2F having the second key 52 formed therein."), Fig. 9 (reproduced and annotated below).

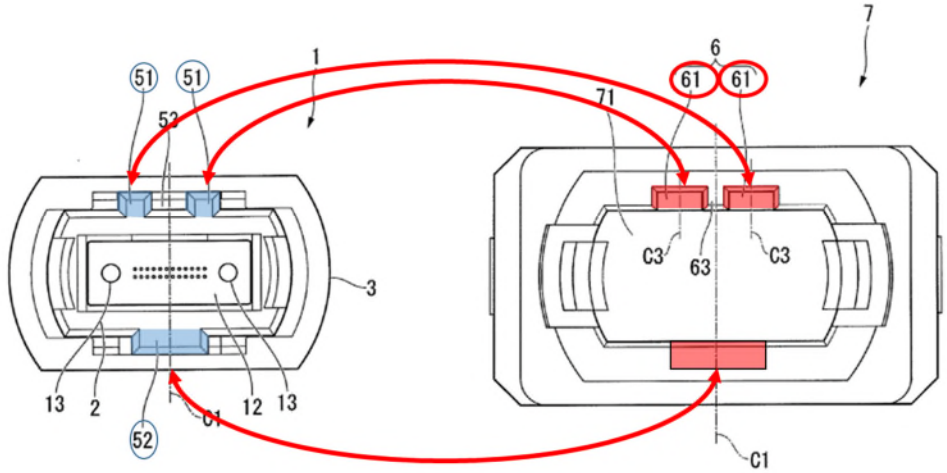
FIG. 9




EX1005: Fig. 9 (annotated).

90. While Katoh does not provide a detailed description of the adapter that would receive the Figure 9 embodiment of the optical connector, one of skill in the art would recognize that a keyway groove (added in the figure below) in the inner bottom surface of the adapter would be necessary for receiving the additional key (52) as demonstrated in the annotated and modified figures below. EX1005: Figs. 5 & 9 (annotated and modified below).

FIG. 9



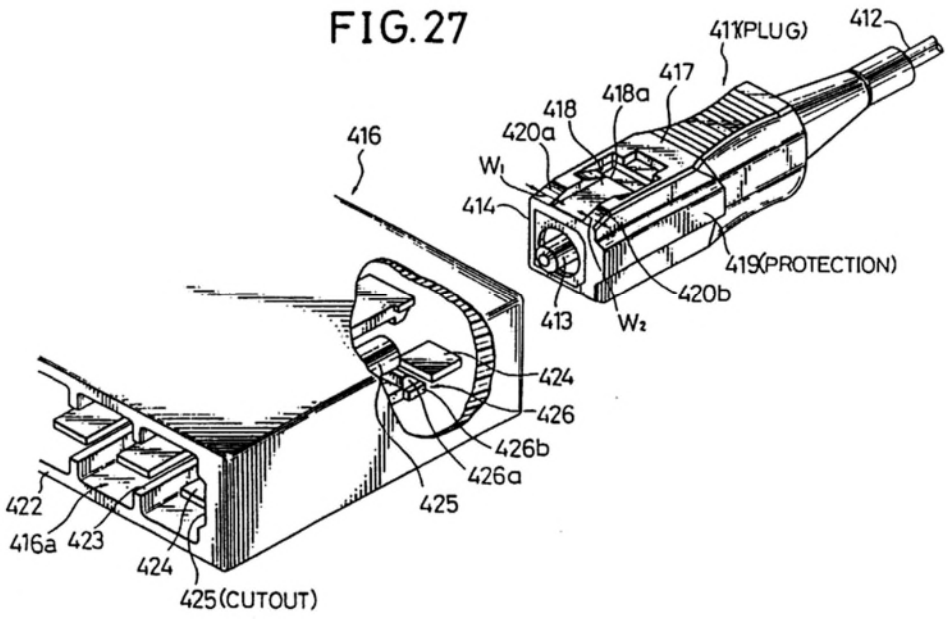

EX1005: Figs. 9 (annotated) and 5 (annotated and modified to demonstrate a keyway groove to receive key (52)).

91. By differing the sizes of the keys (51, 52) on the optical connector and the corresponding keyway grooves on the receiving adapter (61, 62 as added in the modified figure above) the optical connector can only be inserted into the adapter in one orientation. EX1005: [0077] ("By forming the second key 52, it is possible to lower the possibility of erroneous insertion.").

**E. U.S. Patent 5,673,346 ("Iwano")**

92. Iwano—issued in 1997— teaches an optical connector system including a "connector housing" (416)—i.e. an adapter–having opposing openings that connect to each other through the adapter for receiving and mating opposing ferrules. EX1006: 30:12-15 ("On the other hand, in the connector housing 416, the

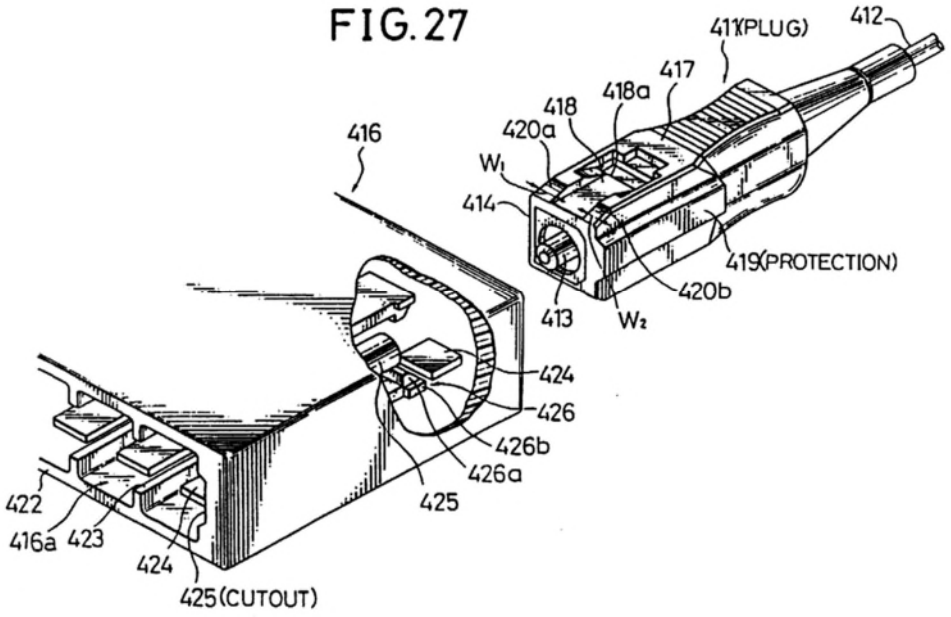
housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted. . .”), Fig. 27.




EX1006: Fig. 27.

93. Each of the opposing openings is configured to receive a plurality of optical connectors (411) side-by-side, such that a plurality of optical connectors inserted on one side of the adapter are mated with a corresponding plurality of optical connectors inserted on the other side of the adapter. EX1006: 30:12-15 (“On the other hand, in the connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted. . .”), Figs. 26(a) and 26(b) (identified as prior art), 27, 30 and 31(a).

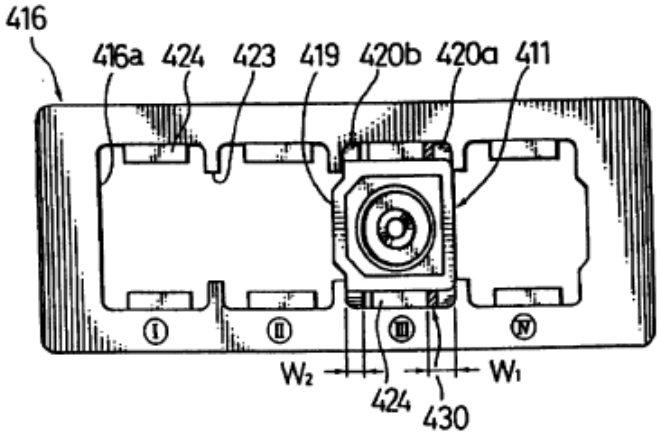
FIG. 27




EX1006: Fig. 27.

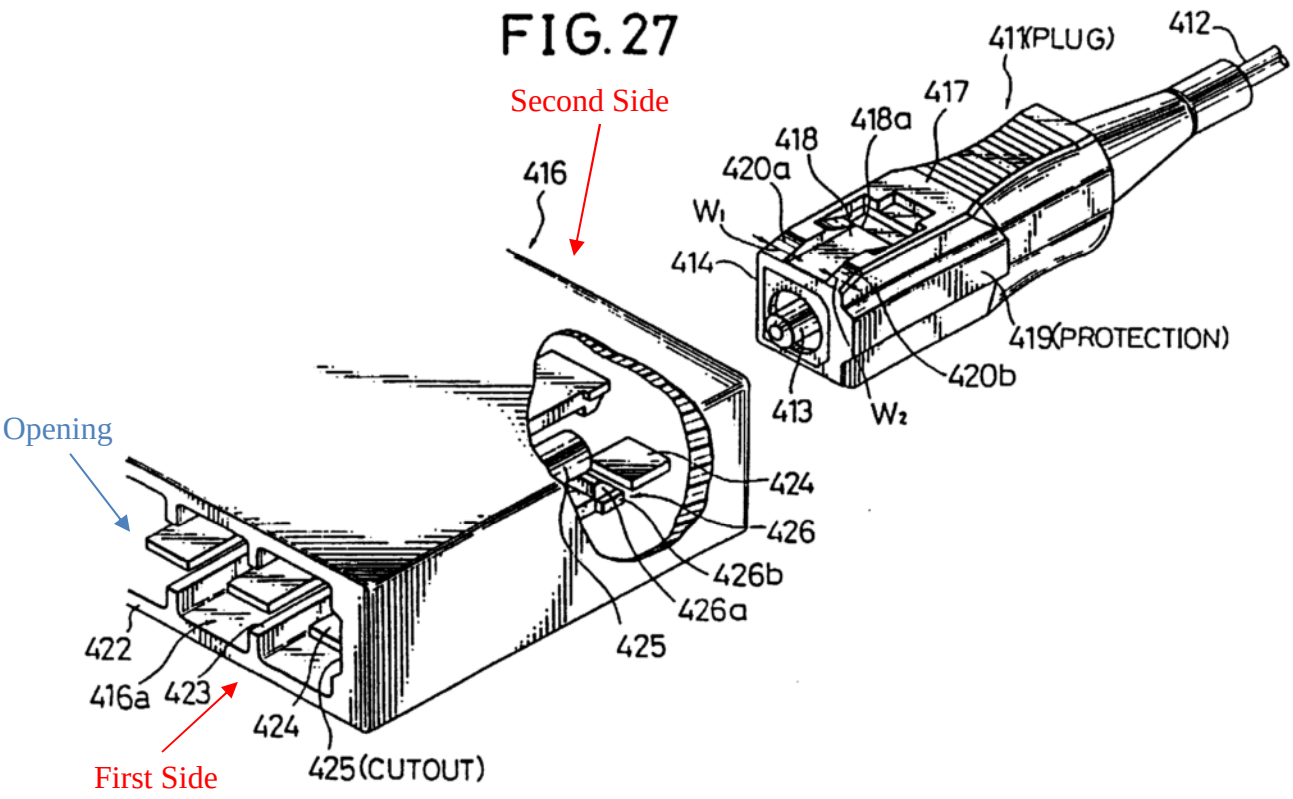
94. Fig. 31(b) is included in the drawings to demonstrate interference preventing the optical connectors from being inserted in the reverse direction. EX1006: 30:45-54.

FIG. 31(b)



EX1006: Fig. 31(b).

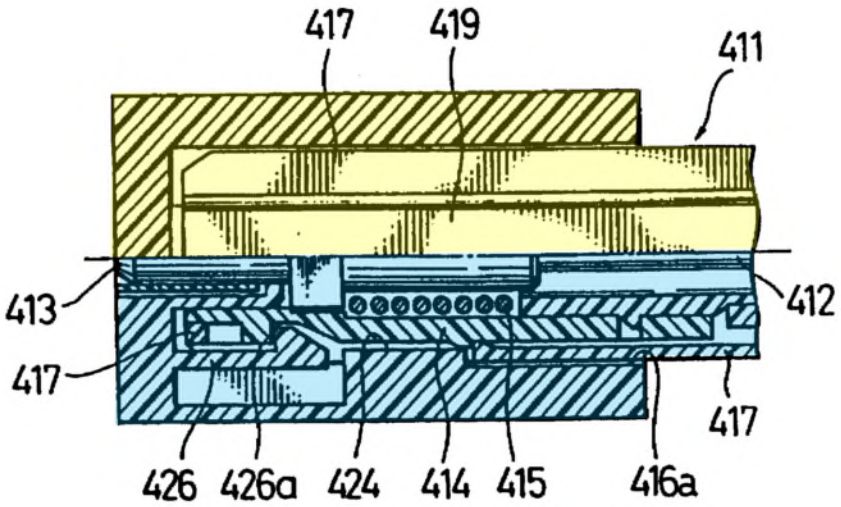
95. As shown in Figure 27 reproduced above, the adapter of Iwano recieves optical connector plugs (411) from two oposing sides.




EX1006: Fig. 27 (annotated).

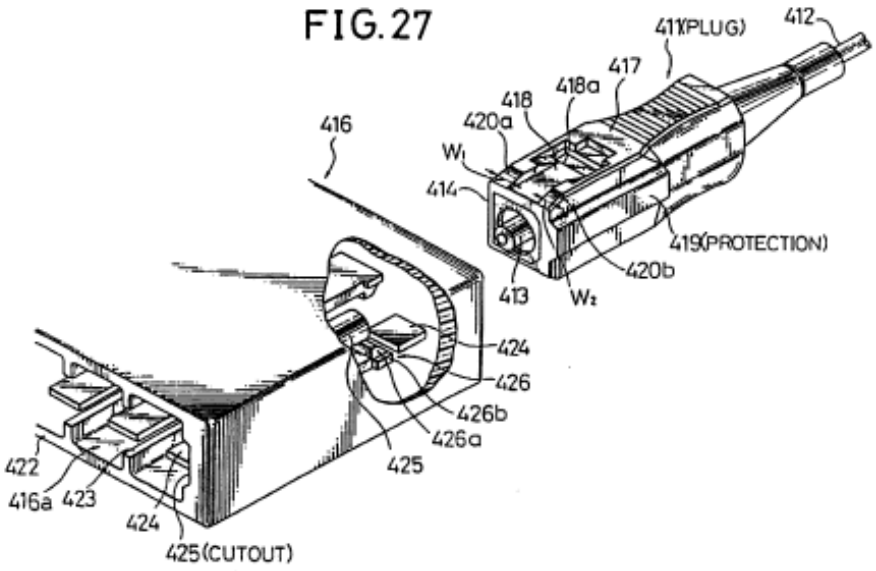
96. Other figures, such as Figure 29, depict cut away veiws of the adapter (the lower half (shaded blue below) cut away at the centerline of an inserted optical plug and the top half (shaded yellow) cutaway at the outer surface of the optical plug) to demonstrate the internal components and their configuration. Notably, Figure 29, only depicts one half of the housing (416) receiving one of the optical connector plugs (411). EX1006: Fig. 29, 8:34-35.

FIG. 29

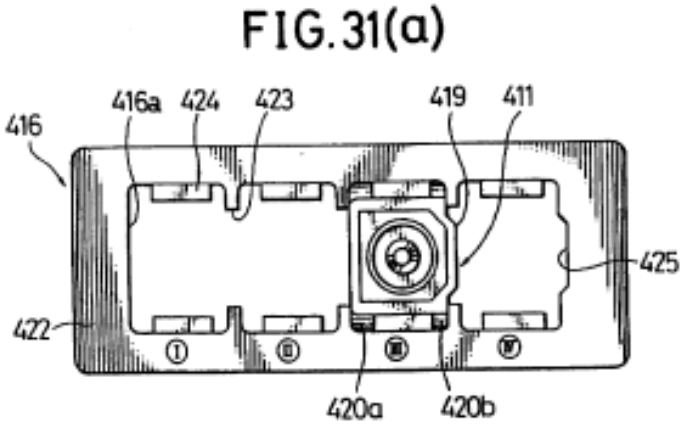



EX1006: FIG. 29.

97. Because Iwano's connector housing (416) connects optical connector plugs (411) inserted from opposing sides of the connector housing, one skilled in the art would understand that the structure (e.g., projections (424), partition walls (423), etc.) shown on one half of Iwano's connector housing (*see* Figs. 27 and 30) is also present on the other half of Iwano's connector housing. EX1006: Figs. 27 and 31(a), 29:40-44 ("The fifth feature of the optical connector according to the present invention is to provide an optical connector locating structure in which the optical connector plugs can be inserted only in a predetermined direction or orientation . . ."), 30:12-15 ("On the other hand, in the connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted. . .").



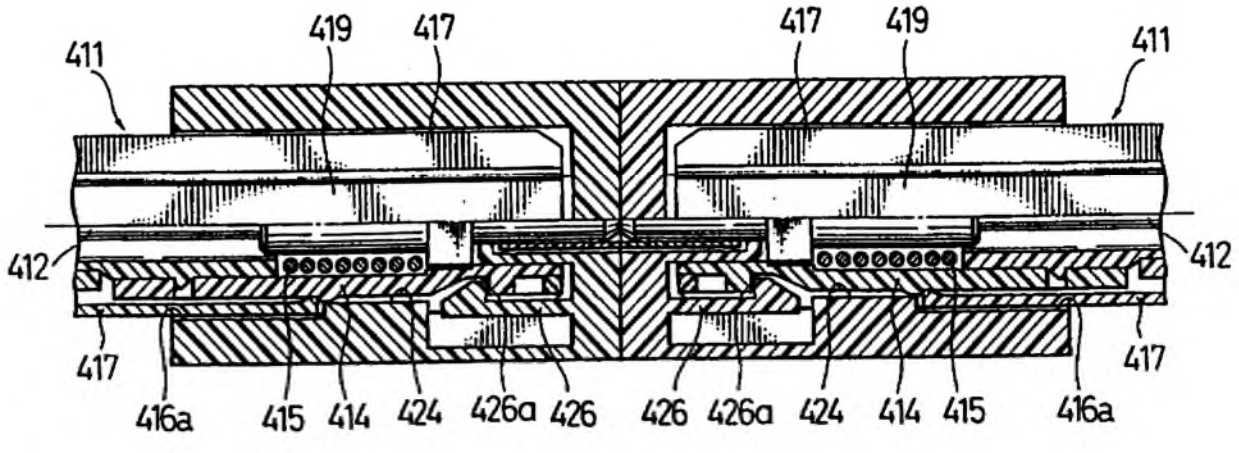

EX1006: FIG. 27.




EX1006: Fig. 31(a).

98. In other words, the missing half of Iwano's connector housing (416) in Figure 29 would be a mirror image of what is shown in Fig. 29. Therefore, by mirroring Figure 29 of Iwano a cross-section through Iwano's full connector housing (416) is demonstrated as follows:

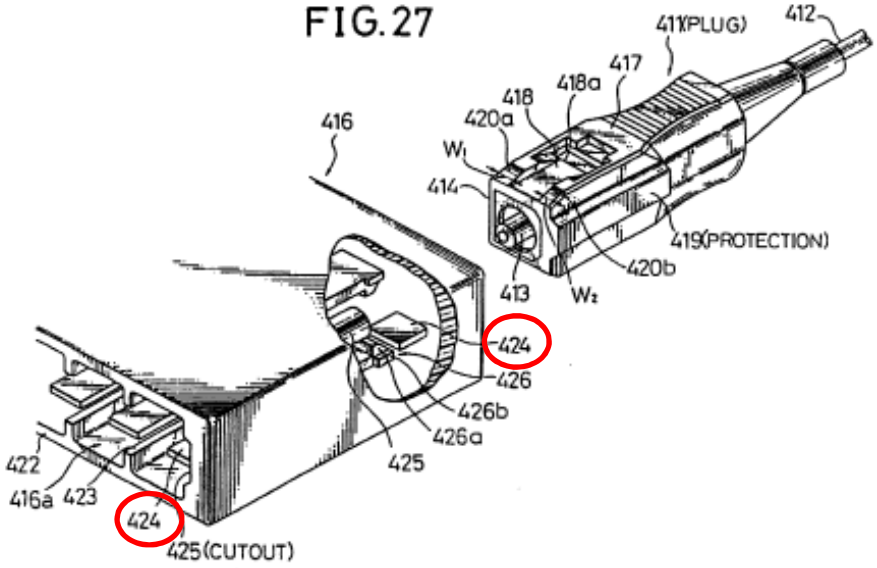
FIG. 29




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing).

99. Iwano's Figure 27 indicates as much as it shows projections (424) on both halves of Iwano's connector housing (416). EX1006: Fig. 27.

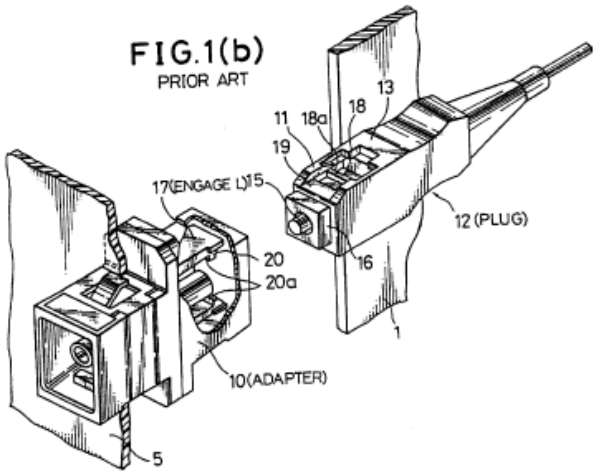
FIG. 27




EX1006: Fig. 27 (annotated).

100. Mirroring the half connector housing depicted in Figure 29 is consistent with the prior art described within Iwano. For example, Figure 1(b)

provides an example of prior art that shows adapters being mirrored across a central plane: "FIG. 1(b) shows a plug-in optical connector to which the above-mentioned optical connector structure is applied. In the drawing, an adaptor 10 is mounted on a back panel 5 and a knob 13 of a plug 12 is fixed to the package board 1. Further, although not shown, another plug for terminating a cable from another package board or a device is mounted on the side (the left side) opposite to the package side of the adaptor 10." EX1006: 28:10-14, Fig. 1(b); *see also* Fig. 25.




EX1006: Fig. 1(b).

101. Another example of prior art that shows adapters being mirrored across a central plane is Hodge as set forth in Figure 3.

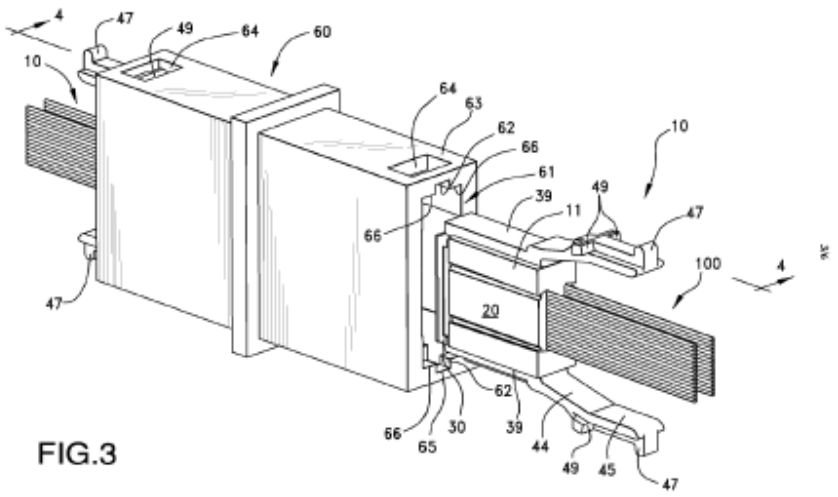


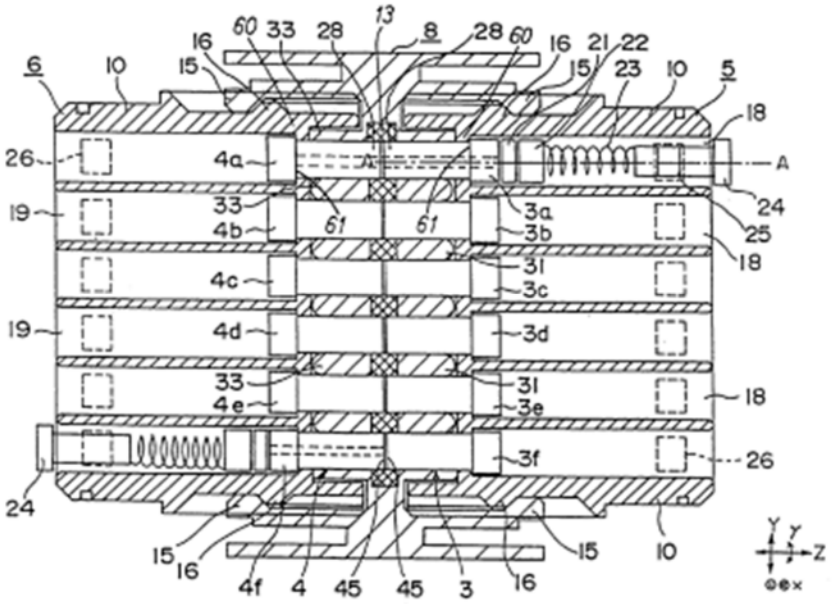
FIG.3

EX1009: Fig. 3.

102. Hodge explains that one ferrule assembly is inserted on one side of the adapter and another ferrule assembly is inserted on the other side of the adapter as follows: "Referring to Figs. 3-4, an adapter 60 is depicted with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion. Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10. A notch or recess 62 extends outwardly from the opening 61 towards each end wall 63. The notches 62 are configured to receive the alignment projections 48 of the latch member 46 to align the ferrule assembly 10 with the adapter 60 during mating. A window or opening 64 is provided in the end walls 63 to lockingly receive the engagement section 49 of the latch member 46 to secure the ferrule assembly 10 within the adapter 60." EX1009: [0041].

103. Another example of prior art that shows adapters being mirrored across a central plane is Kanai. EX1003: 7:21-26 ("As shown in FIG. 1, a plurality of connector inserting holes 18 and 19, into which optical connectors (first and second optical connectors 3 a through 3 f, and 4 a through 4 f) corresponding to the first and second plugs 5 and 6 are inserted, are arrayed and formed in a stacked state in the first and second plugs 5 and 6."), Fig. 1.

Fig. 1

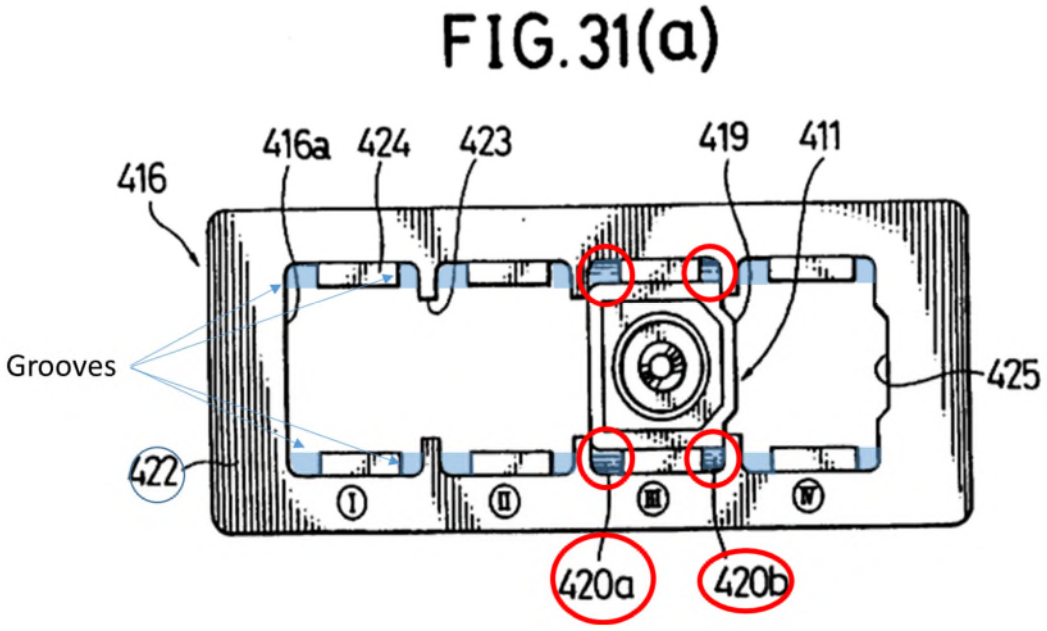



EX1003: Fig. 1.

104. Iwano teaches that in order to achieve the highest density, the partitions in the outer-face of the adapter would be limited to partial walls or ribs (423) such that the insertion slots for the individual optical connectors would be connected. EX1006: 28:65-29:5 ("In this case, since each groove 421 for receiving a projection 412 formed on the side surface of the optical connector plug 401 is

formed at each insertion hole 422 of the connector housing 420, each partition wall 423 for partitioning two adjacent insertion holes 422 is cut away to minimize the mounting pitch, so that two adjacent insertion holes 422 are connected to each other as shown.").

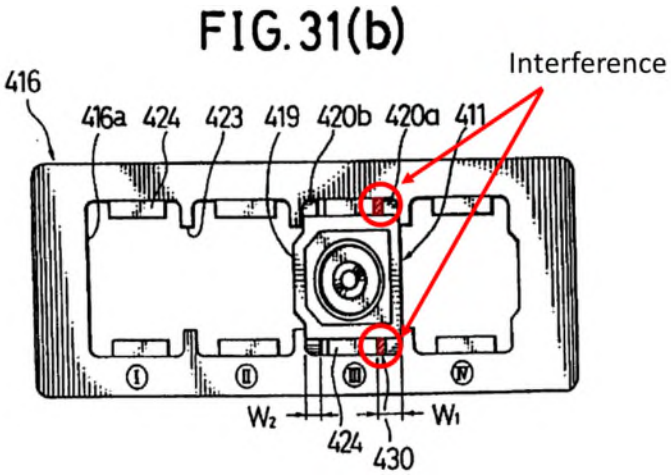
105. The adapter of Iwano includes grooves on the top and bottom surfaces of the adapter for receiving angled projections (420a, 420b) of the optical connectors (411). EX1006: Figs 26(a), 31(a).




EX1006: Fig. 31(a) (annotated).

106. Iwano teaches that the optical connectors can be prevented from being inserted in an incorrect direction or orientation by sizing the widths of some of the grooves differently from the widths of other grooves such that only particular projections (420a or 420b) can be received in the grooves. EX1006: 30:48-54

("for instance as shown in FIG. 31(a), it is impossible to insert the optical connector plug 411 in the reverse direction, because the groove 418 between the projections 420a and 420b having two different widths W1 and W2 of the optical connector plug 411 will not be engaged with the projections 424 of the connector housing 416 with an interference 430 (W1 -W2) between the two"). Fig. 31(b) is included in the drawings to demonstrate this interference. EX1006: Fig. 31(b) (annotated below to identify interference).




EX1006: Fig. 31(b) (annotated).

**F. U.S. Patent 6,929,406 ("Amorim")**

107. Amorim—issued in 2005— teaches an optical device module for housing optical transmitters and receivers. EX1007: Abstract ("An optical device module for housing optical transmitters and receivers.").

108. Amorim pertains to providing electromagnetic interference (EMI) shielding through the use of an EMI gasket that may be manufactured from a

conductive elastomer. EX1007: 3:25-32 ("Referring still to FIG. 3, there is shown an EMI gasket 9. When devices operate at high frequency (i.e. the wavelength is small) then any slots or gaps in the module will cause the EMI shielding to be reduced. The EMI gasket 7 helps to alleviate this problem by providing a conductive medium to provide a continuous low impedance joint between the flange 5 and the casing 7. The EMI gasket may be manufactured from a conductive elastomer.")

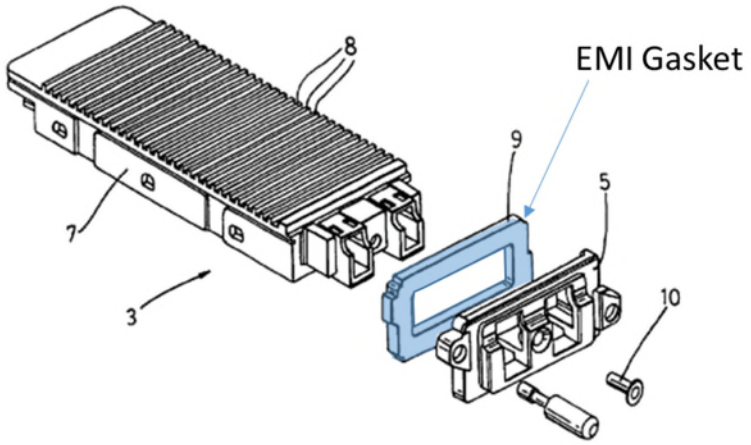



*Fig. 3*

EX1007: Fig. 3 (annotated).

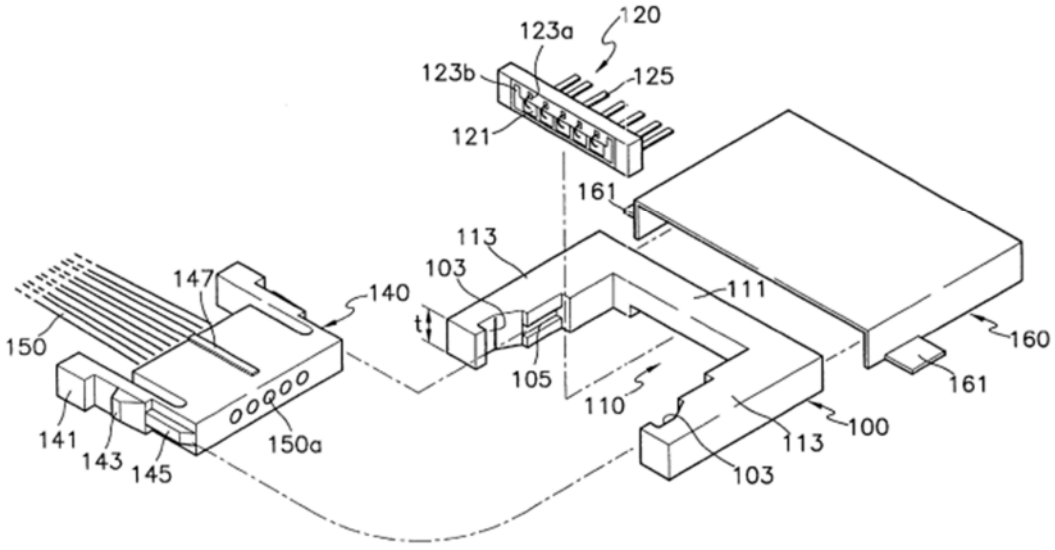
### G. U.S. Patent 6,386,768 ("Yoon")

109. Yoon—issued in 2002— teaches an optical connector module for coupling optical devices—e.g. light sources for producing optical signals and/or photodetectors for receiving optical signals—and an optical fiber. EX1008: 1:14-25 ("The present invention relates to an optical connector module for coupling

optical devices and optical fibers, and more particularly, to an optical connector module having a slim design.").

110. Referring to Figure 2, Yoon teaches mating the fiber optic connector (140)—i.e. a ferrule—to an optical device holder (120) within a body and cover (100 and 160) which collectively correspond to the receiving portion of the adapter of the '415 Patent. EX1008: 3:56-4:02 ("Referring to FIG. 2, an embodiment of an optical connector module in accordance with the present invention includes a holder 120 for receiving at least one optical device 121 and leads 125, a connector 140 for receiving at least one optical fiber for light transmission, and a body 100 for accommodating the holder 120 and the connector 140 such that the optical devices 121 mate with the input/output ends of optical fibers 150. It is preferable that the optical connector module according to the present invention further includes a cover member 160 for holding the combination of the holder 120 and the connector 140 in the binding space 110 of body 100 and attaching the optical connector module. . . ."), Fig. 2.

FIG. 2

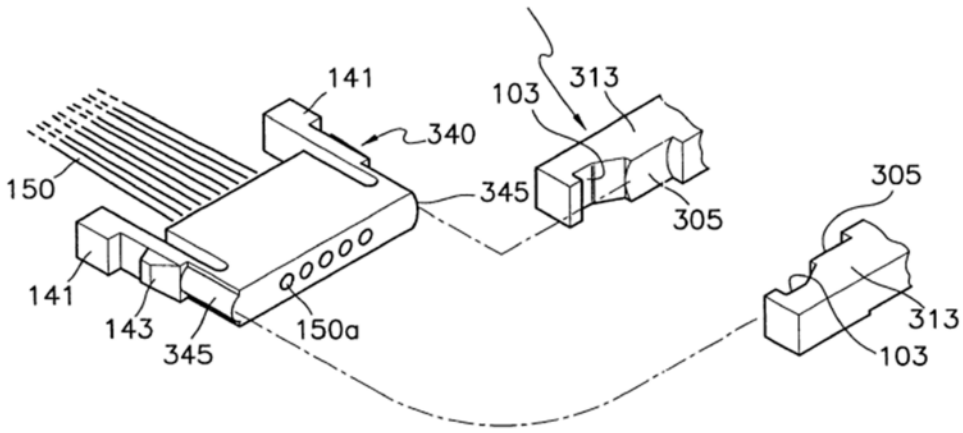



EX1008: Fig. 2.

111. Included within Yoon are different embodiments of ferrules and holders, including the embodiment shown in Figure 6 in which the body/adapter (300) includes guide grooves (305) to receive corresponding guide portions (345) at the leading ends of the connector/ferrule (340). EX1008: 7:34-41 ("FIG. 6 shows another embodiment of means for guiding the connector into the body, which allows for alignment between the optical fibers and the optical device. The connector 340 shown in FIG. 6 has a pair of round guide portions 345 at the leading ends of the flexible portions 141, and the body 300 has a pair of round guide grooves 305, corresponding to the round guide portions 345, at the inner sides of the sidewall portions 313 of the body 300."), 7:49-55 ("As the round guide

portions 345 of the connector 340 are slidably inserted into the body 300 along the corresponding round guide grooves 305, the connector 340 is engaged with the body 300 and in turn the optical fibers 150 are accurately aligned with the optical device. Such a guiding means is applicable to the optical connector modules shown in FIGS. 2, 4 and 5."), Fig. 6.

FIG. 6




EX1008: Fig. 6.

112. Yoon teaches that in this embodiment, the guide grooves (305) and guide portions (345) on opposite facing sides have "different curvatures" so as to ensure proper polarity. EX1008: 7:41-49 ("It is preferable that the curvature of one of the round guide grooves 305 is not identical to the curvature of the other round guide groove, and each of the round guide portions 345 is formed to have a

curvature corresponding to the round guide grooves 305. To shape the round guide portions 345 and the round guide grooves 305 to have different curvatures at facing Sides indicates the appropriate insertion direction of the connector 340 into the body 300.").

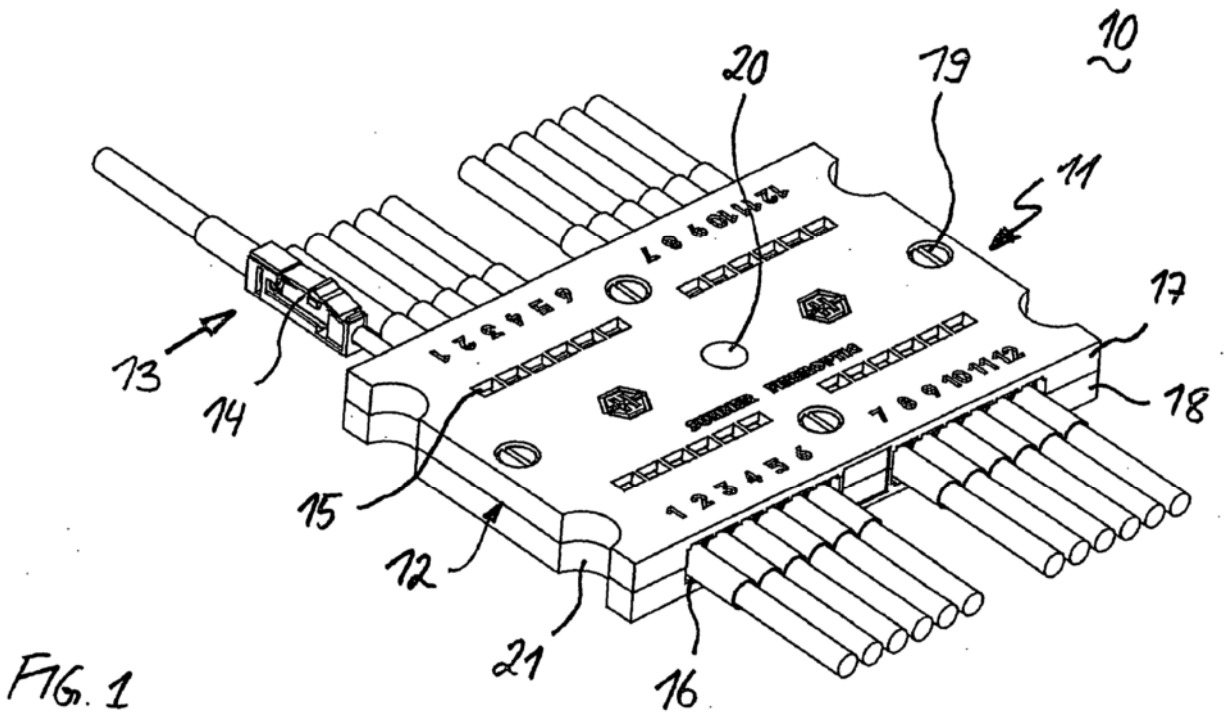
### H. U.S. Publication No. 2005/0135753 ("Eigenmann")

113. Eigenmann – published in 2005 – teaches an adapter (11) and optical plug-in connectors (13) which are inserted into the adapter from opposite sides. EX1010: Abstract.

114. The fiber-optic plug-in connector system (10) comprises an adapter (11), which has a rectangular, flat adapter housing (12) comprising an upper part (17) and a lower part (18). EX1010: ¶ [0027]

115. Respectively arranged on the opposite longitudinal sides of the adapter (11) are two rows of insertion openings (16) lying directly next to one another. EX1010: ¶ [0027]

116. Each of the insertion openings (16) is assigned an insertion channel (47 in FIG. 2), running inside the adapter housing (12). EX1010: ¶ [0027]. Every two insertion openings (16) and insertion channels (47) lying directly opposite one another respectively form a pair, which can be used for connecting two optical fibers. EX1010: ¶ [0027].




EX1010: Fig. 1.[2]

[2] Eigenmann's publication includes duplicate versions of Figs. 1-5. Unless stated otherwise, the figures of Eigenmann referred to in this Petition all reference the first set of Figs. 1-5. Further, it appears the two sets of Figs. 1-5 are identical.

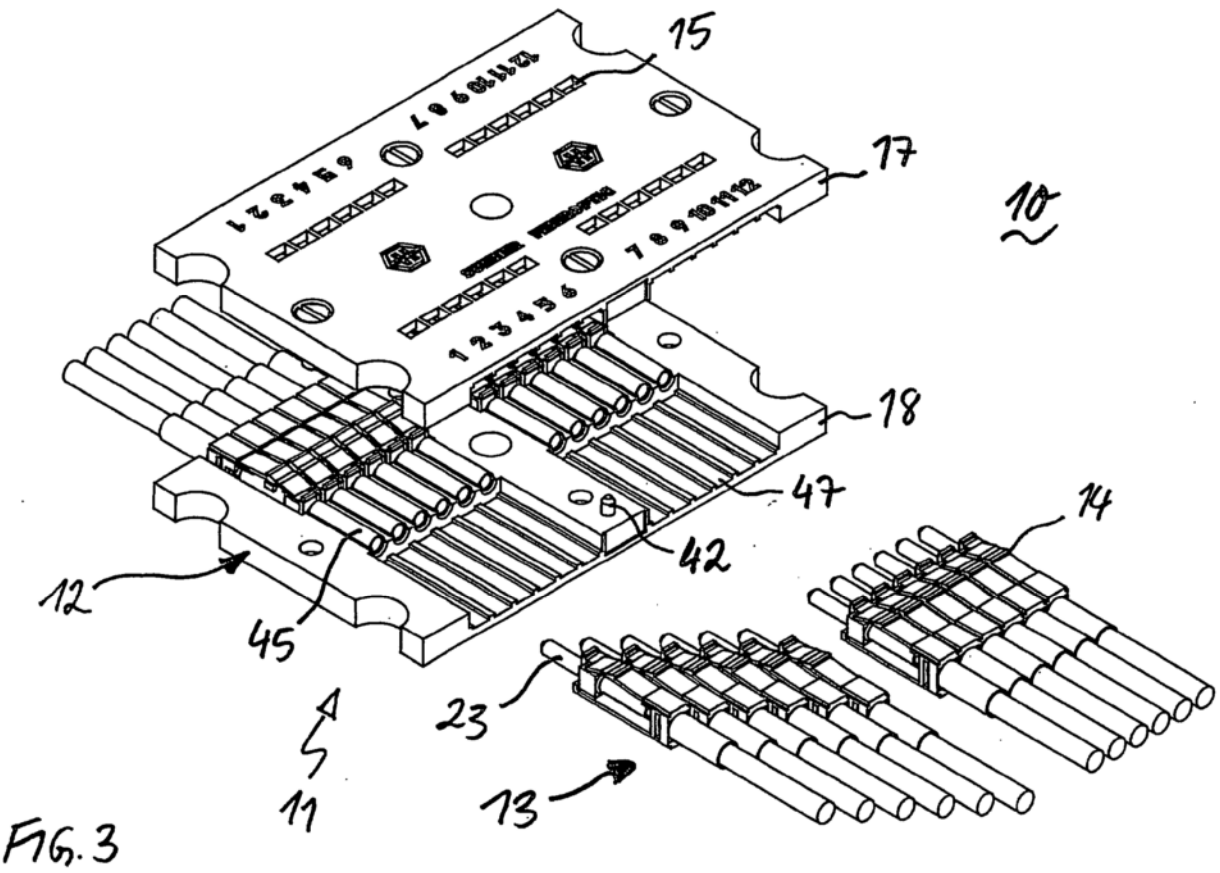



FIG. 3

EX1010: Fig. 3.

117. The internal construction of the adapter (11) is reproduced in the exploded representation of FIG. 2. EX1010: ¶ [0029]. Central elements of the adapter (11) are a plurality of cylindrical guiding sleeves (45), of which there is one per plug-in connection, for a total of 12. EX1010: ¶ [0029]. The guiding sleeves (45) receive the ferrules (23) of the plug-in connectors (13) and guide them in such a way that the ferrules of the two plug-in connectors involved in the plug-in connection and the ends of the fibers that are located in the central

bores of the ferrules butt against one another with the end faces. EX1010: ¶ [0029].

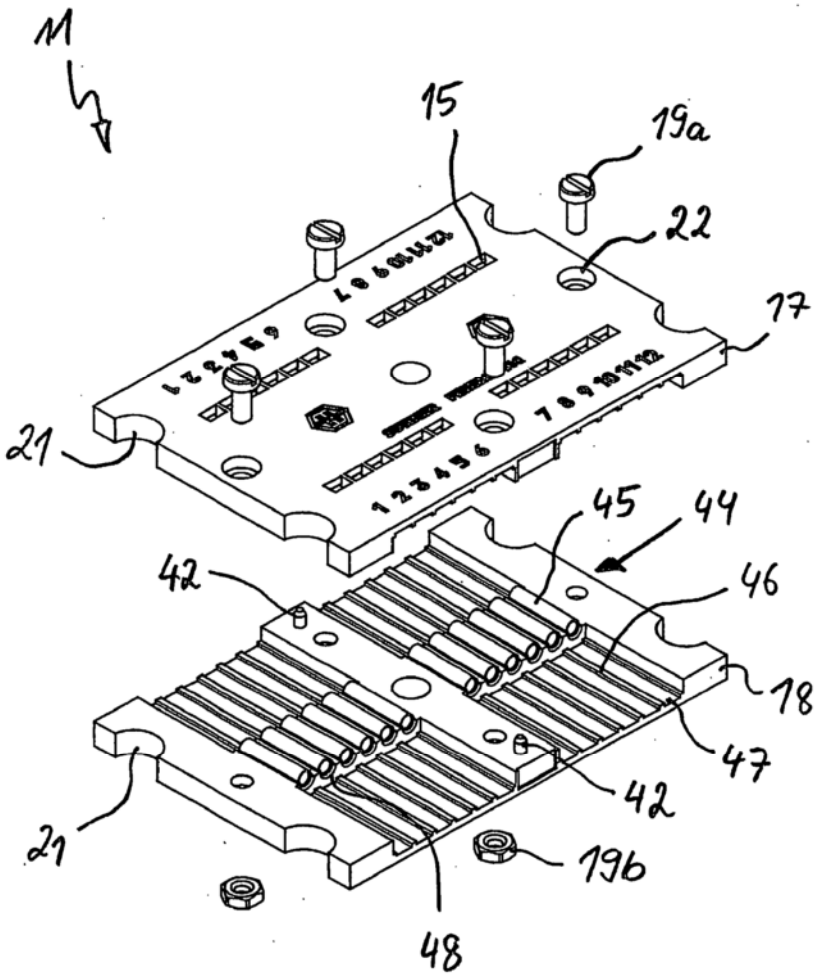



FIG. 2

EX1010: Fig. 2.

118. The adapter (11) has upper and lower parts (17,18) which each include guiding rails (46) that define insertion channels (47) for each plug-in connector (13). EX1010: Figs. 2 and 5, ¶[0031] ("The upper part 17 and the lower

part 18 are two flat plates of the same height, which are formed substantially mirror-symmetrically in relation to a central plane. The overall height of the adapter housing 12 is in this case no more than approximately 5 mm. Respectively provided in the upper part 17 and in the lower part 18, in front of and behind the central web 44 in the plugging direction, in a lower-lying plane, are guiding rails 46, which run between the guiding sleeves 45 in the plugging direction. Every two guiding rails 46 neighboring a guiding sleeve 45 define an insertion channel 47 for a plug-in connector 13, associated with the guiding sleeve.").



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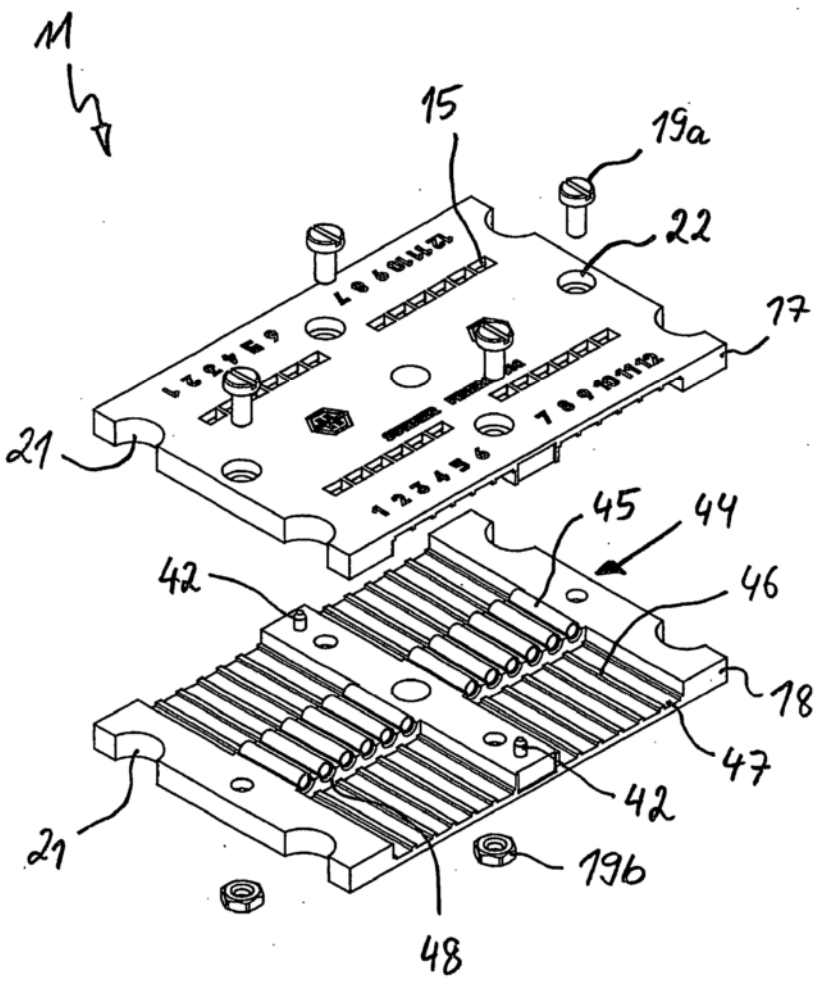
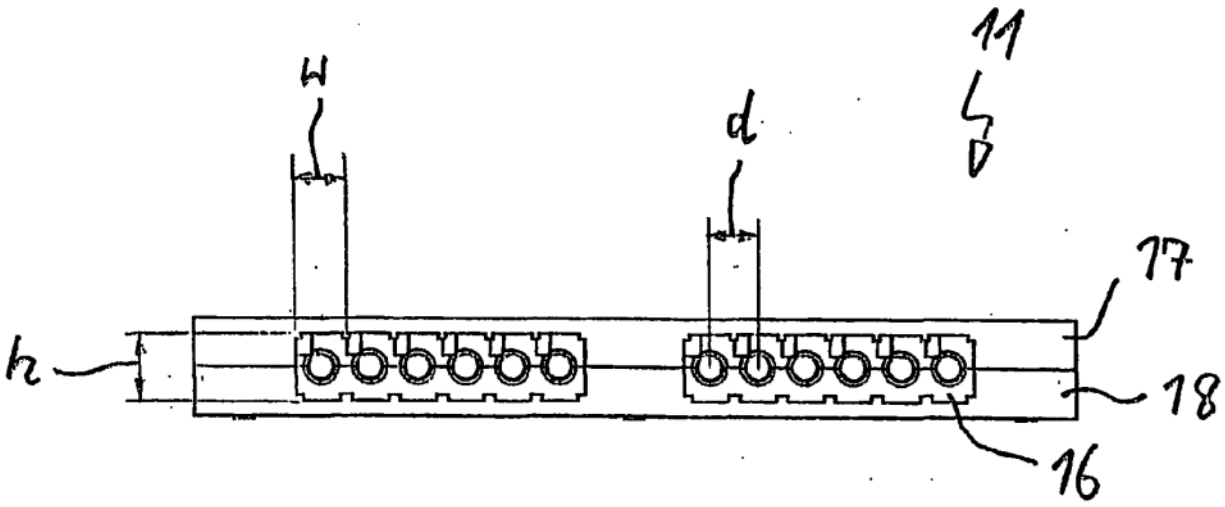



FIG. 2

EX1010: Fig. 2.



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Senko Advanced Components v. US Conec Ltd.
IPR2024-00805




EX1010: Fig. 5; ¶ [0038] ("The high plug-in connector density that is possible with the solution according to the invention can be seen from the front view in the upper part of FIG. 5, showing the height h and the width w of an an individual insertion opening 16 and the spacing d between two neighboring guiding sleeves or insertion openings 16, measured from sleeve axis to sleeve axis.").

## CLAIM CONSTRUCTION

119. As I stated in Paragraph 19 above, it has been explained to me that the Board will interpret the claims of the '415 patent as they would have been understood by those of ordinary skill in the art at the time of the invention in view of the claim language itself, the specification and figures of the '415 patent, the prosecution history of the '415 patent, and other relevant evidence showing how one of ordinary skill would have understood the language.

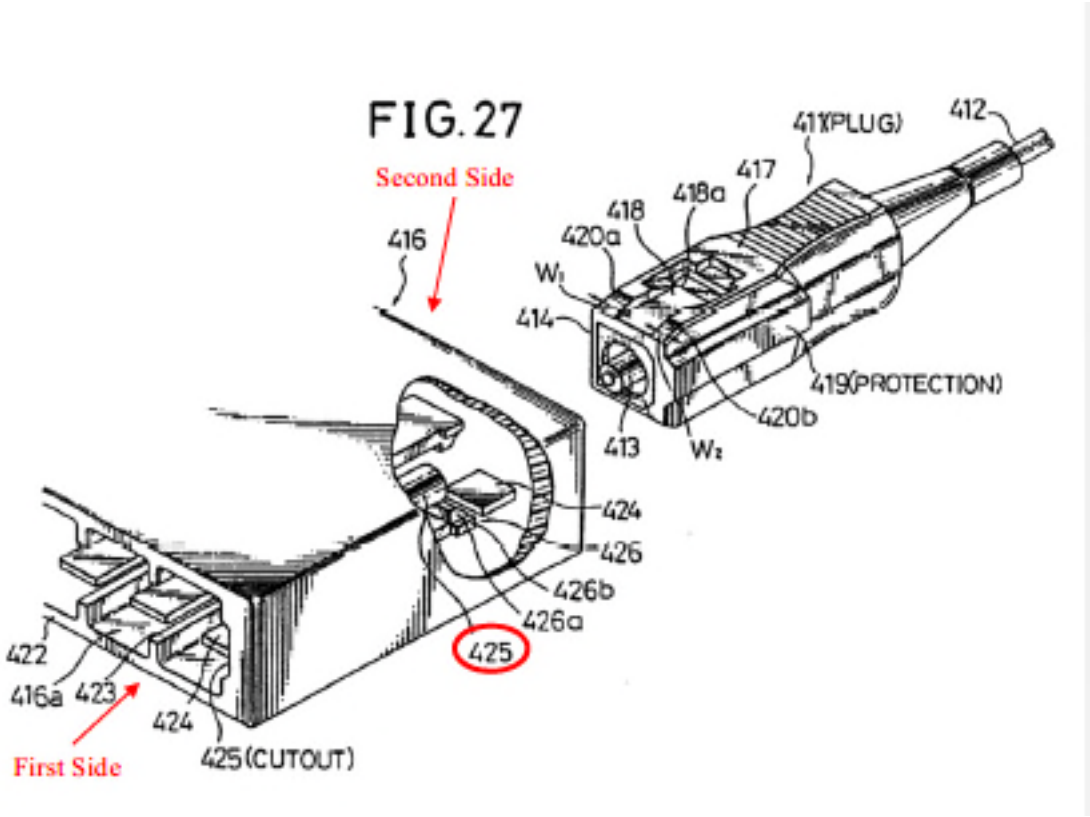
120. In my opinions discussed below, I have applied the plain and ordinary meaning of the claim terms within the grounds below.

## ANTICIPATION: IWANO (GROUND 1)

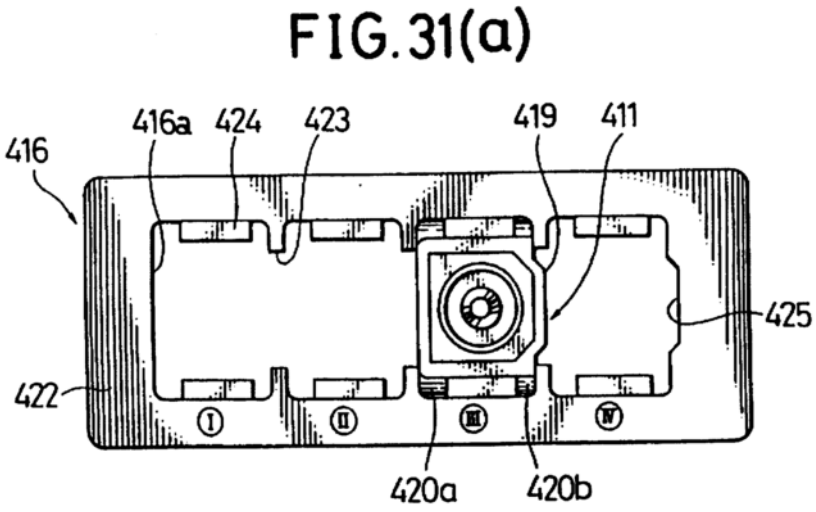
### A. Independent Claim 1

#### 1.P "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising:"

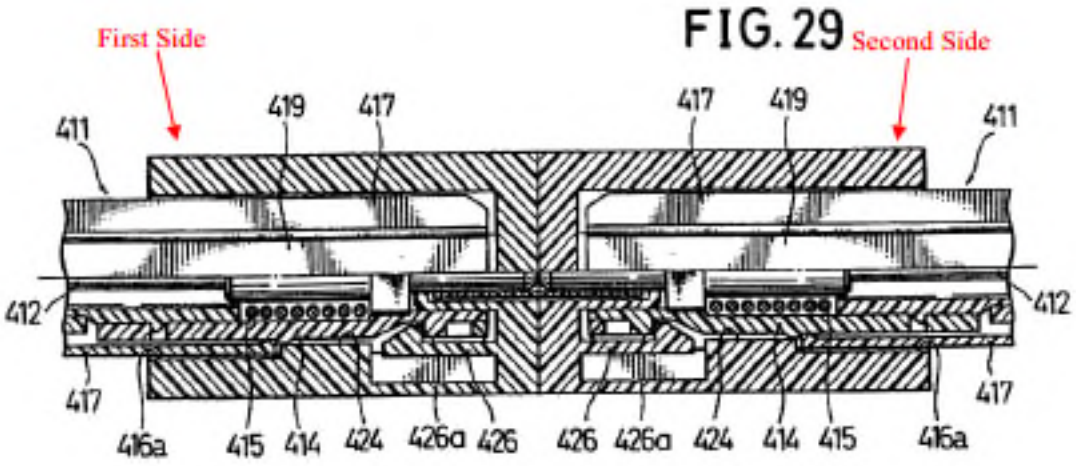
121. Iwano teaches an optical connector having a "connector housing" (416)—i.e. an adapter—for aligning and connecting optical connector plugs (411) inserted from opposite first and second sides of the connector housing. EX1006: 30:12-15 ("On the other hand, in the connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted, and with projections 424 and grooves 425 fitted to the grooves 418 and the projection 419 of the optical connector plugs 411, respectively."), 31:14-17 ("therefore, the structure of the present invention is advantageous in particular when applied to a plug-in optical connector for allowing a plurality of fibers to be connected simultaneously, because the highest possible mounting density is required for the plug-in optical connector."), Fig. 27 and 31(a) (reproduced and annotated below), Fig. 29 (reproduced and modified below).




EX1006: Fig. 27 (The first side is on the left of connector housing 416 and the second side is on the right of connector housing 416).

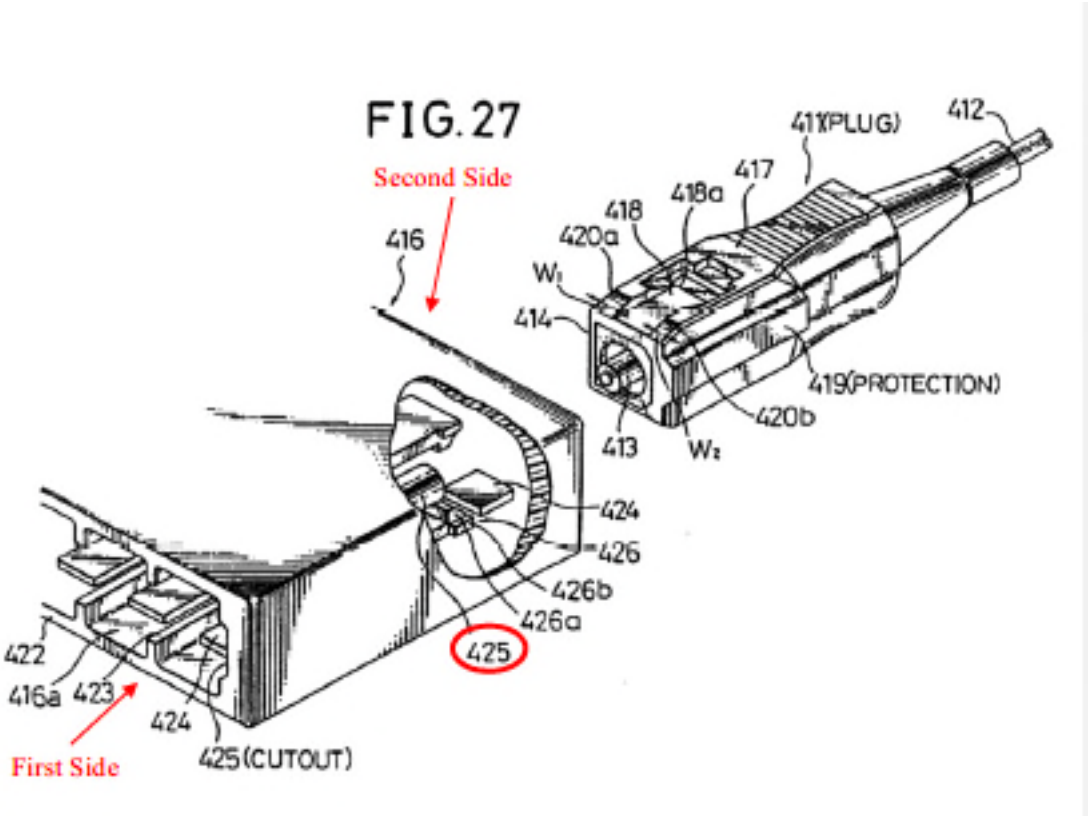



EX1006: Fig. 31(a).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, the first side is on the left and the second side is on the right).

122. More specifically, the optical connector plugs (411) include ferrules (413) which are inserted into cylindrical hollow alignment sleeves (425) of the connector housing (416) for aligning the ferrules of two optical connector plugs. EX1006: Figs. 25 and 27, 30:18-21 ("Further, cylindrical hollow alignment sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416.").




EX1006: Fig. 27 (annotated).

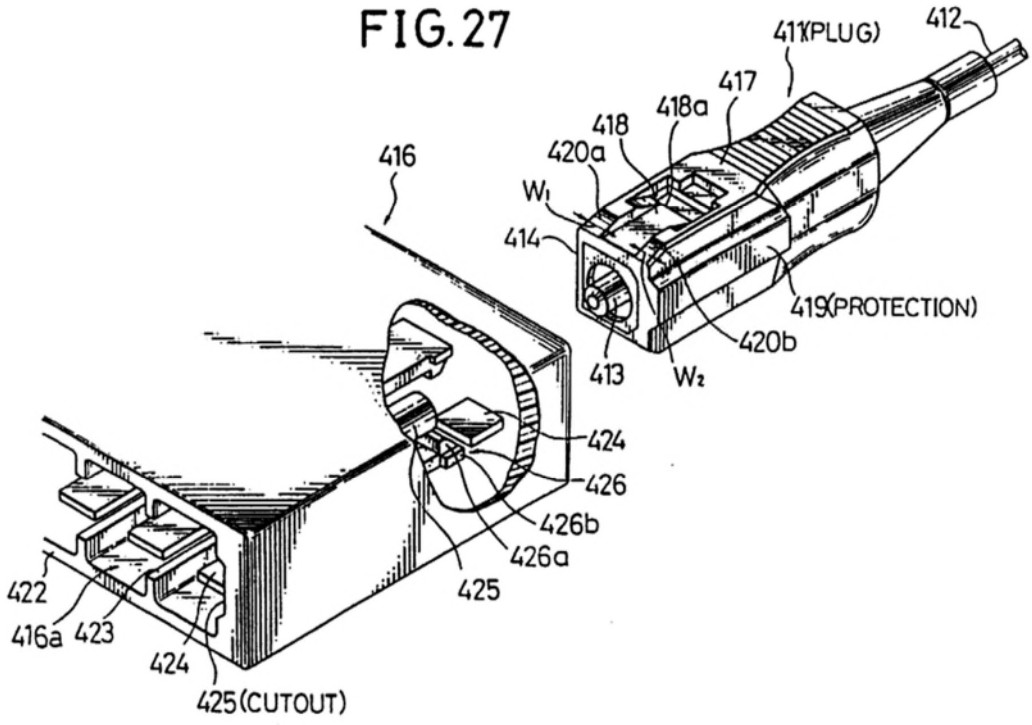
123. As taught by Iwano, a person of skill in the art would recognize that Iwano's "connector housing" (416) is an "adapter" in the context of the '415 Patent. EX1006: 28:10-12 (identifying a prior art connector housing which Iwano improves upon as an "adapter"), Fig. 25 (same).

124. Accordingly, Iwano's connector housing (416) meets the preamble of Claim 1: "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising."

### 1.a.1 "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface,"

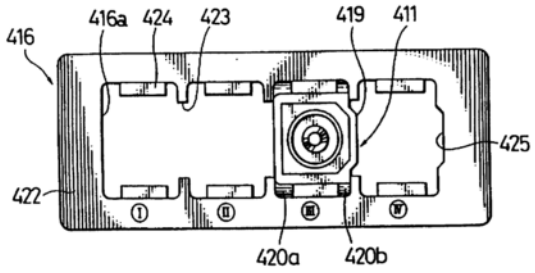
125. Iwano's connector housing (416) has a "housing body 422 formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted." EX1006: 30:12-15, Fig. 27.

126. As shown in Figures 27 and 31(a), each of the plurality of insertion holes "416a" is continuous with the other insertion holes.




EX1006: Fig. 27.

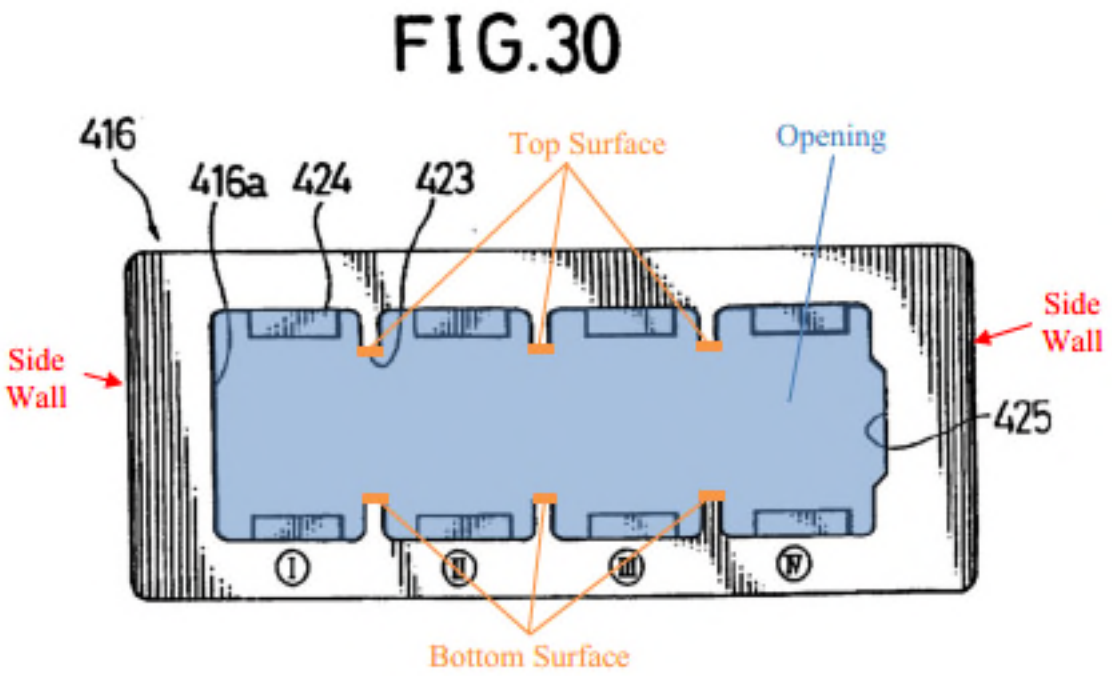
FIG.31(a)




EX1006: Fig. 31(a).

127. Since each insertion hole (416a) is continuous with the other insertion holes, a person of ordinary skill in the art would recognize that the plurality of insertion holes (416a) form a single opening. EX1006: Figs. 27 and 31(a). Notably, Iwano discusses this in the context of the prior art adapter that it depicts in Figures 26(a), 26(b) by stating "adjacent insertion holes . . . are connected to each other." EX1006: 29:4-5.

128. The housing body (422) includes two opposing side walls, a top surface, and a bottom surface that define the opening.




EX1006: Fig. 30 (annotated).

129. Therefore, Iwano's connector housing (416) meets the limitation of "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface."

#### 1.a.2 "the opening extending between the first side and the second side and"

130. Iwano explains the "housing body 422 formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted." EX1006: 30:12-15.

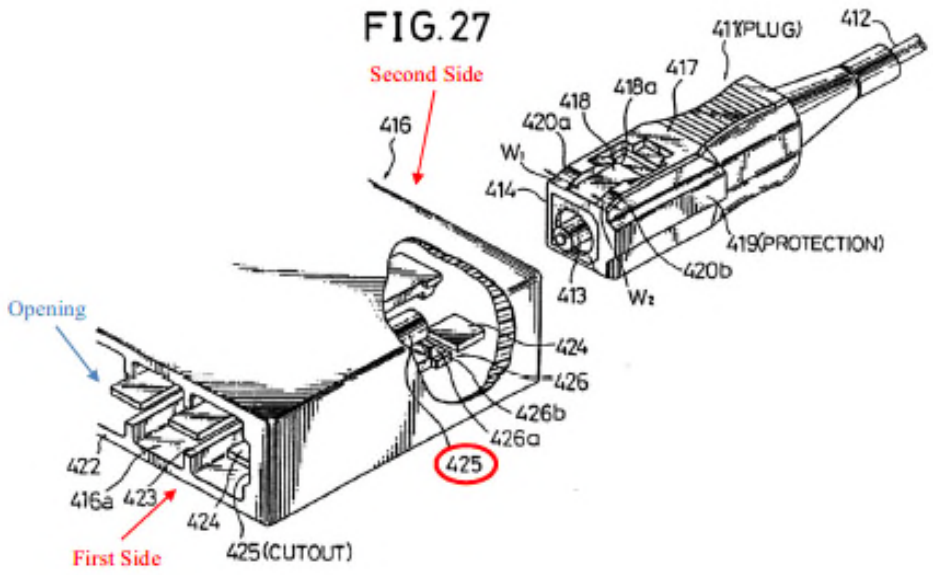
131. Iwano also explains that the optical connector plugs (411) are inserted into the opposite sides of the connector housing (416). EX1006: 28:4-14 (addressing the prior art to explain that "[a] pair of optical connector plugs . . . are

fitted to both the side surfaces of the connector housing . . . for coupling the two optical connector plugs").

132. Iwano's opening includes the holes formed by the "cylindrical hollow alignments sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted." EX1006: 30:18-21.

133. Iwano explains the alignment sleeves (425) "are provided within the insertion holes 416a of the connector housing 416." EX1006: 30:18-21.

134. Thus, a person of skill in the art would understand that Iwano's opening extends between the first and second sides.




EX1006: Fig. 27 (annotated).

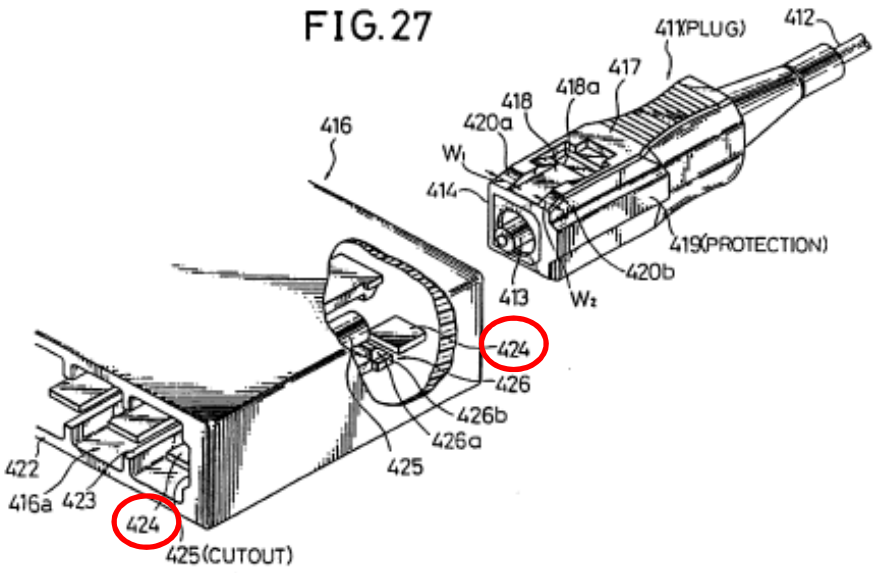
135. Therefore, Iwano's connector housing (416) meets the limitation of "the opening extending between the first side and the second side."

### 1.a.3 "having a central portion therebetween; and"

136. Iwano's connector housing (416) includes a central portion comprising the projections (424) that separates the first and second sides of the connector housing.

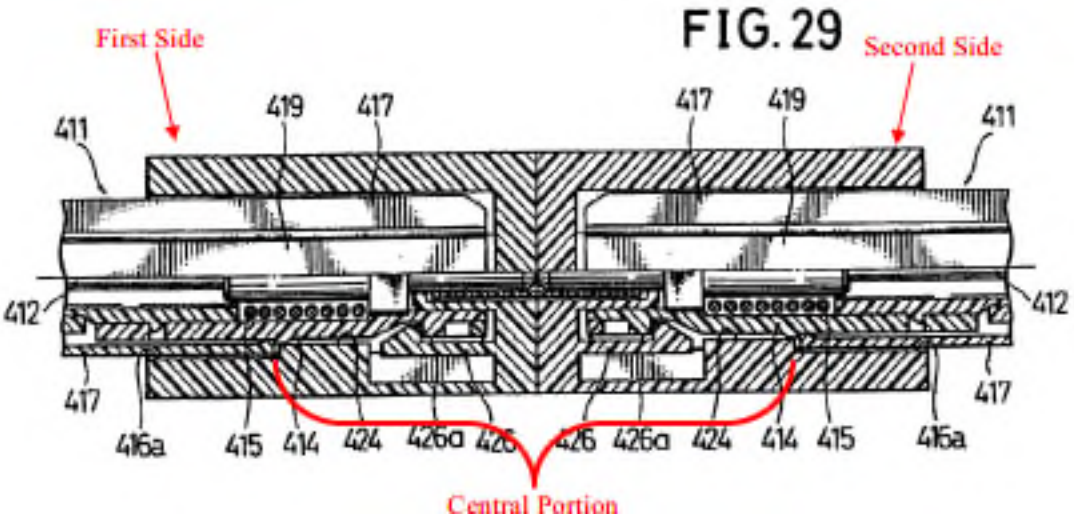
137. Iwano's connector housing (416) includes "projections 424 formed within the insertion holes 416a." EX1006: 30: 33-34.

138. As shown in Fig. 27, one set of projections (424) is spaced inward from the first end of the opening and the other set of projections is spaced inward from the opposite second end of the opening. EX1006: Fig. 27.

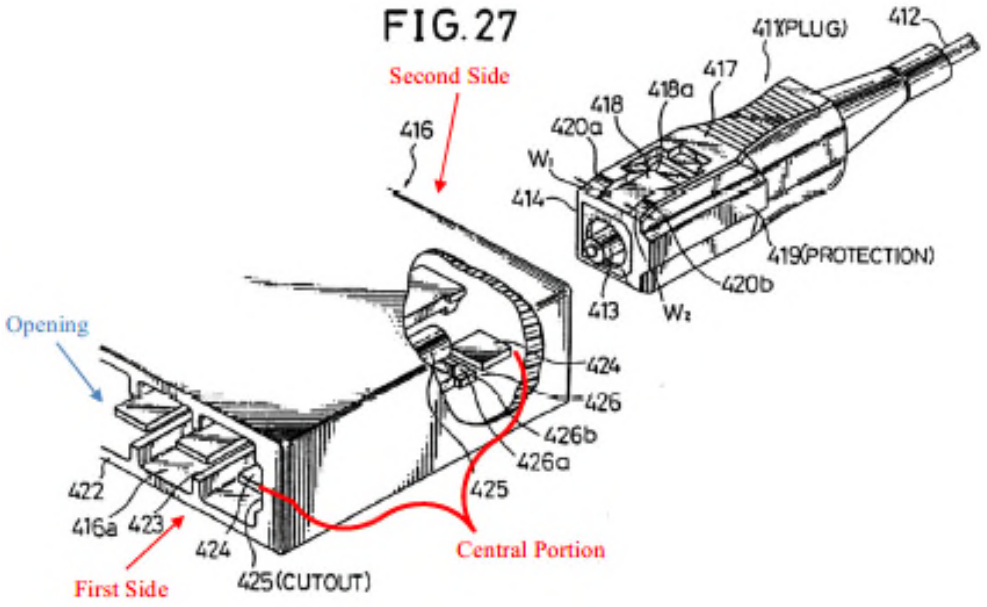



EX1006: Fig. 27 (annotated).

139. The region between and including the projections (424) constitutes a central portion of Iwano's connector housing (416), as shown below:




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).




EX1006: Fig. 27 (annotated).

140. Therefore, Iwano's connector housing (416) meets the limitation of "having a central portion therebetween."

### 1.b.1 "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion,"

141. Iwano's projections (424) are part of the central portion, with the bottom set of projections forming a bottom surface and the upper set of projections forming a top surface. EX1006: Figs. 27 and 30.

142. The projections (424) of Iwano's connector housing (416) are disposed in grooves (425), spaced between either (1) adjacent partition walls (423) of the connector housing, or (2) a side wall of the housing body (422) and one of the partition walls. EX1006: Figs. 27 and 30. Thus, Iwano's connector housing (416) has a plurality of grooves disposed in a second top surface of the central portion and a plurality of grooves disposed in a second bottom surface of the central portion, as shown below:

FIG.30

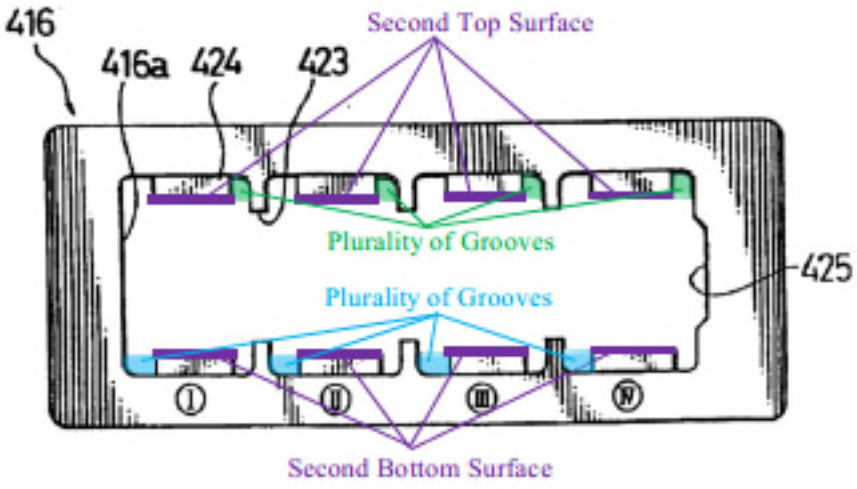
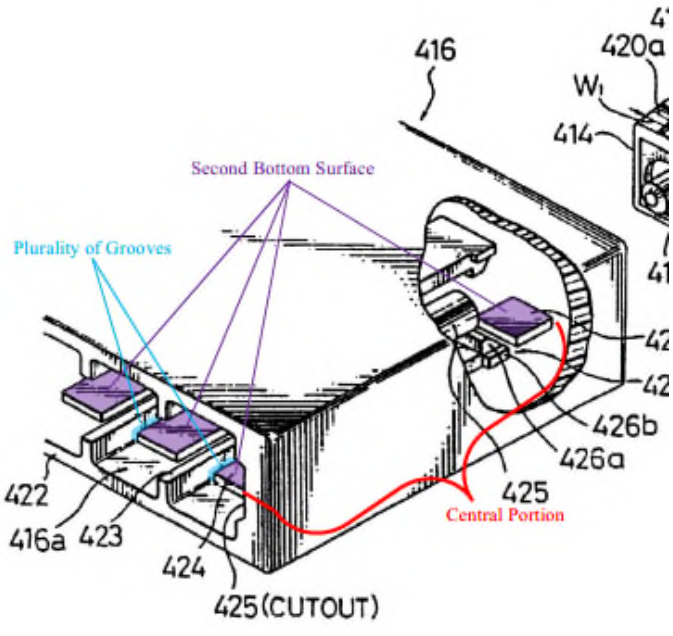


FIG. 27



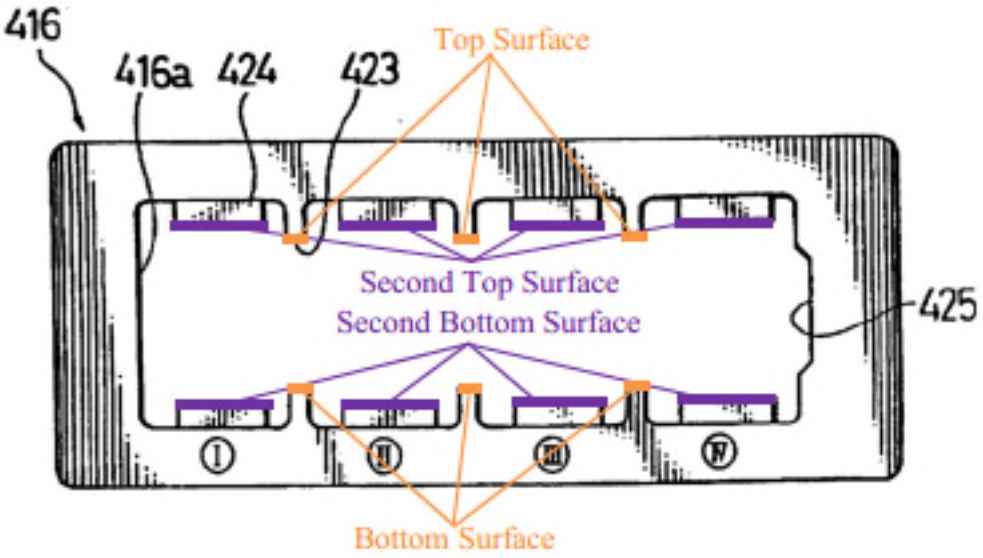

EX1006: Figs. 27 and 30 (annotated).

143. Therefore, Iwano's connector housing (416) meets the limitation of "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion."

**1.b.2 "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body,"**

144. As shown below, the second top surface and the second bottom surface formed by the projections (424) are different than the top surface and bottom surface in the housing body (422):

FIG.30




EX1006: Fig. 30 (annotated).

145. Therefore, Iwano's connector housing (416) meets the limitation of "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body."

**1.b.3 "each of the plurality of grooves extending toward a center of the main body."**

146. Figs. 27 and 30 of Iwano show that the pluralities of grooves in the second top and bottom surfaces have open ends at the first and second sides. EX1006: Figs. 27 and 30.

FIG.30

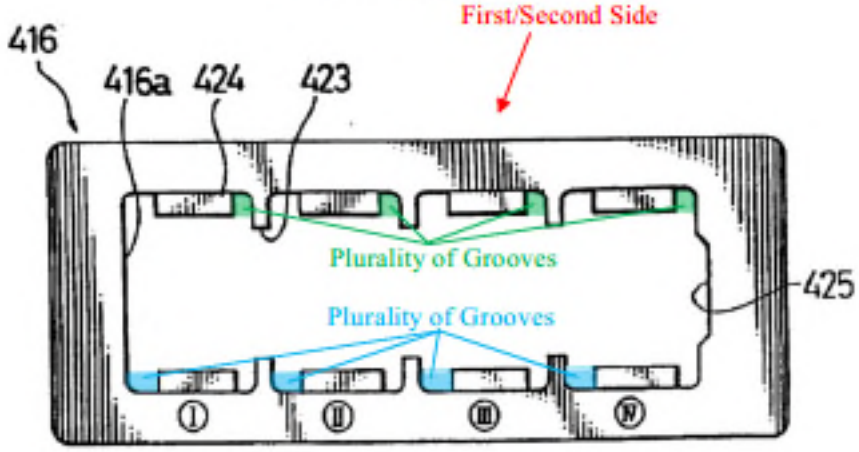
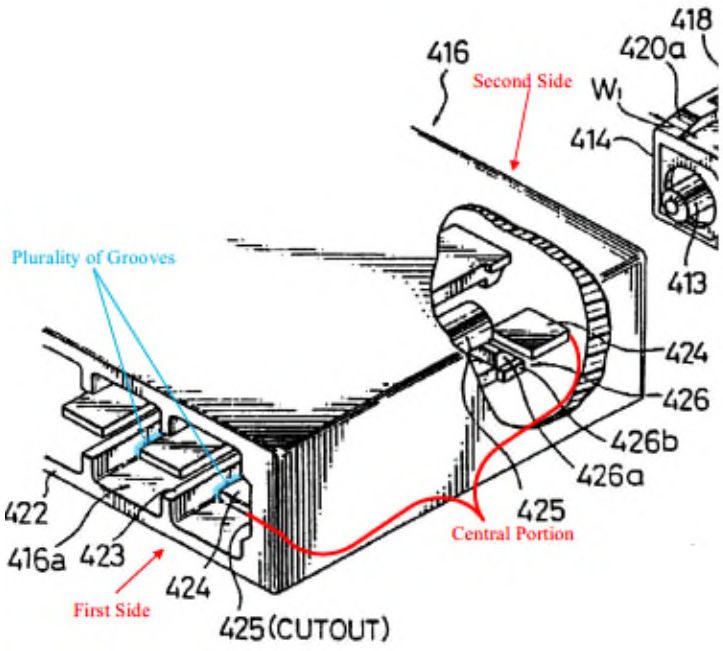
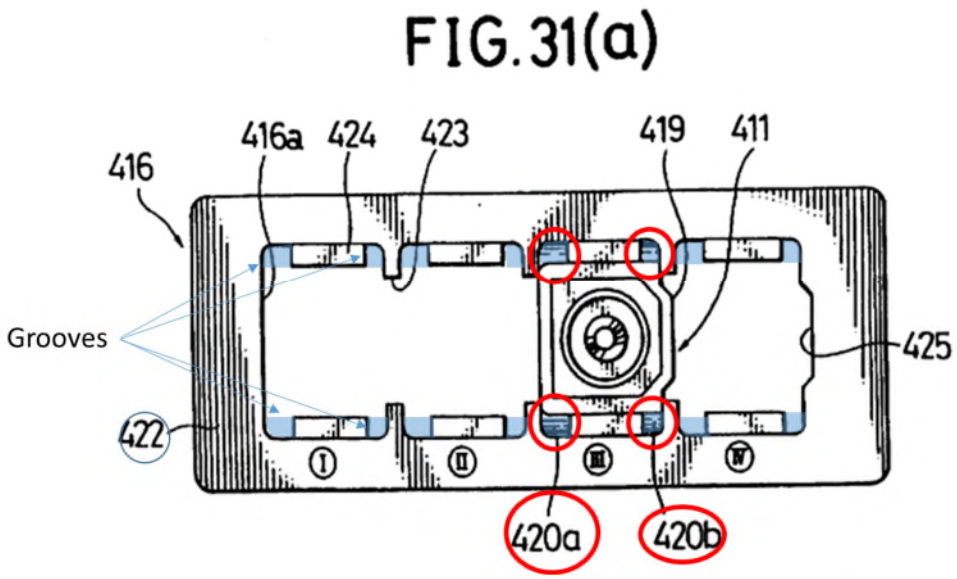



FIG.27




EX1006: Figs. 27 and 30 (annotated).

147. This allows the grooves to receive inclined projection portions (420a, 420b) of the optical connector plug (411) when the optical connector plug is inserted into the connector housing (416). EX1006: Fig. 31(a), 30:47-53.




EX1006: Fig. 31(a) (annotated).

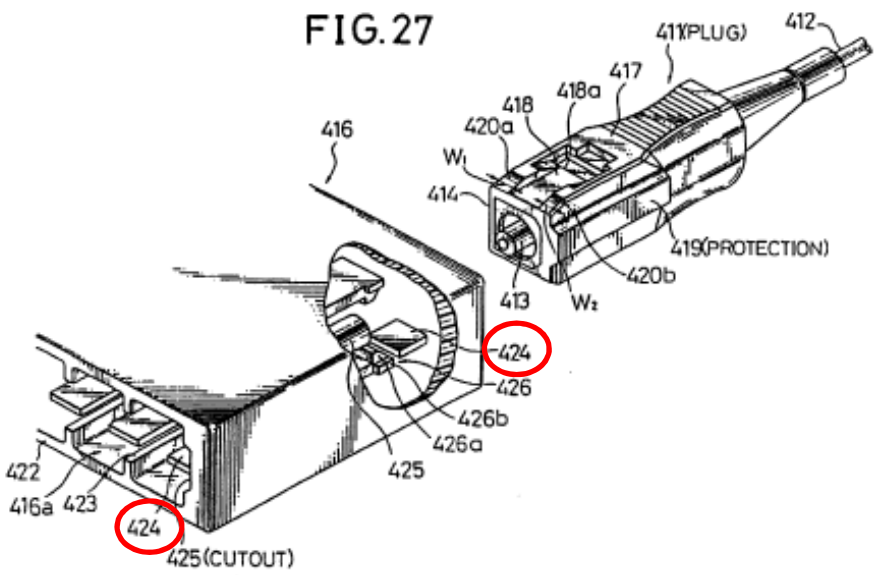
148. Accordingly, the person of skill in the art would understand that the pluralities of grooves extend into the central portion from a side of the connector housing (416).

149. Iwano's connector housing (416) connects optical connector plugs (411) inserted into either side of the connector housing. EX1006: Figs. 27 and 31(a), 28:4-14 (addressing the prior art to explain that "[a] pair of optical connector plugs . . . are fitted to both the side surfaces of the connector housing . . . for coupling the two optical connector plugs"), 30:12-15 ("On the other hand, in the

connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted. . .").

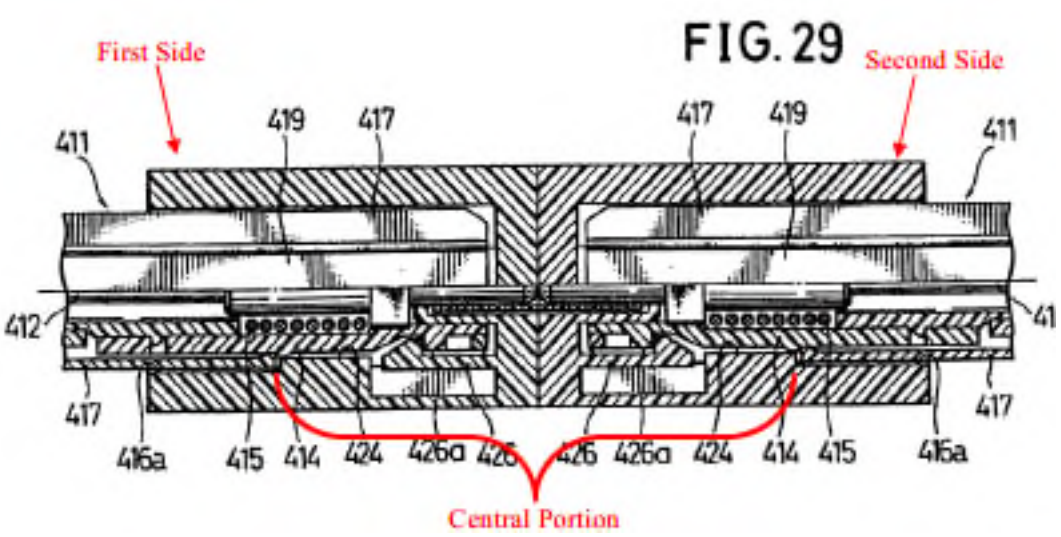
150. The person of skill in the art understands the structure (e.g., projections (424), partition walls (423), etc.) shown on one half of Iwano's connector housing (*see* Figs. 27 and 30) is also present on the other half of Iwano's connector housing, as shown in modified Fig. 29 below.

151. Iwano's Fig. 27 indicates as much as it shows projections (424) on both halves of Iwano's connector housing (416). EX1006: Fig. 27.




EX1006: Fig. 27 (annotated).

152. Thus, the person of skill in the art would understand that the pluralities of grooves are present on both halves of Iwano's connector housing (416), and that the pluralities of grooves extend into the central portion from the first and second sides.



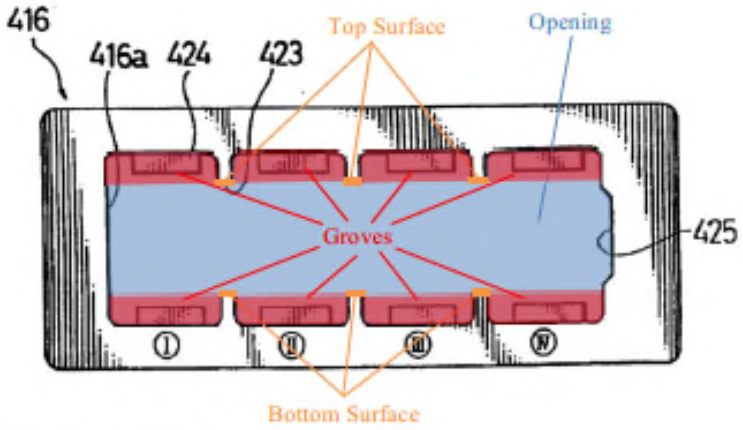

EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

153. Therefore, Iwano's connector housing (416) meets the limitation of "each of the plurality of grooves extending toward a center of the main body."

**B. Claim 2 – "The adapter according to claim 1, further comprising a groove in one of the top surface and the bottom surface."**

154. Iwano opening has grooves between adjacent partition walls (423) and between the side walls and partition walls in the top and bottom surface.

FIG.30

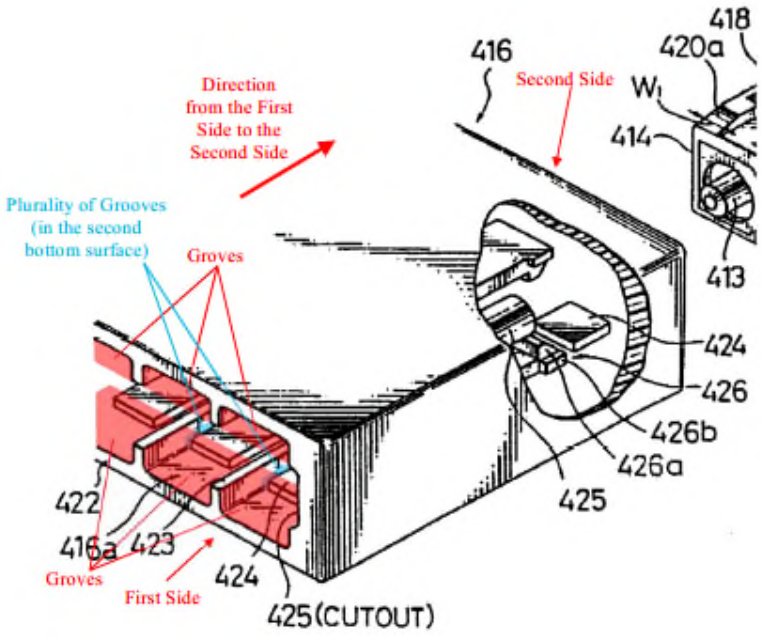



EX1106: Fig. 30 (annotated).

EX1006: Fig. 30 (annotated).

155. As shown in Fig. 27, these grooves extend in a direction from the first side to the second side.

FIG.27



EX1006: Fig. 27 (annotated).

156. Therefore, Iwano's connector housing (416) meets the following limitation: "The adapter according to claim 1, further comprising a groove in one of the top surface and the bottom surface."

### C. Claim 3 – "The adapter according to claim 1, further comprising a groove in each of the top and the bottom surfaces."

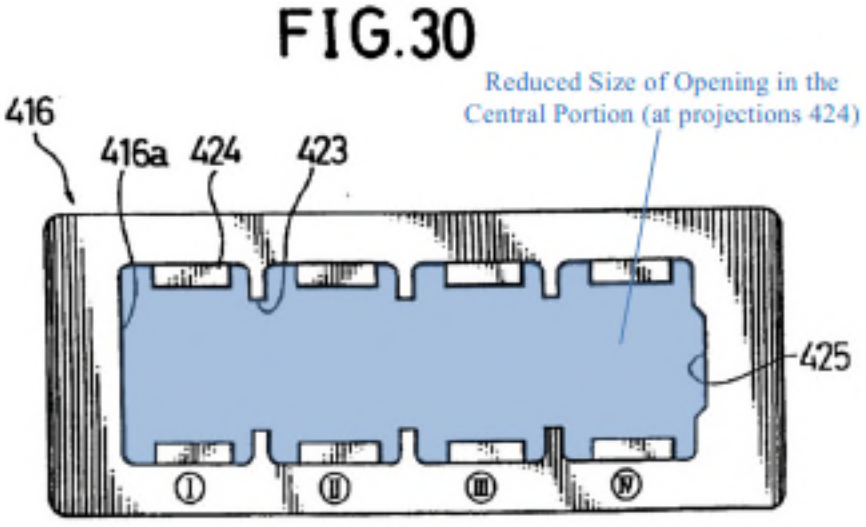
157. For the reasons just discussed above, Iwano meets the following limitation: "The adapter according to claim 1, further comprising a groove in each of the top and the bottom surfaces."

### D. Claim 4 – "The adapter according to claim 1, wherein the opening is smaller in the center of the main body than on the first side and second side."

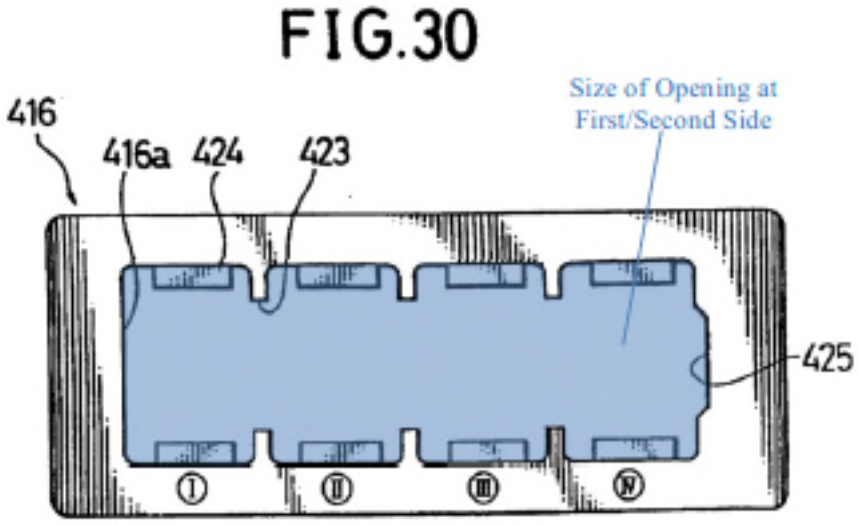
158. As described above in Paragraphs 136-139, the central portion of Iwano's housing body (422) includes projections (424). EX1006: Figs. 27 and 30, 30:12-17.

