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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05	5557

152017 7590 03/04/2024

US Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
03/04/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@usconec.com
eofficeaction@appcoll.com
michael@leetzow.com

Senko Ex. 1017, Page 1
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Office Action Summary	Application No. 17/857,300	Applicant(s) Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on January 15, 2024.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☑ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☑ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

2. With regards to the amendment filed on January 15, 2024, all the requested changes to the claims have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 1-21 are pending.

Terminal Disclaimer

3. The terminal disclaimer filed on January 15, 2024 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date(s) of Patent No. 10,156,684 and Patent No. 10,890,723 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

4. Applicant's arguments with respect to claim(s) 1-21 have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

Specification

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification, as originally filed, does not mention any "channels" as recited by claims 1 and 15.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1, 5, 6, 9-12, and 15-21 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Patent No. 6,146,023 to Weigel et al. (hereinafter "Weigel") in view of Patent Pub. No. US 2012/0057824 A1 to Katoh ("Katoh"). Katoh was made of record in a previously filed Information Disclosure Statement.

In re claim 1, Weigel discloses an adapter/coupling sleeve (40) for holding fiber optic connectors (4), see FIGS. 1-3, the adapter (40) comprising:

a main body, see FIG 3, having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector (4) from the first side mating with a second fiber optic connector (4) from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion for receiving a coding rib (30b); and

wherein the first internal groove has a first width, wherein the adapter (40) is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first

fiber optic connector (4) and an additional fiber optic connector (4) side-by-side with the first fiber optic connector (4) without any internal walls therebetween, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector (4) and another additional fiber optic connector (4) side-by-side with the second fiber optic connector (4) without any internal walls therebetween. *See* columns 3-5 of Weigel for further details.

Thus, Weigel only differs from claim 1 in that he does not teach a second internal groove of the first bottom wall also extending from the first side toward the central portion, wherein the second internal groove has a second width less than the first width. Katoh, on the other hand, teaches an optical connector (1) having first and second keys (52, 51) wherein the second key (51) has a second width less than a first width of the first key (52) as seen in FIG. 9 of Katoh. Katoh further discloses an adapter (7) that would comprise first and second internal grooves for receiving corresponding keys (52, 51) of the connector (1). The keying arrangement of Katoh is useful for distinguishing different connectors and for preventing optical connectors from being connected to different adapters. *See* paragraphs [0020]-[0023] of Katoh. In order to prevent other optical connectors from being connected to his adapter (40), Weigel would have been modified to include a second internal groove in the first bottom wall extending from the first side toward the central portion wherein the second internal groove has a second width less than the first width, per the suggestion of Katoh, thereby obtaining the invention specified by claim 1. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 1 in view of Weigel combined with Katoh.

In re claim 5, as seen in FIG. 3 of Weigel, the first top wall has a dropped top portion surrounding a raised portion of the first top wall that defines first internal groove and the first bottom wall would have been modified to have a raised bottom portion symmetrical to the raised portion of Weigel for mitigating electromagnetic interference (EMI) by providing the second internal groove on the first bottom wall for the reasons mentioned with respect to claim 1.

In re claim 6, as seen in FIG. 3 of Weigel, the first top wall and the first bottom wall have at least a partially smooth plane structure in the central portion.

In re claim 9, as seen in FIG. 3 of Weigel the main body has a width to receive one fiber optic connector (4) to four fiber optic connectors (4).

In re claim 10, Weigel discloses an adapter (40) for aligning fiber optic ferrules (4) inserted from opposing sides, see FIGS. 1-3, comprising:

a main body, see FIG. 3, having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface of the main body extending longitudinally toward the central portion from each of the first side and the second side for receiving coding rib (30b),

wherein the adapter (40) is configured such that a first fiber optic ferrule (4) is received at the first side and a second fiber optic ferrule (4) is received at the second side of the adapter (40) for alignment by the at least one groove at the top surface of the main body, and

wherein the adapter (40) is configured to mate at least four fiber optic ferrules (4) in pairs with space for at least two fiber optic ferrules (4) on the first side without any internal walls of

the adapter (40) therebetween and at least two fiber optic ferrules (4) on the second side without any internal walls of the adapter (40) therebetween, including the first fiber optic ferrule (4) and the second fiber optic ferrule (4). *See* columns 3-5 of Weigel for further details.