159. The projections (424) along the bottom of the housing body (422) extend upward into the opening and the projections along the top of the housing body extend downward into the opening. EX1006: Fig. 30.

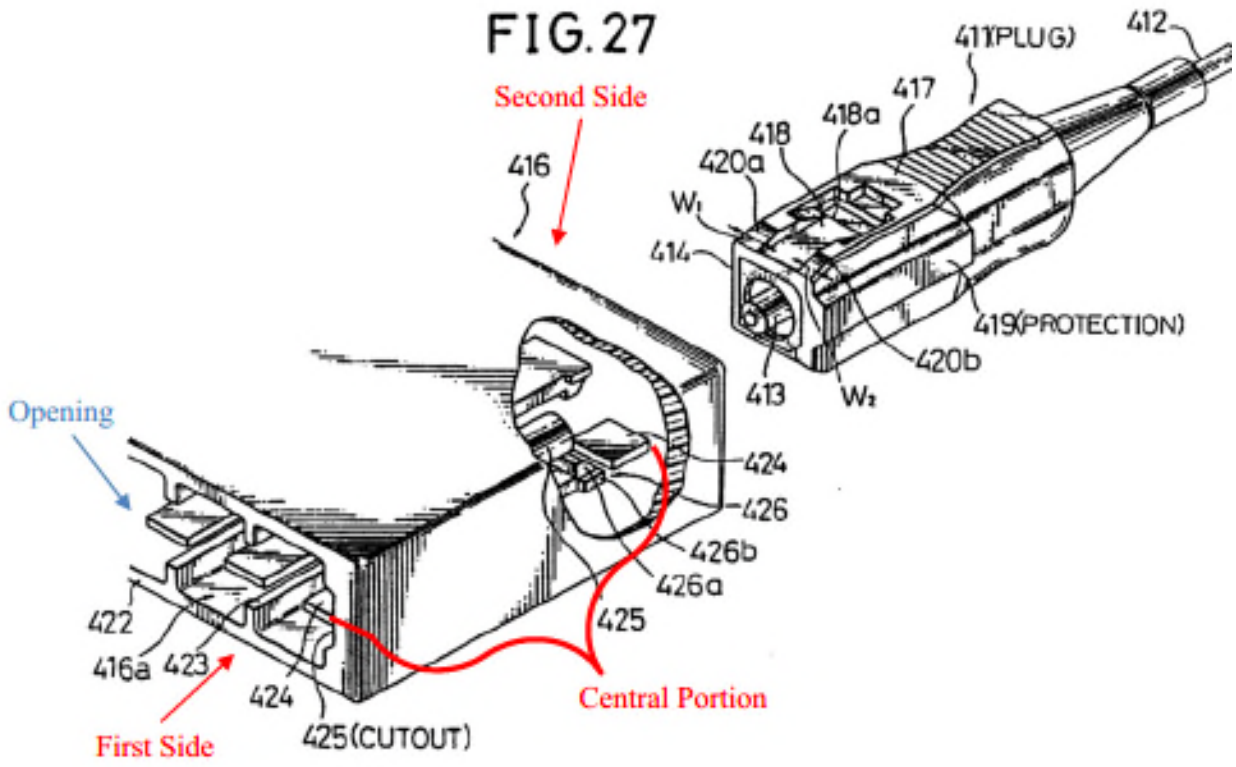
160. Thus, Iwano's projections (424) make the opening in the central portion of Iwano's housing body (422) smaller than the opening in the first and second sides.



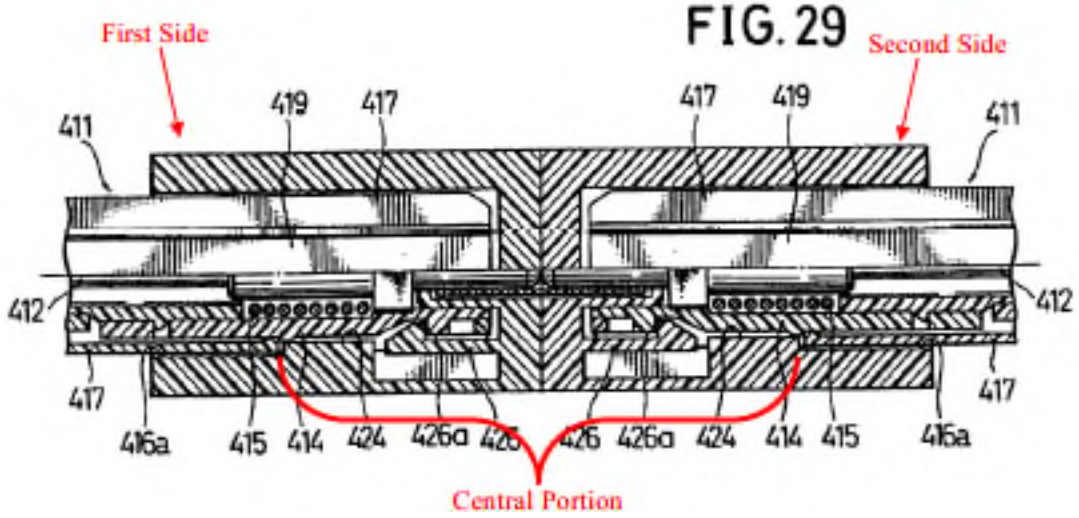

EX1006: Fig. 30 (annotated).




EX1006: Fig. 30 (annotated).



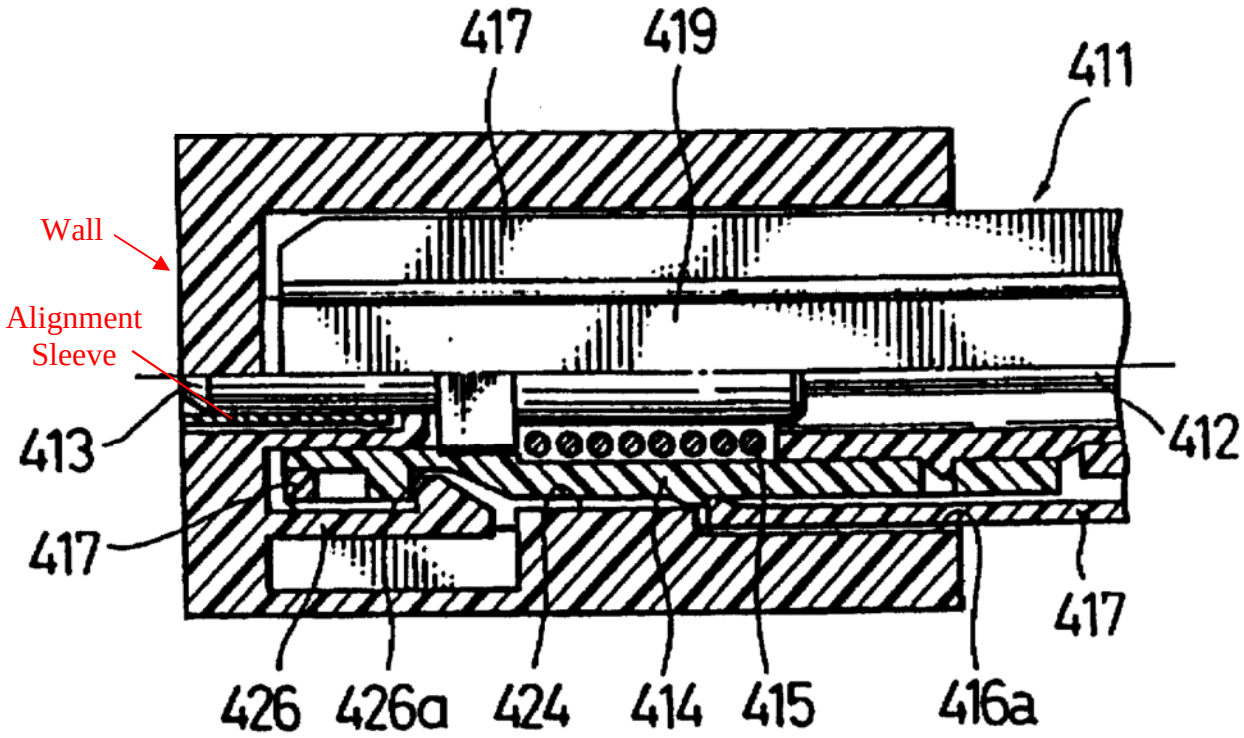

EX1006: Fig 27 (annotated).

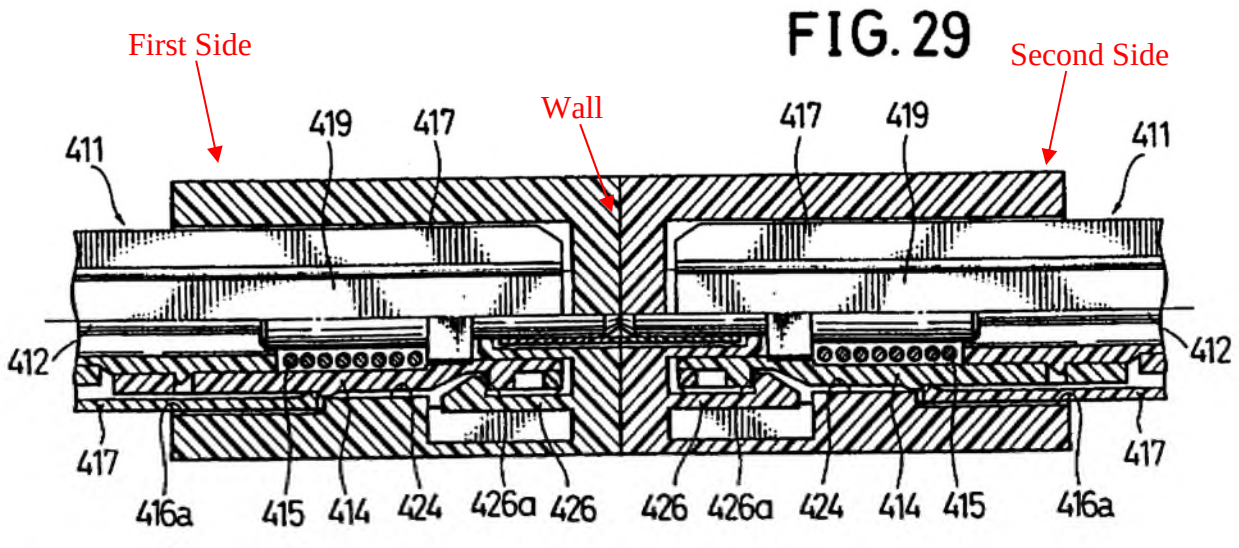



EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing annotated).

161. Alternatively or in addition, the Iwano's connector housing (416) includes a wall in the center of the housing body (422). EX1006: Fig. 29. The wall includes the engagement/latching arms (426) and the hollow alignment sleeves (425). EX1006: Fig. 29. The wall is disposed in the opening and extends between the top and bottom walls of the housing body (422) and between the side walls of the housing body. EX1006: Figs. 27, 29, and 31(a). Thus, the presence of the wall also makes the opening smaller in the center of the housing body (422) than on the first and second sides.

FIG. 29






EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

162. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 1, wherein the opening is smaller in the center of the main body than on the first side and second side."

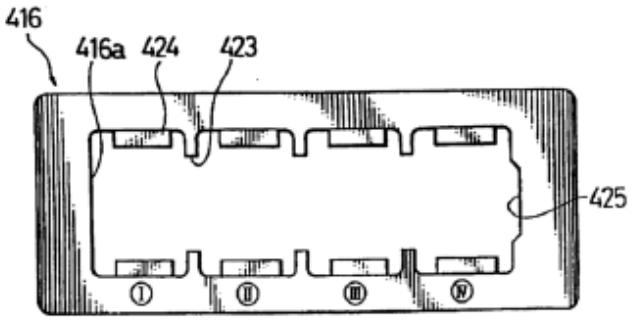
**E. Claim 5 – "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules."**

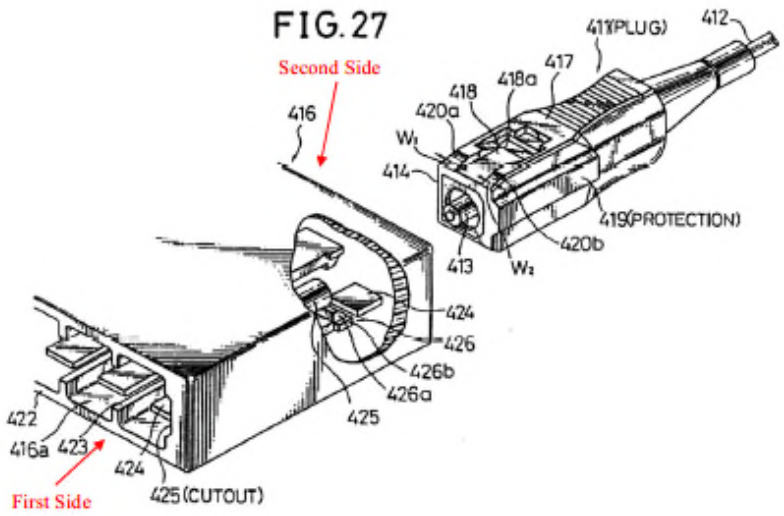
163. Iwano's connector housing (416) is for connecting four pairs of optical connector plugs (411). EX1006: Figs. 27 and 30, 28:64-65 ("FIGS. 26(a) and (b) show a connector housing 420 to which a plurality of optical connector plugs 401 are fitted."), 29:40-44 ("The fifth feature of the optical connector according to the present invention is to provide an optical connector locating structure in which the optical connector plugs can be inserted only in a

predetermined direction or orientation . . ."), 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

164. As illustrated, the first and second sides of the connector housing (416) can each receive a plurality of (e.g., up to four) optical connector plugs (411). EX1006: Fig. 30, 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

FIG.30





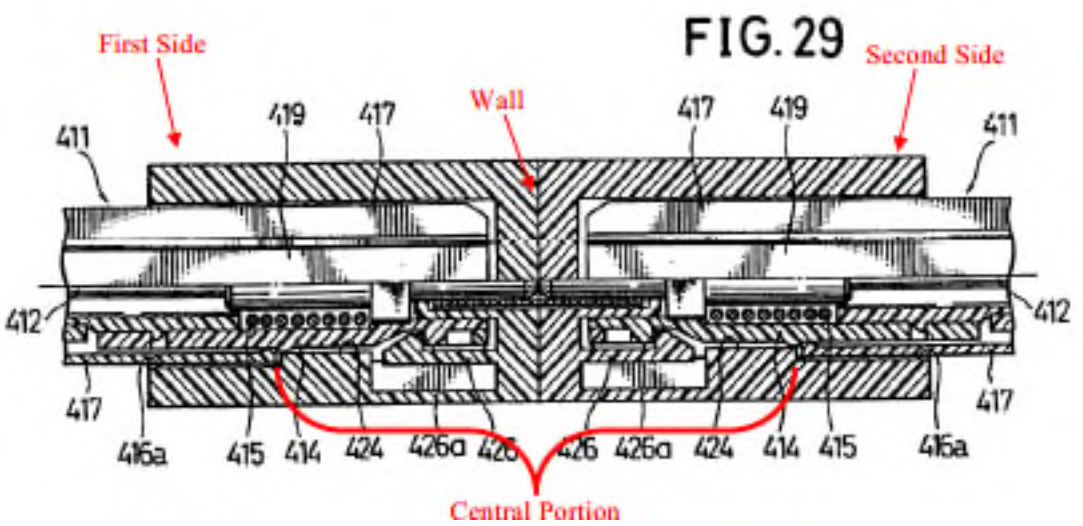

EX1006: Figs. 27 and 30 (annotated).

165. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules."

**F. Claim 6**

**6.a "The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side,"**

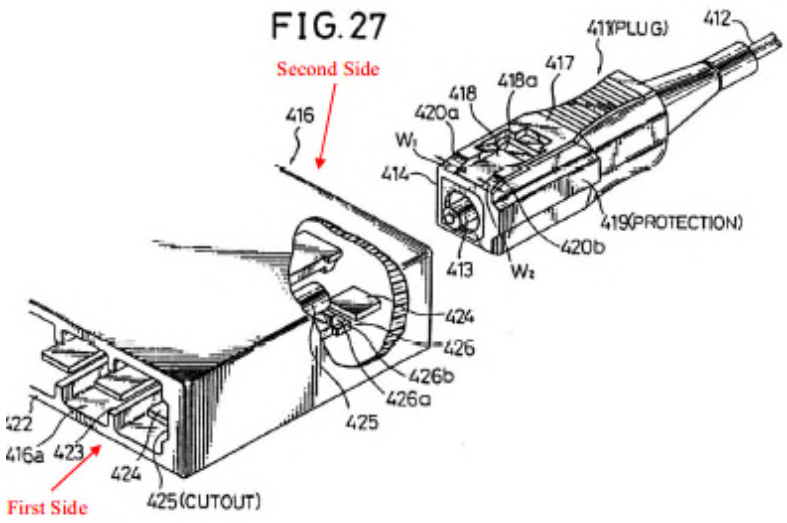
166. Iwano's connector housing (416) includes a wall disposed within and across the central portion of the housing body (422). EX1006: Fig. 29.



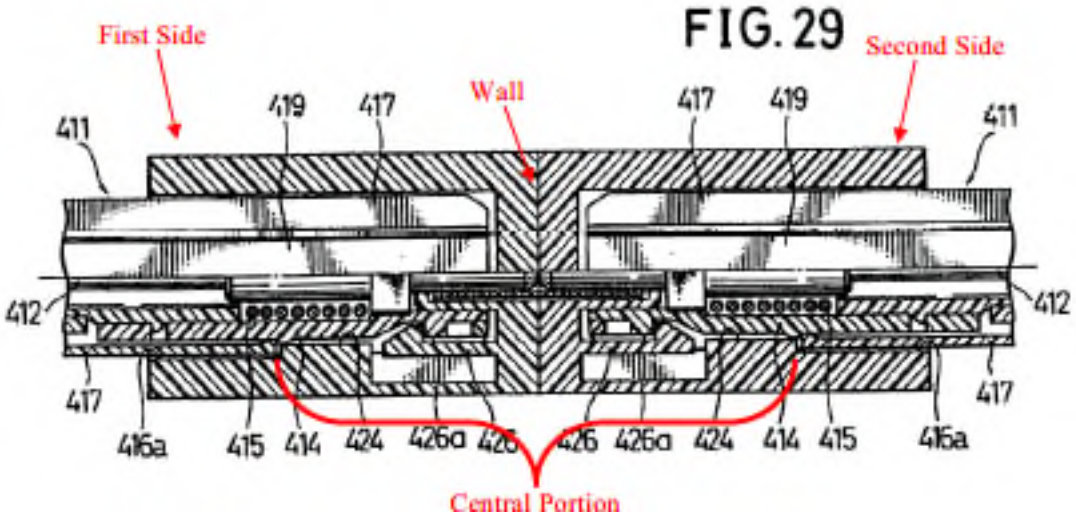

EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

167. The wall includes the engagement/latching arms (426) and the alignment sleeves (425).

168. The wall is disposed between the first and second sides. EX1006: Figs. 27 and 29.




EX1006: Figs. 27 (annotated).



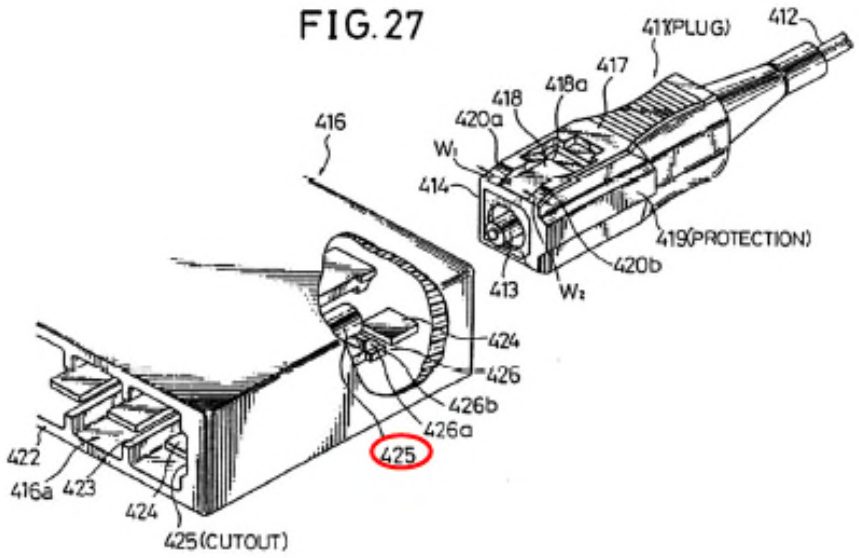

EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

169. Therefore, Iwano's connector housing (416) meets the following limitation: "The adapter according to claim 1, further comprising a wall disposed

within and across the central portion of the main body and between the first side and the second side."

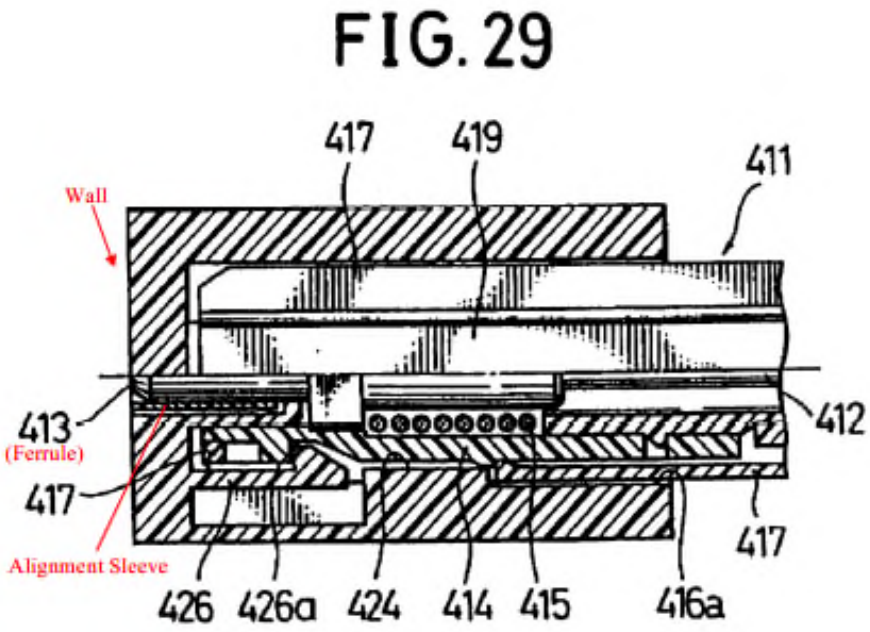
**6.b "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

170. Iwano's wall includes a plurality of cylindrical alignment sleeves (425), one for each pair of optical connector plugs (411) coupled by the connector housing (416). EX1006: Figs. 27 and 29, 30:18-21 ("cylindrical hollow alignment sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416.").



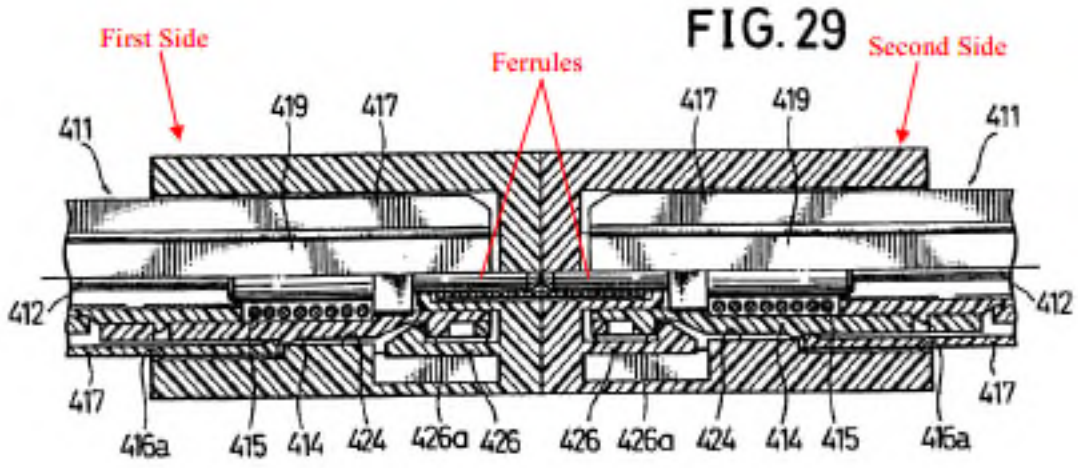

EX1006: Fig. 27 (annotated).

171. Each alignment sleeve (425) is "hollow." EX1006: Fig. 29, 30:18.




EX1006: Fig. 29 (annotated).

172. Accordingly, as demonstrated in the modified Figure 29 below, when the optical connectors are inserted from opposing sides, the ferrules will contact each other within the alignment sleeve.




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

173. The wall has at least one passage provided therein for the ferrules to contact each other within the alignment sleeve. As such, the alignment sleeves (425) allow at least a portion of the ferrules (413) inserted from the first and second sides to pass thererthrough.

174. Likewise, the passage in Iwano's wall includes the space defined by one of the "hollow" alignment sleeves.

175. Therefore, Iwano's connector housing (416) meets the limitation of "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."

### G. Claim 7 – "The adapter according to claim 6, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules."

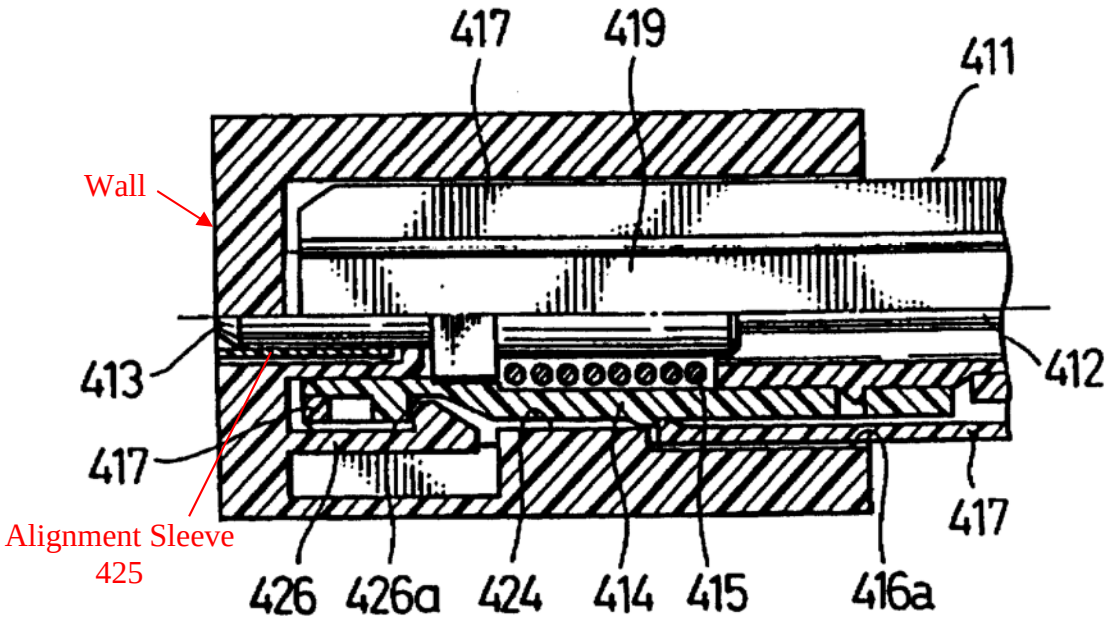
176. Iwano's connector housing (416) is for connecting four pairs of optical connector plugs (411). EX1006: Figs. 27 and 30, 28:64-65 ("FIGS. 26(a) and (b) show a connector housing 420 to which a plurality of optical connector plugs 401 are fitted."), 29:40-44 ("The fifth feature of the optical connector according to the present invention is to provide an optical connector locating structure in which the optical connector plugs can be inserted only in a predetermined direction or orientation . . ."), 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

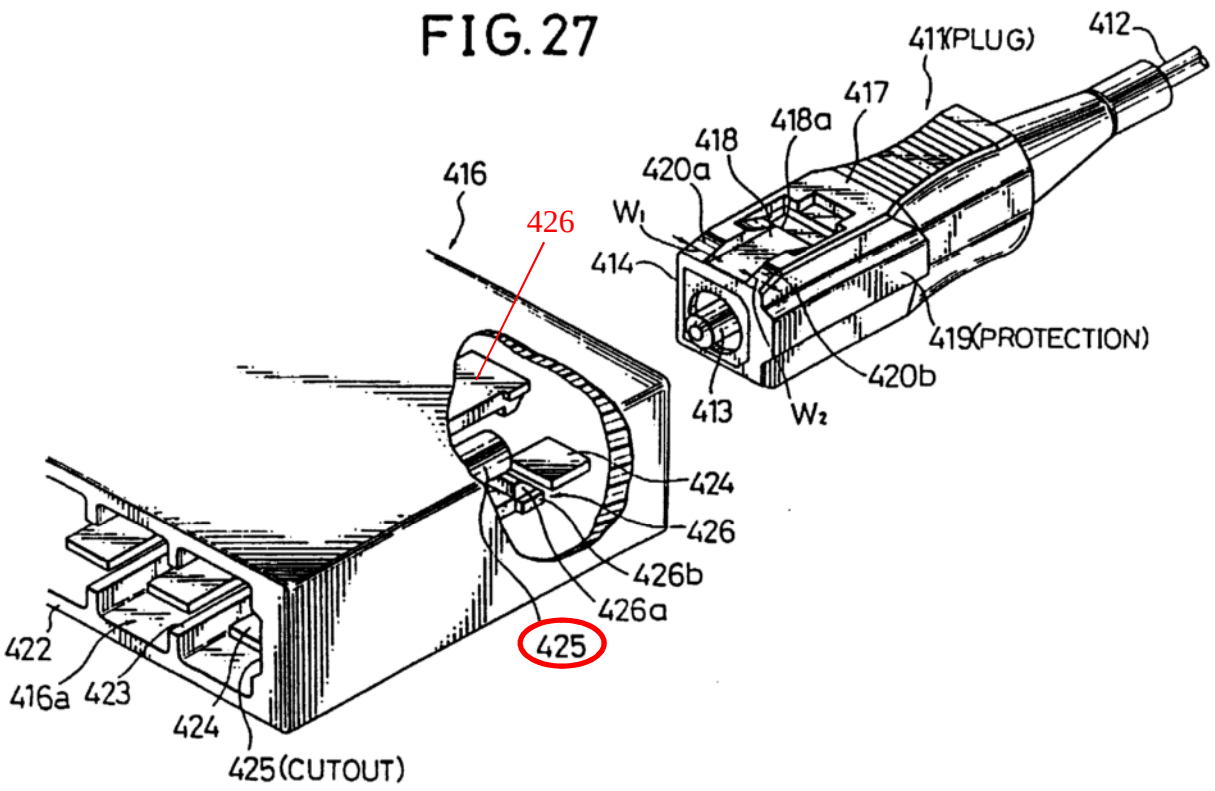
177. Iwano explains "cylindrical hollow alignment sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416." EX1006: 30:18-21.

178. Thus, the connector housing (416) includes an alignment sleeve (425) for each pair of optical connector plugs (411) coupled together by the connector housing (416).

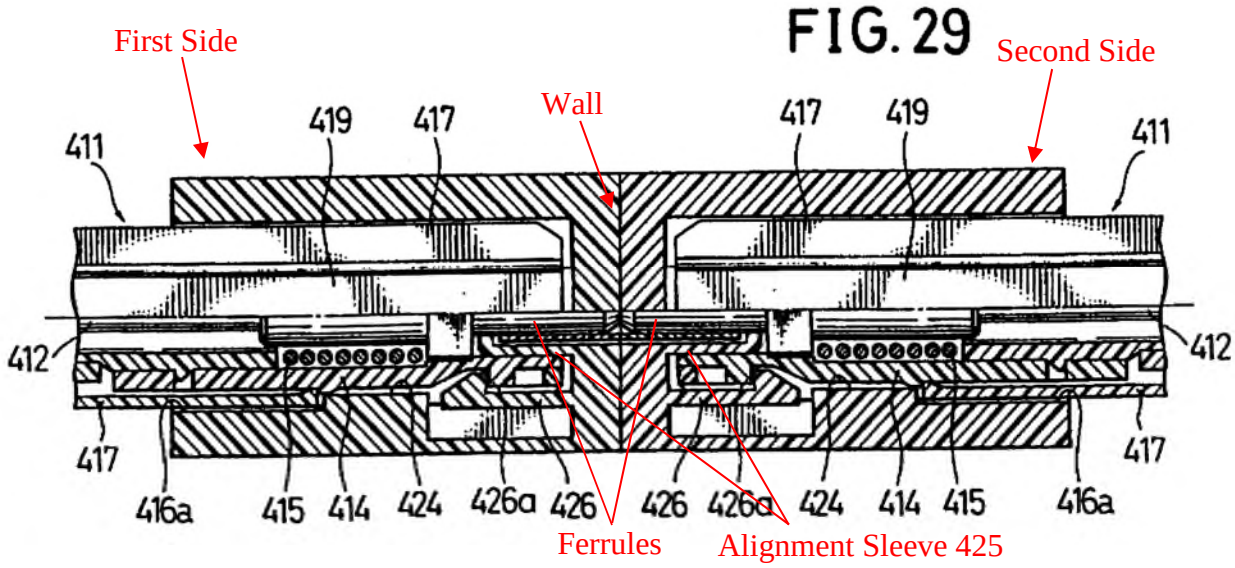
179.

FIG. 29






EX1006: Figs. 27 and 29 (annotated); EXPERT DEC.



EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

180. Thus, the alignment sleeves (425) are part of the plurality of passages.

181. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 6, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules."

## H. Independent Claim 8

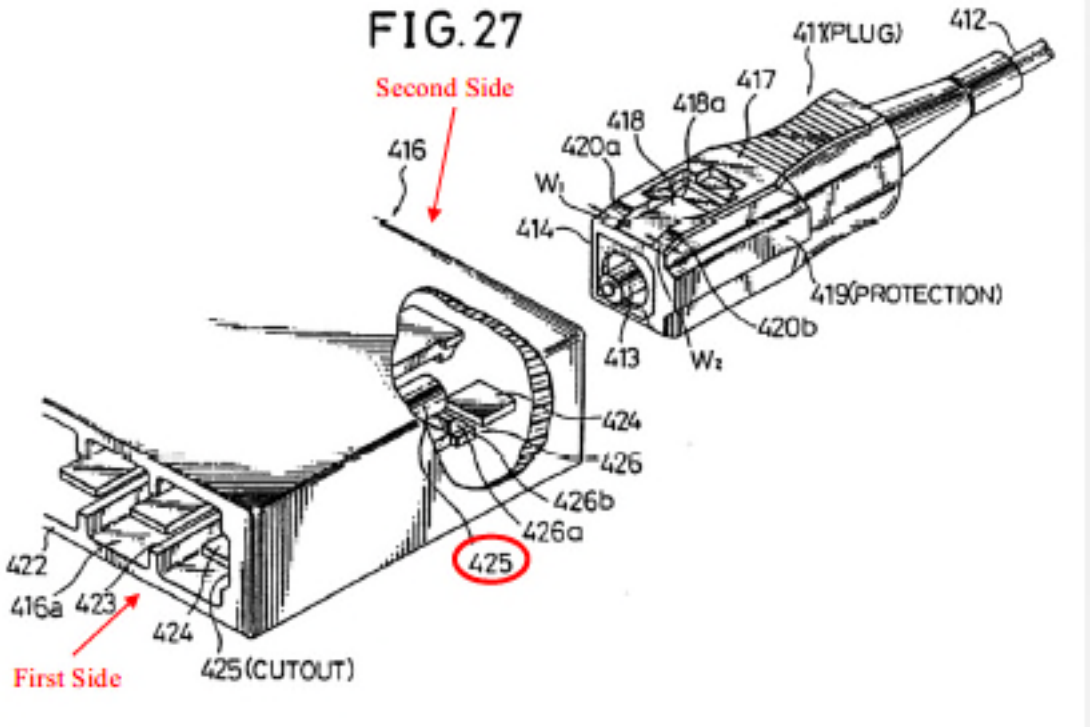
### 8.P "An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising:"

182. As discussed previously, Iwano teaches an optical connector having a "connector housing" (416)—i.e. an adapter—for aligning and connecting optical connector plugs (411) inserted from opposite first and second sides of the connector housing. EX1006: 30:12-15 ("On the other hand, in the connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted, and with projections 424 and grooves 425 fitted to the grooves 418 and the projection 419 of the optical connector plugs 411, respectively."), 31:14-17 ("therefore, the structure of the present invention is advantageous in particular when applied to a plug-in optical connector for allowing a plurality of fibers to be connected simultaneously, because the highest possible mounting density is required for the plug-in optical

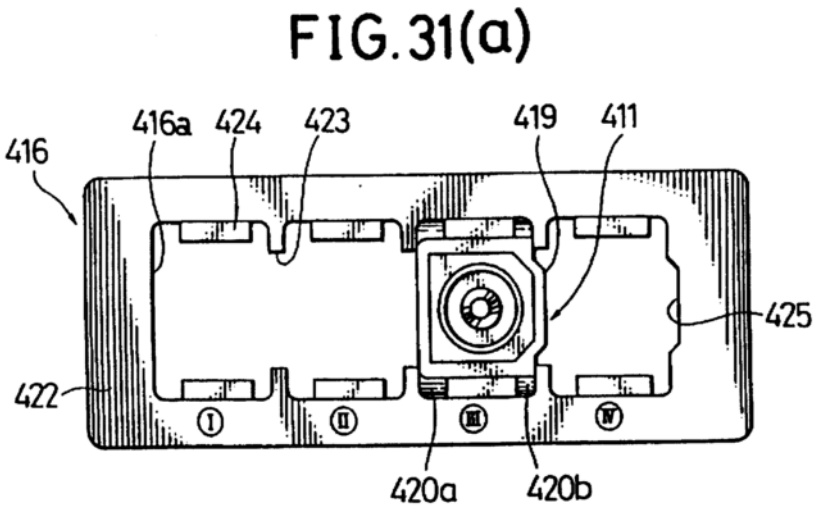


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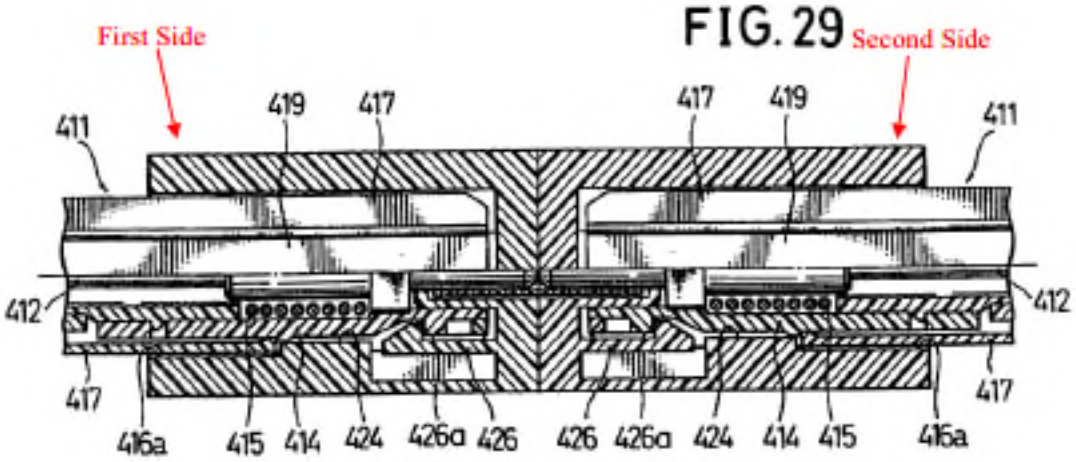
connector."), Fig. 27 and 31(a) (reproduced and annotated below), Fig. 29 (reproduced and modified below).




EX1006: Fig. 27 (The first side is on the left of connector housing 416 and the second side is on the right of connector housing 416).

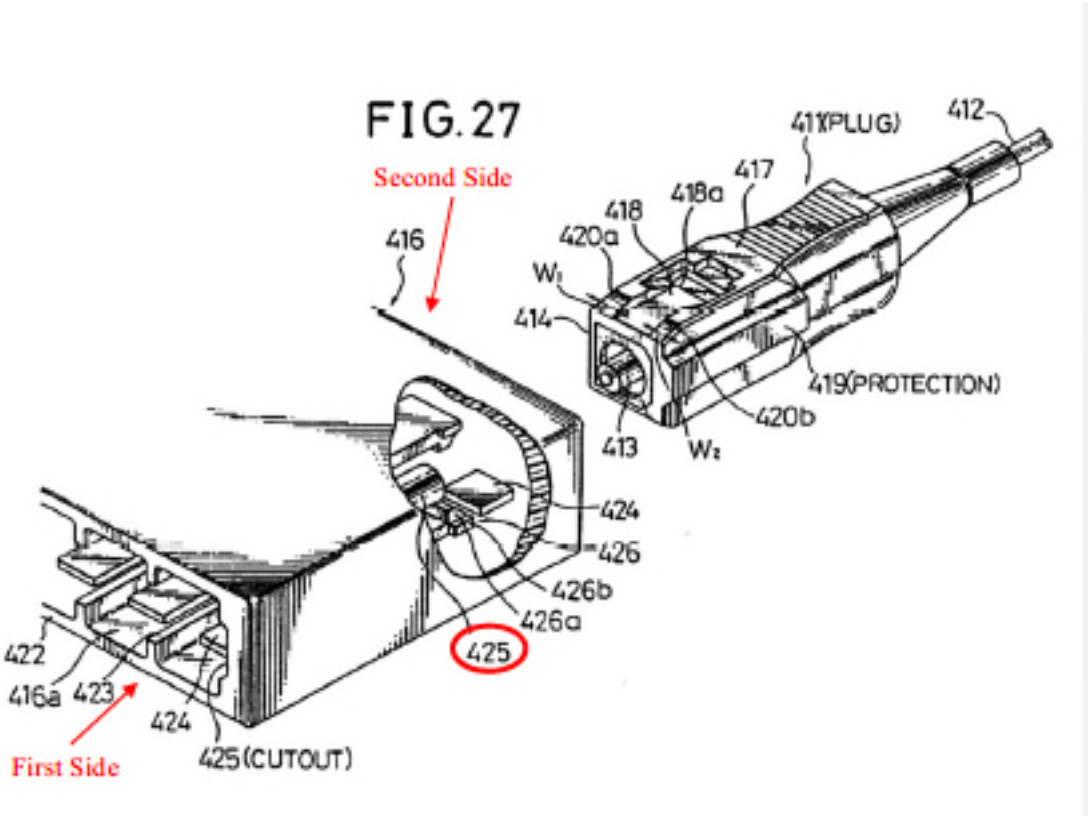


EX1006: Fig. 31(a).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, the first side is on the left and the second side is on the right).

183. More specifically, the optical connector plugs (411) include ferrules (413) which are inserted into cylindrical hollow alignment sleeves (425) of the connector housing (416) for aligning the ferrules of two optical connector plugs. EX1006: Figs. 25 and 27, 30:18-21 (“Further, cylindrical hollow alignment sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416.”).




EX1006: Fig. 27 (annotated).

184. As taught by Iwano, a person of skill in the art would recognize that Iwano's "connector housing" (416) is an "adapter" in the context of the '415 Patent. EX1006: 28:10-12 (identifying a prior art connector housing which Iwano improves upon as an "adapter"), Fig. 25 (same).

185. I understand that, under relevant case law, preambles are typically considered to be non-limiting where the claim body recites a structurally complete invention and the preamble only states an intended use for the invention.

186. Claim 8's phrase "multi-fiber ferrule" is only recited to state a purpose and intended use of the claimed adapter. The body of claim 8 recites a structurally complete invention for an adapter that is agnostic as to whether the connectors for which the adapter is being used has multi-fiber ferrules. Claim 8 is directed to the adapter, not the entire fiber optic system that includes the adapter and the fiber optic connectors. EX1001: claim 8. In fact, "multi-fiber ferrule" is never recited in the body of claim 8, nor in the bodies of dependent claims 9-11, and thus the distinction between "multi-fiber" ferrules and single fiber ferrules is not essential to give life, meaning, or vitality to the claim. EX1001: claims 8-11.

187. As such, I understand that the recitation of a "multi-fiber ferrule" within the pre-amble is non-limiting.

188. Accordingly, Iwano's connector housing (416) meets the preamble of Claim 8: "An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising."

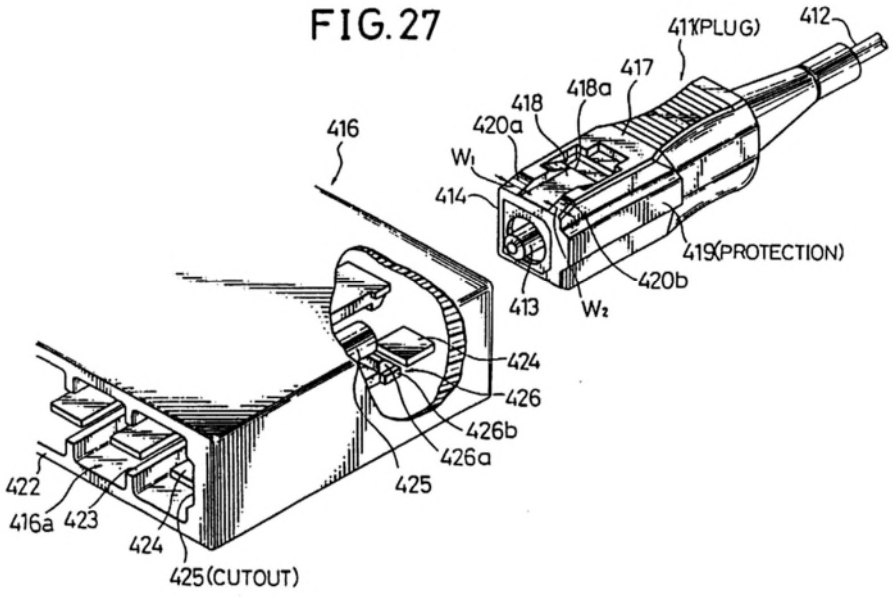
#### 8.a.1 "an opening extending between a first side and a second side of the adapter,"

189. As discussed previously, Iwano's connector housing (416) has a "housing body 422 formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted." EX1006: 30:12-15, Fig. 27.

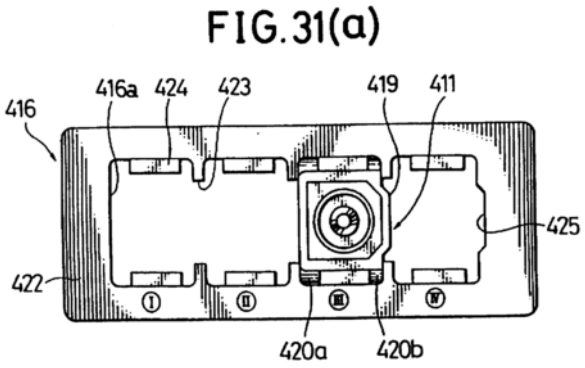
190. As shown in Figures 27 and 31(a), each of the plurality of insertion holes "416a" is continuous with the other insertion holes.



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EX1006: Fig. 27.

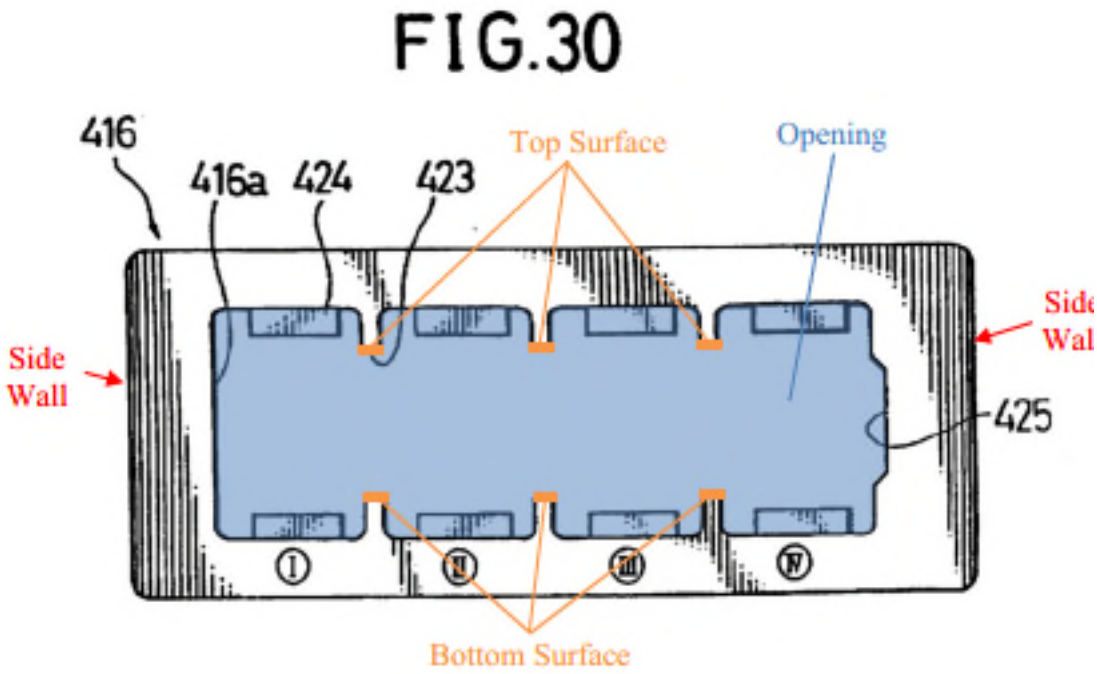



EX1006: Fig. 31(a).

191. Since each insertion hole (416a) is continuous with the other insertion holes, a person of ordinary skill in the art would recognize that the plurality of insertion holes (416a) form a single opening. EX1006: Figs. 27 and 31(a). Notably, Iwano discusses this in the context of the prior art adapter that it depicts

in Figures 26(a), 26(b) by stating "adjacent insertion holes . . . are connected to each other." EX1006: 29:4-5.

192. The housing body (422) includes two opposing side walls, a top surface, and a bottom surface that define the opening.



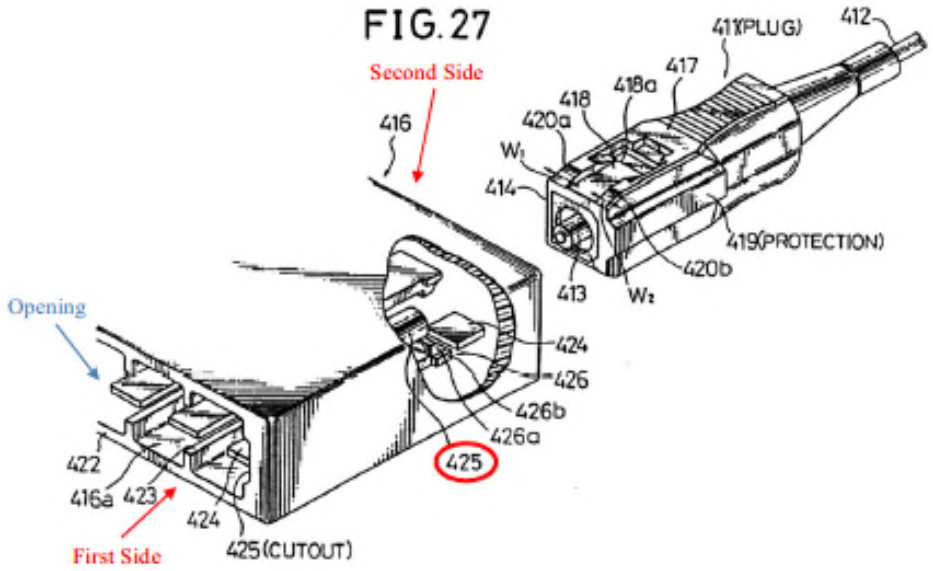

EX1006: Fig. 30 (annotated).

193. Iwano also explains that the optical connector plugs (411) are inserted into the opposite sides of the connector housing (416). EX1006: 28:4-14 (addressing the prior art to explain that "[a] pair of optical connector plugs . . . are fitted to both the side surfaces of the connector housing . . . for coupling the two optical connector plugs").

194. Iwano's opening includes the holes formed by the "cylindrical hollow alignments sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted." EX1006: 30:18-21.

195. Iwano explains the alignment sleeves (425) "are provided within the insertion holes 416a of the connector housing 416." EX1006: 30:18-21.

196. Thus, a person of skill in the art would understand that Iwano's opening extends between the first and second sides.

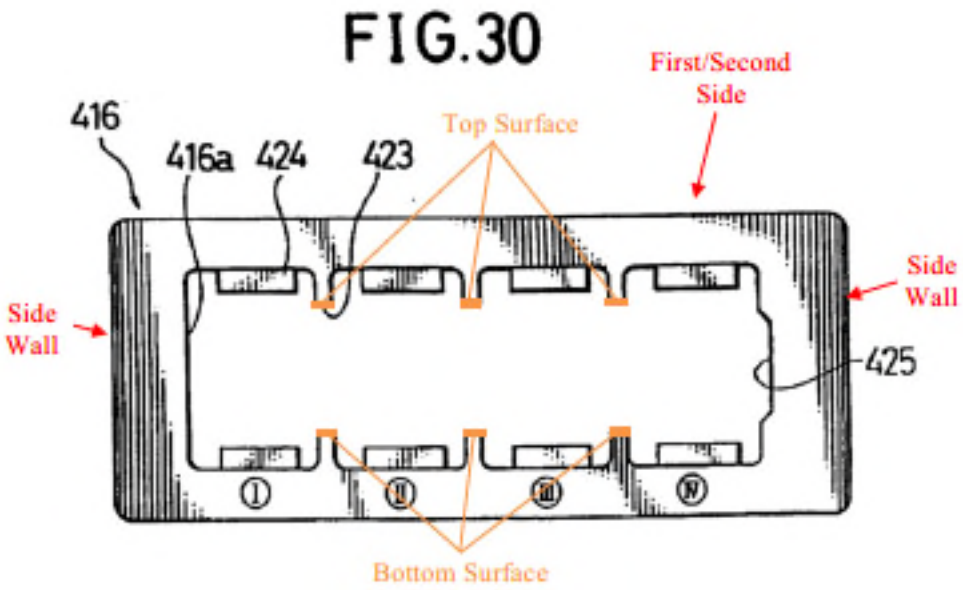



EX1006: Fig. 27 (annotated).

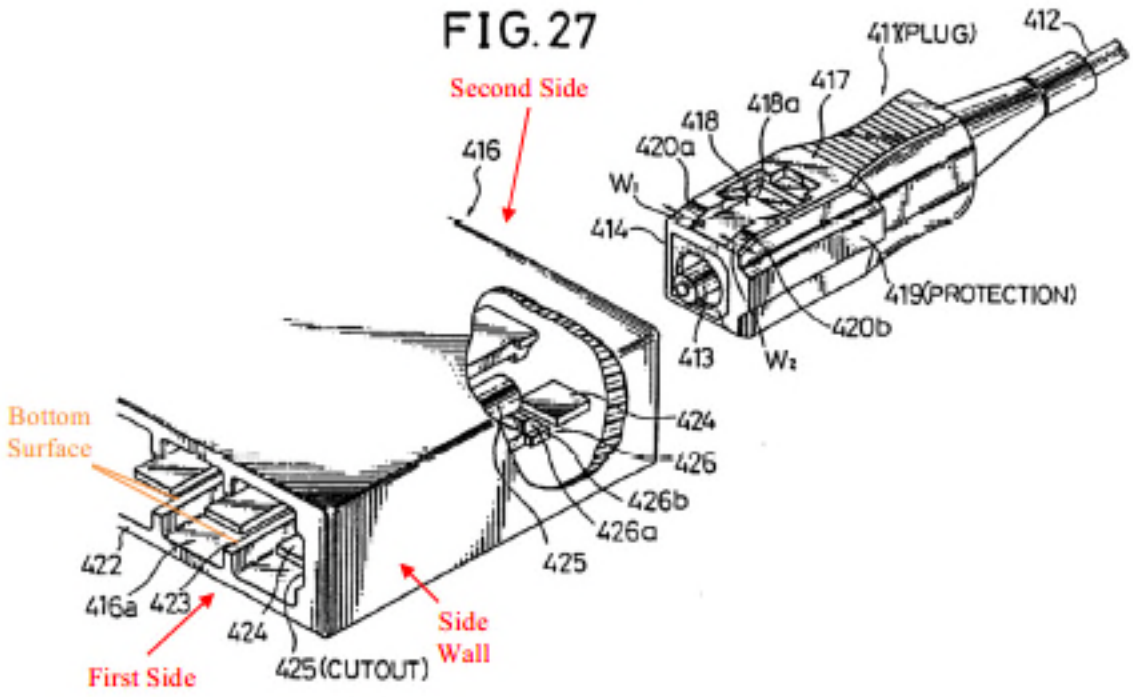
197. Therefore, Iwano's connector housing (416) meets the limitation of "an opening extending between a first side and a second side of the adapter."

### 8.a.2 "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface,"

198. Each of the first and second sides of Iwano's connector housing (416) are respectively defined by two opposing side walls, a top surface, and a bottom surface, as shown below:




EX1006: Fig. 30 (annotated).

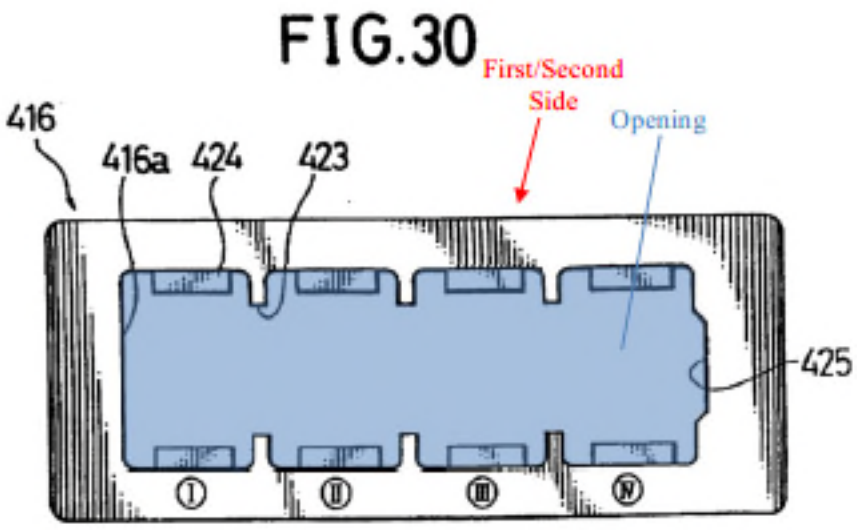



EX1006: Fig. 27 (annotated).

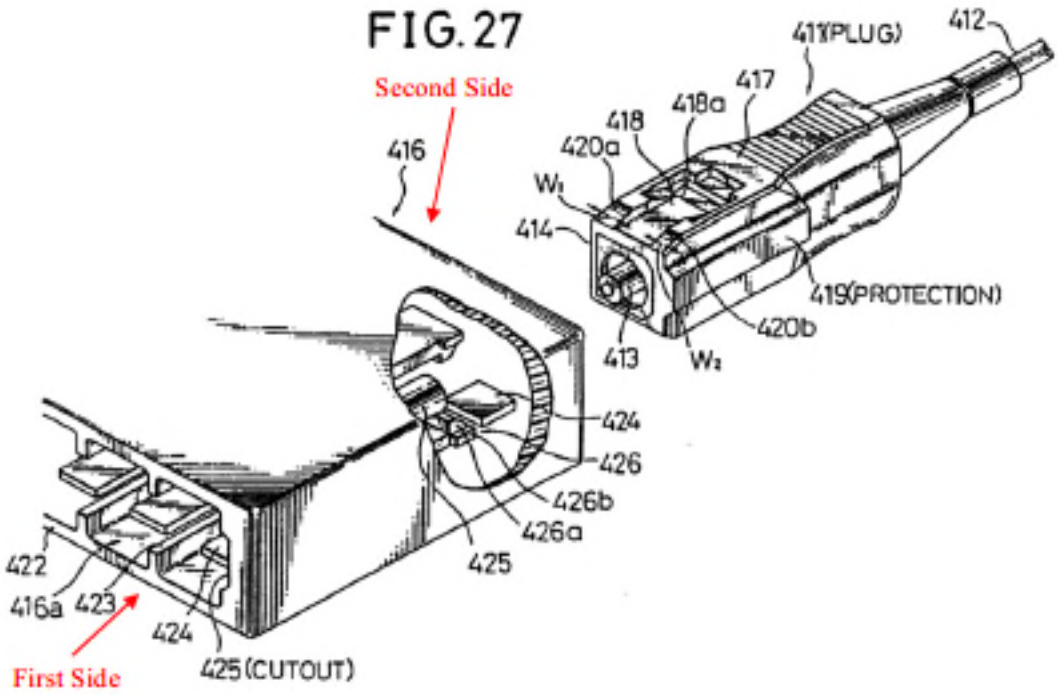
199. Therefore, Iwano's connector housing (416) meets the limitation of "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface."

### 8.a.3 "the opening configured to receive at least two fiber optic connectors from the first side; and"

200. Iwano's opening receives up to four pairs of optical connector plugs (411) from each side. EX1006: Figs. 27 and 30, 28:61-65, 29:44-45, 30:12-15, 30:40-43. As illustrated, the opening of the connector housing (416) can receive a plurality of (e.g., four) optical connector plugs (411) from the first side and the second side. EX1006: Fig. 30, 30:40-43.




EX1006: Fig. 30 (annotated).




EX1006: Fig. 27 (annotated).

201. Therefore, Iwano's connector housing (416) meets the following limitation: "the opening configured to receive at least two fiber optic connectors from the first side."

**8.b "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side; and"**

202. As just discussed above, Iwano's opening can receive a plurality of (e.g., four) optical connector plugs (411) from the second side.

203. The optical connector plugs (411) inserted from the second side mate with the optical connectors inserted from the first side. EX1006: 28:4-9, 28:12-14, 29:40-44, 31:14-17.

204. For each pair of optical connector plugs (411), one inserted from the first side and one inserted from the second side, the ferrules (413) of the two optical connector plugs are inserted into the cylindrical hollow alignment sleeves (425) for mating and forming an optical connection between the two optical connector plugs. EX1006: Figs. 25 and 27, 28:4-9, 30:18-21.

205. Therefore, Iwano's connector housing (416) meets the following limitation: "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side."



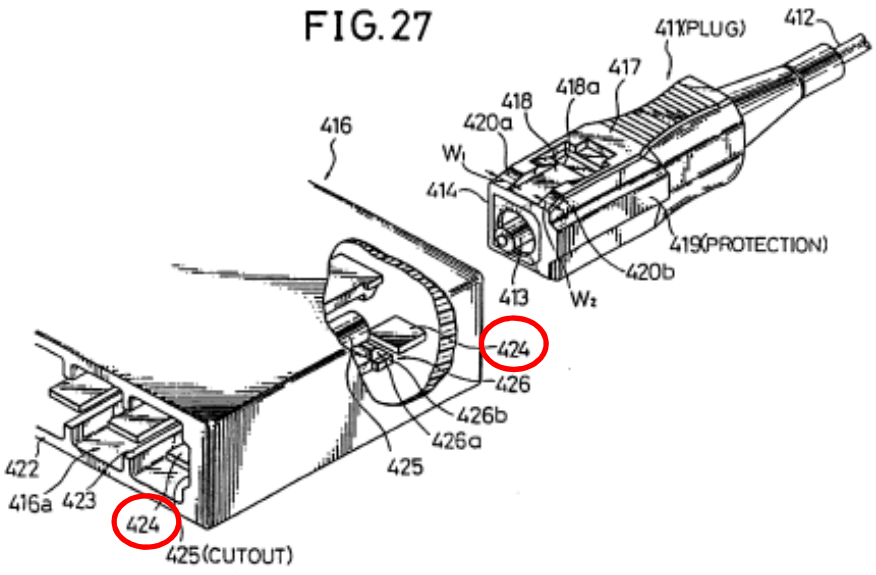
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### 8.c.1 "a central portion between the first side and the second side and"

206. Iwano's connector housing (416) includes a central portion comprising the projections (424) that separates the first and second sides of the connector housing.

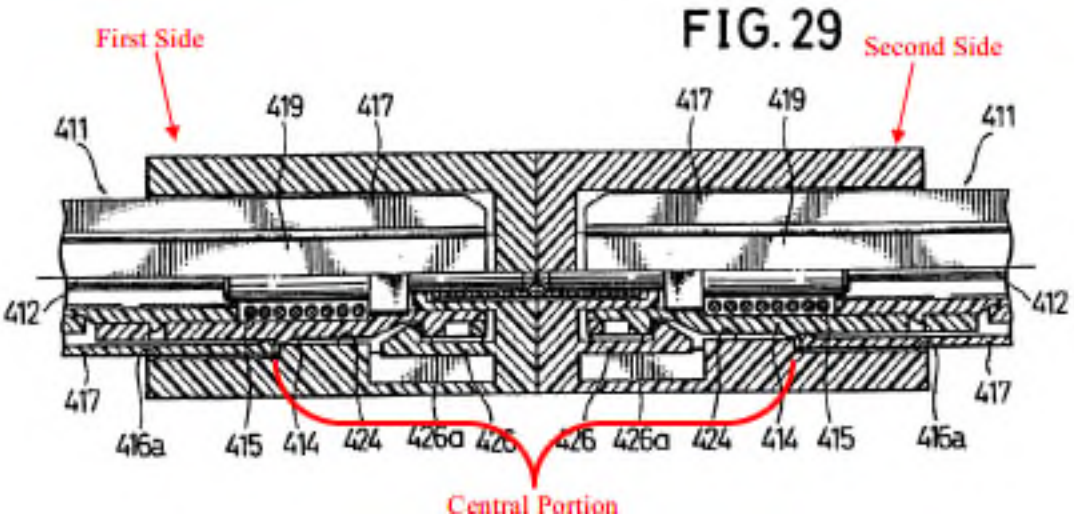
207. Iwano's connector housing (416) includes "projections 424 formed within the insertion holes 416a." EX1006: 30: 33-34.

208. As shown in Fig. 27, one set of projections (424) is spaced inward from the first end of the opening and the other set of projections is spaced inward from the opposite second end of the opening. EX1006: Fig. 27.

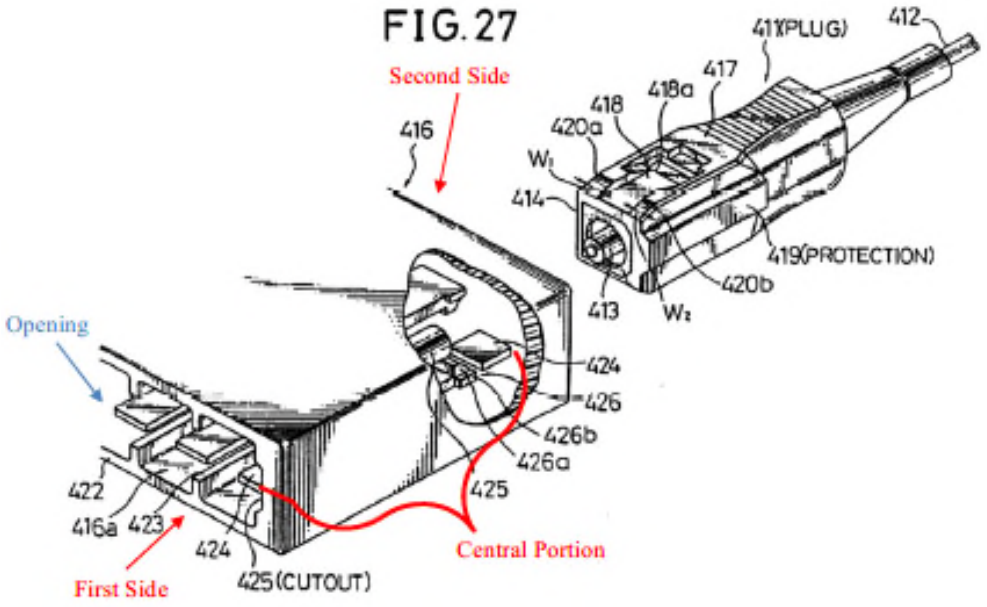



EX1006: Fig. 27 (annotated).

209. The region between and including the projections (424) constitutes a central portion of Iwano's connector housing (416), as shown below:




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).




EX1006: Fig. 27 (annotated).

210. Therefore, Iwano's connector housing (416) meets the limitation of "a central portion between the first side and the second side."

### 8.c.2 "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion,"

211. Iwano's projections (424) are part of the central portion, with the bottom set of projections forming a bottom surface and the upper set of projections forming a top surface. EX1006: Figs. 27 and 30.

212. The projections (424) of Iwano's connector housing (416) are disposed in grooves (425), spaced between either (1) adjacent partition walls (423) of the connector housing, or (2) a side wall of the housing body (422) and one of the partition walls. EX1006: Figs. 27 and 30. Thus, Iwano's connector housing (416) has a plurality of grooves disposed in a second top surface of the central portion and a plurality of grooves disposed in a second bottom surface of the central portion, as shown below:

FIG.30

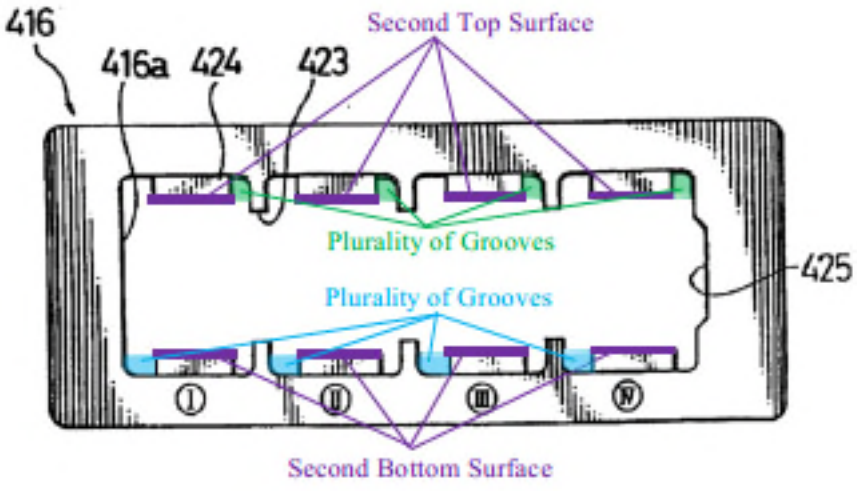
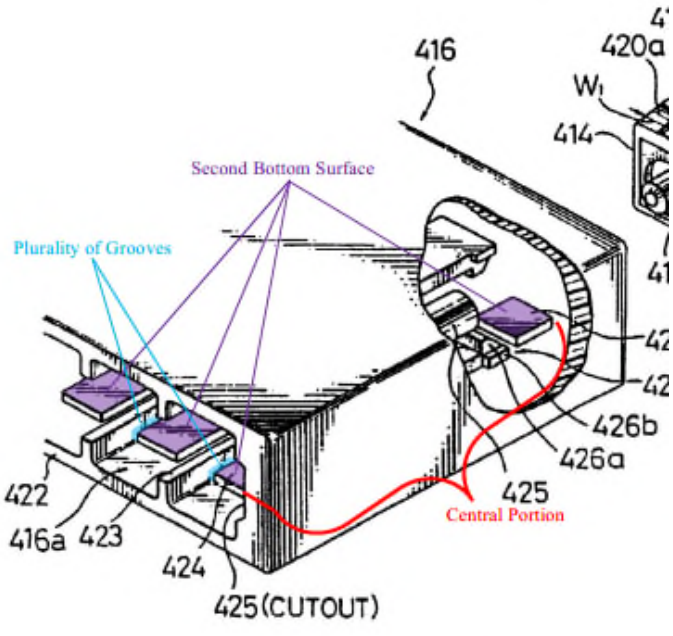


FIG. 27

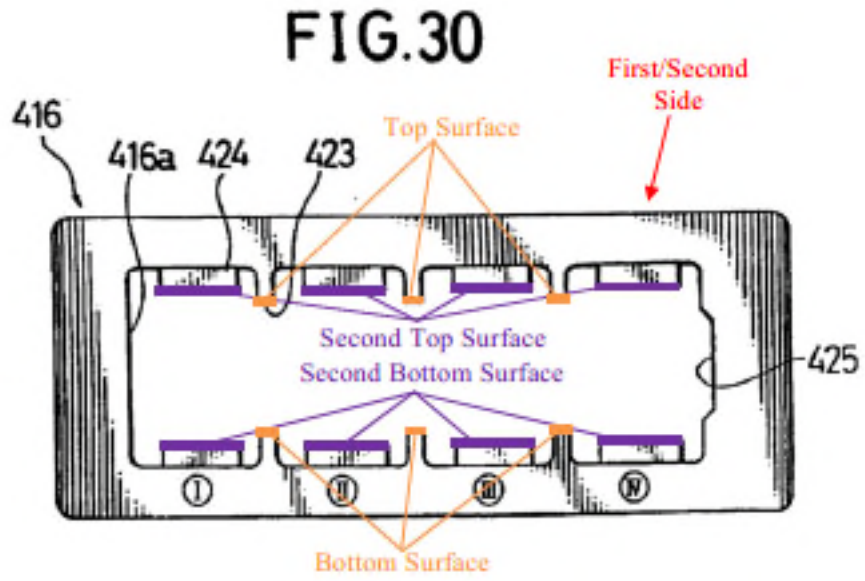



EX1006: Figs. 27 and 30 (annotated).

213. Therefore, Iwano's connector housing (416) meets the limitation of "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion."

**8.c.3 "the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side and the second side,"**

214. As shown below, the second top surface and the second bottom surface formed by the projections (424) are different than the respective top surface and bottom surface of the first and second sides:




EX1006: Fig. 30 (annotated).

215. Therefore, Iwano's connector housing (416) meets the limitation of "the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side and the second side."

**8.c.4 "each of the plurality of grooves extending toward a center of the adapter."**

216. Figs. 27 and 30 of Iwano show that the pluralities of grooves in the second top and bottom surfaces have open ends at the first and second sides. EX1006: Figs. 27 and 30.

FIG.30

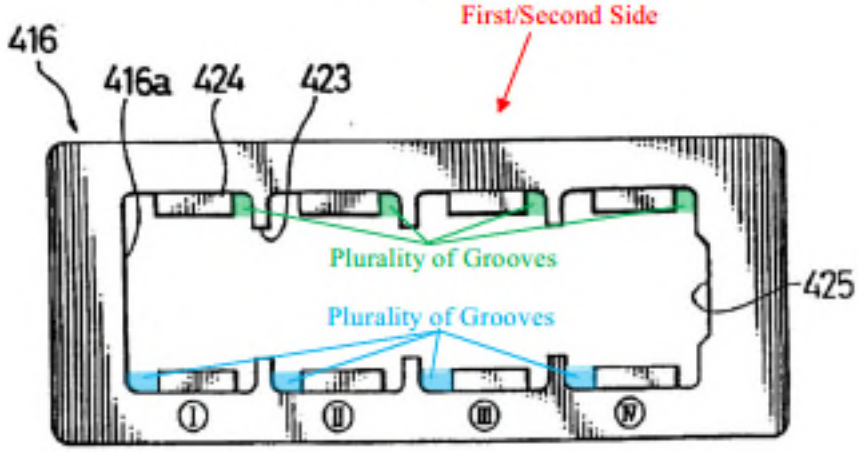
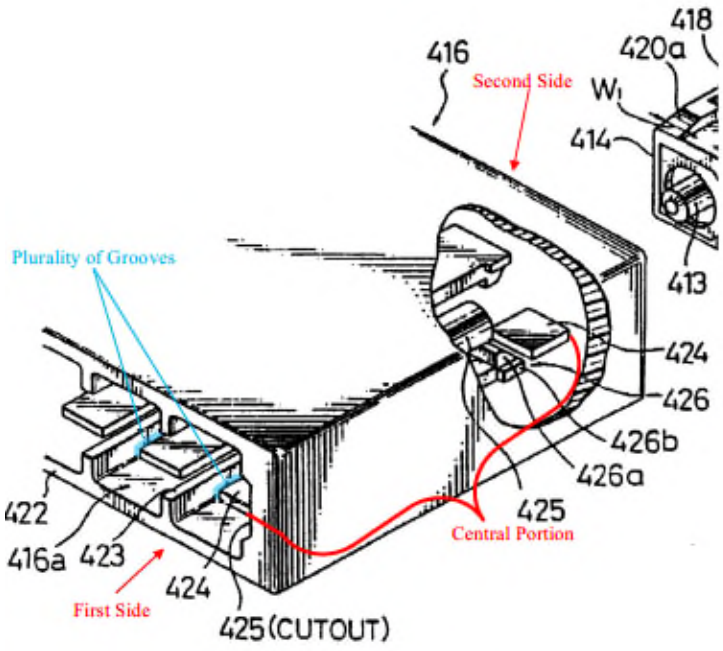
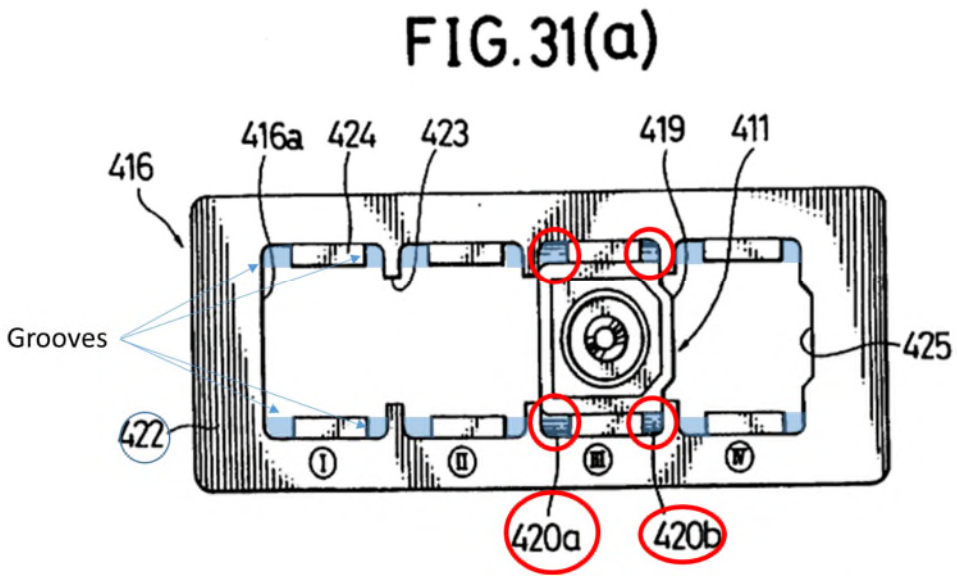



FIG.27




EX1006: Figs. 27 and 30 (annotated).

217. This allows the grooves to receive inclined projection portions (420a, 420b) of the optical connector plug (411) when the optical connector plug is inserted into the connector housing (416). EX1006: Fig. 31(a), 30:47-53.




EX1006: Fig. 31(a) (annotated).

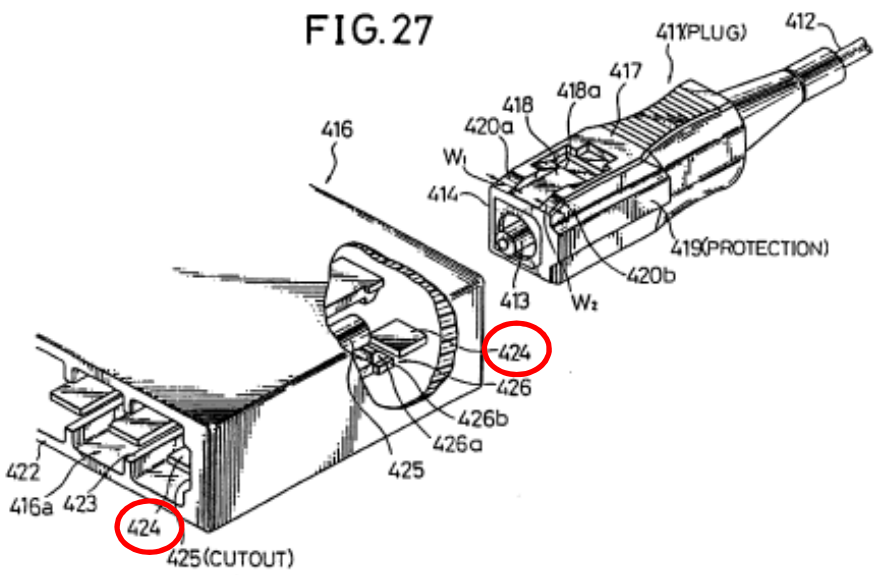
218. Accordingly, the person of skill in the art would understand that the pluralities of grooves extend into the central portion from a side of the connector housing (416).

219. Iwano's connector housing (416) connects optical connector plugs (411) inserted into either side of the connector housing. EX1006: Figs. 27 and 31(a), 28:4-14 (addressing the prior art to explain that "[a] pair of optical connector plugs . . . are fitted to both the side surfaces of the connector housing . . . for coupling the two optical connector plugs"), 30:12-15 ("On the other hand, in the

connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted. . .").

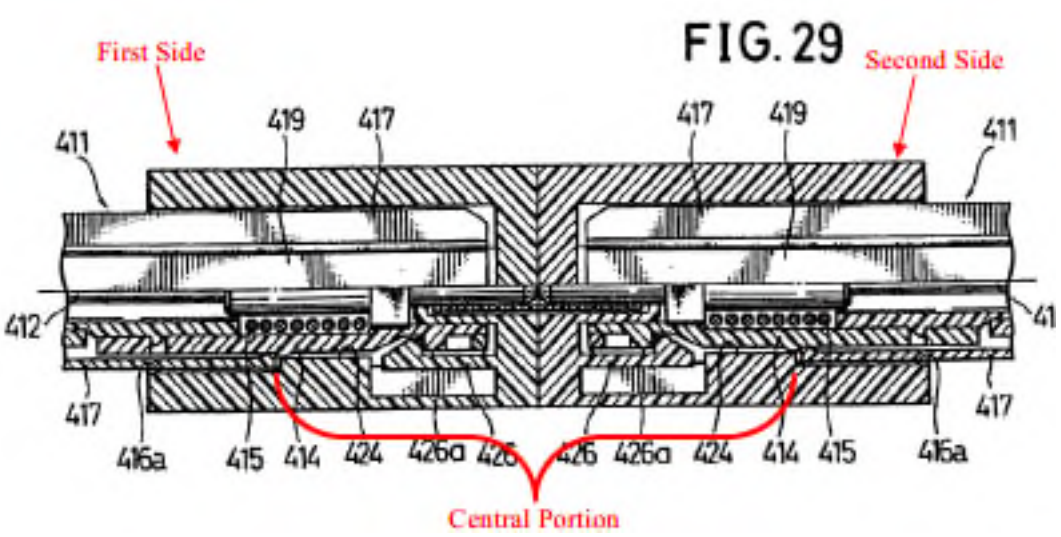
220. The person of skill in the art understands the structure (e.g., projections (424), parition walls (423), etc.) shown on one half of Iwano's connector housing (*see* Figs. 27 and 30) is also present on the other half of Iwano's connector housing, as shown in modified Fig. 29 below.

221. Iwano's Fig. 27 indicates as much as it shows projections (424) on both halves of Iwano's connector housing (416). EX1006: Fig. 27.




EX1006: Fig. 27 (annotated).

222. Thus, the person of skill in the art would understand that the pluralities of grooves are present on both halves of Iwano's connector housing (416), and that the pluralities of grooves extend into the central portion from the first and second sides.




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

223. Therefore, Iwano's connector housing (416) meets the limitation of "each of the plurality of grooves extending toward a center of the adapter."

## I. Claim 9

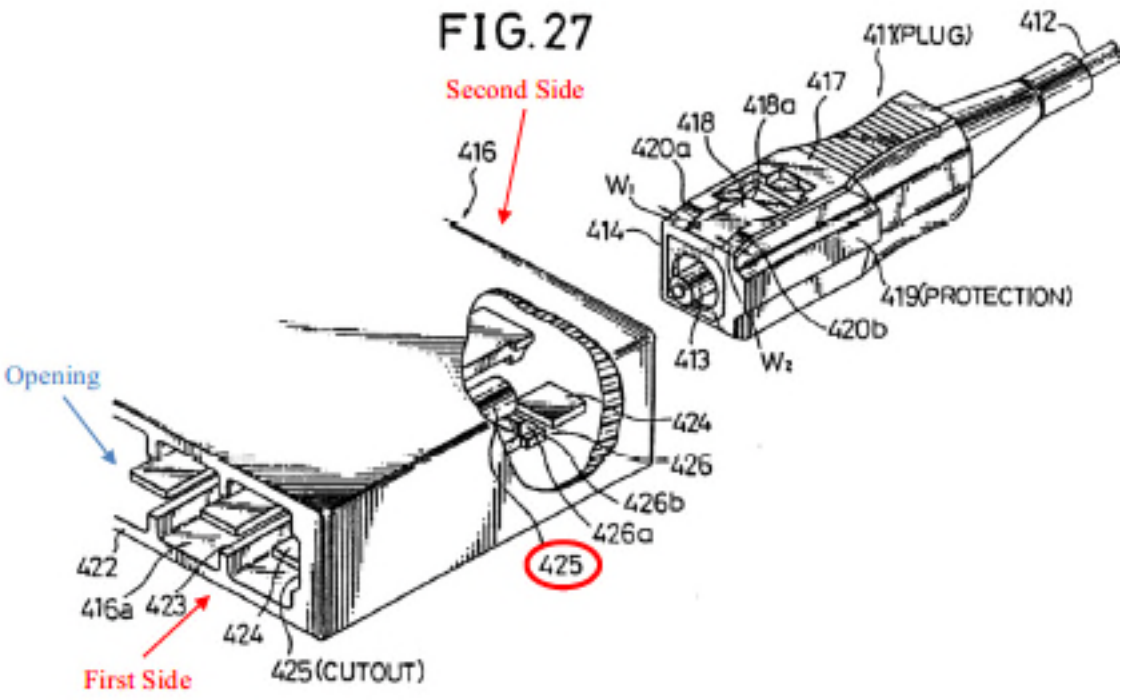
### 9.a "The adapter according to claim 8, wherein the first side and the second side of the opening are in communication with one another in the central portion,"

224. Iwano explains the "housing body 422 formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted." EX1006: 30:12-15.

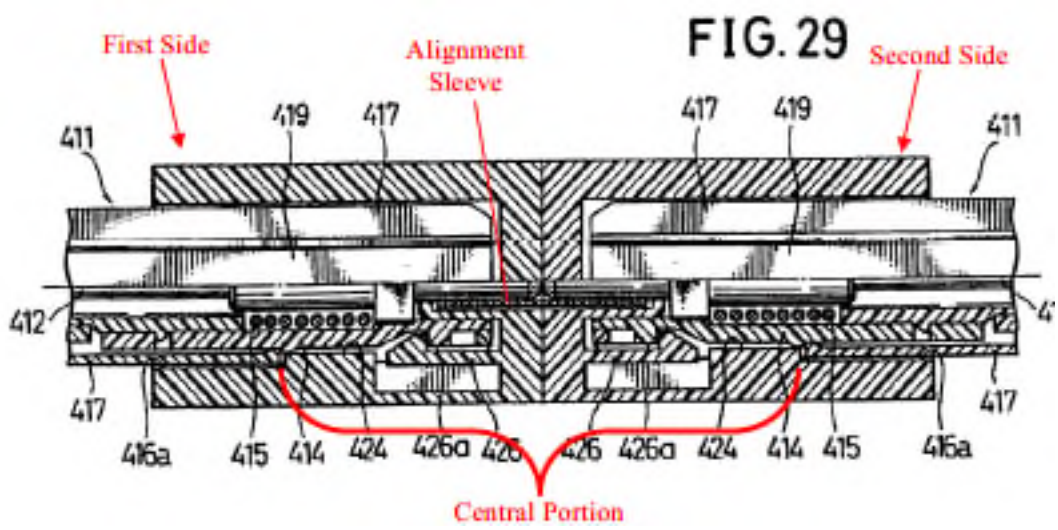
225. Iwano's opening includes the holes formed by the cylindrical hollow alignments sleeves (425) in the central portion of the connector housing. EX1006: 30:18-21, Figs. 27 and 29.

226. The alignment sleeves (425) "are provided within the insertion holes 416a of the connector housing 416." EX1006: 30:18-21.

227. Thus, the first and second sides of the opening are in communication with one another via the hollow alignment sleeves (425) in the central portion.




EX1006: Fig. 27 (annotated).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

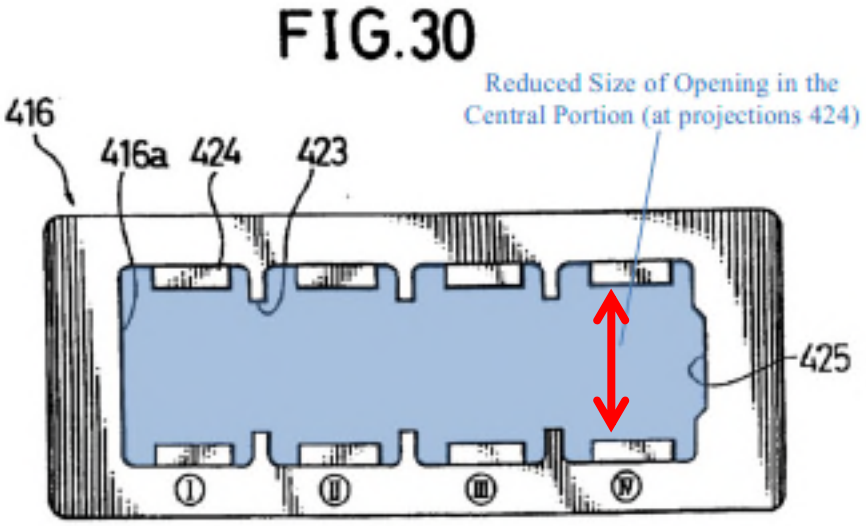
228. Therefore, Iwano's connector housing (416) meets the following limitation: "The adapter according to claim 8, wherein the first side and the second side of the opening are in communication with one another in the central portion."

**9.b "the opening being smaller in the central portion than on the first side and the second side."**

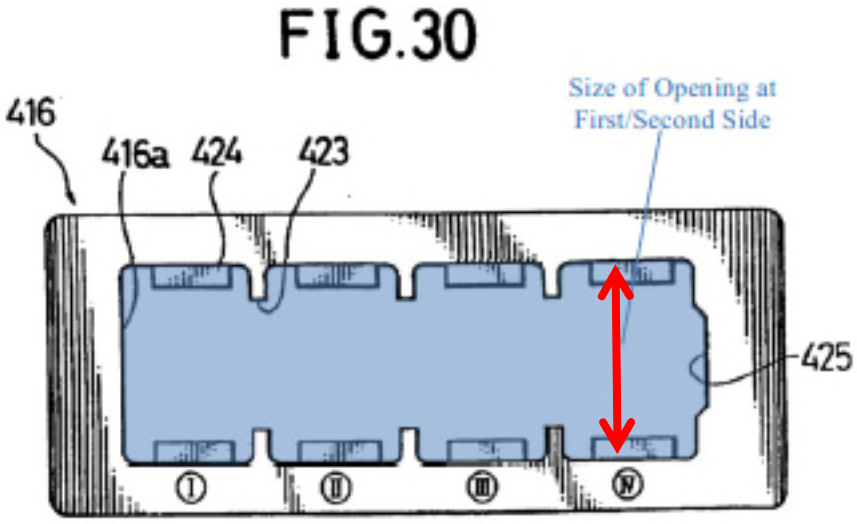
229. The central portion of Iwano's housing body (422) includes projections (424). EX1006: Figs. 27 and 30, 30:12-17.

230. The projections (424) along the bottom of the housing body (422) extend upward into the opening and the projections along the top of the housing body extend downward into the opening. EX1006: Fig. 30.

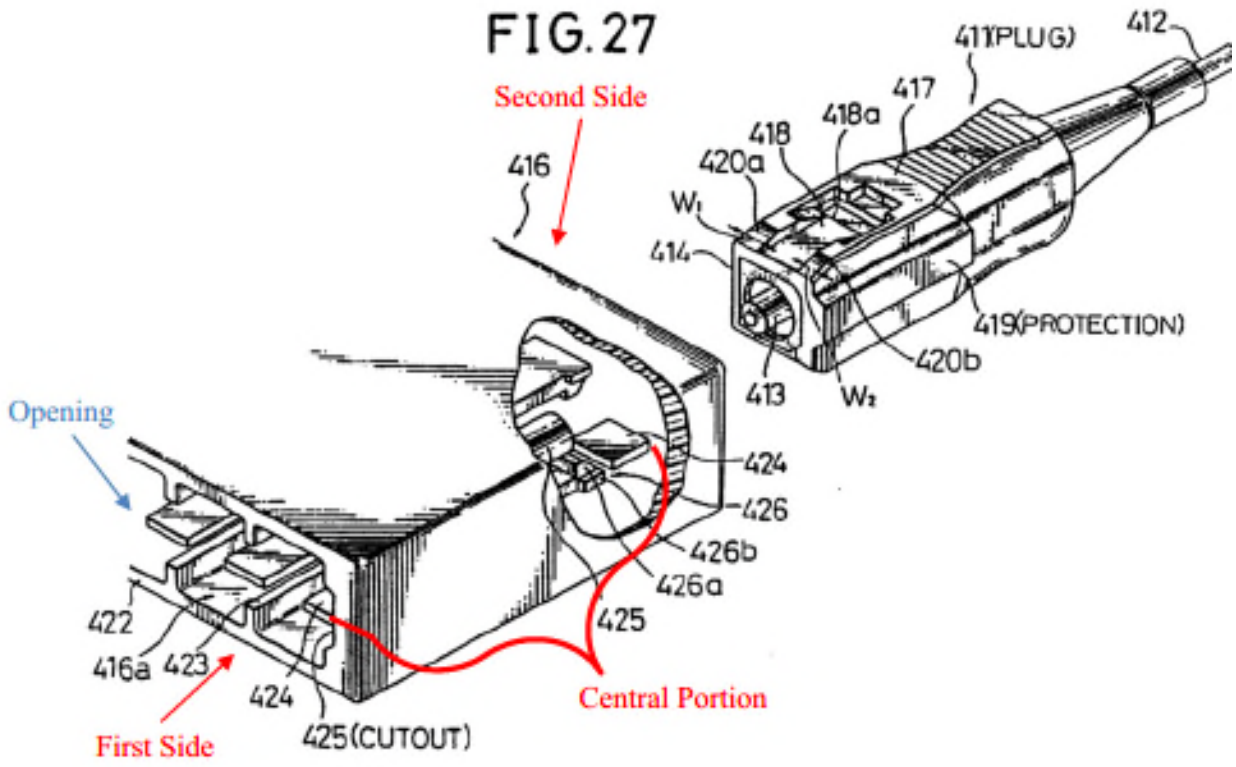
231. Thus, Iwano's projections (424) make the opening in the central portion of Iwano's housing body (422) smaller than the opening in the first and second sides.



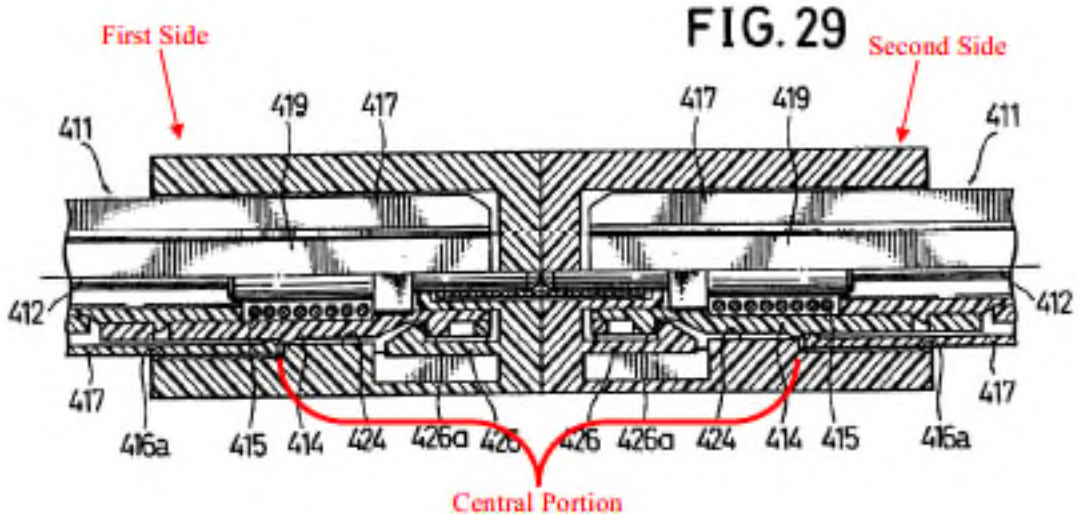

EX1006: Fig. 30 (annotated).




EX1006: Fig. 30 (annotated).




EX1006: Fig 27 (annotated).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing annotated).

232. Therefore, Iwano's connector housing (416) meets the limitation of "the opening being smaller in the central portion than on the first side and the second side."

### J. Claim 10 – "The adapter according to claim 8, wherein the first and second sides are configured to receive a plurality of fiber optic connectors."

233. Iwano's connector housing (416) is for connecting four pairs of optical connector plugs (411). EX1006: Figs. 27 and 30, 28:64-65 ("FIGS. 26(a) and (b) show a connector housing 420 to which a plurality of optical connector plugs 401 are fitted."), 29:40-44 ("The fifth feature of the optical connector according to the present invention is to provide an optical connector locating structure in which the optical connector plugs can be inserted only in a predetermined direction or orientation . . ."), 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

234. As illustrated, the first and second sides of the connector housing (416) can each receive a plurality of (e.g., up to four) optical connector plugs (411). EX1006: Fig. 30, 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

FIG.30

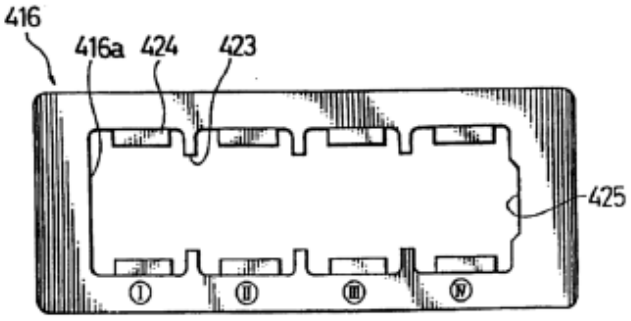
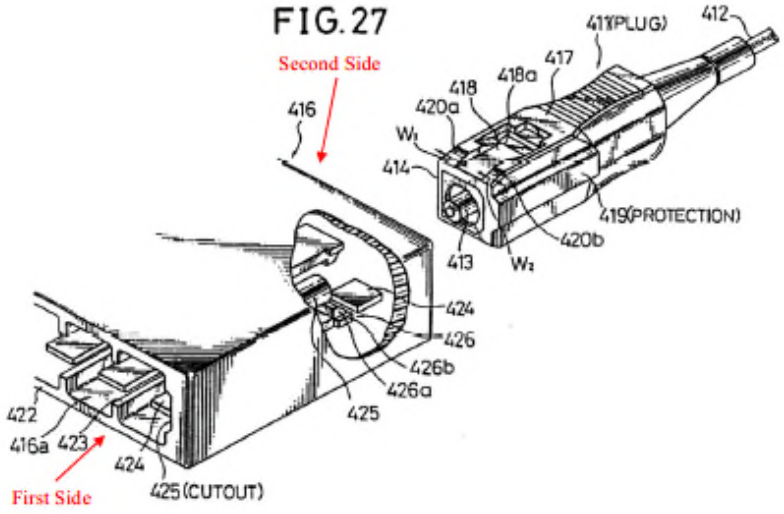



FIG.27




EX1006: Figs. 27 and 30 (annotated).

235. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 8, wherein the first and second sides are configured to receive a plurality of fiber optic connectors."

**K. Claim 11 – "The adapter according to claim 8, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the**

**second bottom surface of the central portion have a second width, and the first and second widths are different."**

236. Iwano's projections (424) are part of the central portion, with the bottom set of projections forming a bottom surface and the upper set of projections forming a top surface. EX1006: Figs. 27 and 30.

237. The projections (424) of Iwano's connector housing (416) are disposed in grooves (425), spaced between either (1) adjacent partition walls (423) of the connector housing, or (2) a side wall of the housing body (422) and one of the partition walls. EX1006: Figs. 27 and 30. Thus, Iwano's connector housing (416) has a plurality of grooves disposed in a second top surface of the central portion and a plurality of grooves disposed in a second bottom surface of the central portion, as shown below:

FIG.30

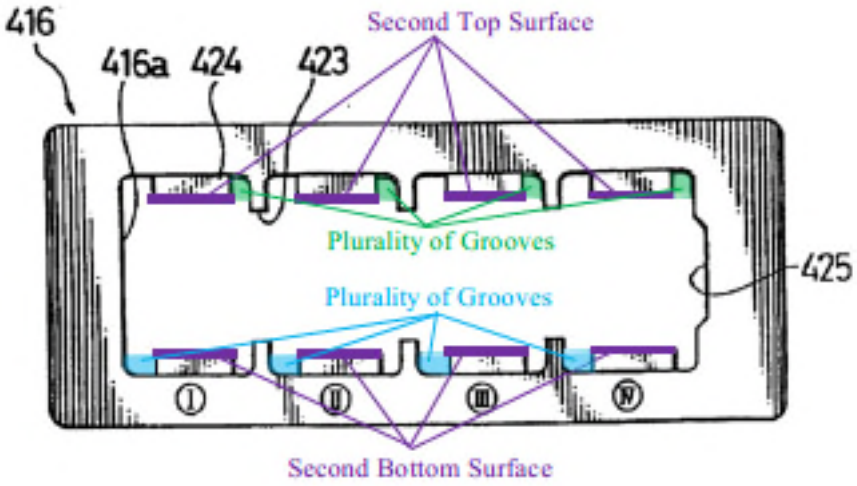
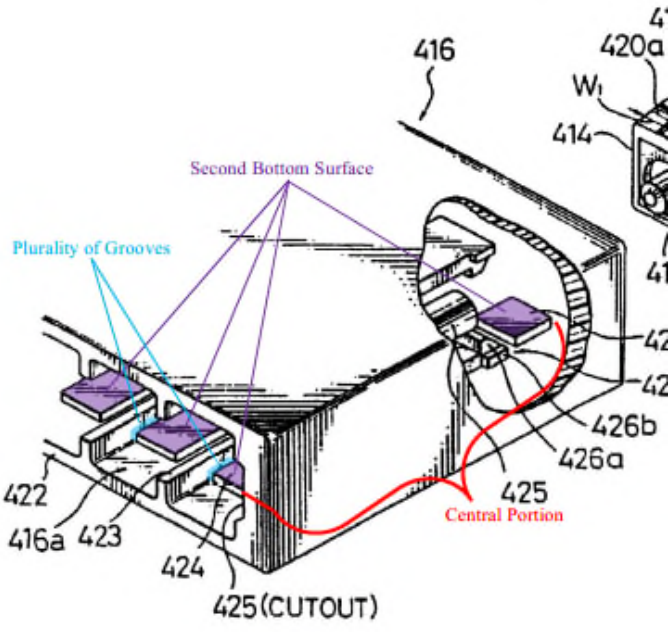


FIG. 27

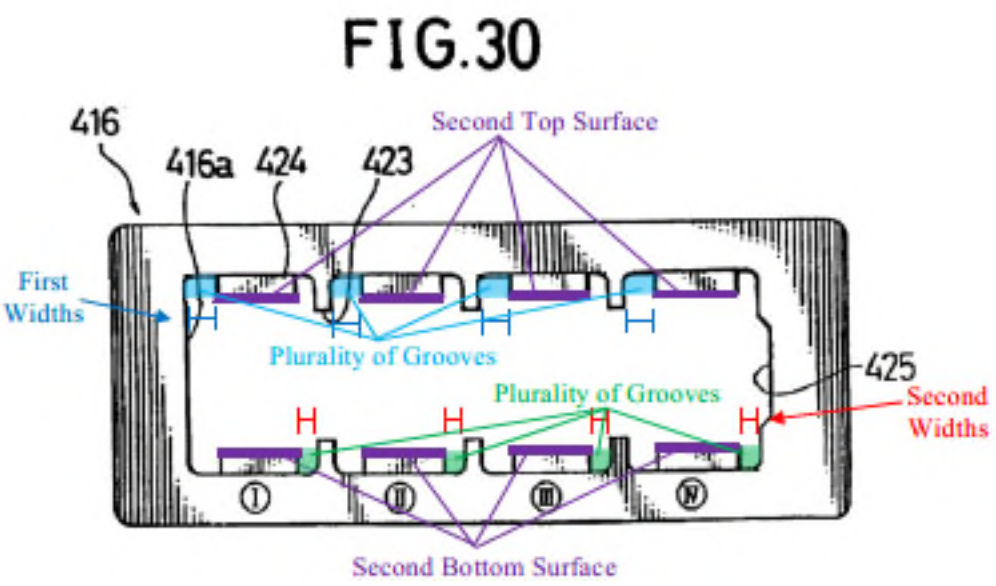



EX1006: Figs. 27 and 30 (annotated).

238. Each of the grooves in the top surface of the central portion have a first width and each of the grooves in the bottom surface of the central portion have a second width. EX1006: Fig. 30 (annotated) and 31(a)&(b).



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EX1006: Fig. 30 (annotated).

239. As illustrated and described, the first and second widths are different. EX1006: Fig. 30 (annotated) and 31(a)&(b), 30:1-5, 30:44-54.

240. Iwano explains the indicated first and second widths are different "to prevent the optical connector plug 411 from being inserted into the connector housing 416 erroneously." EX1006: 30:55-57.

241. The different width of these grooves of Iwano's connector housing (416) is a direct function of the projection portions (420a, 420b) of the optical connector plug (411) having different widths. EX1006: 30:15-17 ("projections 424 [being] fitted to the grooves 418 … of the optical connector plugs 411").

242. The different widths of the grooves of Iwano's connector housing (416) (i.e. adapter) match the different widths of the projection portions (420a,

420b) of the optical connector plug (411) so that the optical connector plug (411) can only be inserted in one orientation. EX1006: Figs. 31(a)&(b), 30:44-54.

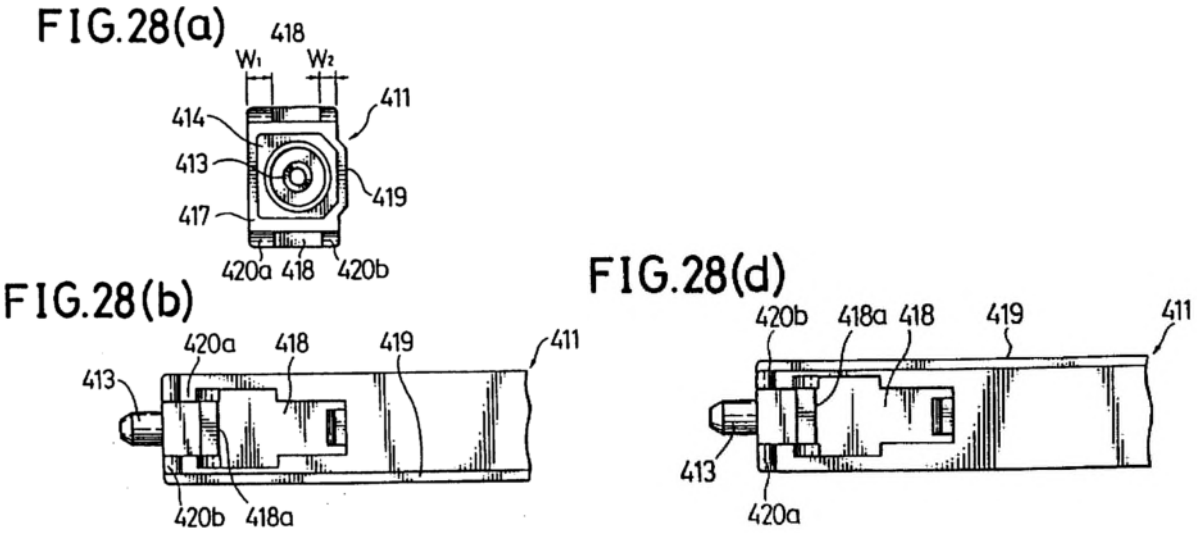
243. Iwano explains:

> The groove 418 is formed on each of the two opposing side surfaces of the knob 417 so as to be **a little offset** from the middle portion thereof, in such a way that the **width W1** of one inclined projection portion 420a **is wider than that W2** of the other inclined projection portion 420b.

EX1006: 30:1-5.

> In the above-mentioned structure between the optical connector plug 411 and the connector housing 416, even when only a single optical connector plug is inserted into a part III, for instance as shown in FIG. 31(a), it is impossible to insert the optical connector plug 411 in the reverse direction, because the groove 418 between the projections 420a and 420b having ***two different widths W1 and W2*** of the optical connector plug 411 will not be engaged with the projections 424 of the connector housing 416 with an interference 430 (W1 -W2) between the two.

EX1006: 30:44-54.




EX1006: Figs. 28(a), (b), and (d).

FIG. 31(a)

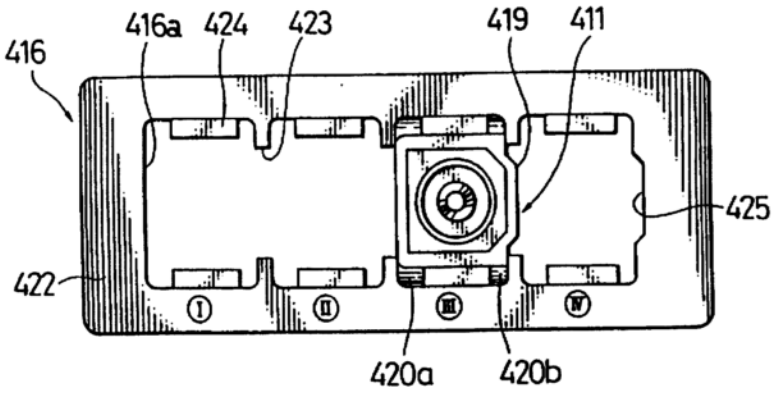
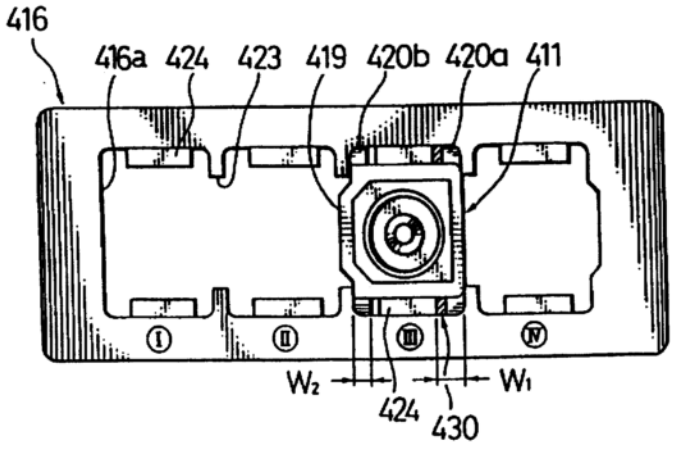



FIG. 31(b)



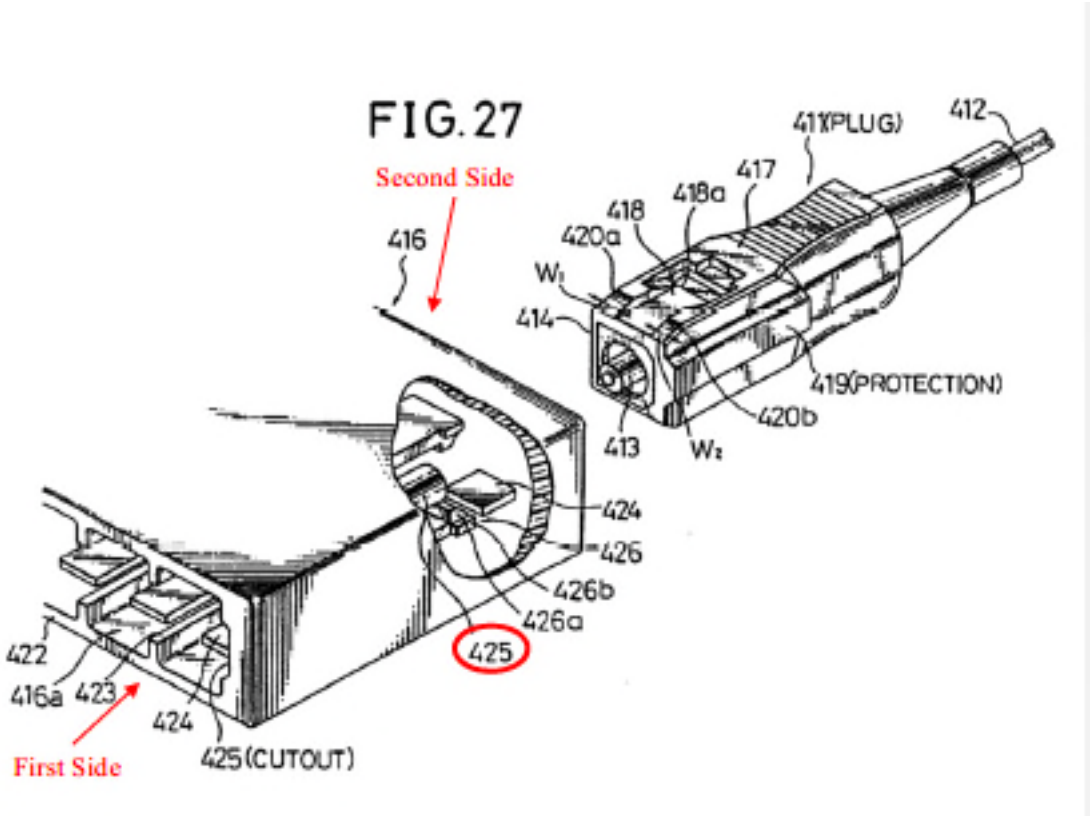

EX1006: Figs. 31(a)&(b).

244. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 8, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different."

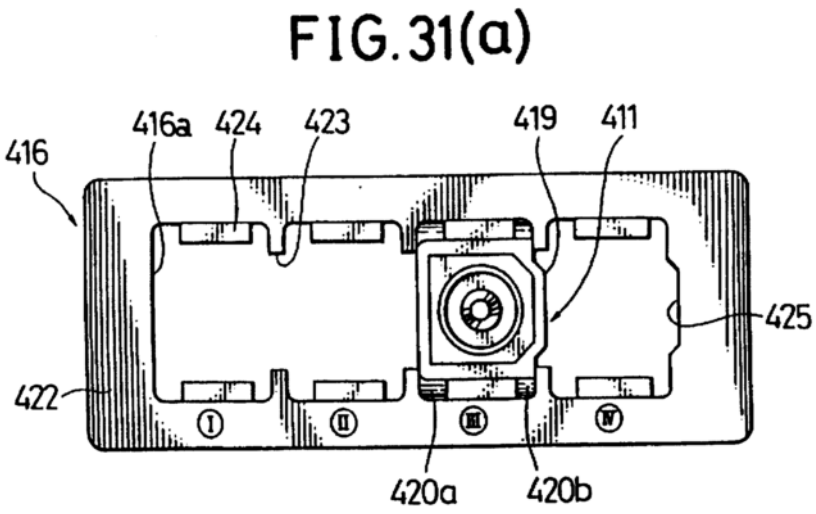
## L. Independent Claim 12

### 12.P "An adapter for holding fiber optic connectors, the adapter comprising:"

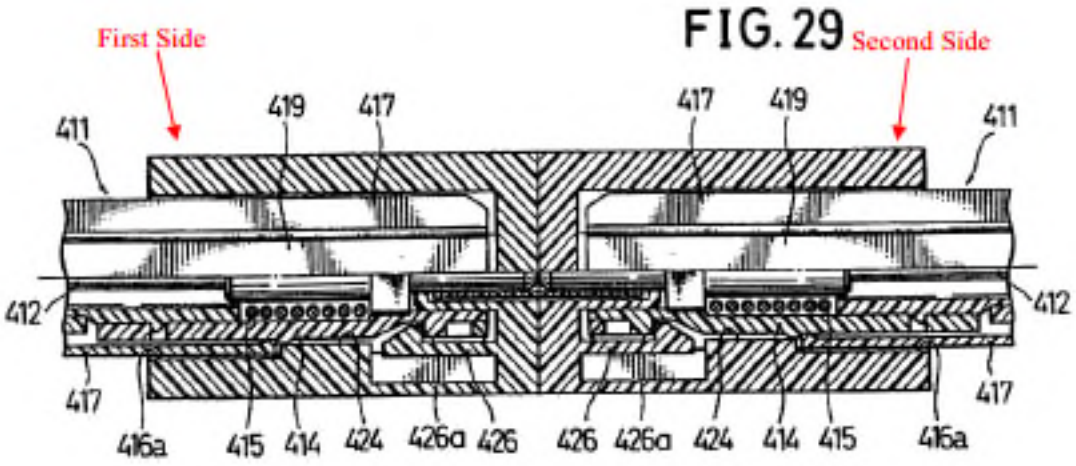
245. Iwano teaches an optical connector having a "connector housing" (416)—i.e. an adapter—for aligning, connecting, and holding optical connector plugs (411) inserted from opposite first and second sides of the connector housing. EX1006: 30:12-15 ("On the other hand, in the connector housing 416, the housing body 422 is formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted, and with projections 424 and grooves 425 fitted to the grooves 418 and the projection 419 of the optical connector plugs 411, respectively."), 31:14-17 ("therefore, the structure of the present invention is advantageous in particular when applied to a plug-in optical connector for allowing a plurality of fibers to be connected simultaneously, because the highest possible mounting density is required for the plug-in optical connector."), Fig. 27 and 31(a) (reproduced and annotated below), Fig. 29 (reproduced and modified below).




EX1006: Fig. 27 (The first side is on the left of connector housing 416 and the second side is on the right of connector housing 416).




EX1006: Fig. 31(a).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, the first side is on the left and the second side is on the right).

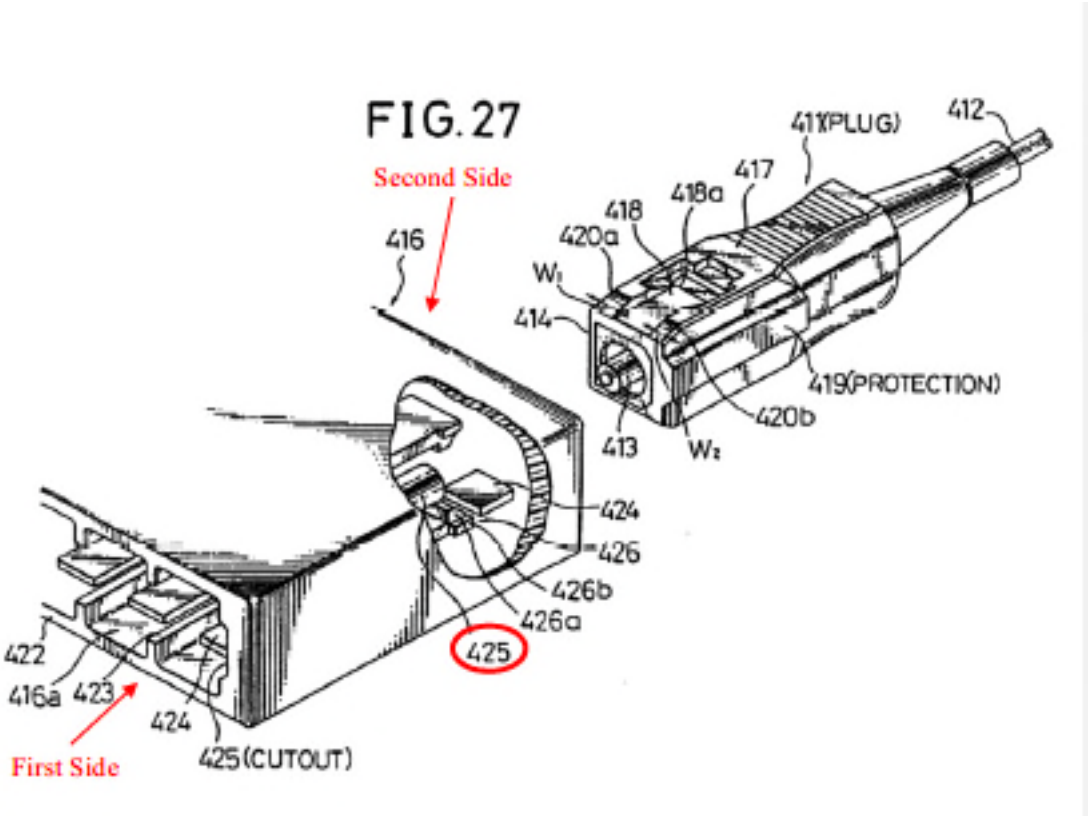
246. More specifically, the optical connector plugs (411) include ferrules (413) which are inserted into cylindrical hollow alignment sleeves (425) of the connector housing (416) for aligning the ferrules of two optical connector plugs. EX1006: Figs. 25 and 27, 30:18-21 ("Further, cylindrical hollow alignment sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416.").

247. Iwano's adapter includes engagement/latching arms (426) that engage and hold the optical connector plugs (411) in the adapter. EX1006: Figs. 27 and 29, 30:21-39 ("Further, two elastic deformable engage arms 426 each having an engage claw 426a are formed within the connector housing 416 so as to be engageable with the recessed portion 418a of the groove 418 of the optical

connector plug 411. Further, the engage arm 426 is formed with side projection portions 426b (only one is shown) brought into contact with the inclined projection portions 420a and 420b for locking and unlocking function, when the optical connector plug 411 is inserted into or removed from the connector housing 416. Therefore, when the optical connector 411 is inserted into the insertion hole 416a of the connector housing 416, the grooves 418 formed in both the surfaces of the knob 417 are engaged with the projections 424 formed within the insertion holes 416a, so that the claw portions 426a are engaged with the recessed portion 418a of the grooves 418 and further the projections 424 are engaged deep with the grooves 418 to engage the optical connector plug 411 with the connector housing 416 as shown in FIG. 29.").



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EX1006: Fig. 27 (annotated).

248. As taught by Iwano, a person of skill in the art would recognize that Iwano's "connector housing" (416) is an "adapter" in the context of the '415 Patent. EX1006: 28:10-12 (identifying a prior art connector housing which Iwano improves upon as an "adapter"), Fig. 25 (same).

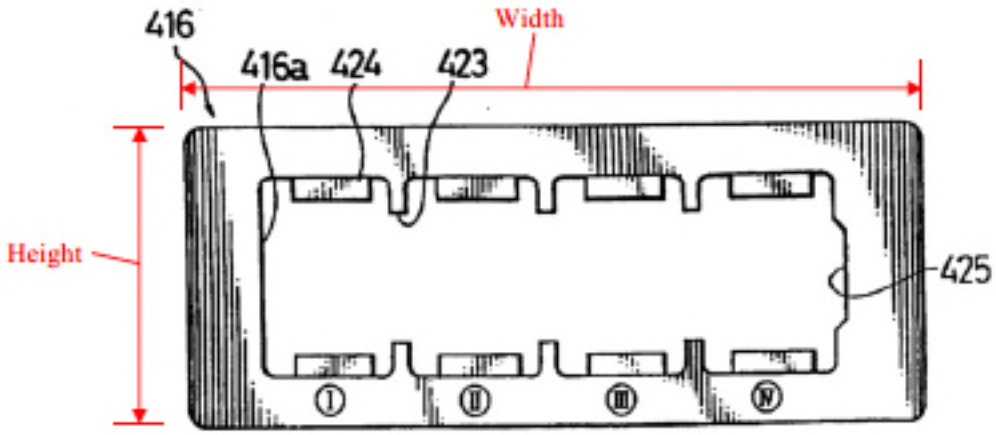
249. Accordingly, Iwano's connector housing (416) meets the preamble of Claim 12: "An adapter for holding fiber optic connectors, the adapter comprising."

**12.a.1 "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side,"**

250. Iwano's connector housing (416) has a "housing body 422 formed with a plurality of insertion holes 416a into which optical connector plugs 411 are inserted." EX1006: 30:12-15, Fig. 27.

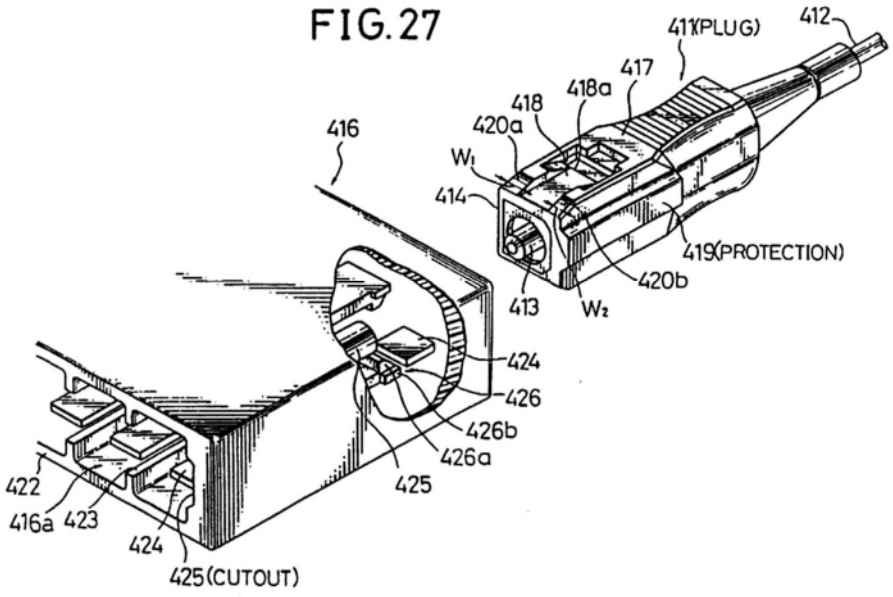
251. The housing body (422) has a width and a height.

FIG.30

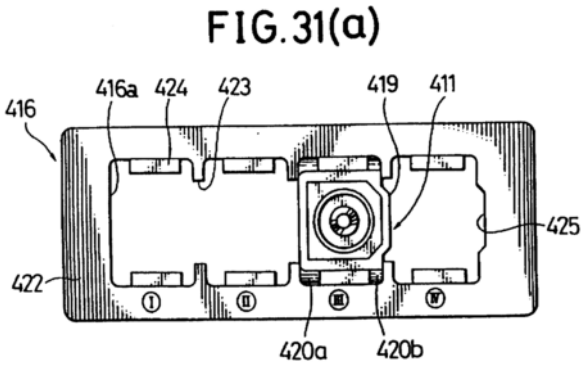



EX1006: Fig. 30 (annotated).

252. As shown in Figures 27 and 31(a), each of the plurality of insertion holes "416a" is continuous with the other insertion holes.




EX1006: Fig. 27.




EX1006: Fig. 31(a).

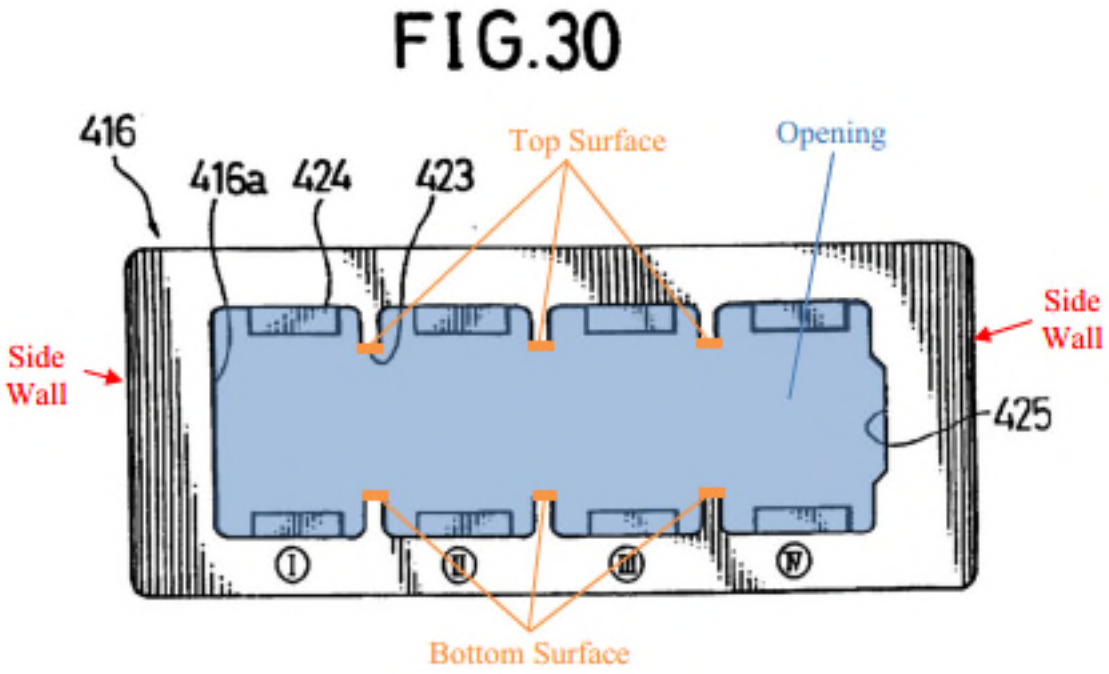
253. Since each insertion hole (416a) is continuous with the other insertion holes, a person of ordinary skill in the art would recognize that the plurality of insertion holes (416a) form a single opening. EX1006: Figs. 27 and 31(a). Notably, Iwano discusses this in the context of the prior art adapter that it depicts



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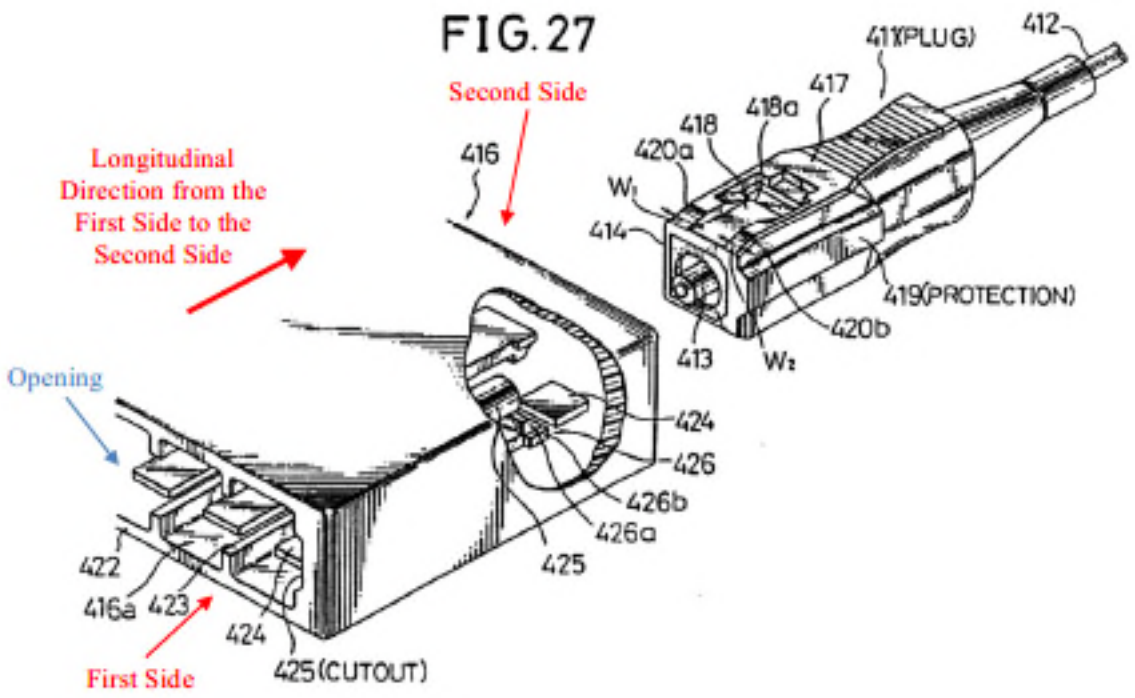
in Figures 26(a), 26(b) by stating "adjacent insertion holes . . . are connected to each other." EX1006: 29:4-5.

254. The housing body (422) includes two opposing side walls, a top surface, and a bottom surface that define the opening.




EX1006: Fig. 30 (annotated).

255. As shown below, the opening extends longitudinally from the first side to the second side:

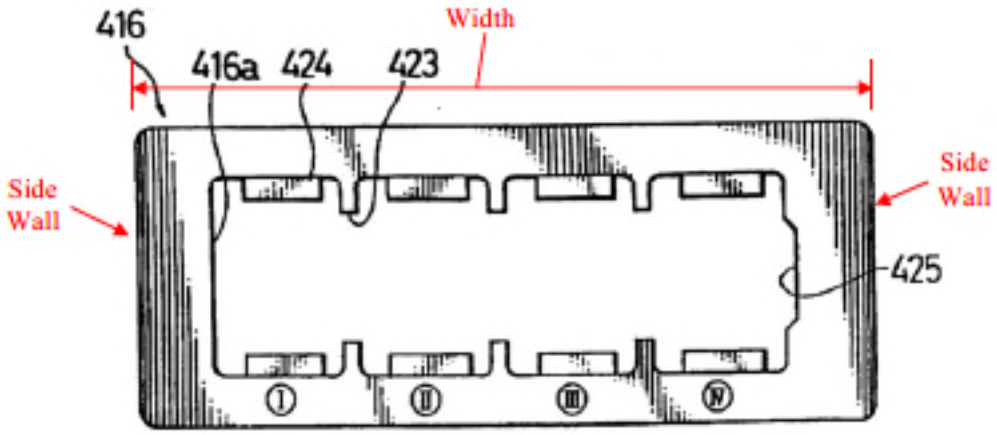



EX1006: Fig. 27 (annotated).

256. Therefore, Iwano's connector housing (416) meets the limitation of "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side."

**12.a.2 "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height,"**

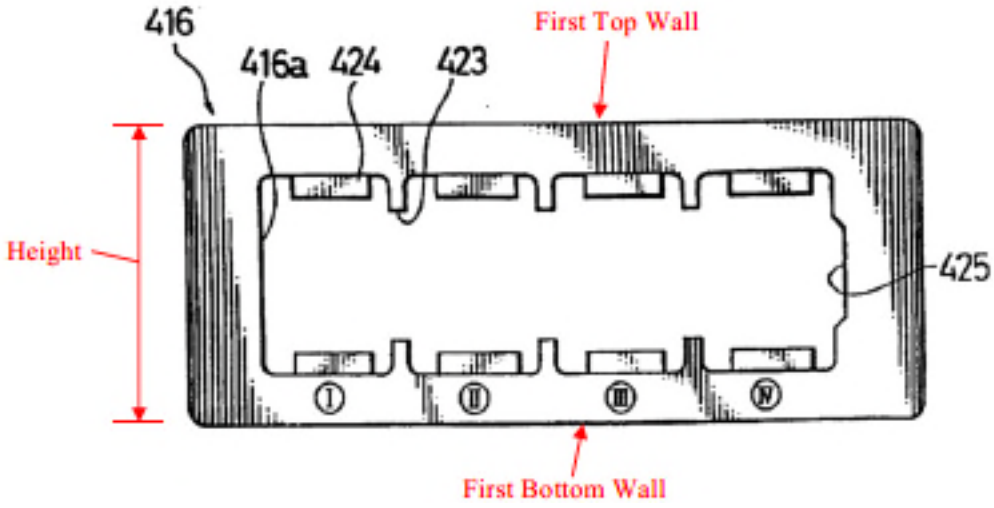
257. Iwano's housing body (422) includes two opposing side walls spaced apart along the width.




EX1006: Fig. 30 (annotated).

258. Iwano's housing body (422) includes a first top wall and a first bottom wall spaced apart along the height.

FIG.30



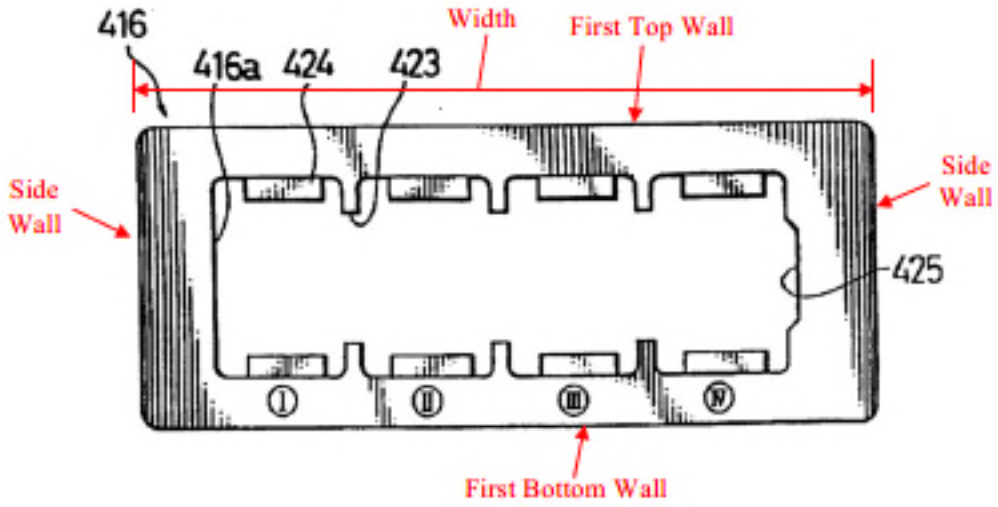

EX1006: Fig. 30 (annotated).

259. Accordingly, Iwano's connector housing (416) meets the limitation of "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height."

**12.a.3 "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls,"**

260. Iwano's first top and bottom walls each extends widthwise between the two opposite side walls.

FIG.30




EX1006: Fig. 30 (annotated).

261. Accordingly, Iwano's connector housing (416) meets the limitation of "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls."

**12.b "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width,"**

262. As discussed previously, Iwano's connector housing (416) includes grooves.

263. Iwano's projections (424) are part of the central portion, with the bottom set of projections forming a bottom surface and the upper set of projections forming a top surface. EX1006: Figs. 27 and 30.

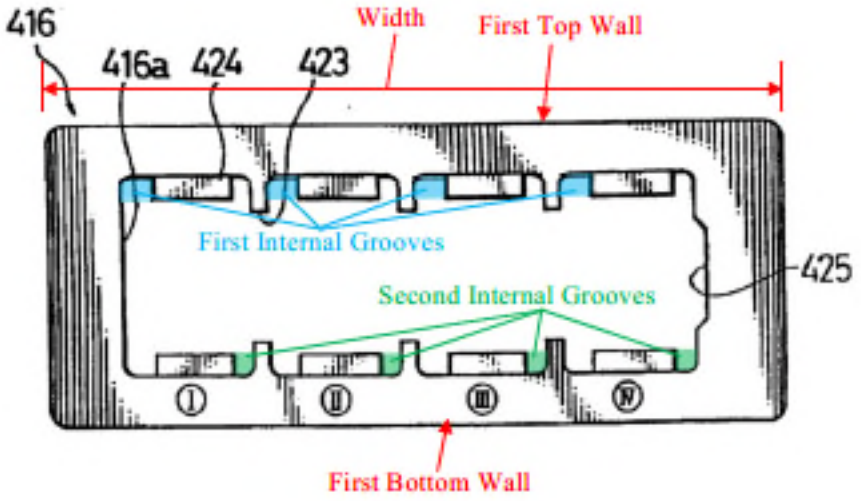
264. The projections (424) of Iwano's connector housing (416) are disposed in grooves (425), spaced between either (1) adjacent partition walls (423) of the connector housing, or (2) a side wall of the housing body (422) and one of the partition walls. EX1006: Figs. 27 and 30.

265. Each of the first top and bottom walls includes projections (424) and partition walls (423) which form the grooves. EX1006: Figs. 27, 29, and 30. As shown below, the first top wall has first internal grooves spaced apart along the width, and the first bottom wall has second internal grooves spaced apart along the width:



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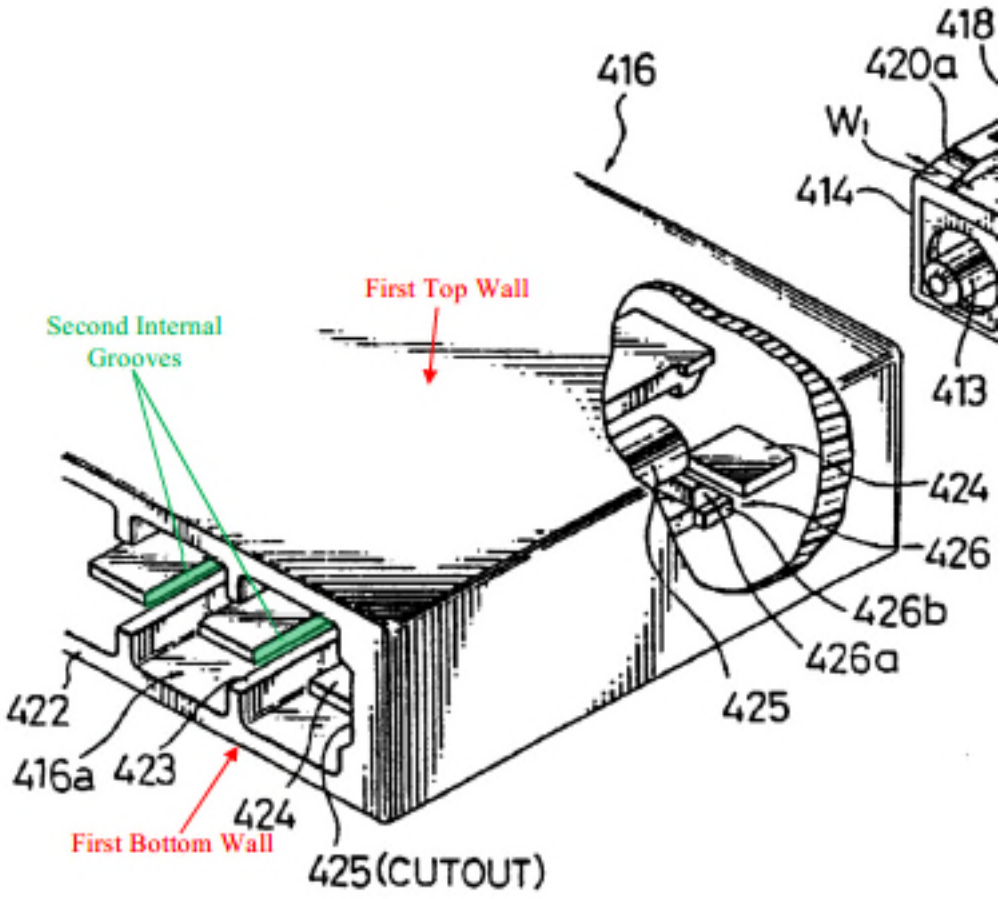
FIG.30






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FIG. 27



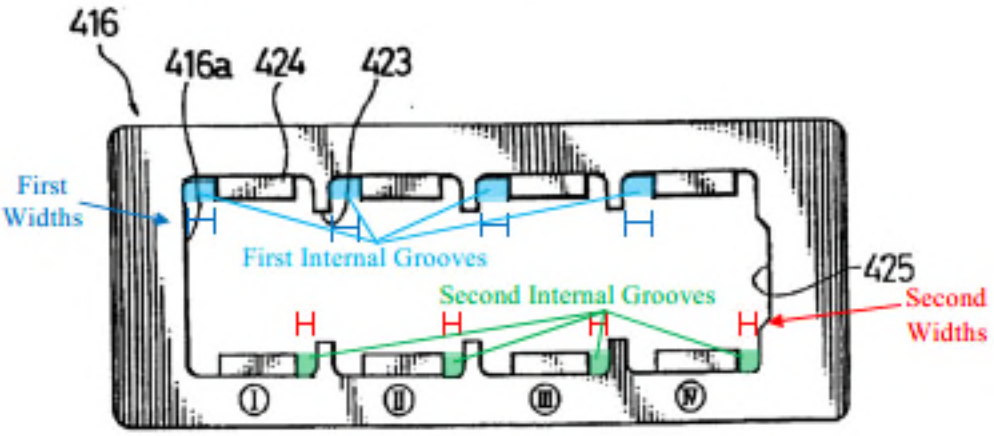

EX1006: Fig. 27 and 30 (annotated).

266. Therefore, Iwano's connector housing (416) meets the limitation of "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width."

**12.c.1 "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width,"**

267. The first internal grooves have a first width and the second internal grooves have a second width. The second width is greater than the first width. EX1006: Figs. 31(a)&(b), 30:1-5, 30:44-54.

FIG.30




EX1006: Fig. 30 (annotated).

268. Iwano explains the indicated first and second widths are different "to prevent the optical connector plug 411 from being inserted into the connector housing 416 erroneously." EX1006: 30:55-57.

269. The different width of these grooves of Iwano's connector housing/adapter (416) is a direct function of the projection portions (420a, 420b) of the optical connector plug (411) having different widths. EX1006: 30:15-17

("projections 424 [being] fitted to the grooves 418 … of the optical connector plugs 411").

270. The different widths of the grooves of Iwano's connector housing (416) match the different widths of the projection portions (420a, 420b) of the optical connector plug (411) so that the optical connector plug (411) can only be inserted in one orientation. EX1006: Figs. 31(a)&(b), 30:44-54.

271. Iwano explains:

> The groove 418 is formed on each of the two opposing side surfaces of the knob 417 so as to be **a little offset** from the middle portion thereof, in such a way that the **width W1** of one inclined projection portion 420a **is wider than that W2** of the other inclined projection portion 420b.

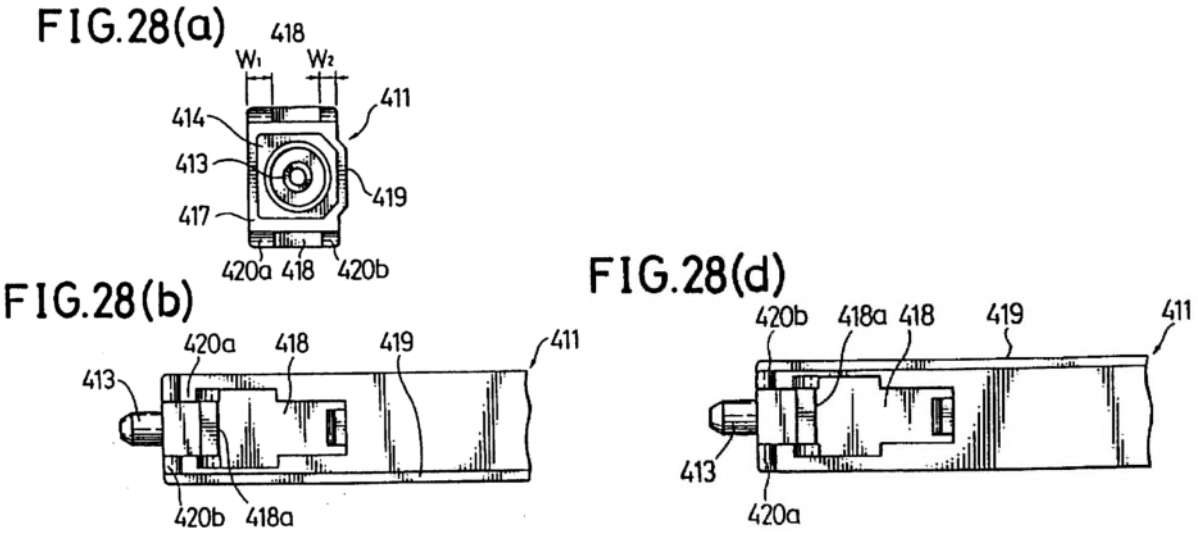
EX1006: 30:1-5.

> In the above-mentioned structure between the optical connector plug 411 and the connector housing 416, even when only a single optical connector plug is inserted into a part III, for instance as shown in FIG. 31(a), it is impossible to insert the optical connector plug 411 in the reverse direction, because the groove 418 between the projections 420a and 420b having ***two different widths W1 and W2*** of the optical connector plug 411 will not be engaged with the projections 424 of the connector housing 416 with an interference 430 (W1 -W2) between the two.

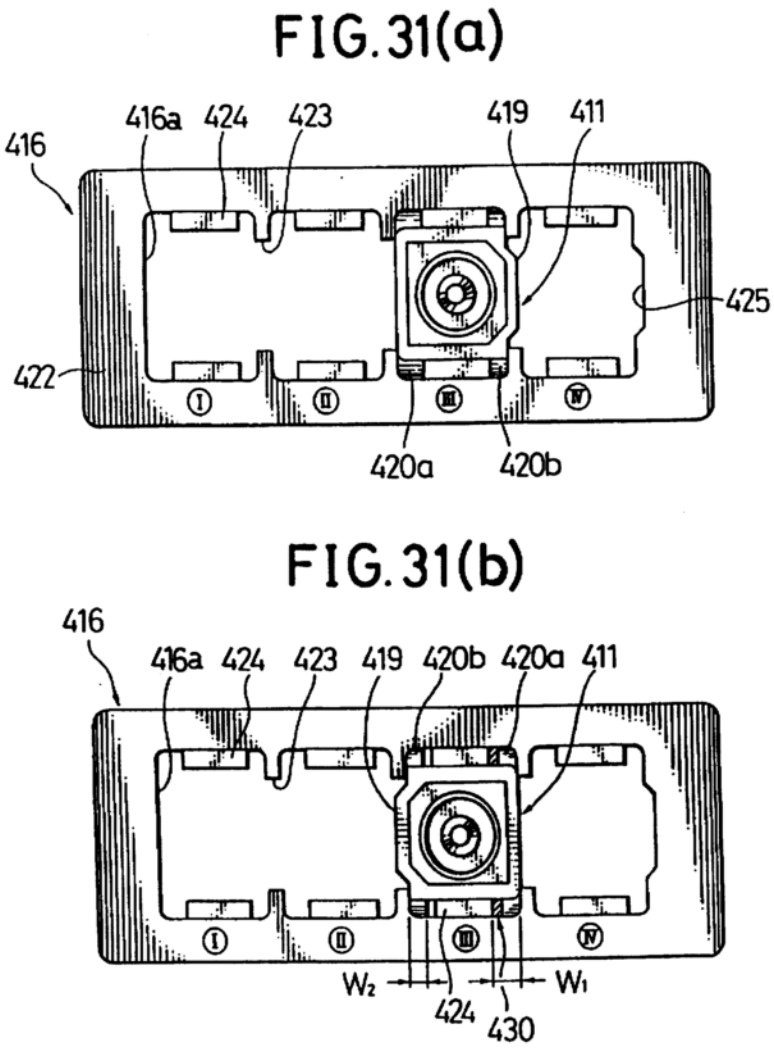
EX1006: 30:44-54.



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EX1006: Figs. 28(a), (b), and (d).






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EX1006: Figs. 31(a)&(b).

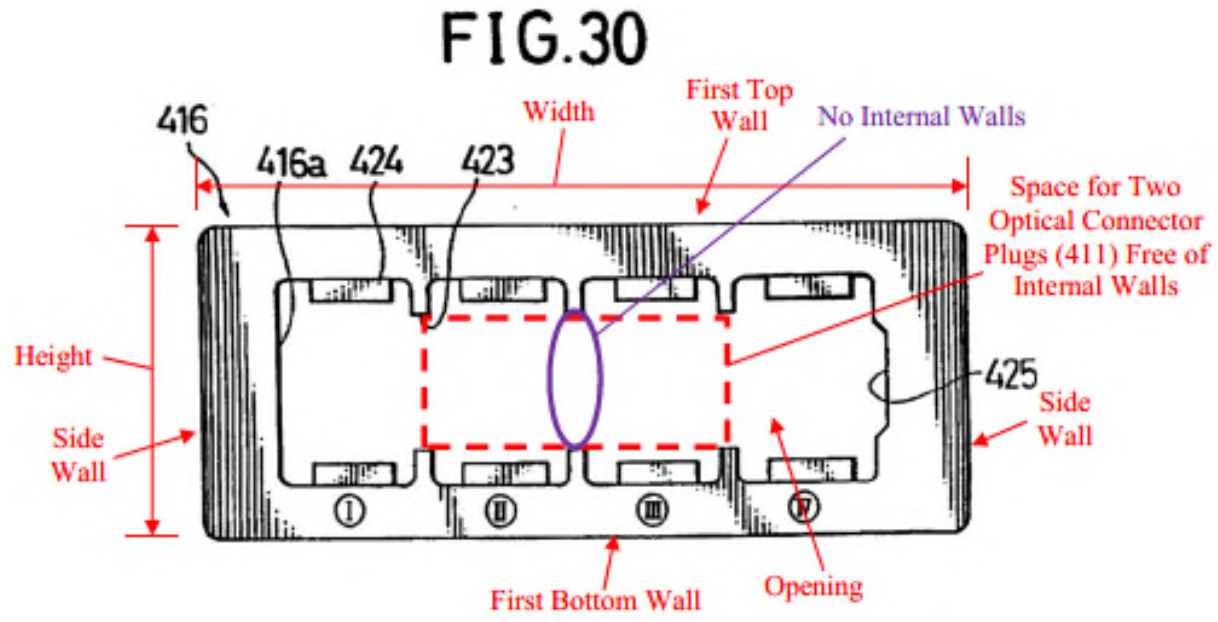
272. Therefore, Iwano's connector housing (416) meets the limitation of "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width."

**12.c.2 "and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height."**

273. As shown in Fig. 30, Iwano's connector housing (416) is free of internal walls between a space for two optical connector plugs (411) adjacent one another on the same side in the opening. EX1006: Fig. 30. This space free of internal walls in the opening is between the side walls along the width and between first top and bottom walls along the height. EX1006: Fig. 30.



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EX1006: Fig. 30 (annotated).

274. Each of the first top and bottom walls includes projections (424) and partition walls (423). The first and second internal grooves are identified by Claim 12 as being part of the first top and first bottom walls, respectively. EX1001: 8:17-19. As such, a POSA would consider the projections (424) and partition walls (423) defining the grooves to be part of the respective top and bottom walls—in the context of the claims of the '415 Patent.

275. Therefore, Iwano's connector housing (416) meets the limitation of "and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height."

### M. Claim 13 – "The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors."

276. Iwano's connector housing (416) is for connecting four pairs of optical connector plugs (411). EX1006: Figs. 27 and 30, 28:64-65 ("FIGS. 26(a) and (b) show a connector housing 420 to which a plurality of optical connector plugs 401 are fitted."), 29:40-44 ("The fifth feature of the optical connector according to the present invention is to provide an optical connector locating structure in which the optical connector plugs can be inserted only in a predetermined direction or orientation . . ."), 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").

277. As illustrated, the first and second sides of the connector housing (416) can each receive a plurality of (e.g., up to four) optical connector plugs (411). EX1006: Fig. 30, 30:40-43 ("FIG. 30 shows an example of the connector housing 416 for supporting a plurality of optical connector plugs, in which four insertion holes 416a are formed as four parts I, II, II and IV.").



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FIG.30

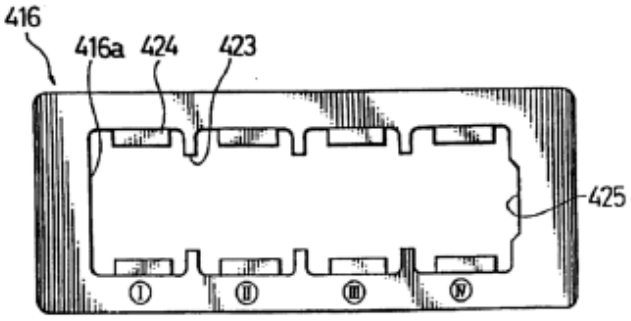
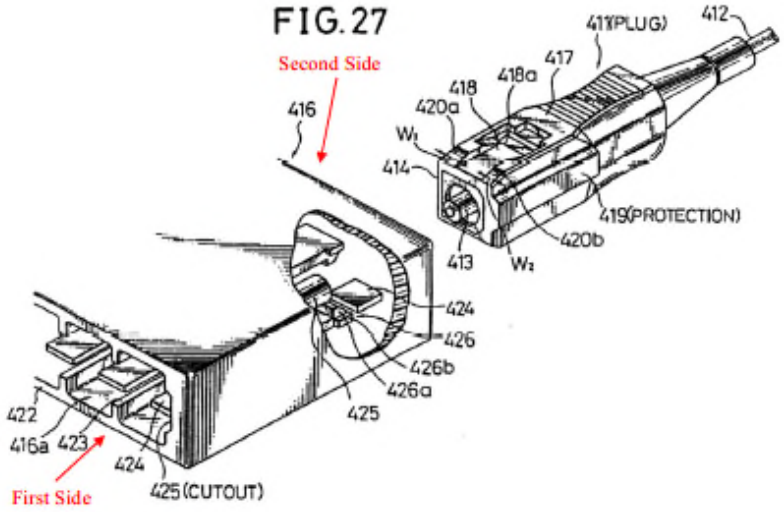



FIG.27



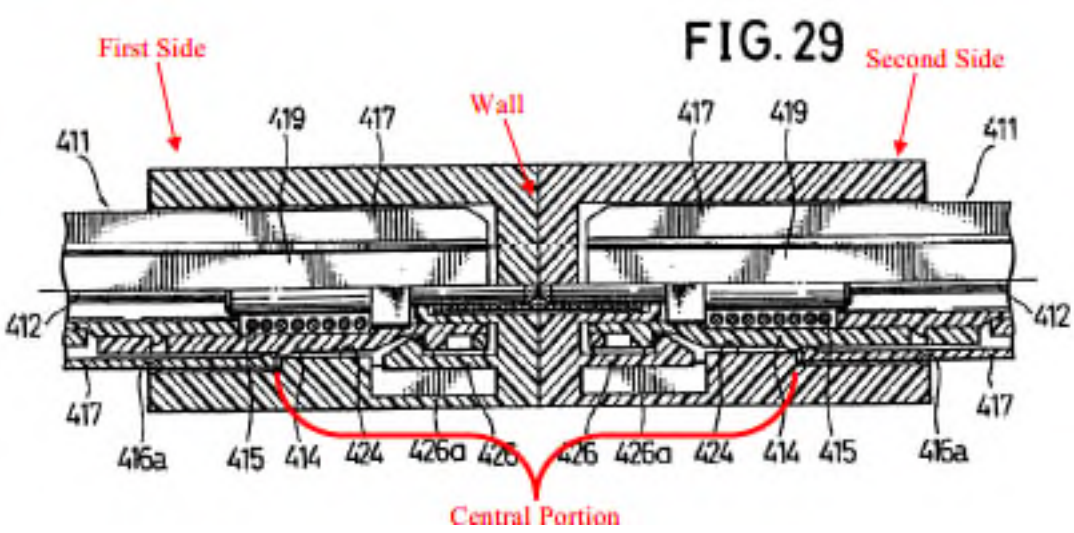

EX1006: Figs. 27 and 30 (annotated).

278. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors."

**N. Claim 14 – "The adapter according to claim 12, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a**

**portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

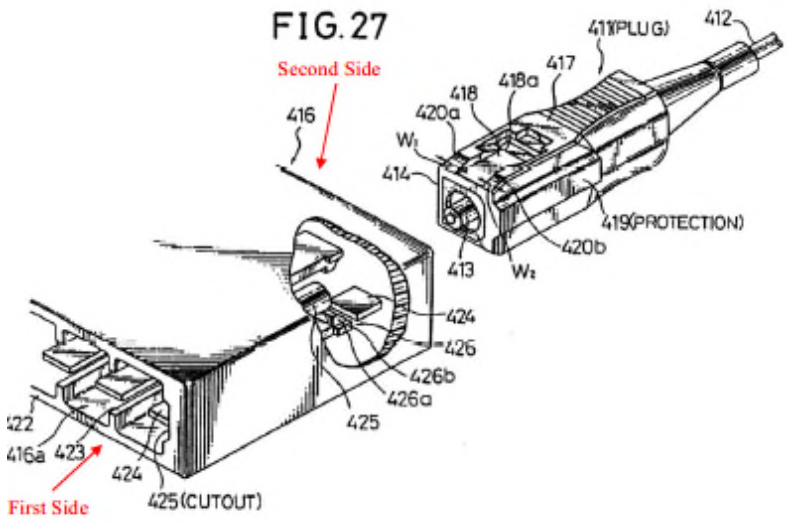
279. Iwano's connector housing (416) includes a wall disposed within and across the central portion of the housing body (422). EX1006: Fig. 29.



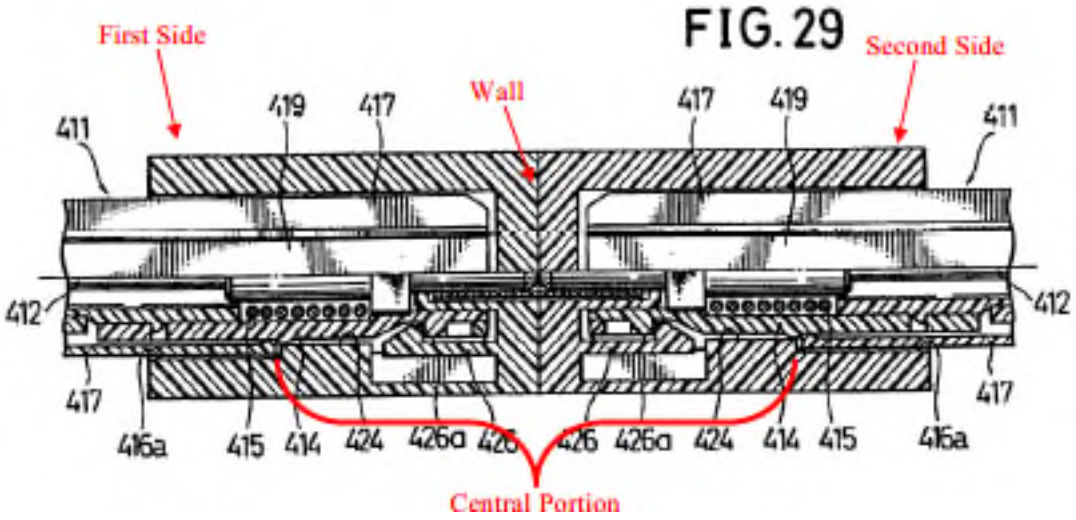

EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

280. The wall includes the engagement/latching arms (426) and the alignment sleeves (425).

281. The wall is disposed between the first and second sides. EX1006: Figs. 27 and 29.



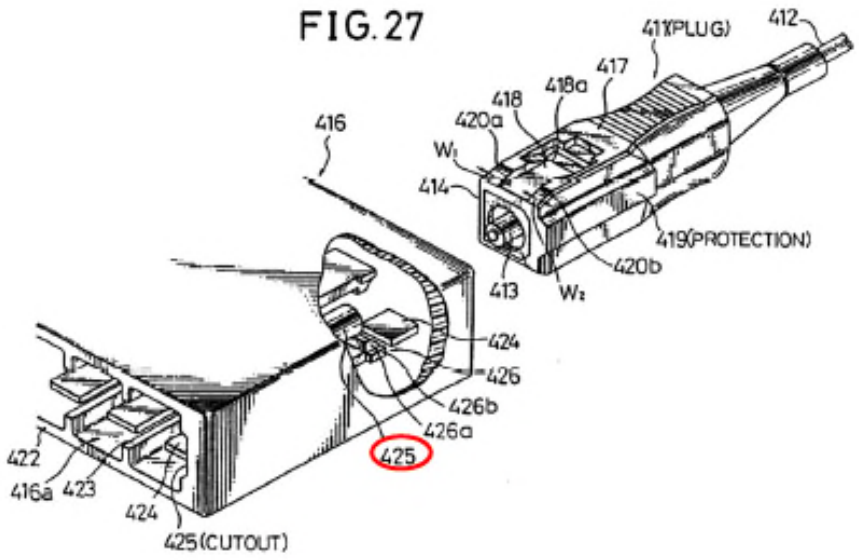

EX1006: Figs. 27 (annotated).




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).

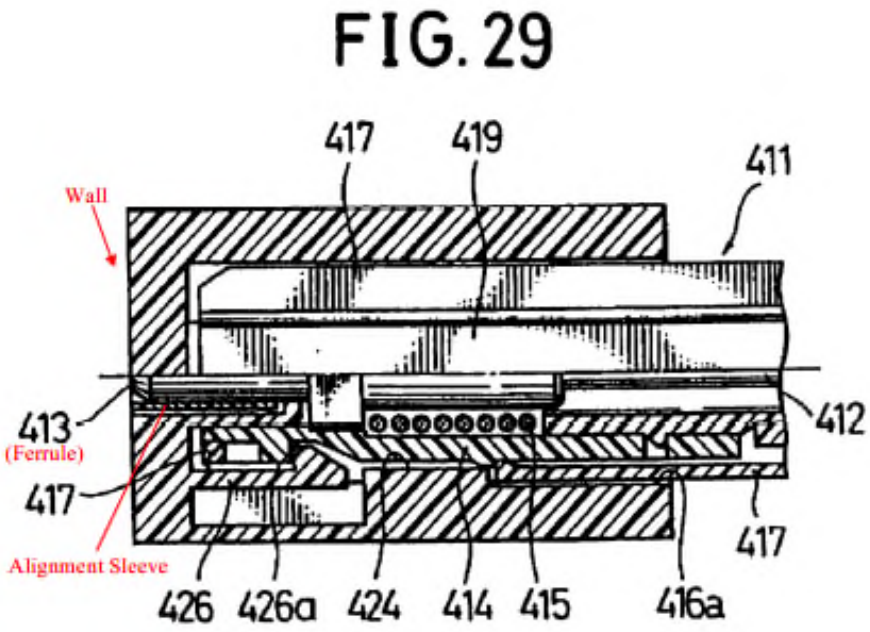
282. Iwano's wall includes a plurality of cylindrical alignment sleeves (425), one for each pair of optical connector plugs (411) coupled by the connector housing (416). EX1006: Figs. 27 and 29, 30:18-21 ("cylindrical hollow alignment

sleeves 425 into each of which the ferrule 413 of the optical connector plug 411 is inserted are provided within the insertion holes 416a of the connector housing 416.").



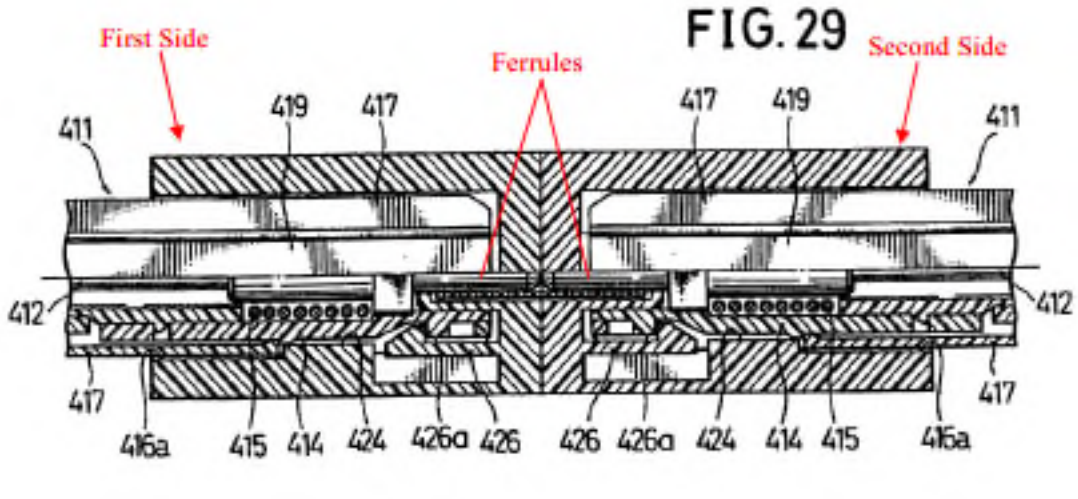

EX1006: Fig. 27 (annotated).

283. Each alignment sleeve (425) is "hollow." EX1006: Fig. 29, 30:18. Such hollow alignment sleeves were commonly in the form of a split bushing that provided an annular spring force to the outside diameter of each ceramic ferrule, thereby providing precision alignment of the mated fiber cores, which are epoxy bonded and polished within each ferrule.




EX1006: Fig. 29 (annotated).

284. Accordingly, as demonstrated in the modified Figure 29 below, when the optical connectors are inserted from opposing sides, the ferrules will contact each other within the alignment sleeve.




EX1006: Fig. 29 (duplicated and mirrored to show the full connector housing, annotated).



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285. In order for the ferrules to contact each other within the alignment sleeve, the alignment sleeves (425) allow at least a portion of the ferrules (413) inserted from the first and second sides to pass thererthrough.

286. Likewise, the passage in Iwano's wall includes the space defined by one of the "hollow" alignment sleeves.

287. Therefore, Iwano's connector housing (416) meets the limitation of "The adapter according to claim 12, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."

## ANTICIPATION: EIGENMANN (GROUND 2)

### A. Independent Claim 12

#### 12.P "An adapter for holding fiber optic connectors, the adapter comprising:"

288. Eigenmann teaches "a fibre-optic plug-in connector system (10) comprising an adapter (11), in addition to individual optical plug-in connectors (13) … which can be respectively inserted into the adapter (11) from two opposing sides to produce an optical connection." EX1010: Abstract, Figs 1 & 3 (reproduced below).

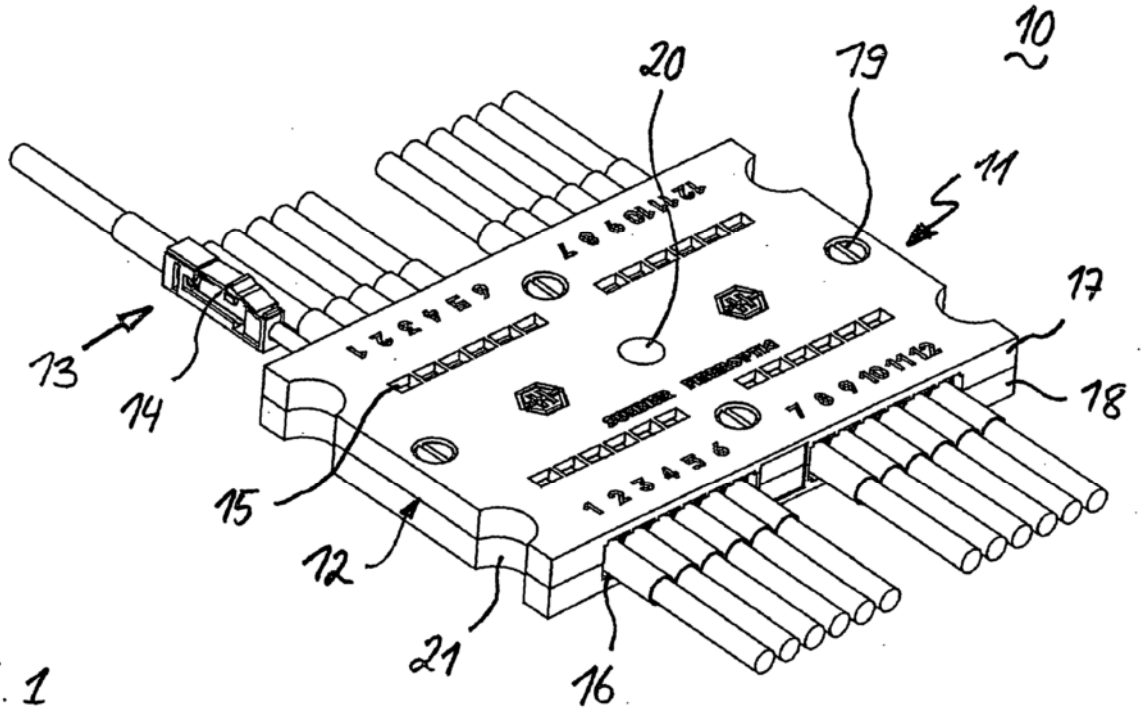



FIG. 1

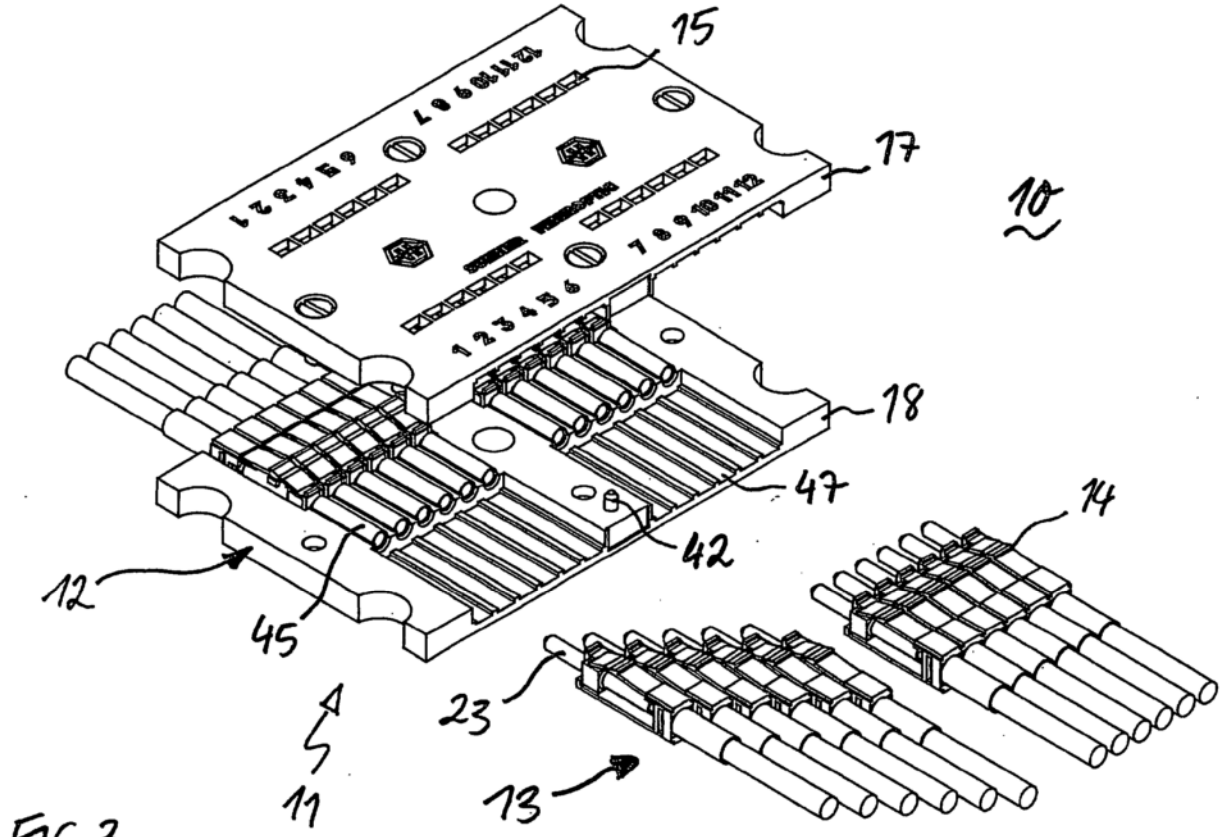



FIG. 3



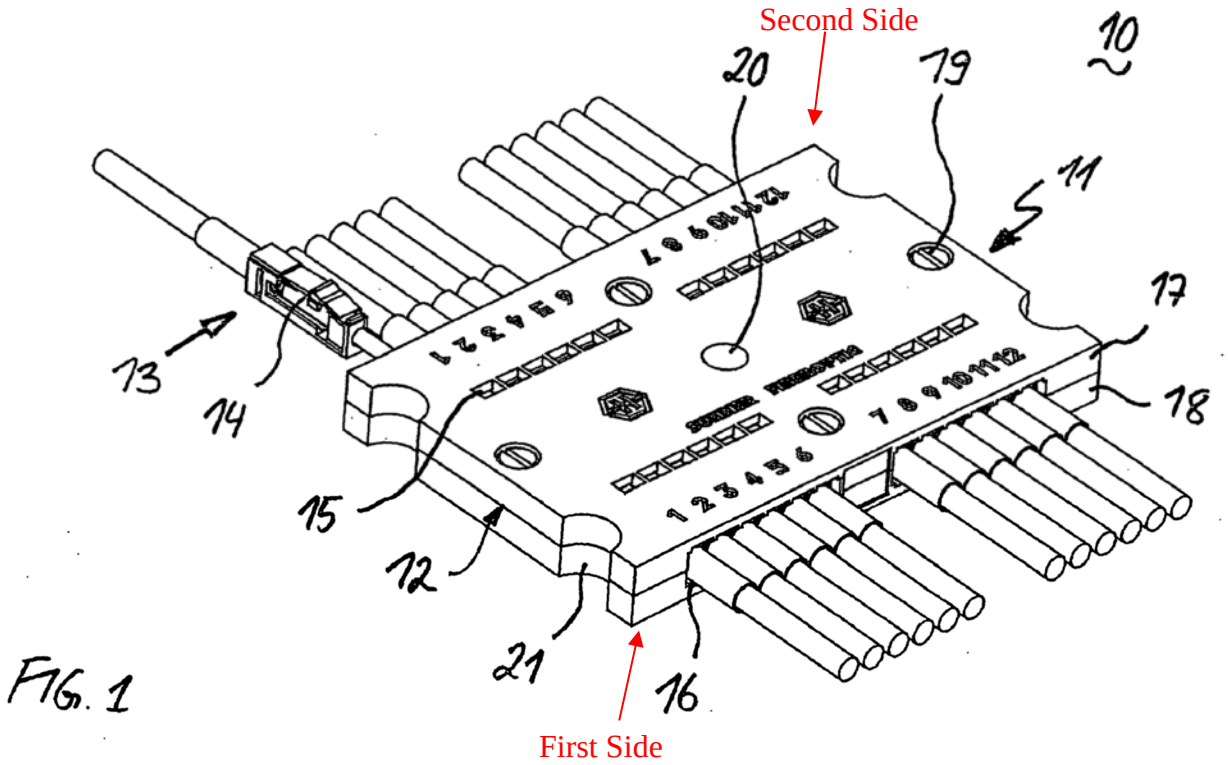
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EX1010: Figs 1 & 3.

289. Eigenmann's adapter (11) meets the preamble of Claim 12: "An adapter for holding fiber optic connectors."

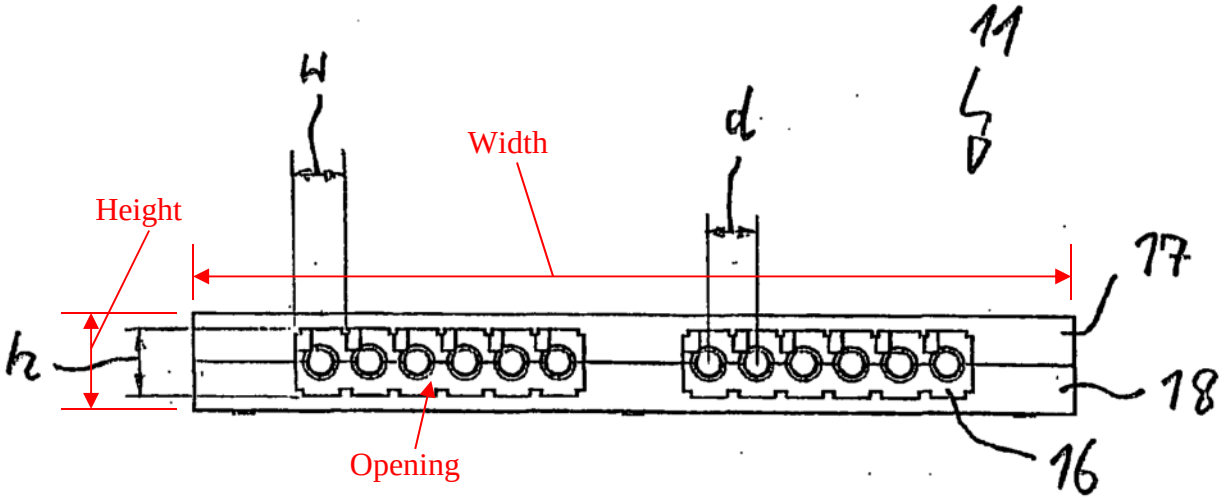
**12.a.1 "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side"**

290. Eigenmann's adapter (11) includes an adapter housing (12). EX1010: ¶[0027] ("The fiber-optic plug-in connector system 10 comprises an adapter 11, which has a rectangular, flat adapter housing 12 comprising an upper part 17 and a lower part 18.").




EX1010: Fig. 1 (annotated).

291. As shown in the annotated Figure 5 below, the adapter housing (12) has a width and a height:




EX1010: Fig. 5 (annotated).

292. Eigenmann includes an opening comprising the insertion openings (16) on each side of the adapter (11) and the cylindrical bores extending between pairs of the insertion openings.

293. For example, Eigenmann explains its adapter housing (12) has "two rows of insertion openings 16 lying directly next to one another" that are "arranged on the opposite longitudinal sides of the adapter 11." EX1010: ¶[0027].

294. Eigenmann further explains that the adapter has corresponding insertion openings (16) on opposing sides that directly oppose one another to form pairs. EX1010: ¶[0027] ("Every two insertion openings 16 and insertion channels 47 lying directly opposite one another respectively form a pair, which can be used for connecting two optical fibers.").

295. An alignment sleeve (45) disposed between and connects each pair of insertion openings (16). EX1010: Fig. 2, ¶[0029] ("The internal construction of the adapter 11 is reproduced in the exploded representation of FIG. 2. Central elements of the adapter 11 are a plurality of cylindrical guiding sleeves 45, of which there is one per plug-in connection, that is a total of 12. The guiding sleeves 45 receive the ferrules (23 in FIGS. 3, 4) of the plug-in connectors 13 . . . .").

296. Specifically, Eigenmann explains that the alignment sleeves (45) are deposed within half-cylindrical depressions (48) that form a central web (44) within the main body of the adapter. EX1010: Fig. 2, ¶[0030] ("The mounting of the guiding sleeves 45 takes place directly in the parts 17 and 18 of the adapter housing 12. For this purpose, in the upper part 17 and the lower part 18 there is respectively formed a central web 44, which runs in the longitudinal direction and in which there are formed two rows of parallel, half-cylindrical depressions 48 . . . .").

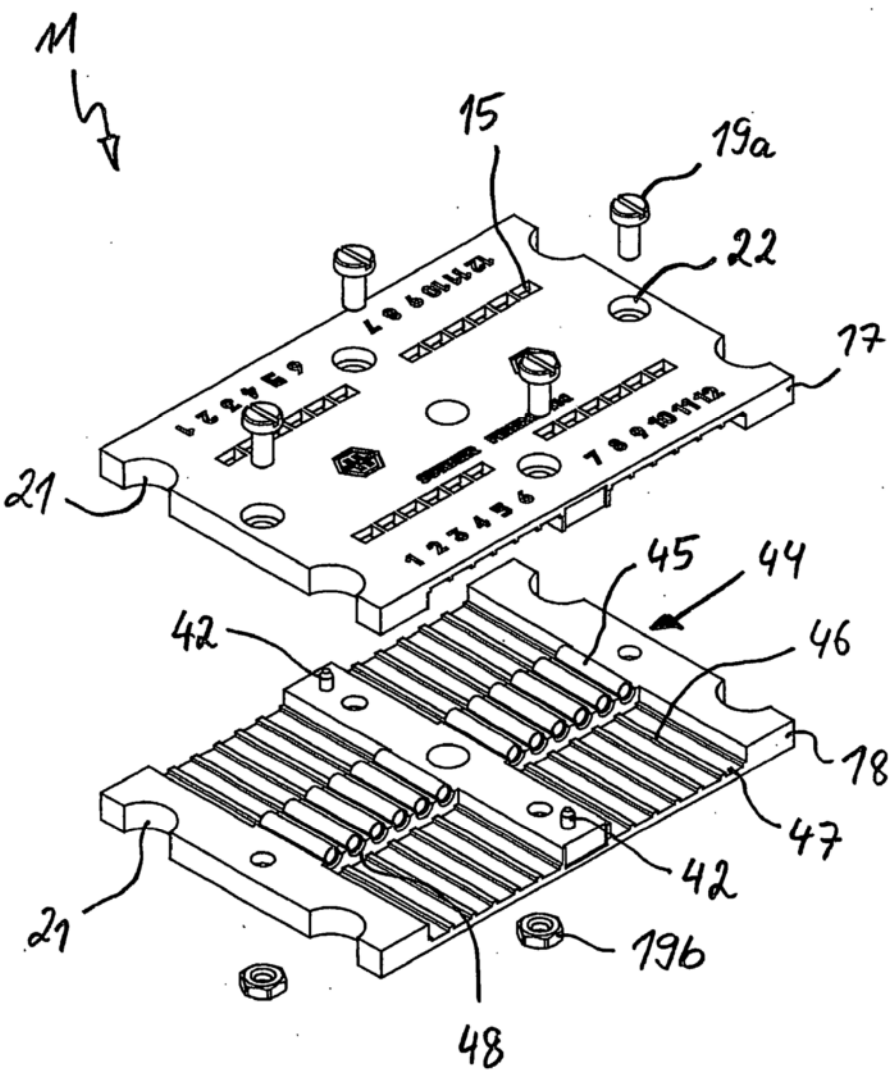
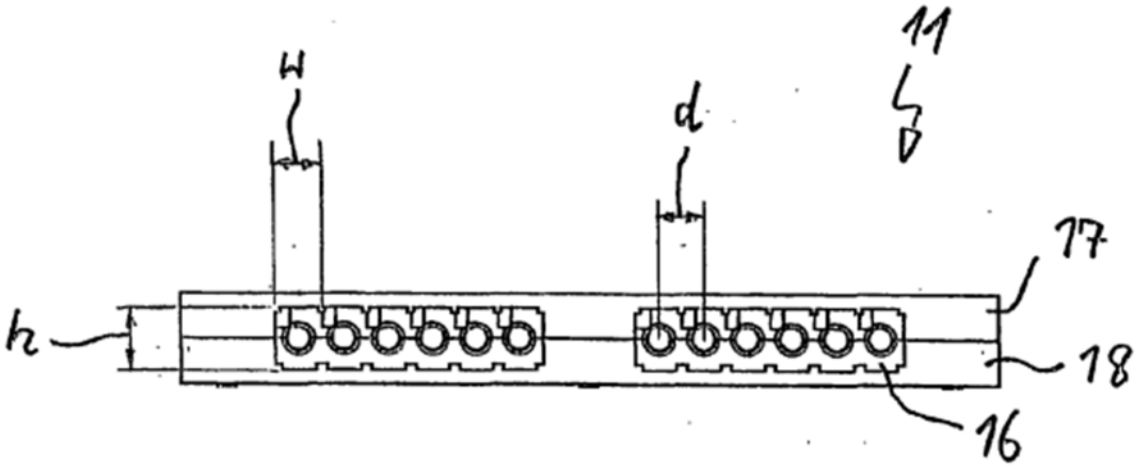



FIG. 2

EX10EX1010: Fig. 2 (annotated).

297. Since each cylindrical bore is continuous with its respective pair of insertion openings (16) and each pair of insertion openings is continuous with the other pairs of insertion openings, the plurality of cylindrical bores and insertion openings form a single opening. EX10EX1010: Figs. 2 and 5, ¶[0027].

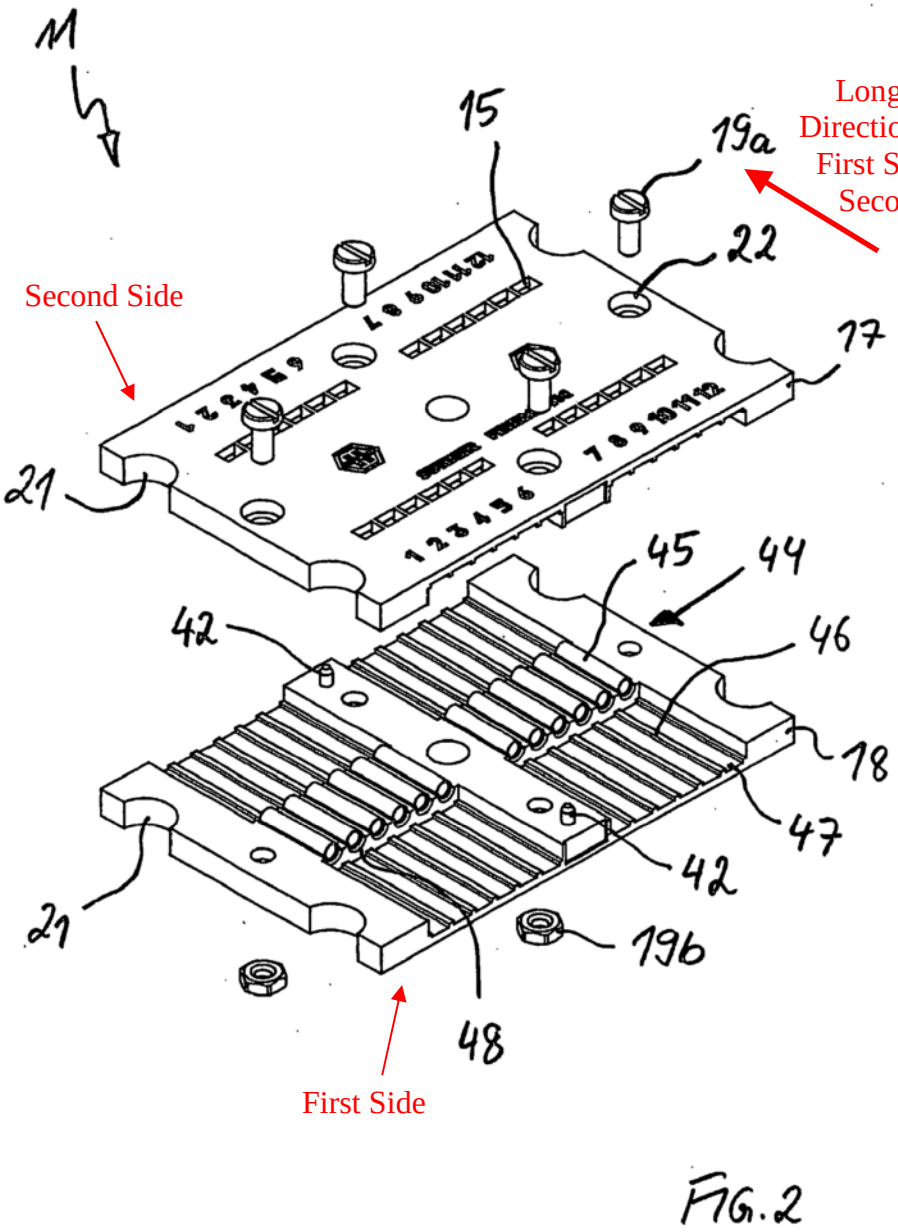



EX1010: Fig. 5.

298. The opening comprising the insertion openings (16) and cylindrical bores extends longitudinally from a first side of the adapter (11) to a second side of the adapter. EX1010: Figs. 1-3, ¶[0027].



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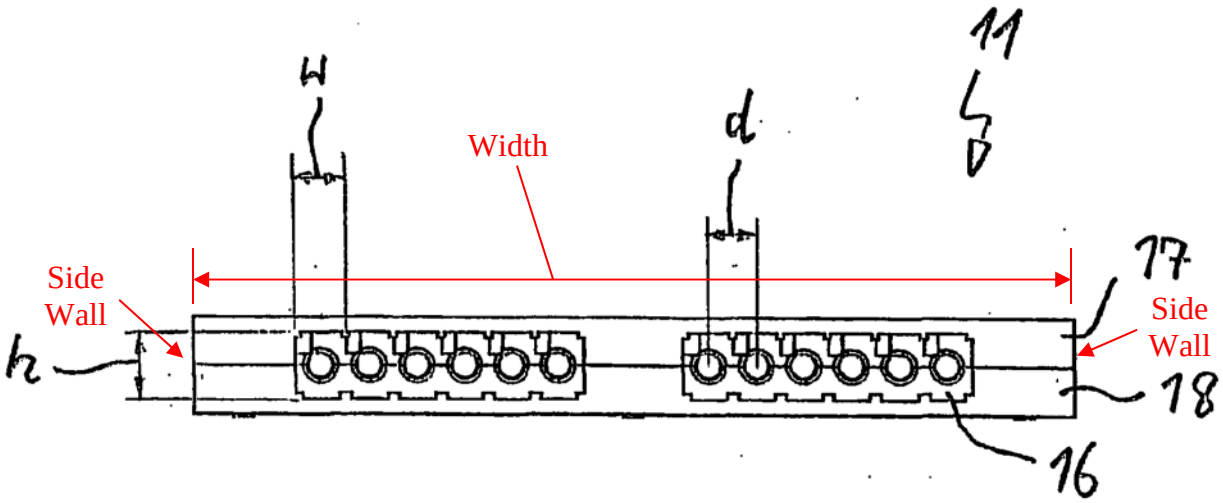

EX1010: Fig. 2 (annotated).

299. Therefore, Eigenmann's connector housing (416) meets the "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side" limitation.

### 12.a.2 "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height"

300. Eigenmann's adapter housing (12) includes upper and lower parts (17, 18). EX1010: ¶[0027] ("The fiber-optic plug-in connector system 10 comprises an adapter 11, which has a rectangular, flat adapter housing 12 comprising an upper part 17 and a lower part 18.").

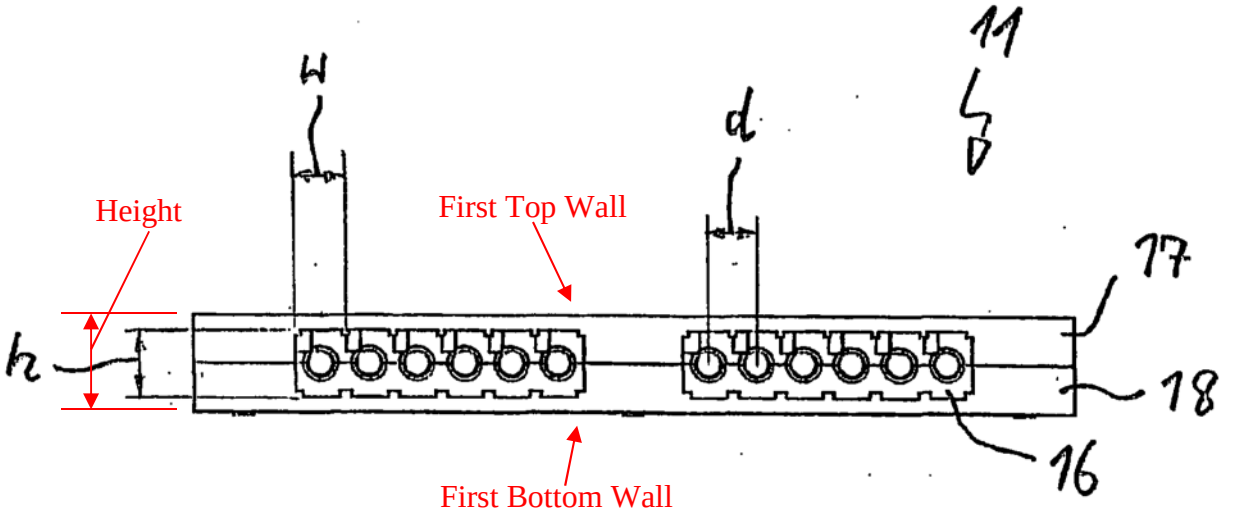
301. As shown in Figure 5 (reproduced and annotated below), as assembled the upper and lower parts (17, 18) form two opposing side walls of the adapter housing (12). EX1010: Fig. 5.




EX1010: Fig. 5 (annotated).

302. As shown above, the two opposing side walls are spaced apart along the width of the adapter housing (12). EX1010: Fig. 5.

303. As shown in Figures 3 and 5 (reproduced and annotated below), The upper part (17) forms a first top wall and the lower part (18) forms a first bottom wall. EX1010: Figs. 3 & 5.



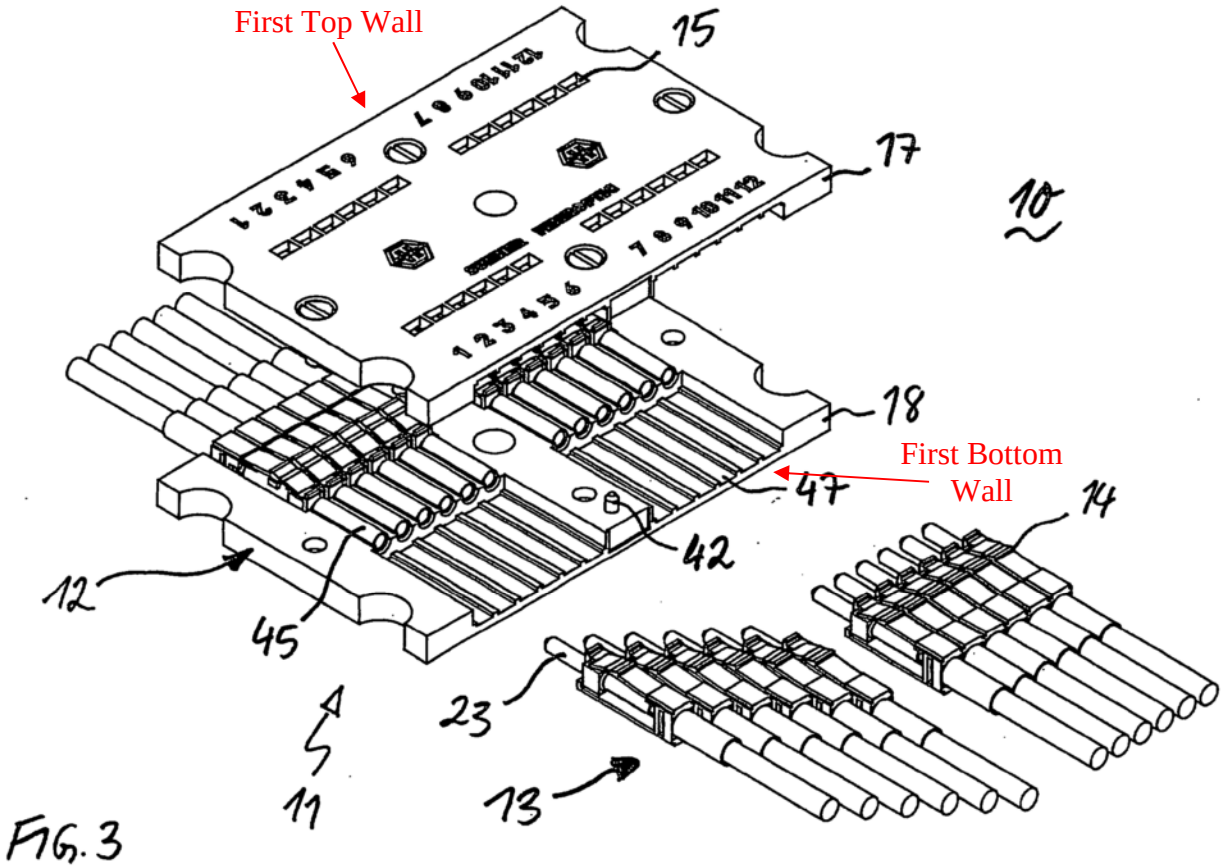




FIG. 3

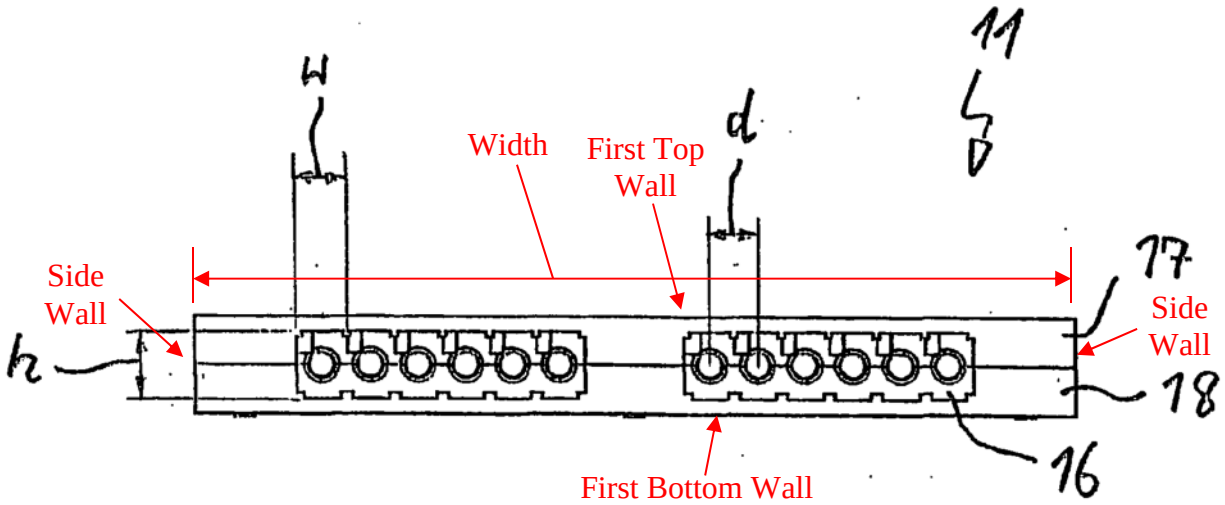
EX1010: Figs. 3 and 5 (annotated).

304. As shown above, the first top wall and first bottom wall are spaced apart along the height of the adapter housing (12). EX1010: Fig. 5.

305. Therefore, Eigenmann meets 12.a.2.

**12.a.3 "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls"**

306. As shown in Figure 5 (reproduced and annotated below), Eigenmann's first top wall and first bottom wall each extend widthwise between the two opposing side walls:




EX1010: Fig. 5 (annotated).

307. Therefore, Eigenmann meets 12.a.3.

**12.b "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width"**

308. Eigenmann's first top wall and first bottom wall each include internal grooves spaced apart along the width. EX1010: Figs. 2 and 5.

309. As seen in Figures 2 and 5, each of the upper and lower parts (17, 18) include guiding rails (46) defining the insertion channels (47) (e.g., grooves). EX1010: ¶[0031] ("Respectively provided in the upper part 17 and in the lower part 18, in front of and behind the central web 44 in the plugging direction, in a lower-lying plane, are guiding rails 46, which run between the guiding sleeves 45 in the plugging direction. Every two guiding rails 46 neighboring a guiding sleeve 45 define an insertion channel 47 for a plug-in connector 13, associated with the guiding sleeve.").