Thus, Weigel only differs from claim 10 in that he does not teach and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side for aligning the ferrules (4). Katoh, as previously discussed, discloses an adapter (7) that would comprise at least one groove in a top surface of a main body of the adapter at least one groove in a bottom surface of the main body for aligning connectors (1) using first and second keys (52, 51). *See* FIGS. 2-9 of Katoh. The keying arrangement of Katoh is useful for distinguishing different connectors and for preventing optical connectors from being connected to different adapters. *See* paragraphs [0020]-[0023] of Katoh. In order to prevent other optical connectors from being connected to his adapter (40), Weigel would have been modified to include at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side for aligning the ferrules (4), per the suggestion of Katoh, thereby obtaining the invention specified by claim 10. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 10 in view of Weigel combined with Katoh.

In re claim 11, Katoh further teaches using differently sized grooves on the top surface than on the bottom surface of his adapter (7). It would have also been obvious to use differently sized grooves in Weigel for the same reasons mentioned with respect to claim 10.

In re claim 12, as seen in FIG. 2 of Weigel, the first fiber optic ferrule (4) is disposed partially inside a first ferrule holder (30), and wherein the at least one groove is sized to match a projection/rib (30b) on an outside surface of the first ferrule holder (30) for alignment.

In re claim 15, Weigel discloses an adapter (40) for aligning a first fiber optic connector (4) having a first fiber optic ferrule (4) inserted from a first side and a second fiber optic connector (4) having a second fiber optic ferrule (4) inserted from a second side, see FIGS. 1-3, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector (4) and the second side configured to receive the second fiber optic connector (4);

a central portion inside the main body located between the first side and the second side, the first fiber optic connector (4) and the second fiber optic connector (4) mating in a region of the central portion; and

a first groove disposed on the top surface on each of the first side and the second side, the first groove extending toward the central portion from each of the first side and the second side,

wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector (4) and an additional fiber optic connector (4) side-by-side with the first fiber optic connector (4) without any internal walls therebetween, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector (4) and another additional fiber optic connector (4) side-by-side with the

second fiber optic connector (4) without any internal walls therebetween. *See* columns 3-5 of Weigel for further details.

Thus, Weigel only differs from claim 15 in that he does not teach a second groove disposed on the bottom surface on each of the first side and the second side extending toward the central portion from each of the first side and the second side, wherein the first groove has a dimension different from the second groove. Katoh, as previously discussed, discloses an adapter (7) that would comprise a different sized grooves disposed in a top surface and a bottom surface of a main body of the adapter (7) for aligning connectors (1) using first and second keys (52, 51). *See* FIGS. 2-9 of Katoh. The keying arrangement of Katoh is useful for distinguishing different connectors and for preventing optical connectors from being connected to different adapters. *See* paragraphs [0020]-[0023] of Katoh. In order to prevent other optical connectors from being connected to his adapter (40), Weigel would have been modified to include a second groove disposed on the bottom surface on each of the first side and the second side extending toward the central portion from each of the first side and the second side, wherein the first groove has a dimension different from the second groove, per the suggestion of Katoh, thereby obtaining the invention specified by claim 15. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 15 in view of Weigel combined with Katoh.

In re claim 16, the first groove of Katoh is wider than the second groove in order to receive the first key (52) that is wider than the second key (51) of connector (1). Therefore, the invention

specified by claim 16 is also considered obvious for the same reasons mentioned with respect to claim 15.

In re claim 17, as seen in FIG. 3 of Weigel, the dimension of the first groove matches a dimension of a projection (30b) of the first fiber optic connector (4) for alignment.

In re claim 18, Weigel discloses an adapter (40) for holding fiber optic connectors (4), see FIGS. 1-3, the adapter (40) comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector (4) from the first side mating with a second fiber optic connector (4) from the opposing second side within the central portion; and

an internal groove on each of the first side and the opposing second side within a space of the adapter (40), the internal groove configured to align the first fiber optic connector (4) and the second fiber optic connector (4) in the main body and also align an additional fiber optic connector (4) side-by-side with the first fiber optic connector (4) without any internal walls therebetween to an additional fiber optic connector (4) side-by-side with the second fiber optic connector (4) without any internal walls therebetween within the width of the adapter (40). *See* columns 3-5 of Weigel for further details.