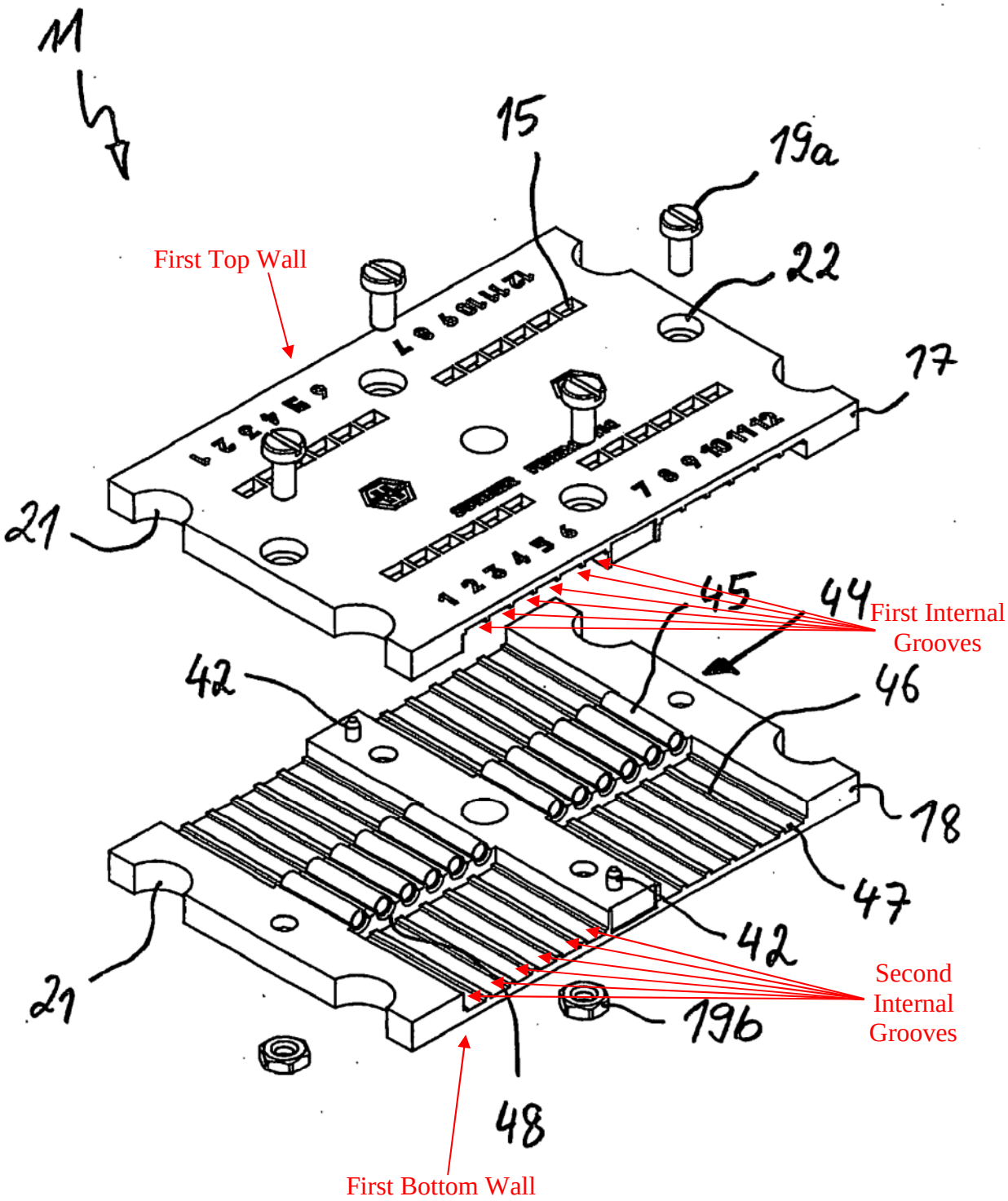
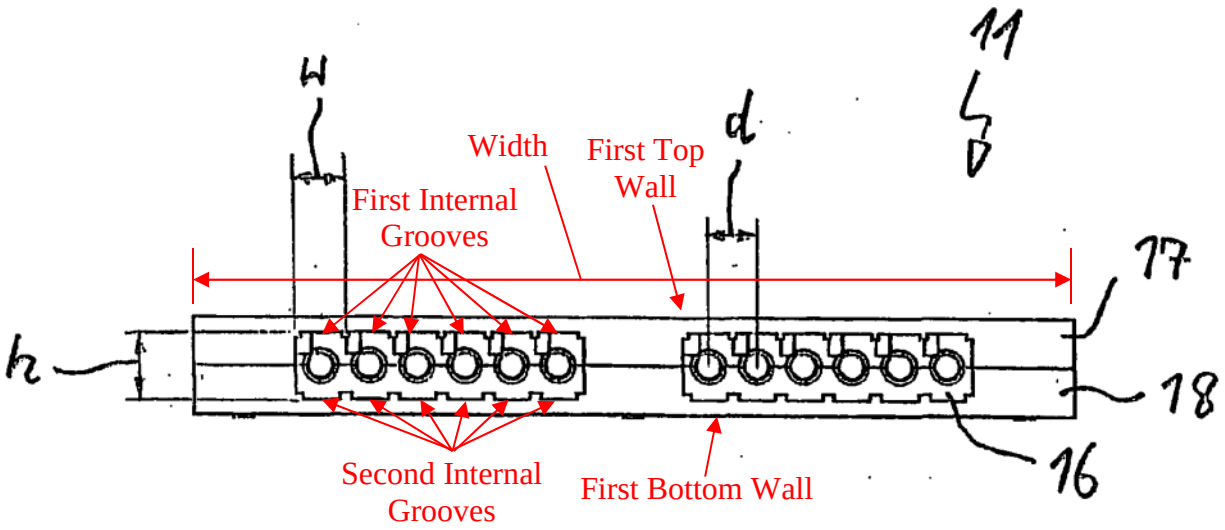



FIG. 2



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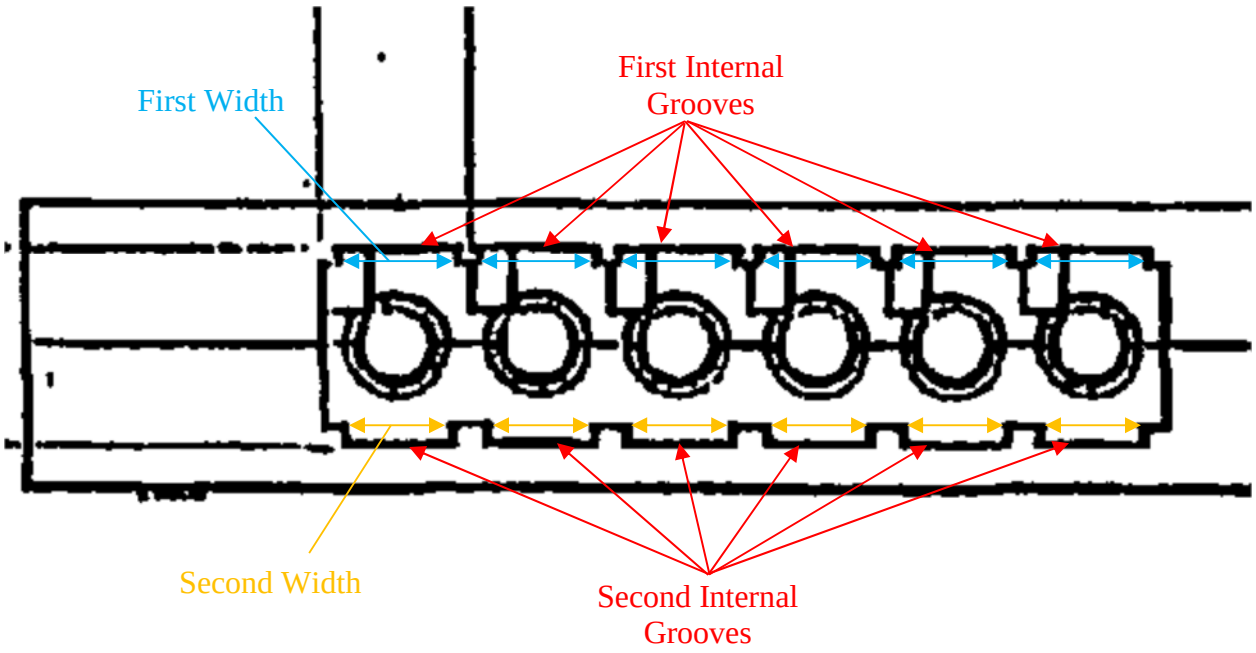

EX1010: Figs. 2 and 5 (annotated).

310. As seen above, the guiding rails (46) on the top define first internal grooves along the first top wall and the guiding rails (46) on the bottom define second internal grooves along the first bottom wall.

311. Therefore, Eigenmann meets 12.b.

**12.c.1 "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width"**

312. As shown in Figure 5 (reproduced and annotated below), each of the first internal grooves have a first width and each of the second internal grooves have a second width.




EX1010: Fig. 5 (excerpted, annotated).

313. More specifically, Eigenmann's upper and lower parts (17, 18) each include guide rails (46 defining insertion channels (47) (i.e., internal grooves) there-between. EX1010: ¶[0031] (" Respectively provided in the upper part 17 and in the lower part 18, in front of and behind the central web 44 in the plugging direction, in a lower-lying plane, are guiding rails 46, which run between the guiding sleeves 45 in the plugging direction. Every two guiding rails 46 neighboring a guiding sleeve 45 define an insertion channel 47 for a plug-in connector 13.").

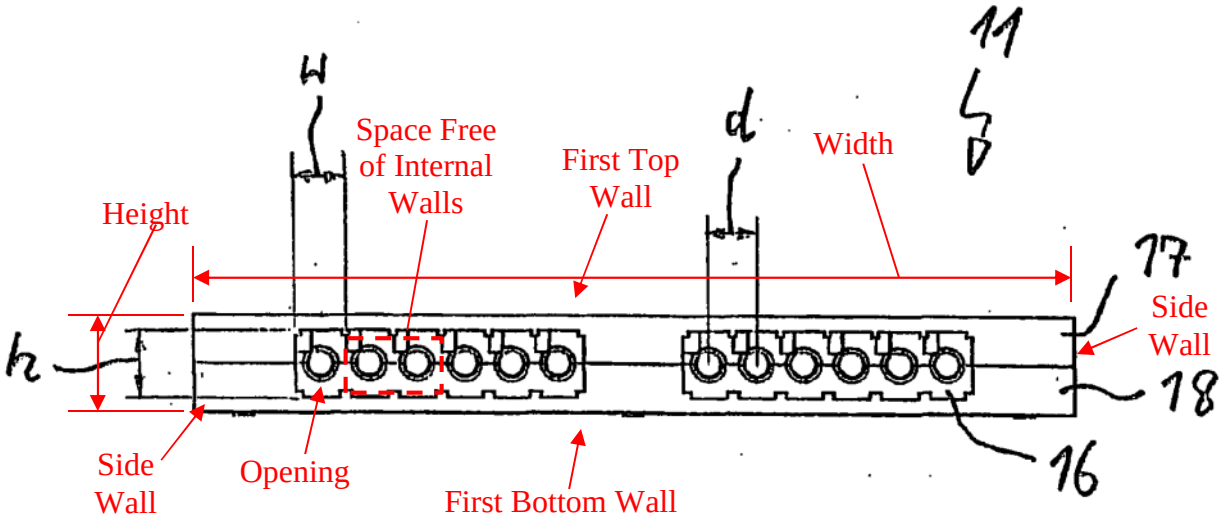
314. As shown in Fig. 5 (excerpted and annotated above), the guide rails (46) on the upper part (17) have a smaller width than the guide rails 46 on the lower part 18. EX1010: Fig. 5.

315. As a result, each insertion channel (47) in the upper part (17) has a width larger than a width of each insertion channel in the lower part (18). EX1010: Fig. 5.

316. Therefore, Eigenmann meets "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width."

**12.c.2 "and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height."**

317. As shown in Figure 5 (reproduced and annotated below), Eigenmann's adapter (11) includes openings in which multiple fiber optic connectors may be inserted adjacent to one another on a same side of the adapter.



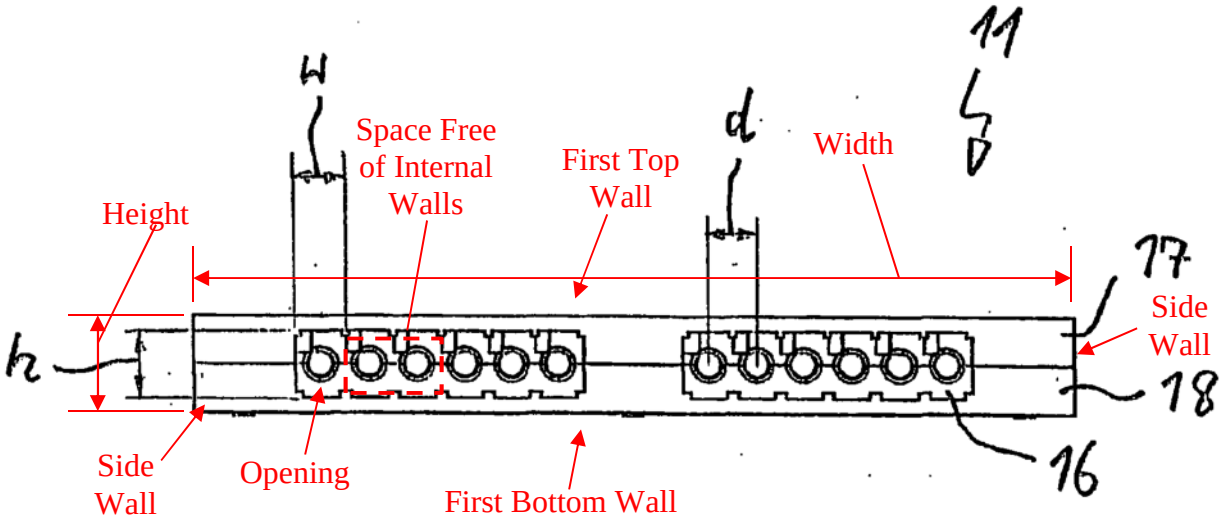

EX1010: Fig. 5 (annotated).

318. As described in Eigenmann, both the upper part (17) that forms the first top wall and the lower part (18) that forms the first bottom wall include guiding rails (46) spaced apart along the width. EX1010: ¶[0031] ("The upper part 17 and the lower part 18 are two flat plates of the same height, which are formed substantially mirror-symmetrically in relation to a central plane. . . . Respectively provided in the upper part 17 and in the lower part 18, in front of and behind the central web 44 in the plugging direction, in a lower-lying plane, are guiding rails 46, which run between the guiding sleeves 45 in the plugging direction.").

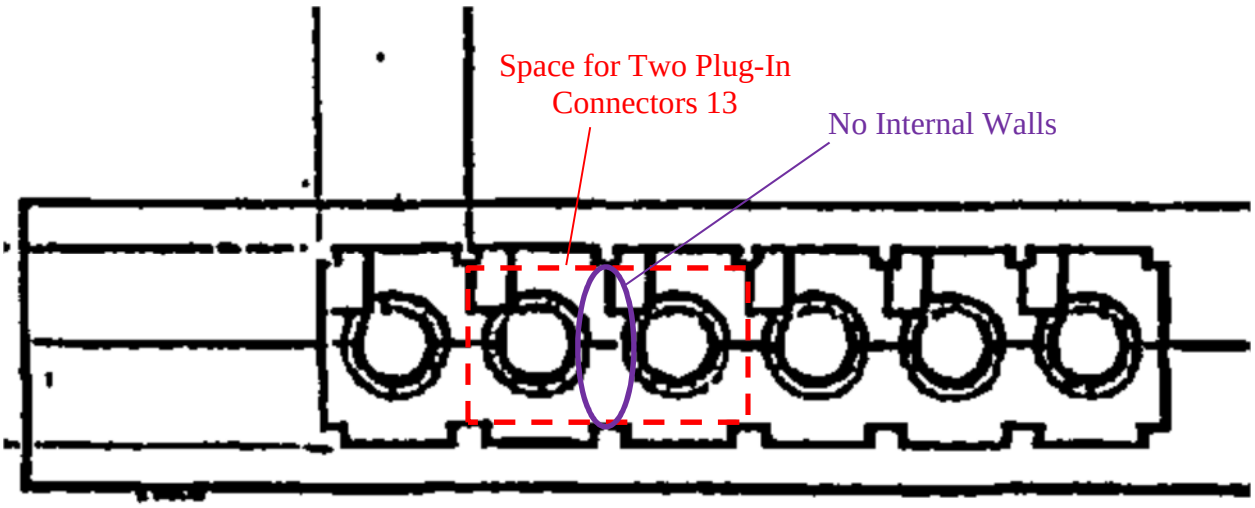
319. Notably, the first internal grooves and second internal grooves are identified in Claim 12 of the '415 Patent as part of the first top and first bottom walls respectively. Accordingly, one of skill in the art would consider the insertion channels (47) of Eigenmann to be disposed in their respective top and bottom walls—and the guiding rails (46) defining the insertion channels (47) of

Eigenmann to be part of the respective top and bottom walls—in the context of the claims of the ‘415 Patent.

320. As shown in Figures Eigenmann’s adapter (11) does not include internal walls between the adjacent spaces for two plug-in connectors (13) to be inserted. EX1010: Fig. 5.




EX1010: Fig. 5 (annotated).



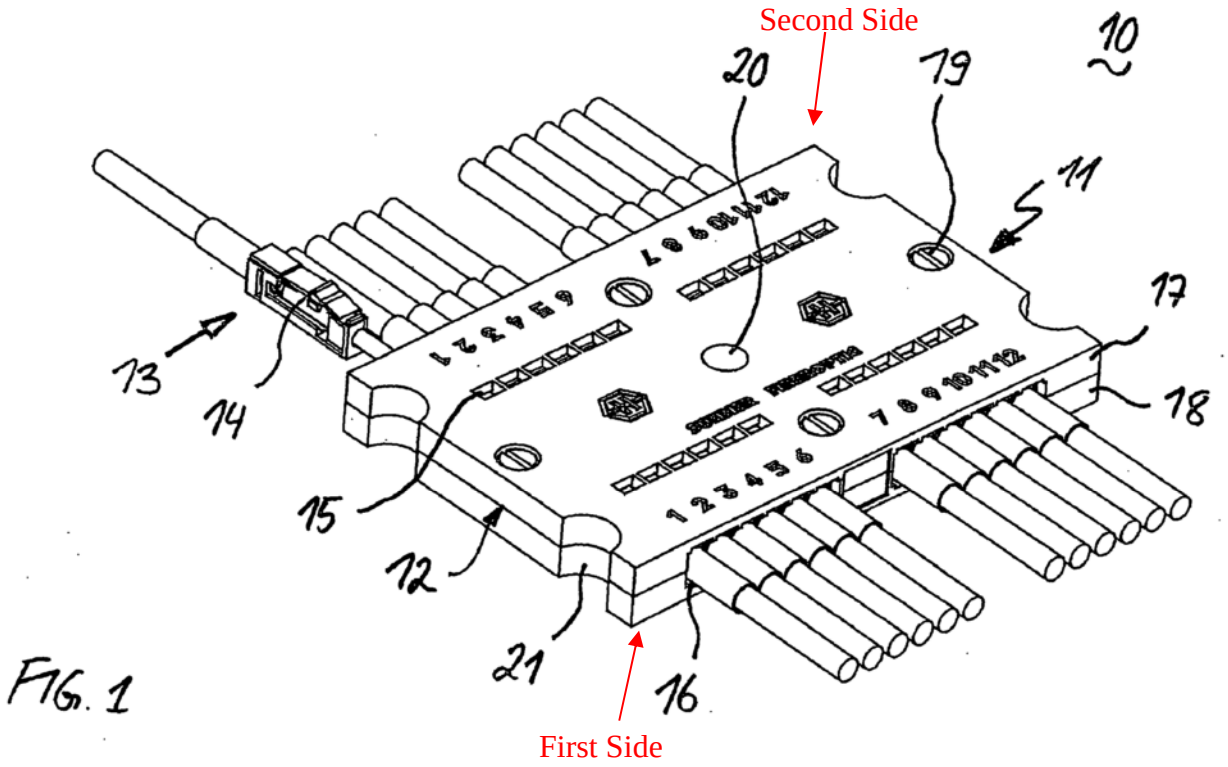

EX1010: Fig. 5 (enlarged, annotated).

321. Therefore, Eigenmann meets "the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height."

**B. Claim 13 – "The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors."**

322. Claim 13 depends from Claim 12, adding the further limitation requiring that the first side and the second side of the adapter be configured to receive a plurality of fiber optic connectors. This added limitation is further met by the adapter disclosed within Eigenmann.

323. As shown and explained by Eigenmann, the first and second sides of Eigenmann's adapter housing (12) can each receive up to 12 plug-in connectors (13). EX1010: Figs. 1 and 3, ¶[0027] ("With the adapter represented in FIG. 1, a maximum of 12 pairs of optical fibers can be connected to one another according to choice, for which purpose a total of at most 24 plug-in connectors 13 shown in FIG. 1 are required (23 plug-in connectors are shown in the inserted state in FIG. 1, 1 plug-in connector at position 1 is shown pulled out).").




EX1010: Fig. 1 (annotated).

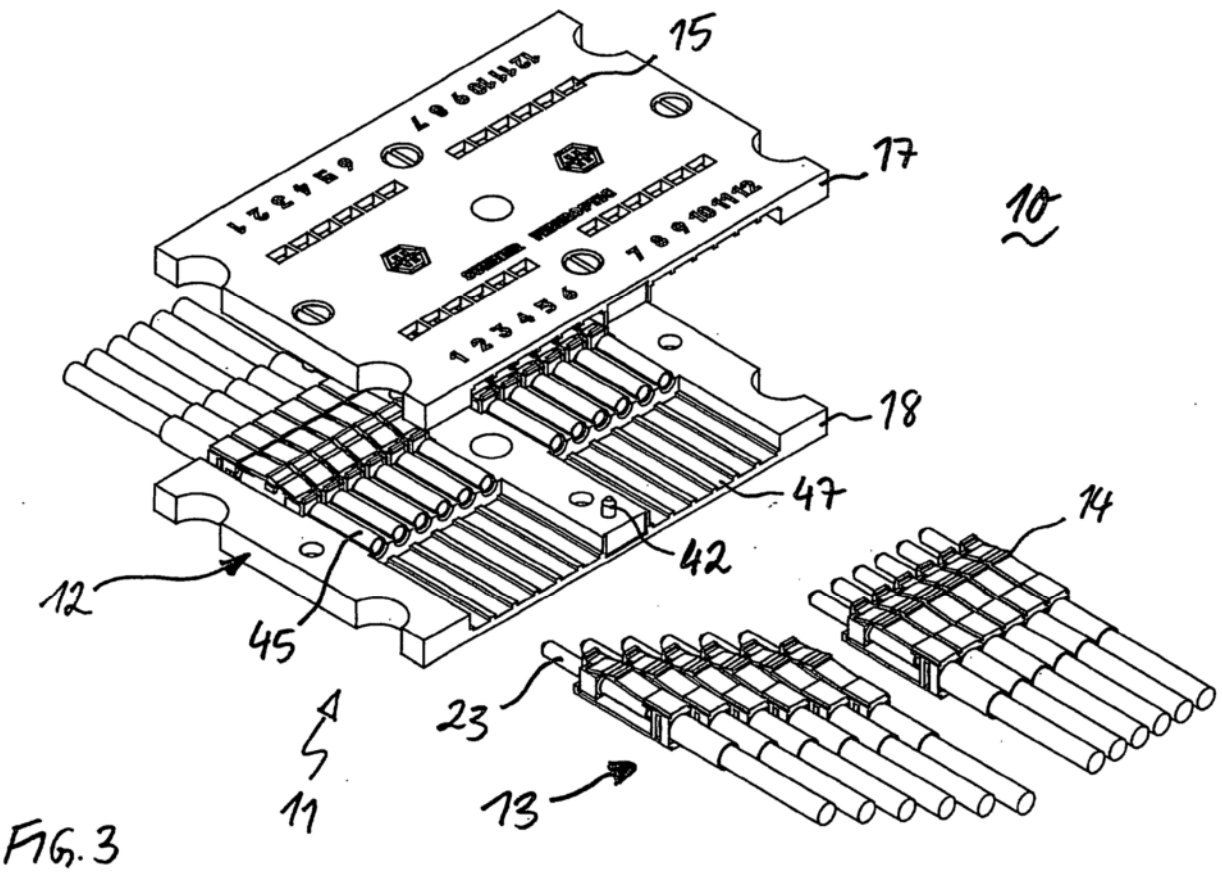


FIG. 3

EX1010: Fig. 3.

324. Therefore, Eigenmann meets "the first side and the second side are configured to receive a plurality of fiber optic connectors."

**C. Claim 14**

325. Claim 14 depends from Claim 12, adding the further limitations that are also met by the adapter disclosed within Eigenmann.

**14.a "The adapter according to claim 12, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side"**

326. As shown in Figures 2 and 3 (reproduced below), Eigenmann's adapter (11) includes a central web (44) with "guiding sleeves" (45) disposed between the first and second sides of the adapter. EX1010: Figs. 2 and 3, ¶[0030]. The central web (44) thus constitutes a wall disposed within and across the central portion of the adapter housing (12).

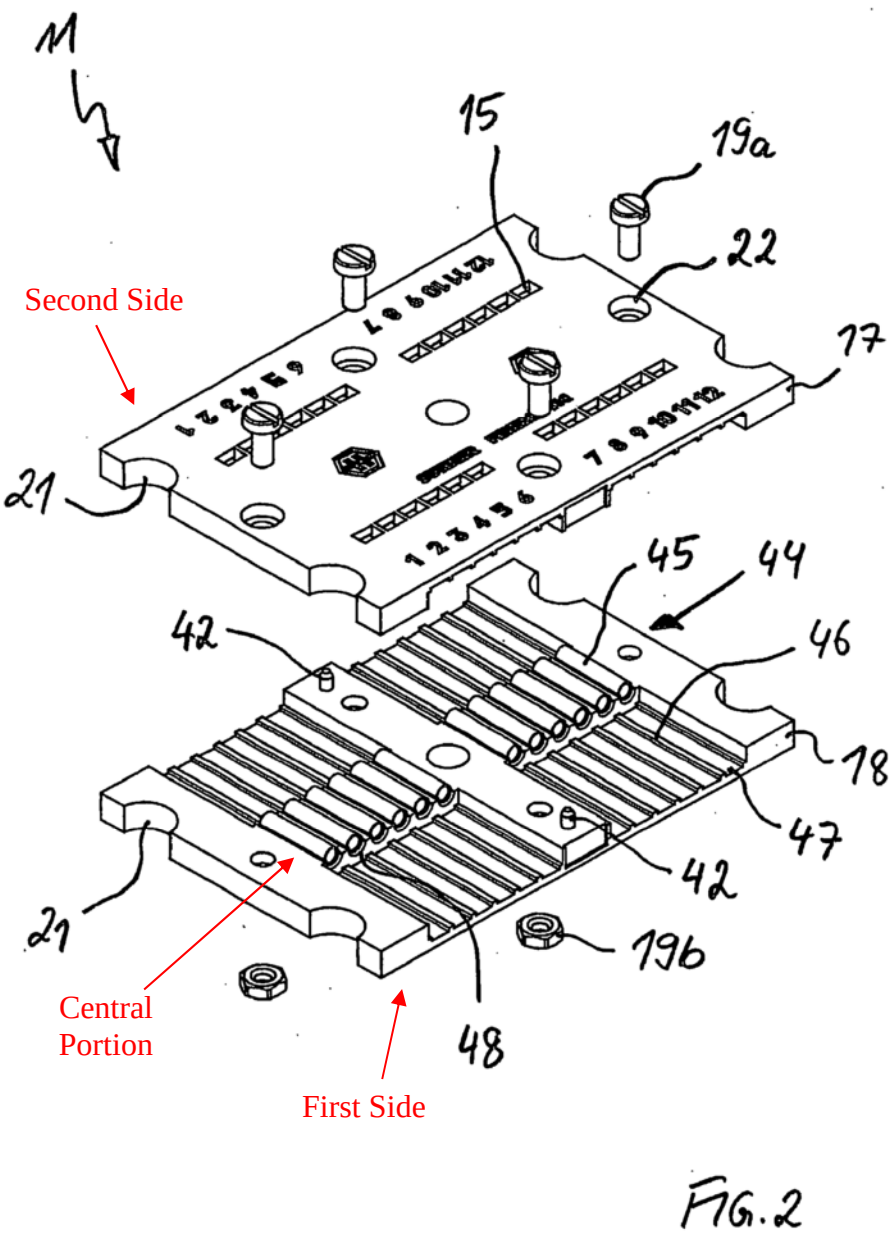



FIG. 2

EX1010: Fig. 2 (annotated).

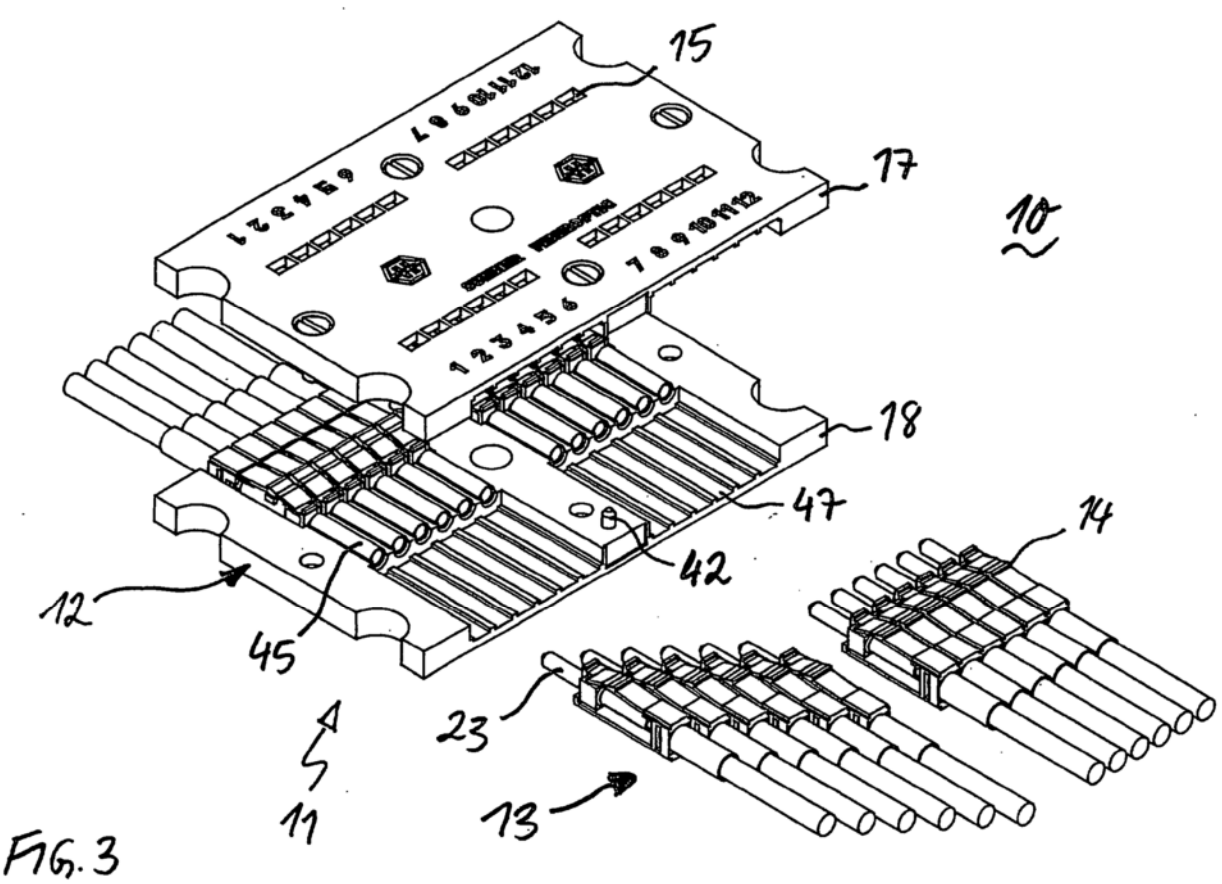


FIG. 3

EX1010: Fig. 3.

327. Therefore, Eigenmann meets "a wall disposed within and across the central portion of the main body and between the first side and the second side."

**14.b "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

328. Eigenmann's wall—central web (44)—across the central portion of the adapter housing (12) includes the plurality of guiding sleeves (45). EX1010: Figs. 2 and 3, ¶¶[0029]-[0032].

329. As described by Eigenmann, the adapter (11) includes one guiding sleeve for each pair of plug-in connectors (13) coupled by the adapter (11).

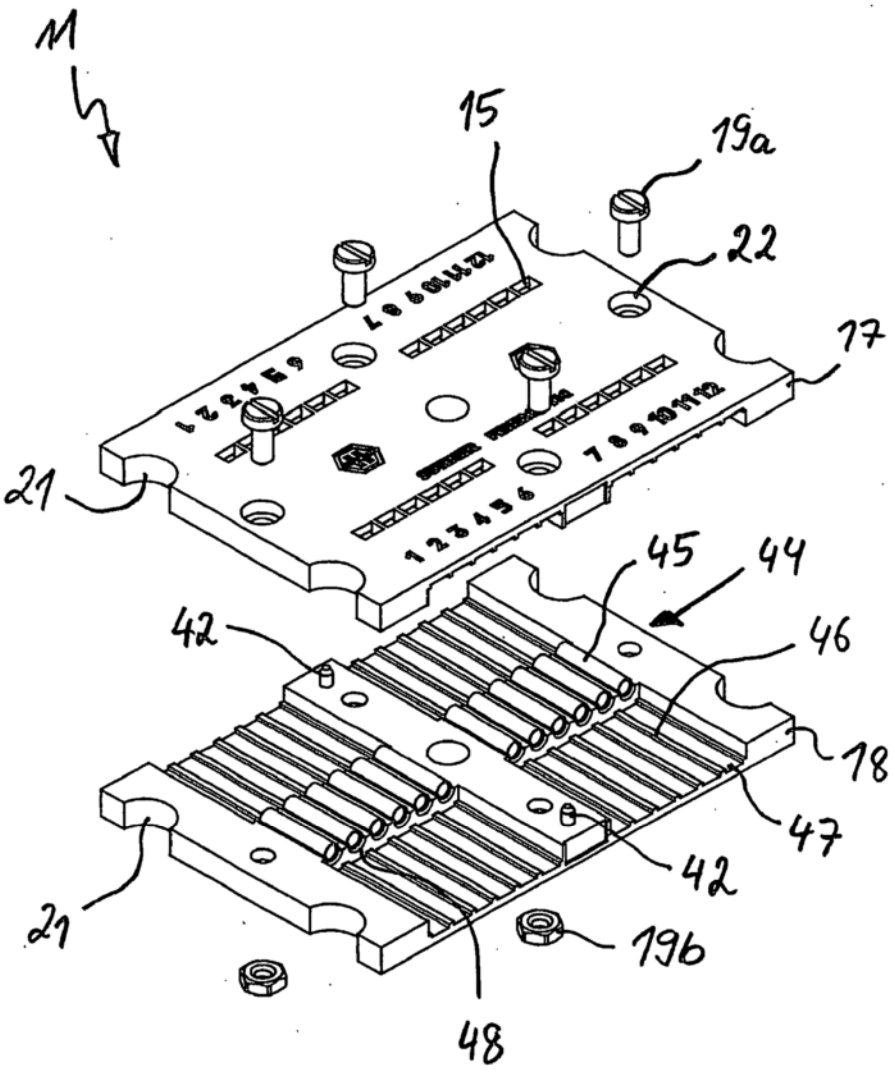



FIG. 2



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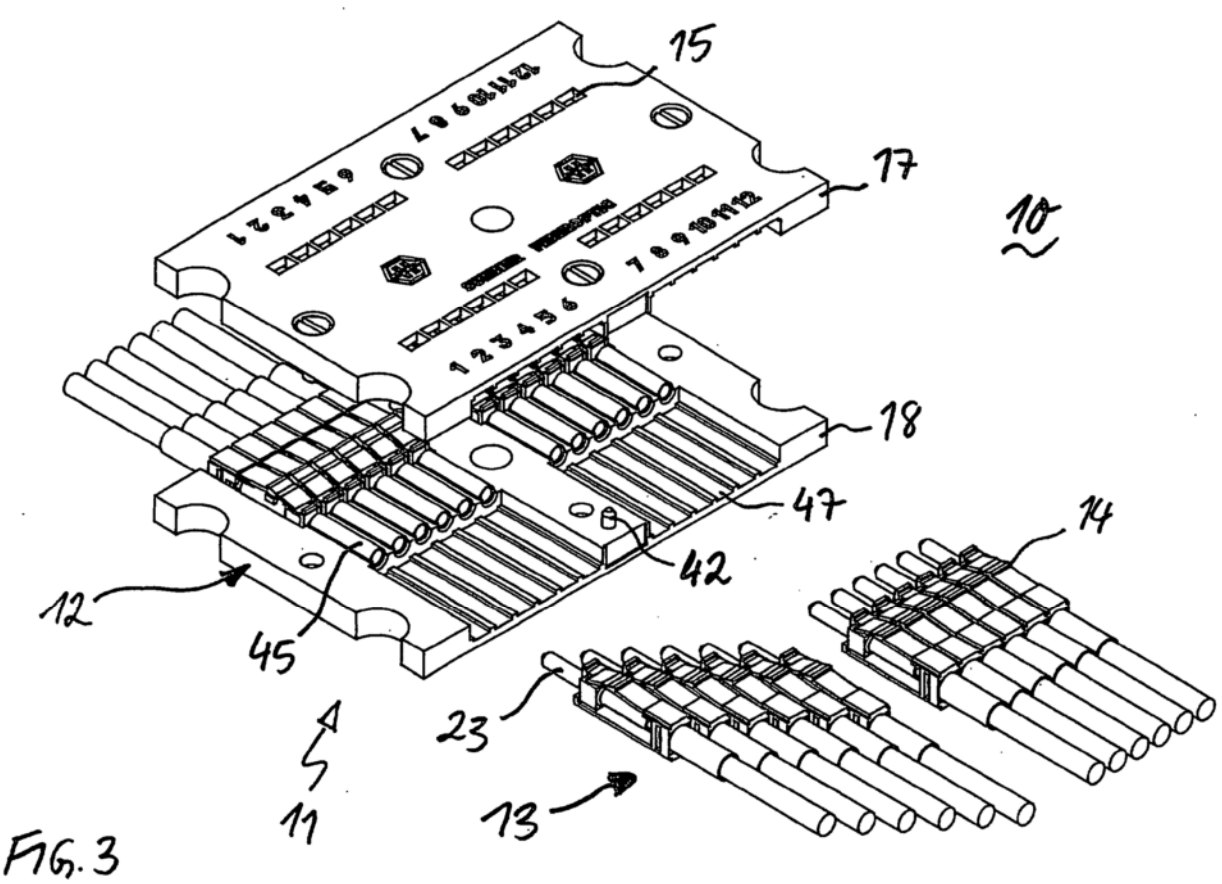


FIG. 3

EX1010

10: Figs. 2 and 3.

330. Each guiding sleeve (45) of the wall defines a passage. EX1010: ¶¶[0029] ("The guiding sleeves 45 receive the ferrules (23 in FIGS. 3, 4) of the plug-in connectors 13 in a way known per se and guide them in such a way that the ferrules of the two plug-in connectors involved in the plug-in connection and the ends of the fibers that are located in the central bores of the ferrules butt against one another with the end faces.").

331. The ferrules (23) of the plug-in connectors (13) pass into the wall via the passages formed by the guiding sleeves (45). EX1010: ¶¶[0029], [0032].

332. More specifically, Eigenmann explains that when the plug-in connectors are inserted into the adapter housing (12), "their ferrules 23 [are] received by the associated guiding sleeves 45." EX1010: ¶[0032].

333. Thus, the guiding sleeves (45) allow at least a portion of the ferrules (23) inserted from the first and second sides to pass therethrough.

334. Therefore, Eigenmann meets "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."

**OBVIOUSNESS: KANAI AND SAITO (GROUND 3)**

335. It would have been obvious to modify the inner guides (31, 33) of Kanai's adapter that receive and provide fine alignment to the ferrules in view of the teachings of Saito.

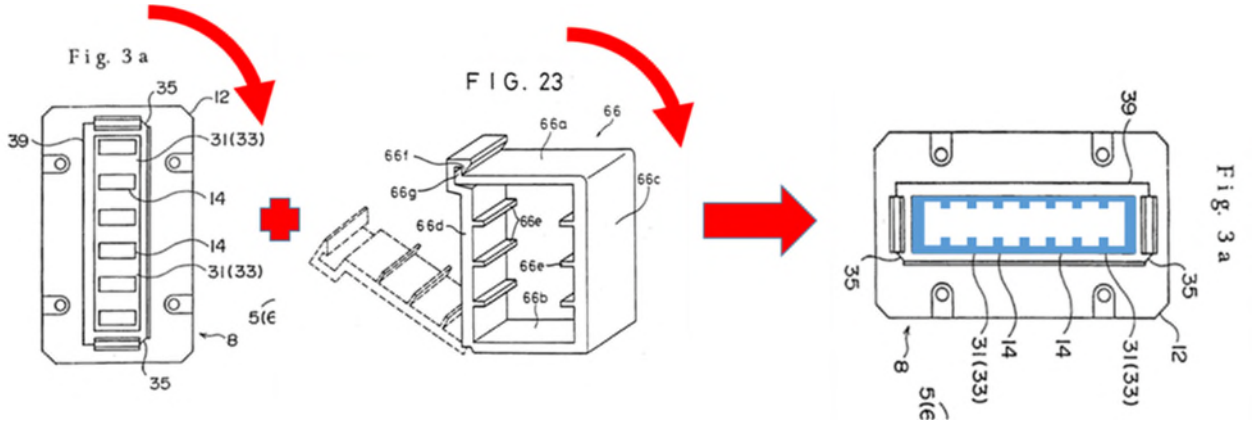
336. Kanai teaches an adapter for connecting optical connector plugs having an array of floating optical connectors/ferrules. EX1003: Abstract.

337. As I will discuss in greater detail below, the adapter of Kanai meets every limitation of claims 1 and 4-10 except for the claim limitations pertaining to the presence and configuration of various grooves on the interior surfaces of the adapter.

338. It would have been obvious to modify the adapter—and corresponding connector plugs/optical ferrules—of Kanai in a manner meeting these limitations in view of Saito.

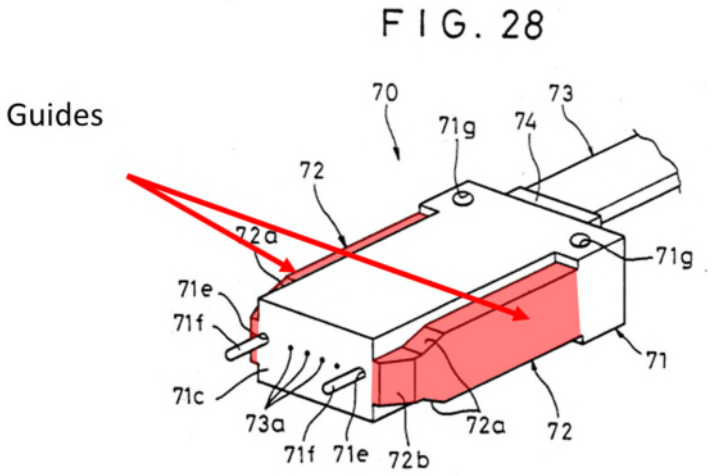
339. It would have similarly been obvious to modify the inner guides (31, 33) of the Kanai adapter that receive and provide pre-alignment alignment to the ferrules in view of the teachings of Saito.

340. Those of skill in the art would have been motivated in view of Saito to increase optical connector density by decreasing the pitch of the inner guides (31, 33) of the Kanai adapter, and to reduce material by replacing the partition walls separating the inner guides with ribs or partial partitions as taught by Saito, as shown below. This modification would result in grooves for receiving the edges of the ferrules between each of the ribs—or between the first/last rib and the inner side wall.




EX1003: Fig. 3a; EX1004: Fig. 23.

341. It would have been obvious to further modify the interior grooves/ribs of the adapter as suggested by the embodiment of ferrule shown in Fig. 28 of Saito (reproduced below).




EX1004: Fig. 28 (annotated).

342. In this embodiment, guides (72) with tapered surfaces (72a, 72b) are located on the sides of the ferrule for aligning the ferrule within the grooves of the adapter.

343. Saito's use of guides on the sides of the ferrule is advantageous at least for the reason that guiding engagement of the ferrules into the adapter is removed from the face of the ferrule containing the termini of the fibers.

344. The corresponding adapter would only receive the guides (72)—rather than the entire side of the ferrule—within the grooves of the adapter.

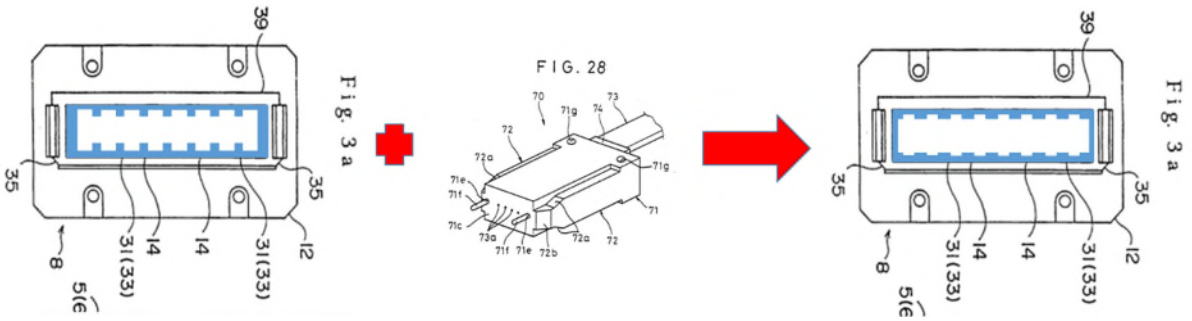
345. Saito explains that the ferrule embodiment of Figure 28 was merely a variation of ferrule embodiment used with the adapter of Figure 23. EX1004:

12:56-68. Although the details as to the adapter were not specifically addressed with respect to the Figure 28 ferrule embodiment, one of skill in the art would have recognized that the adapter configuration that would correspond to the ferrule of Saito Figure 28 would require slight modifications as compared to the adapter shown in Saito Figure 23.

346. More specifically, the grooves of the adapter shown in Saito Figure 23 would be narrowed so as to securely hold the guides (72) of the ferrule and the ribs would require widening so as to entirely fill the space between the guides (72) of adjacent ferrules and provide a modest separation of the main bodies of the ferrules so as to allow for individual alignment of the ferrules.

347. Shoulders would further be placed against the inner side walls of the central opening so that the guides of the first and last ferrule were secured from both sides.

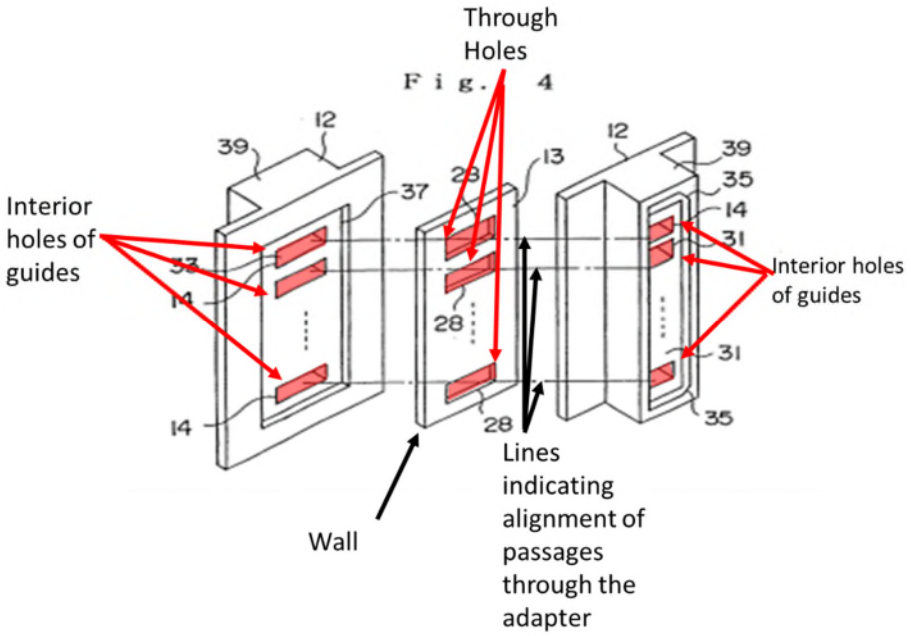
348. An implementation of the Saito Figure 28 embodiment with respect to the Kanai adapter is demonstrated below.




EX1003: Fig. 3a; EX1004: Fig. 28

### A. Motivation to Modify Kanai Based on Saito

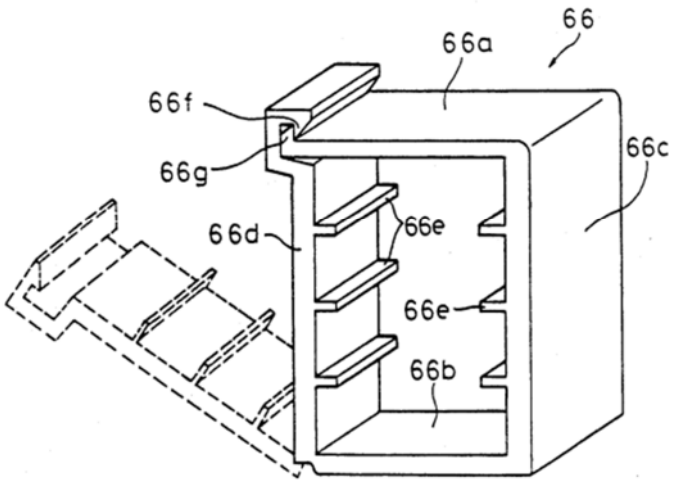
349. The adapter as disclosed by Kanai uses individual tubular guides (31, 33) extending between the first side and the second side to align the corresponding ferrules.




EX1003: Fig. 4 (annotated).

350. It would also have been obvious to modify the adapter of Kanai to consolidate the individual tubular guides (31, 33) into a single opening having walls extending continuously around the optical connectors with grooves to guide each ferrule of the optical connectors into mating position as demonstrated by Figure 23 of Saito (reproduced below).

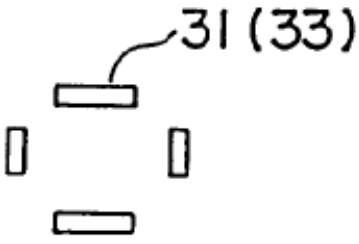
FIG. 23




EX1004: Fig. 23.

351. Kanai specifically recognizes that the walls of the guides can be discontinuous. EX1003: Fig. 9 (depicting the guide as being comprised of four walls), 11:67 – 12:3 (". . . the frame may not be formed of a continuous wall frame, but, for example, may be formed of a non-continuous frame (intermittent frame) as shown in FIG. 9").

Fig. 9




EX1003: Fig. 9.



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352. Figure 23 of Saito represents an obvious variation on Kanai Figure 9's discontinuous guides in which short ribs or partitioning pieces are attached to top and bottom walls[3] to define grooves for receiving a sufficient portion of the optical connector to align the connector pair.

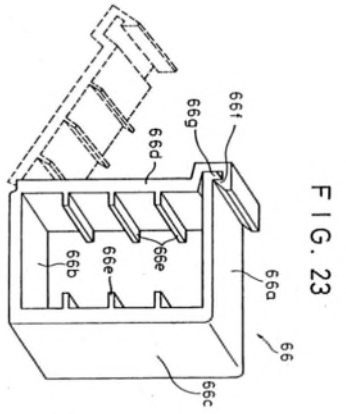
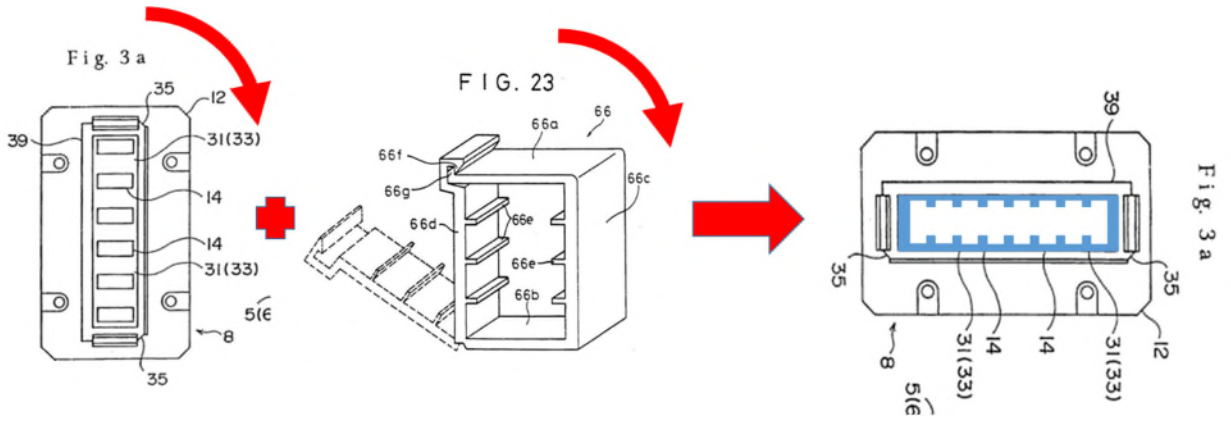



FIG. 23

EX1004: Fig. 23 (rotated).

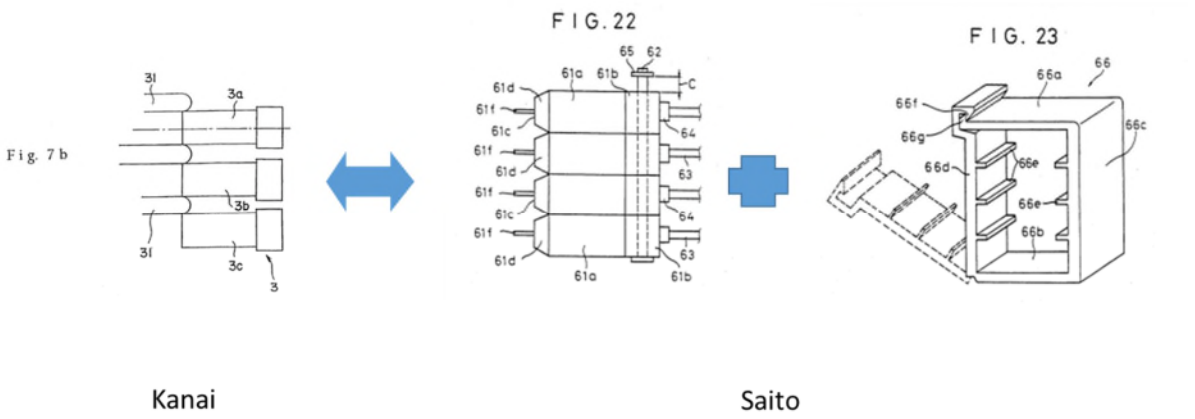
353. This modification of Kanai in view of Saito is demonstrated in the renderings below.

[3] Those of skill in the art would recognize that the orientation of the adapters and stacked connectors identified in the '415 Patent and in the prior art is arbitrary in that the adapters and stacked connectors may be rotated such that the ferrules are stacked parallel to one another either vertically or horizontally.



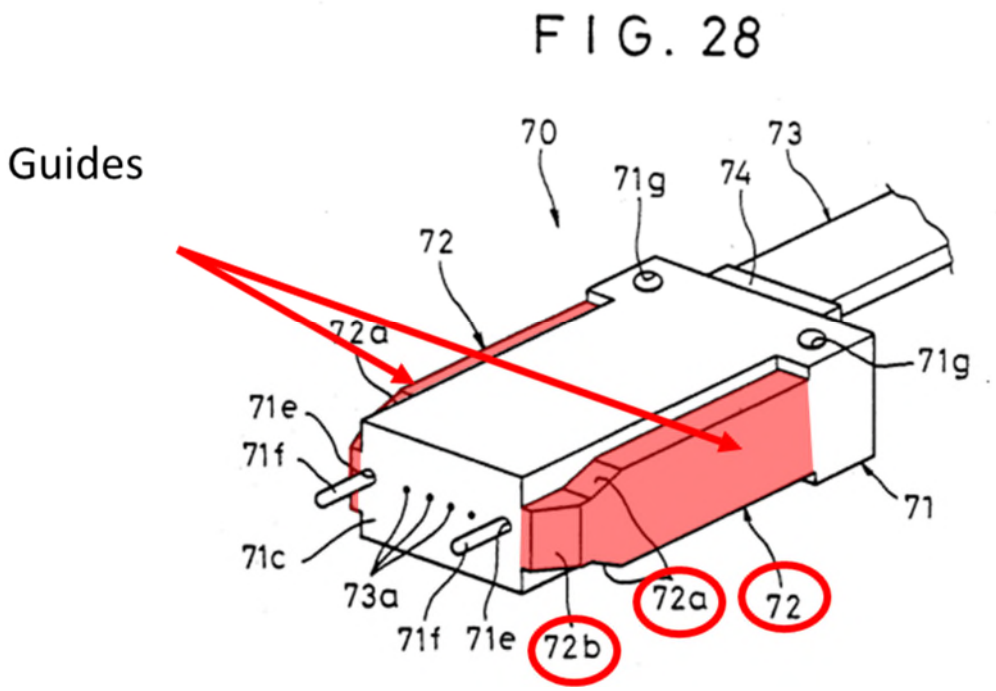

EX1003: Fig. 3a; EX1004: Fig. 23.

354. Instead of relying on rounded edges of the walls of the adapter's guides to align the ferrules as used in Kanai, Saito provides tapered surfaces on the ferrules to provide the pre-alignment alignment of the ferrules. Saito expressly identifies that tapering the surfaces of the optical connectors and tapering the surfaces of the adapter that act as guides are substitute design alternatives. EX1004: 12:9-13 ("Further, in the embodiment wherein an adapter is used to stack the ferrules, the optical connectors are provided with tapered surfaces. It is needless to say that the adapter may be provided with tapered surfaces which serve as guides at the time of butt-connection.").




EX1003: Fig. 7b; EX1004: Figs. 22, 23.

355. This is especially true of the embodiment of Saito shown in Figure 28 where the ferrule uses two sets of tapered surfaces (72a and 72b) which serve to position the ferrule in both the vertical and widthwise orientation. EX1004: 11:56-64 ("Each of the optical connectors of the above-described stacked-type optical connector 60 may be provided with a guide 72 which extends lengthwise along either side of a ferrule 71 as in an optical connector 70 shown in FIG. 28, the guide 72 being provided, as shown in the drawing, with tapered surfaces 72a and 72a which serve as vertical guides and a tapered surface 72b which serves as a widthwise guide for butt-connecting the connectors via the adapter 66").



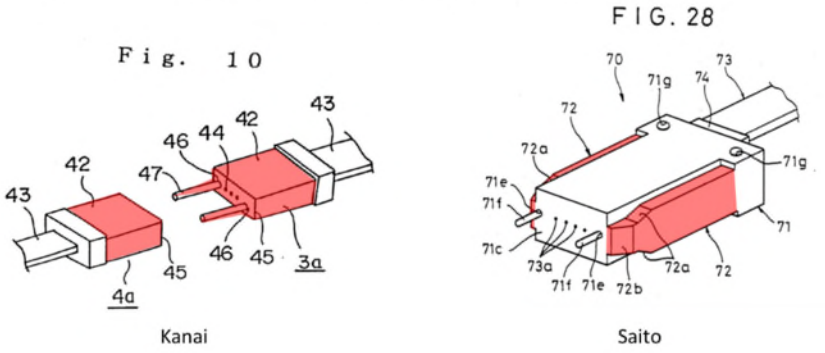

EX1004: Fig. 28 (annotated).

356. One of skill in the art would have been motivated to modify the Kanai adapter in view of Saito because the modification would allow the walls separating the guide slots (31 and 33) to be eliminated, which in turn would provide increased density of fiber optic connectors and a reduction in material required to manufacture the adapter. EX1004: 11:56-64 ("Each of the optical connectors of the above-described stacked-type optical connector 60 may be provided with a guide 72 which extends lengthwise along either side of a ferrule 71 as in an optical connector 70 shown in FIG. 28, the guide 72 being provided, as shown in the drawing, with tapered surfaces 72a and 72a which serve as vertical guides and a

tapered surface 72b which serves as a widthwise guide for butt-connecting the connectors via the adapter 66").

357. The adoption of Saito's guides (72) and the corresponding grooves in the adapter (66) also greatly minimizes the contact between the ferrule and the adapter's interior surfaces. The figures below (Figure 10 from Kanai and Figures 28 from Saito) demonstrate this minimization of surface area on the ferrule that would contact the adapter's interior surfaces.

Potential Contact with the Adapter's Interior Walls




EX1003: Fig. 10 (annotated); EX1004: Fig. 28 (annotated).

358. Further, by eliminating the guide walls separating the slots for the ferrules, the risk of scraping plastic debris or damaging the ferrule's alignment pins (71f in Saito Figure 28 and 47 of Kanai figure) by inadvertently contacting them with the adapter's guide walls while inserting the ferrules into the guides would thus be eliminated.

359. Those of skill in the art would recognize that use of guide holes with rounded entries to align a squared edge ferrule—as disclosed in Kanai—and

grooves for receiving ferrules with tapered surfaces and guide ribs as disclosed in Saito represents interchangeable design alternatives that achieve the same result of providing fine pre-alignment of the ferrules, before the guide pins engage in the opposing guide-pin holes for final precision alignment.

### B. Independent Claim 1

#### 1.P "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising:"

360. Kanai teaches an "adapter" which is "suitable for application in the field of optical transmission, and which are able to collectively, easily and accurately connect a plurality of optical connectors." Ex.1103, Abstract.

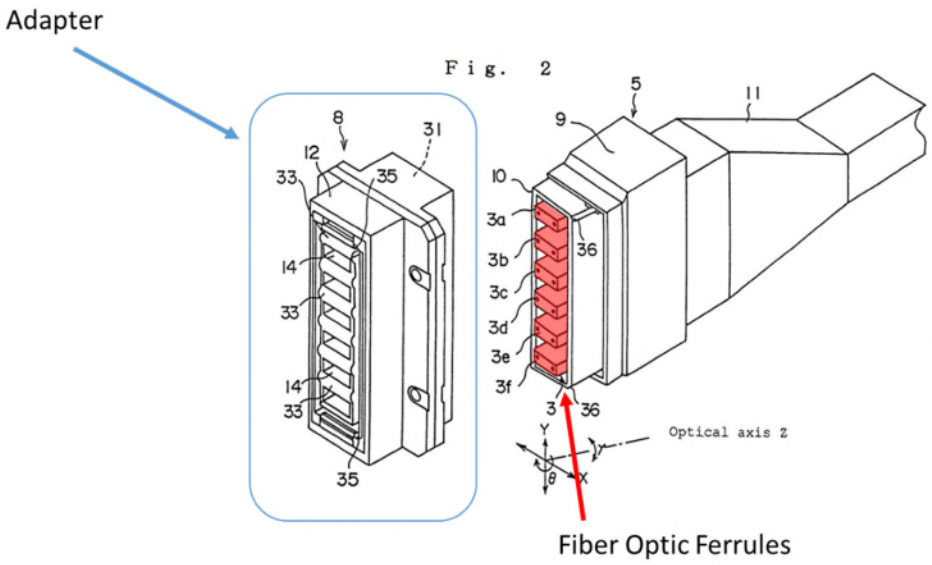
361. Kanai teaches that the disclosed adapter aligns optical connector groups (3) of optical connectors (3a-f, 4a-f)—and their fiber optic ferrules (42)—inserted from opposing first and second sides:

> The connection end face (45) side [i.e. the end face of multi-fiber ferrule (42)] of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) … The optical connectors of the respective connection pairs are position-regulated in the X direction orthogonal to the optical axis and Y direction, thereby causing the axes to be matched, wherein the optical connector groups (3) and (4) are collectively connected via the adapter (8).

EX1003: Abstract, Figure 2 (depicting the adapter and fiber optic connectors).



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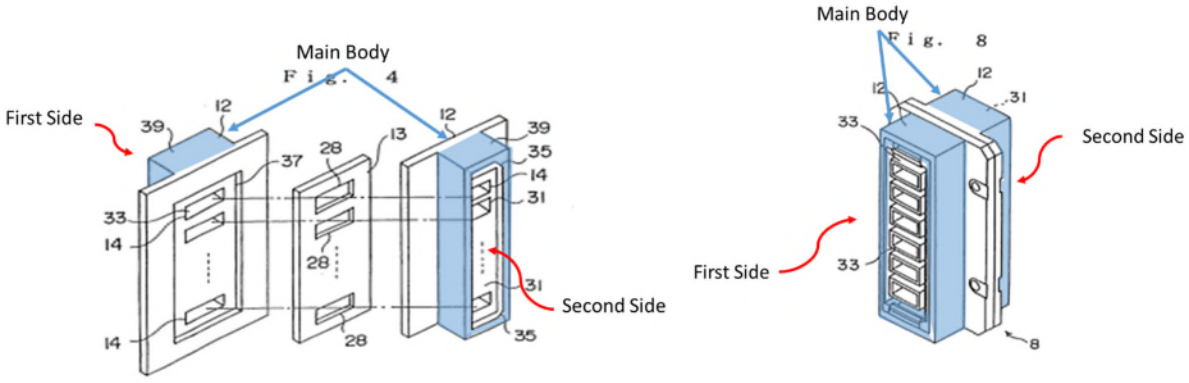



EX1003: Fig. 2 (annotated).

362. Therefore, Kanai's adapter meets the limitation of "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising."

**1.a.1 "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface,"**

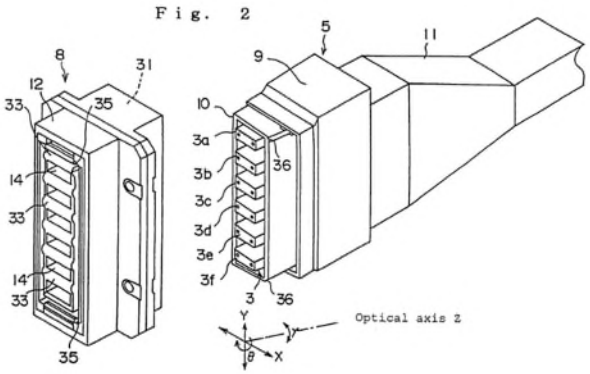
363. The adapter as disclosed by Kanai is formed of two housing halves (12) and a metallic plate (13) between the two housing halves, with the two housing halves welded together by ultrasonic welding to form the housing. EX1003: 8:22-26 ("[T]he adapter 8 is constructed to have two housing halves 12 of almost the same shape and a metallic plate 13. The housing halves 12 are inserted back to back and, for example, are welded by ultrasonic welding."), Figs. 4 and 8 (annotated below).




EX1003: Figs. 4 & 8 (annotated).

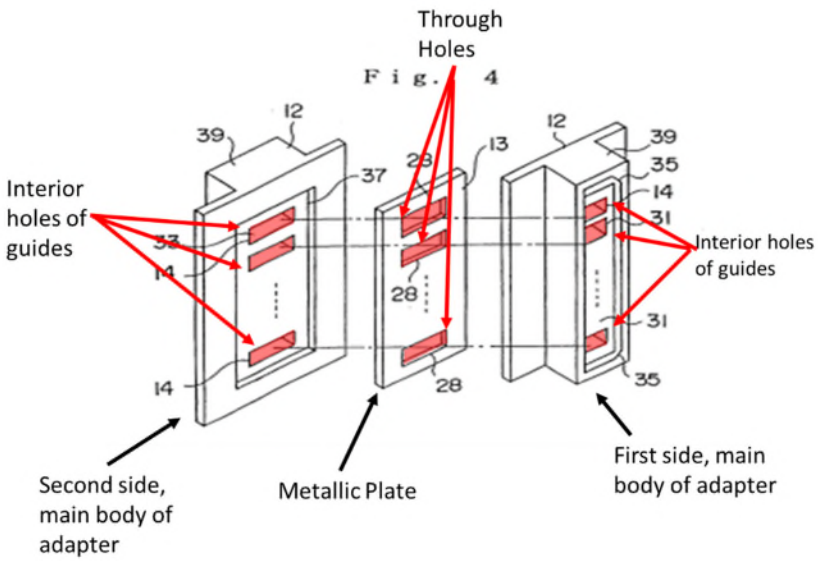
364. The adapter depicted in Figure 8 represents a modified embodiment as compared to the adapter depicted in Figures 2-4 and 7a-7b with respect to the guides (31, 33).

365. Referring back to the frame portions (39), as welded together, the two frame portions define a first side and a second side of the main body for receiving fiber optic connectors. EX1003: Fig. 2.




EX1003: Fig. 2. The housing halves each have a frame portion (39) which collectively act as the "main body" in the context of the claims of the '415 Patent. EX1003: 8:54-59, Figs. 2 and 4 (annotated above).

366. The frames (39) forming the main body define an opening on opposing sides, with guides (31 and 33) providing passages through the adapter and connecting the openings in the opposing sides of the main body. EX1003: 8:46-51 ("The metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33, through which optical connectors are inserted."), Fig. 4 (annotated below).

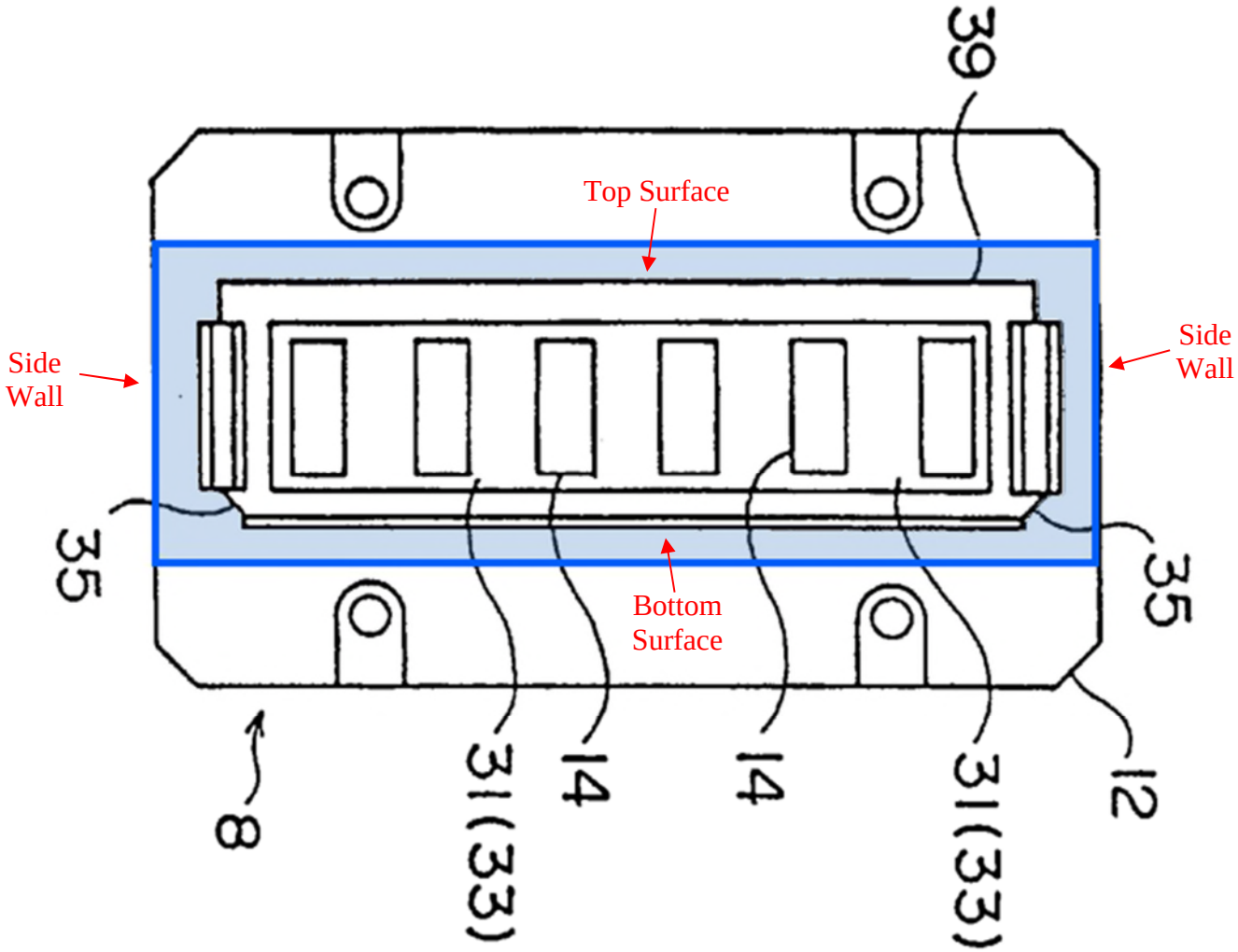



EX1003: Fig. 4 (annotated).

367. Notably, Kanai's adapter further includes a wall (13) with holes (28) that align with the rectangular passages in the guides (31, 33) to define continuous openings through the main body.

368. The main body of Kanai thus defines continuous openings extending between the first side and the second side of the adapter.

369. As shown below, the opening is defined by two opposing side walls, a top surface, and a bottom surface. EX1003: Fig. 3a (annotated).




EX1003: Fig. 3a (Annotated).

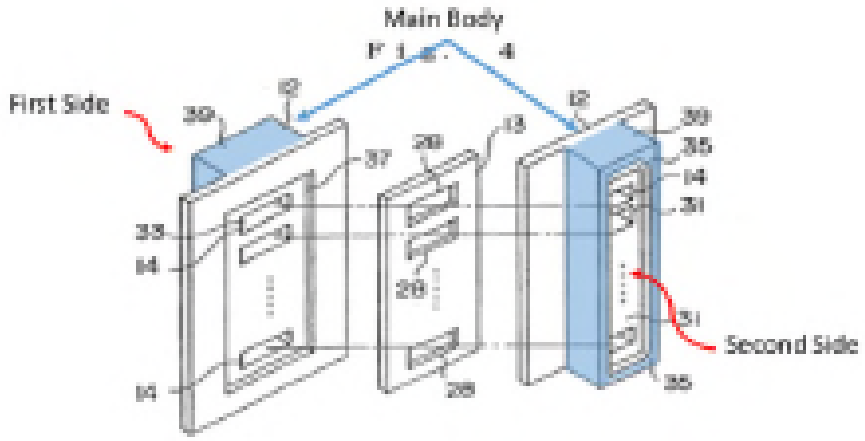
370. Therefore, Kanai's adapter meets the limitation of "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface."

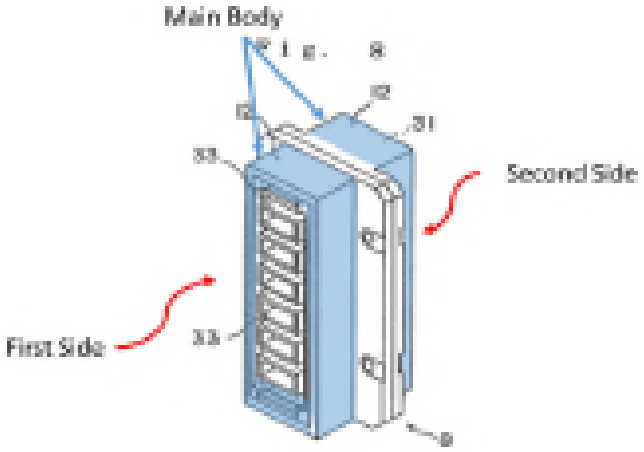
### 1.a.2 “the opening extending between the first side and the second side and”

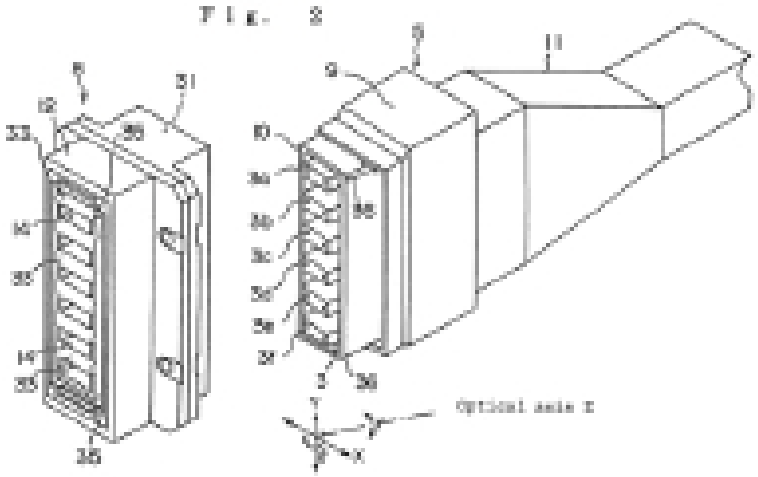
371. Kanai’s frame portions (39), as welded together, form the first side and the second side of the main body for receiving fiber optic connectors.



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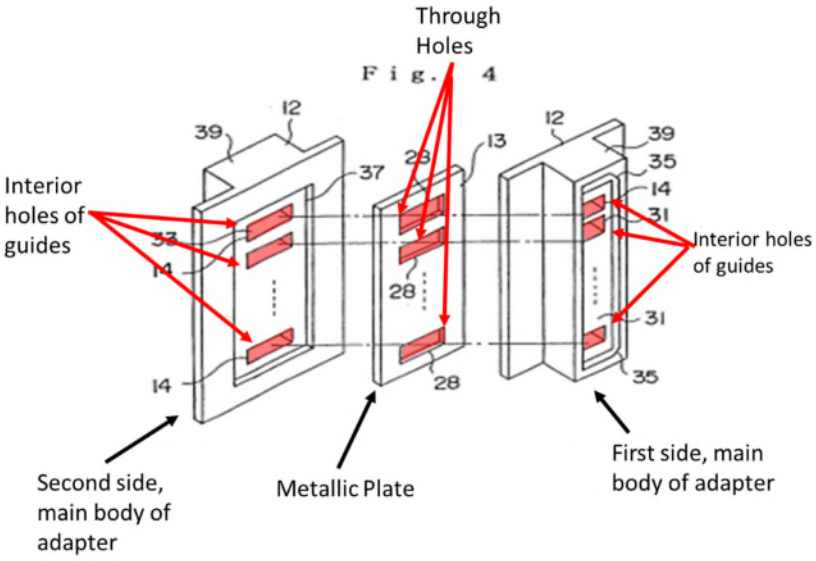





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EX1003: Figs. 2, 4, and 8 (annotated).

372. The frames (39) forming the main body define an opening on opposing sides, with guides (31, 33) providing passages through the adapter and connecting the openings in the opposing sides of the main body.



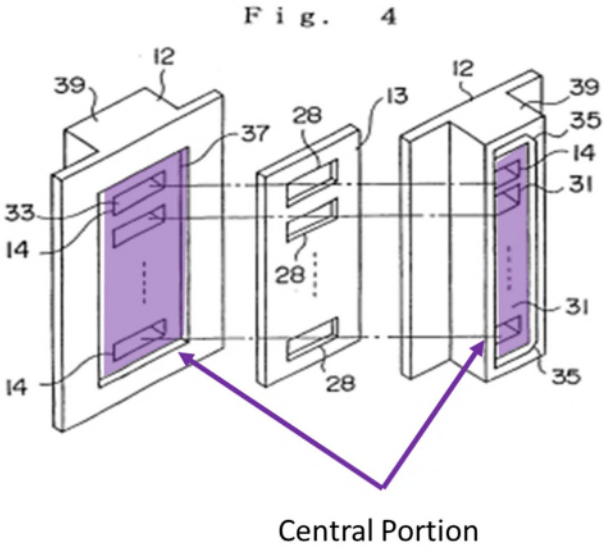

EX1003: Fig. 4 (annotated).

373. Therefore, Kanai's adapter meets the limitation of "the opening extending between the first side and the second side."

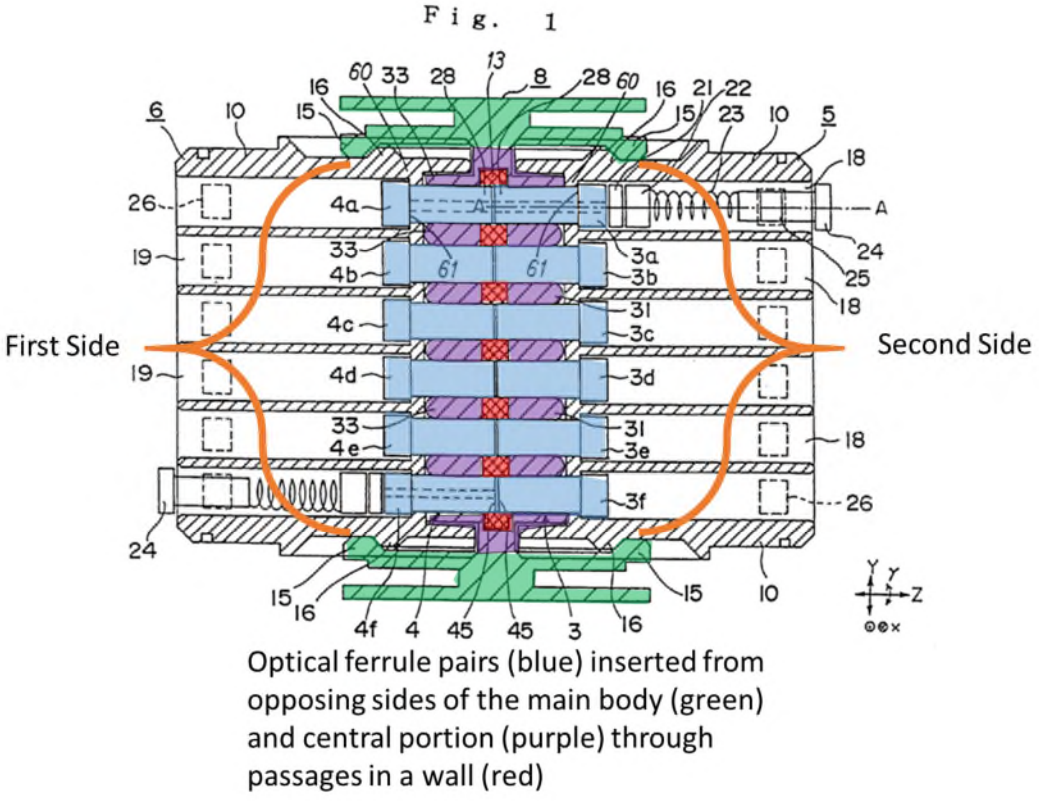
**1.a.3 "having a central portion therebetween; and"**

374. The adapter as disclosed by Kanai has a central portion (shaded purple below) formed by the first and second guides 31 and 33 and separating the first side and the second side of the main body. *See* EX1003: 8:27-29 ("at each of the housing halves 12, a plurality of the first and second guides 31 and 33 are formed

to protrude in the direction (horizontal direction) along which the insertion of optical connectors is received").




EX1003: Fig. 4 (annotated).






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EX1003: Fig. 1 (annotated).

375. Accordingly, the adapter as disclosed by Kanai meets the limitation of "having a central portion therebetween."

**1.b.1 "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion,"**

376. Kanai discloses guides (31, 33) including rectangular passages that receive optical connectors (3a-3f, 4a-4f) to guide the optical connectors into connection with each other. EX1003: 8:26-36.

377. Instead of grooves, the preferred embodiment of the adapter disclosed by Kanai uses notched inserting portions (35) formed at the corners of the inner wall of the frame portion (39) for the purpose of providing the correct orientation and course alignment of the plugs (5, 6) carrying the optical connectors (3a-3f and 4a-4f). EX1003: 8:54-64, 12:16-21.

378. Kanai recognized that the notched insertion portion could be omitted and that other methods of orientation and alignment could be implemented, such as the use of markings attached to the adapter and plugs. EX1003: 12:21-30 ("However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the Second

connector group 4 (so as not make any mistake in the mating of each connection pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6.”). Additional methods of providing alignment and orientation of plugs for insertion into adapters were well known in the art.

379. Those skilled in the art would have been aware that there were other approaches to regulating the positioning of the optical connector guides.

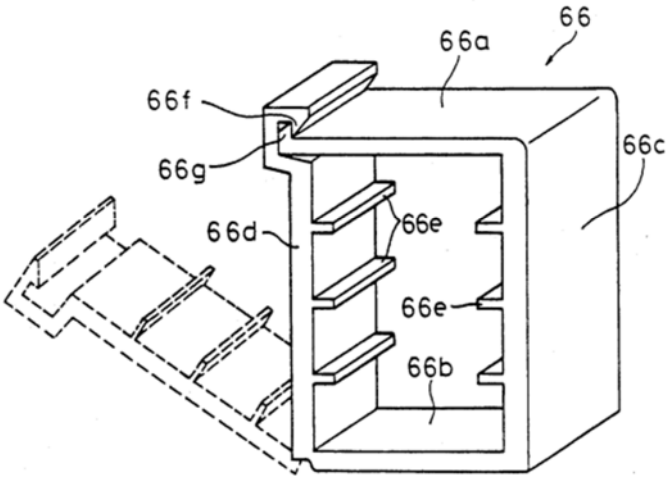
380. For example, Saito concerns stacked-type optical connectors—*i.e.*, fiber optic connectors with fiber optic ferrules that are ganged together—and corresponding adapters, similar to those at issue in Kanai and the ‘415 Patent. EX1004: 1:56-2:42, 10:28-30 (“The stacked-type optical connector 60 thus assembled is butt-connected to another stacked-type optical connector via an adapter 66 shown in FIG. 23.”).

381. Rather than providing rectangular openings that extend continuously around each ferrule separately when received therein, Saito discloses the use of partitioning pieces or ribs (66e) with groove separating them. EX1004: 10:65–68 (“when the individual stacked-type optical connectors 60 are pushed into the adapter 66, the tapered surfaces 61d are guided by the individual partitioning pieces 66e of the adapter 66”), Fig. 23.



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FIG. 23




EX1004: Fig .23.

382. These ribs define grooves forming passageways for optical connectors (61), similar to the guides (31, 33) of Kanai. EX1004:10:41-45 ("When the stacked-type optical connector 60 is attached to the adapter, the individual optical connectors 61 vertically move with its tapered surfaces 61d being guided by the partitioning pieces 66e, and they are separately housed in the respective spaces formed by the side piece 66c, the flap 66d, and the individual partitioning pieces 66e.").

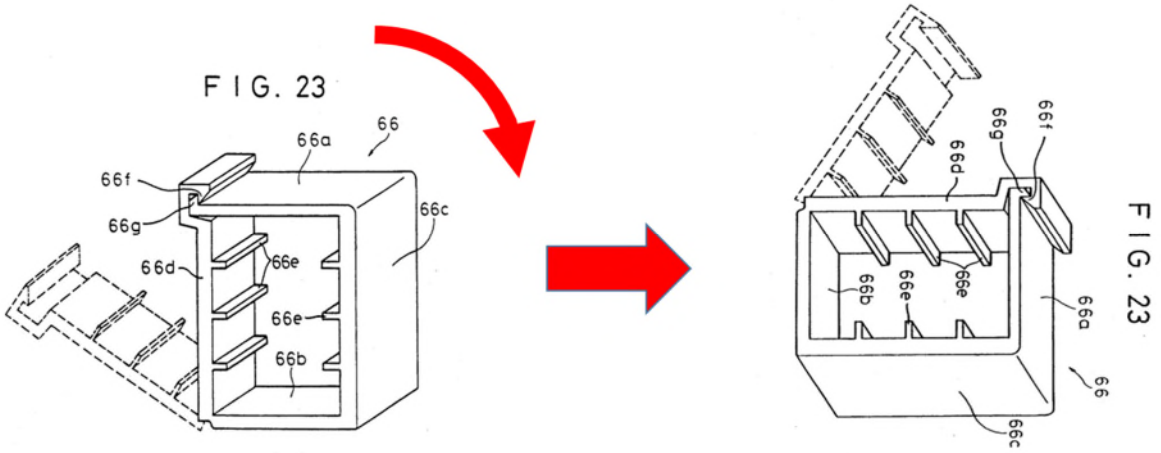
383. In the case of Saito, the passageways are formed by opposing grooves on each side of the adapter.

384. While Saito's adapter is depicted in a vertical orientation, those of skill in the art would recognize that such an adapter would have been readily used



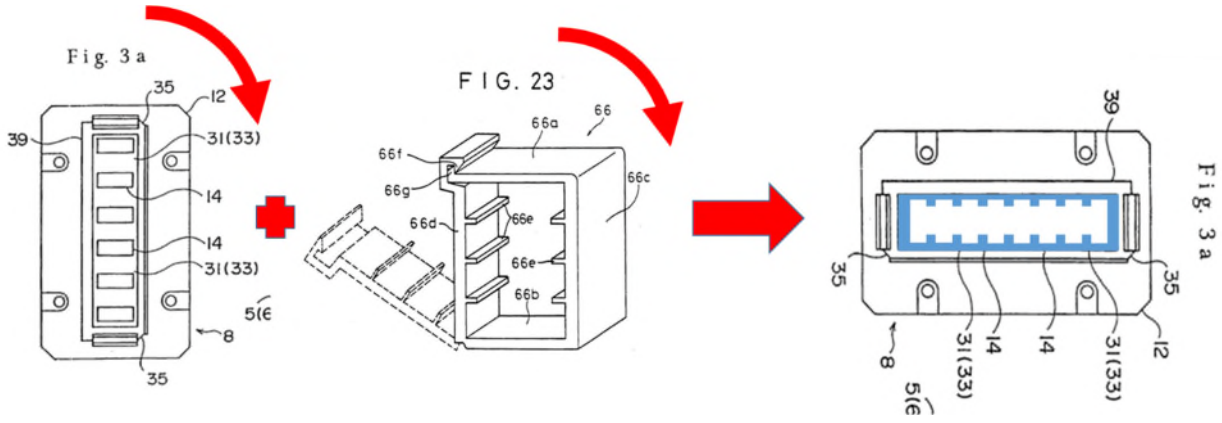
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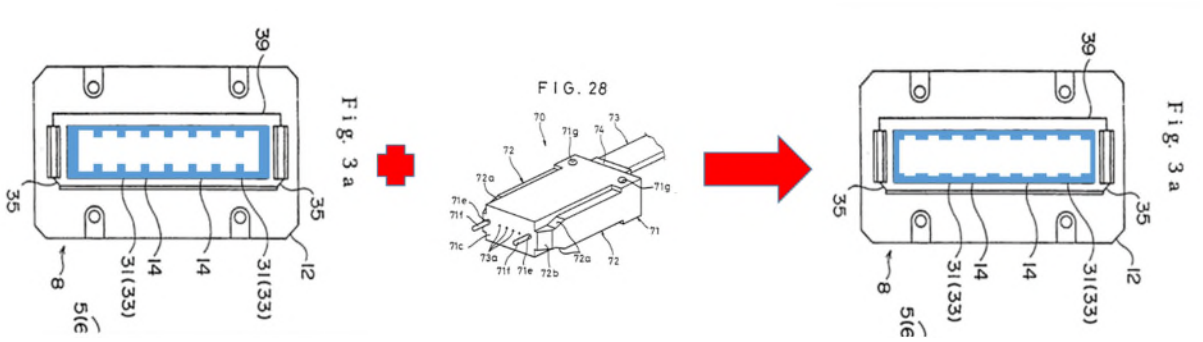
in either a vertical and horizontal orientation. As such, it would have been recognized by one of skill in the art that Saito's adapter could—and frequently would—be oriented such that the grooves would be on the top and bottom surface of the adapter.




EX1004: Fig. 23 (rotated).

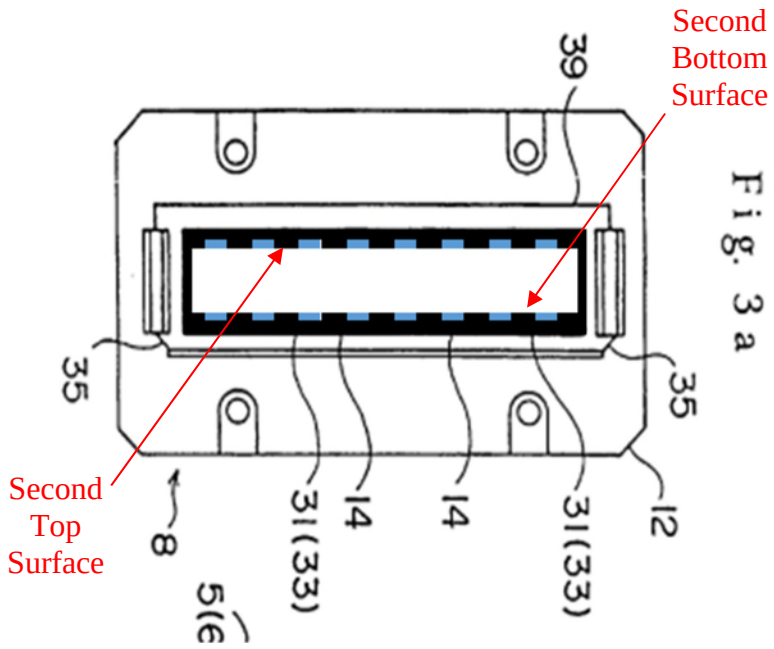
385. A representative depiction of how Kanai could be modified to consolidate the individual tubular guides (31, 33) into a single opening—separated by partial partitions or ribs—was described above and is shown again below.






386. As discussed above, one of skill in the art would have been motivated to modify the Kanai adapter as described above in view of Saito, as the modification would have resulted in increased fiber optic density, a reduction in material used to form the guides, and a reduced risk to damage the ferrules.

387. This modification would result in grooves (blue) between each of the ribs, or between the first/last rib and the inner side wall, as depicted below.

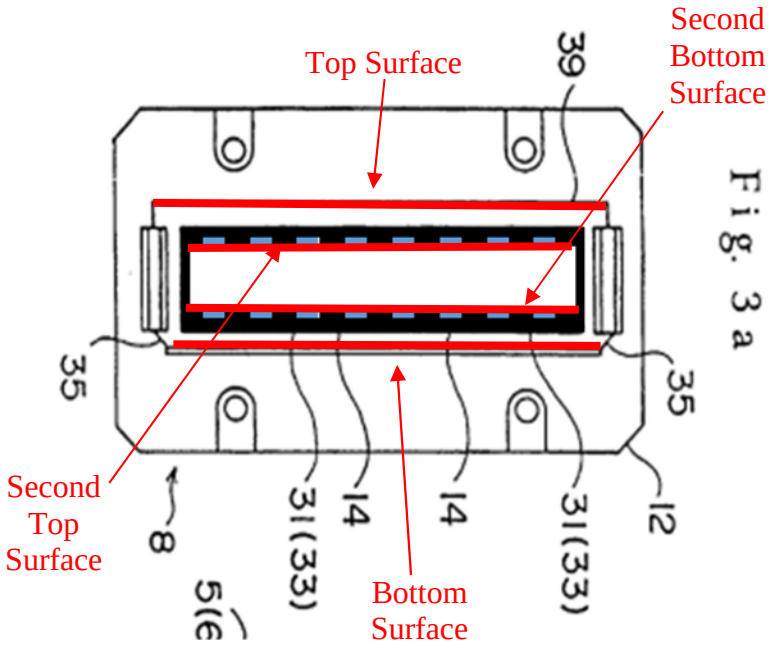



EX1003: Fig. 3a (modified).

388. Accordingly, the Kanai-Saito combination renders the limitation "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion."

**1.b.2 "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body,"**

389. As shown below, the second top surface and the second bottom surface are different than the top surface and the bottom surface in Kanai's main body:

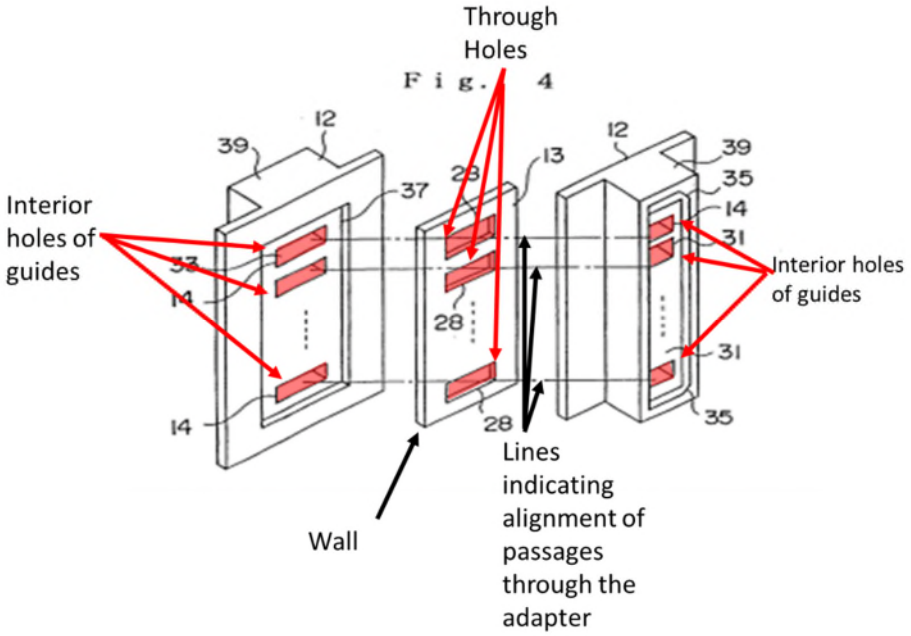



EX1003: Fig. 3a/(modified).

390. Therefore, the Kanai/Saito combination renders the limitation of "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body" obvious.

### 1.b.3 "each of the plurality of grooves extending toward a center of the main body."

391. The passageways of the guides (31, 33) of Kanai extend into the central portion of the main body from each of the first and second sides.

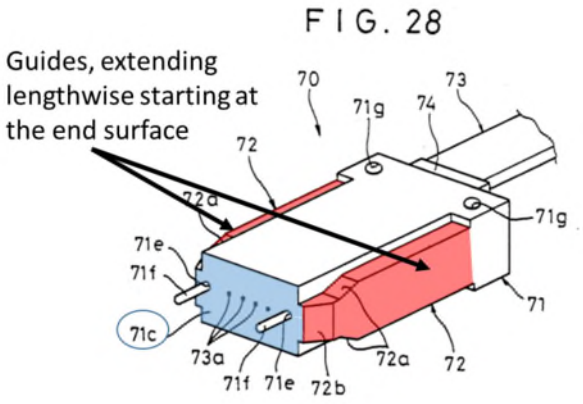



EX1003: Fig. 4 (annotated).

392. In incorporating the teachings of Saito into the plug and adapter of Kanai, it would have been obvious for the grooves being incorporated into the interior surface of guides (31, 33) to extend into the central portion from each of the first and second sides.

393. Saito shows in Fig. 23 that the ribs (66e) extend into a central portion from opposite first and second sides of the adapter. This condition is necessary to perform the function of the Kanai and Saito adapters to achieve connection of opposing optical connectors.

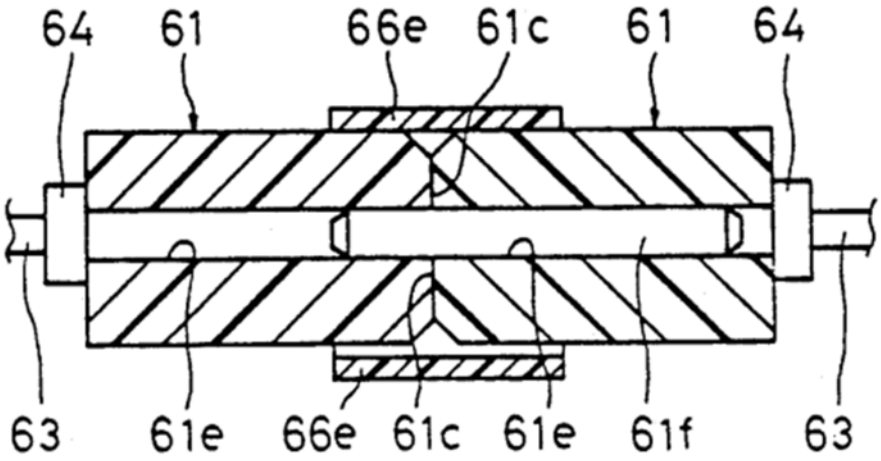
394. As depicted in Saito the guide (72) extends lengthwise, starting at the end surface (71c)—i.e. the face—of the ferrule. EX1004: 11:56-60 ("the optical connectors of the above described stacked-type optical connector 60 may be provided with a guide 72 which extends lengthwise along either side of a ferrule 71 as in an optical connector 70 shown in FIG. 28"), Fig. 28.




EX1004: Fig. 28 (annotated).

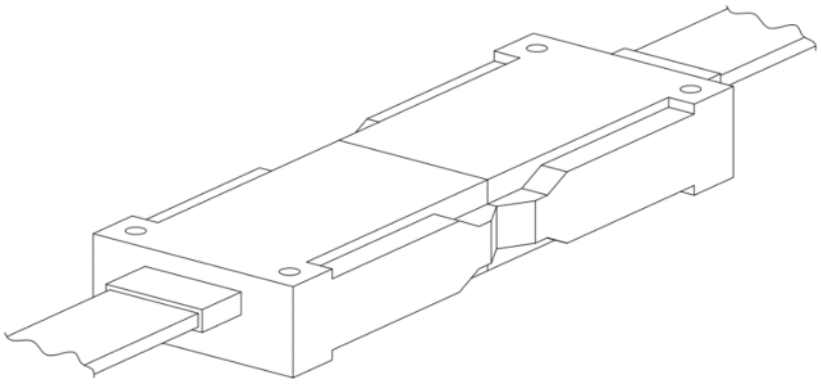
395. Saito teaches that the corresponding ferrules butt-connect with each other within the adapter such that they would meet end surface-to-end surface. EX1004: 11:10-19 (". . . the individual optical connectors 61 of the stacked-type optical connectors 60 and 60 are butt-connected with the adapter 66"), Fig. 26.

FIG. 26




EX1004: Fig. 26.

396. Because the guides (72) start at the end surface (71c) of each ferrule, when the ferrules are butt-connected the guides of one ferrule would meet up with the guides of the corresponding ferrule.



397. Thus, modifying Kanai according to Saito would result in the grooves in the second top and bottom surfaces extending into the central portion from each



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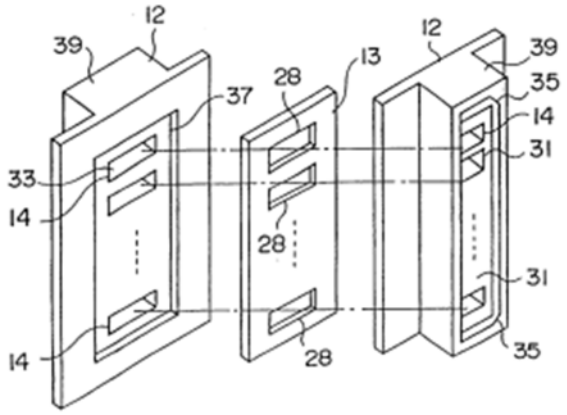
of the first and second sides in order to align the ferrules inserted from each side relative to one another for butt-connection within the adapter.

398. Therefore, the Kanai/Saito combination renders the limitation of "each of the plurality of grooves extending toward a center of the main body" obvious.

### C. Claim 4 – "The adapter according to claim 1, wherein the opening is smaller in the center of the main body than on the first side and second side."

399. As shown in Figure 4, the opening in the center of the main body of the Kanai adapter comprises the aggregate of the through holes 28—which themselves "correspond[] to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33." EX1003: 8:45-51.

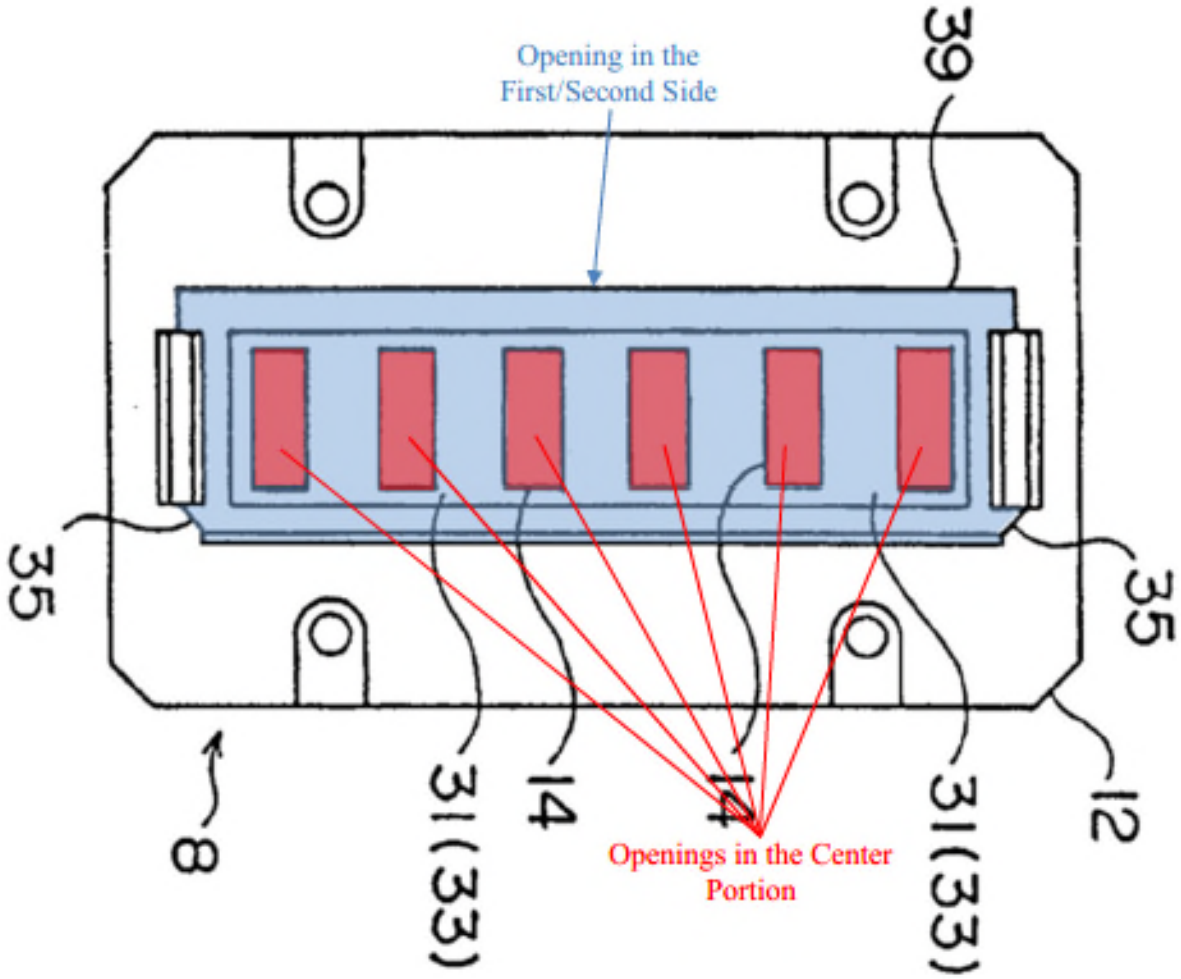
Fig. 4




EX1003: Fig. 4.

400. As the plurality of guides (31, 33) are entirely within their respective opening in the frame portions (39) of adapter's housing [i.e., the opening in the

first and second sides (blue in the figure below)], the opening in the center of the adapter [the aggregate opening of the guides (31, 33) (red in the figure below)] is smaller than the opening in the first and second sides. EX1003: Figure 3a.




EX1003: Fig. 3a (annotated).

401. This would remain the case even as the Kanai adapter is modified in view of Saito discussed above.

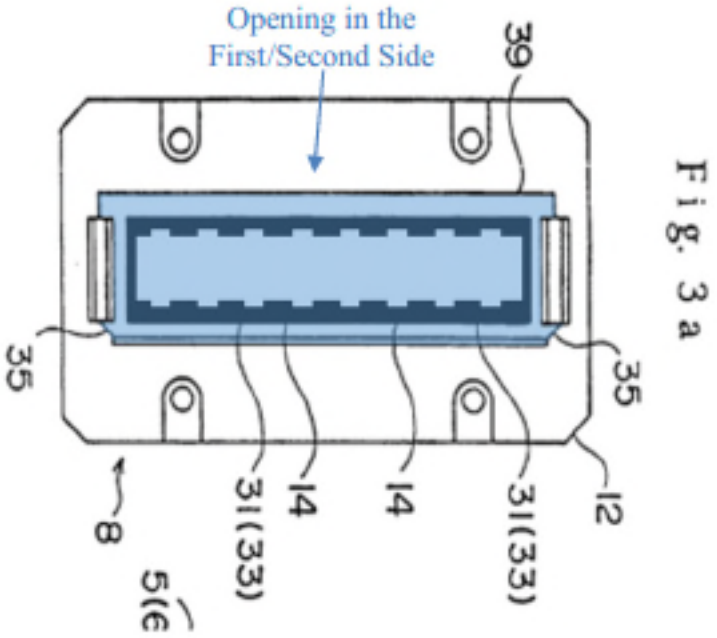



Fig. 3a

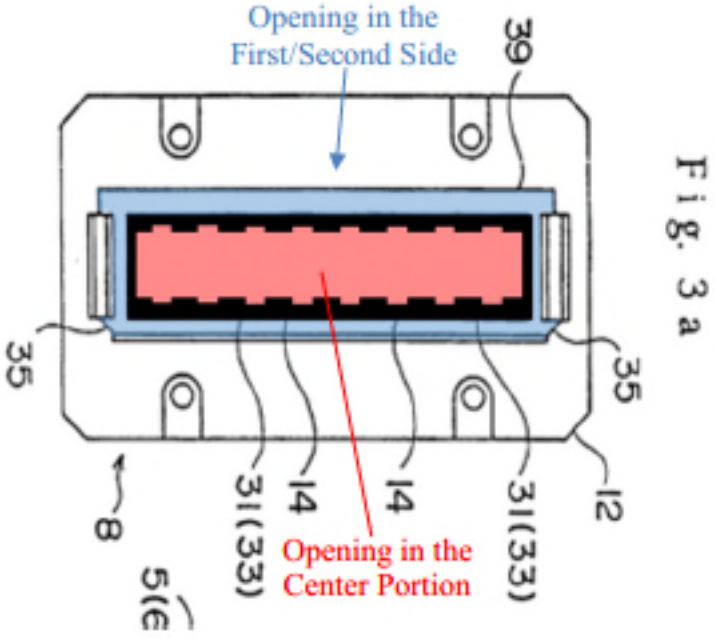



Fig. 3a

EX1003: Fig. 3a (annotated).



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402. Therefore, Kanai/Saito renders "The adapter according to claim 1, wherein the opening is smaller in the center of the main body than on the first side and second side" obvious.

### D. Claim 5 – "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules."

403. As discussed throughout the specification of Kanai, the "connection end face (45) side of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) along guides (31) and (33) at both sides of the adapter (8)." EX1003, Abstract.

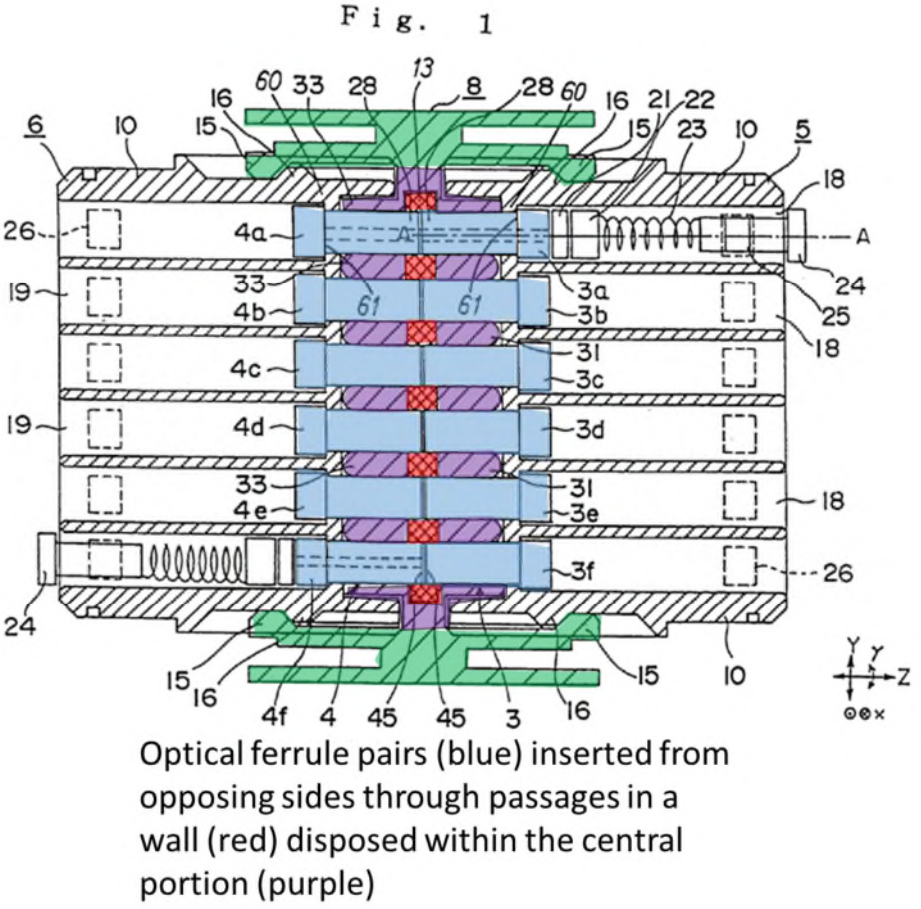
404. Those of skill in the art would recognize that the optical connectors (e.g. 3a to 3f and 4a to 4f) of optical connector groups (3) and (4) include optical ferrules (42). EX1003: 10:44-49 ("For example, differing from an optical connector in which a large-sized super multi-fiber ferrule is shown in FIGS. 11(a) and (b), the optical connectors 3 *a* to 3 *f* and 4 *a* to 4 *f* are excellent in view of moldability and mass productivity of multi-fiber ferrules 42 and attaching efficiency of optical fibers").

405. As disclosed in Kanai, each of the connector groups (3) and (4) consist of a plurality optical connectors/ferrules.

406. For example, the adapter depicted in Figure 1 of Kanai is configured to receive six optical connectors/ferrules (blue) from each side.



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EX1003: Fig. 1 (annotated).

407. Therefore, the Kanai/Saito combination renders "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules" obvious.

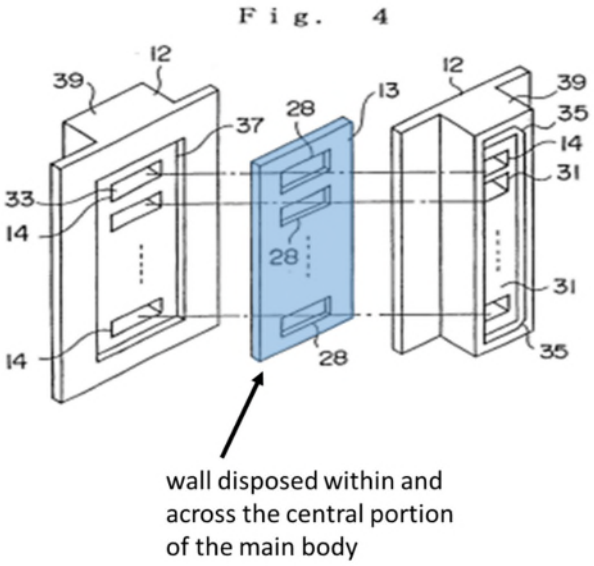
### E. Claim 6

#### 6.a "The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side,"

408. The adapter as disclosed by Kanai includes a metallic plate (13) between the two housing halves (12), with the two housing halves welded together

by ultrasonic welding to form the housing. EX1003: 8:22-26 ("As shown in FIG. 1 and FIG. 4, the adapter 8 is constructed to have two housing halves 12 of almost the same shape and a metallic plate 13"); 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33.").

409. This metallic plate constitutes a wall disposed within and across the central portion of the main body and between the first side and the second side. EX1003: 8:22-26, Figs. 4 (annotated below).




410. Although Kanai identifies the metallic plate (13) as being optional, Kanai identifies its inclusion as a preferred embodiment in that it serves the purpose of mitigating electromagnetic interference (EMI). EX1003: 11:21-50

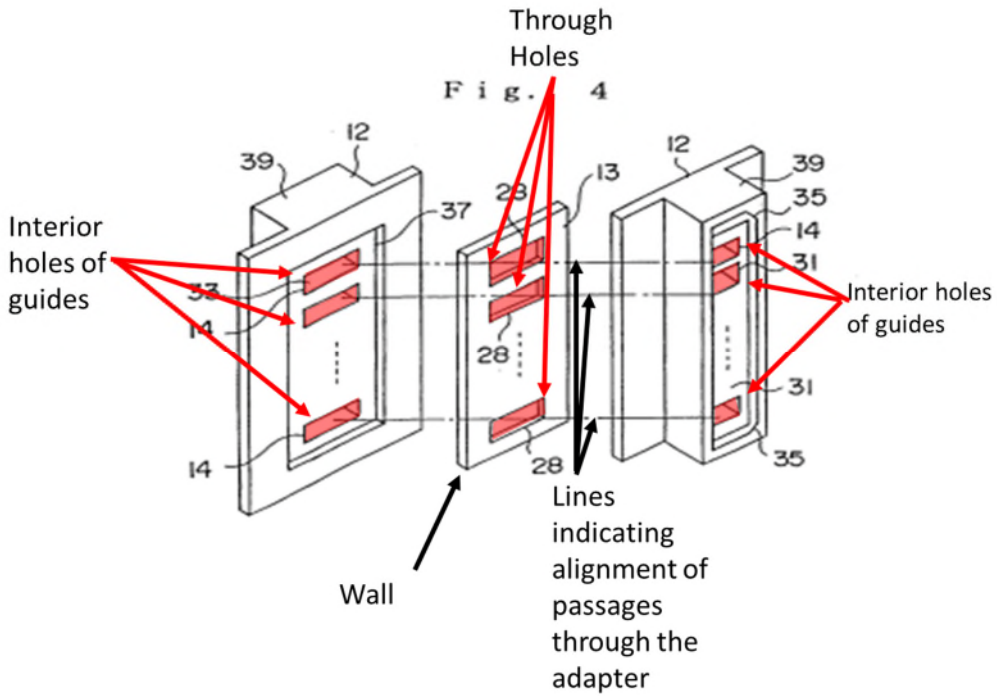
(". . . it is preferable that the adapter 8 is formed so as to include a conductive material or to have a metallic plate 13, in order to prevent any erroneous operation in the other measurement instruments, computer, etc., resulting from leakage of the abovementioned electromagnetic waves").

411. It was known within the art that EMI interference presents a known problem in electro-optical equipment deploying fiber optic interconnects. *See* EX1022: [0002]; EX1023: [0004] ("As the bandwidth and carrier frequencies increase, electromagnetic interference (EMI) becomes a more serious problem. Accordingly, control of EMI has arisen as an issue in optical connector system design.").

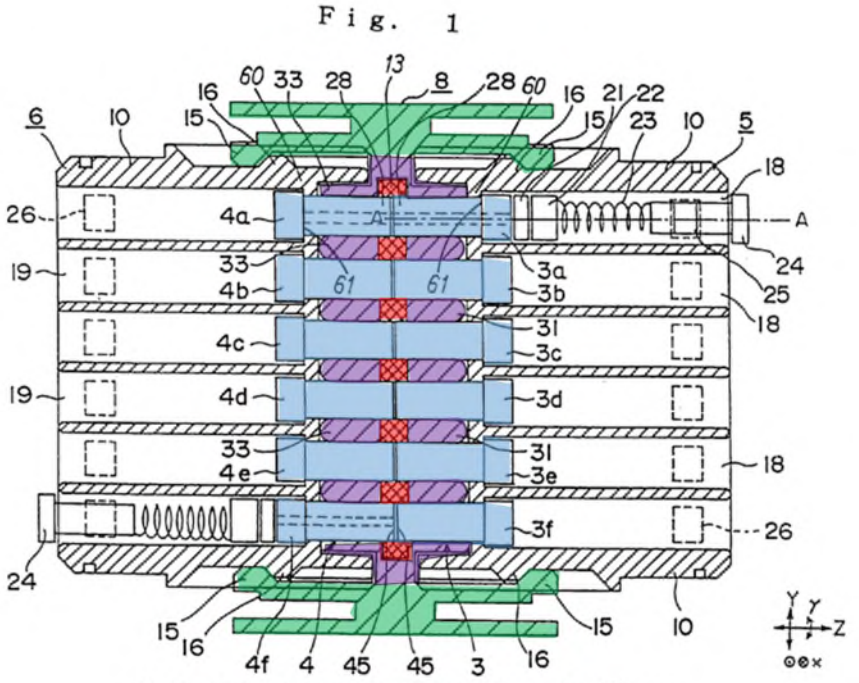
412. In modifying the Kanai adapter, those of skill in the art would have recognized that it would have still been desirable to maintain the metallic plate (13) as the metallic plate was included in Kanai for the purpose of providing EMI mitigation, and also serving as a central passageway for each half of the mated connector pair.

413. As disclosed by Kanai, the metallic plate (13) contains through holes (28) conforming to the profile of the ferrules for the opposing ferrules to pass into and mate. EX1003: 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the

inner circumferential wall 14 of the first and second guides 31 and 33."); *see also* EX1003: Figs. 4 and 1 (annotated below).




EX1003: Fig. 4 (annotated).



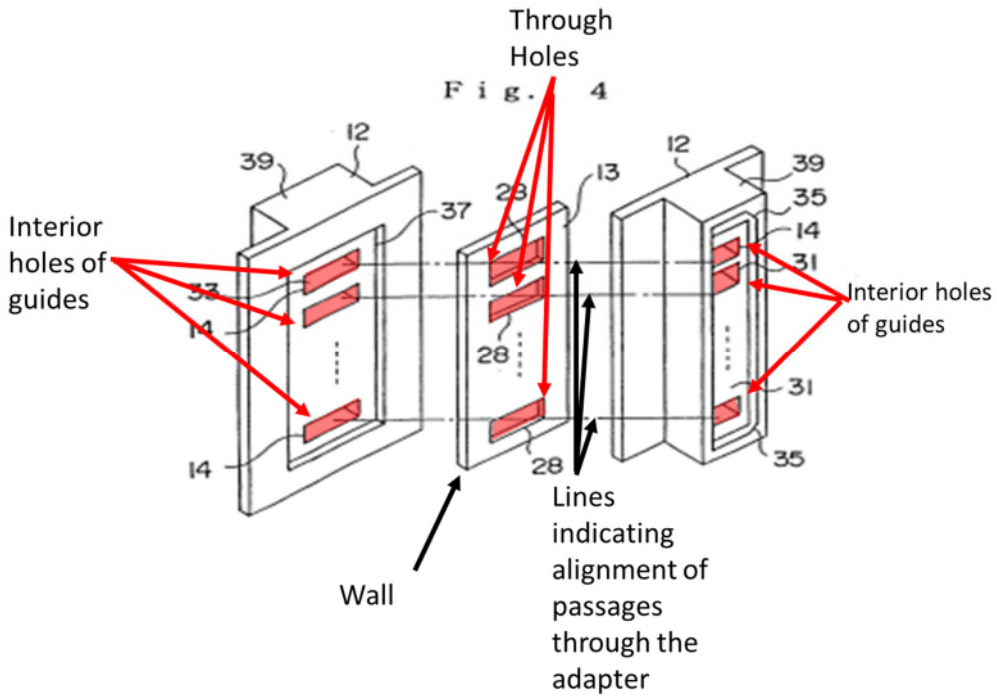

EX1003: Fig. 1 (annotated).

414. Incumbent to maintaining the metallic plate (13), those of skill in the art would likewise maintain the through holes (28) within the metallic plate (13) in conformance to the profile of the ferrules so as to allow the ferrules to mate at the central optical plane, while providing EMI mitigation.

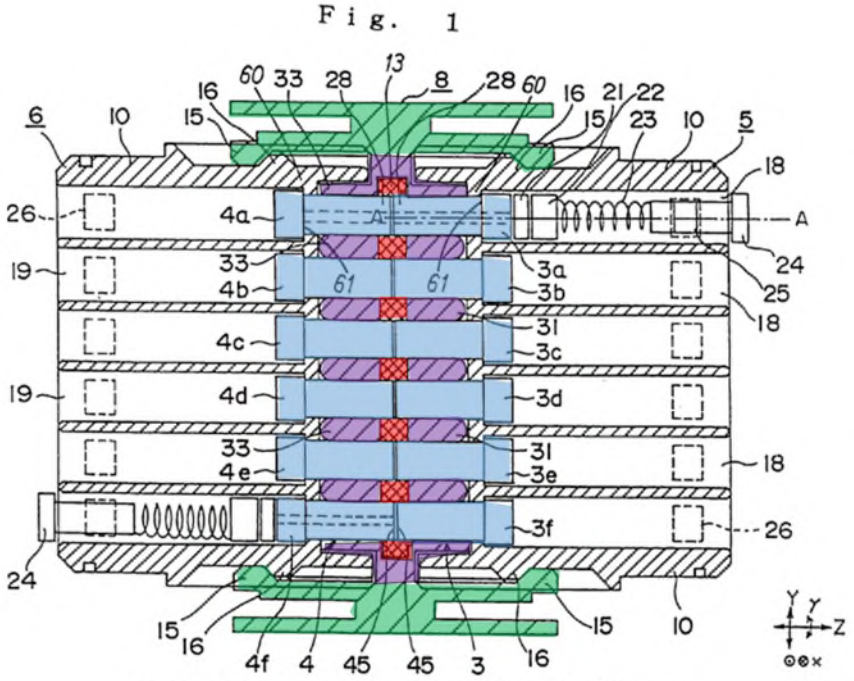
415. Therefore, Kanai meets the limitation of "The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side."

**6.b "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

416. The metallic plate (13) between the two housing halves (12) of Kanai contains through holes (28)—i.e., passages—for the end portions of the fiber optic ferrules to pass therethrough. EX1003: 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33."); *see also* EX1003: Figs. 4 and 1 (annotated below).




EX1003: Fig. 4 (annotated).




EX1003: Fig. 1 (annotated).

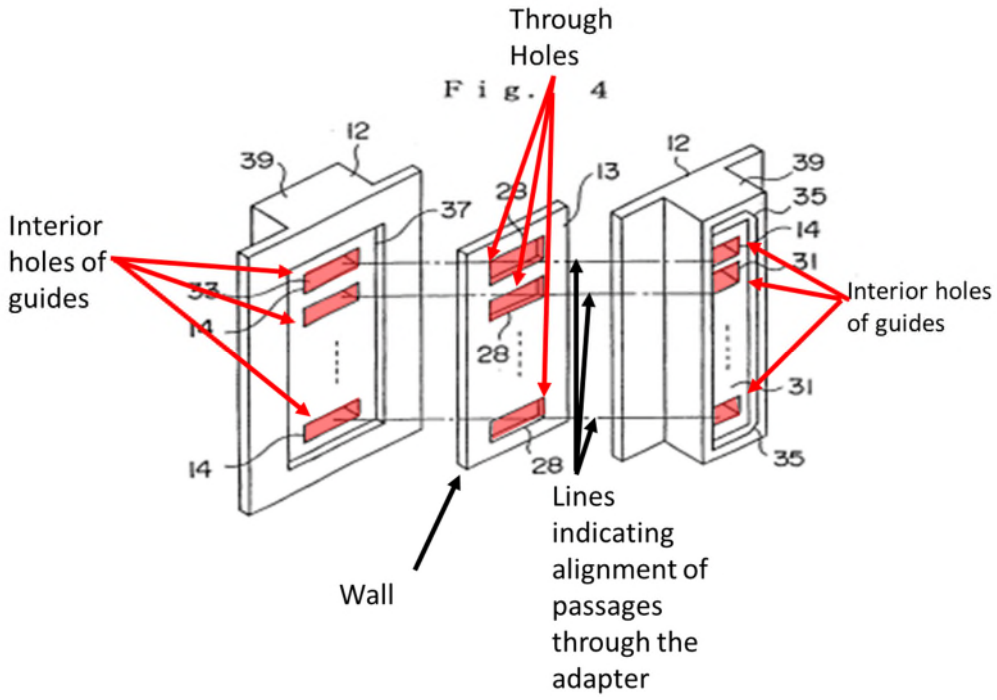
417. As discussed above, incumbent to maintaining the metallic plate (13), those of skill in the art would likewise maintain the through holes (28) within the metallic plate (13) in conformance to the profile of the ferrules so as to allow the ferrules to mate at the central optical plane, while providing EMI mitigation.

418. Therefore, Kanai meets the limitation of "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."

### F. Claim 7 – "The adapter according to claim 6, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules."

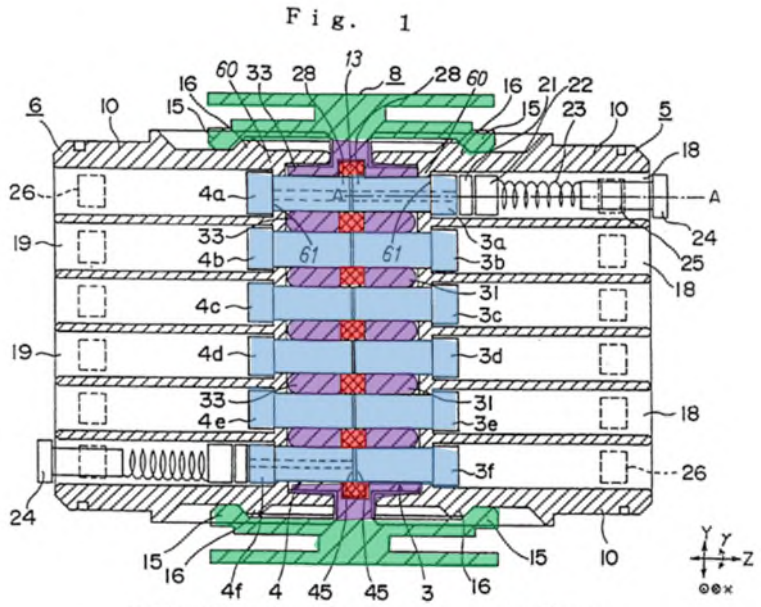
419. As shown in Figures 1 and 4, the multiple guides (31, 33) and through holes (28) of Kanai define a plurality of passages through the disclosed adapter.

EX1003: Figs. 1 and 4 (annotated below).




EX1003: Fig. 4 (annotated).

420. Each of these passages corresponds to a pair of optical connectors such that the number of passages corresponds to the number of pairs of corresponding fiber optic ferrules. *See* EX1003: Fig. 1 (annotated below).




EX1003: Fig. 1 (annotated).

421. Therefore, Kanai meets the limitation of "The adapter according to claim 6, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules."

## G. Independent Claim 8

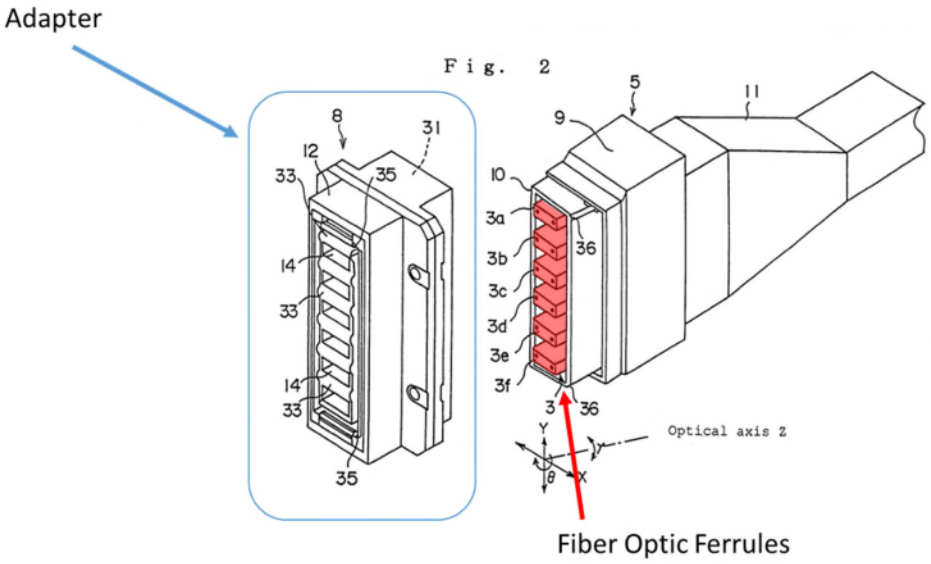
### 8.P "An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising:"

422. Kanai teaches an "adapter" which is "suitable for application in the field of optical transmission, and which are able to collectively, easily and accurately connect a plurality of optical connectors." Ex.1103, Abstract.

423. Kanai teaches that the disclosed adapter aligns optical connector groups (3) of optical connectors (3a-f, 4a-f)—and their fiber optic ferrules (42)—inserted from opposing first and second sides:

> The connection end face (45) side [i.e. the end face of multi-fiber ferrule (42)] of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) … The optical connectors of the respective connection pairs are position-regulated in the X direction orthogonal to the optical axis and Y direction, thereby causing the axes to be matched, wherein the optical connector groups (3) and (4) are collectively connected via the adapter (8).

EX1003: Abstract, Figure 2 (depicting the adapter and fiber optic connectors).




EX1003: Fig. 2 (annotated).

424. Thus, Kanai's adapter connects plugs (5, 6) containing optical connectors (3a-f, 4a-f). EX1001, Abstract.

425. Each optical connector (3a-f, 4a-f) includes a multi-fiber ferrule (42). EX1001: Figs. 10-11b, 1:18-32, 10:40-53, 10:63-11:3.

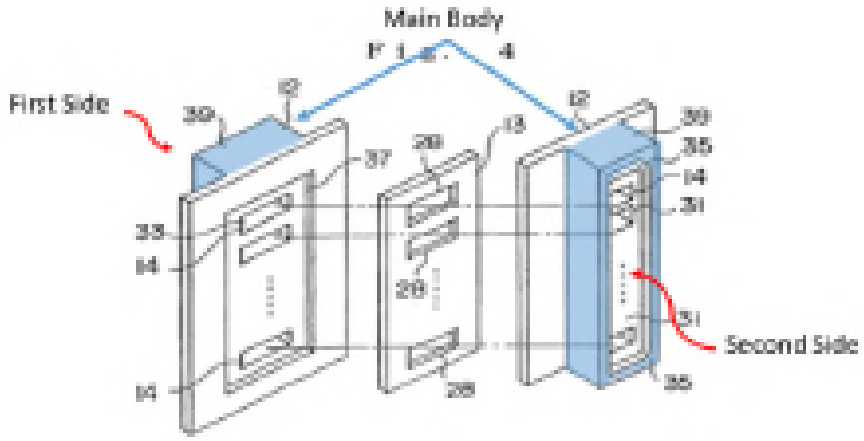
426. Therefore, Kanai's adapter meets the limitation of "An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter."

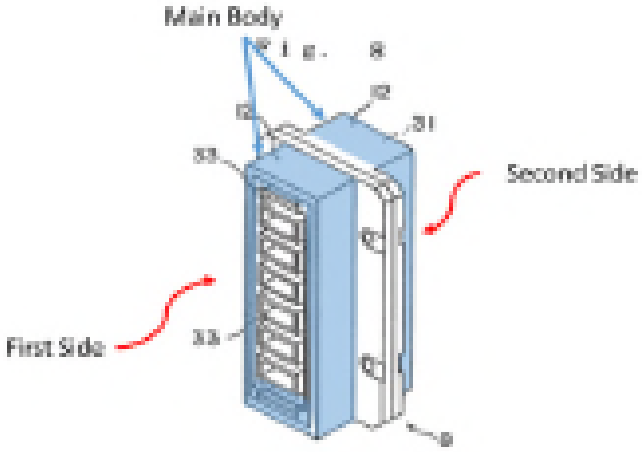
**8.a.1 "an opening extending between a first side and a second side of the adapter,"**

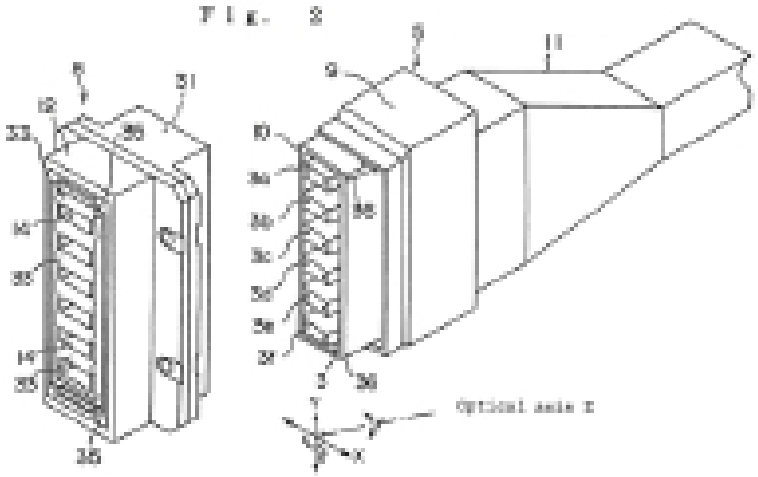
427. Kanai's frame portions (39), as welded together, form the first side and the second side of the main body for receiving fiber optic connectors.



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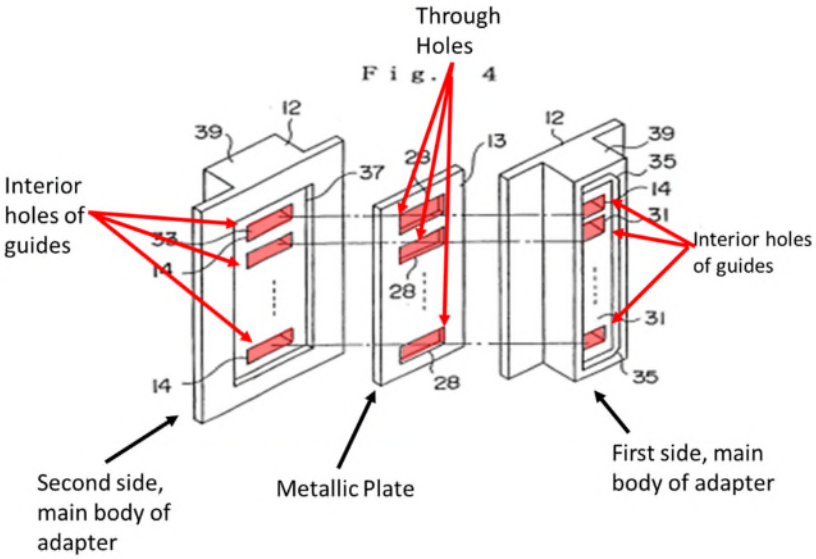





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EX1003: Figs. 2, 4, and 8 (annotated).

428. The frames (39) forming the main body define an opening on opposing sides, with guides (31, 33) providing passages through the adapter and connecting the openings in the opposing sides of the main body.



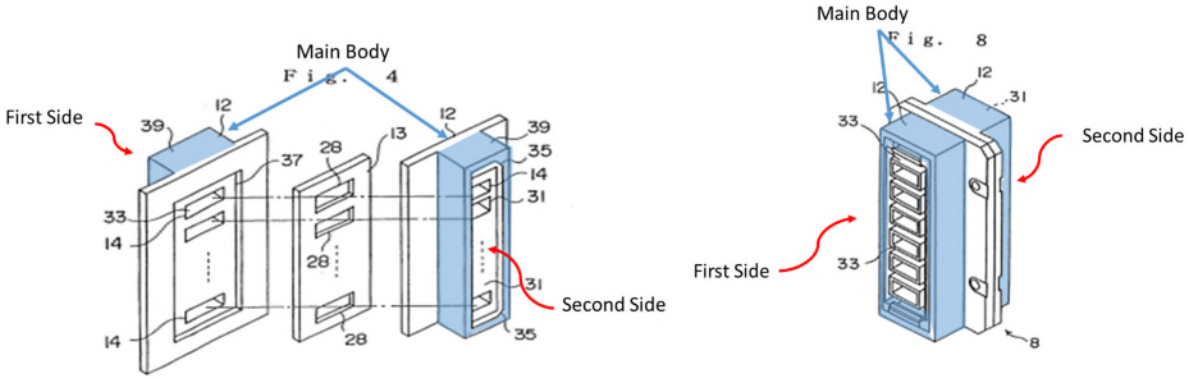

EX1003: Fig. 4 (annotated).

429. Therefore, Kanai's adapter meets the limitation of "an opening extending between a first side and a second side of the adapter."

**8.a.2 "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface,"**

430. The adapter as disclosed by Kanai is formed of two housing halves (12) and a metallic plate (13) between the two housing halves, with the two housing halves welded together by ultrasonic welding to form the housing. EX1003: 8:22-26 ("[T]he adapter 8 is constructed to have two housing halves 12 of

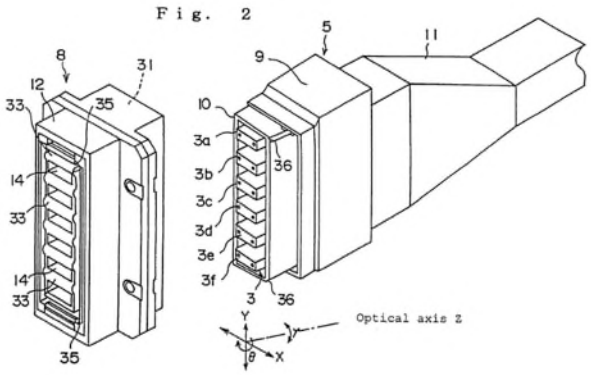
almost the same shape and a metallic plate 13. The housing halves 12 are inserted back to back and, for example, are welded by ultrasonic welding."), Figs. 4 and 8 (annotated below).




EX1003: Figs. 4 & 8 (annotated).

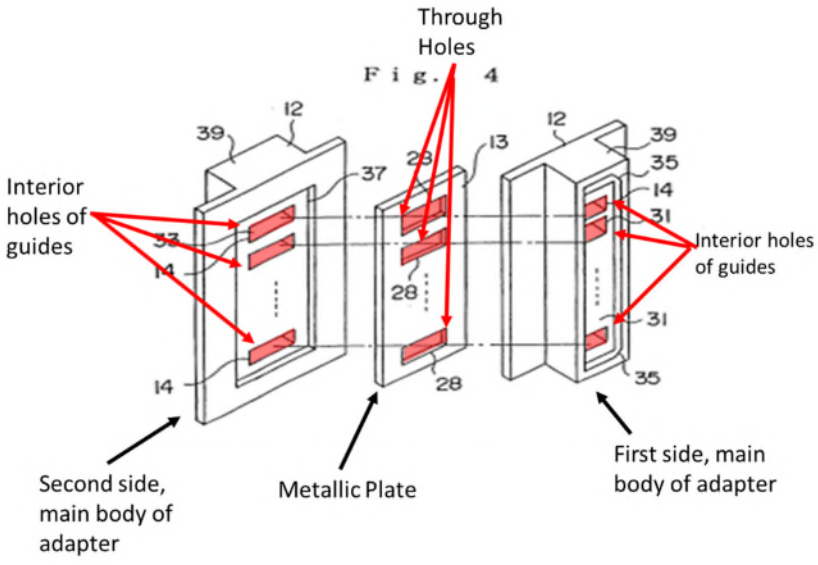
431. The adapter depicted in Figure 8 represents a modified embodiment as compared to the adapter depicted in Figures 2-4 and 7a-7b with respect to the guides (31, 33).

432. Referring back to the frame portions (39), as welded together, the two frame portions define a first side and a second side of the main body for receiving fiber optic connectors. EX1003: Fig. 2.



EX1003: Fig. 2. The housing halves each have a frame portion (39) which collectively act as the "main body" in the context of the claims of the '415 Patent. EX1003: 8:54-59, Figs. 2 and 4 (annotated above).

433. The frames (39) forming the main body define an opening on opposing sides, with guides (31 and 33) providing passages through the adapter and connecting the openings in the opposing sides of the main body. EX1003: 8:46-51 ("The metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33, through which optical connectors are inserted."), Fig. 4 (annotated below).

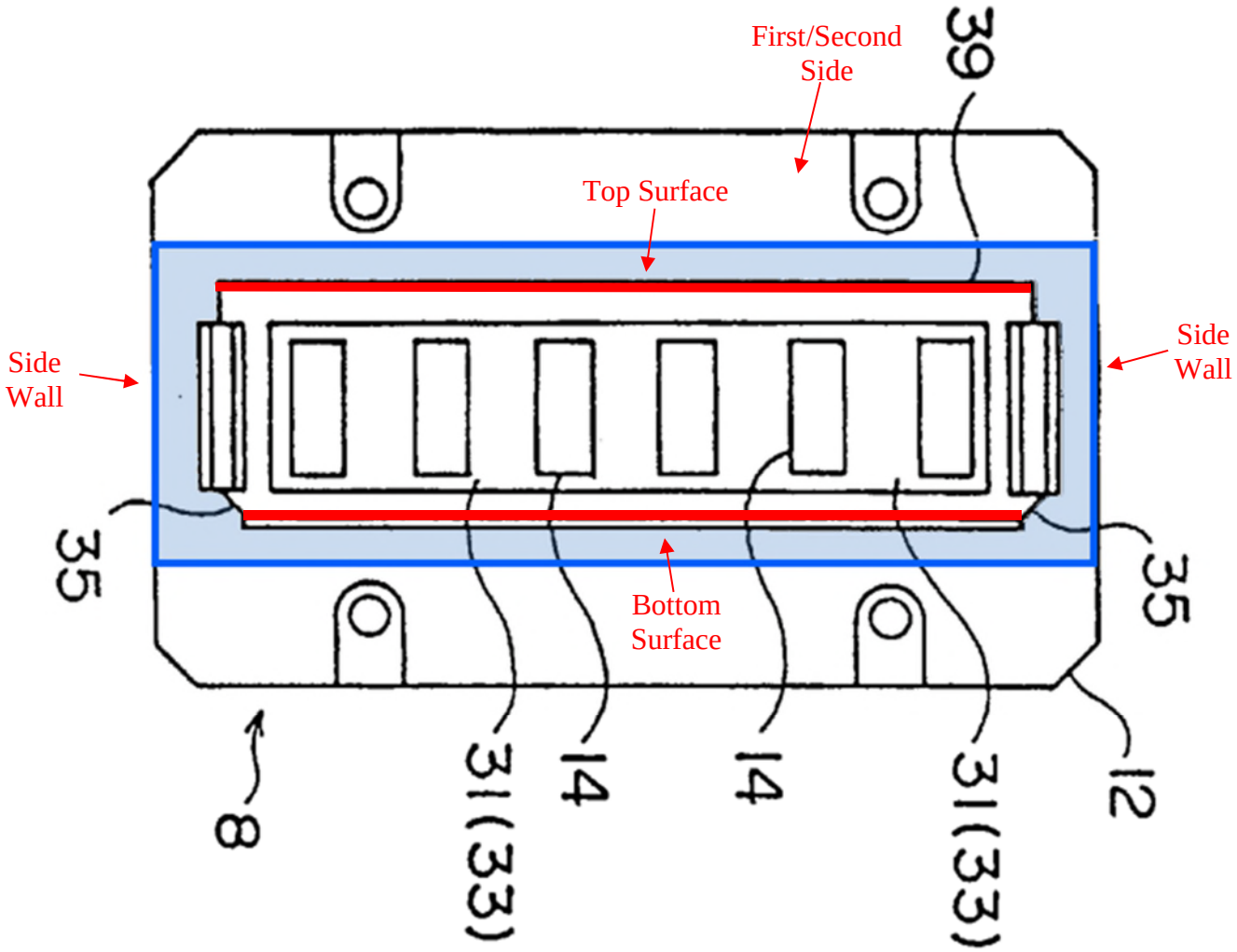



EX1003: Fig. 4 (annotated).

434. Notably, Kanai's adapter further includes a wall (13) with holes (28) that align with the rectangular passages in the guides (31, 33) to define continuous openings through the main body.

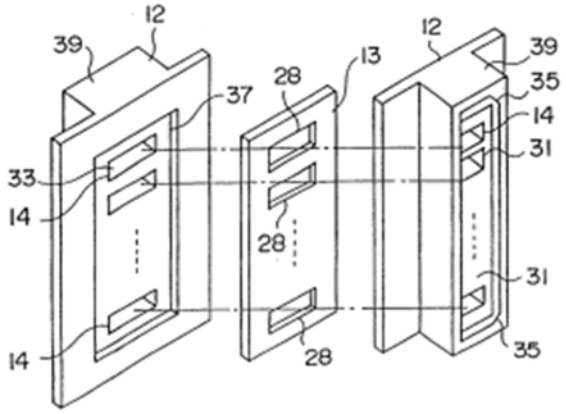
435. The main body of Kanai thus defines continuous openings extending between the first side and the second side of the adapter.

436. As shown below, the opening is defined by two opposing side walls, a top surface, and a bottom surface. EX1003: Fig. 3a (annotated).




EX1003: Fig. 3a (Annotated).

Fig. 4




EX1003: Fig. 4.

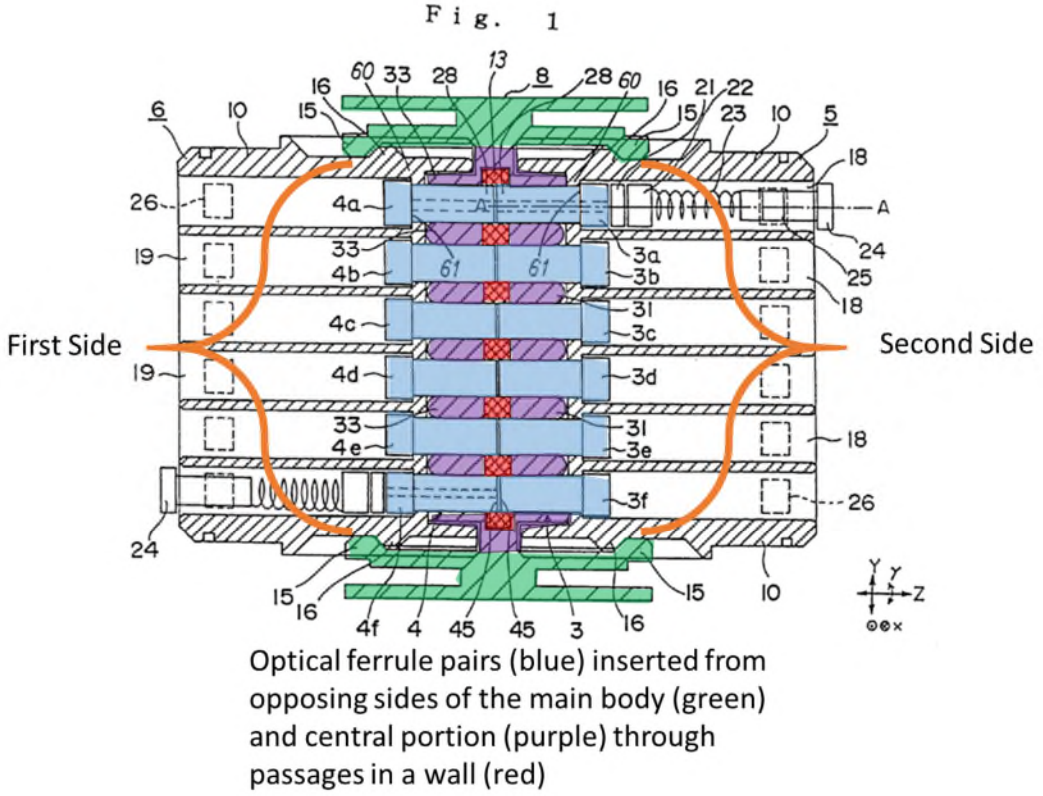
437. Thus, each of the first and second sides of Kanai's adapter (8) are respectively defined by two opposing side walls, a top surface, and a bottom surface

438. Therefore, Kanai's adapter meets the limitation "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface."

**8.a.3 "the opening configured to receive at least two fiber optic connectors from the first side; and"**

439. Kanai's opening receives up to six pairs of optical connectors (3a-f, 4a-f) from each side. EX1003: Abstract, Fig. 1, 7:8-11.

440. As illustrated, the opening of the adapter (8) can receive six optical connectors (3a-f, 4a-f) from each of the first and second sides. EX1003: Abstract, Fig. 1, 7:1-11.




EX1003: Fig. 1 (annotated).

441. Therefore, Kanai meets the limitation of "the opening configured to receive at least two fiber optic connectors from the first side."

**8.b "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side; and"**

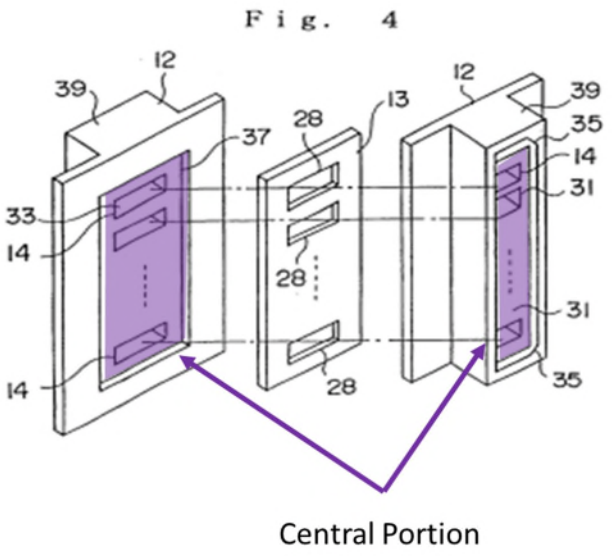
442. As just discussed above, Kanai's opening receives six optical connectors (3a-f, 4a-f) from the second side. The optical connectors (3a-f, 4a-f) inserted from the second side mate with the optical connectors inserted from the first side. EX1003: Fig. 1, Abstract, 7:1-11.

443. For each pair of optical connectors (3a-f, 4a-f), one inserted from each first, the ferrules (42) of the two optical connectors butt-connect with each other, thereby mating and forming an optical connection there-between. EX1003: Fig. 1, Abstract.

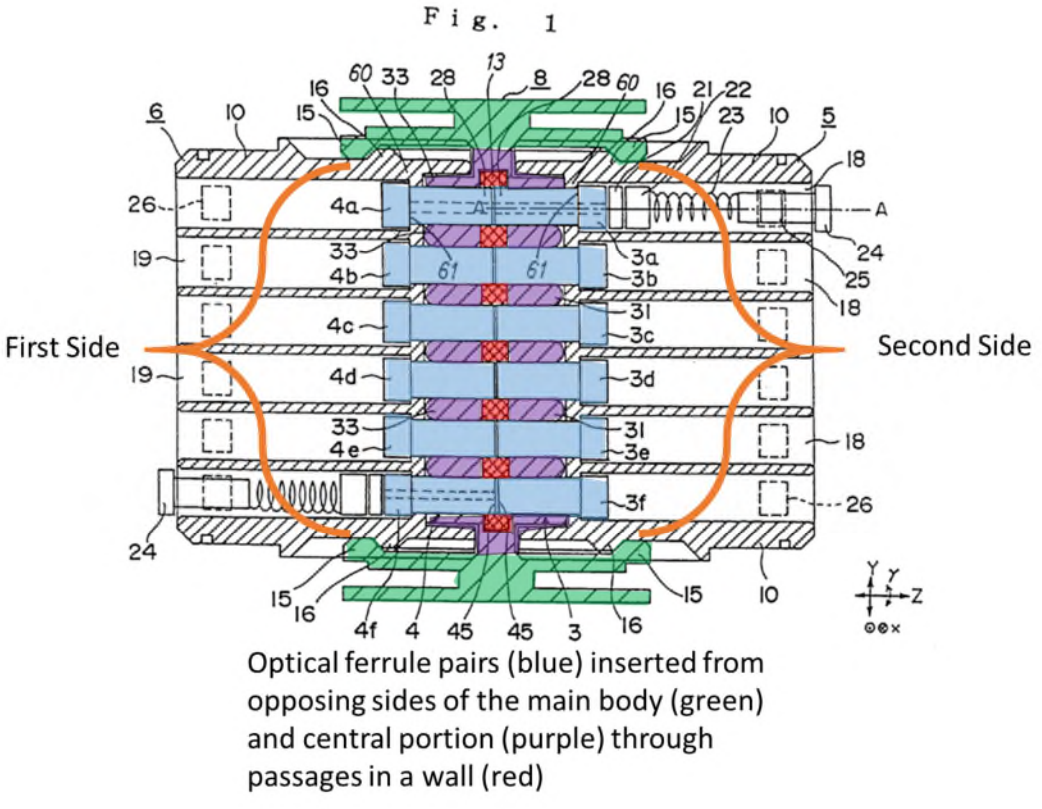
444. Therefore, Kanai meets the limitation of "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side."

#### 8.c.1 "a central portion between the first side and the second side and"

445. The adapter as disclosed by Kanai has a central portion (shaded purple below) formed by the first and second guides 31 and 33 and separating the first side and the second side of the main body. *See* EX1003: 8:27-29 ("at each of the housing halves 12, a plurality of the first and second guides 31 and 33 are formed to protrude in the direction (horizontal direction) along which the insertion of optical connectors is received").




EX1003: Fig. 4 (annotated).




EX1003: Fig. 1 (annotated).



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446. Accordingly, the adapter as disclosed by Kanai meets the limitation of "a central portion between the first side and the second side."

**8.c.2 "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion,"**

447. Kanai discloses guides (31, 33) including rectangular passages that receive optical connectors (3a-3f, 4a-4f) to guide the optical connectors into connection with each other. EX1003: 8:26-36.

448. Instead of grooves, the preferred embodiment of the adapter disclosed by Kanai uses notched inserting portions (35) formed at the corners of the inner wall of the frame portion (39) for the purpose of providing the correct orientation and course alignment of the plugs (5, 6) carrying the optical connectors (3a-3f and 4a-4f). EX1003: 8:54-64, 12:16-21.

449. Kanai recognized that the notched insertion portion could be omitted and that other methods of orientation and alignment could be implemented, such as the use of markings attached to the adapter and plugs. EX1003: 12:21-30 ("However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the Second connector group 4 (so as not make any mistake in the mating of each connection



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pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6.”). Additional methods of providing alignment and orientation of plugs for insertion into adapters were well known in the art.

450. Those skilled in the art would have been aware that there were other approaches to regulating the positioning of the optical connector guides.

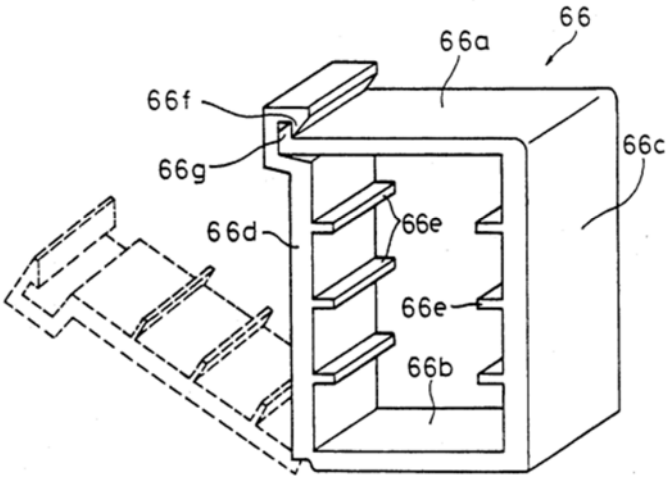
451. For example, Saito concerns stacked-type optical connectors—*i.e.*, fiber optic connectors with fiber optic ferrules that are ganged together—and corresponding adapters, similar to those at issue in Kanai and the ‘415 Patent. EX1004: 1:56-2:42, 10:28-30 (“The stacked-type optical connector 60 thus assembled is butt-connected to another stacked-type optical connector via an adapter 66 shown in FIG. 23.”).

452. Rather than providing rectangular openings that extend continuously around each ferrule separately when received therein, Saito discloses the use of partitioning pieces or ribs (66e) with groove separating them. EX1004: 10:65–68 (“when the individual stacked-type optical connectors 60 are pushed into the adapter 66, the tapered surfaces 61d are guided by the individual partitioning pieces 66e of the adapter 66”), Fig. 23.



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FIG. 23




EX1004: Fig .23.

453. These ribs define grooves forming passageways for optical connectors (61), similar to the guides (31, 33) of Kanai. EX1004:10:41-45 ("When the stacked-type optical connector 60 is attached to the adapter, the individual optical connectors 61 vertically move with its tapered surfaces 61d being guided by the partitioning pieces 66e, and they are separately housed in the respective spaces formed by the side piece 66c, the flap 66d, and the individual partitioning pieces 66e.").

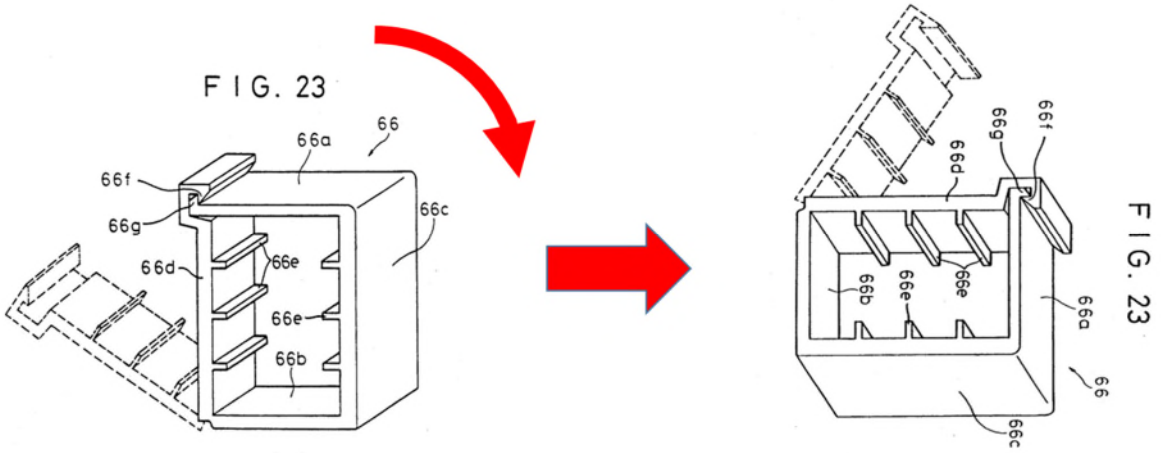
454. In the case of Saito, the passageways are formed by opposing grooves on each side of the adapter.

455. While Saito's adapter is depicted in a vertical orientation, those of skill in the art would recognize that such an adapter would have been readily used



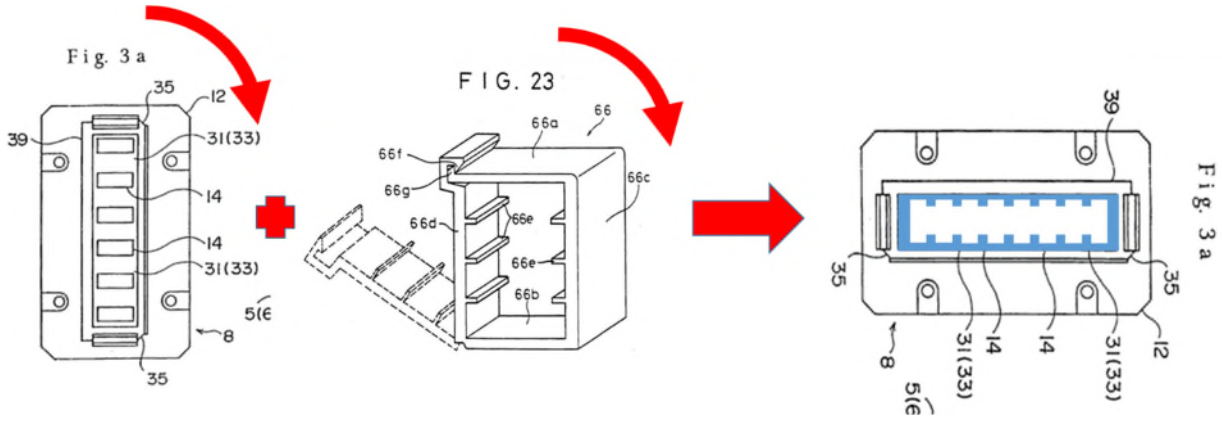
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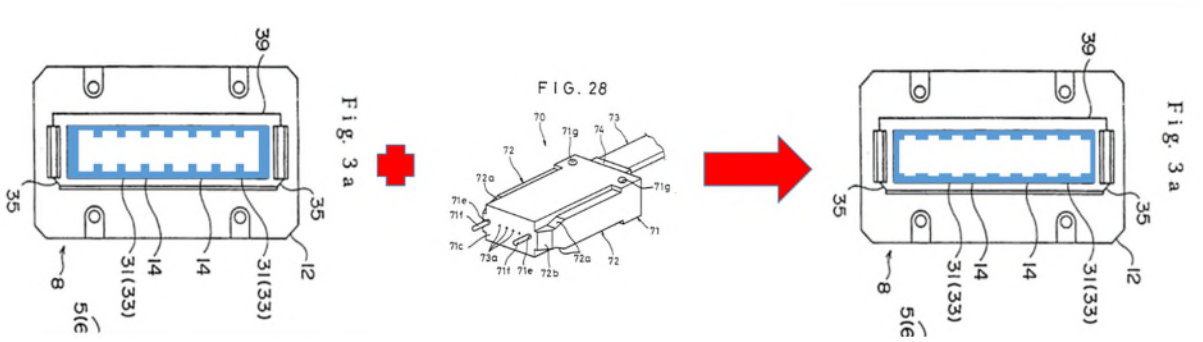
in either a vertical and horizontal orientation. As such, it would have been recognized by one of skill in the art that Saito's adapter could—and frequently would—be oriented such that the grooves would be on the top and bottom surface of the adapter.




EX1004: Fig. 23 (rotated).

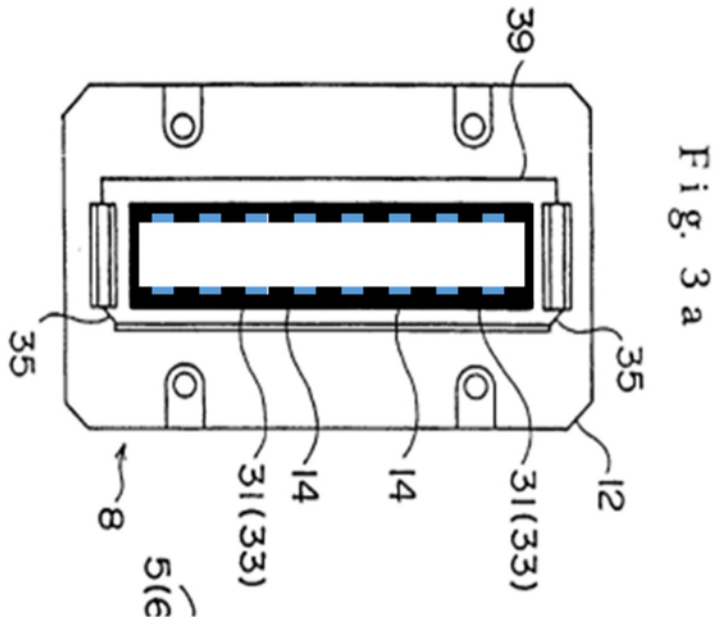
456. A representative depiction of how Kanai could be modified to consolidate the individual tubular guides (31, 33) into a single opening—separated by partial partitions or ribs—was described above and is shown again below.






457. As discussed above, one of skill in the art would have been motivated to modify the Kanai adapter as described above in view of Saito, as the modification would have resulted in increased fiber optic density, a reduction in material used to form the guides, and a reduced risk to damage the ferrules.

458. This modification would result in grooves (blue) between each of the ribs, or between the first/last rib and the inner side wall, as depicted below.

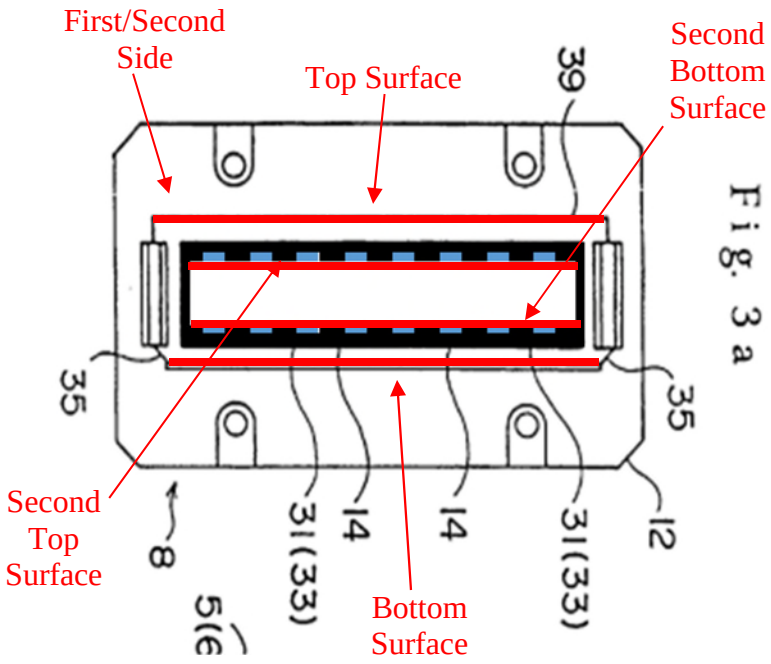



EX1003: Fig. 3a/(modified).

459. Accordingly, the Kanai-Saito combination renders the limitation "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion" obvious.

**8.c.3 "the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side and the second side,"**

460. As shown below, the second top surface and the second bottom surface of the Kanai/Saito combination are different than the respective top surface and bottom surface of the first and second sides:




EX1003: Fig. 3a (annotated).

461. Therefore, the Kanai/Saito combination renders the limitation of "the second top surface and the second bottom surface being different from the

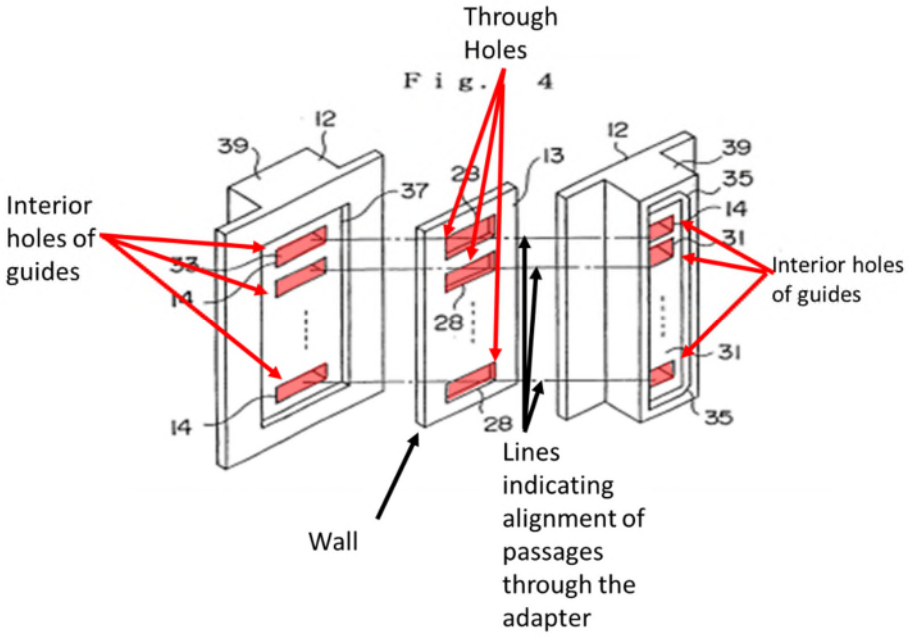


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respective top surface and the bottom surface of the first side and the second side" obvious.

### 8.c.4 "each of the plurality of grooves extending toward a center of the adapter."

462. The passageways of the guides (31, 33) of Kanai extend into the central portion of the main body from each of the first and second sides.



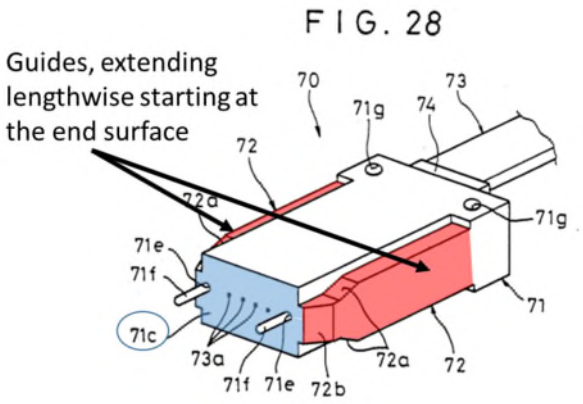

EX1003: Fig. 4 (annotated).

463. In incorporating the teachings of Saito into the plug and adapter of Kanai, it would have been obvious for the grooves being incorporated into the interior surface of guides (31, 33) to extend into the central portion from each of the first and second sides.

464. Saito shows in Fig. 23 that the ribs (66e) extend into a central portion from opposite first and second sides of the adapter. This condition is necessary to

perform the function of the Kanai and Saito adapters to achieve connection of opposing optical connectors.

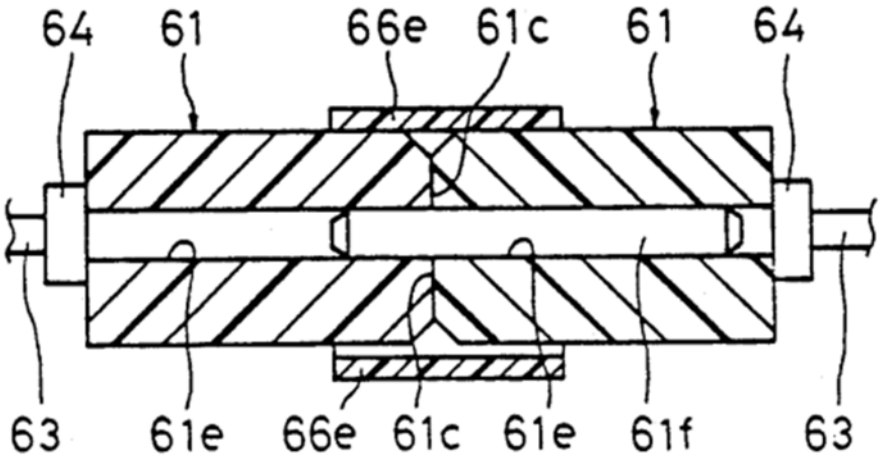
465. As depicted in Saito the guide (72) extends lengthwise, starting at the end surface (71c)—i.e. the face—of the ferrule. EX1004: 11:56-60 ("the optical connectors of the above described stacked-type optical connector 60 may be provided with a guide 72 which extends lengthwise along either side of a ferrule 71 as in an optical connector 70 shown in FIG. 28"), Fig. 28.




EX1004: Fig. 28 (annotated).

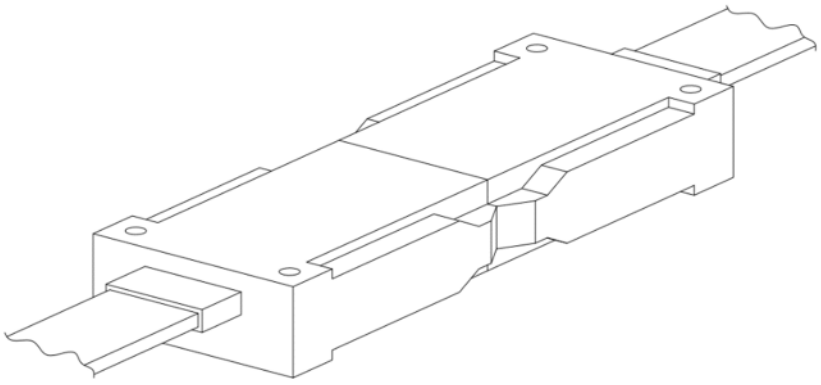
466. Saito teaches that the corresponding ferrules butt-connect with each other within the adapter such that they would meet end surface-to-end surface. EX1004: 11:10-19 (". . . the individual optical connectors 61 of the stacked-type optical connectors 60 and 60 are butt-connected with the adapter 66"), Fig. 26.

FIG. 26




EX1004: Fig. 26.

467. Because the guides (72) start at the end surface (71c) of each ferrule, when the ferrules are butt-connected the guides of one ferrule would meet up with the guides of the corresponding ferrule.



468. Thus, modifying Kanai according to Saito would result in the grooves in the second top and bottom surfaces extending into the central portion from each



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of the first and second sides in order to align the ferrules inserted from each side relative to one another for butt-connection within the adapter.

469. Therefore, the Kanai/Saito combination renders the limitation of "each of the plurality of grooves extending toward a center of the adapter" obvious.

## H. Claim 9

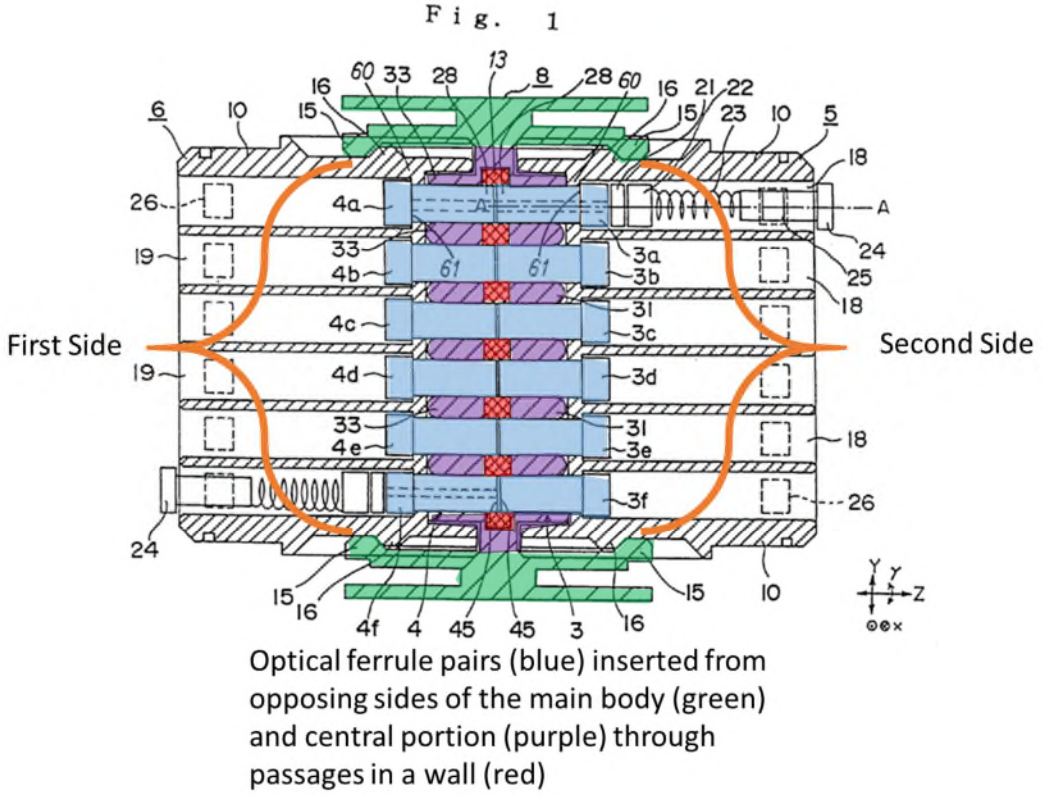
### 9.a "The adapter according to claim 8, wherein the first side and the second side of the opening are in communication with one another in the central portion,"

470. As discussed previously, Kanai's adapter (8) includes an opening.

471. The optical connectors (3a-f, 4a-f) butt-connect with one another in the central portion of Kanai's adapter (8). EX1003: Abstract, Fig. 1. Thus, as shown below, the first and second sides of the opening are in communication with one another in the central portion.



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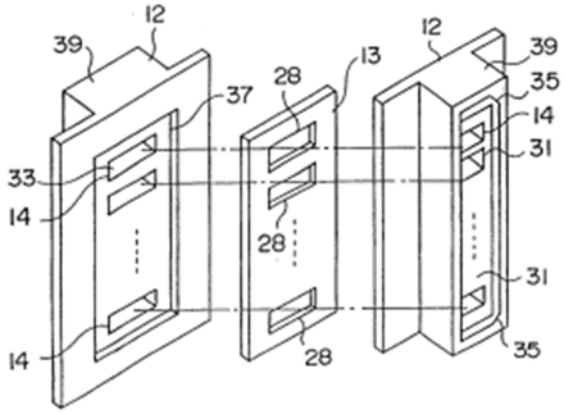

EX1003: Fig. 1 (annotated).

472. Therefore, Kanai meets the limitation of "The adapter according to claim 8, wherein the first side and the second side of the opening are in communication with one another in the central portion."

**9.b "the opening being smaller in the central portion than on the first side and the second side."**

473. As shown in Figure 4, the opening in the center of the main body of the Kanai adapter comprises the aggregate of the through holes 28—which themselves "correspond[] to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33." EX1003: 8:45-51.

Fig. 4

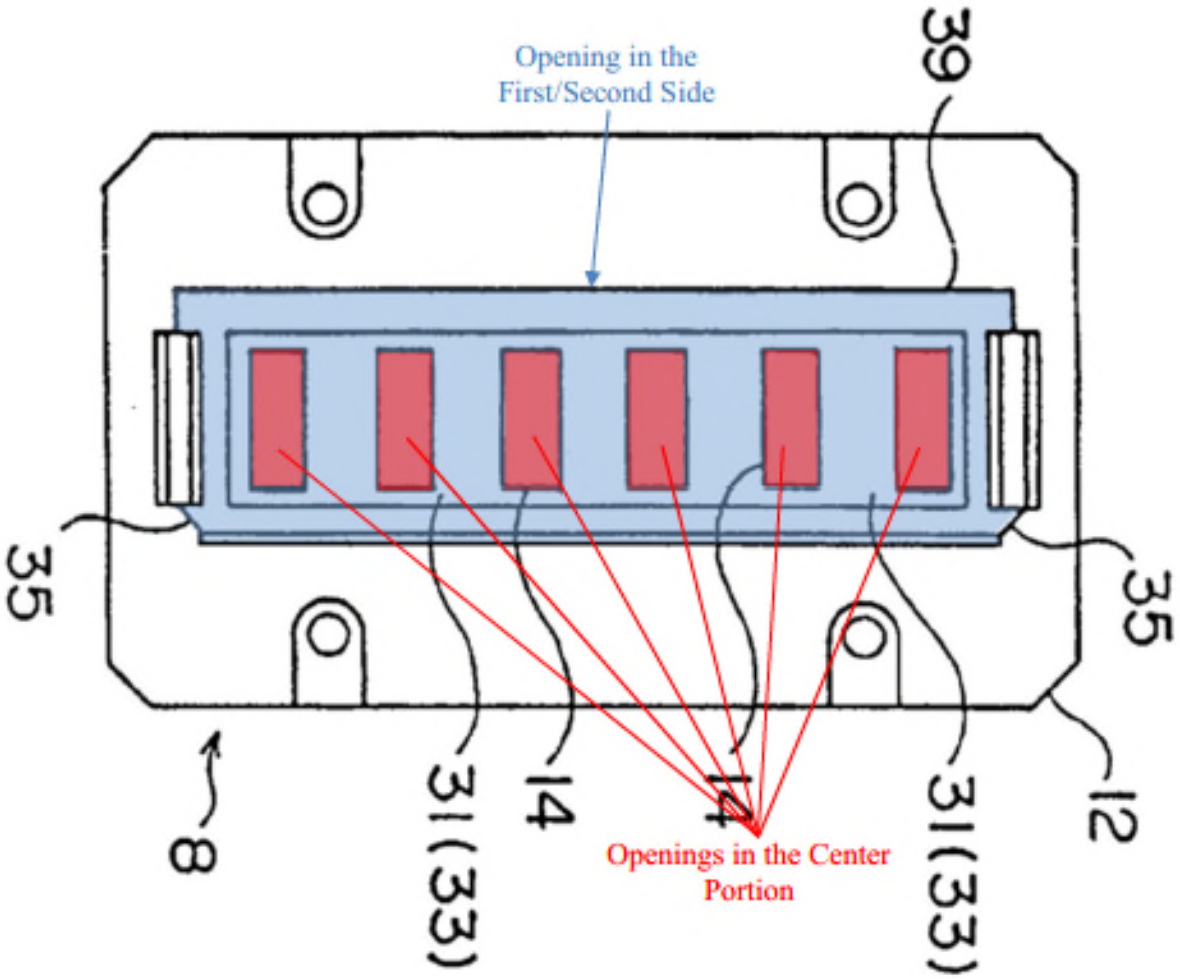



EX1003: Fig. 4.

474. As the plurality of guides (31, 33) are entirely within their respective opening in the frame portions (39) of adapter's housing [i.e., the opening in the first and second sides (blue in the figure below)], the opening in the center of the adapter [the aggregate opening of the guides (31, 33) (red in the figure below)] is smaller than the opening in the first and second sides. EX1003: Figure 3a.

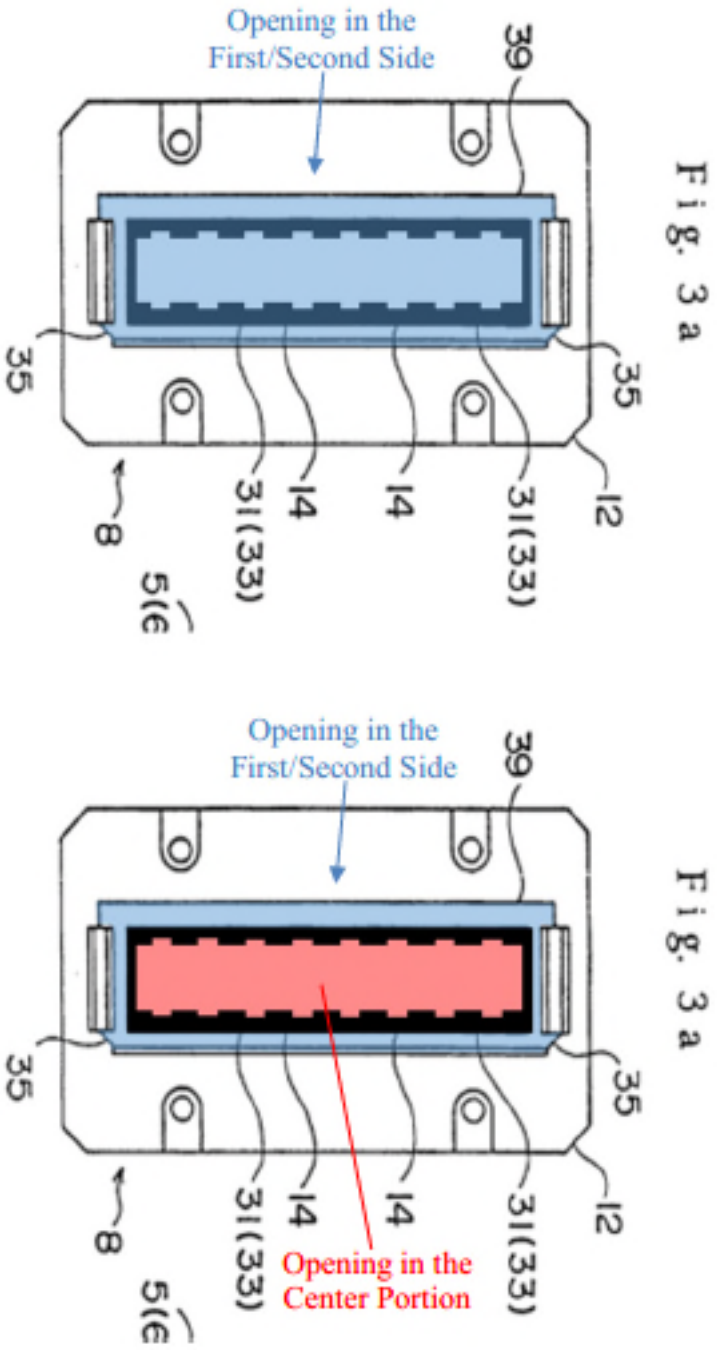


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EX1003: Fig. 3a (annotated).

475. This would remain the case even as the Kanai adapter is modified in view of Saito discussed above.




EX1003: Fig. 3a (annotated).

476. Therefore, Kanai/Saito renders "the opening being smaller in the central portion than on the first side and the second side" obvious.

## I. Claim 10 – "The adapter according to claim 8, wherein the first and second sides are configured to receive a plurality of fiber optic connectors."

477. As discussed throughout the specification of Kanai, the "connection end face (45) side of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) along guides (31) and (33) at both sides of the adapter (8)." EX1003, Abstract.

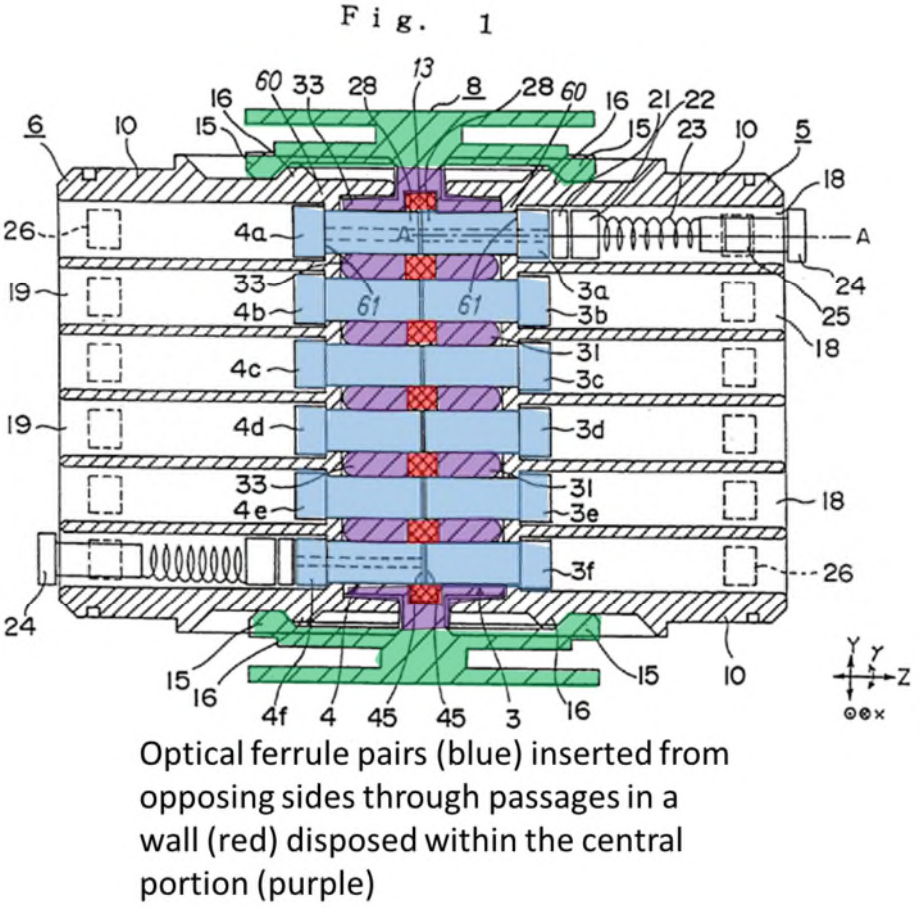
478. Those of skill in the art would recognize that the optical connectors (e.g. 3a to 3f and 4a to 4f) of optical connector groups (3) and (4) include optical ferrules (42). EX1003: 10:44-49 ("For example, differing from an optical connector in which a large-sized super multi-fiber ferrule is shown in FIGS. 11(a) and (b), the optical connectors 3 *a* to 3 *f* and 4 *a* to 4 *f* are excellent in view of moldability and mass productivity of multi-fiber ferrules 42 and attaching efficiency of optical fibers").

479. As disclosed in Kanai, each of the connector groups (3) and (4) consist of a plurality optical connectors/ferrules.

480. For example, the adapter depicted in Figure 1 of Kanai is configured to receive six optical connectors/ferrules (blue) from each side.



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EX1003: Fig. 1 (annotated).

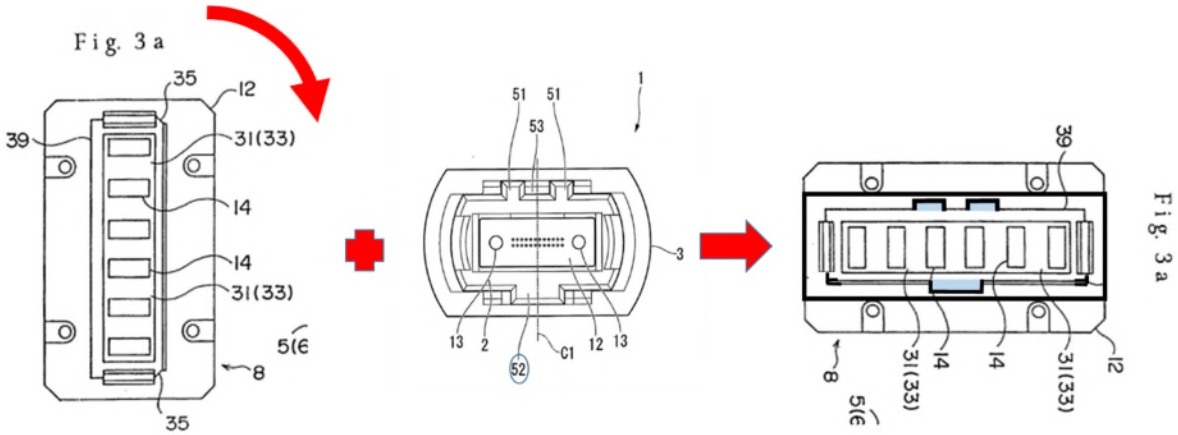
481. Therefore, the Kanai/Saito combination renders "The adapter according to claim 8, wherein the first and second sides are configured to receive a plurality of fiber optic connectors" obvious.

## OBVIOUSNESS: KANAI, SAITO, AND KATOH (GROUND 4)

### A. Motivation to Modify Kanai/Saito Combination Based on Katoh

482. It would have been obvious to modify the adapter—and corresponding connector plugs/optical ferrules—of Kanai in a manner meeting the limitations of Claims 2 and 3 in view of Katoh and Saito.

483. Specifically, a person of ordinary skill in the art would have considered modifying the inner wall of the frame portion (39) of the Kanai adapter to incorporate grooves (highlighted blue) for receiving corresponding keys on the plug as taught by Katoh as shown below.




EX1003: Fig. 3a; EX1005: Fig. 9.

484. One of skill in the art would have recognized that when using an adapter to mate opposing plugs that each contain multiple fiber optic ferrules—as is the case with Kanai—it is critical to match the proper corresponding ferrules of the opposing plugs within an adapter.

485. The adapter of Kanai discloses the use of notched inserting portions (35) formed at two of the corners of the inner wall of the frame portion (39) for the purpose of providing a key for the proper orientation of the plug:

> Further, as shown in FIG. 3(a), a notched inserting portion 35 is formed at two of the four corners of the inner wall of the frame portion 39 at the housing halves 12 of the adapter 8, and the notched inserting portion 35 corresponds to the notched part 36 formed at the frame 10 of the second plugs 5 and 6. When inserting the first and second plugs 5 and

> 6 in the adapter 8, no error occurs with respect to the vertical direction (the optical connector arraying direction), that is, for example, the second connector 4a of the second connector group 4 is connected to the first connector 3a of the first connector group 3 without fail.

EX1003: 8:54-64.

486. Kanai presents these notched portions (35) as an optional preferred embodiment. EX1003: 12:21-29 ("However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the second connector group 4 (so as not make any mistake in the mating of each connection pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6.").

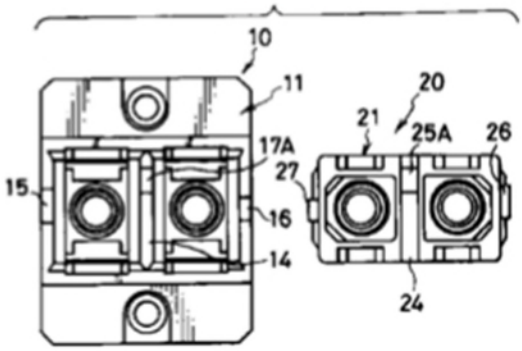
487. Those of skill in the art would have been familiar with other methods to identify and ensure the proper orientation of the optical connector plug being inserted into the adapter. Notably, markings are not fail-safe to prevent backwards installation, therefore it is understood that asymmetric plug keys and matched adapter keyways are preferred.

488. For example, another common method of ensuring proper plug orientation is the use of differing sized/or configured projections or keys on the plug. See EX1019: Fig. 3; EX1020: Fig. 1.

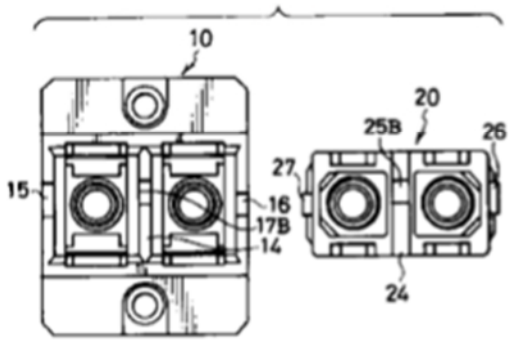
489. These projections or keys would match corresponding grooves in the adapter to receive the projections/keys.

490. This technique of using keys and keyways of differing sizes to ensure proper orientation was known in the art. See e.g. EX1024: [0011] ("A width of the identification guide key 26 is larger than a width of the identification guide key 27."), [0014] ("When attempting to mate this in the opposite direction, for example, attempting to mate the double-core optical connector plug 20 with the double-core optical connector adapter 10 in a direction reversed from the position illustrated in FIG. 1, the respective guide keyway and guide key cannot fit together, and thus mating is not possible."), Figs 2-5.

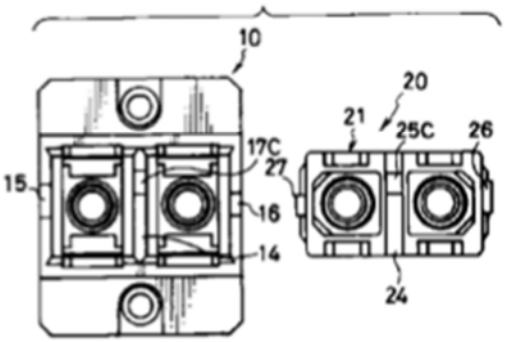
[FIG. 2]



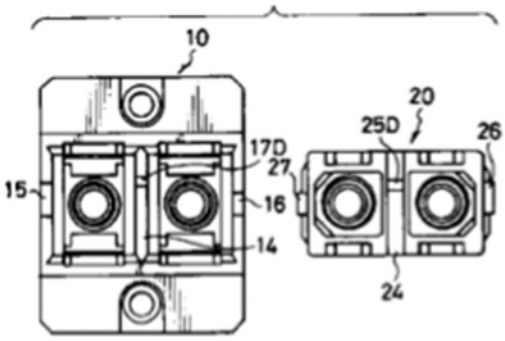
[FIG. 3]




[FIG. 4]




[FIG. 5]

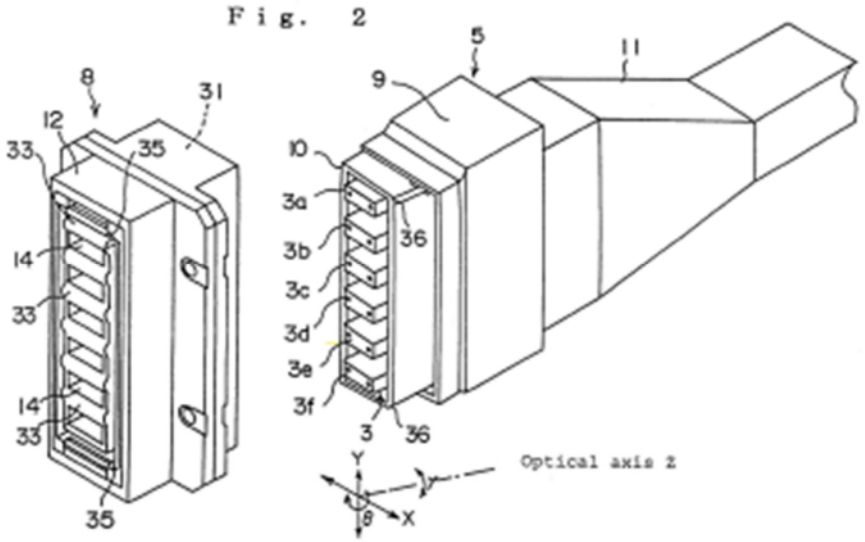


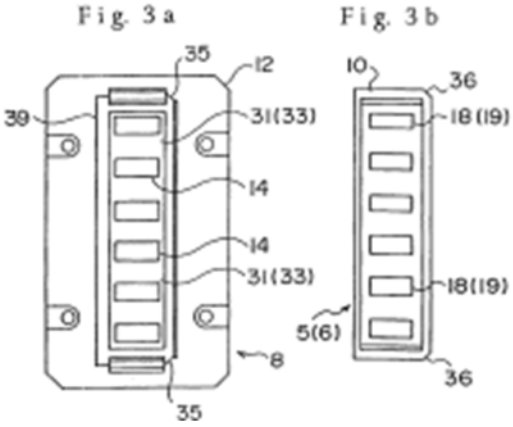

EX1024: Figs 2-5.

491. This method is specifically taught by Katoh.

492. While Kanai's notched inserting portions (35) formed at two of the corners of the inner wall of the frame portion (39) should prevent the plug from being fully inserted upside-down of its proper polarity, as depicted in Figures 2 and 3, the notched inserting portions (35) of the frame and respective notches (36) on the plug are relatively small such that they may be difficult to see and fail to provide visual confirmation of the proper plug orientation in advance of meeting

interference upon the insertion of the plug into the adapter, thus potentially causing debris by scraping or housing damage. EX1003:8:54-64.



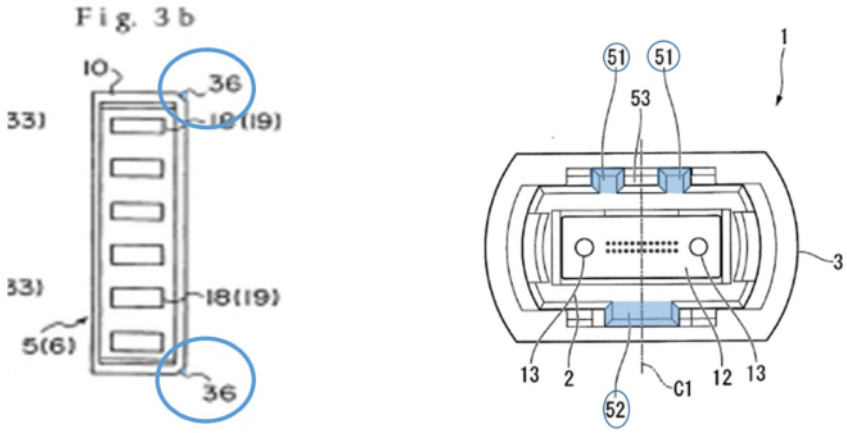




EX1013: Figs. 2, 3a, and 3b.

493. The use of keys (51 and 52) on the plug and corresponding keyway grooves (e.g., 61) in the adapter as taught by Katoh can be more readily seen by the installer as they are more pronounced both in location and size. EX1005: [0014] (explaining that different connectors can be "visually distinguish[ed] . . . on the

basis of the protruding position of the end of the key"), [0045]-[0046], [0058] ("easily visually distinguished"), [0077] ("By forming the second key 52, it is possible to lower the possibility of erroneous insertion."), Fig. 2, 5, 9.

FIG. 9




EX1003: Fig. 3b (annotated); EX1005: Fig. 9 (annotated)

494. One of skill in the art would recognize the differences in keying methods between Kanai and Katoh is merely a design choice as to the shape and location of the keying feature, as both methods would be readily compatible, and could easily be merged into one design.

495. One of skill in the art would have also had an expectation of success in incorporating the keying method of Katoh in that the notched corners of Kanai and asymmetric keys and keyways of Katoh were know methods within the art, requiring only a simple substitution of notches as disclosed in Kanai for the keys and keyways of Katoh.

496. Accordingly, incorporating Katoh's method of identifying and ensuring the proper orientation would have been a simple and obvious substitution.

### B. Claim 2 – "The adapter according to claim 1, further comprising a groove in one of the top surface and the bottom surface."

497. The claimed grooves in the top and bottom surfaces of the first side and the second side of the main body provide rough alignment and orientation guides for plugs in which multiple fiber optic ferrules are ganged together.

498. Instead of grooves, the preferred embodiment of the adapter disclosed by Kanai uses notched inserting portions (35) formed at the corners of the inner wall of the frame portion (39) for the purpose of providing the correct orientation and course alignment of the plugs (5, 6) carrying the optical connectors (3a-3f and 4a-4f). EX1003: 8:54-64, 12:16-21.

499. Kanai recognized that the notched insertion portion could be omitted and that other methods of orientation and alignment could be implemented, such as the use of markings attached to the adapter and plugs. EX1003: 12:21-30 ("However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the Second connector group 4 (so as not make any mistake in the mating of each connection

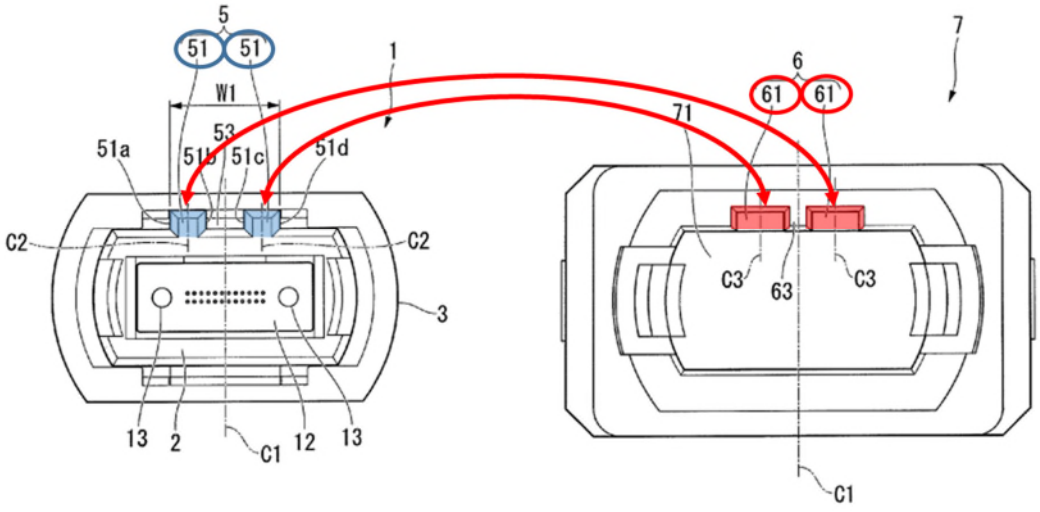
pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6.").