Thus, Weigel only differs from claim 18 in that he does not teach a plurality of internal grooves on each of the first side and the opposing second side. Katoh, as previously discussed, discloses an adapter (7) that would comprise a plurality of internal grooves on each of the first side and the opposing second side of the adapter (7) for aligning fiber optic connectors (1) having first and second keys (52, 51). *See* FIGS. 2-9 of Katoh. The keying arrangement of Katoh is useful for distinguishing different connectors and for preventing optical connectors from being connected to different adapters. *See* paragraphs [0020]-[0023] of Katoh. In order to prevent other optical connectors from being connected to his adapter (40), Weigel would have been modified to include a plurality of internal grooves on each of the first side and the opposing second side, per the suggestion of Katoh, thereby obtaining the invention specified by claim 18. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 18 in view of Weigel combined with Katoh.

In re claim 19, as seen in FIG. 3 of Weigel, the internal groove is sized to receive a respective projection/rib (30b) on each of the first fiber optic connector (4) and the second fiber optic connector (4) for alignment. Since it would have been obvious to use a plurality of internal grooves in Weigel, the invention specified by claim 19 is also considered obvious for the same reasons mentioned with respect to claim 18.

In re claim 20, as seen in FIG. 3 of Weigel, the internal groove extends longitudinally in a direction toward the central portion. Since it would have been obvious to use a plurality of

internal grooves in Weigel, the invention specified by claim 20 is also considered obvious for the same reasons mentioned with respect to claim 18.

In re claim 21, Weigel discloses an adapter (40) for optical fiber communications, see FIGS. 1-3, the adapter (40) comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors (4) from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

wherein the adapter (40) is free of internal walls between the at least two channels on the first side. *See* columns 3-5 of Weigel for further details.

Thus, Weigel only differs from claim 21 in that he does not teach a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove, wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width. Katoh, as previously discussed, discloses an adapter (7) that would comprise a

second internal groove of a first bottom wall extending toward a central portion, the second internal groove being on a same side of the opening as a first internal groove, wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width for aligning fiber optic connectors (1) having first and second keys (52, 51). *See* FIGS. 2-9 of Katoh. The keying arrangement of Katoh is useful for distinguishing different connectors and for preventing optical connectors from being connected to different adapters. *See* paragraphs [0020]-[0023] of Katoh. In order to prevent other optical connectors from being connected to his adapter (40), Weigel would have been modified to include a second internal groove on the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove, wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, per the suggestion of Katoh, thereby obtaining the invention specified by claim 21. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 21 in view of Weigel combined with Katoh.

8. Claims 2-4, 7, 8, 13, and 14 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Weigel in view of Katoh as applied to claim 1, 6, or 10 above, and further in view of Patent No. 4,645,295 to Pronovost ("Pronovost"). Pronovost was applied in a prior Office action.

In re claims 2, 7, and 13, Weigel in view of Katoh only differs in that Weigel does not disclose that the central portion of his adapter (40) includes a wall extending across the opening in the adapter (40). Pronovost, however, teaches an adapter (10) comprising a central portion that

includes a wall/spacer (72) extending across an opening in the adapter (10) that maintains a short distance between optical fibers (28A). *See* col. 6, line 43 to col. 7, line 4 of Pronovost. In order to maintain an appropriate distance between the fiber optic connectors (4), the central portion of the adapter (40) of Weigel in view of Katoh would have also included a wall extending across the opening in the adapter (40), per the teachings of Pronovost, thereby obtaining the invention specified by claims 2, 7, and 13. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claims 2, 7, and 13 in view of Weigel combined with Katoh, and further in view of Pronovost.

In re claims 3 and 14, as seen in FIG. 3 of Pronovost, the wall (72) divides the central portion of his adapter (10) in half. Therefore, it would have also been obvious to obtain the invention specified by claims 3 and 14 for the same reasons mentioned with respect to claims 2 and 13.

In re claims 4 and 8, as seen in FIG. 1 of Pronovost, the wall (72) has passageways (84) sized to allow respective ferrules from a first fiber optic connector (16) and a second fiber optic connector (16) to engage. Therefore, it would have also been obvious to obtain the invention specified by claims 4 and 7 for the same reasons mentioned with respect to claims 2 and 7.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar R. Rojas whose telephone number is (571)272-2357. The examiner can normally be reached Monday-Friday, 10AM-6PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Hollweg can be reached on 571-270-1739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Omar R Rojas/
Primary Examiner
Art Unit 2874

or
February 27, 2024

Examiner-Initiated Interview Summary	**Application No.** 17/857,300	**Applicant(s)** Nguyen et al.		
	Examiner Omar R Rojas	**Art Unit** 2874	**AIA (First Inventor to File) Status** No	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
Omar R Rojas	Primary Examiner	Telephonic
Michael L. Leetzow	Attorney of Record	

Date of Interview: 05 February 2024

Issues Discussed:

Proposed Amendment(s)

The examiner contacted Mr. Leetzow to propose adding "a plurality of grooves that extend across the central portion and configured to align ferrule holders" to each of the independent claims in view of newly found prior art to Weigel. (Pat. No. 6,146,023). To date, however, no agreement to the proposed amendment has been reached.