500. Additional methods of providing alignment and orientation of plugs for insertion into adapters were well known in the art.

501. For example, Katoh teaches an optical connector with "keys" (51) (blue in the annotated figure below) on the top surface of the optical connector housing and an adapter for receiving the optical connector with "key grooves" (61) (red in the annotated figure below) along the inside top surface to receive the keys. EX1005: ¶¶[0045]-[0046], [0077], Figs. 2 & 5 (reproduced and annotated below).

FIG. 3

FIG. 5




EX1005: Figs, 3, 5 (annotated).

502. Katoh further teaches an embodiment corresponding to Figure 9, in which an additional "key" (52) is included on the bottom surface of the optical

connector housing. EX1005: [0077] (“Plural first keys 51 may be formed on an outer surface of the housing and a second key 52 may be formed on the outer surface opposite to the outer surface on which the first keys 51 are formed. FIG. 9 shows a housing 2F having the second key 52 formed therein.”), Fig. 9 (reproduced and annotated below).

FIG. 9

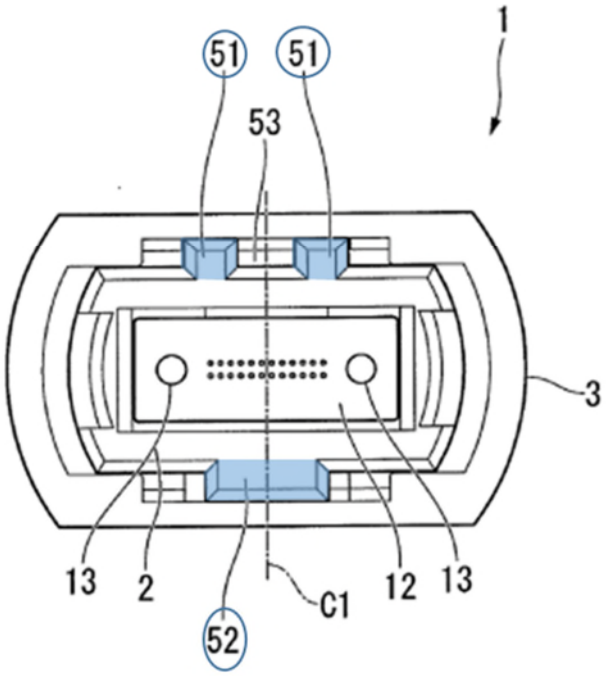



Fig. 9 (annotated).

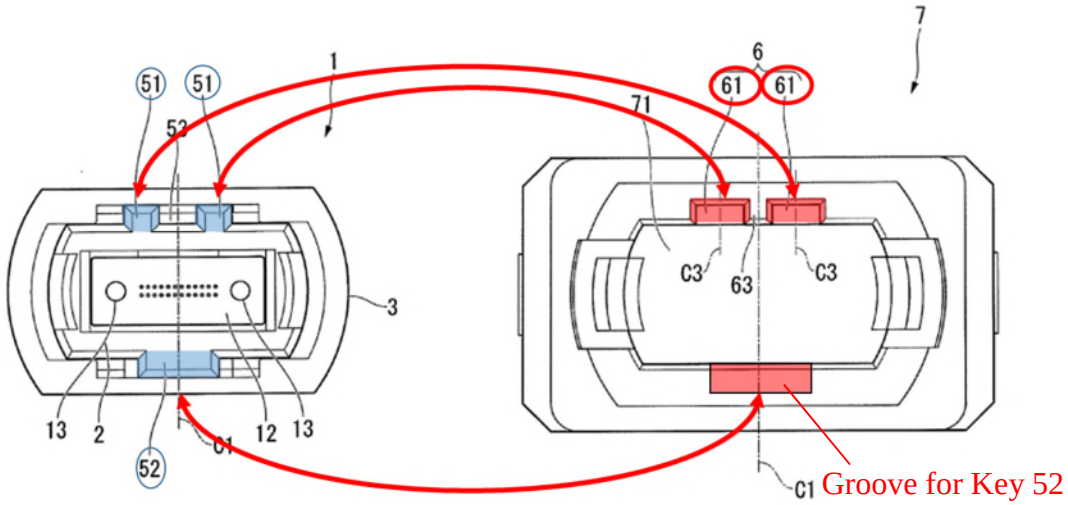
503. While Katoh does not provide a detailed description of the adapter that would receive the Figure 9 embodiment of the optical connector, one of skill in the art would recognize that a keyway groove (added in the figure below) in the



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inner bottom surface of the adapter would be necessary for receiving the additional key (52) as demonstrated in the annotated and modified figures below.

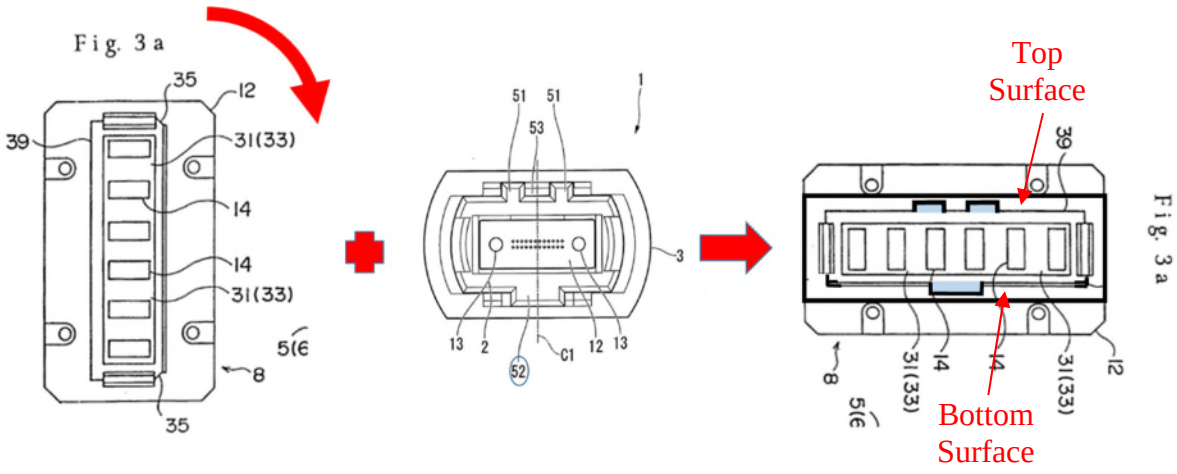
FIG. 9




EX1005: Figs. 9 (annotated) & 5 (annotated and modified to add bottom groove for key 52).

504. It would have been obvious to modify Kanai/Saito combination according to Katoh to replace the notch (35) with grooves, as such grooves in the inner walls—including a larger groove centered on one of the inner walls—would be more visually apparent than small notches in corners of the inner walls.

505. When implemented in the Kanai/Saito combination, the key grooves of Katoh would be in the top and bottom surfaces of the Kanai/Saito adapter.




EX1003: Fig. 3a (annotated); EX1005: Fig. 9.

506. Therefore, the Kanai/Saito/Katoh combination renders the limitation "The adapter according to claim 1, further comprising a groove in one of the top surface and the bottom surface" obvious.

### C. Claim 3 – "The adapter according to claim 1, further comprising a groove in each of the top and the bottom surfaces."

507. For the reasons just discussed, the Kanai/Saito/Katoh combination renders the limitation "The adapter according to claim 1, further comprising a groove in each of the top and the bottom surfaces" obvious.

## OBVIOUSNESS: KANAI, SAITO, AND YOON (GROUND 5)

### A. Motivation to Modify Kanai/Saito Combination Based on Yoon

508. The adapter of Kanai discloses the use of notched inserting portions (35) formed at two of the corners of the inner wall of the frame portion (39) for the purpose of providing a key for the proper orientation of the plug:

> Further, as shown in FIG. 3(a), a notched inserting portion 35 is formed at two of the four corners of the inner wall of the frame portion 39 at

> the housing halves 12 of the adapter 8, and the notched inserting portion 35 corresponds to the notched part 36 formed at the frame 10 of the second plugs 5 and 6. When inserting the first and second plugs 5 and 6 in the adapter 8, no error occurs with respect to the vertical direction (the optical connector arraying direction), that is, for example, the second connector 4a of the second connector group 4 is connected to the first connector 3a of the first connector group 3 without fail.

EX1003: 8:54-64.

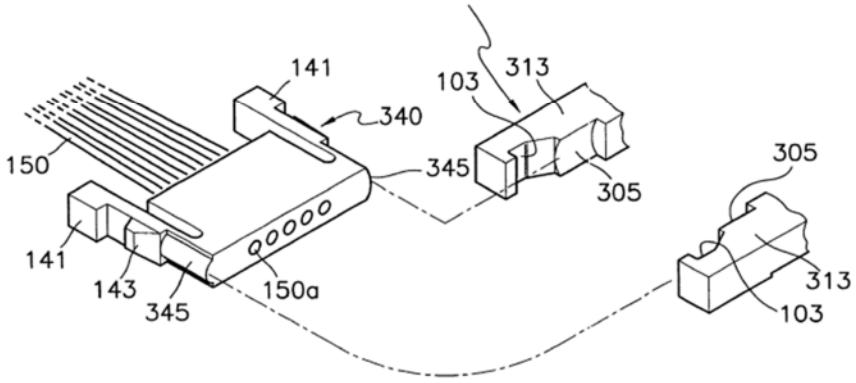
509. As discussed above, it is also common within the art to include polarity keys on the ferrule housings and to include corresponding grooves within the adapter to ensure proper polarity.

510. One of skill in the art would recognize that it would be desirable to provide keying at the individual ferrule housing, in addition to keying the ganged optical plugs, as the optical connectors are manufactured and tested (e.g., interferometer testing for fiber geometry and light loss testing for overall transmission performance) in the smallest units prior to final assembly.

511. As an example, Yoon teaches using guide grooves (305) to receive corresponding guide portions (345) at the leading ends of a ferrule. EX1008: 7:34-41 ("FIG. 6 shows another embodiment of means for guiding the connector into the body, which allows for alignment between the optical fibers and the optical device. The connector 340 shown in FIG. 6 has a pair of round guide portions 345 at the leading ends of the flexible portions 141, and the body 300 has a pair of round guide grooves 305, corresponding to the round guide portions 345, at the

inner sides of the sidewall portions 313 of the body 300."), Fig. 6 (reproduced below); EX1005: Fig. 9 (different sizes of keys).

FIG. 6




EX1008: Fig. 6.

512. While Yoon's guide grooves (305) and guide portions (345) are curved, they are otherwise similar to and provide the same function as the grooves and guides of the Saito adapter (66) and ferrule (70). EX1008: 7:49-55 ("As the round guide portions 345 of the connector 340 are slidably inserted into the body 300 along the corresponding round guide grooves 305, the connector 340 is engaged with the body 300 and in turn the optical fibers 150 are accurately aligned with the optical device.").

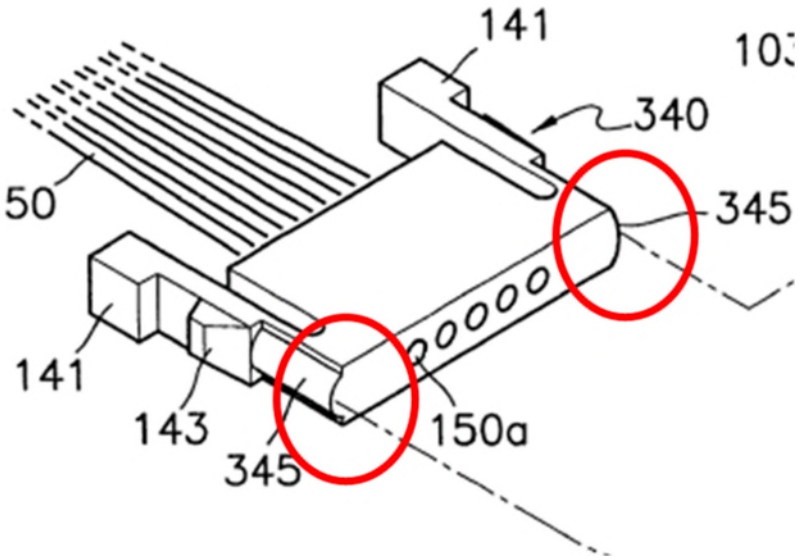
513. Yoon teaches that it is preferable that the guide grooves (305) and guide portions (345) have "different curvatures at facing sides" so as to ensure



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proper polarity. EX1008: 7:41-49 ("It is preferable that the curvature of one of the round guide grooves 305 is not identical to the curvature of the other round guide groove, and each of the round guide portions 345 is formed to have a curvature corresponding to the round guide grooves 305. To shape the round guide portions 345 and the round guide grooves 305 to have different curvatures at facing Sides indicates the appropriate insertion direction of the connector 340 into the body 300.").

514. As visible by comparing the heights of the guide portions (345) in Figure 6 below, this equates to the guide on one side of the ferrule —and thus the corresponding groove of the adapter—being wider than on the other side. For instance, the guide portion (345) on the left is shorter than the height of the ferrule, while the guide portion (345) on the right appears to be the full height of the ferrule. EX1008: Fig. 6 (excerpted and annotated below).




EX1008: Fig. 6 (excerpted and annotated).

515. In modifying the Kanai adapter to incorporate the guide and groove alignment taught by Saito, it would have been obvious to choose non-identical shapes/sizes for the ferrule guides—and the corresponding grooves in the adapter—as taught by Yoon to ensure proper polarity of the ferrules as they are being inserted into the adapter.

516. It would have been an obvious design choice to size the guides and grooves on the opposing sides of the ferrule differently, such that the grooves on the top surface and bottom surface of the central portion of the adapter would have different widths.

517. This modification of the Kanai/Saito combination in further view of Katoh is demonstrated below (upper grooves colored blue, lower grooves colored orange).

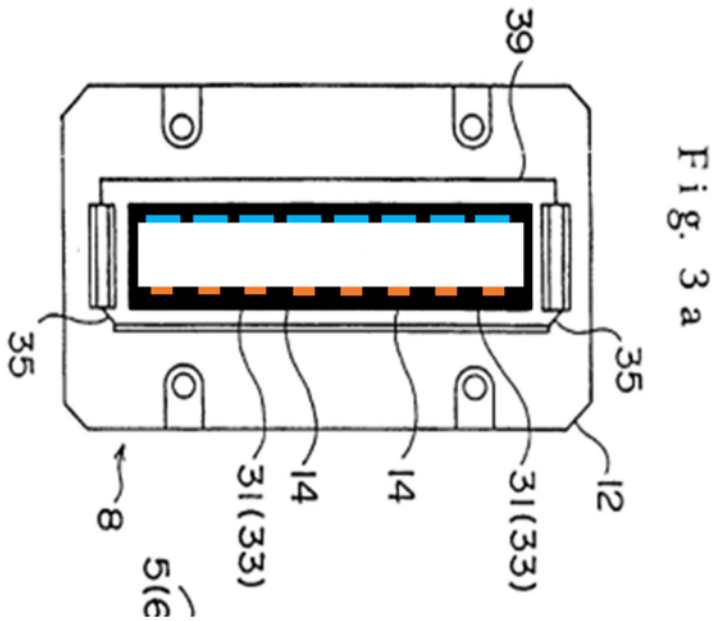



Fig. 3a

EX1003: Fig. 3a (annotated).

**B. Claim 11 – "The adapter according to claim 8, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different."**

518. The Kanai/Saito combination as modified in view of Yoon results in the grooves (blue) in the second top surface of the central portion having a different width than the grooves (orange) in the second bottom surface of the central portion.

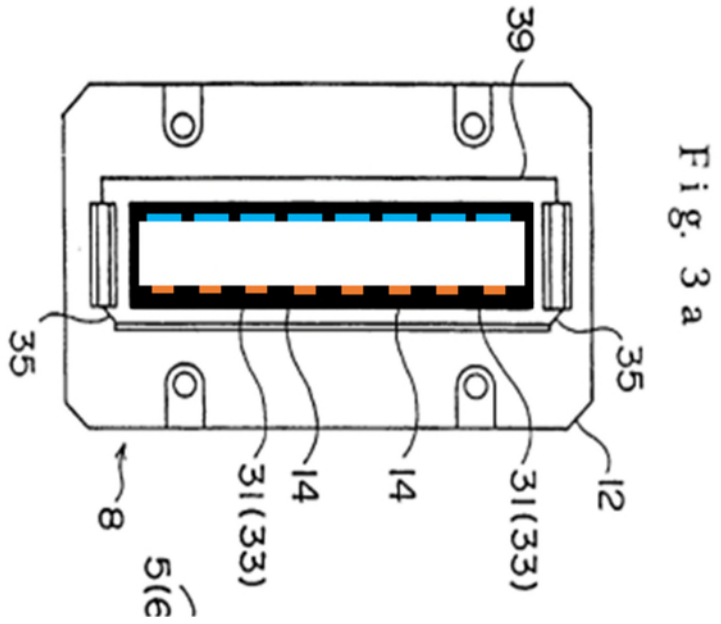



Fig. 3a

EX1003: Fig. 3 (annotated).

519. Therefore, the Kanai/Saito/Yoon renders "The adapter according to claim 8, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different" obvious.

### C. Independent Claim 12

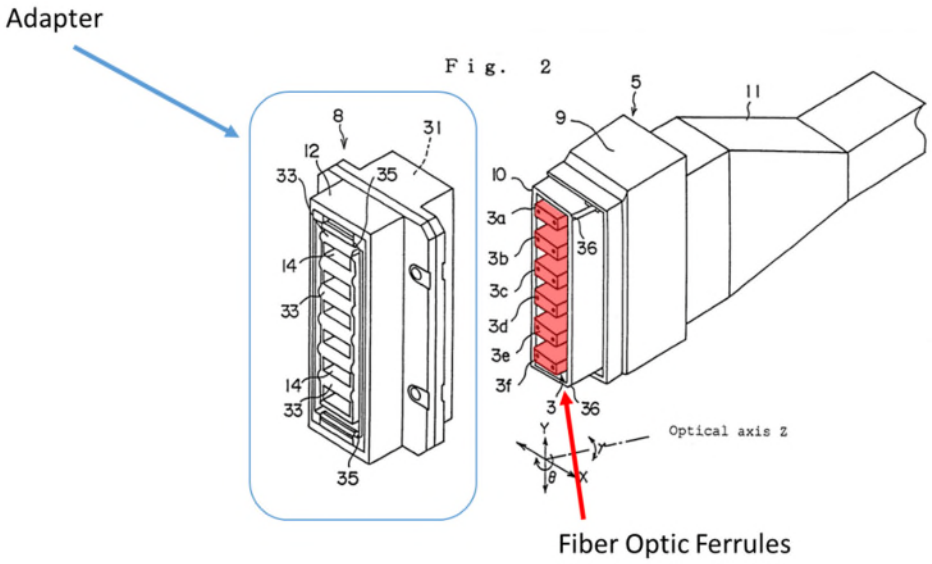
#### 12.P "An adapter for holding fiber optic connectors, the adapter comprising:"

520. Kanai teaches an "adapter" which is "suitable for application in the field of optical transmission, and which are able to collectively, easily and accurately connect a plurality of optical connectors." Ex.1103, Abstract.

521. Kanai teaches that the disclosed adapter aligns and holds optical connector groups (3) of optical connectors (3a-f, 4a-f)—and their fiber optic ferrules (42)—inserted from opposing first and second sides:

> The connection end face (45) side [i.e. the end face of multi-fiber ferrule (42)] of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) … The optical connectors of the respective connection pairs are position-regulated in the X direction orthogonal to the optical axis and Y direction, thereby causing the axes to be matched, wherein the optical connector groups (3) and (4) are collectively connected via the adapter (8).

EX1003: Abstract, Figure 2 (depicting the adapter and fiber optic connectors).

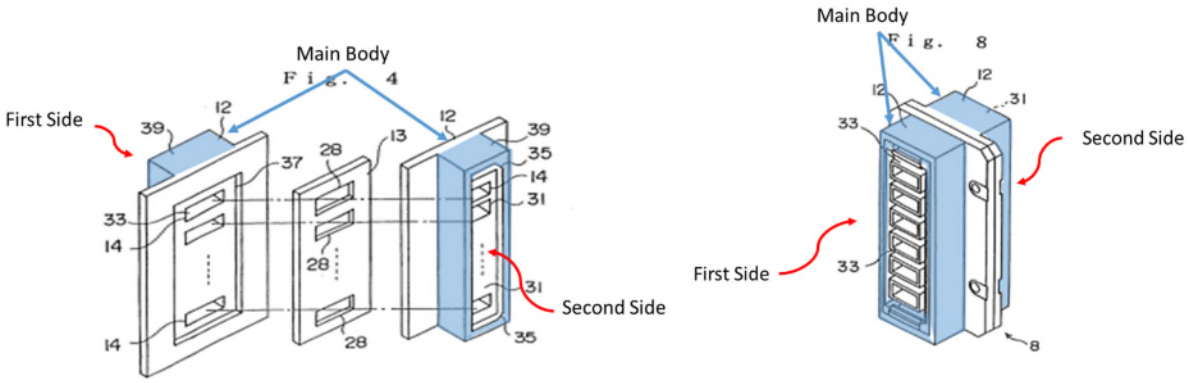



EX1003: Fig. 2 (annotated).

522. Therefore, Kanai's adapter meets the limitation of "An adapter for holding fiber optic connectors, the adapter comprising."

### 12.a.1 "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side,"

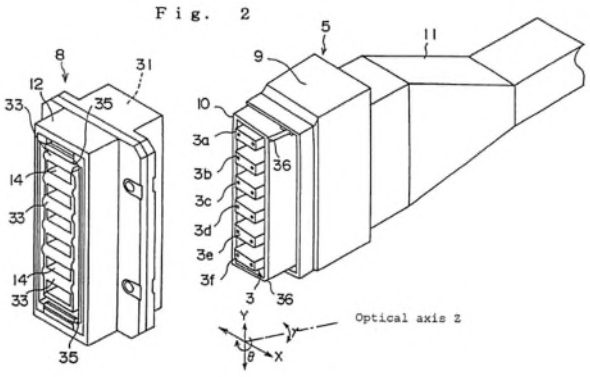
523. The adapter as disclosed by Kanai is formed of two housing halves (12) and a metallic plate (13) between the two housing halves, with the two housing halves welded together by ultrasonic welding to form the housing. EX1003: 8:22-26 ("[T]he adapter 8 is constructed to have two housing halves 12 of almost the same shape and a metallic plate 13. The housing halves 12 are inserted back to back and, for example, are welded by ultrasonic welding."), Figs. 4 and 8 (annotated below).




EX1003: Figs. 4 & 8 (annotated).

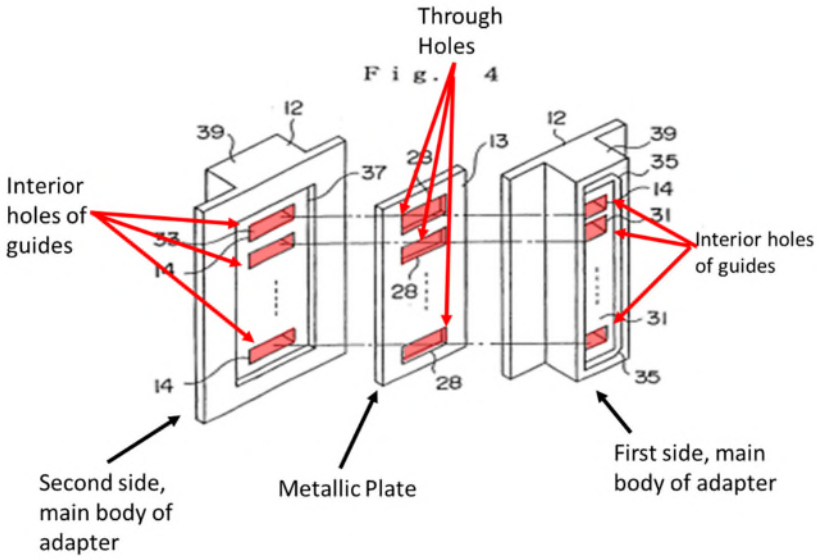
524. The adapter depicted in Figure 8 represents a modified embodiment as compared to the adapter depicted in Figures 2-4 and 7a-7b with respect to the guides (31, 33).

525. Referring back to the frame portions (39), as welded together, the two frame portions define a first side and a second side of the main body for receiving fiber optic connectors. EX1003: Fig. 2.




EX1003: Fig. 2. The housing halves each have a frame portion (39) which collectively act as the "main body" in the context of the claims of the '415 Patent. EX1003: 8:54-59, Figs. 2 and 4 (annotated above).

526. The frames (39) forming the main body define an opening on opposing sides, with guides (31 and 33) providing passages through the adapter and connecting the openings in the opposing sides of the main body. EX1003: 8:46-51 ("The metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33, through which optical connectors are inserted."), Fig. 4 (annotated below).

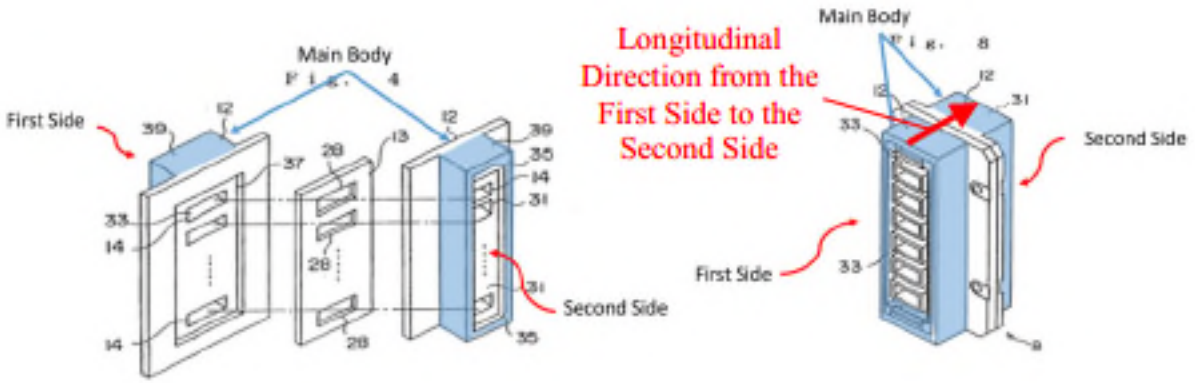



EX1003: Fig. 4 (annotated).

527. Notably, Kanai's adapter further includes a wall (13) with holes (28) that align with the rectangular passages in the guides (31, 33) to define continuous openings through the main body.

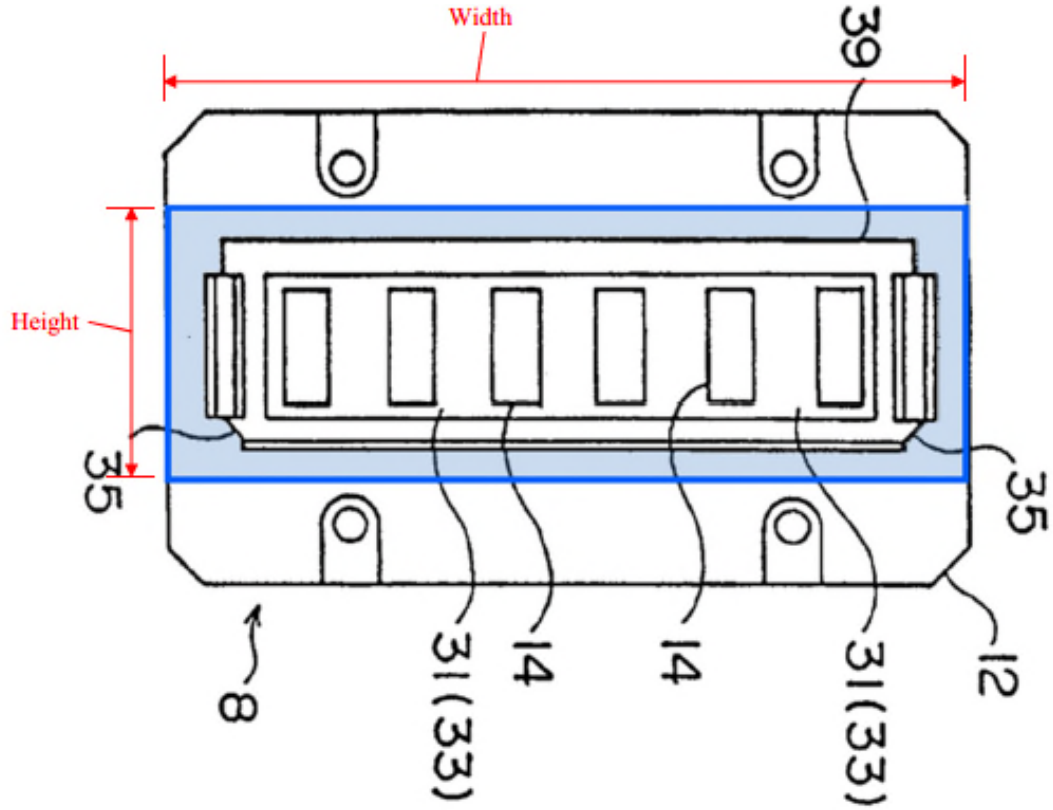
528. The main body of Kanai thus defines continuous openings extending between the first side and the second side of the adapter.

529. As shown below, the opening extends longitudinally from the first side to the second side:

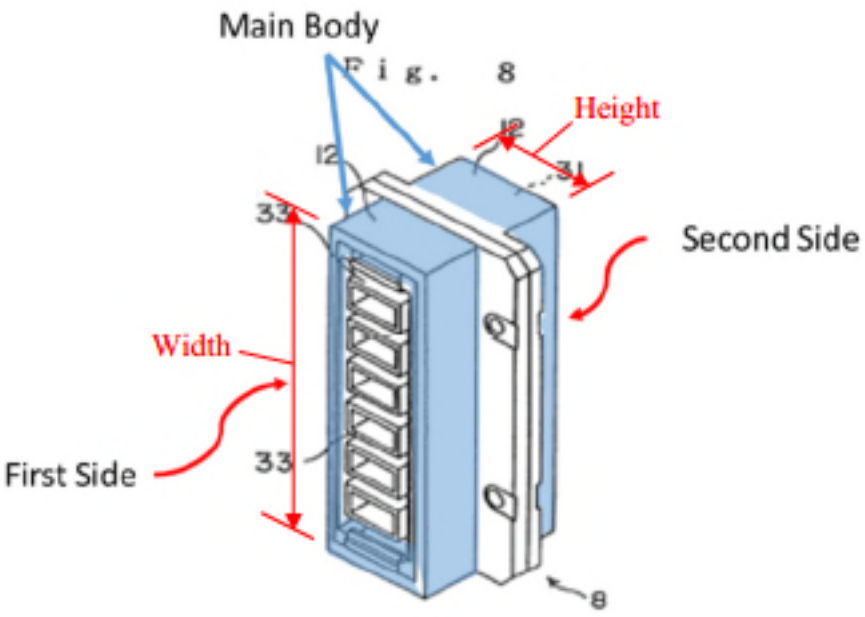



EX1003: Figs. 4 and 8 (annotated).

530. The main body has a width and a height.




EX1003: Fig. 3a (annotated).

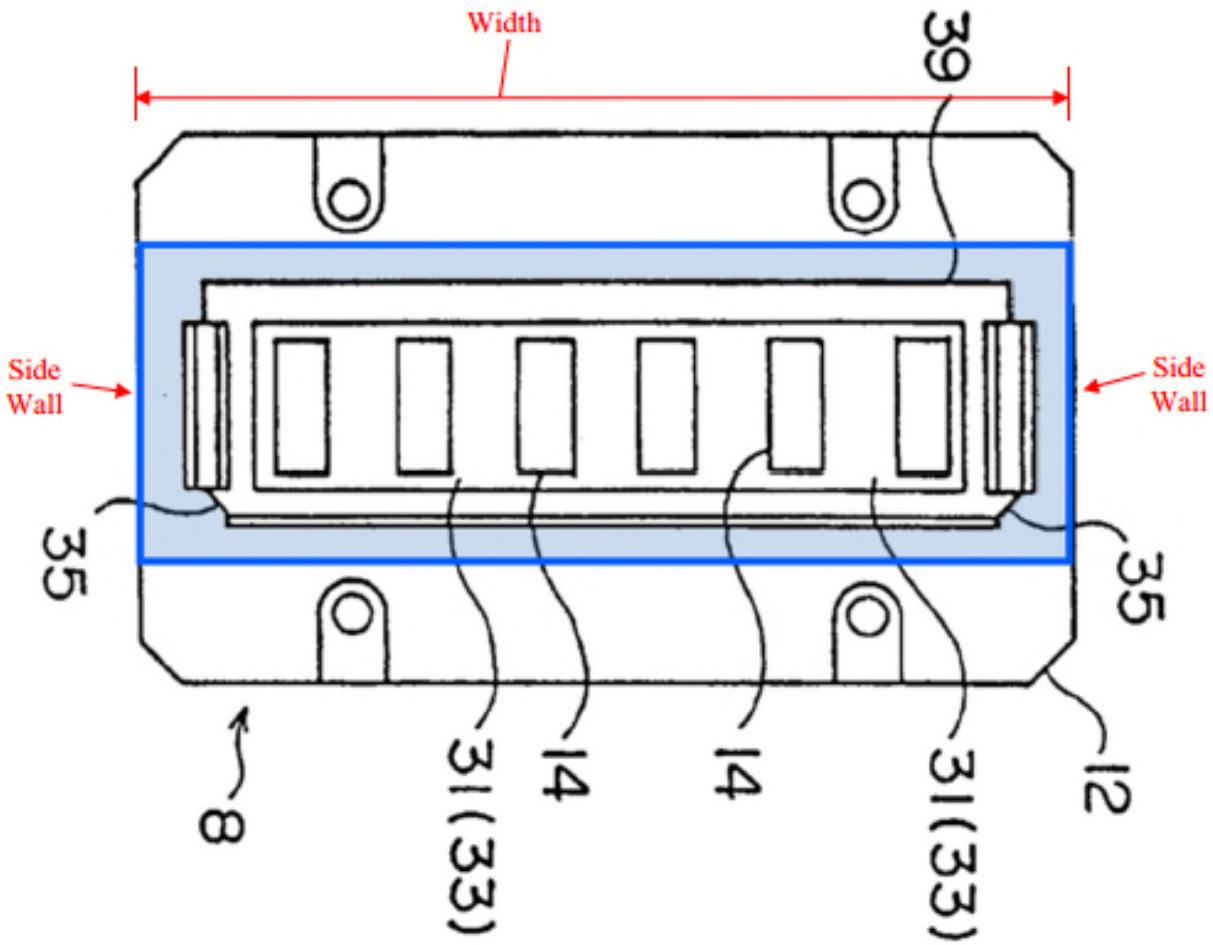



EX1003: Fig. 8 (annotated).

531. Thus, Kanai meets the limitation "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side."

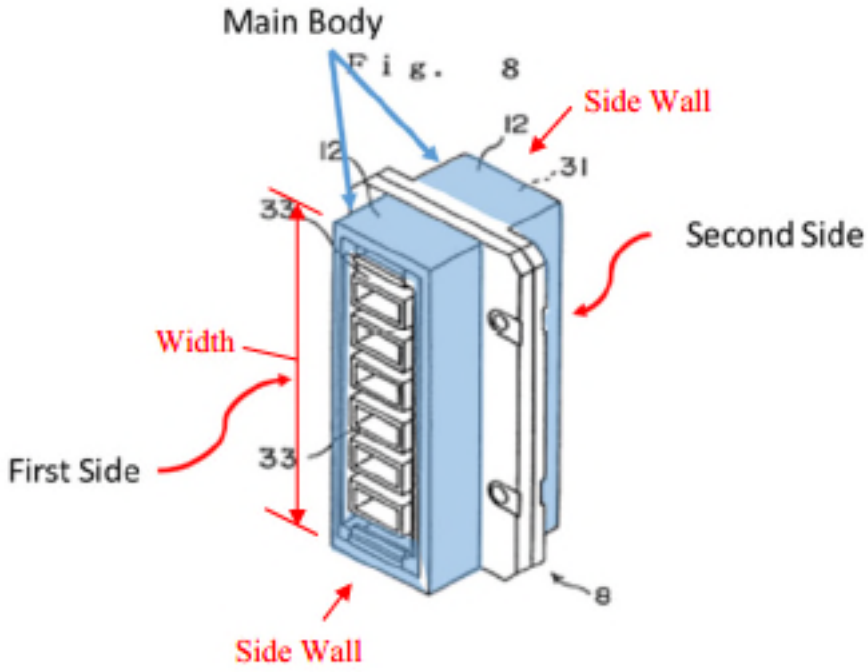
**12.a.2 "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height,"**

532. Kanai's main body includes two opposing side walls spaced apart along the width.



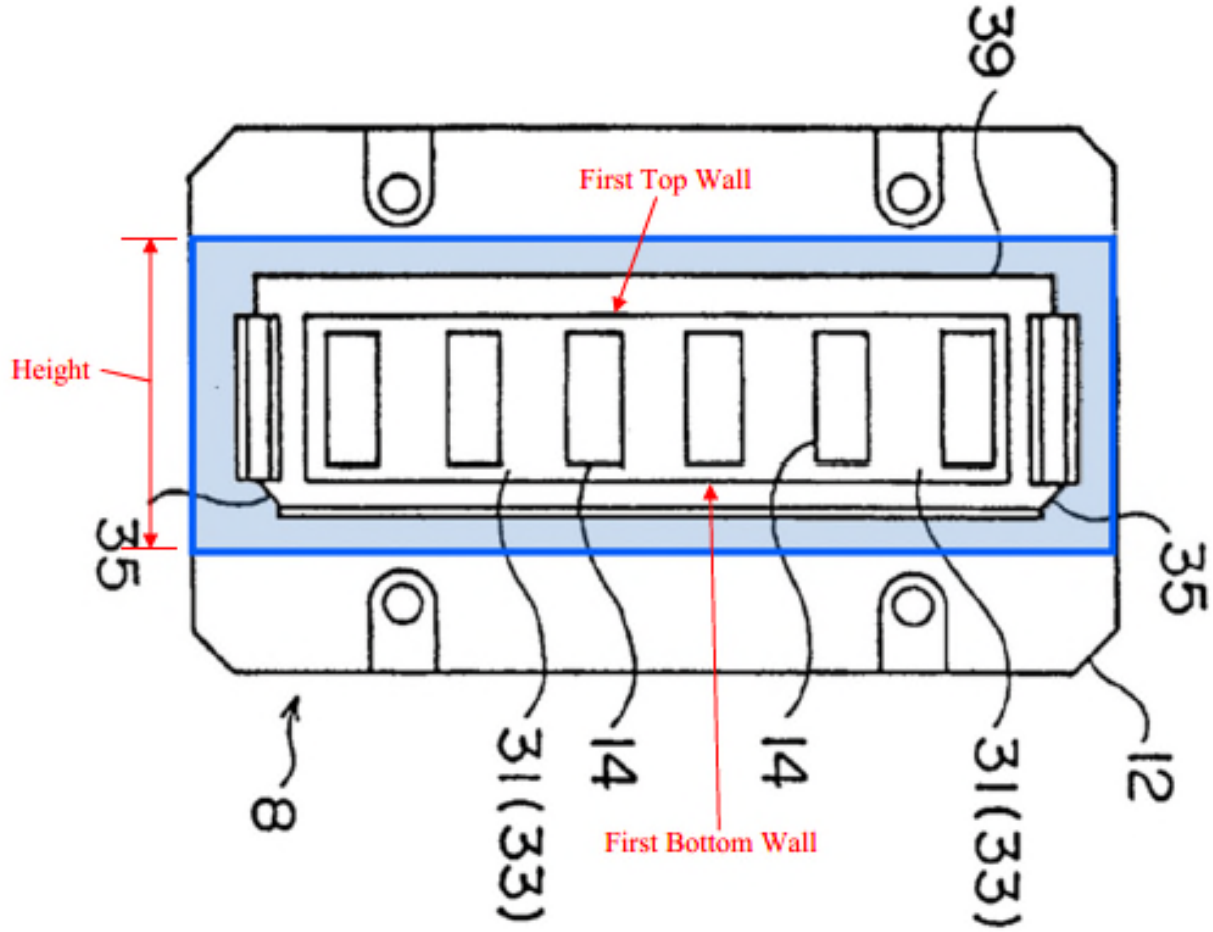



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EX1003: Fig. 3a and 8 (annotated).

533. Kanai's main body includes a first top wall and a first bottom wall spaced apart along the height.

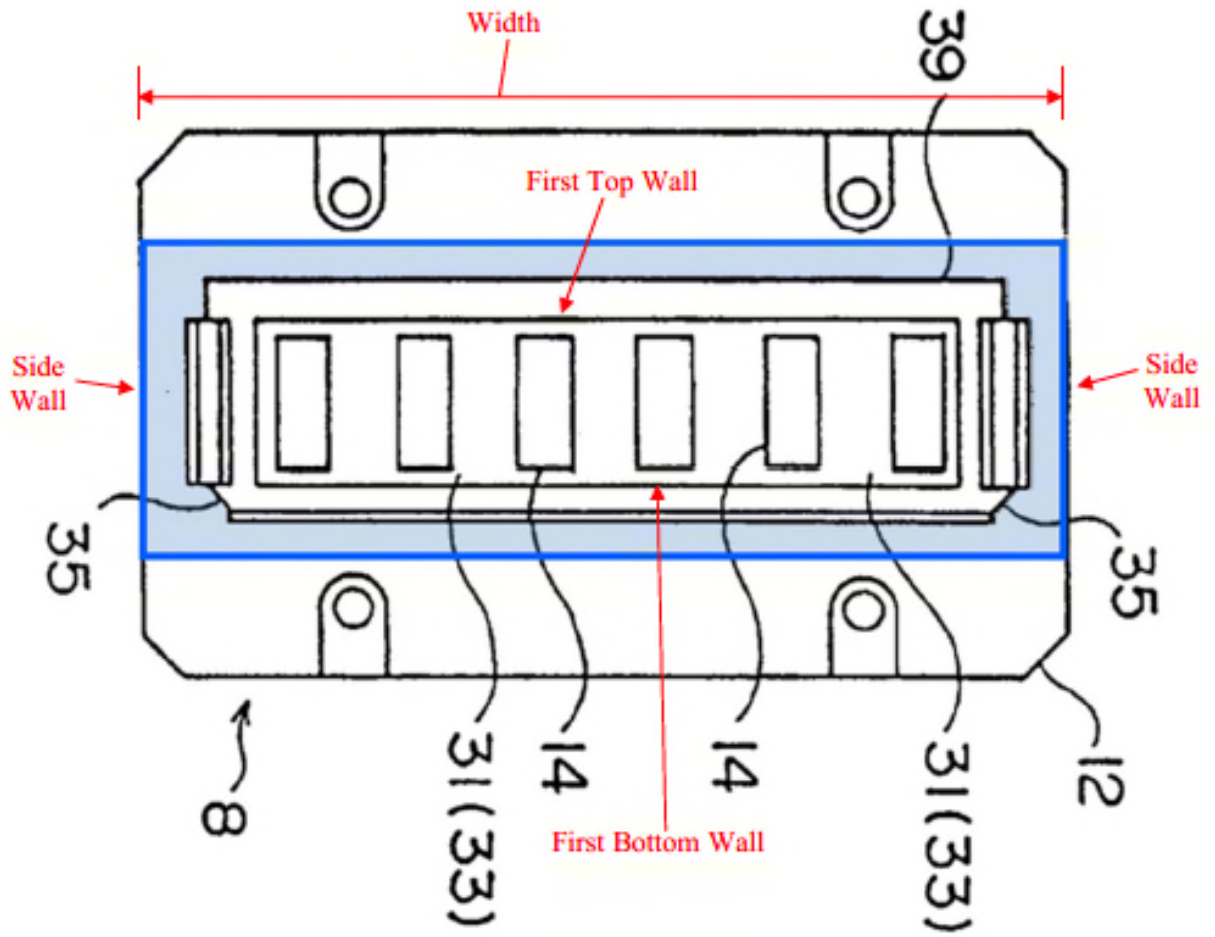



EX1003: Fig. 3a (annotated).

534. Therefore, Kanai meets the limitation "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height."

**12.a.3 "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls,"**

535. Kanai's first top and bottom walls each extends widthwise between the two opposite side walls.




EX1003: Fig. 3a (annotated).

536. Therefore, Kanai meets the limitation "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls."

**12.b "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width,"**

537. Kanai discloses guides (31, 33) including rectangular passages that receive optical connectors (3a-3f, 4a-4f) to guide the optical connectors into connection with each other. EX1003: 8:26-36.

538. Instead of grooves, the preferred embodiment of the adapter disclosed by Kanai uses notched inserting portions (35) formed at the corners of the inner wall of the frame portion (39) for the purpose of providing the correct orientation and course alignment of the plugs (5, 6) carrying the optical connectors (3a-3f and 4a-4f). EX1003: 8:54-64, 12:16-21.

539. Kanai recognized that the notched insertion portion could be omitted and that other methods of orientation and alignment could be implemented, such as the use of markings attached to the adapter and plugs. EX1003: 12:21-30 ("However, the notched inserting portion 35 of the frame portion 39 and the notched part 36 of the frame 10 may be omitted. However, in this case, as in the above preferred embodiment, in order to securely connect the optical connectors of the respective connection pairs of the first connector group 3 and the Second connector group 4 (so as not make any mistake in the mating of each connection pair), it is preferable that a certain type of marking is attached to the adapter 8 and the first and second plugs 5 and 6."). Additional methods of providing alignment and orientation of plugs for insertion into adapters were well known in the art.

540. Those skilled in the art would have been aware that there were other approaches to regulating the positioning of the optical connector guides.

541. For example, Saito concerns stacked-type optical connectors—*i.e.*, fiber optic connectors with fiber optic ferrules that are ganged together—and

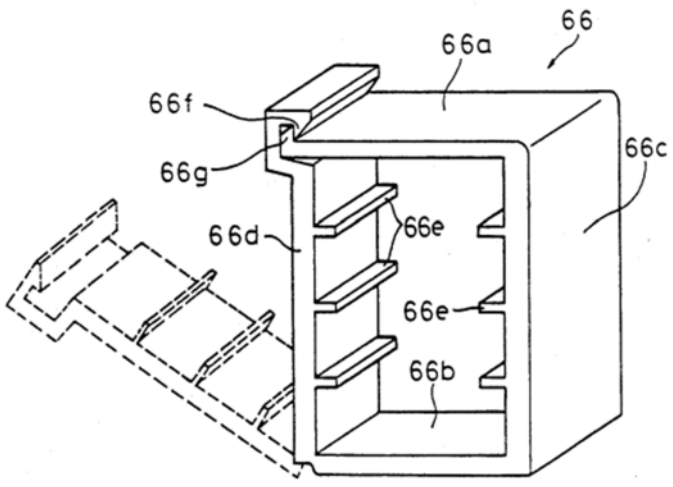


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corresponding adapters, similar to those at issue in Kanai and the ‘415 Patent. EX1004: 1:56-2:42, 10:28-30 (“The stacked-type optical connector 60 thus assembled is butt-connected to another stacked-type optical connector via an adapter 66 shown in FIG. 23.”).

542. Rather than providing rectangular openings that extend continuously around each ferrule separately when received therein, Saito discloses the use of partitioning pieces or ribs (66e) with groove separating them. EX1004: 10:65–68 (“when the individual stacked-type optical connectors 60 are pushed into the adapter 66, the tapered surfaces 61d are guided by the individual partitioning pieces 66e of the adapter 66”), Fig. 23.

FIG. 23




EX1004: Fig .23.

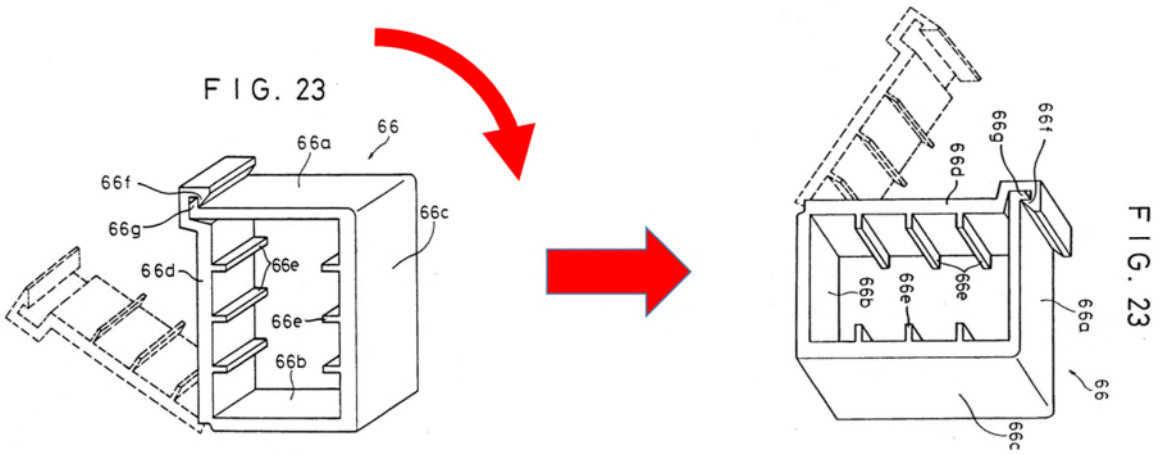


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543. These ribs define grooves forming passageways for optical connectors (61), similar to the guides (31, 33) of Kanai. EX1004:10:41-45 ("When the stacked-type optical connector 60 is attached to the adapter, the individual optical connectors 61 vertically move with its tapered surfaces 61d being guided by the partitioning pieces 66e, and they are separately housed in the respective spaces formed by the side piece 66c, the flap 66d, and the individual partitioning pieces 66e.").

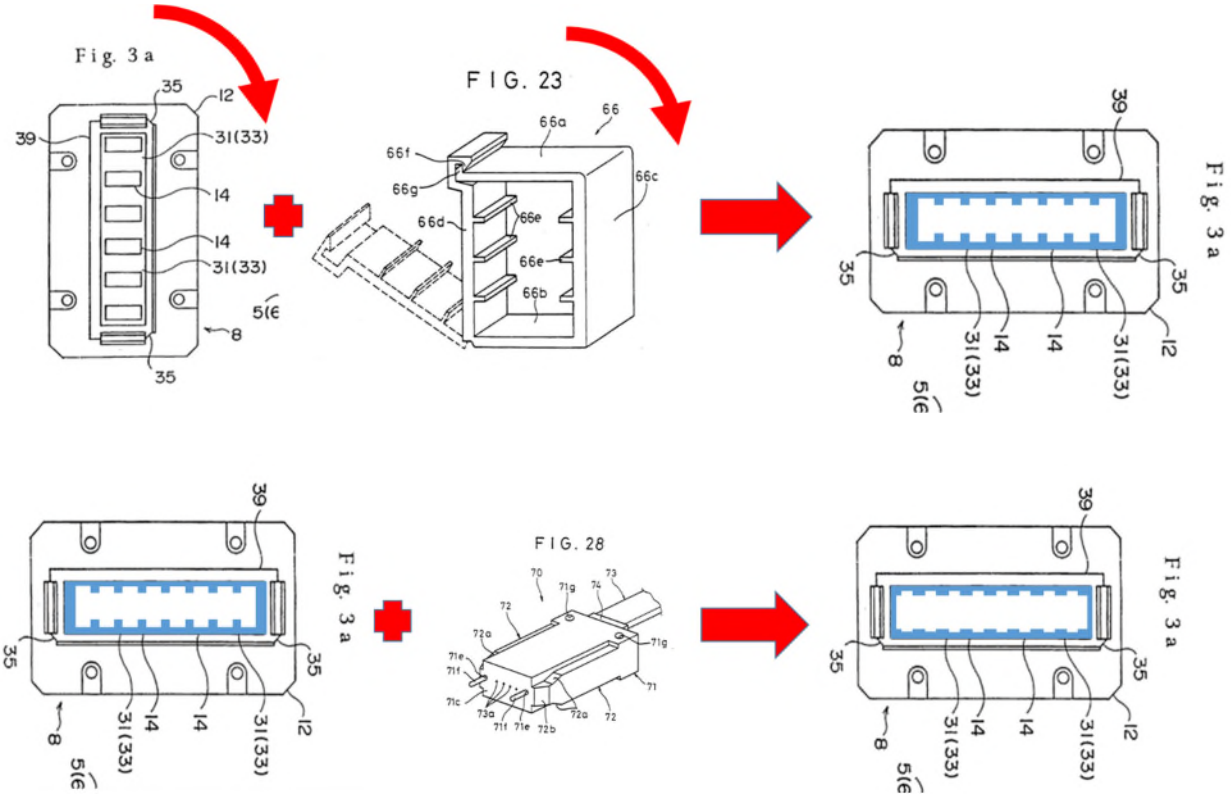
544. In the case of Saito, the passageways are formed by opposing grooves on each side of the adapter.

545. While Saito's adapter is depicted in a vertical orientation, those of skill in the art would recognize that such an adapter would have been readily used in either a vertical or horizontal orientation. As such, it would have been recognized by one of skill in the art that Saito's adapter could—and frequently would be—oriented such that the grooves would be on the top and bottom surface of the adapter.




EX1004: Fig. 23 (rotated).

546. A representative depiction of how Kanai could be modified to consolidate the individual tubular guides (31, 33) into a single opening—separated by partial partitions or ribs—was described above and is shown again below.



547. As discussed above, one of skill in the art would have been motivated to modify the Kanai adapter as described above in view of Saito, as the modification would have resulted in increased fiber optic density, a reduction in material used to form the guides, and a reduced risk to damage the ferrules.

548. This modification would result in grooves (blue) between each of the ribs, or between the first/last rib and the inner side wall, as depicted below.

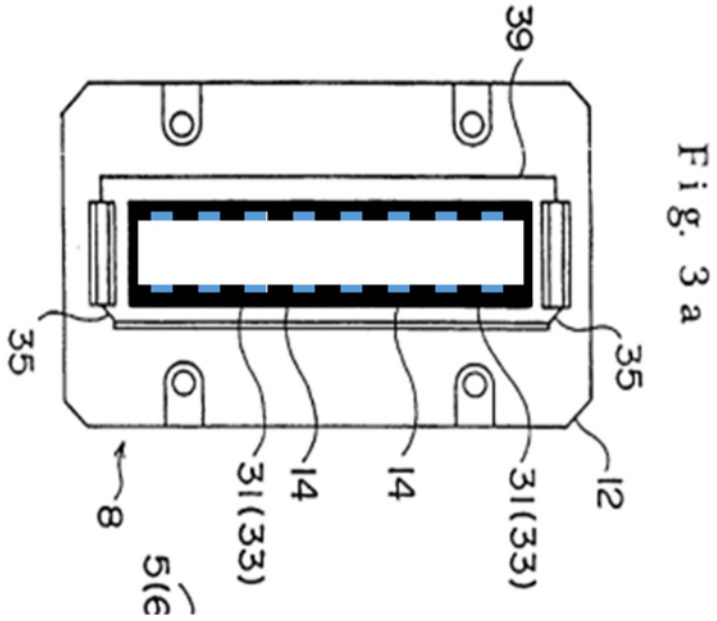
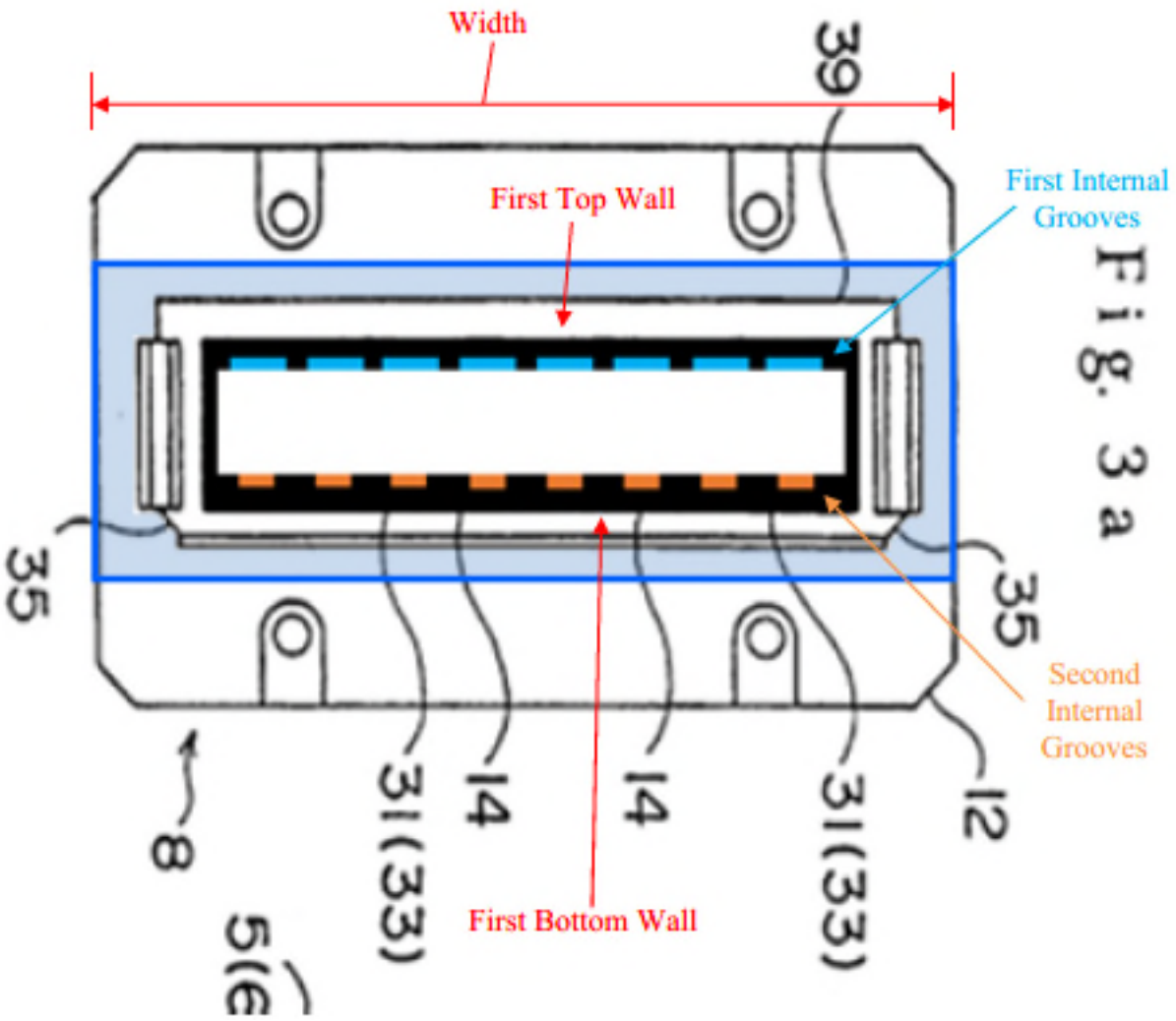



Fig. 3a

EX1003: Fig. 3a/(modified).

549. Thus, as illustrated below, the Kanai/Saito combination includes first internal grooves (blue) in the first top wall and second internal grooves (orange) in the first bottom wall. As shown below, the first and second internal grooves are spaced apart along the width:




EX1003: Fig. 3a (annotated).

550. Thus, the Kanai/Saito combination renders the limitation "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width" obvious.

**12.c.1 "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width,"**

551. As discussed above, the Kanai/Saito combination, modified in view of Yoon, includes first internal grooves (blue) in the first top wall that have a

different—specifically, larger—width than the second internal grooves (orange) in the first bottom wall.

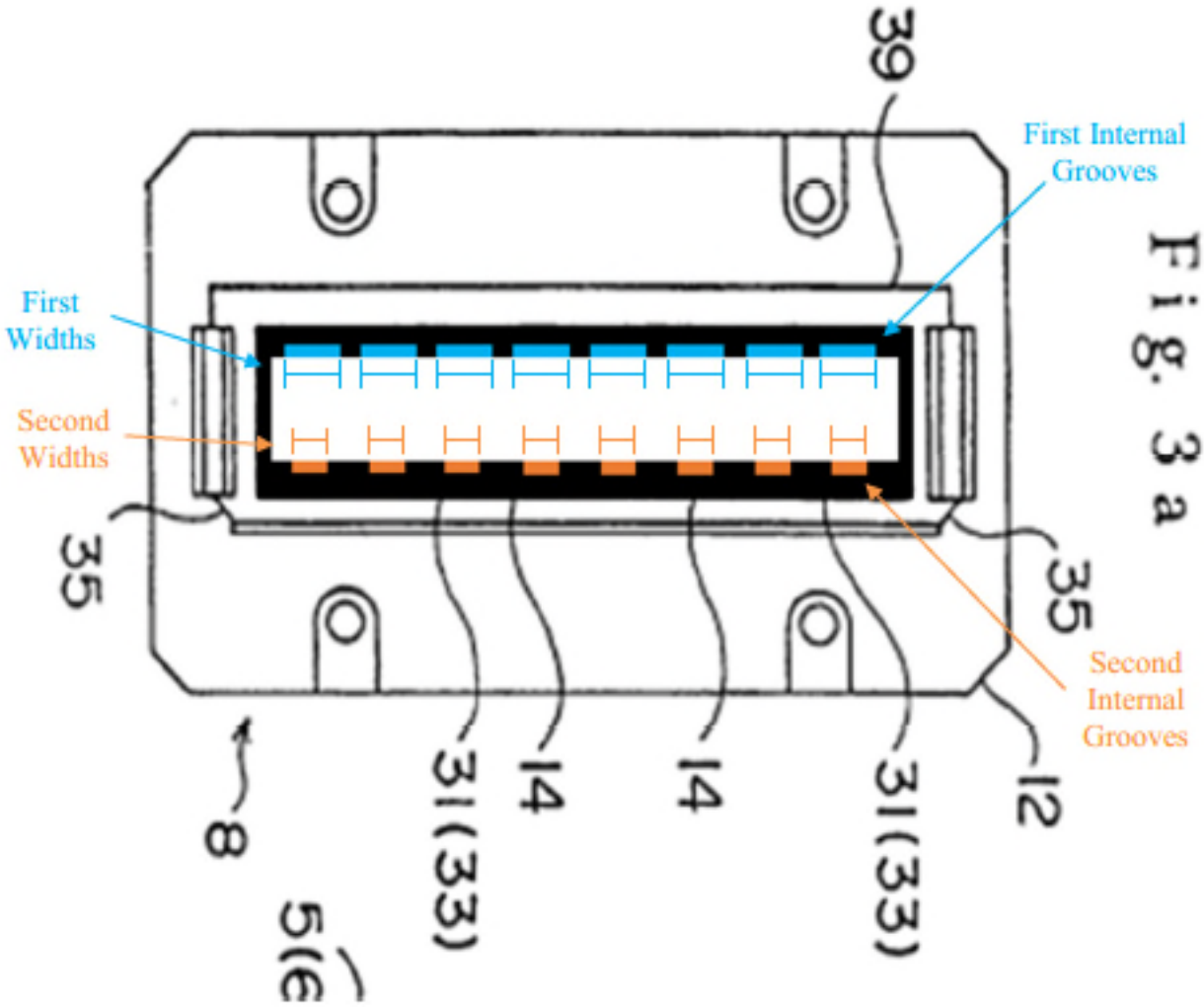



Fig. 3a

EX1003: Fig. 3a (annotated).

552. It would have been an obvious design choice to make the width of the grooves in the top wall larger than the grooves in the bottom wall for keying.

553. Yoon teaches making the two guide grooves (305) and the two guide portions (345) on opposite sides different sizes so as to ensure proper polarity. EX1008: 7:41-49, Fig. 6.

554. The POSA would understand that there are only two options when making the width of the grooves in the top wall different than the width of grooves in the bottom wall, per Yoon's teachings. EX10The POSA would understand that the two options are, to either (1) make the width of the grooves in the top wall larger than the width of grooves in the bottom wall, or (2) make the width of the grooves in the top wall smaller than the width of grooves in the bottom wall.

555. Thus, deciding which of the top or bottom grooves to make larger is merely a design choice as to the arrangement of the keying feature. Further, because there are only two options, the POSA would have found it obvious to try to have the width of the grooves in the top wall larger than the width of grooves in the bottom wall when implementing Yoon teachings into the Kanai/Saito combination.

556. Therefore, Kanai/Saito/Yoon renders "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width" obvious.

**12.c.2 "and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the**



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**opposing side walls along the width and between the first top wall and the first bottom wall along the height."**

557. As shown below, Kanai's adapter (modified in view of Saito and Yoon) is free of internal walls between a space for two optical connectors adjacent one another on the same side in the opening. This space free of internal walls in the opening is between the side walls along the width and between the first top and bottom walls along the height.

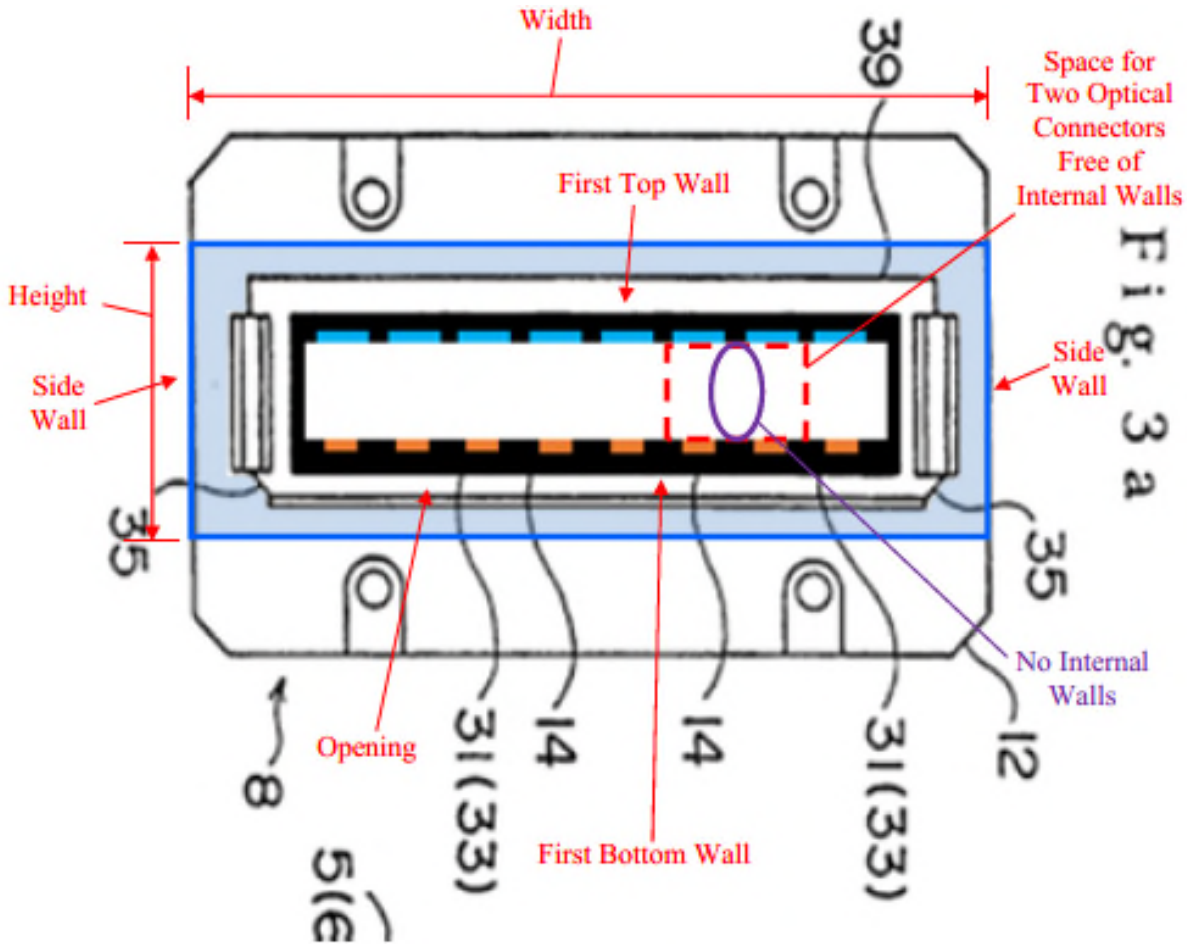



Fig. 3a

558. The first and second internal grooves are identified by Claim 12 as being part of the first top and first bottom walls, respectively. EX1001: 8:17-19.

As such, a POSA would consider the ribs of the Kanai/Saito/Yoon combination that define the grooves to be part of the respective walls—in the context of the claims of the ‘415 Patent.

559. Therefore, the Kanai/Saito/Yoon combination renders the limitation “and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height” obvious.

### D. Claim 13 – “The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors.”

560. As discussed throughout the specification of Kanai, the “connection end face (45) side of the respective optical connector groups (3) and (4) is inserted from both sides of the adapter (8) along guides (31) and (33) at both sides of the adapter (8).” EX1003, Abstract.

561. Those of skill in the art would recognize that the optical connectors (e.g. 3a to 3f and 4a to 4f) of optical connector groups (3) and (4) include optical ferrules (42). EX1003: 10:44-49 (“For example, differing from an optical connector in which a large-sized super multi-fiber ferrule is shown in FIGS. 11(a) and (b), the optical connectors 3 *a* to 3 *f* and 4 *a* to 4 *f* are excellent in view of

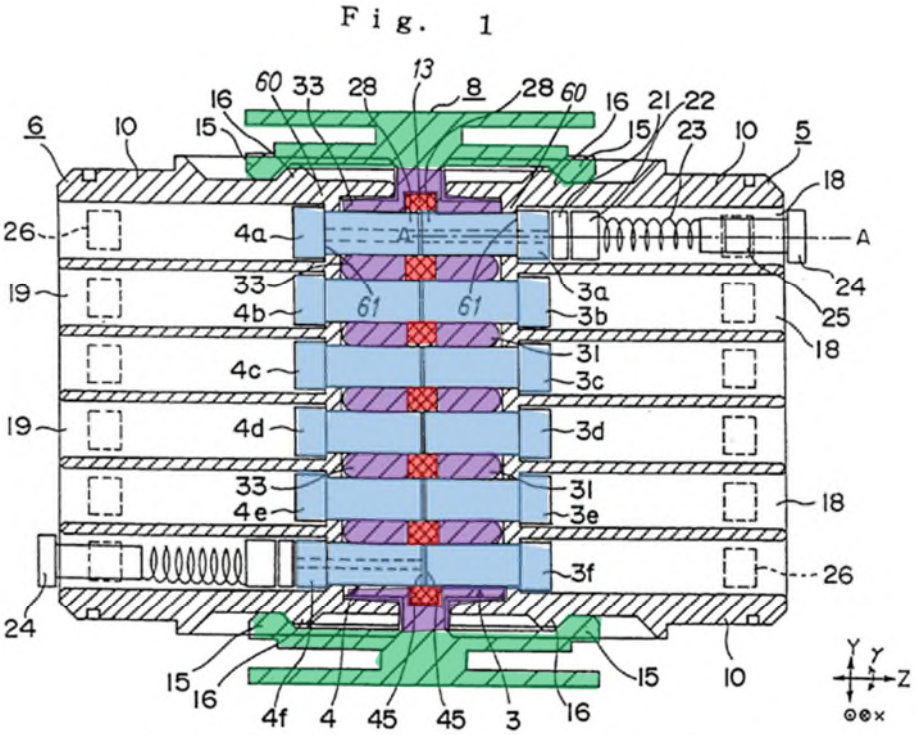


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moldability and mass productivity of multi-fiber ferrules 42 and attaching efficiency of optical fibers").

562. As disclosed in Kanai, each of the connector groups (3) and (4) consist of a plurality optical connectors/ferrules.

563. For example, the adapter depicted in Figure 1 of Kanai is configured to receive six optical connectors/ferrules (blue) from each side.




EX1003: Fig. 1 (annotated).

564. Therefore, the Kanai/Saito/Yoon combination renders "The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors" obvious.

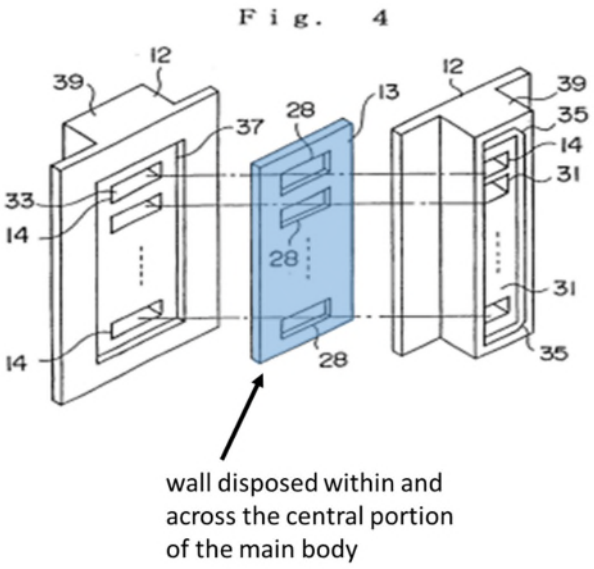
**E. Claim 14 – "The adapter according to claim 12, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

565. The adapter as disclosed by Kanai includes a metallic plate (13) between the two housing halves (12), with the two housing halves welded together by ultrasonic welding to form the housing. EX1003: 8:22-26 ("As shown in FIG. 1 and FIG. 4, the adapter 8 is constructed to have two housing halves 12 of almost the same shape and a metallic plate 13"); 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33.").

566. This metallic plate constitutes a wall disposed within and across the central portion of the main body and between the first side and the second side. EX1003: 8:22-26, Figs. 4 (annotated below).



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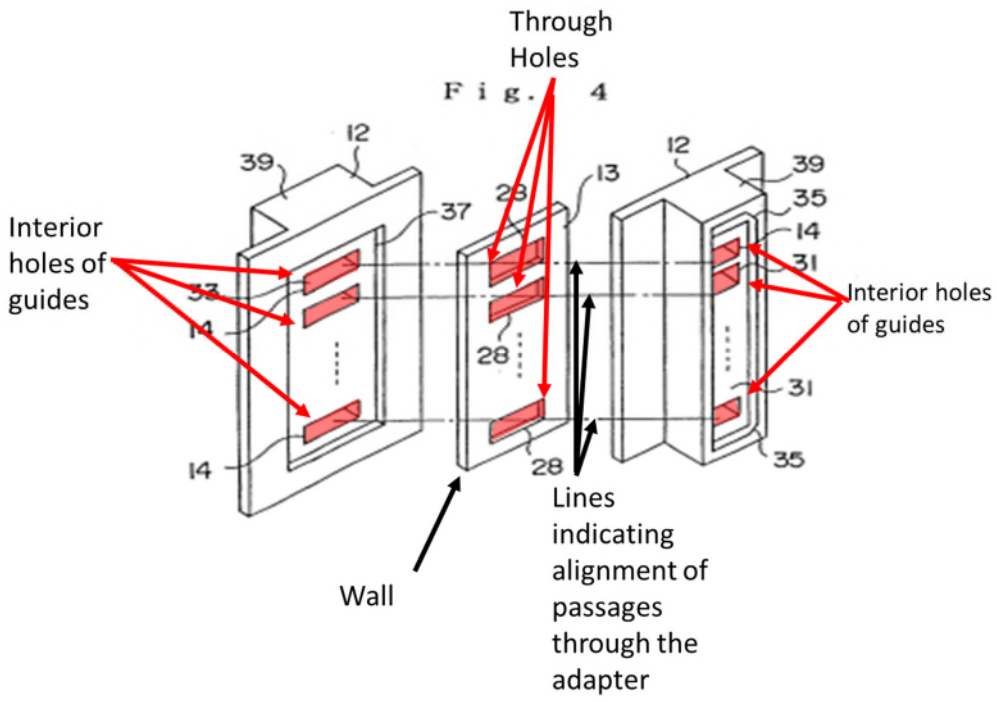



567. Although Kanai identifies the metallic plate (13) as being optional, Kanai identifies its inclusion as a preferred embodiment in that it serves the purpose of mitigating electromagnetic interference (EMI). EX1003: 11:21-50 (. . . it is preferable that the adapter 8 is formed so as to include a conductive material or to have a metallic plate 13, in order to prevent any erroneous operation in the other measurement instruments, computer, etc., resulting from leakage of the abovementioned electromagnetic waves").

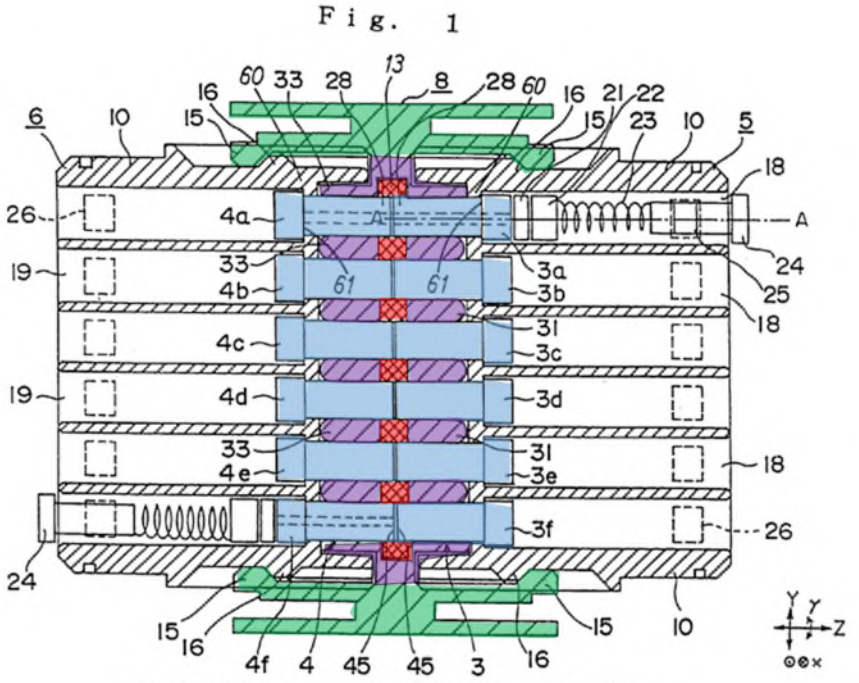
568. It was known within the art that EMI interference presents a known problem in electro-optical equipment deploying fiber optic interconnects. *See* EX1022: [0002]; EX1023: [0004] ("As the bandwidth and carrier frequencies increase, electromagnetic interference (EMI) becomes a more serious problem. Accordingly, control of EMI has arisen as an issue in optical connector system design.").

569. In modifying the Kanai adapter, those of skill in the art would have recognized that it would have still been desirable to maintain the metallic plate (13) as the metallic plate was included in Kanai for the purpose of providing EMI mitigation, and also serving as a central passageway for each half of the mated connector pair.

570. As disclosed by Kanai, the metallic plate (13) contains through holes (28) conforming to the profile of the ferrules for the opposing ferrules to pass into and mate. EX1003: 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33."); *see also* EX1003: Figs. 4 and 1 (annotated below).




EX1003: Fig. 4 (annotated).




EX1003: Fig. 1 (annotated).

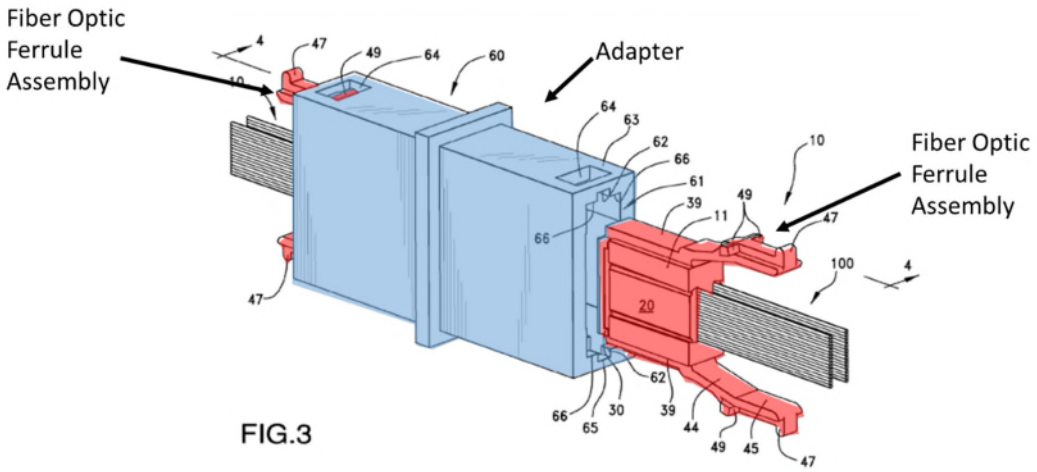
571. Incumbent to maintaining the metallic plate (13), those of skill in the art would likewise maintain the through holes (28) within the metallic plate (13) in conformance to the profile of the ferrules so as to allow the ferrules to mate at the central optical plane, while providing EMI mitigation.

572. Therefore, the Kanai/Saito/Yoon combination renders "The adapter according to claim 12, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the

wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough" obvious.

## OBVIOUSNESS: HODGE AND IWANO (GROUND 6)

573. Hodge teaches an adapter for connecting optical connector plugs. EX1009: [0041] ("Referring to Figs. 3-4, an adapter 60 is depicted with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion."), Fig. 3 (annotated below).

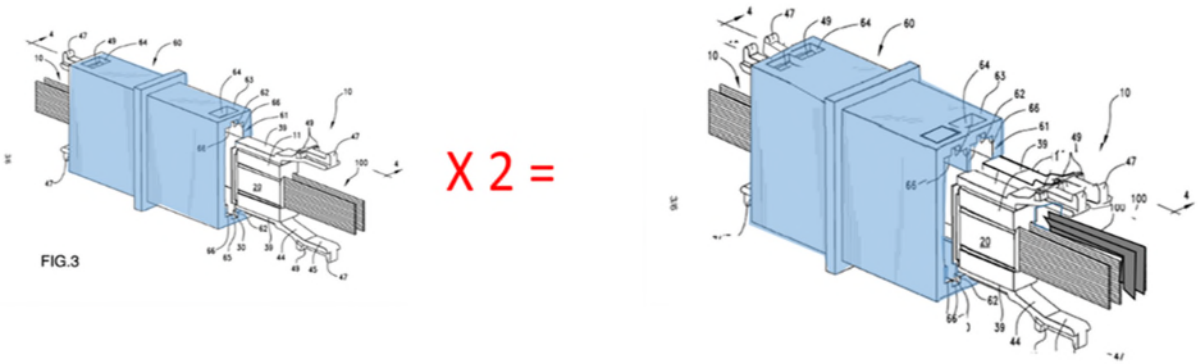



EX1009: Fig. 3 (annotated).

574. The adapter of Hodge meets every limitation of claims 1-5, 8-13, and 14 except that it only accepts one single-ferrule optical connector from each side.

575. It would have been obvious to expand Hodge's adapter (60) to receive multiple fiber optic connectors arranged in parallel to one another, similar to the SC quad adapter of Iwano.

576. The rendering below for example depicts the Hodge adapter modified to accept two fiber optic connectors arranged in parallel to one another from each side of the adapter.




EX1009: Fig. 3 (modified).

577. Similarly, an illustrative cross-section of the Hodge/Iwano combination taken through the central portion is depicted as follows:

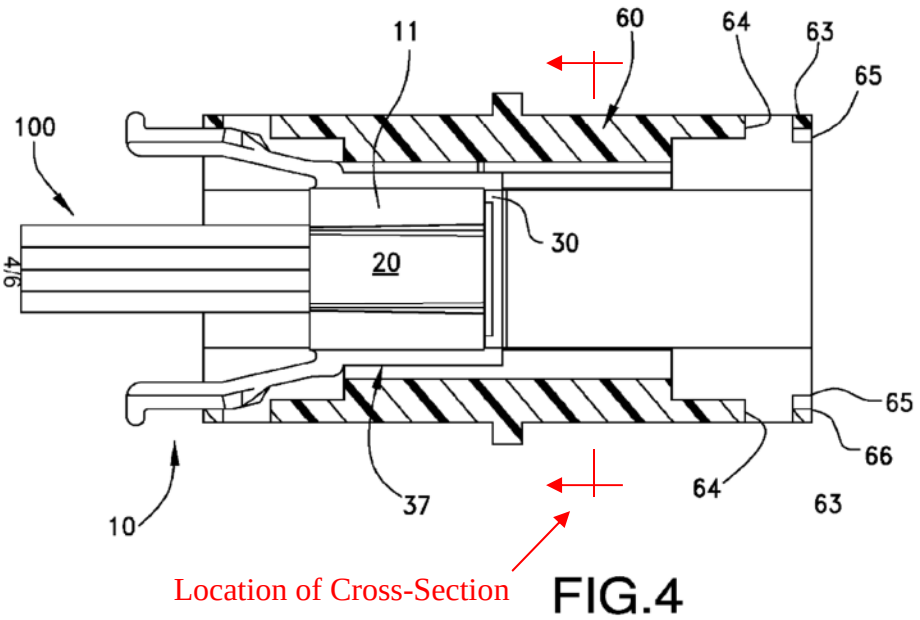
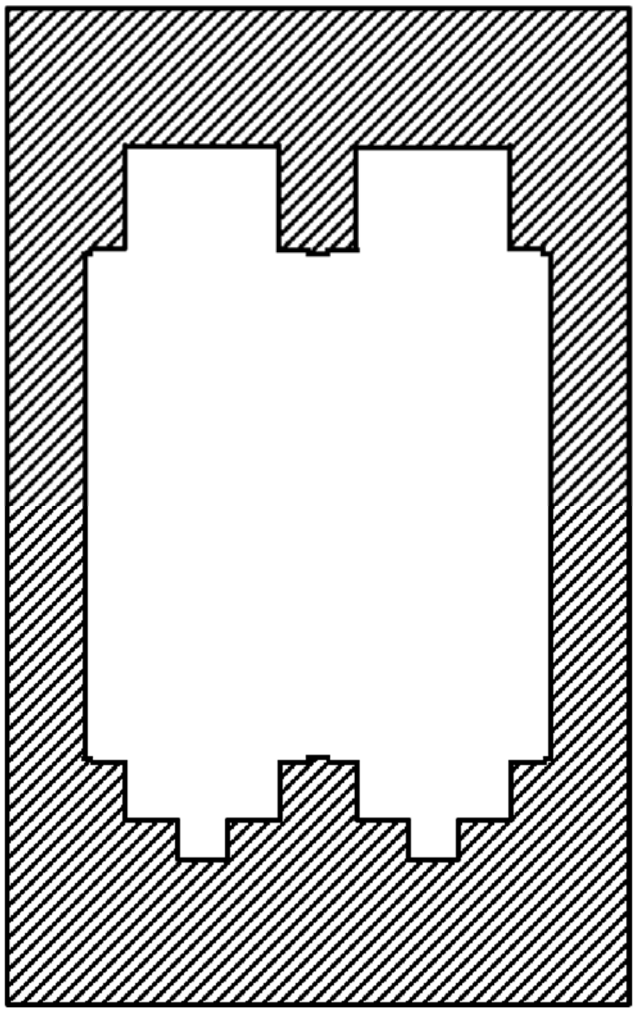



FIG.4

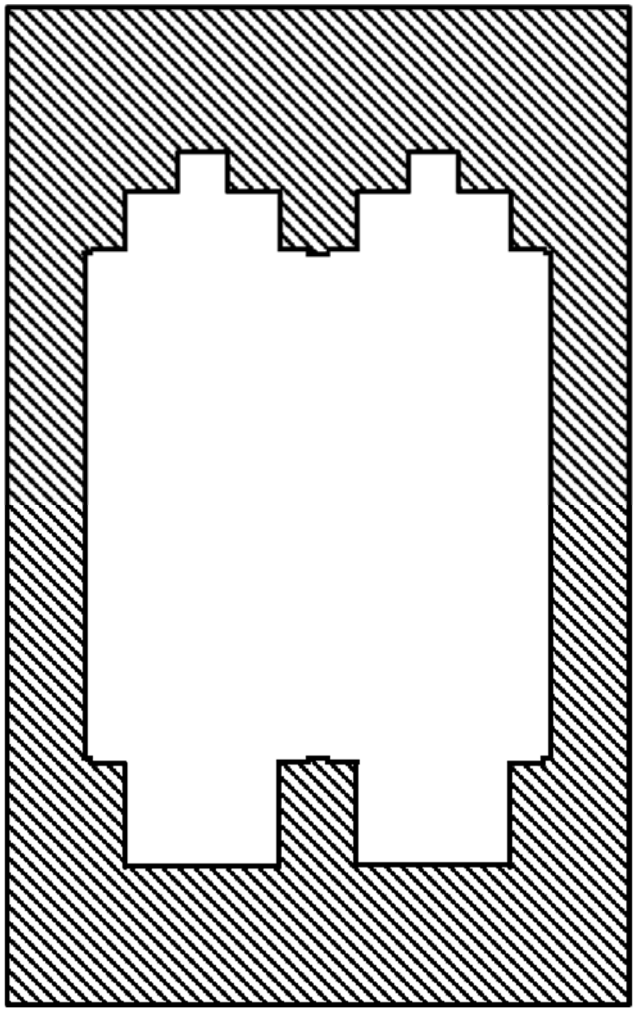
EX1009: Fig. 4 (annotated).



Cross-Section of Hodge/Iwano Combination (orientation of adapter shown in Fig. 3 of Hodge)



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Cross-Section of Hodge/Iwano Combination (orientation of adapter shown in *Fig. 4* of Hodge)[4]

**A. Motivation to Modify Hodge Based on Iwano**

578. Hodge discloses an adapter that only accepts one multi-fiber optical connector from each side.

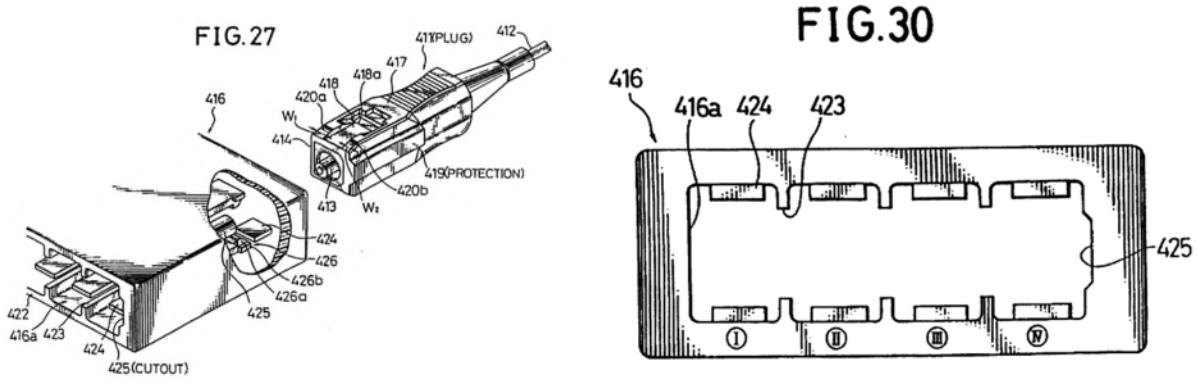
[4] As addressed above, the orientation of Hodge Figure 4 is upside down compared to Hodge Figure 3.



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579. Those of skill in the art would recognize that the industry has increasingly sought to increase fiber optic density, starting with duplex connectors for transceivers (2-fiber yoked connectors with a transmit and receive channel). and progressively by expanding adapters to receive multiple fiber optic connectors from each side, such as quad and 8-pack adapters for instruments and patch panels.

580. For example, Iwano teaches an adapter that accepts a plurality of fiber optic connector assemblies to achieve increased density. EX1006: 28:60-63 ("when a higher mounting density is required for the ordinary single core optical connector, a method of using an adapter is known to simultaneously couple a plularity [*sic*] of plugs"); see e.g. EX1006: Figs. 27 & 30 (reproduced below).




EX1006: Figs. 27 & 30.

581. It would have been obvious to expand Hodge's adapter (60) to receive multiple fiber optic connectors (e.g., ferrule assemblies (10)) arranged in parallel to one another, similar to the SC quad adapter of Iwano.

582. Notably, Hodge and Iwano disclosed different styles of ferrule and connectors (an expanded beam, multi-fiber ferrule for Hodge and a ceramic ferruled, SC connector per Fig. 27 for Iwano). This difference in styles of ferrule would have been of little consequence in terms of providing the motivation to expand the adapter of Hodge because it was also known in the art to stack and gang multiple MT ferrules, as for example taught by Saito. *See e.g.*, EX1004: Figs. 21, 22.

FIG. 21

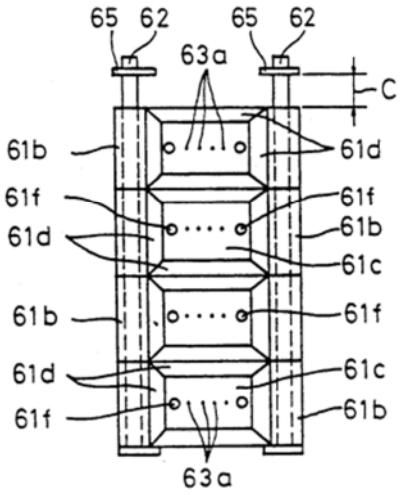
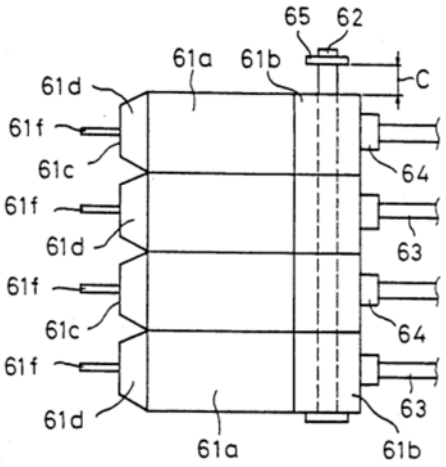



FIG. 22




EX1004: Figs. 21, 22.

583. Those skilled in the art would recognize that the fiber optic ferrule assembly and corresponding adaptor of Hodge provide a secure alignment and connection of the fiber optic connectors within the adapter.

584. As will be discussed further below, this secure alignment and connection is achieved through certain internal structures of the Hodge adapter—



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specifically the internal structures for receiving the fiber optic connector's forward section (39), alignment projections (48), and engagement section (49)—by guiding the ferrule into the correct positioning and providing for latching the fiber optic connector into the adapter.

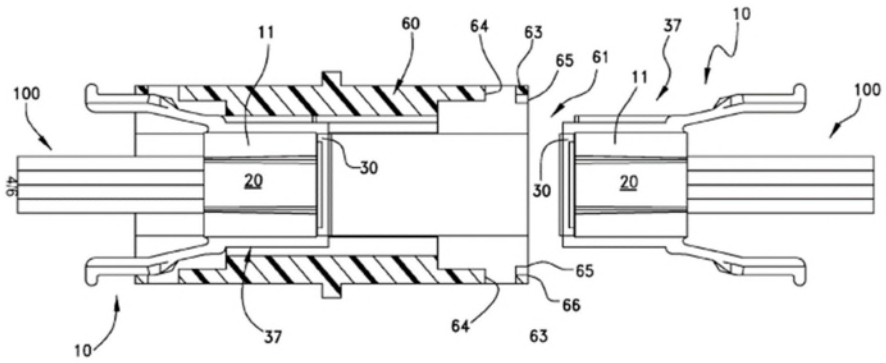



FIG.4

EX1009: Fig. 4.

585. In modifying the Hodge adaptor to accept a plurality of fiber optic connectors, one of skill in the art would be motivated to duplicate these internal structures for each of the fiber optic connectors.

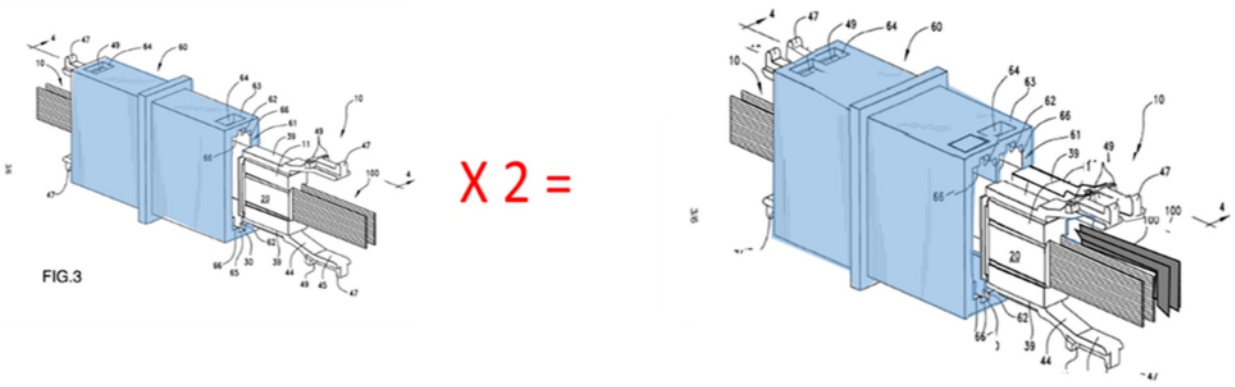
586. As described by Iwano, one of skill in the art would recognize that in expanding the Hodge adapter to a multi-connector adapter, the partitions between the individual optical connectors (within the multi-connector adapter) would be limited to ribs in order to achieve the highest density and reduce cost. EX1006: 28:65-29:5 ("… each partition wall 423 for partitioning two adjacent insertion

holes 422 is cut away to minimize the mounting pitch, so that two adjacent insertion holes 422 are connected to each other as shown").

587. One of skill in the art would have an expectation of success in modifying the Hodge adapter to receive multiple fiber optic connectors and to minimize the mounting pitch and maximize the mounting density as taught by Iwano.

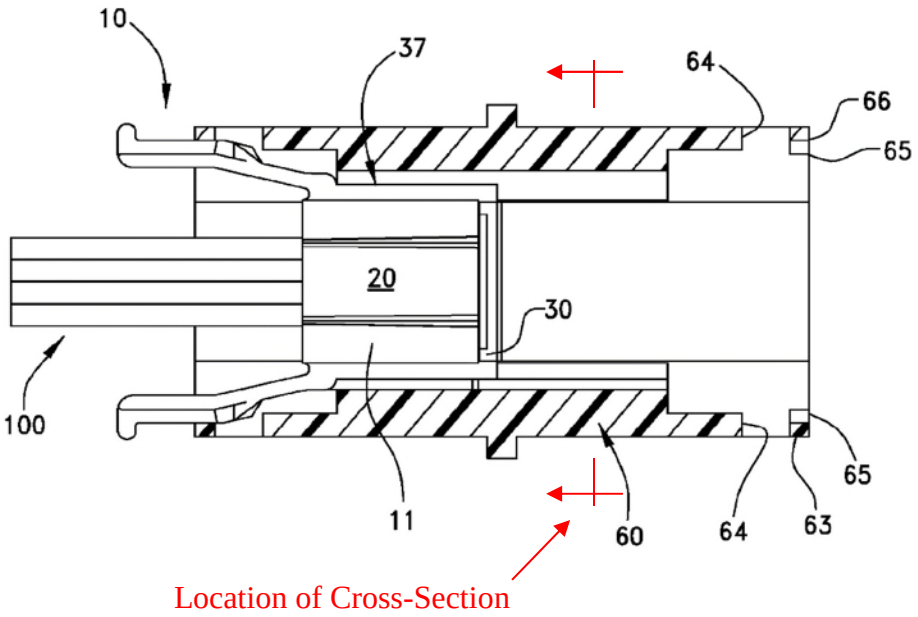
588. For example, both Hodge and Iwano use grooves in the top and bottom surfaces of the adapter to receive and engage corresponding projections in the top and bottom surfaces of the optical connector.

589. This modification of Hodge in further view of Iwano is demonstrated below.

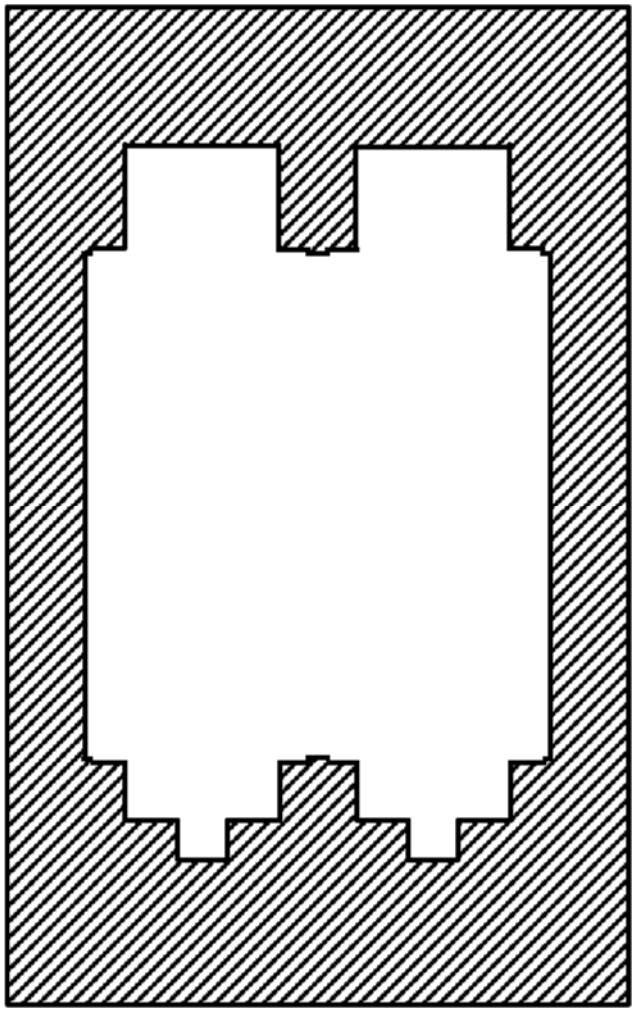



EX1009: Fig. 3 (annotated and modified to demonstrate a Hodge adapter modified to receive two ferrule assemblies (10)); EXPERT DEC.

590. An illustrative cross-section of the Hodge/Iwano combination taken through the central portion is illustated below. EXPERT DEC.




EX1009: Fig. 4 (annotated, flipped).



Cross-Section of Hodge/Iwano Combination
(orientation as shown in Hodge *Fig. 3*)



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## B. Independent Claim 1

### 1.P "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising:"

591. Hodge discloses an "adapter" receiving, holding, and aligning ferrule assemblies from opposite first and second sides.

592. For example, Figures 3 and 4 of Hodge depict an adapter (60) "with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion." EX1009: ¶[0041]; Figs. 3 and 4 (annotated below).