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Senko Ex. 1017, Page 16
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Notice of References Cited	Application/Control No. 17/857,300	Applicant(s)/Patent Under Reexamination Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-6146023-A	2000-11-14	Weigel; Hans-Dieter	G02B6/3879	385/139
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/857,300	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2874

CPC - Searched*		
Symbol	Date	Examiner
G02B6/3825,3831,3879	09/11/2023	/ORR/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Checked refs. for 17/145,864.	07/14/2023	/ORR/
G02B6/3825,3831,3879 limited by CPC query - PE2E Search History Printout.	09/11/2023	/ORR/
Updated above - See PE2E Search History Printout.	01/08/2024	/ORR/
Updated PE2E search from 17/145,864 - See Search History Printout .	01/08/2024	/ORR/
PE2E SEARCH (PGPUB,USPAT) - See Search History Printout.	01/31/2024	/ORR/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Senko Ex. 1017, Page 13
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/857,300	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2874

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Senko Ex. 1017, Page 19
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1822	32	("20030063862"|"20040117981"|"20090226140"|"20110019962"|"20120177326"|"20130183004"|"20130209041"|"20130216188"|"20130301994"|"20140147081"|"20140331464"|"20140348468"|"5283848"|"5796896"|"5971625"|"6146023"|"6259856"|"6331079"|"6357928"|"6422760"|"6461053"|"6572276"|"8500470"|"8641293"|"8873921"|"8998505"|"9057845"|"9086546"|"9146351"|"9494744"|"9519114"|"9568689").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/31 04:08 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Senko Ex. 1017, Page 20
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT

Further to the Amendment filed on January 15, 2024, Applicant amends the application as follows:

IN THE CLAIMS:

1. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending ~~from the~~ between the first side ~~toward the central portion~~ and the second side; and

a second internal groove of the first bottom wall also extending ~~from the~~ between the first side and the second side ~~toward the central portion~~,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Currently Amended) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally ~~toward the central portion from each of~~ between the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by a projection associated with each of the first and second fiber optic ferrules the at least one groove at the top surface and the bottom surface of the main body, and wherein the adapter is configured to mate at least four fiber optic ferrules in pairs with space for at least two fiber optic ferrules on the first side without any internal walls of the adapter therebetween and at least two fiber optic ferrules on the second side without any internal walls of the adapter therebetween, including the first fiber optic ferrule and the second fiber optic ferrule.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Currently Amended) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side, the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending ~~toward the central portion from each of~~ between the first side and the second side,

wherein the first groove has a dimension different from the second groove, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing

second side, the main body configured to receive a first plurality of fiber optic ~~connector~~ connectors from the first side for mating with a second plurality of fiber optic ~~connector~~ connectors from the opposing second side within the central portion, each of the first and second plurality of fiber optic connectors having projections; and

a first plurality of internal grooves on ~~each of~~ the first side and a second plurality of internal grooves on the opposing second side within a space of the adapter, each of the plurality of internal grooves configured to receive a respective projection to align the first plurality of fiber optic connectors with ~~connector and~~ the second plurality of fiber optic connectors ~~connector~~ in the main body ~~and also align an additional fiber optic connector side-by-side with the first fiber optic connector~~ without any internal walls ~~therebetween to an additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls~~ therebetween within the width of the adapter.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. Canceled.

22. (New) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

the main body configured to receive a first plurality of fiber optic connectors from the first side and a second plurality of fiber optic connectors from the opposing second side, wherein the each of the first and second plurality of fiber optic connectors have projections;

a central portion inside the main body located between the first side and the opposing second side, wherein the central portion is configured such that fiber optic connectors received from the first side of the main body mate with fiber optic connectors received from the second side of the main body within the central portion; and

a first plurality of internal grooves on the first side of the main body and a second plurality of internal grooves on the opposing second side of the main body, each of the plurality of internal grooves configured to receive a respective projection on a fiber optic connector and to align the first plurality of fiber optic connectors with the second plurality of fiber optic connectors in the main body without any internal walls therebetween within the width of the adapter.

REMARKS

Applicant has amended the claims in the present application to further the prosecution of the case. None of the cited or identified references disclose or suggest the claims as now pending. Applicant requests that the Examiner pass the application to issue.

Respectfully submitted,

/Michael L. Leetzow/
Michael L. Leetzow PLLC
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Telephone: 407/302-9970

Date: March 1, 2024

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**03/01/2024 11:37:14 AM Z ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	64515978	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
AmendFeb2024.pdf	8	Supplemental Response or Supplemental Amendment	148 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
AmendFeb2024.pdf	4B62E355D0C55B8C79A039E2C60986D4D1B89A570B92450EA C18037C8DC7BA0C29AD06748DCCD9DEA72EE0ED24107578 9587FD8A9D6AA292E6E53FFEB4F5F1AC

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

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Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**01/15/2024 05:36:02 PM Z ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63953327	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
AmendUSCO5305Jan2024.pdf	8	Amendment/Request for Reconsideration-After Non-Final Rejection	132 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
AmendUSCO5305Jan2024.pdf	24D368A5BD852A238DC39DF0F73069EAD5002F854F693B33E7FA22313C5186420B948C091EE333ACCEF0D37A1F77ADDFED3F8D45DE13D8C166CD4525D16A767D

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT

In response to the Office Action mailed on January 12, 202, Applicant amends the application as follows:

IN THE CLAIMS:

1. (Previously Presented) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall also extending from the first side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Currently Amended) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body, and wherein the adapter is configured to mate at least four fiber optic ferrules in pairs with space for at least two fiber optic ferrules on the first side without any internal walls of the adapter therebetween and at least two fiber optic ferrules on the second side without any internal walls of the adapter therebetween, including the first fiber optic ferrule and the second fiber optic ferrule.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Previously Presented) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side,

the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. (Previously Presented) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves on each of the first side and the opposing second side within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body and also align an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween to an additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween within the width of the adapter.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. (Previously Presented) An adapter for optical fiber communications, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove,

wherein the first internal groove has a first width and the second internal groove has a second

width, the first width is greater than the second width, wherein the adapter is free of internal walls between the at least two channels on the first side.

REMARKS

In the above-referenced Office Action, the Examiner rejected claims 10 -14 under 35 U.S.C. 112(b) and rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 and claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684.

Applicant has amended claim 10 as suggested by the Examiner. Applicant has also filed a terminal disclaimer to obviate the double patenting rejections. Thus, the case is allowable.

Respectfully submitted,

/Michael L. Leetzow/
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Date: January 15, 2024

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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A PRIOR PATENT

APPLICATION #	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET #
17857300	07/05/2022	Hiep Nguyen	USCO-053-05

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

☑ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☑ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent interest
US Conec Ltd.	100%
Total	100%

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)

Application #	Filing Date

as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the

instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

Patent #
10156684
10890723

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.



Terminal disclaimer fee under 37 CFR 1.20(d) included with Electronic Terminal Disclaimer request.

Applicant claims the following entity status:
Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statemnts made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I certify, in accordance with 37 CFR 1.4(d)(4) that I am: An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Signature	Name	Registration #
/Michael L. Leetzow/	Michael Leetzow	35932

* Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner). Form PTO/SB/96 may be used for making this certification. See MPEP 324.

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PATENT AND TRADEMARK OFFICE

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Alexandria, VA 22313 - 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	01/15/2024 05:33:36 PM Z ET	USCO-053-05

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63953289	AUTHORIZED BY	-
CUSTOMER #	152017	FILING DATE	07/05/2022
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Hiep V. Nguyen

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 7852	E20241EH34209409	Michael Leetzow

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1814	STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER	170.00	1	170.00
			TOTAL AMOUNT:	$170.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313 - 1450
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APPROVAL LETTER

APPLICATION #	FILING DATE	APPLICANT/PATENT UNDER REEXAMINATION
17/857,300	07/05/2022	Hiep Nguyen

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Electronic terminal disclaimer filed on 01/15/2024