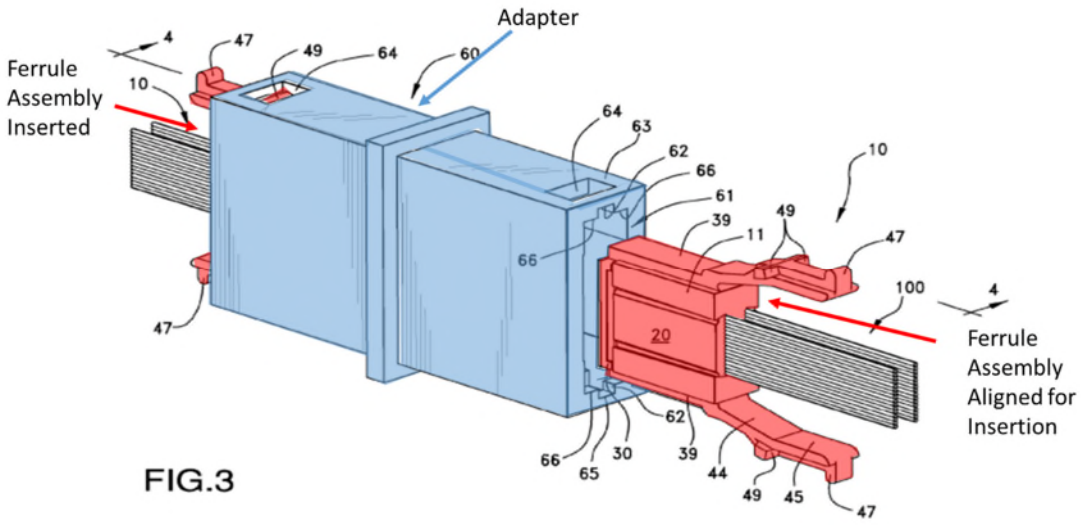


FIG.3

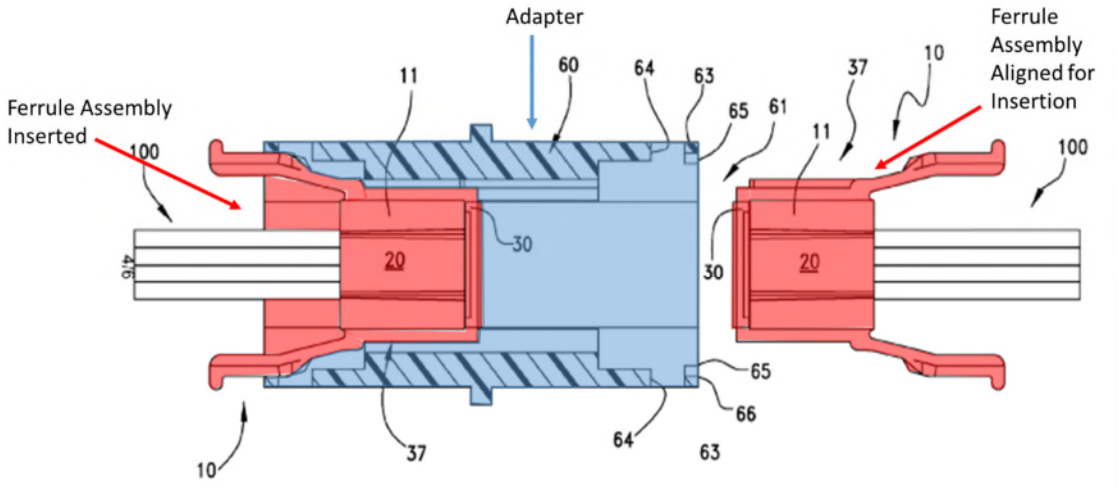


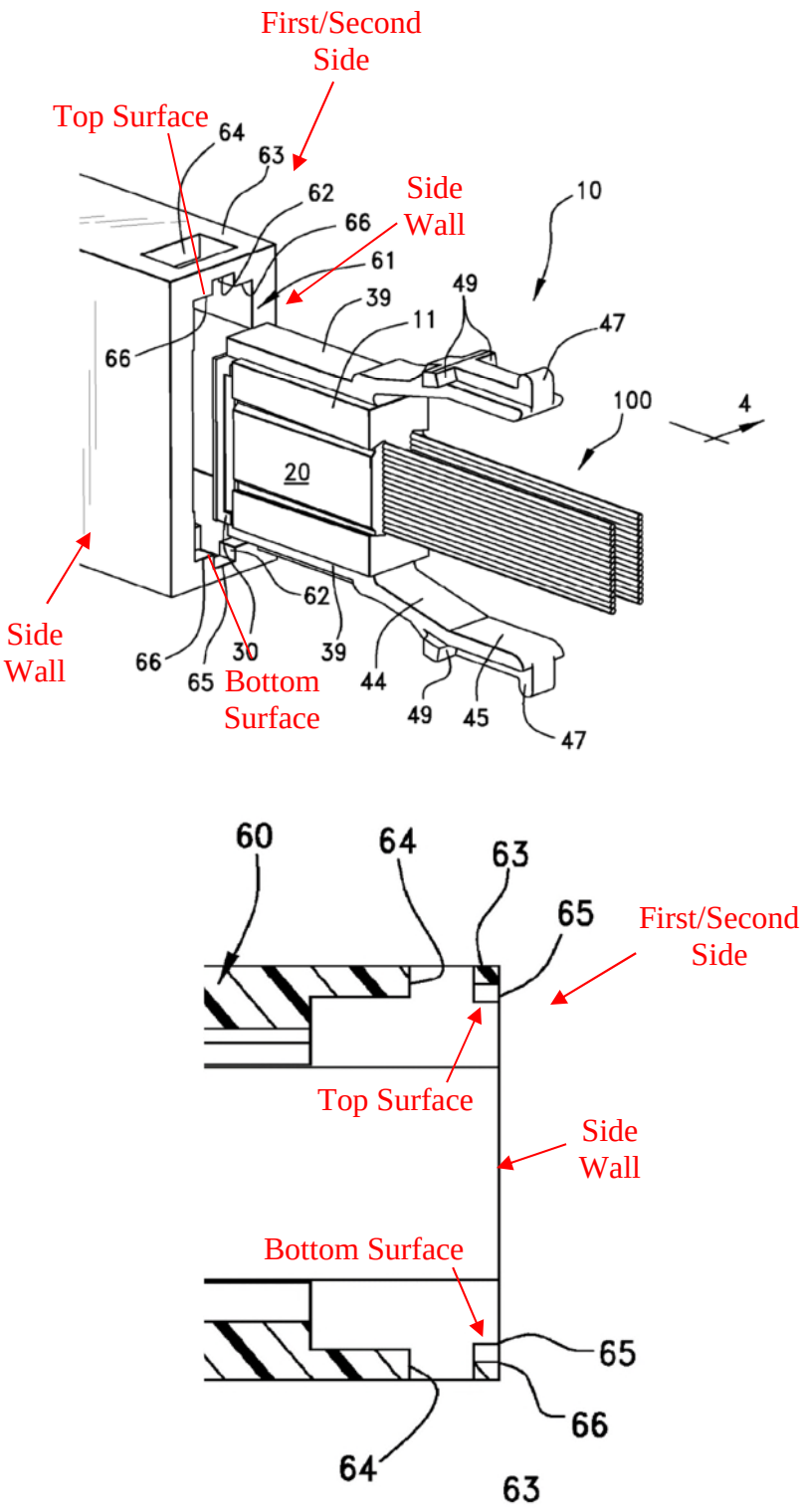

FIG.4

EX1009: Figs. 3 & 4 (annotated).

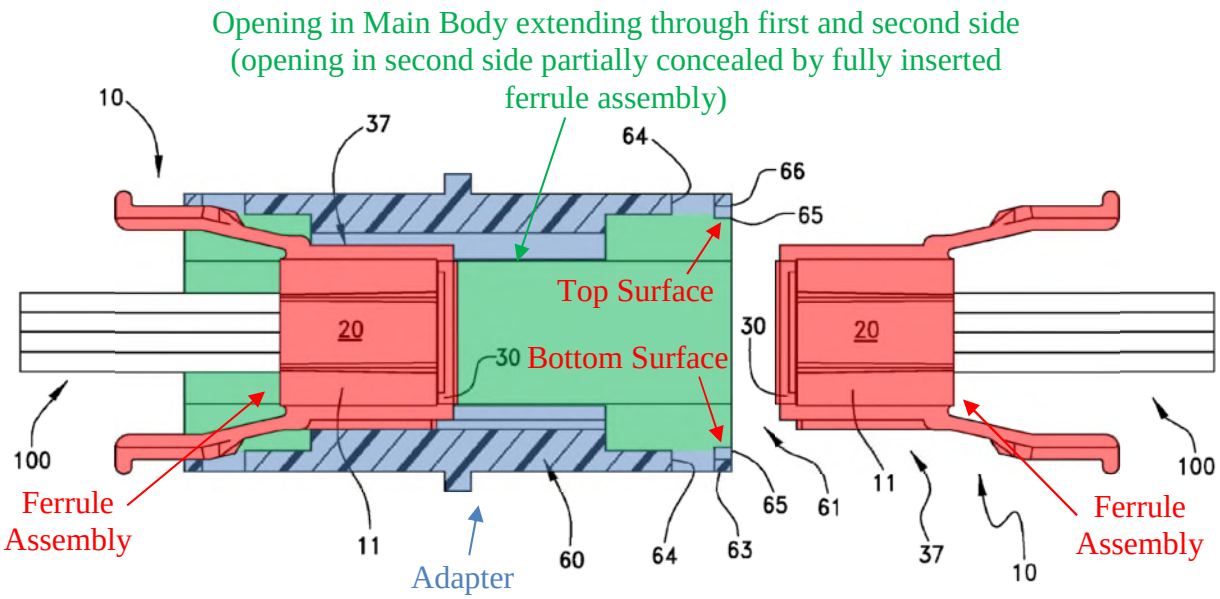
593. Accordingly, the adapter as disclosed by Hodge would meet the preamble of Claim 1: "An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side."

**1.a.1 "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface"**

594. The adapter as disclosed by Hodge has a main body with an opening (61) (green in the annotated figures below) from each side for receiving the ferrule assemblies. *See* EX1009*:* [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."); Figs. 3 & 4 (annotated below).




EX1009: Figs. 3 and 4 (annotated).



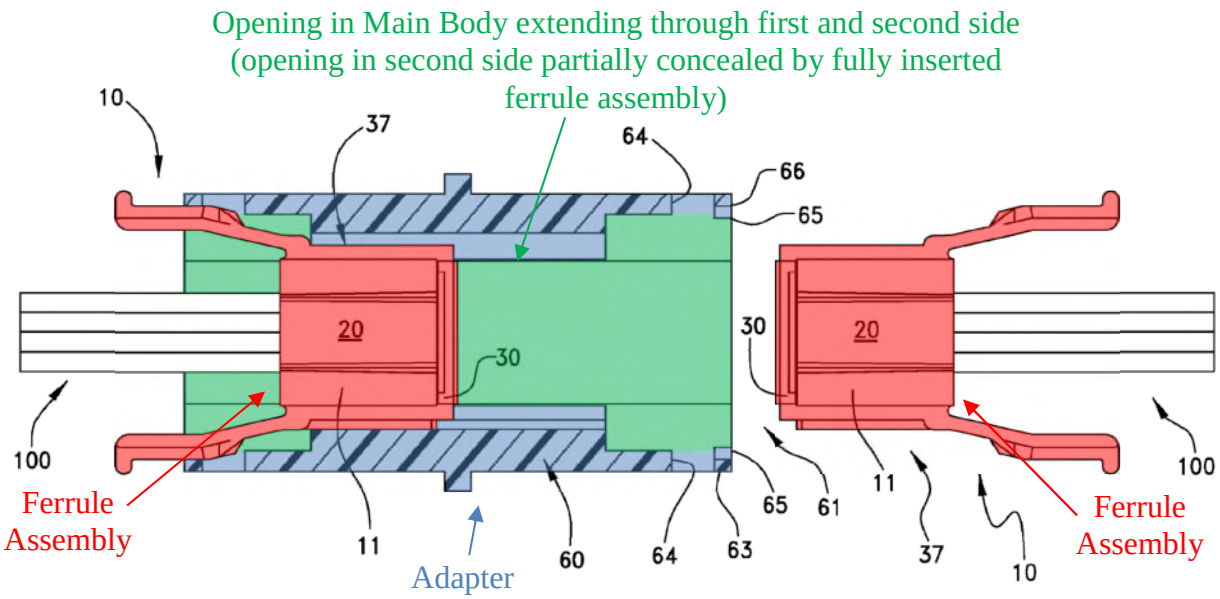

EX1009: Fig. 4 (annotated, flipped).

595. As shown in Figure 4 above, the opening is defined by two opposing side walls, a top surface, and a bottom surface.

596. Therefore, Hodge's adapter meets the "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface" limitation.

### 1.a.2 "the opening extending between the first side and the second side"

597. As shown in Figure 4, the opening of the Hodge adapter extends through the main body from the first side to the second side. EX1009: Fig. 4 (annotated).




EX1009: Fig. 4 (annotated, flipped).

598. The adapter as disclosed by Hodge would meet the limitation of "the opening extending between the first side and the second side."

**1.a.3 "having a central portion therebetween"**

599. The Hodge adapter as depicted in Figure 4 (annotated below) has an initial opening height at each side (indicated in red) and then has an internal step within the adapter to a shorter opening height at a distance interior to both the first side and the second side (indicated in blue) that would clear the rearward latch arms (40), thus defining a center portion of the adapter separating the first side and the second side. EX1009: Fig. 4 (annotated below).

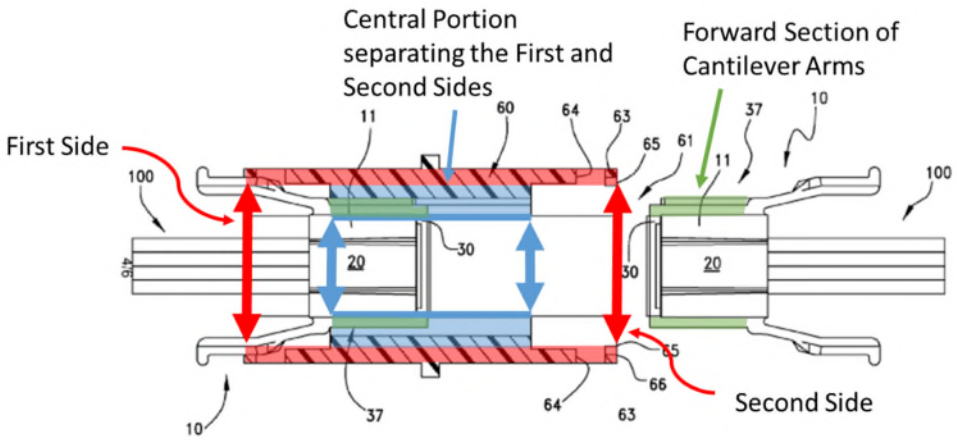



FIG.4

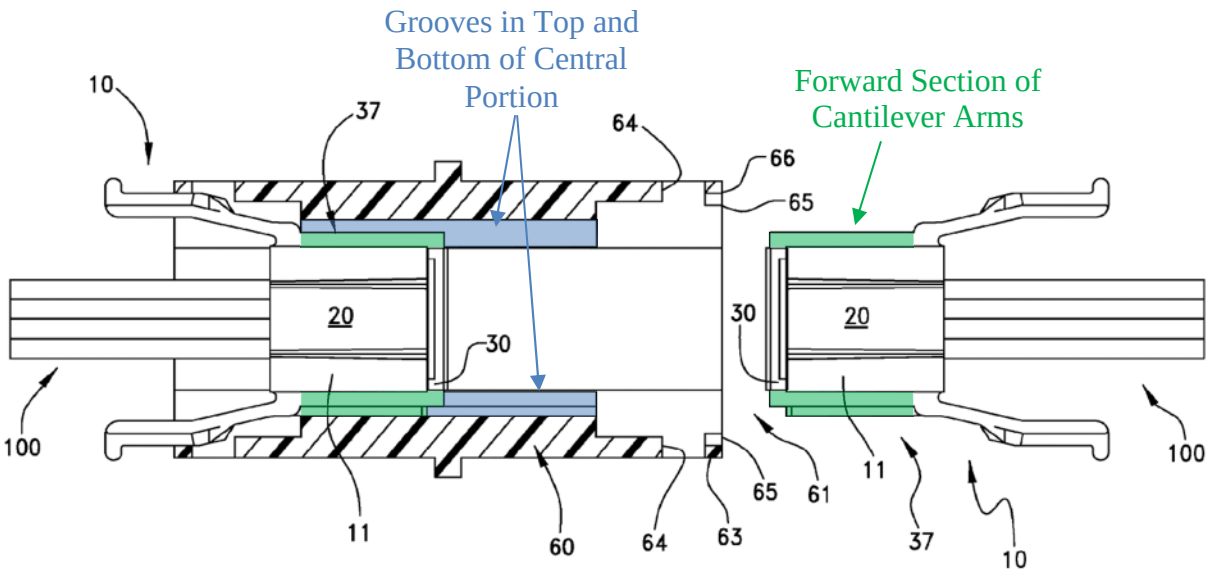
EX1009: Fig. 4 (annotated).

600. Accordingly, the adapter as disclosed by Hodge would meet the limitation of "having a central portion therebetween."

**1.b.1 "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion"**

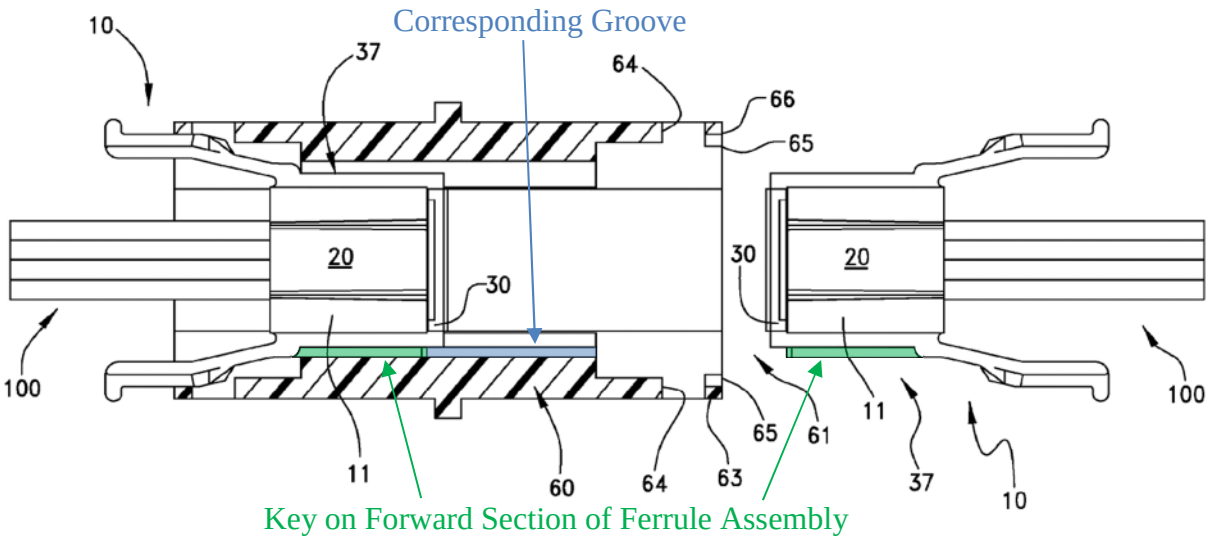
601. Although not described within the specification, those of skill in the art would recognize that the stepped up bottom surface and stepped down top surface of the center portion provides ledges to engage the sidewalls (14) of the ferrule body and includes alignment slots (i.e., grooves) to receive the forward sections (39) of the cantilever arms (37) (green in the annotated Figure 4 below).

EX1009: Fig. 4 (annotated below).

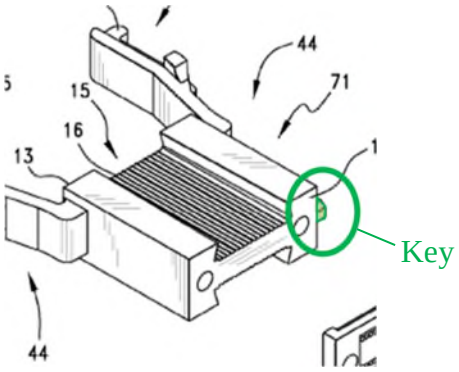



EX1009: Fig. 4 (annotated, flipped).

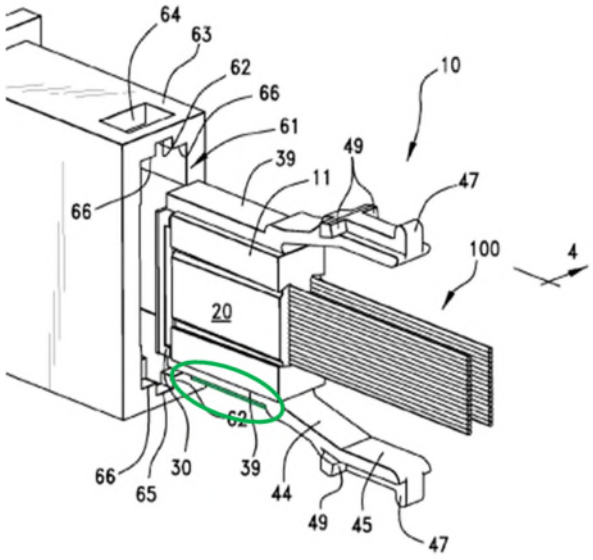
602. Additionally, the Hodge adapter contains a groove within a groove at the bottom of its central portion so as to receive a key (not numbered) on the forward section (39) of the cantilevered arm (37) forming one side of the ferrule assembly. Although not specifically called out in the specification, the key is depicted in Figures 3, 4, and 6 (annotated below) on the forward section (39) of the cantilevered arm (37) forming one side of the ferrule assembly.




EX1009: Fig. 4 (annotated, flipped).




EX1009: Fig. 6 (annotated).

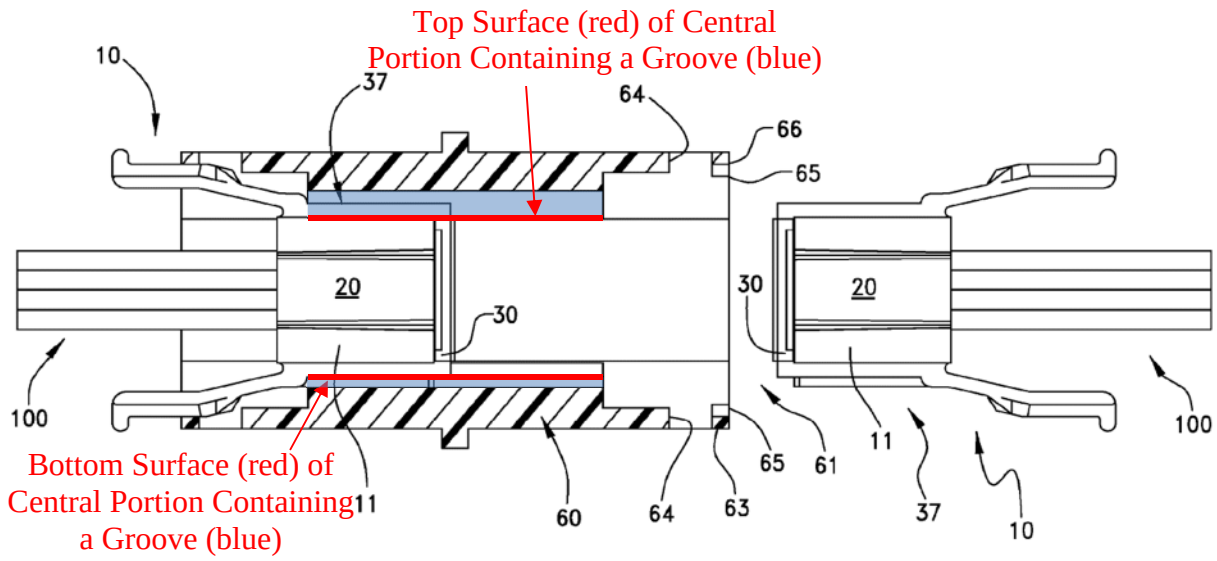



EX1009: Fig. 3 (annotated).

603. Figure 4 depicts a corresponding key-way groove in the bottom surface of central portion of the adapter.

604. Despite not being discussed in the specification, one of skill in the art would recognize that the projection acts as a key to ensure the correct orientation of the ferrule assembly (10) within the adapter. Such keys and key-way grooves were well known in the art. *See .e.g*. US5159652: 4:25-29 (identifying a "key" and "keyway"), Figs. 2 and 3 (demonstrating a matching key and keyway in an optical connector).

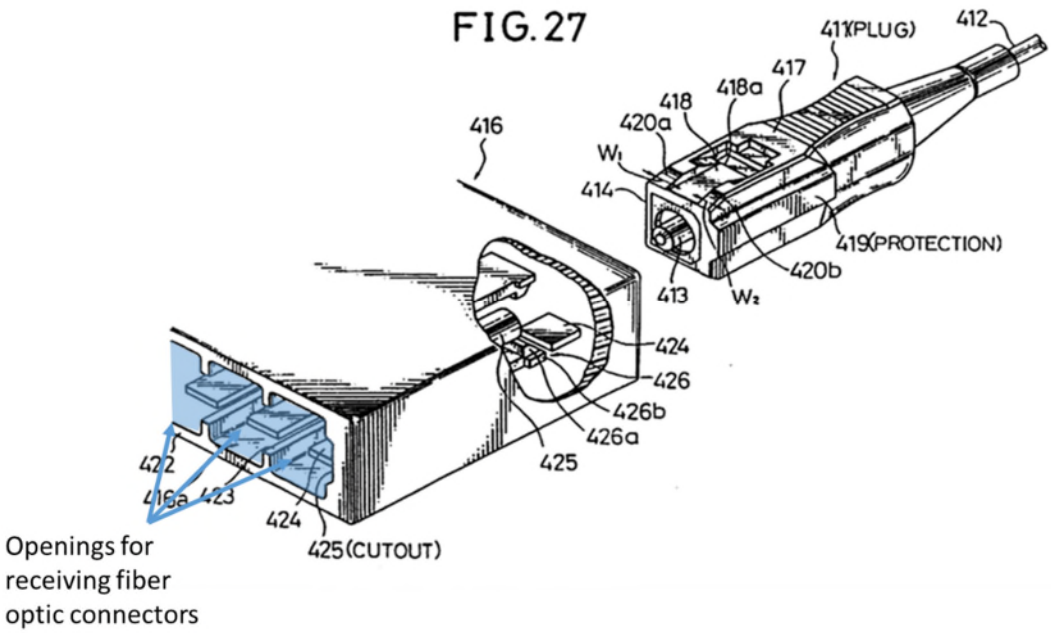
605. Accordingly, the Hodge adapter as depicted in Figure 4 (annotated below) has grooves (blue) on a top surface and the bottom surface of the central portion of the adapter (red). EX1009: Fig. 4 (annotated below).



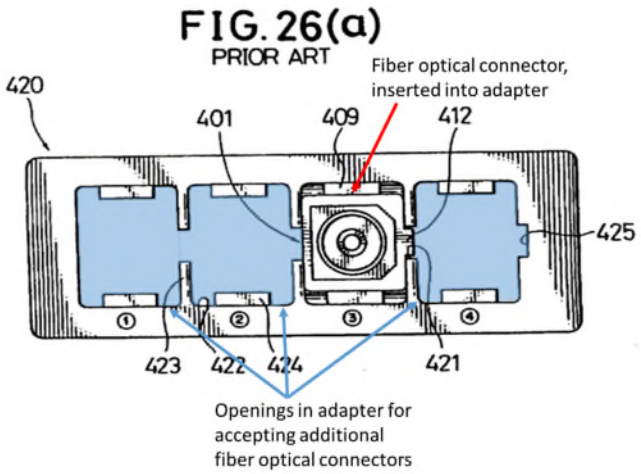

EX1009: Fig. 4 (annotated, flipped).

606. Although Hodge discloses an adapter that only accepts a single ferrule assembly from each side, those of skill in the art would recognize that the industry has increasingly sought to increase fiber optic density, including the use of adapters that receive multiple optical connectors in close proximity to one another.

607. For example, Iwano teaches the use of adapters that receive a plurality of optical connectors. EX1006: 28:64 - 29:5 ("FIGS. 26(a) and (b) show a connector housing 420 to which a plurality of optical connector plugs 401 are fitted. In this case, … each partition wall 423 for partitioning two adjacent insertion holes 422 is cut away to minimize the mounting pitch, so that two adjacent insertion holes 422 are connected to each other as shown."); *see also* Figures 26(a) and 26(b) (identified as prior art), 27, 30. and 31(a).




EX1006: Fig. 27 (annotated).




EX1006: Fig. 26(a) (annotated).

608. It would have been obvious to modify the adapter disclosed in Hodge to accept additional fiber optic connectors.

609. In modifying Hodge to accept a plurality of fiber optic connectors, one of skill in the art would have duplicated the grooves in the top and bottom surfaces of central portion of the adapter such that each ferrule assembly would have a corresponding groove to accept the forward section (39) of the cantilever arms (37) of each ferrule assembly.

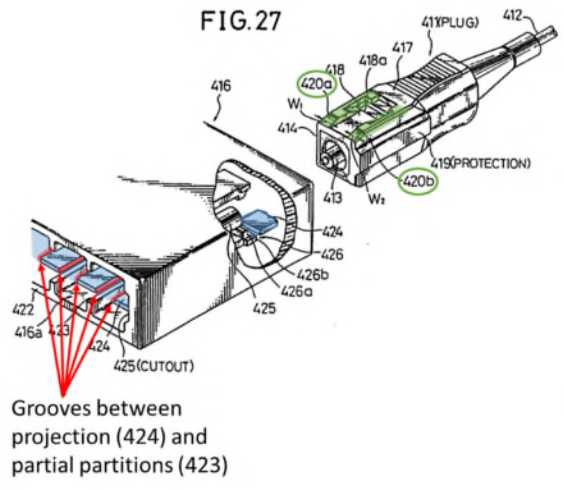
610. This duplication would result in plurality of grooves disposed in the bottom surface of the central portion of the adapter. This modification would allow forward section (39) of the cantilever arms (37) and corresponding grooves to continue to act as guides.

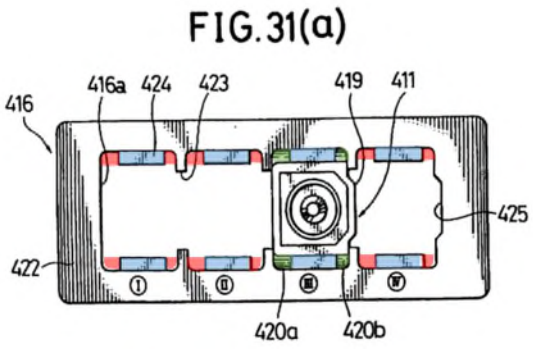
611. In modifying Hodge to accept a plurality of fiber optic connector pairs, one of skill in the art would have also duplicated the groove in the top of central portion that accepts the projection/key on the forward section (39) for each of the multiple ferrule assemblies.

612. The duplication of grooves for each ferrule is precisely how the adapter disclosed by Iwano operates.

613. With reference to the Figures 27 and 31 reproduced below, Iwano discloses an adapter with projections (424) (blue in the annotated figures below) set interior of the opening in the face of the adapter. EX1006: 29:12-19 (“FIG. 26(a) shows a state where an optical connector plug 401 is engaged with the above-mentioned connector housing 420, in which the optical connector plug 401

is fitted to the connector housing 420 by engaging two grooves 409 and a single projection 412 formed in the side surfaces of the optical connector plug 401 with two engage members 424 and a single groove 425 formed in the inner surfaces of the connector housing 420."), Figs. 27 and 31 (annotated below).

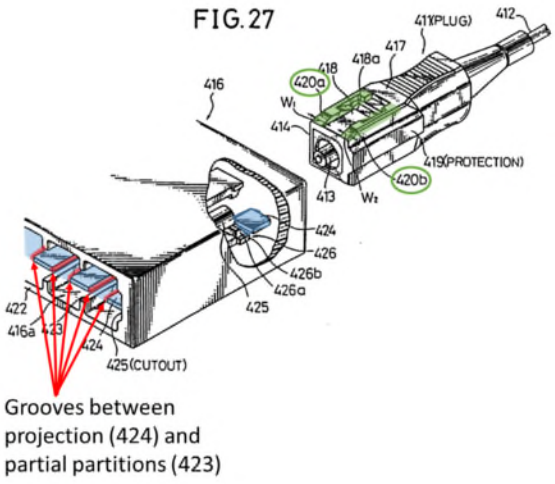


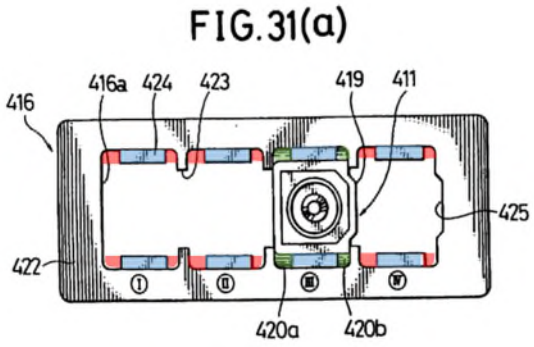




EX1006: Figs. 27 and 31(a).

614. One of skill in the art would recognize that in the context of the claims of the '415 patent, the projections (424) would thus constitute a "central portion" of the adapter that separate the first and the second sides of the adapter.

615. One of skill in the art would further recognize that there are grooves (red in the figures below) between partition (423) and projection (424) that are configured to receive corresponding projections (420a and 420b) (green in the figures below) of the optical connector plugs. EX1006: Figs. 27 and 31 (annotated below).



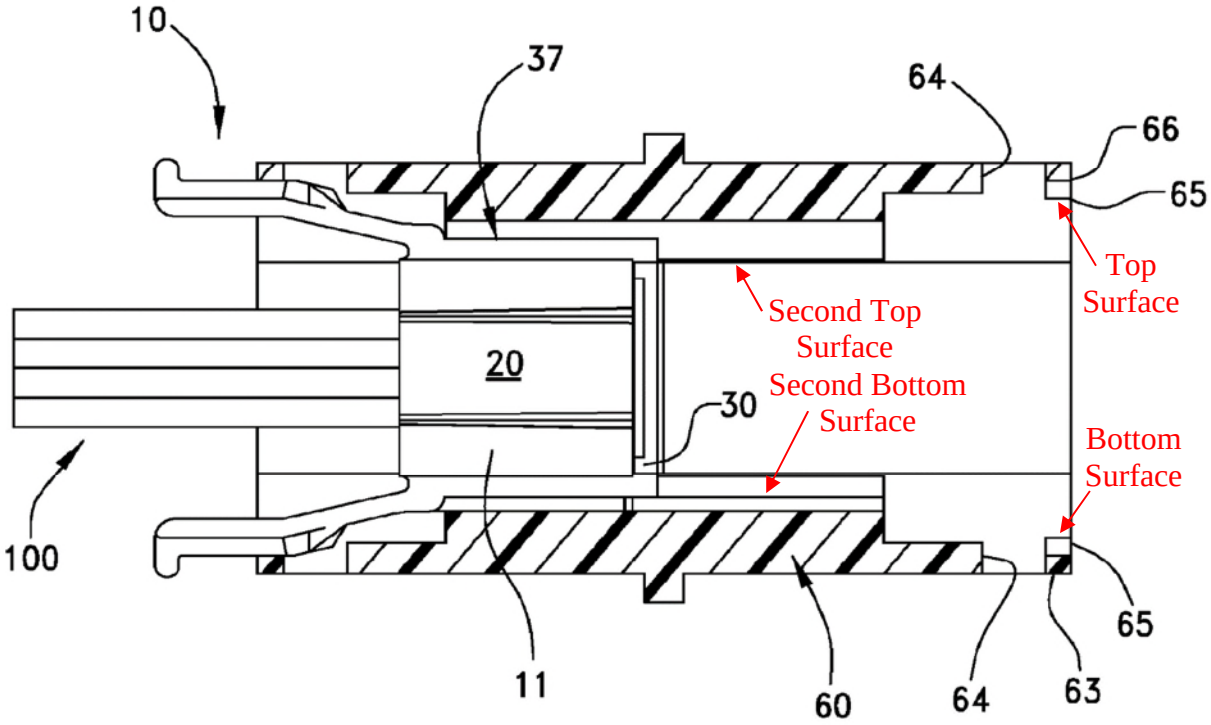




EX1006: Figs. 27 and 31(a).

616. Accordingly, the Hodge/Iwano combination renders the limitation of "a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion" obvious.

### 1.b.2 "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body"

617. As shown below, the second top surface and the second bottom surface of the central portion are different than the top surface and the bottom surface in Hodge's adapter (60):

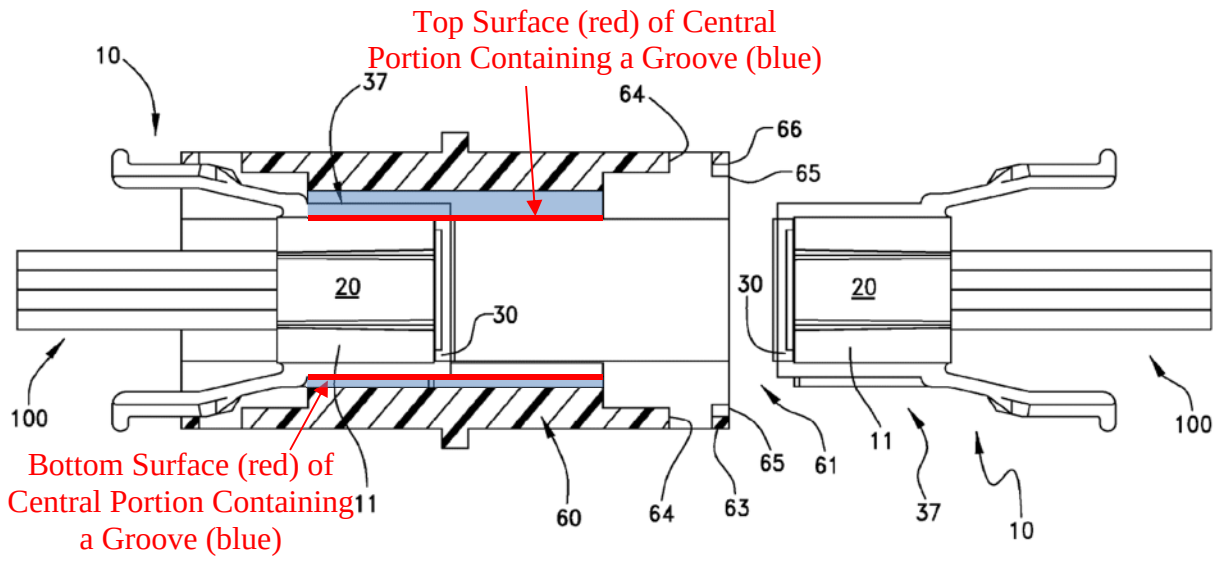



EX1009: Fig. 4 (annotated and flipped).

618. Therefore, the Hodge/Iwano combination renders the limitation of "the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body" obvious.

### 1.b.3 "each of the plurality of grooves extending toward a center of the main body."

619. As depicted in Figure 4 below, the groove (blue) in the second top surface of central portion of the Hodge and the groove (blue) in the second bottom surface of Hodge each extend into the central portion from the first side and from the second side toward the center of the adapter's (60) main body.




EX1009: Fig. 4 (annotated and flipped).

620. It would have been obvious that in duplicating the groove in the second top surface of the central portion and the groove in the second bottom surface of the central portion as taught by Iwano, that the added grooves would likewise extended into the central portion from the first side and from the second side.

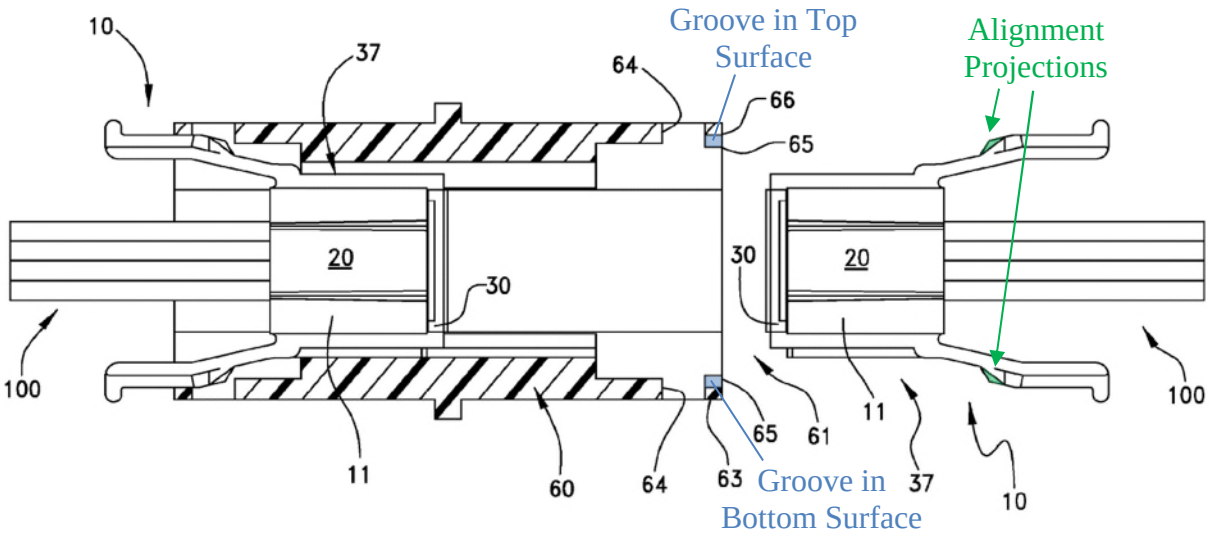
621. Accordingly, the Hodge-Iwano combination renders the limitation "each of the plurality of grooves extending toward a center of the main body" obvious.

### C. Claim 2 – "The adapter according to claim 1, further comprising a groove in one of the top surface and the bottom surface."

622. The Hodge adapter as depicted in Figure 4 (annotated below) has "[a] notch or recess 62 extend[ing] outwardly from the opening 61 towards each end wall 63." EX1009: ¶[0041].

623. These notch or recess (62) are described in Hodge's specification as being "configured to receive the alignment projections 48 of the latch member 46 to align the ferrule assembly 10 with the adapter 60 during mating," and thus meet the description of claimed grooves in the '415 Patent. EX1009: ¶[0041].

624. Further as depicted in Figure 3 of Hodge, these grooves are located at both the top surface and the bottom surface of the main body. As shown below, both these grooves extend in a direction from the first side to the second side.




EX1009: Fig. 4 (annotated, flipped).

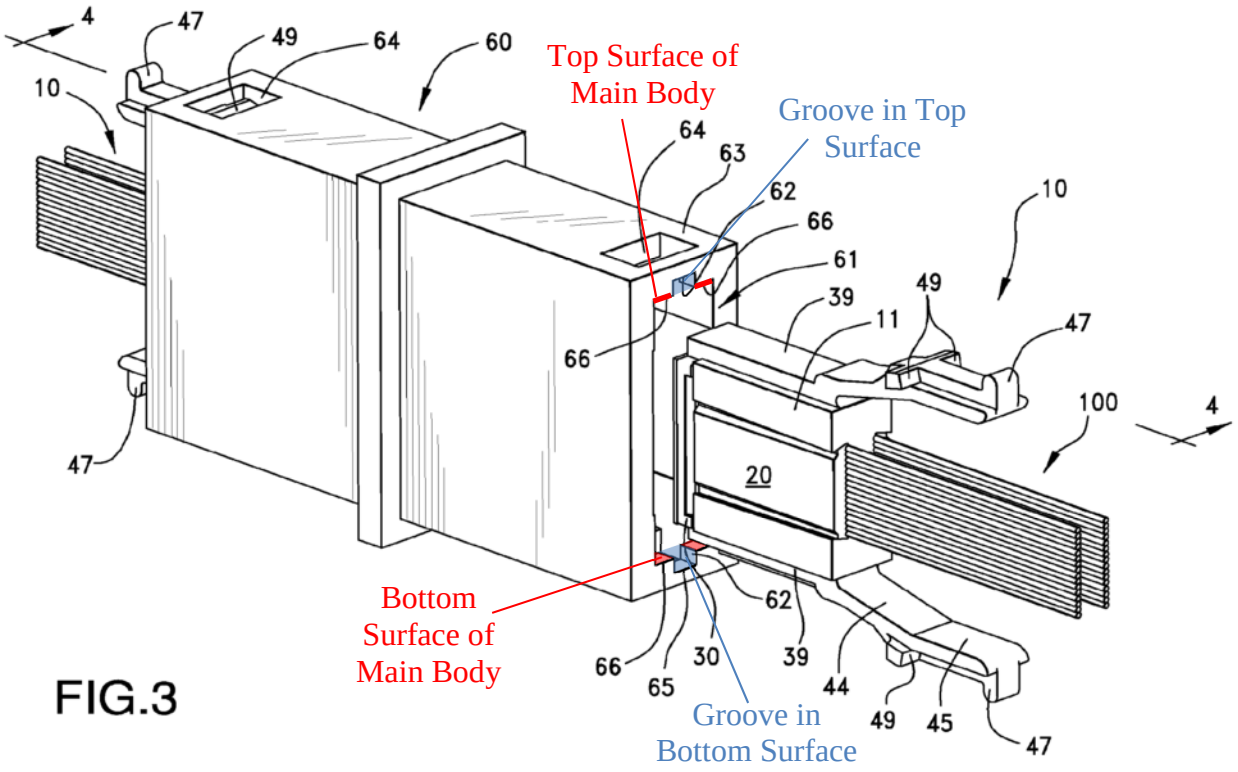



FIG.3

EX1009: Fig. 2 (excerpted and annotated).

625. Therefore, Hodge's adapter meets the additional limitation of "[t]he adapter . . . comprising a groove in one of the top surface and the bottom surface."

**D. Claim 3 – "The adapter according to claim 1, further comprising a groove in each of the top and the bottom surfaces."**

626. As discussed with respect to Claim 2 immediately above, Hodge's adapter meets the additional limitation of "[t]he adapter . . . comprising a groove in each of the top and bottom surfaces."

### E. Claim 4 – "The adapter according to claim 1, wherein the opening is smaller in the center of the main body than on the first side and second side."

627. The adapter as disclosed by Hodge has a main body with an opening (61) from each side for receiving the ferrule assemblies. *See* EX1009: [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."), Figs. 3 and 4 (annotated below).

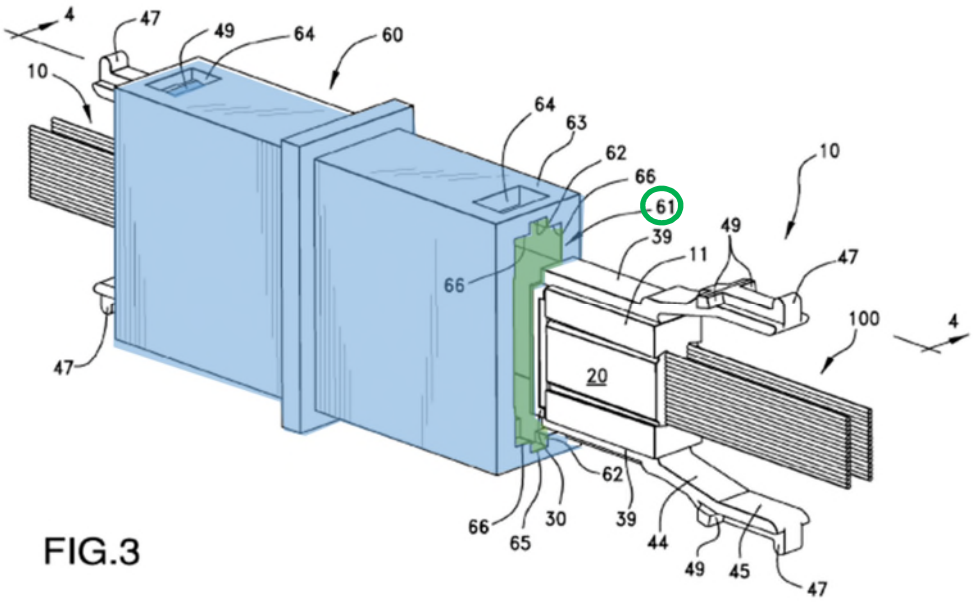


FIG.3

EX1009: Fig. 3 (annotated).

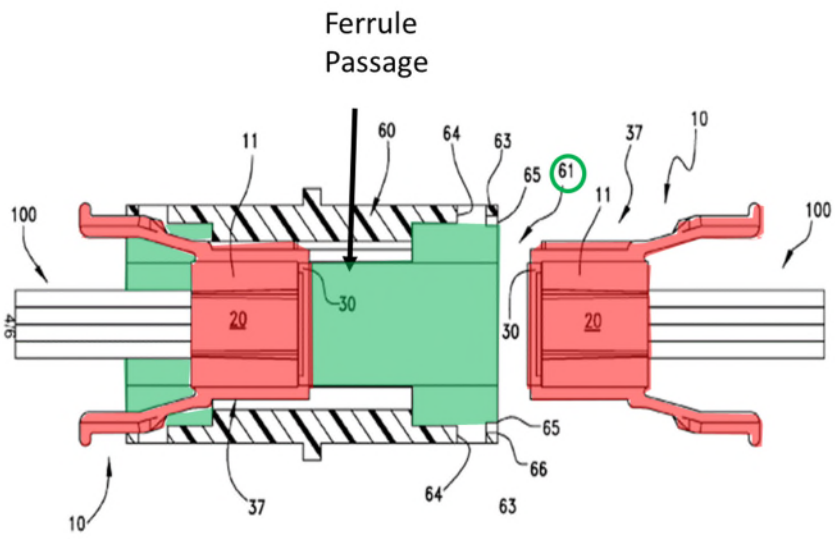



FIG.4

EX1009: Fig. 4 (annotated).

628. As depicted in Figure 4 (annotated below) the adapter has an initial opening height at each side and then has an internal step within the adapter to a shorter opening height at a distance interior to both the first side and the second side that would clear the latch arms (40). *See* EX1009: Fig. 4 (annotated below)

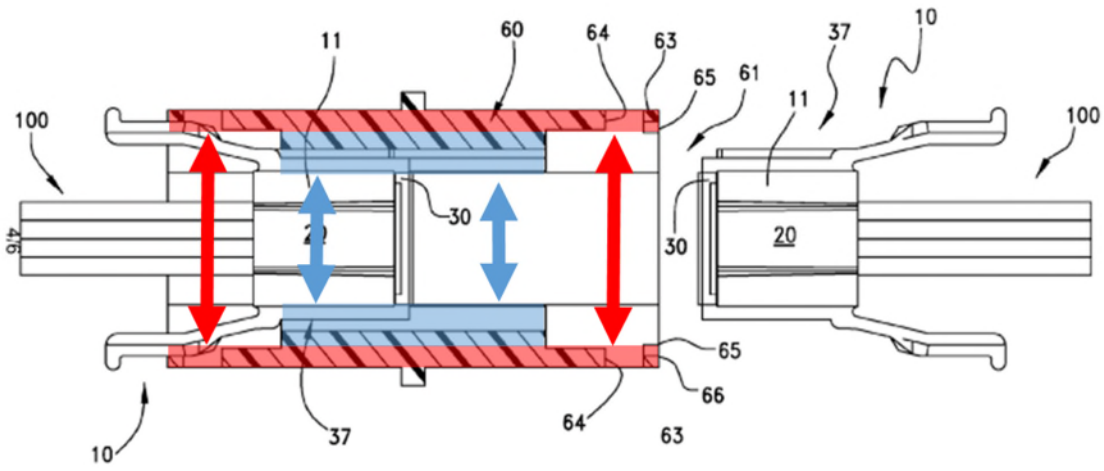



FIG.4

EX1009: Fig. 4 (annotated).

629. By virtue of the opening being shorter through the central portion to match the height of the forward section of the ferrule housings, inside the cantilevered latching arms (as depicted in Paragraph 602), the opening in the central portion of the main body is smaller than the opening in the first and second sides.

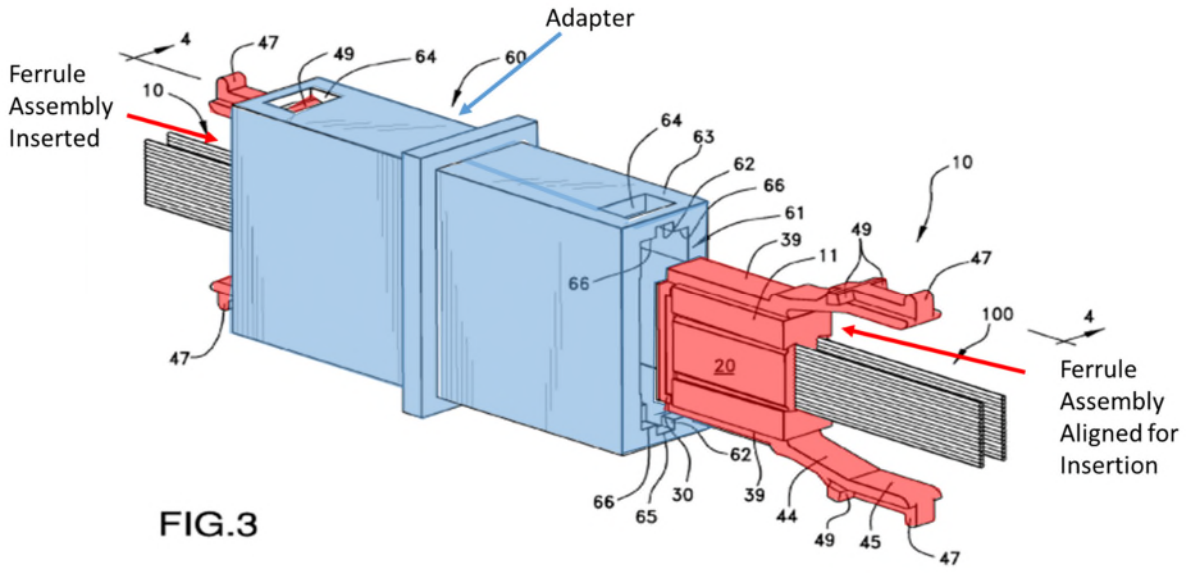
630. Accordingly, the adapter as disclosed by Hodge would meet the "wherein the opening is smaller in the center of the main body than on the first side and second side" limitation**.**

### F. Claim 5 – "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules."

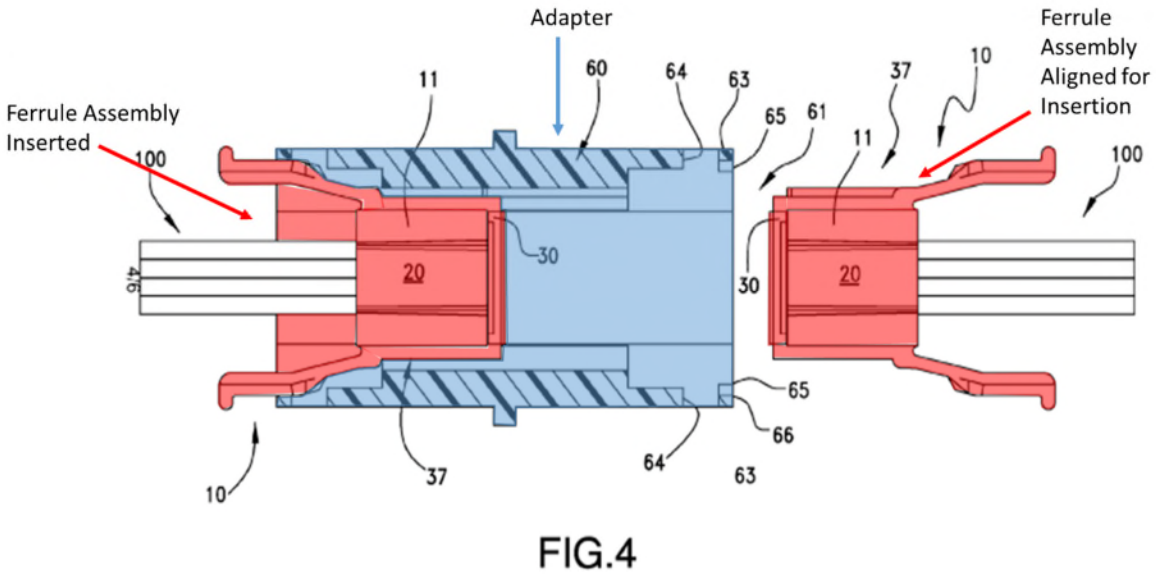
631. Hodge discloses an adapter that accepts a single ferrule assembly from each side. *See* EX1009: [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."), Figs. 3 and 4 (annotated below).



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Senko Advanced Components v. US Conec Ltd.
IPR2024-00805




EX1009: Fig. 3 (annotated).

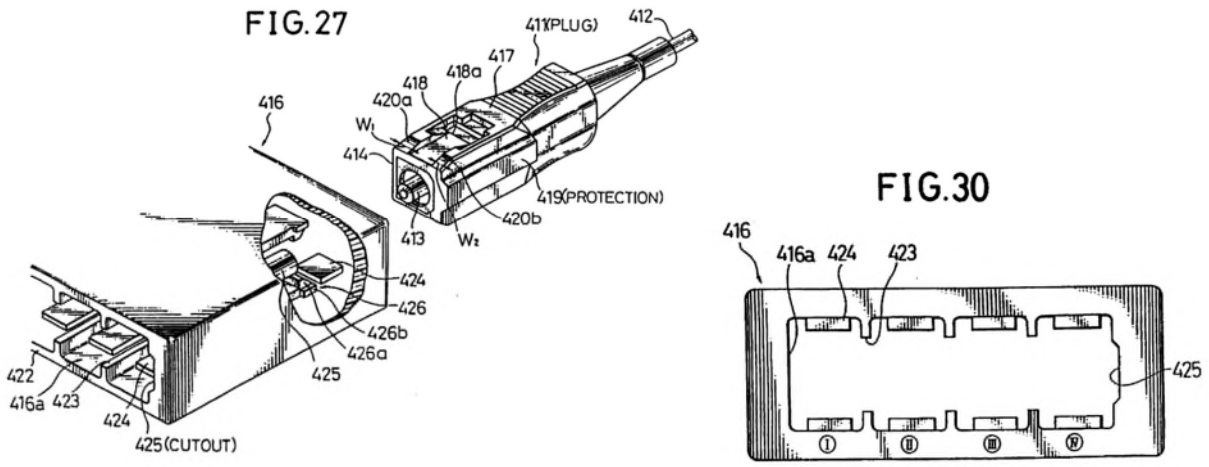



EX1009: Fig. 4 (annotated).

632. Although Hodge discloses an adapter that only accepts one multi-fiber optical connector from each side, those of skill in the art would recognize that the

industry has increasingly sought to increase fiber optic density, including through expanding adapters to receive multiple fiber optic connectors from each side.

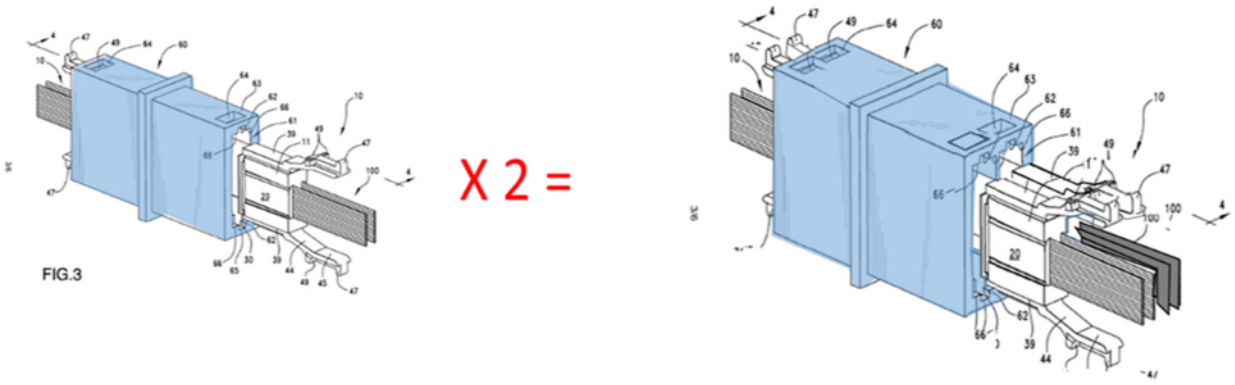
633. For example, Iwano teaches an adapter that accepts a plurality of fiber optic connector assemblies to achieve increased density. EX1006: 28:60-63 ("when a higher mounting density is required for the ordinary single core optical connector, a method of using an adapter is known to simultaneously couple a plurality [*sic*] of plugs"), Figs. 27 & 30.




EX1006: Figs. 27 & 30.

634. As discussed in Paragraphs 579-581, It would have been obvious to expand Hodge's adapter (60) to receive multiple fiber optic assemblies (10) arranged in parallel to one another, similar to the SC quad adapter of Iwano.

635. As a result of this modification, the expanded Hodge adapter would receiver multiple fiber assemblies (10) from each side.




EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter (60) that receives two ferrule assemblies (10)).

636. Accordingly, the Hodge-Iwano combination renders "The adapter according to claim 1, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules." obvious.

### G. Independent Claim 8

#### 8.P "An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising:"

637. As addressed above for Claim 1, Hodge discloses an "adapter" receiving, holding, and aligning ferrule assemblies from opposite first and second sides.

638. For example, Figures 3 and 4 of Hodge depict an adapter (60) "with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion." EX1009: ¶[0041]; Figs. 3 and 4 (annotated below).

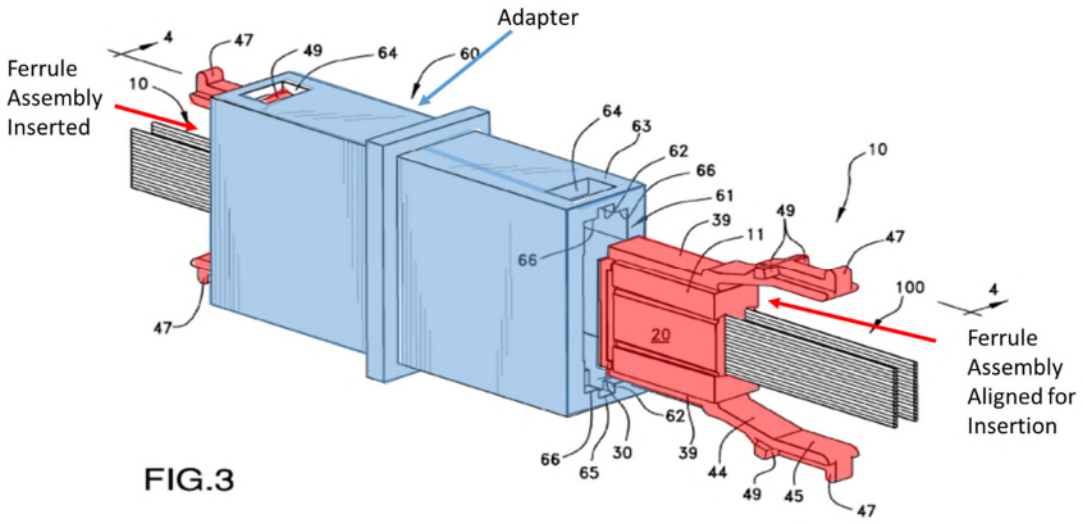



FIG.3

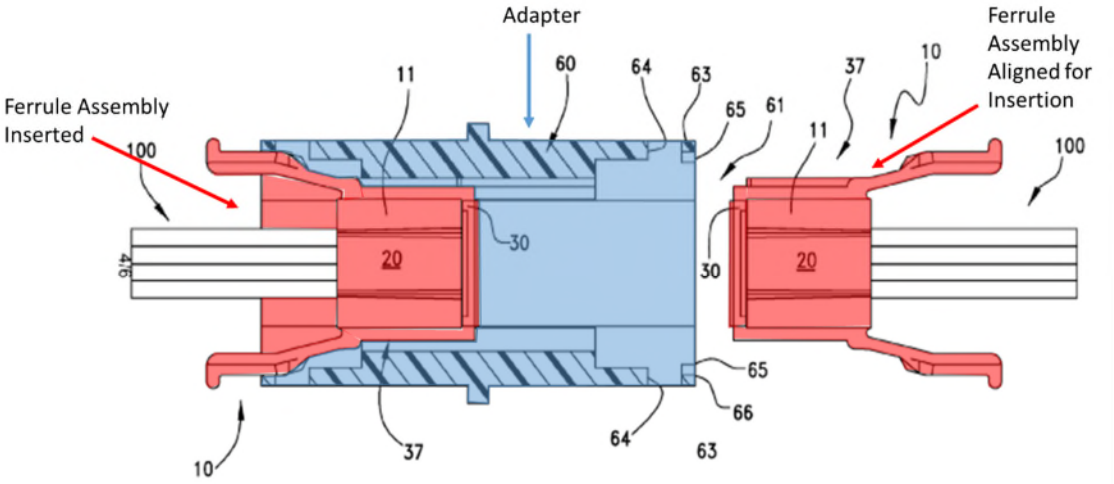



FIG.4

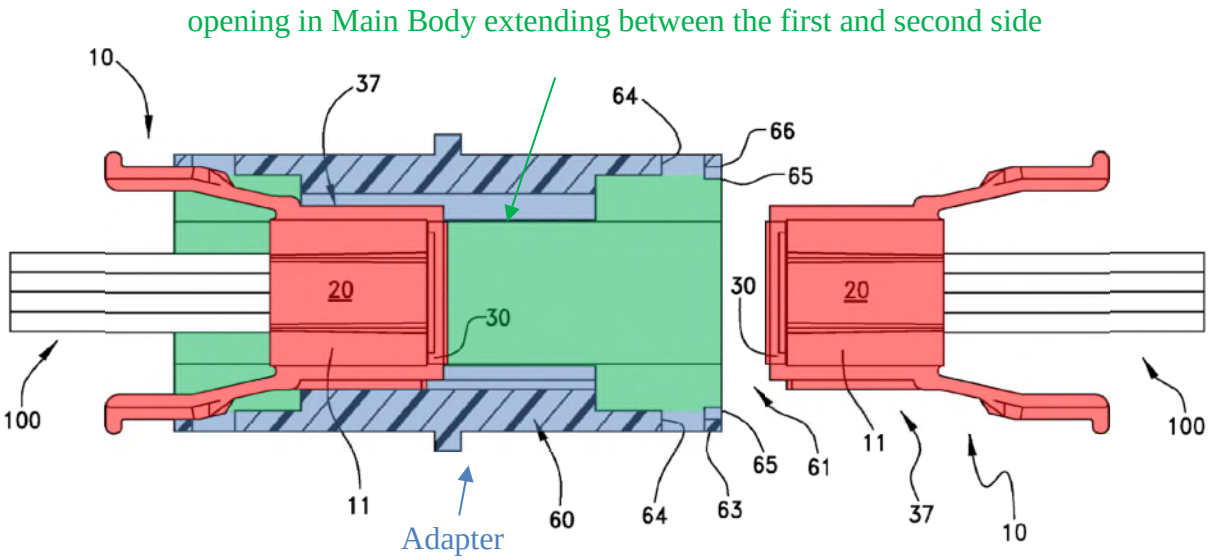
EX1009: Figs. 3 & 4 (annotated).

639. Each ferrule assembly (10) "includes a ferrule body (11) with a plurality of optical fibers (100) secured thereto." EX1009: ¶[0019].

640. Accordingly, the adapter as disclosed by Hodge would meet the preamble of Claim 8: " An adapter for fiber optic connectors with a multi-fiber ferrule."

### 8.a.1 "an opening extending between a first side and a second side of the adapter"

641. As discussed in the context of Claim 1 elements (1.a.1) and (1.a.2), Hodge's adapter (60) has an opening extending between first and second sides of the adapter. *See* EX1009*:* [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."); Fig. 4 (annotated).

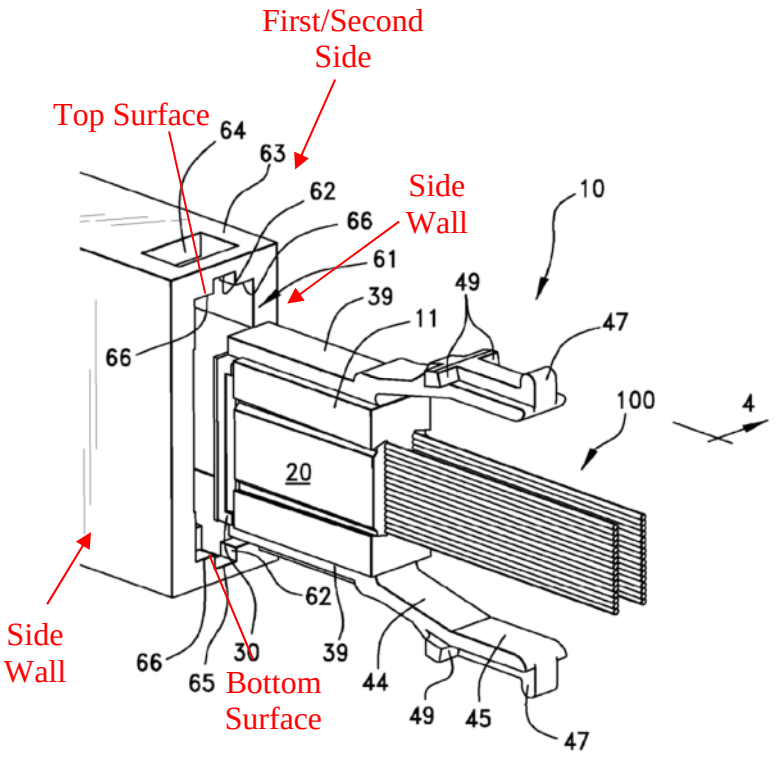



EX1009: Fig. 4 (annotated, flipped).

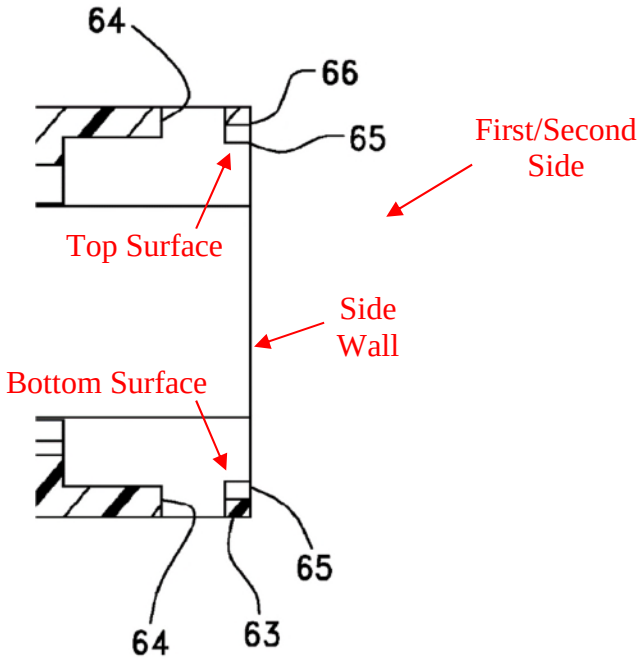
642. Therefore, Hodge's adapter meets the "a main body having an opening defined by two opposing side walls, a top surface and a bottom surface" Limitation.

### 8.a.2 "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface"

643. Each of the first and second sides of Hodge's adapter (60) are respectively defined by two opposing side walls, a top surface, and a bottom surface, as shown below:




EX1009: Fig. 3 (annotated).




EX1009: Fig. 4 (annotated, flipped).

644. As discussed at Paragraphs 582-589, in expanding the Hodge adapter to a multi-connector adapter, the partitions between the individual optical connectors (within the multi-connector adapter) would be limited to ribs in order to achieve the highest density and reduce cost

645. Accordingly, first and second sides of the expanded Hodge adapter would likewise be defined by two opposing side walls, a top surface, and a bottom surface.

646. Therefore, Hodge's adapter meets the "each of the first side and the second side respectively defined by two opposing side walls, a top surface and a bottom surface" limitation.

### 8.a.3 "the opening configured to receive at least two fiber optic connectors from the first side"

647. Hodge discloses an adapter that accepts a single ferrule assembly from each side. EX1009: ¶[0041], Figs. 3 and 4 (reproduced and annotated below).

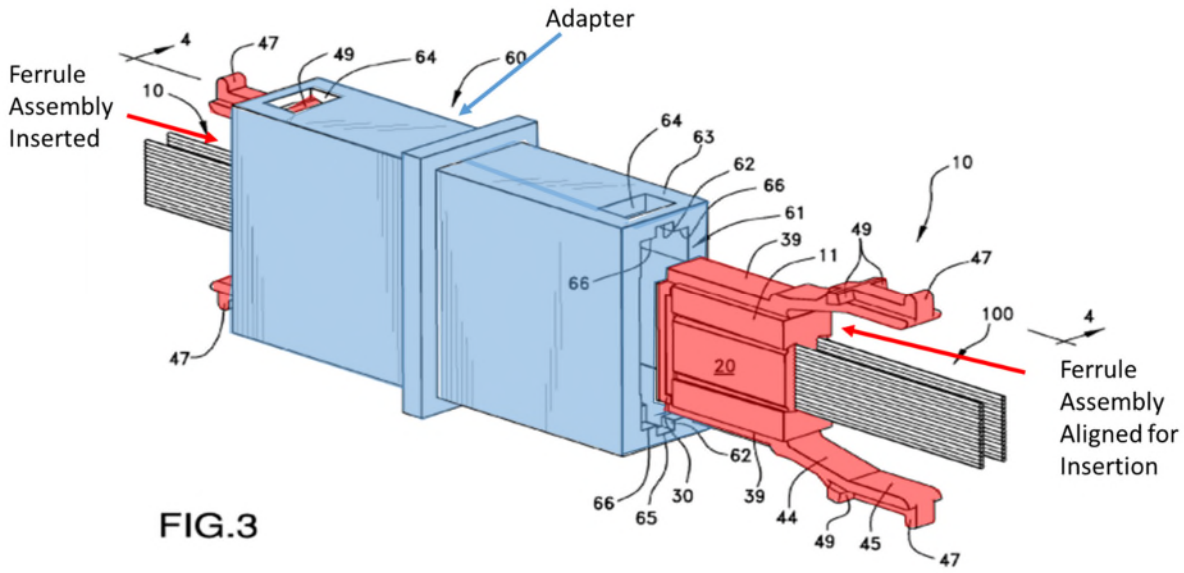



FIG.3

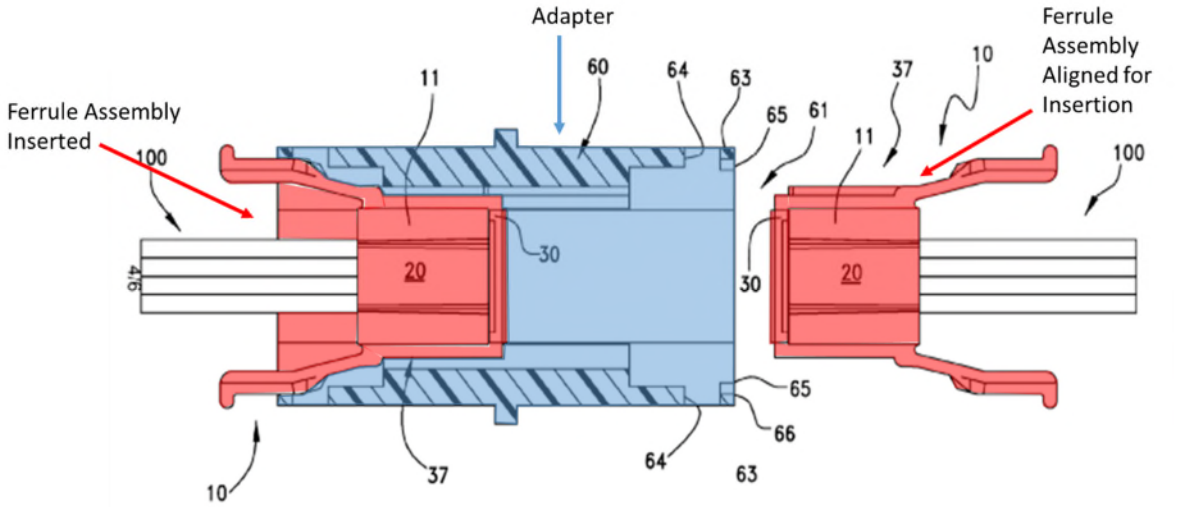
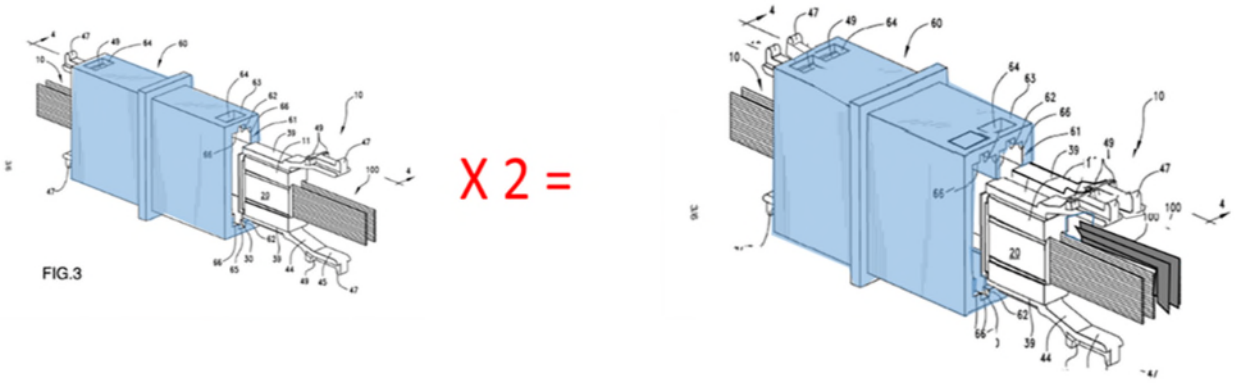



FIG.4

EX1009: Figs. 3 and 4 (annotated).

648. As discussed at Paragraphs 579-589, it would have been obvious to expand Hodge's adapter (60) to receive multiple fiber assemblies (10) (each having their own ferrule body (11)) arranged in parallel to one another, similar to Iwano's adapter.

649. As modified, the opening of Hodge's adapter would receive two ferrule assemblies (10) from the first side and another two ferrule assemblies from the second side.

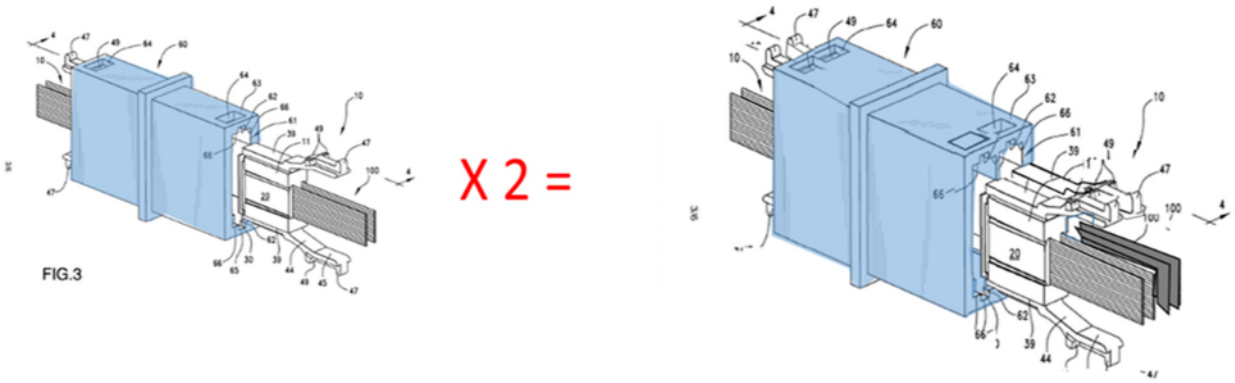



EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter (60) that receives two ferrule assemblies (10)).

650. Therefore, the Hodge-Iwano combination renders the "the opening configured to receive at least two fiber optic connectors from the first side" limitation obvious.

**8.b "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side"**

651. As discussed in with respect to element 8.a.3 immediately above, the adapter of the Hodge/Iwano combination can receive two ferrule assemblies (10) from each side.




EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter that receives two sets of ferrule assemblies (10)); EXPERT DEC.

652. The ferrule assemblies (10) inserted from the second side mate with the ferrule assemblies inserted from the first side. For each pair of ferrule assemblies (10), one inserted from the first side and one inserted from the second side, the ferrules ends of the two ferrule assemblies face and connect with each other, thereby mating and forming an optical connection between the two ferrule assemblies. EX1009: Figs. 3 and 4, ¶¶[0003], [0004], [0041] ("Referring to Figs. 3-4, an adapter 60 is depicted with one ferrule assembly 10 inserted therein and a second ferrule assembly aligned for insertion."), [0044] ("the optical fibers 100 of

one ferrule assembly are mated directly with another similarly configured ferrule assembly"), claim 8 ("The optical fiber assembly of Claim 1, wherein the mating component is an adapter configured to mate with another ferrule assembly.").

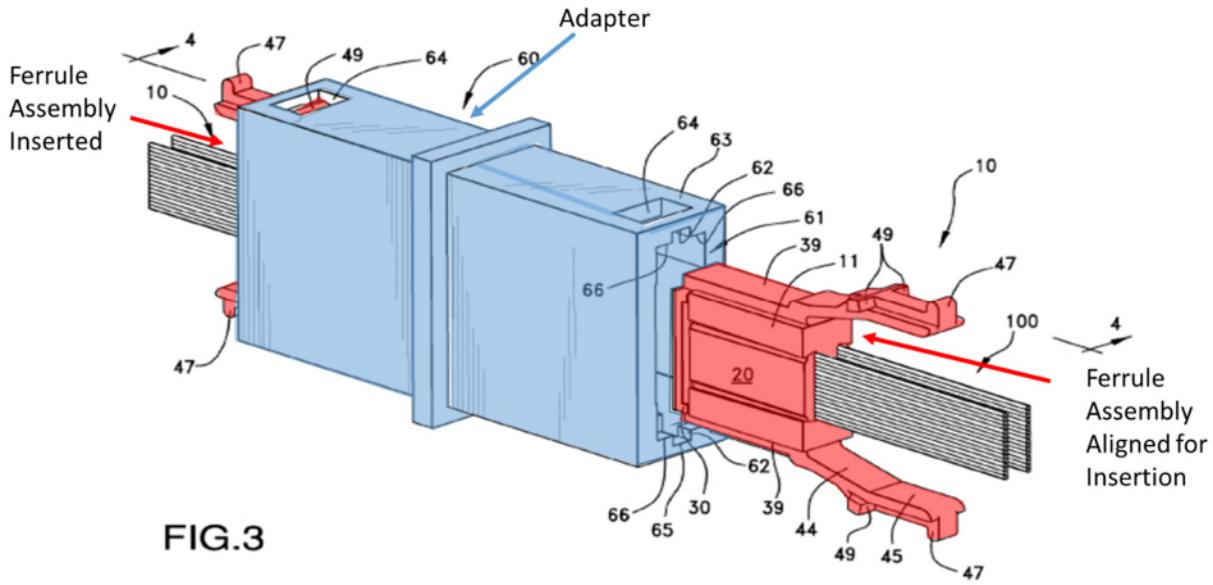



FIG.3

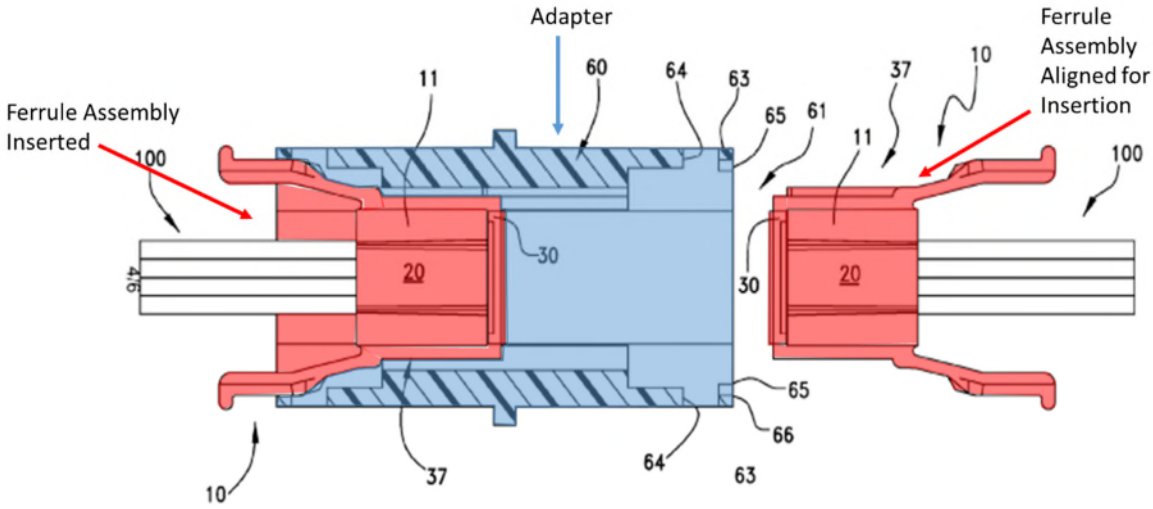



FIG.4

EX1009: Figs. 3 and 4 (annotated).

653. Therefore, the Hodge-Iwano combination renders the "configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side" limitation obvious.

### 8.c.1 "a central portion between the first side and the second side"

654. As discussed in with respect to Claim 1 element 1.a.3, Hodge's adapter (60) includes a central portion.

655. The central portion is between the first and second sides.

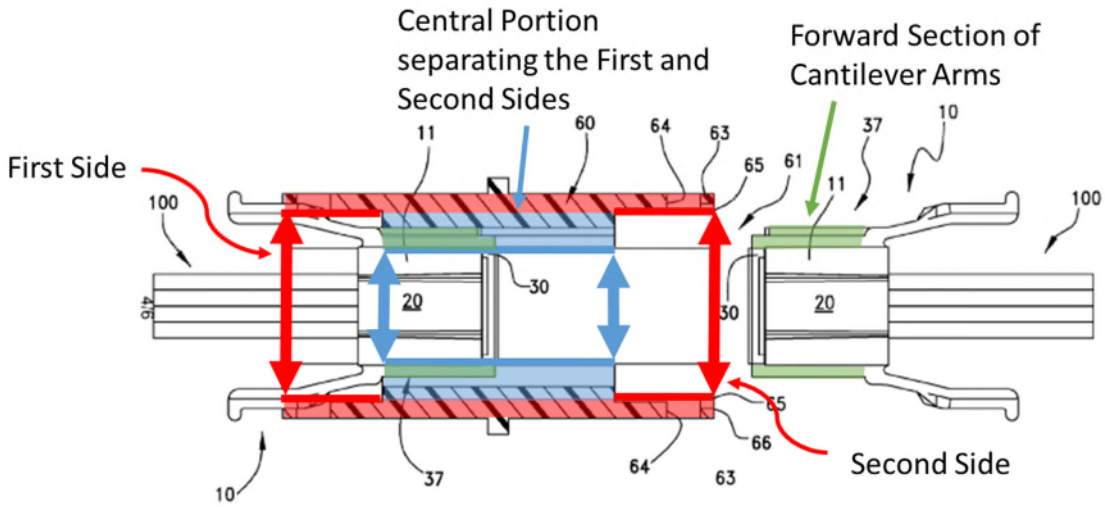


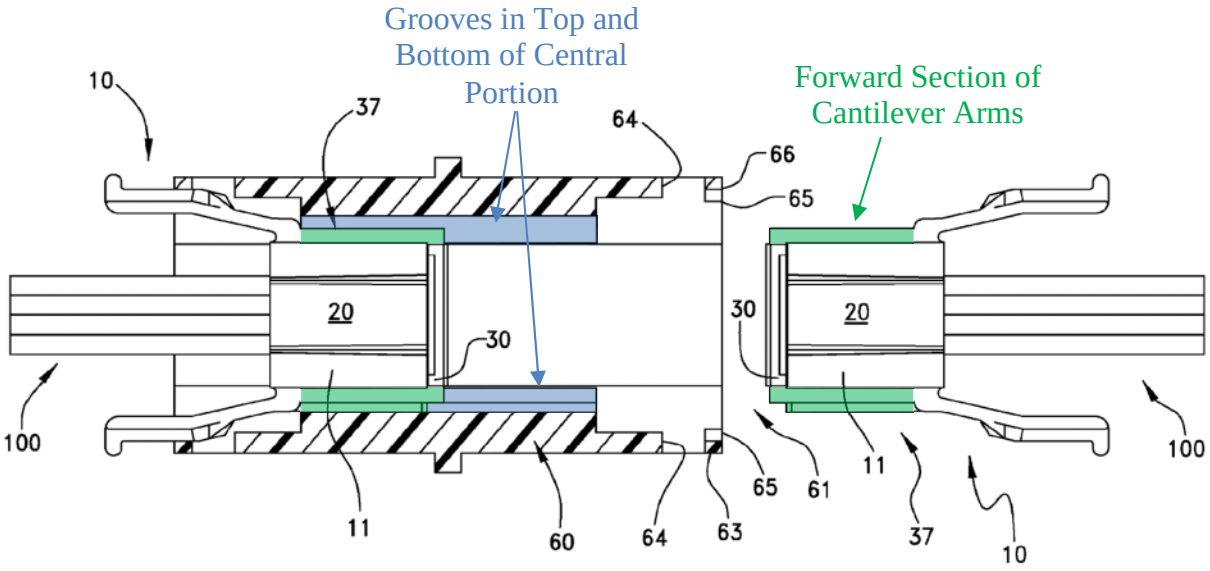

FIG.4

EX1006: Fig. 4 (annotated).

656. Therefore, Hodge meets the "a central portion between the first side and the second side" limitation.

### 8.c.2 "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion"

657. As discussed in Paragraphs 600-604, those of skill in the art would recognize that the stepped up bottom surface and stepped down top surface of the center portion provides ledges to engage the sidewalls (14) of the ferrule body and includes alignment slots (i.e., grooves) to receive the forward sections (39) of the cantilever arms (37) (green in the annotated Figure 4 below). EX1009: Fig. 4 (annotated below).




EX1009: Fig. 4 (annotated, flipped).

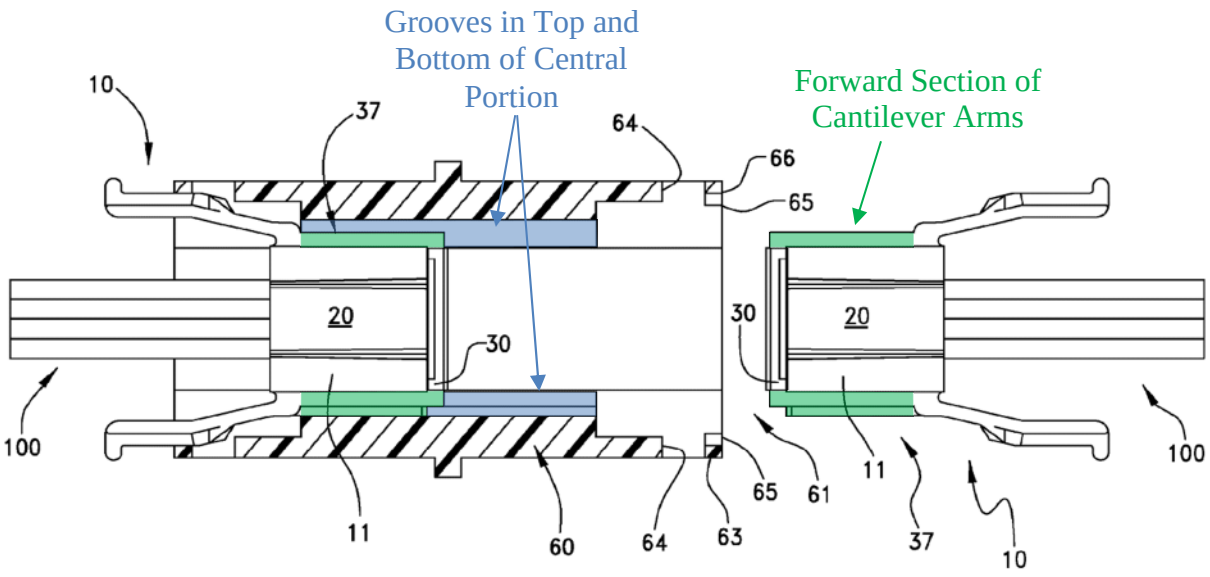
658. As further discussed in Paragraphs 605-614, it would have been obvious to modify Hodge's adapter in view of Iwano to accept additional fiber optic connectors, and in doing so one of skill in the art would have duplicated the grooves in the bottom surface of central portion of the adapter to have a

corresponding groove to accept the forward section (39) of the cantilever arms (37) of each ferrule assembly. This duplication would result in a plurality of grooves disposed in the bottom surface of the central portion of the adapter.

659. Accordingly, the Hodge-Iwano combination renders the "having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion" limitation obvious.

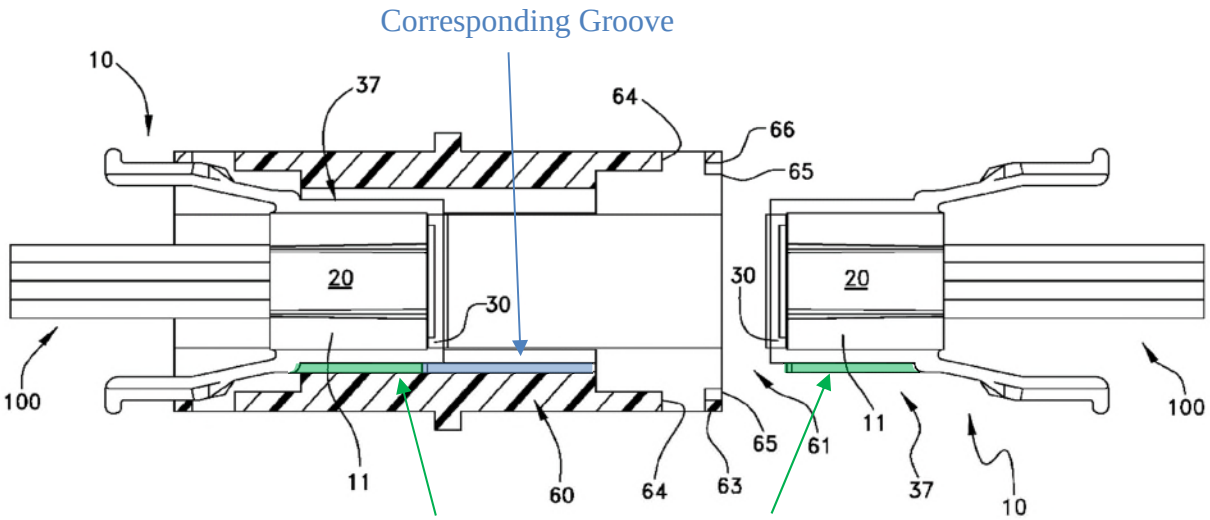
#### 8.c.3 "the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side and the second side"

660. Although not described within the specification, those of skill in the art would recognize that the center portion of the Hodge adapter provides ledges to engage the sidewalls (14) of the ferrule body and includes alignment slots (i.e., grooves) to receive the forward sections (39) of the cantilever arms (37) (green in the annotated Figure 4 below). EX1009: Fig. 4 (annotated below).



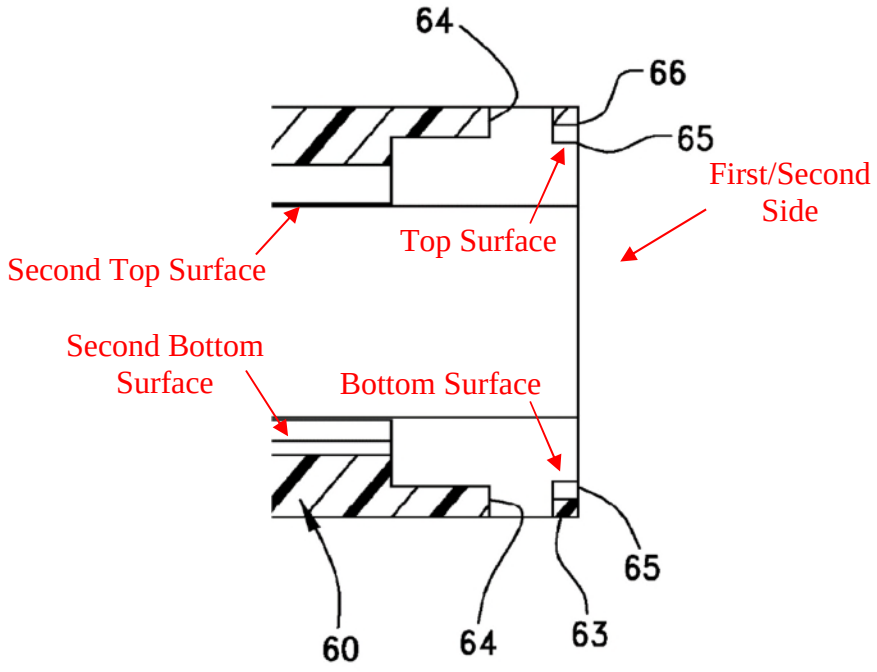

EX1009: Fig. 4 (annotated, flipped).

661. Additionally, the Hodge adapter contains a groove within a groove at the bottom of its central portion so as to receive a key (not numbered) on the forward section (39) of the cantilevered arm (37) forming one side of the ferrule assembly.




EX1009: Fig. 4 (annotated, flipped).

662. As shown below, the surfaces in which these grooves a are disposed represents a second top surface and second bottom surface of the Hodge adapter that are different than the adapter's respective top surface and bottom surface of the first and second sides:

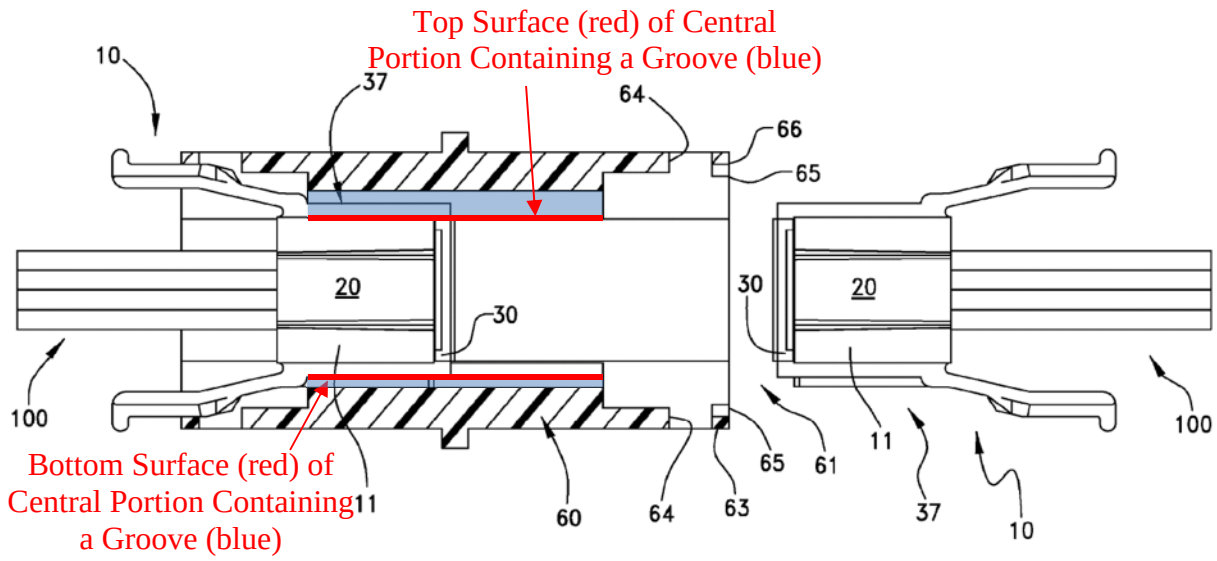



EX1009: Fig. 4 (annotated, flipped).

663. Therefore, the Hodge adapter meets the "the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side and the second side" limitation.

### 8.c.4 "each of the plurality of grooves extending toward a center of the adapter."

664. As discussed in Paragraphs 618-619, the groove (blue) in the second top surface of central portion of the Hodge and the groove (blue) in the second bottom surface of Hodge each extend into the central portion from the first side and from the second side toward the center of the adapter's (60) main body.




EX1009: Fig. 4 (annotated and flipped).

665. It would have been obvious that in duplicating the groove in the second top surface of the central portion and the groove in the second bottom surface of the central portion as taught by Iwano, that the added grooves would likewise extended into the central portion from the first side and from the second side.

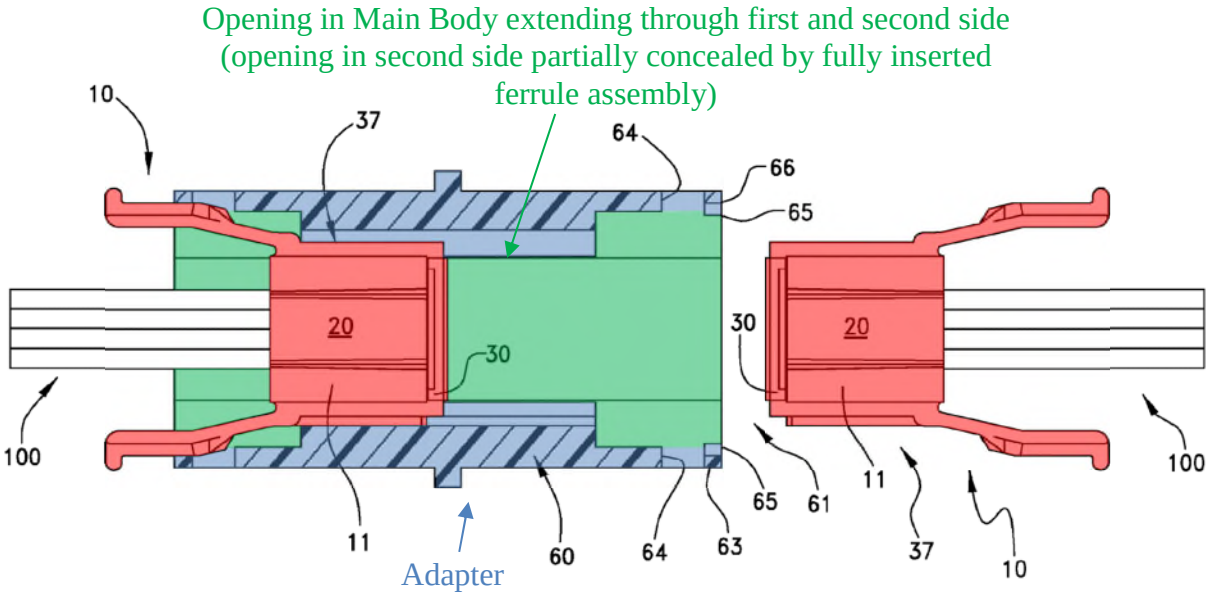
666. Accordingly, the Hodge-Iwano combination renders the "each of the plurality of grooves extending toward a center of the adapter" limitation obvious.