☑ Approved

This patent is subject to a Terminal Disclaimer

Approved / Disapproved by: Electronic Terminal Disclaimer automatically approved

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**01/15/2024 05:33:36 PM Z ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63953289	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
petition-request.pdf	3	Terminal Disclaimer-Filed (Electronic)	49 KB
grantLetter.pdf	1	Terminal Disclaimer-Electronic-Approved	19 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
petition-request.pdf	EAD2B3D0B93D99C0085FF463655813B58F73722F06EEF1A7D633D1CE1662CA1BC738D2D5677A8B1D5A069A24B49D5032F3

	245D88CE067581BD122511CCF8402E
grantLetter.pdf	68C78971D5E84C9789C0B4A853D6F372EFBCF34F98BE1F826 65E16D653FF602C691B1F3530573BB798EC2B67B20D572CB97 BD11D0BB03782B68E707C1E99F0E3

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/857,300	Filing Date 07/05/2022	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/15/2024	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VICTORIA JOHNSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05	5557

152017 7590 01/12/2024

US Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
01/12/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@usconec.com
eofficeaction@appcoll.com
michael@leetzow.com

Office Action Summary	Application No. 17/857,300	Applicant(s) Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on December 26, 2023.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 26, 2023 has been entered.

Response to Amendment

3. With regards to the amendment filed on December 26, 2023, all the requested changes to the claims have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 1-21 are pending.

Response to Arguments

4. Applicant's arguments, see pages 8-9, filed December 26, 2023, with respect to previous claim rejections under 35 USC §102 have been fully considered and are persuasive. The rejection of claims 1-4 and 6-21 under 35 USC §102 has been withdrawn.

Claim Rejections - 35 USC § 112

5. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 10-14 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention. Claim 10 recites the newly added limitation "with space for at least two fiber optic ferrules on the first side without any internal walls therebetween". As seen in Fig. 6A of the application drawings, however, internal walls of connectors (300) are located between adjacent ferrules (12). Thus, the aforementioned limitation contradicts the disclosure and renders claim 10 indefinite because there are actually "internal walls" located between the fiber optic ferrules in view of Fig. 6A. This rejection may be overcome by changing the term "internal walls" to "internal walls of the adapter".

7. Claims 11-14 are rejected under this section as being dependent upon rejected claim 10.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619

(CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

9. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684 (hereinafter "the '684 patent").** The '684 parent was applied in a prior Office action. Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-11 of the '684 patent only differ from pending claims 1-21 in that the patented claims do not recite all of the additional

aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-11 of the '684 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-11 of the '684 patent.

10. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 (hereinafter "the '723 patent").** The '723 parent was applied in a prior Office action. Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-17 of the '723 patent only differ from pending claims 1-21 in that the patented claims do not recite all of the additional aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-17 of the '723 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-17 of the '723 patent.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar R. Rojas whose telephone number is (571)272-2357. The examiner can normally be reached on Monday-Friday, 10AM-6PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using

a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Hollweg can be reached on 571-270-1739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Omar R Rojas/
Primary Examiner
Art Unit 2874

or
January 8, 2024

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/857,300	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2874

CPC - Searched*		
Symbol	Date	Examiner
G02B6/3825,3831,3879	09/11/2023	/ORR/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Checked refs. for 17/145,864.	07/14/2023	/ORR/
G02B6/3825,3831,3879 limited by CPC query - PE2E Search History Printout.	09/11/2023	/ORR/
Updated above - See PE2E Search History Printout.	01/08/2024	/ORR/
Updated PE2E search from 17/145,864 - See Search History Printout .	01/08/2024	/ORR/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Senko Ex. 1017, Page 53
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L32	92	4 AND 7	(US-PGPUB; USPAT; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:25 PM
L33	441	1 AND 2	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:28 PM
L34	289	2 AND 10	(US-PGPUB; USPAT; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:28 PM
L35	1072	10 AND (4 7)	(US-PGPUB; USPAT; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH,	OR	ON	ON	2024/01/08 01:29 PM

Senko Ex. 1017, Page 59
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

			CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Senko Ex. 1017, Page 60
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1816	988	1803 AND 1804	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:36 PM
L1818	43	(Artificial Intelligence) More like doc: CN-202600189-U Text: (WO-2013179197-A1 OR CN-103257407-B OR CN-103257407-A OR CN-202421558-U OR CN-219799842-U OR US-8444327-B2 OR CN-101779344-B OR CN-101779344-A OR CN-220105344-U OR EP-2168214-A2 OR EP-2168214-B1 OR CN-116315823-A OR JP-2022513812-A OR DE-60100639-T2 OR CN-106887726-A OR EP-1710864-A3 OR CN-1845381-A OR EP-1033786-B1 OR CA-2300000-C OR EP-1033786-A2).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:38 PM
L1819	32	("5283848" | "5796896" | "5971625" | "6146023" | "6259856" | "6331079" | "6357928" | "6422760" | "6461053" | "6572276" | "8500470" | "8641293" | "8873921" | "8998505" | "9057845" | "9086546" | "9146351" | "9494744" | "9519114" | "9568689" | "20030063862" | "20040117981" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/01/08 01:38 PM