### H. Claim 9

#### 9.a "The adapter according to claim 8, wherein the first side and the second side of the opening are in communication with one another in the central portion"

667. As discussed in the context of Claim 1 elements (1.a.1) and (1.a.2), Hodge's adapter (60) has an opening extending between first and second sides of

the adapter. *See* EX1009*:* [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."); Fig. 4 (annotated).




EX1009: Fig. 4 (annotated, flipped).

668. Therefore, Hodge's adapter meets the "wherein the first side and the second side of the opening are in communication with one another in the central portion" limitation.

**9.b "the opening being smaller in the central portion than on the first side and the second side."**

669. As discussed in Paragraphs 626-628 with respect to Claim 4 above, as depicted in Figure 4 (annotated below) the adapter of Hodge has an initial opening height at each side and then has an internal step within the adapter to a shorter opening height at a distance interior to both the first side and the second side that would clear the latch arms (40). *See* EX1009: Fig. 4 (annotated below)

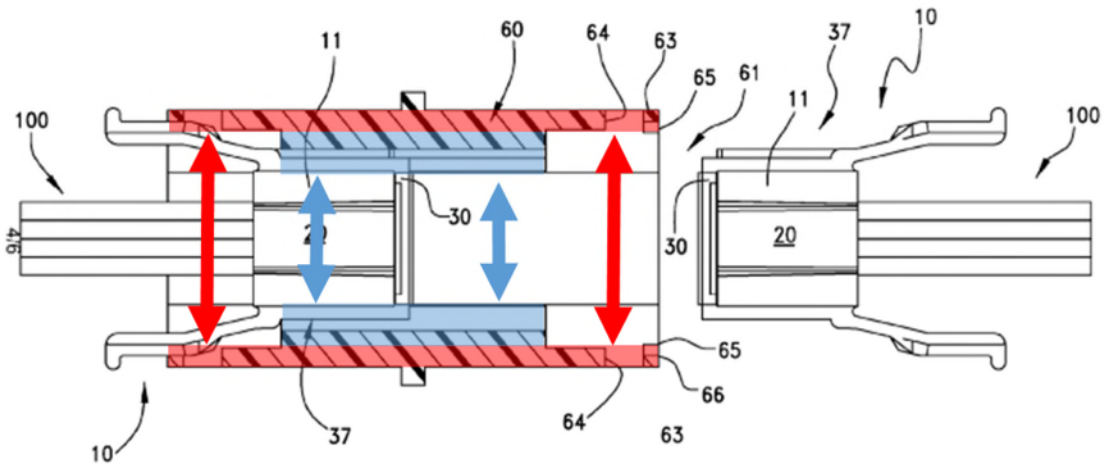



FIG.4

EX1009: Fig. 4 (annotated).

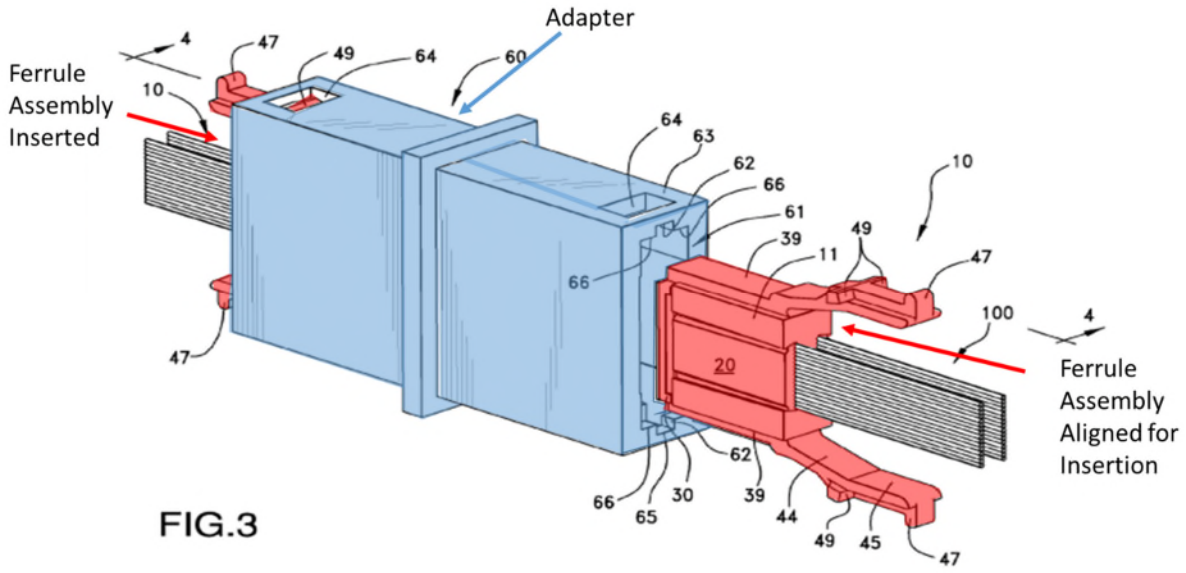
670. By virtue of the opening being shorter through the central portion to closely match the plug housing, the opening in the central portion of the main body is smaller than the opening in the first and second sides.

671. Accordingly, the adapter as disclosed by Hodge would meet the " the opening being smaller in the central portion than on the first side and the second side" limitation.

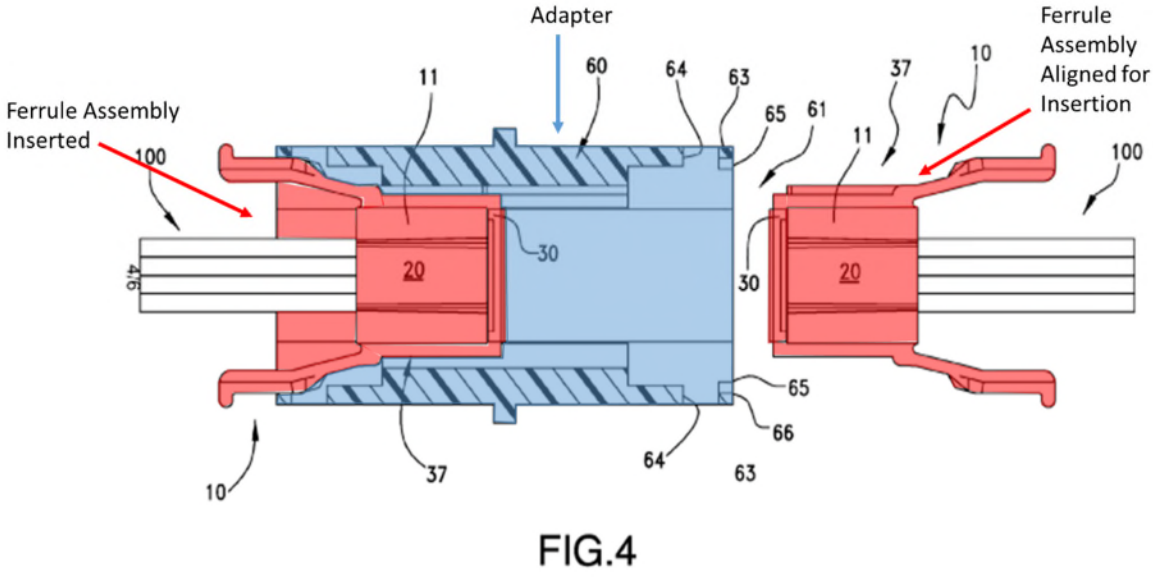
### I. Claim 10 – "The adapter according to claim 8, wherein the first and second sides are configured to receive a plurality of fiber optic connectors."

672. As discussed in Paragraphs 630-634 with respect to Claim 5 above, it would have been obvious to modify the Hodge adapter to accept a plurality of pairs fiber optic connectors.

673. Hodge discloses an adapter that accepts a single ferrule assembly from each side. *See* EX1009: [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."), Figs. 3 and 4 (annotated below).



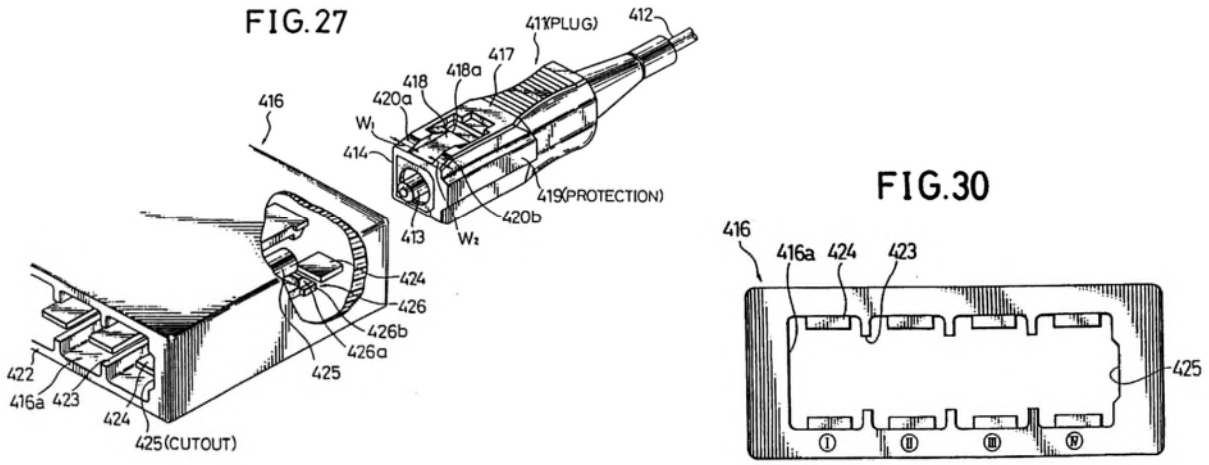

EX1009: Fig. 3 (annotated).




EX1009: Fig. 4 (annotated).

674. Although Hodge discloses an adapter that only accepts one multi-fiber optical connector from each side, those of skill in the art would recognize that the industry has increasingly sought to increase fiber optic density, including through expanding adapters to receive multiple fiber optic connectors from each side.

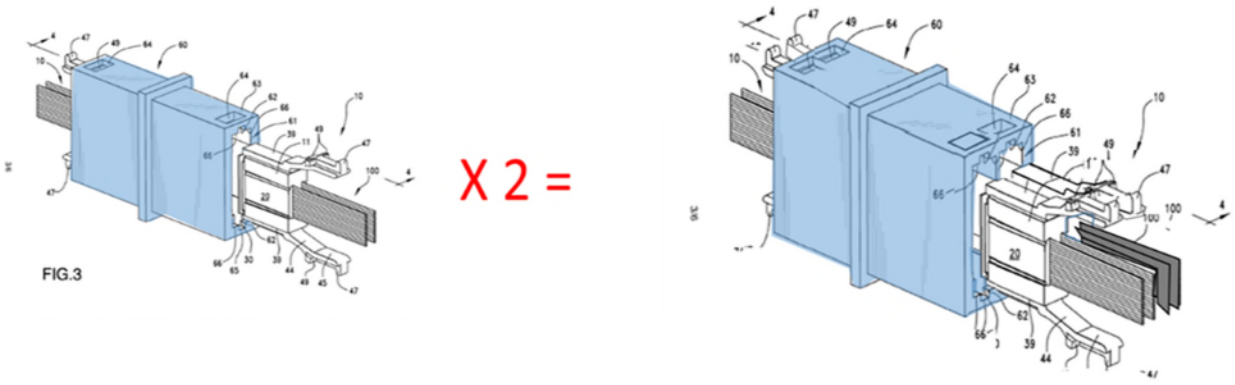
675. For example, Iwano teaches an adapter that accepts a plurality of fiber optic connector assemblies to achieve increased density. EX1006: 28:60-63 ("when a higher mounting density is required for the ordinary single core optical connector, a method of using an adapter is known to simultaneously couple a plularity [*sic*] of plugs"), Figs. 27 & 30.




EX1006: Figs. 27 & 30.

676. As discussed in Paragraphs 579-581, It would have been obvious to expand Hodge's adapter (60) to receive multiple fiber optic assemblies (10) arranged in parallel to one another, similar to the SC quad adapter of Iwano.

677. As a result of this modification, the expanded Hodge adapter would receiver multiple fiber assemblies (10) from each side.



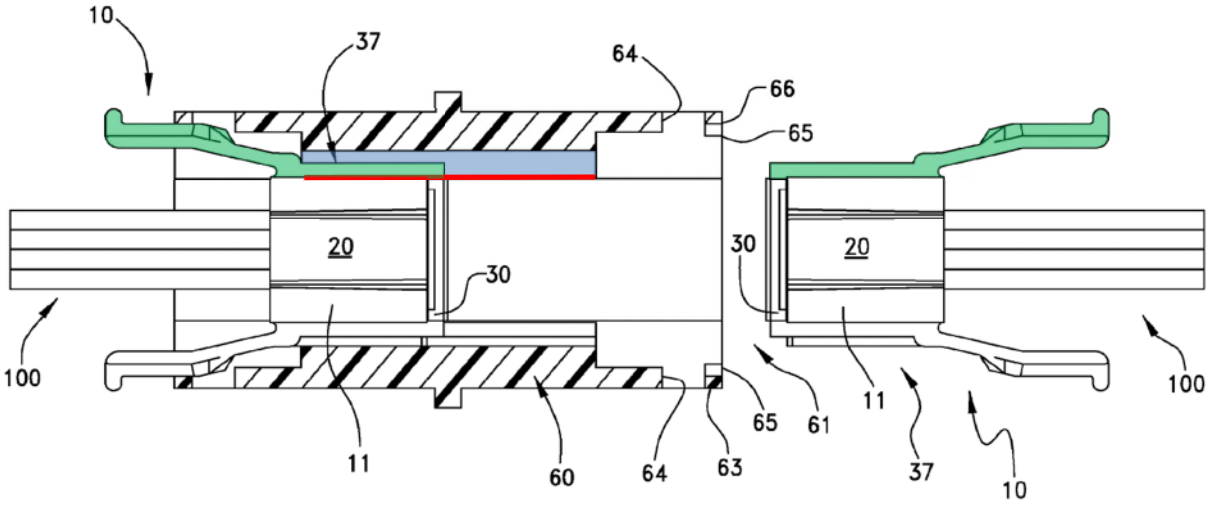

EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter (60) that receives two ferrule assemblies (10)).

678. Accordingly, the Hodge-Iwano combination renders "The adapter according to claim 8, wherein the first side and second side are configured to receive a plurality of fiber optic connectors" obvious.

**J. Claim 11 – "The adapter according to claim 8, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different."**

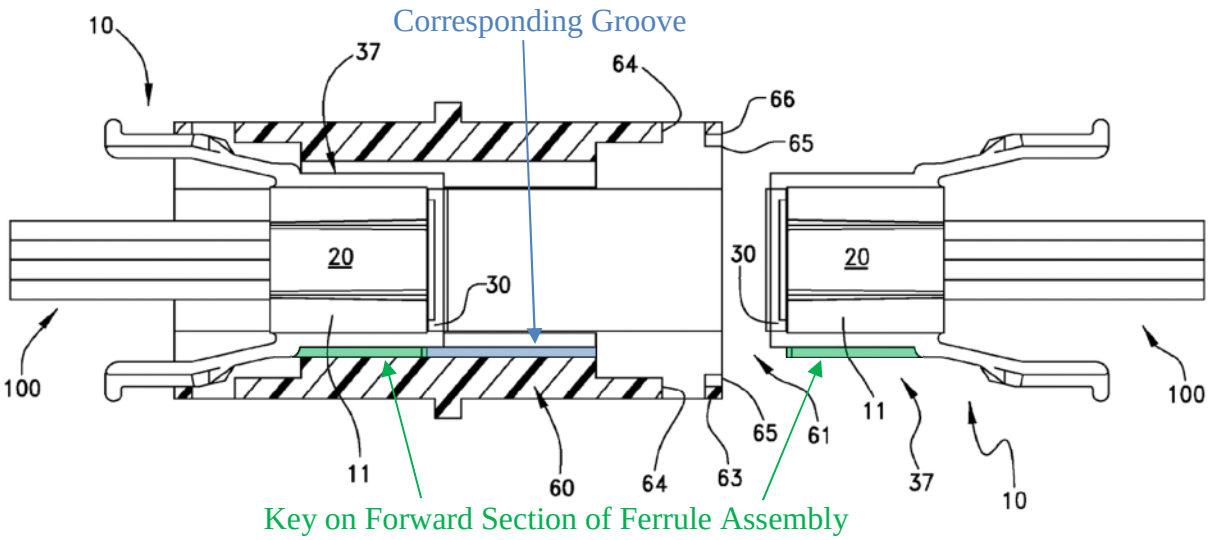
679. As addressed above with respect to Claim 1, Figure 4 of Hodge depicts an adapter with a groove (blue in the annotated figure below) disposed in the top surface of a central portion that would correspond to and receive the

forward section (39) of the top cantilevered arm (37). EX1009: Fig. 4 (annotated below).



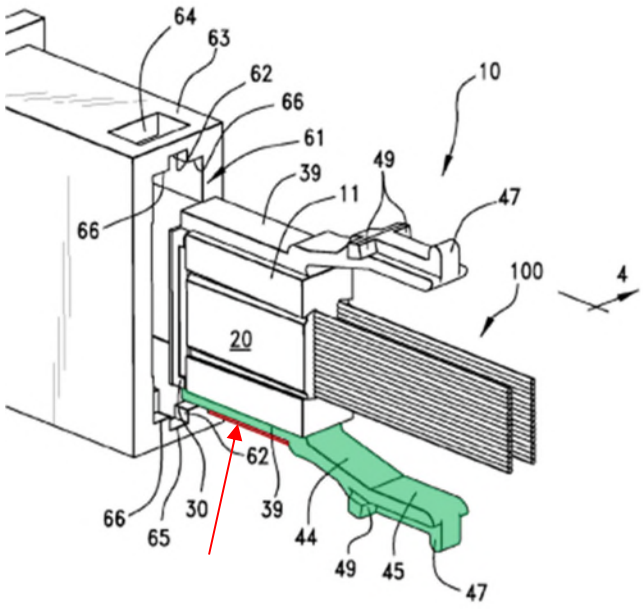

EX1009: Fig. 4 (annotated, flipped).

680. As addressed above with respect to Claim 1, Figure 4 of Hodge further depicts a keyway groove (blue in the annotated figure below) disposed in a bottom surface of a central portion that would correspond to and receive the key (not numbered) on the forward section (39) of the bottom cantilevered arm (37). EX1009: Fig. 4 (annotated).




EX1009: Fig. 4 (annotated, flipped).

681. As is evident from the Figure 3 (excerpted and annotated below) of Hodge, the key (red) on the forward section (39) is narrower than the forward section (39) (green) itself. EX1009: Fig. 3 (excerpted and annotated below).




EX1009: Fig. 3 (excerpted and annotated).

682. Accordingly, with respect to orientation of Figure 3, the key-way groove on the bottom surface of the central portion will also be narrower than the groove for accepting the forward section (39) on the top surface of the central portion. In fact, the key-way groove is itself located within the surface of a groove for accepting the forward section (39).

683. Iwano similarly relies on different sized grooves in the adapter—specifically the groove between partition (423) and projection (424)—and respective projections (420a and 420b) from the optical connector to ensure proper polarity of the optical connectors. EX1006: 30:48-54 ("for instance as shown in FIG. 31(a), it is impossible to insert the optical connector plug 411 in the reverse direction, because the groove 418 between the projections 420a and 420b having two different widths W1 and W2 of the optical connector plug 411 will not be engaged with the projections 424 of the connector housing 416 with an interference 430 (W1 -W2) between the two [circled in Fig. 31(b) reproduced below]"), Figs. 31(a) and (b) (annotated below with the interference between the projection (424) of the adapter and projection (420a) of the optical connector plug circled in red).



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FIG. 31(a)

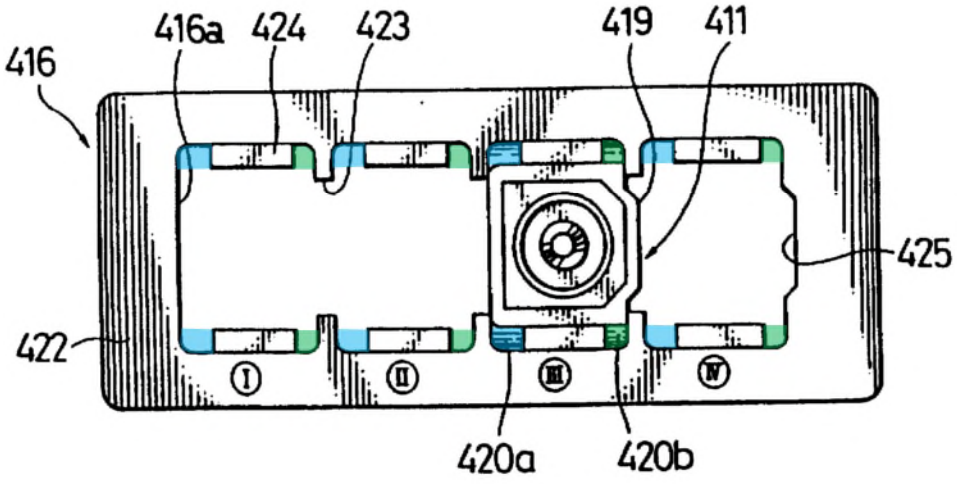
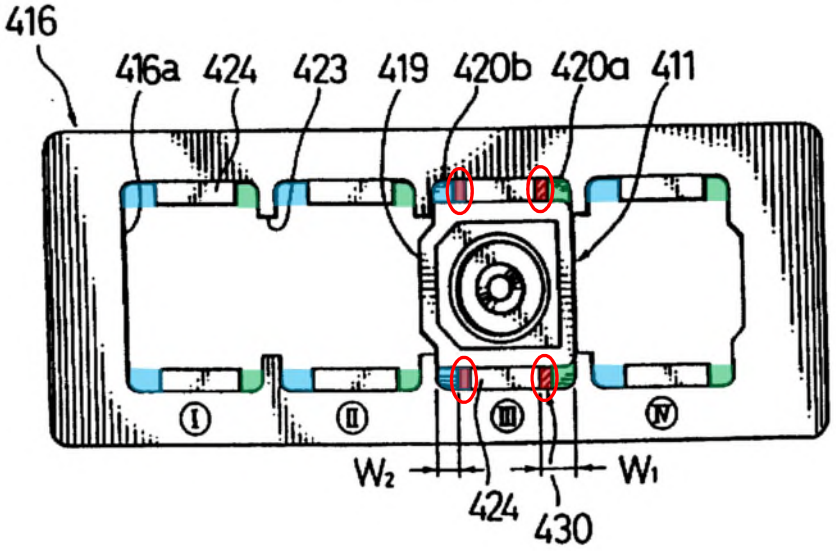



FIG. 31(b)




EX1006: Figs. 31(a)&(b) (annotated to show interference when inserted in improper orientation).



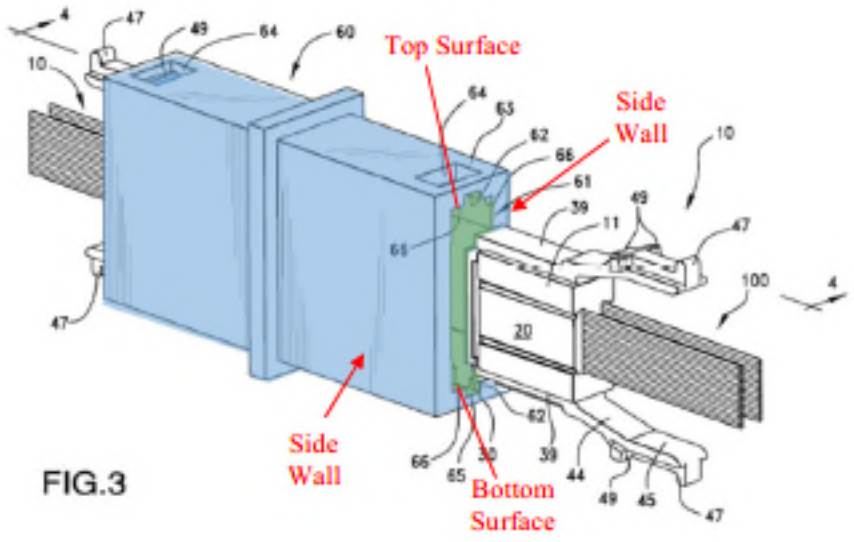
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684. Accordingly, the Hodge-Iwano combination renders "The adapter according to claim 8, wherein the plurality of grooves in the top surface of the central portion have a first width and the plurality of grooves in the bottom surface of the central portion have a second width, and the first and second widths are different" obvious.

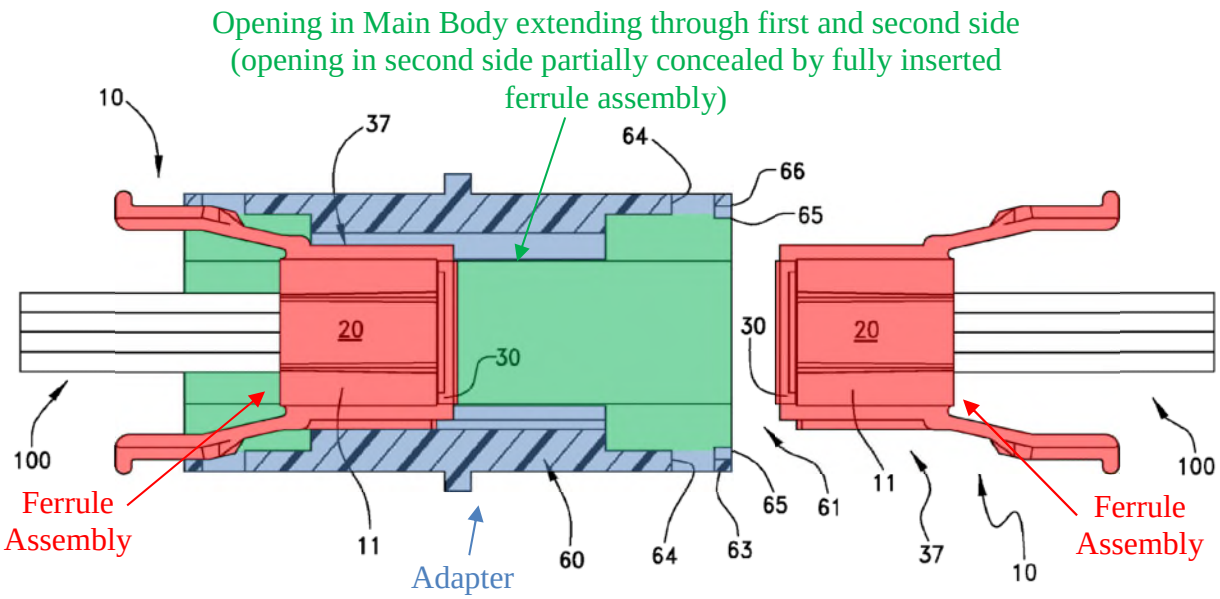
## K. Independent Claim 12

### 12.P "An adapter for holding fiber optic connectors, the adapter comprising:"

685. The adapter as disclosed by Hodge has a main body with an opening (61) (green in the annotated figures below) from each side for receiving the ferrule assemblies. *See* EX1009*:* [0041] ("Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10."); Figs. 3 & 4 (annotated below).




EX1009: Fig. 3.




EX1009: Fig. 4 (annotated, flipped).

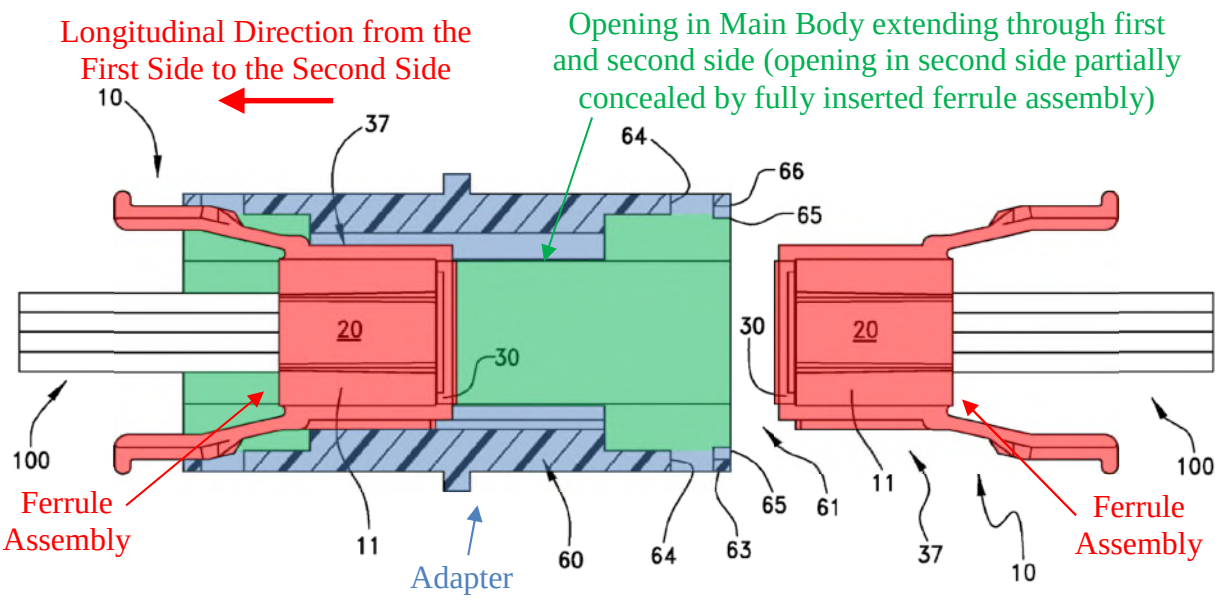
686. As shown in Figure 4 above, the opening is defined by two opposing side walls, a top surface, and a bottom surface.

687. Therefore, Hodge's adapter meets the "An adapter for holding fiber optic connector" preamble.

**12.a.1 "a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side"**

688. As discussed in Paragraphs 593-597 above, Hodge has a main body with an opening extending between the first and second sides.

689. As shown below, the opening extends longitudinally from the first side to the second side:




EX1009: Fig. 4 (annotated, flipped).

690. One of skill in the art would recognize that the width and a height of the main body of the Hodge adapter can be defined as shown:

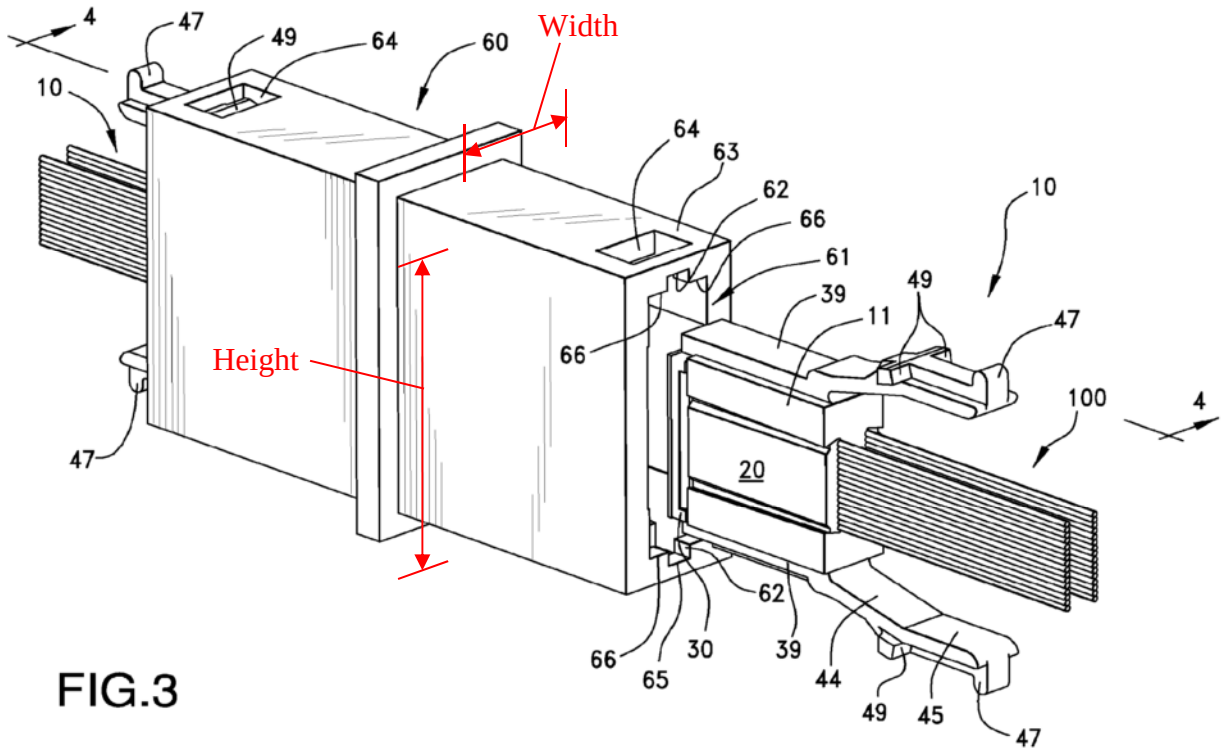
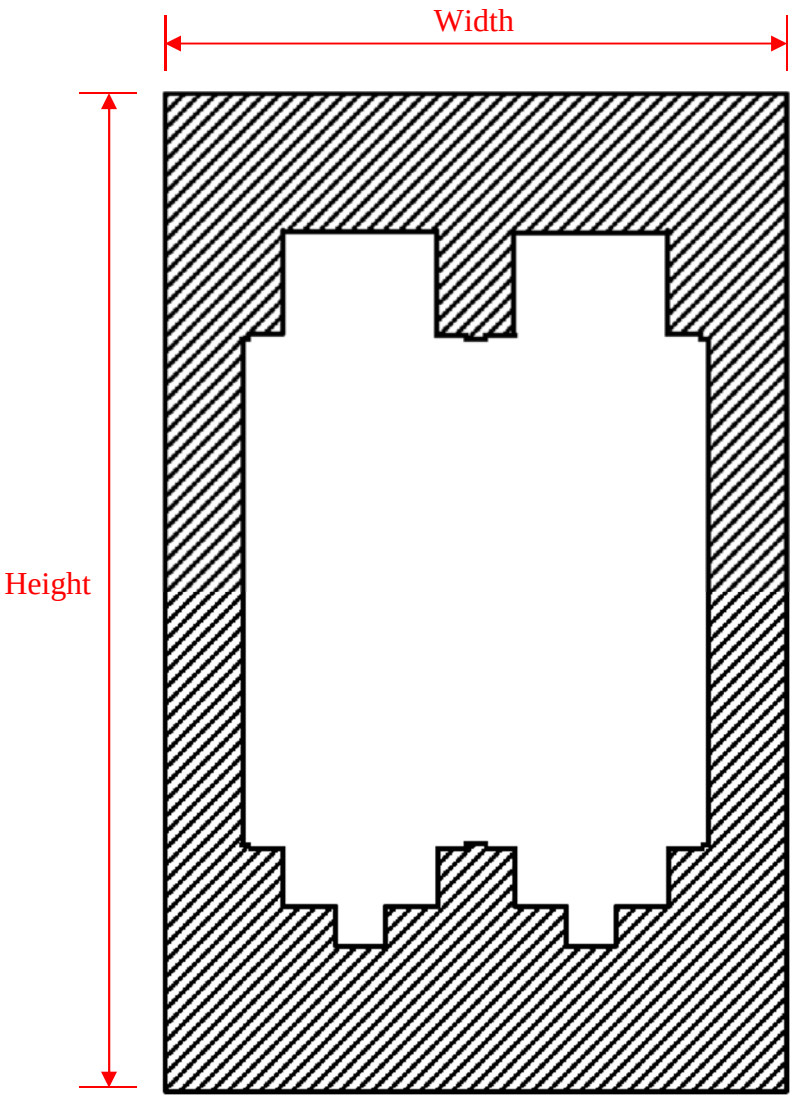



FIG.3

EX1009: Fig. 3 (annotated).




Cross-Section of Hodge/Iwano Combination
(orientation as shown in Fig. 3 of Hodge)

691. Therefore, Hodge-Iwano combination renders the "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height" limitation obvious.

### 12.a.2 "the main body comprising two opposing side walls spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height"

692. Hodge's main body includes two opposing side walls spaced apart along the width.

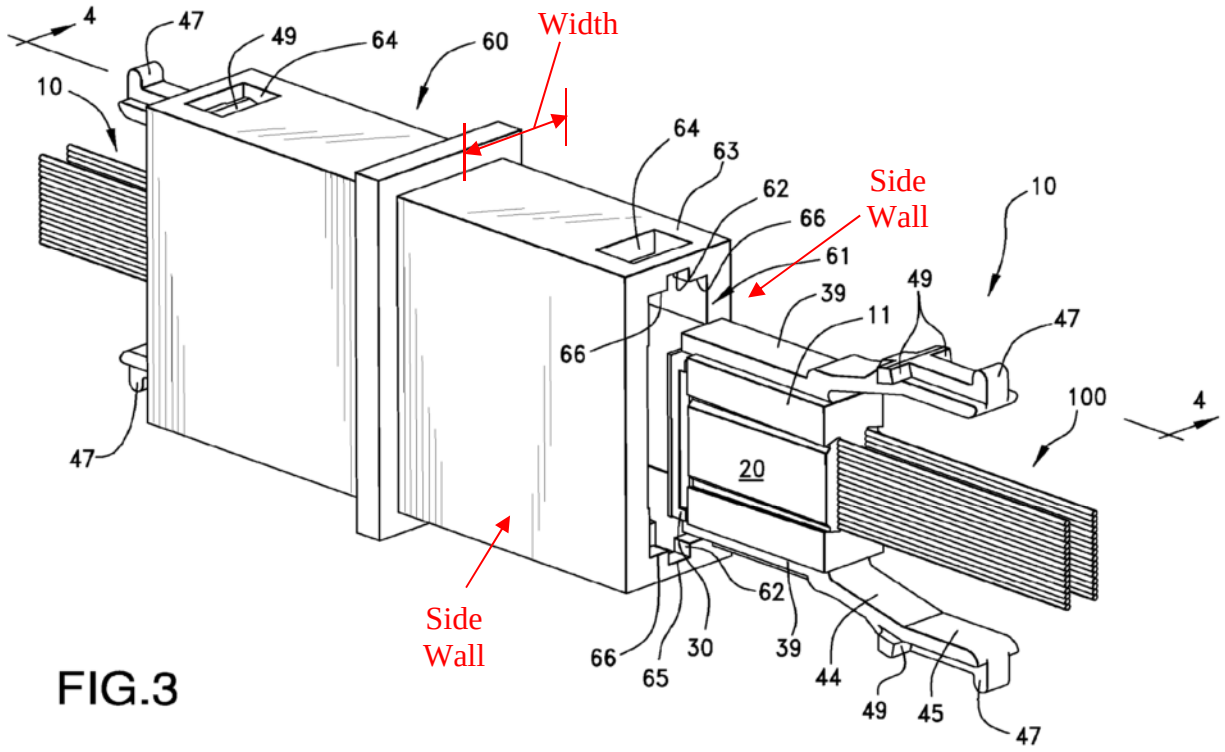
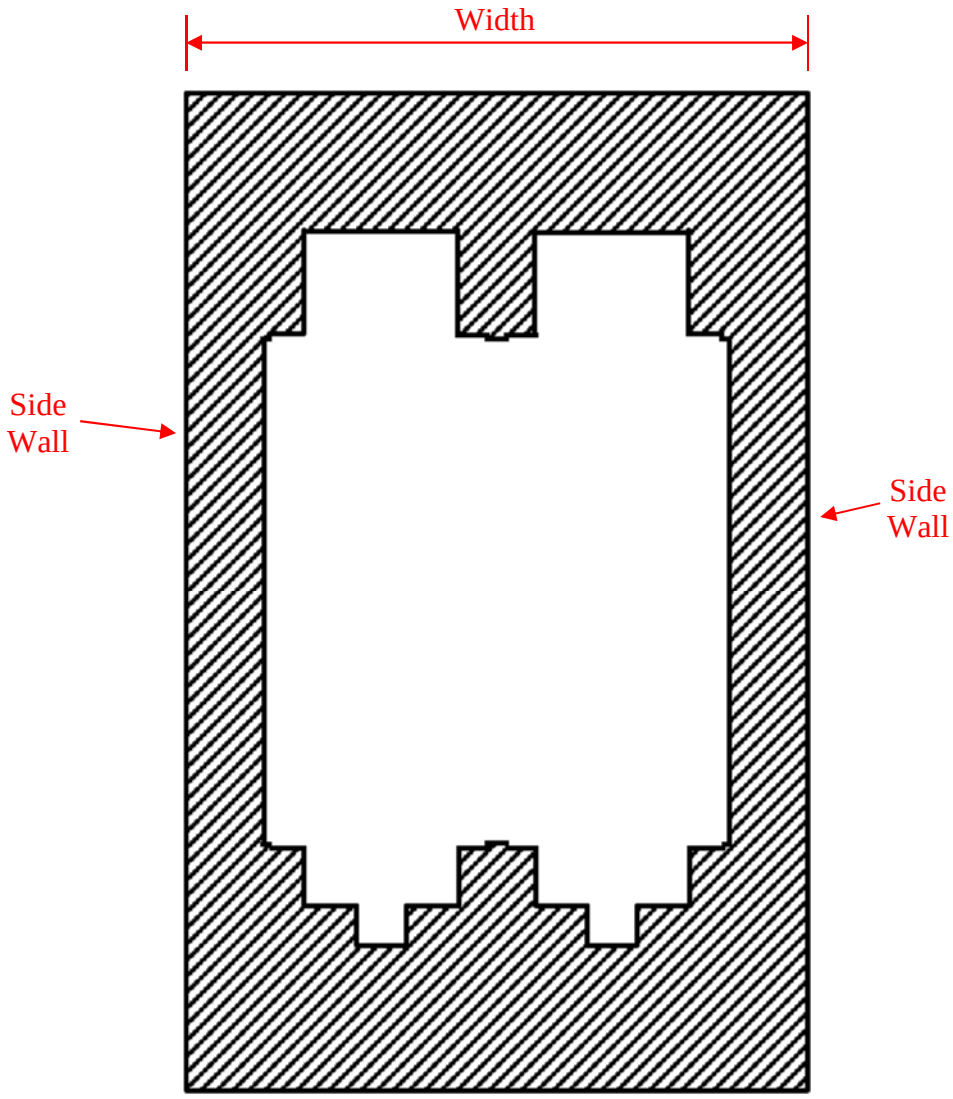



FIG.3

EX1009: Fig. 3 (annotated).

693. As discussed at Paragraph 585-589, in expanding the Hodge adapter to a multi-connector adapter, the partitions between the individual optical connectors (within the multi-connector adapter) would be limited to ribs in order to achieve the highest density and reduce cost.

694. Accordingly, the expanded Hodge adapter would likewise have a main body that includes two opposing side walls spaced apart along the width.




Cross-Section of Hodge/Iwano Combination
(orientation of adapter as shown in Fig. 3 of Hodge)

695. Hodge's main body further includes a first top wall and a first bottom wall spaced apart along the height.

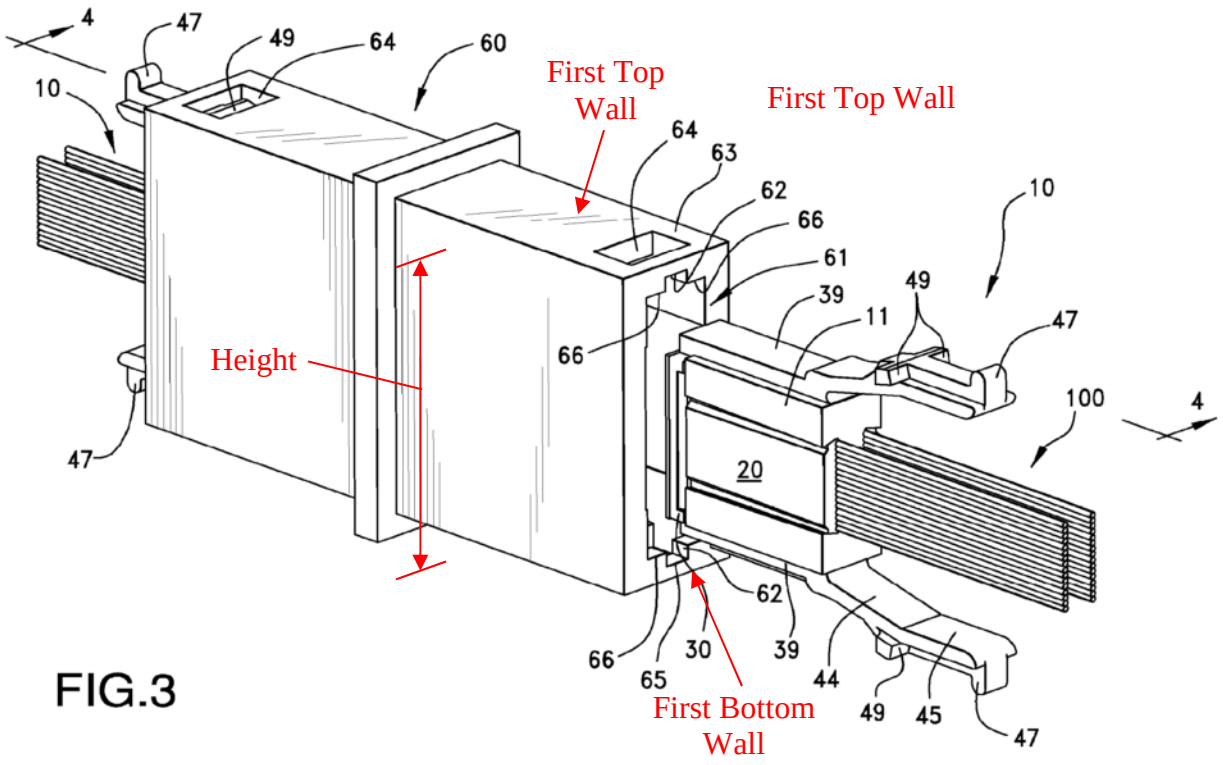
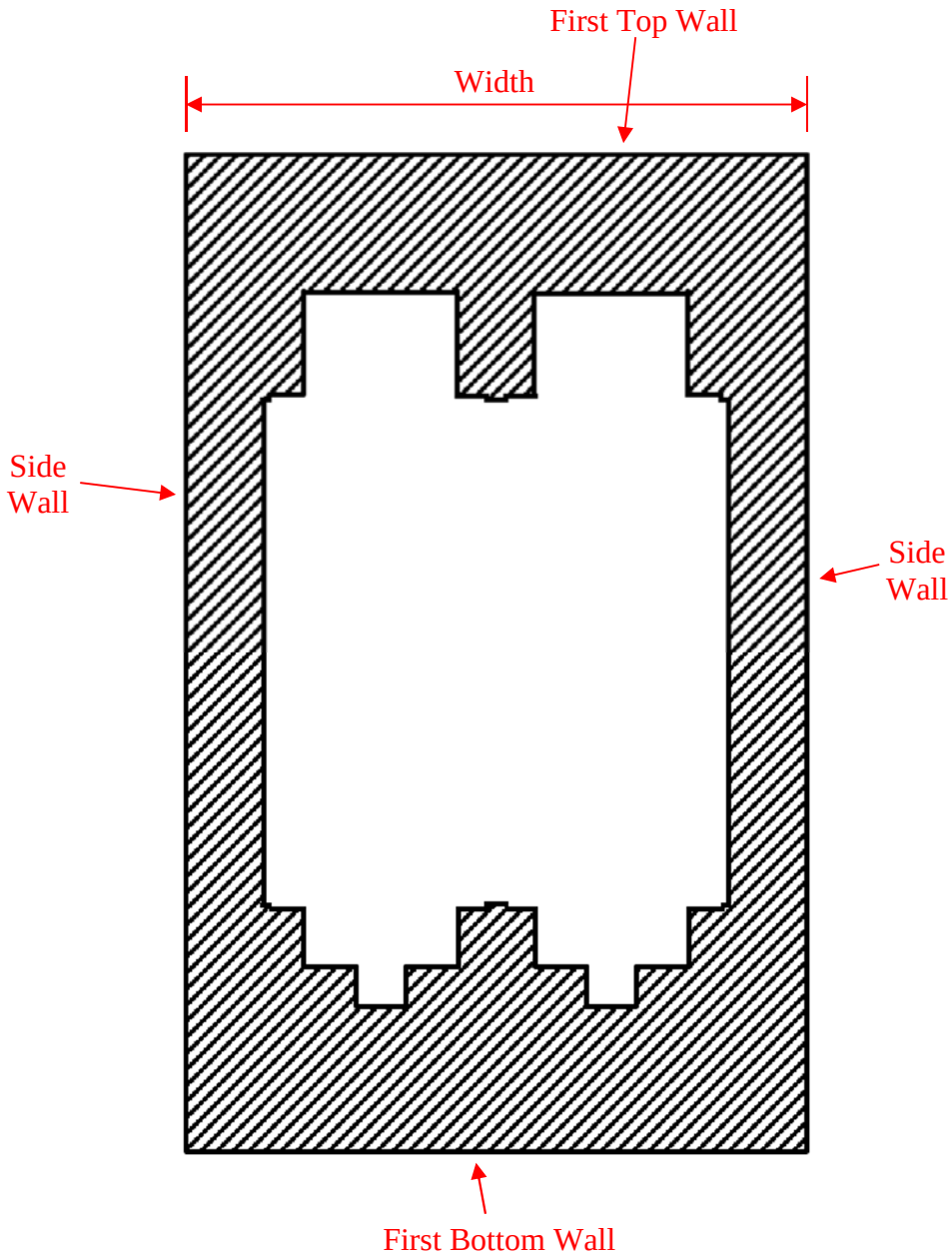



FIG.3

EX1009: Fig. 3 (annotated).




Cross-Section of Hodge/Iwano Combination (orientation of adapter shown in Fig. 3 of Hodge)

696. Therefore, the Hodge-Iwano combination renders the "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls" limitation obvious.



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### 12.a.3 "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls"

697. Hodge's first top and bottom walls each extends widthwise between the two opposite side walls.

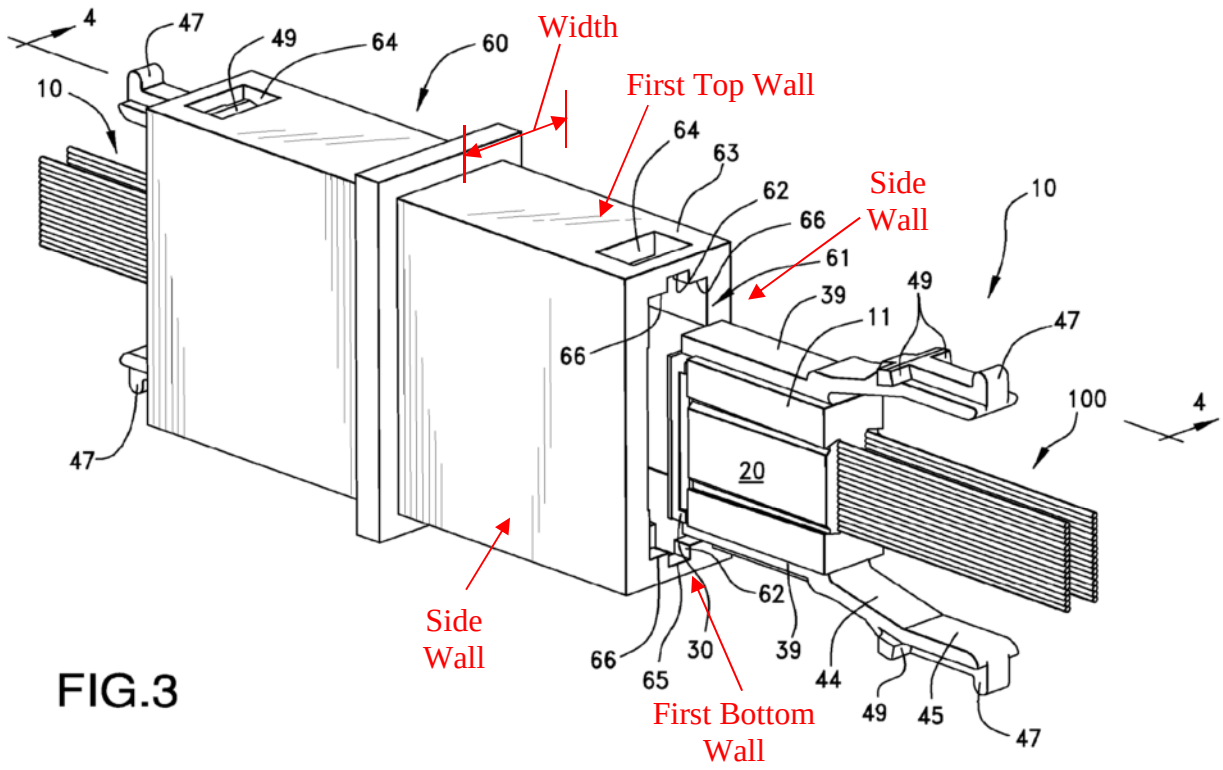
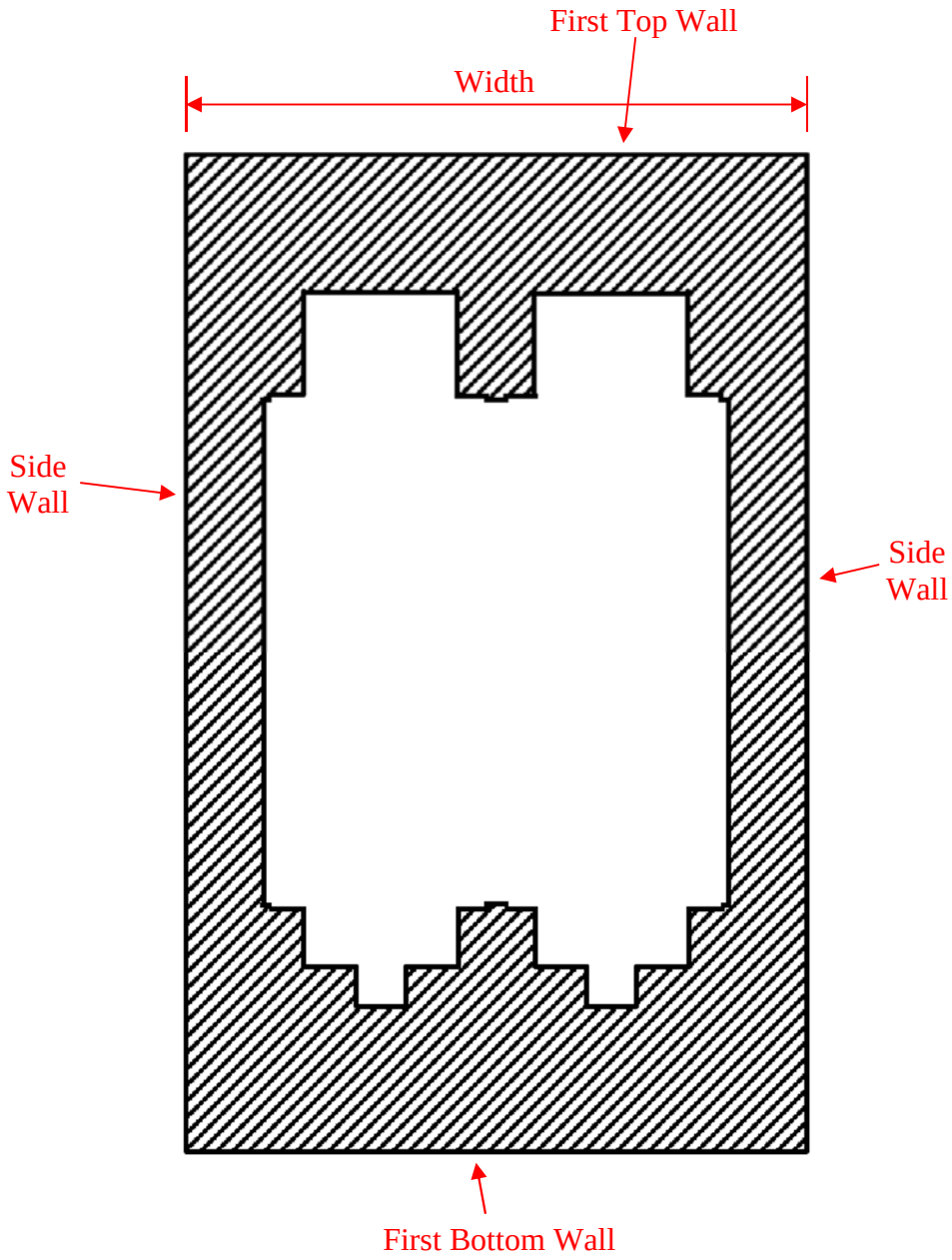



FIG.3

EX1009: Fig. 3 (annotated).




Cross-Section of Hodge/Iwano Combination
(orientation of adapter as shown in Fig. 3 of Hodge)

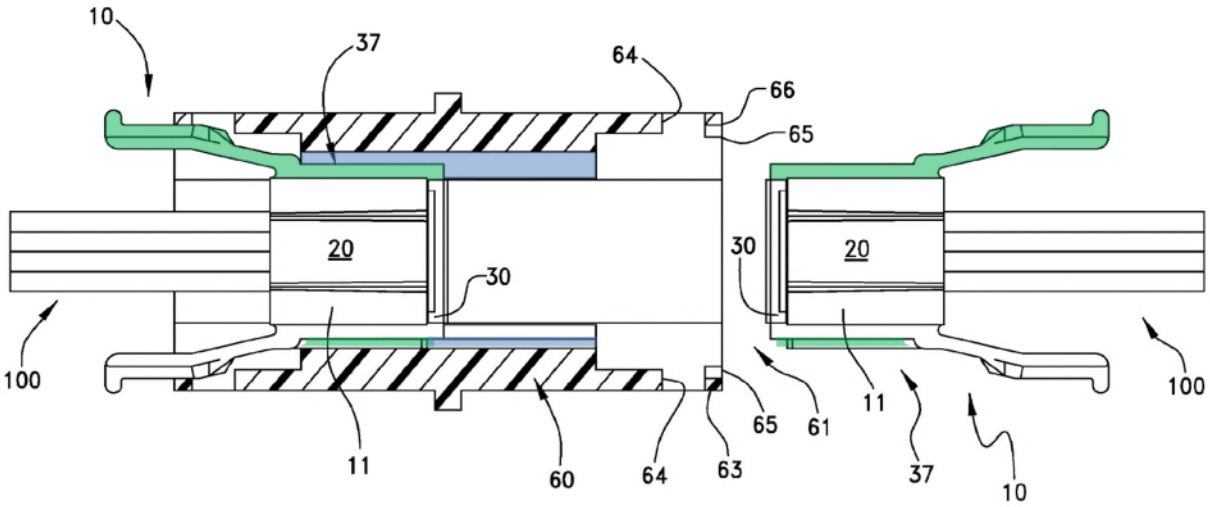
698. Therefore, the Hodge-Iwano combination renders the "each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls" limitation obvious.



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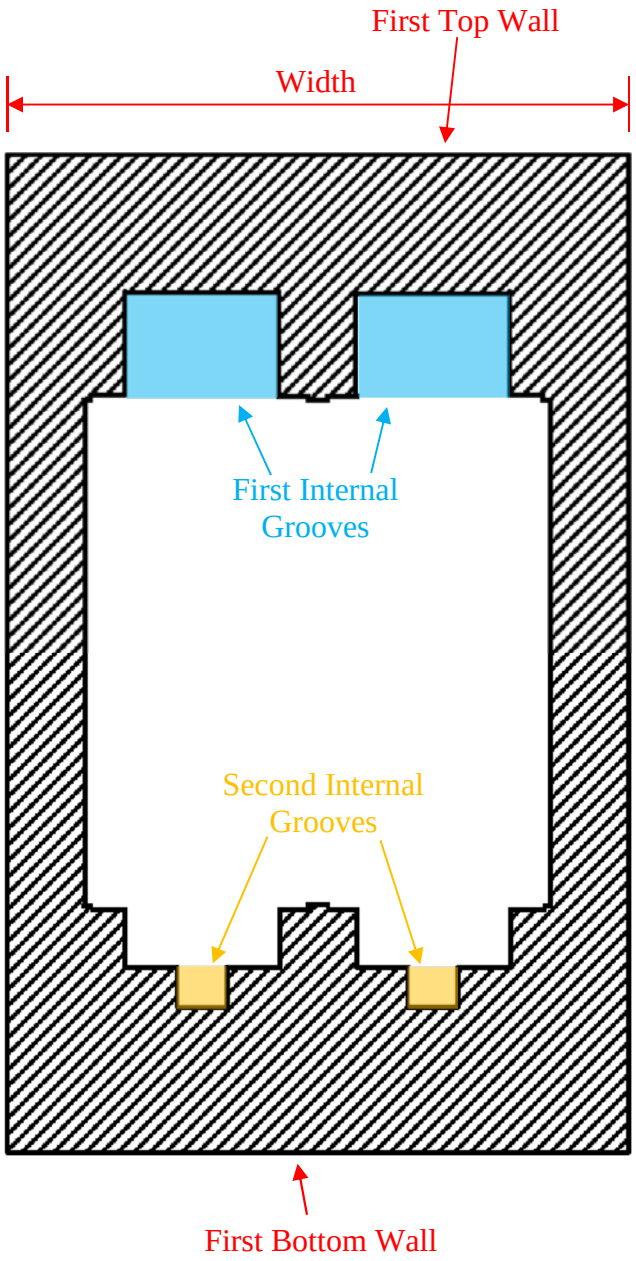
**12.b "the first top wall having first internal grooves spaced apart along the width and the first bottom wall having second internal grooves spaced apart along the width"**

699. As discussed in Paragraphs 600-604, the Hodge-Iwano combination includes first internal grooves (blue) in the first top wall and second internal grooves in the first bottom wall.




EX1009: Fig. 4 (annotated, flipped).

700. As shown below, the first and second internal grooves are spaced apart along the width:




Cross-Section of Hodge/Iwano Combination
(orientation of adapter as shown in Fig. 3 of Hodge)

701. Therefore, the Hodge-Iwano combination renders the "the first top wall having first internal grooves spaced apart along the width and the first bottom

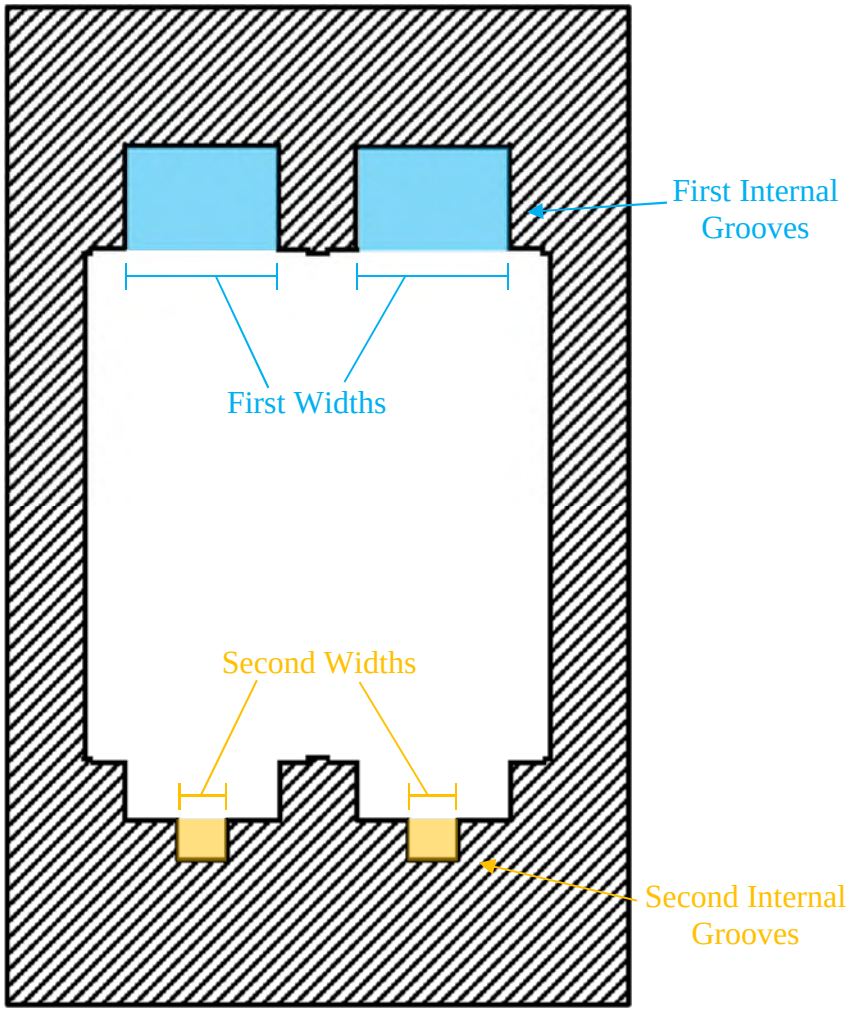
wall having second internal grooves spaced apart along the width" limitation obvious.

**12.c.1 "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width"**

702. As discussed in Paragraphs 699-700, the Hodge/Iwano combination includes first internal grooves (blue) in the first top wall that have a different—specifically, larger—width than the second internal grooves (orange) in the first bottom wall.



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Cross-Section of Hodge/Iwano Combination (orientation of adapter shown in Fig. 3 of Hodge)

703. Therefore, the Hodge-Iwano combination renders the "each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width" limitation obvious.

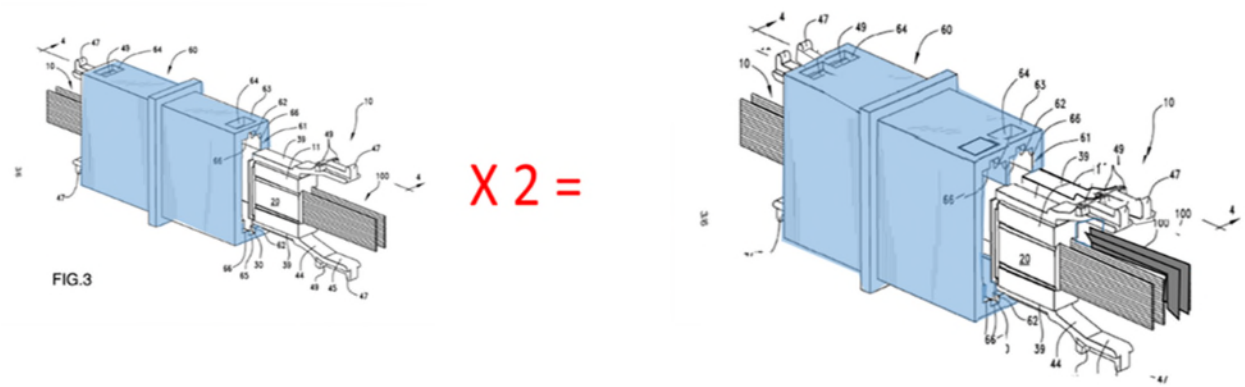
**12.c.2 "and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the**



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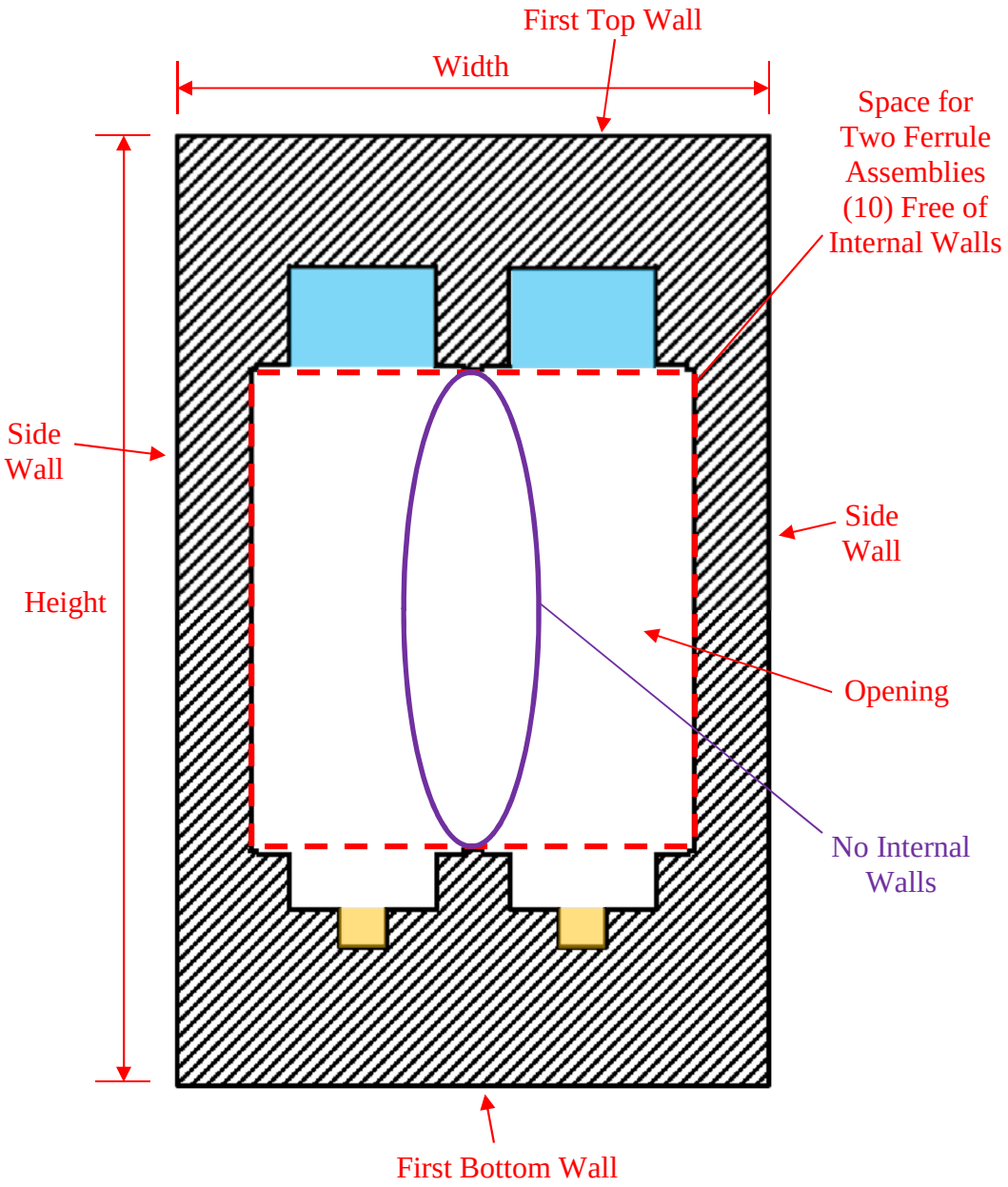
**opposing side walls along the width and between the first top wall and the first bottom wall along the height."**

704. As described in Paragraphs 585-589 above, when implementing the Hodge/Iwano combination, one of skill in the art would have eliminated any partitions to achieve the highest density. EX1006: 28:65-29:5.




EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter (60) that receives two ferrule assemblies (10)).

705. As shown above and below, Hodge's adapter (modified in view of Iwano) does not include internal walls between the adjacent spaces for receiving the ferrule assemblies (10) that are adjacent to one another on the same side in the opening.




Cross-Section of Hodge-Iwano Combination
(orientation of adapter as shown in Fig. 3 of Hodge)

706. The first and second internal grooves are identified by Claim 12 as being part of the first top and first bottom walls, respectively. EX1001: 8:17-19. As such, a POSA would consider the ribs of the Hodge/Iwano combination that



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define the grooves to be part of the respective walls—in the context of the claims of the ‘415 Patent.

707. Therefore, the Hodge-Iwano combination renders the “the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height” limitation obvious.

### L. Claim 13 – “The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors.”

708. As discussed in Paragraphs 630-634 and 671-677 with respect to Claims 5 and 10 above, it would have been obvious to modify the Hodge adapter to accept a plurality of pairs fiber optic connectors.

709. Hodge discloses an adapter that accepts a single ferrule assembly from each side. *See* EX1009: [0041] (“Adapter 60 includes a generally rectangular opening 61 to receive each ferrule assembly 10.”), Figs. 3 and 4 (annotated below).

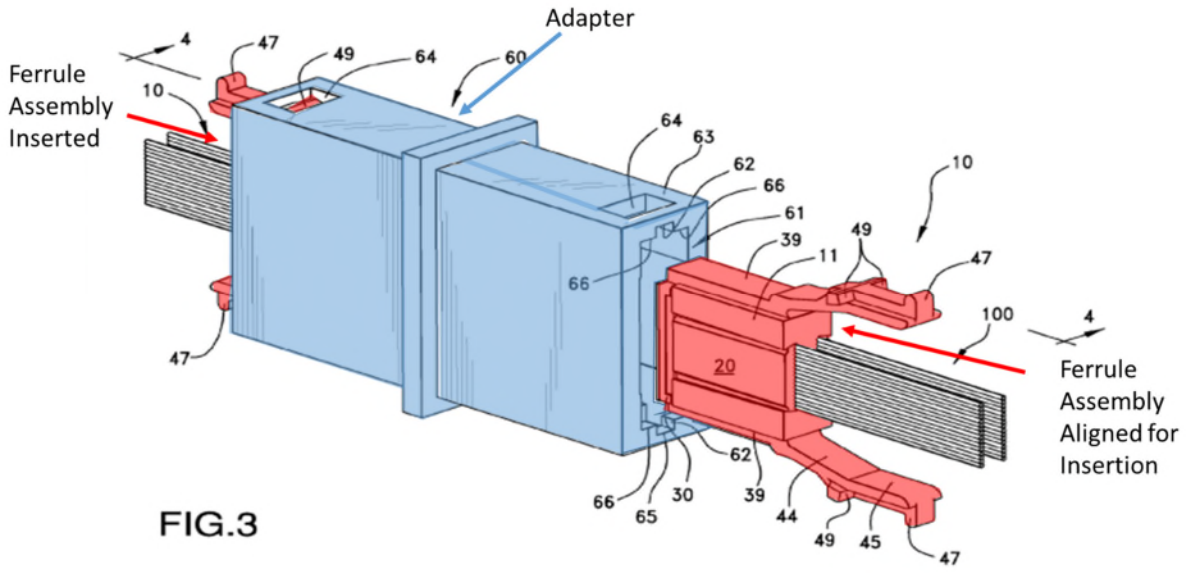



FIG.3

EX1009: Fig. 3 (annotated).

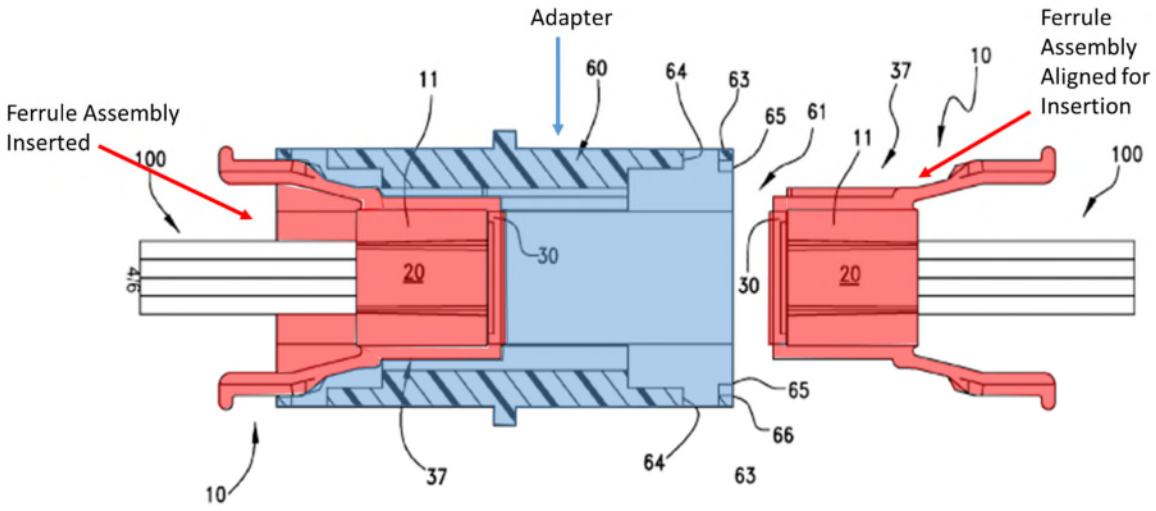


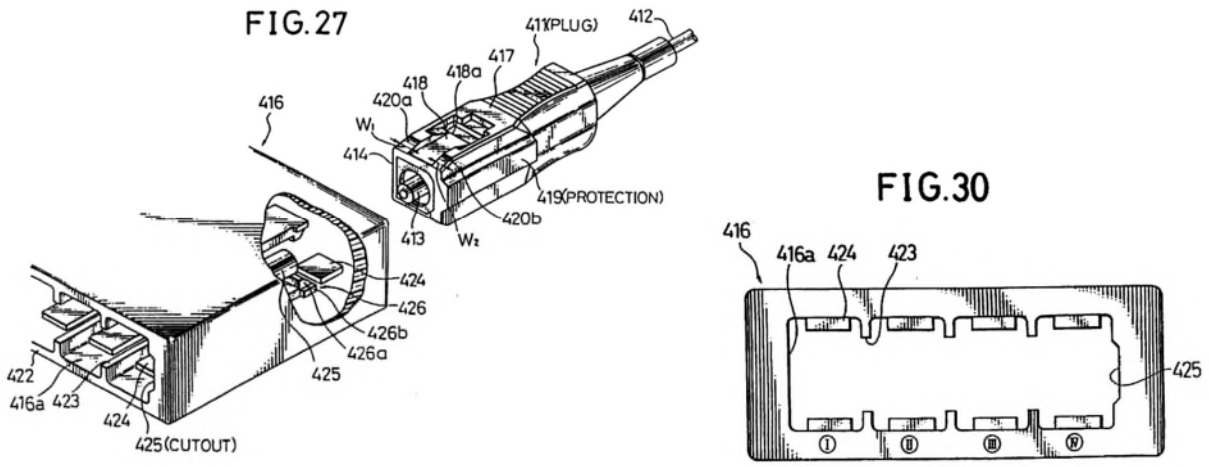

FIG.4

EX1009: Fig. 4 (annotated).

710. Although Hodge discloses an adapter that only accepts one multi-fiber optical connector from each side, those of skill in the art would recognize that the

industry has increasingly sought to increase fiber optic density, including through expanding adapters to receive multiple fiber optic connectors from each side.

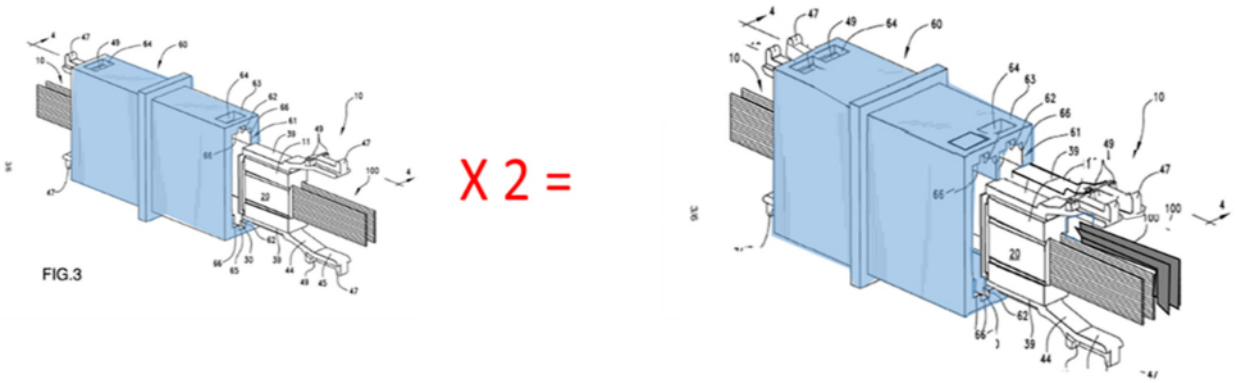
711. For example, Iwano teaches an adapter that accepts a plurality of fiber optic connector assemblies to achieve increased density. EX1006: 28:60-63 ("when a higher mounting density is required for the ordinary single core optical connector, a method of using an adapter is known to simultaneously couple a plurality [*sic*] of plugs"), Figs. 27 & 30.




EX1006: Figs. 27 & 30.

712. As discussed in Paragraphs 579-581, It would have been obvious to expand Hodge's adapter (60) to receive multiple fiber optic assemblies (10) arranged in parallel to one another, similar to the SC quad adapter of Iwano.

713. As a result of this modification, the expanded Hodge adapter would receiver multiple fiber assemblies (10) from each side.




EX1009: Fig. 3 (annotated, modified to show a modified Hodge adapter (60) that receives two ferrule assemblies (10)).

714. Accordingly, the Hodge-Iwano combination renders "The adapter according to claim 12, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors" obvious.

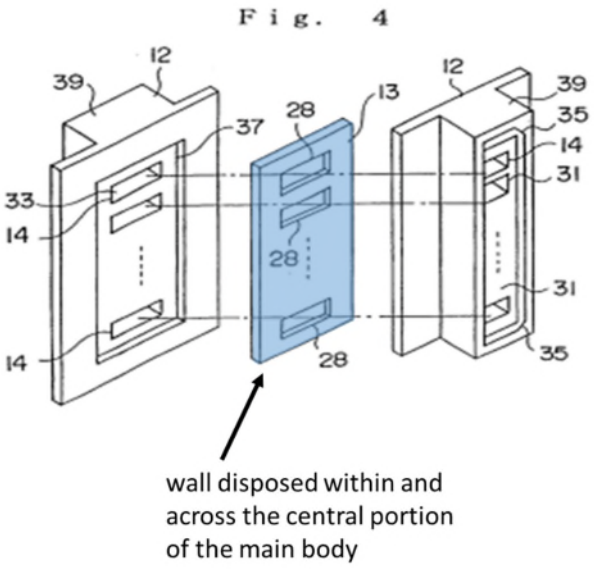
## OBVIOUSNESS: HODGE, IWANO, AND KANAI (GROUND 7)

### A. Motivation to Modify Hodge Based on Kanai

715. Electromagnetic interference is a known problem encountered in fiber optic interconnects. *See* EX1022: [0002] (identifying EMI as a problem); EX1023: [0004] ("As the bandwidth and carrier frequencies increase, electromagnetic interference (EMI) becomes a more serious problem. Accordingly, control of EMI has arisen as an issue in optical connector system design.").

716. While the Hodge and Iwano references do not discuss solutions to block electromagnetic interference, Kanai teaches the inclusion of a metallic plate (13) made of a conductive material at the center of the adapter housing to mitigate

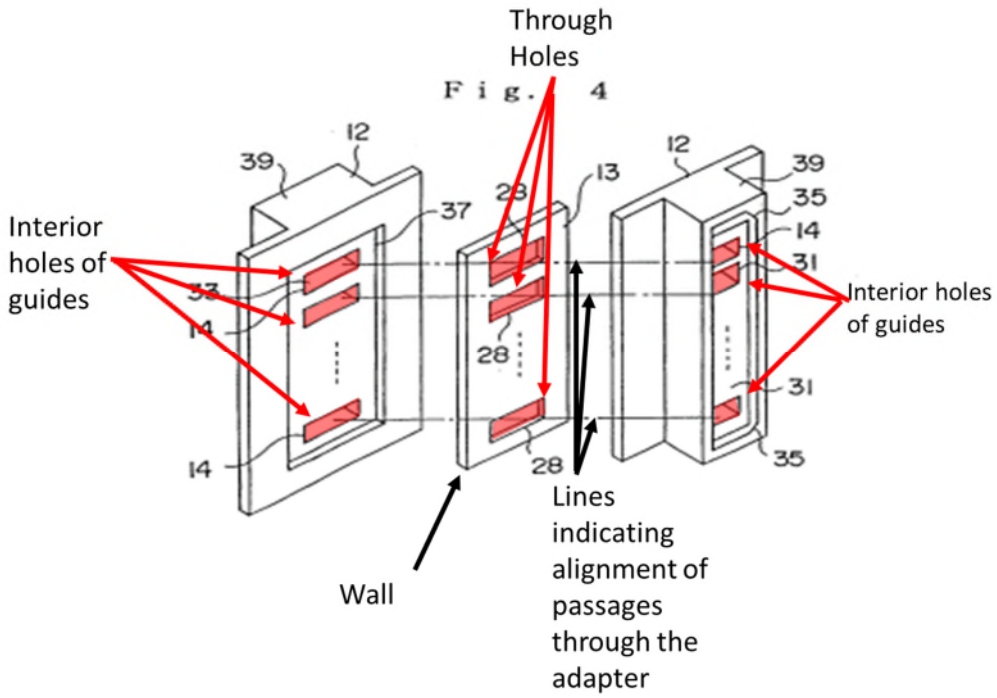
EMI interference. EX1003: 8:22-24 ("… it is also possible to secure continuity with the frame of the measurement instruments as in the adapter 8 in which a metallic plate 13 is caused to intervene between the housing halves 12 … to prevent any erroneous operation in the other measurement instruments, computer, etc. which may be generated by electromagnetic waves."); EX1003: Fig. 4 (annotated below).




EX1003: Fig. 4 (annotated).

717. The metallic plate (13) between the two housing halves (12) of Kanai contains through holes (28)—i.e., passages—for the end portions of the fiber optic ferrules to pass therethrough. EX1003: 8:45-51 ("the metallic plate 13 is caused to intervene between the first guides 31 and the second guides 33, and the metallic plate 13 has through holes 28 formed at the position corresponding to the hole

space enclosed by the inner circumferential wall 14 of the first and second guides 31 and 33."); *see also* EX1003: Figs. 4 and 1 (annotated below).




EX1003: Fig. 4 (annotated).

718. As the Hodge adapter and its openings are expanded to receive a plurality of optical connectors in parallel from each side of the adapter, it would have been obvious to incorporate a wall between the parallel ferrules, such as the metallic plate taught by Kanai to mitigate EMI interference.

719. It would have been obvious to modify Hodge's adapter (60) to include Kanai's metallic plate (13) to prevent electromagnetic interference. EX1003: 8:22-24; EX1007: 3:25-32; EX1021: 1:44-47; EX1023: ¶[0004].

720. In incorporating such a wall within the adapter, the wall would contain apertures or through holes shaped and sized to closely surround the faces of the ferrules so as to allow the ferrules to mate while providing EMI mitigation as taught by Kanai.

721. This modification of Hodge would have been nothing more using a known technique (Kanai's metallic plate (13) for an optical device module) to improve a similar device (Hodge's adapter (60)) in the same way (EMI shielding for a fiber optic adapter).

722. A person of skill in the art would have had a reasonable expectation of success in adding Kanai's metallic plate (13) to Hodge's adapter (60) because Kanai's metallic plate (13) would retain the same functionality when mounted to Hodge's adapter that it had when mounted to in Kanai's adapter

**B. Claims 6 and 14**

723. Claim 6 depends from Claim 1, adding claim limitations regarding the inclusion of limitations regarding a "wall disposed within and across the central portion of the main body." Claim 14 depends from Claim 12, but otherwise adds identical claim limitations as further recited by Claims 6. Accordingly, I am addressing the claim limitations added by Claims 6 and 14 to the independent claims together.



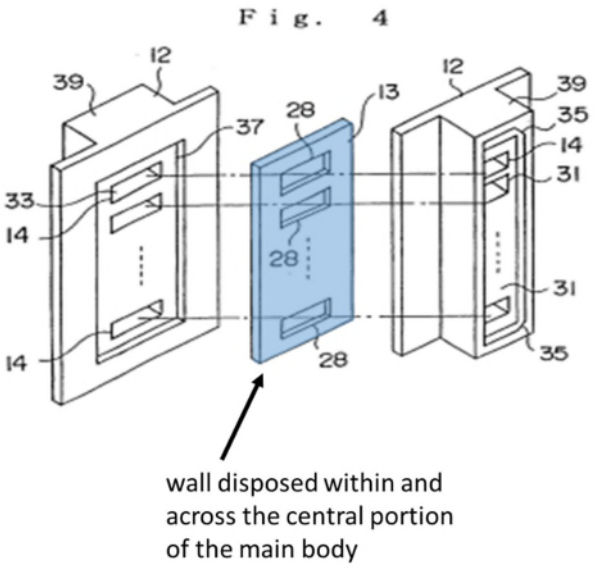
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**6.a "The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side"**

724. As discussed above, electromagnetic interference presents a known problem in electrical systems, including in fiber optic interconnects. *See* EX1022: [0002] (identifying EMI as a problem); EX1023: [0004] ("As the bandwidth and carrier frequencies increase, electromagnetic interference (EMI) becomes a more serious problem. Accordingly, control of EMI has arisen as an issue in optical connector system design.").

725. It was known to provide internal walls with apertures therethrough for the opposing ferrules to mate within in order to reduce electromagnetic interference. *See e.g.*, EX1022: Abstract ("An internal wall is provided with an aperture there through to reduce electromagnetic interference.")

726. Kanai teaches the inclusion of such a wall in the form of a metallic plate (13) at the center of the adapter housing. EX1003: 8:22-24 ("As shown in FIG. 1 and FIG. 4, the adapter 8 is constructed to have two housing halves 12 of almost the same shape and a metallic plate 13."), Fig. 4 (annotated below).




EX1003: Fig. 4 (annotated).

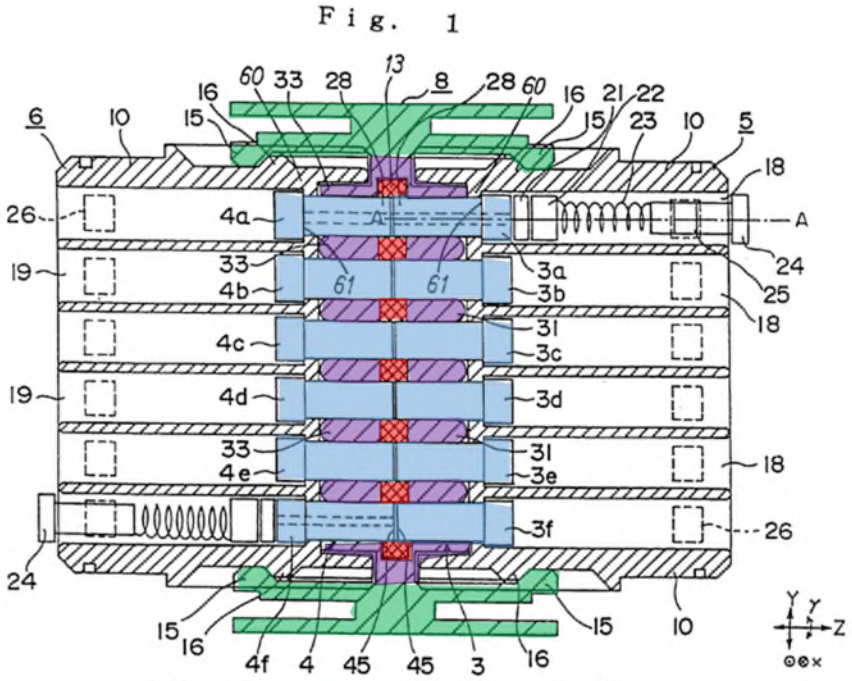
727. The metallic plate of Kanai is taught to be made of a conductive material to mitigate EMI interference. EX1003: 11:21-50 (. . . it is preferable that the adapter 8 is formed so as to include a conductive material or to have a metallic plate 13, in order to prevent any erroneous operation in the other measurement instruments, computer, etc., resulting from leakage of the abovementioned electromagnetic waves").

728. As explained above, it would have been obvious to further modify the Hodge adapter to include an internal wall of Kanai that would surround the interface of connected corresponding ferrules to reduce electromagnetic interference. As a result of this modification, Kanai's metallic plate (13) would be disposed within and across the central portion of Hodge's adapter (60), between the first and second sides of the adapter.

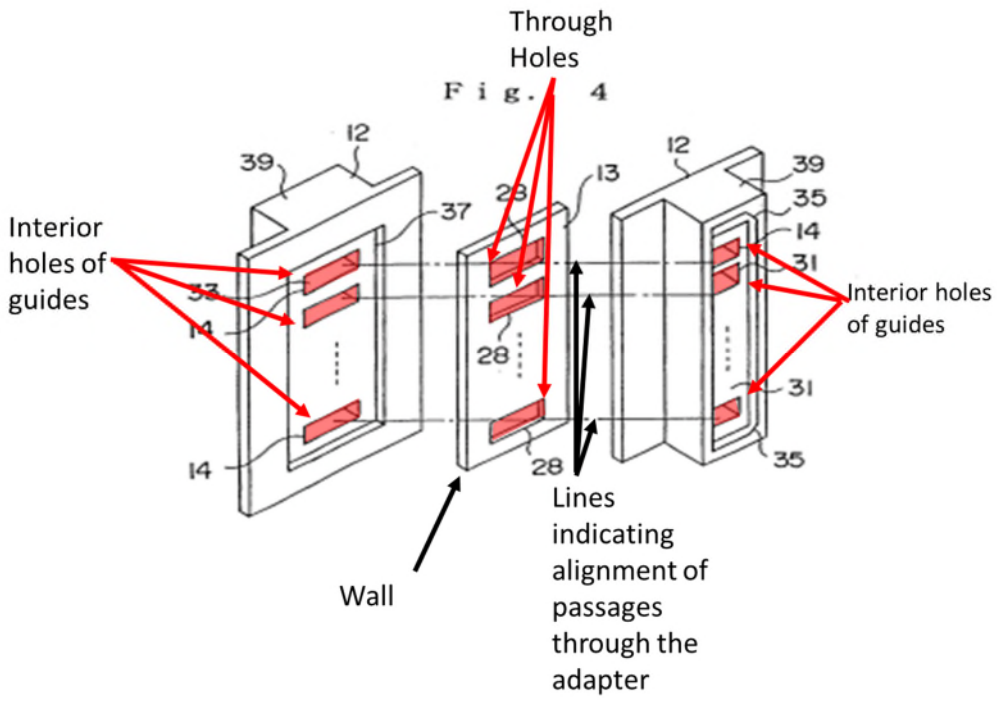
729. Therefore, Hodge/Iwano/Kanai renders "The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side" obvious.

**6.b "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough."**

730. As shown in Figures 1 and 4, the multiple guides (31, 33) and through holes (28) in the metallic plate (13) of Kanai define a plurality of passages through the disclosed adapter. EX1003: Figs. 1 and 4 (annotated below).




EX1003: Fig. 1 (annotated).




EX1003: Fig. 4 (annotated).

731. Each of passage within the metallic plate (13) of Kanai corresponds to a pair of optical connectors such that the number of passages corresponds to the number of pairs of corresponding fiber optic ferrules.

732. In modifying the Hodge adapter—as expanded in view of Iwano—to include an internal wall, it would have been obvious to size, shape, and locate the apertures to precisely correspond to the outer edges of the face of the ferrules, such that the ferrules could pass therethrough.

733. As such, when mating fiber optic connectors within the adapter, the face-to-face mating of corresponding ferrules would occur within the aperture of Kanai's wall.

734. Therefore, the Hodge/Iwano/Kanai combination renders "the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first and second sides to pass therethrough" obvious.

### G. Claim 7 – "The adapter according to claim 6, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules."

735. In modifying the expanded adapter of the Hodge/Iwano adapter to include an internal wall as taught by Kanai, in keeping with the teachings of Kanai, the resulting wall would have exactly one aperture corresponding to each pair of fiber optic ferrules.

736. This configuration would provide shielding of EMI for each pair of optical connectors being mated.

737. Therefore, the Hodge/Iwano/Kanai combination renders "The adapter according to claim 3, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules" obvious.

## SECONDARY CONSIDERATIONS

738. I understand that to date Patent Owner has not identified any secondary considerations of non-obviousness. In the event that the Patent Owner identifies any secondary considerations in the future, I may supplement my opinion to address them.



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

Executed this 11th day of April, 2024.

By Edward Lurie: /Edward B. Lurie/



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# APPENDIX

# Edward Lurie | Sr. Fiber Optic Interconnect Developer

**Remote from Haiku, HI**
**512-689-3664**
**eblurie@sbcglobal.net**

## Professional Profile

Proven Track record designing & developing Fiber Optic Interconnect Products: Connectors, Cable Assemblies, Fanouts, Multifiber Connectors, and related Field Installation Kits & Tools. I successfully launched dozens of FO new products, leading development teams. My background in Precision Optical Mfg. has given me a unique perspective re: FO Product & Process Devel. Process development, Sub-micron machining, Injection Molding, Optical inspection, Precision Metrology, Tool Design and Fixturing are also areas of expertise. I have over 18 US Patents in FO Interconnect, listed below.

## Core Skills

- FO Interconnect Design & Devel.
- Concurrent Engineering -DFM
- Invention submission & IP
- Creativity
- Ideation
- Project Management
- High yield manufacturing - 6 Sigma
- Problem solving
- Process development
- Prototype development

## Career Summary

**Sep 1983 - Aug 2019** **3M Co and Corning, Inc, Austin, TX**
**Sr Product Development Specialist**

*Outline*

Developed Industry Standard and novel FO Interconnect Products for Telecom, Datacom, Enterprise (LANs) & Wireless markets. I was a Sr. Product Development Specialist (Chief Engineer - Technical SME) and concurrently served as Project Manager.

*Key Responsibilities*

- FO Interconnect product Design & development from concept to Launch,
- Design for high yield manufacturing,
- Support to Customers & Application Engineering
- Concurrent process engineering.
- Manufacturing interface & support.

*Key Achievements*

- Developed a large portfolio of FO Simplex, Duplex, and Multifiber Interconnect products over a 36 yr Career (Biconic, ST Epoxy, ST, SC & LC Hotmelt, SC/UPC and SC/APC Epoxy, 8F -24F MTP/MPO, OGI, SC/No-Polish Mechanical Splice, Crimplok+, Crimplok+ Extreme, and SC/APC Shuttered Connectors).
- Developed dozens of proprietary manufacturing processes for polishing and Cable Assembly, that are held as Trade Secret.
- Developed novel field installable FO Interconnects and Field Termination Kits for both Key Account Customers and the general Market.
- I am known widely as an industry expert in FO Connector Design and Process Development.
- Contributed to Telcordia, IEC, and TIA/EIA Industry Standards FO Interconnect over 85% of my career.
- Managed the Manufacturing Engineering group for several years in the early 1990's.



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**Apr 1980 - Apr 1983** **Republic Lens Co, Englewood, NJ**
**Production Manager**

*Outline*

Production and Plant Manager for Precision OEM Optical Manufacturer. Oversaw precision optical manufacturing of custom lenses, mirrors, prisms, and optical assemblies, including in-house Thin-film coatings. Had P&L responsibility for the company.

## Education

- **BS in Business Administration** | Franklin & Marshall College | Jul 1976 - Apr 1980 | Post Graduate Study at the Institute of Optics, University of Rochester, NY

## Additional

**Hobbies & Interests**

Swimming, Tennis, Downhill Skiing, Hiking, Golf, Fitness , Tropical fruit & vegetable farming

**Software**

Microsoft office, Excel, Word, PowerPoint, Skype, Microsoft Teams, Adobe Illustrator, Microsoft Windows, Microsoft Project

**Languages**

Proficient in German

**Publications**

I have published several articles for OFC (Optical Fiber Conference), and other industry Magazines eg: Fiber Optic Product News, etc.

**Awards**

I have been awarded the following US Patents, most are also filed Internationally:

US-20210405304-A1 - Fiber optic connectors with funnel-shaped boots and methods of installing the same

US-10663679-B2 - Assembly tool and optical fiber connector assembly method

US-10502919-B2 - Cable assembly with a removable installation device

US-20180299633-A1 - Cable assembly with a removable installation device

US-10001619-B2 - Cable assembly with a removable installation device

US-20180081130-A1 - Assembly tool and optical fiber connector assembly method

US-20170261716-A1 - Cable assembly with a removable installation device

US-20140299645-A1 - Low cost, disposable optical fiber cleaver

US-8292699-B2 - Optical fiber polishing apparatus and method

US-20100029180-A1 - Optical fiber polishing apparatus and method

US-7255486-B2 - Field termination apparatus and method for small form factor optical connectors with thermoplastic adhesive

US-7147384-B2 - Small form factor optical connector with thermoplastic adhesive

US-7149402-B2 - Device for holding field termination load adapter for optical connectors

US-7108431-B2 - Ferrule for use in fiber optic connectors



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US-20060105684-A1 - Fiber polishing apparatus and method for field terminable optical connectors

US-20060103039-A1 - Heat shrink device and method

US-20060104574-A1 - Field termination apparatus and method for small form factor optical connectors with thermoplastic
adhesive

US-20060104588-A1 - Device for holding field termination load adapter for optical connectors

US-7001081-B2 - Strain relief boot with flexible extension for guiding fiber optic cable

US-6973242-B2 - Apparatus useful for guiding fiber optic ribbons into ferrules

US-20050213891-A1 - Small form factor optical connector with thermoplastic adhesive

US-6850684-B2 - Three dimensional optical circuits

US-6832032-B2 - In-line shuffle modules utilizing three dimensional optical circuits

US-20040234209-A1 - Strain relief boot with flexible extension for guiding fiber optic cable

US-20040208455-A1 - Apparatus useful for guiding fiber optic ribbons into ferrules

US-20040208456-A1 - Ferrule for use in fiber optic connectors

US-6556754-B2 - Three dimensional optical circuit

US-6549710-B2 - Method of making a three dimensional optical circuit

US-20030031436-A1 - Three dimensional optical circuit

US-20030031437-A1 - In-line shuffle modules utilizing three dimensional optical circuits

US-20030031452-A1 - Method of making a three dimensional optical circuit

US-20030031448-A1 - Optical manifold

US-5458528-A - Method for polishing fiber optic ferrules

US-5351327-A - Polished fiber optic ferrules

US-5109983-A - Package for an optical fiber jumper



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