Senko Ex. 1017, Page 61
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

		"20090226140" | "20110019962" | "20120177326" | "20130183004" | "20130209041" | "20130216188" | "20130301994" | "20140147081" | "20140331464" | "20140348468").pn. AND (PGPB | USPT | USOC).dbnm.					
L1820	1	(13/790599).APP.	(USPAT; USOCR)	OR	ON	ON	2024/01/08 01:38 PM
L1821	136	1758 AND 1806	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/01/08 01:38 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Senko Ex. 1017, Page 62
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	12/26/2023 02:51:51 PM Z ET	USCO-053-05

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63749650	AUTHORIZED BY	-
CUSTOMER #	152017	FILING DATE	07/05/2022
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Hiep V. Nguyen

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 1000	E2023BPE52316183	Michael Leetzow

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1251	EXTENSION FOR RESPONSE WITHIN FIRST MONTH	220.00	1	220.00
1801	REQUEST FOR CONTINUED EXAMINATION (RCE) - 1ST REQUEST (SEE 37 CFR 1.114)	1360.00	1	1360.00
			TOTAL AMOUNT:	$1,580.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/22 (12-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): USCO-053-05

Application Number: 17/857,300

Filed: 2022-07-05

For: Alignment Adapter and Alignment Design for a Connector Therefor

Art Unit: 2874

Examiner: Omar R ROJAS

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$220	$88	$44	$ 220
☐	Two months (37 CFR 1.17(a)(2))	$640	$256	$128	$
☐	Three months (37 CFR 1.17(a)(3))	$1,480	$592	$296	$
☐	Four months (37 CFR 1.17(a)(4))	$2,320	$928	$464	$
☐	Five months (37 CFR 1.17(a)(5))	$3,160	$1,264	$632	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

☑ Payment made via USPTO's patent electronic filing system (Patent Center or EFS-Web).

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 35932.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Michael L. Leetzow/
Signature

2023-12-26
Date

Michael L. Leetzow
Typed or printed name

407 302 9970
Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 6 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to: 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law; 2) a Federal, state, local, or international agency, in response to its request; 3) a contractor of the USPTO having need for the information in order to perform a contract; 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record; 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record; 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations; 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals; 8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)); 9) the Office of Personnel Management (OPM) for personnel research purposes; and 9) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Additional Uses

Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.

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Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**12/26/2023 02:51:51 PM Z ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63749650	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
USCO-053-05_USPTO_AIA22_20231226_141408.pdf	2	Extension of Time	244 KB
AmendUSCO5305Dec2023.pdf	11	Amendment Submitted/Entered with Filing of Continued Prosecution Application (CPA)/Request for Continued Examination(RCE)	482 KB
USCO-053-05_USPTO_SB30PC_20231226_141057.pdf	3	Request for Continued Examination (RCE)	1642 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
USCO-053-05_USPTO_AIA22_20231226_141408.pdf	F1B2FB36C1AFA6523DE0AFF63A68023B67C197203A510FAC450F27A3A8709C2989AE8AC71FDA8C420BF41DBA15105AEBCB346F503E3762D99C6BF99CED55F40B
AmendUSCO5305Dec2023.pdf	A857F42674E9D84FE068A5664721807EC31F41C11C89475AA9401DDC7F840461ADDE912864A1535FC99CFE31B37DF3744A8C3726EBDA85AFCCD5334A7CB783D5
USCO-053-05_USPTO_SB30PC_20231226_141057.pdf	42DE9A6FCA9FB9662D4BC2255EB56C6A5A0C8811FCBC2B3826042FA81842BABFEC07EB904D1B83C207EC5792CF7A6E22A458670FC6CF8CAD64F1A15FDCE8F625

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/30EFS (01-22)
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	17/857,300	Filing Date	2022-07-05	Docket Number (if applicable)	USCO-053-05	Art Unit	2874
First Named Inventor	Hiep V. Nguyen			Examiner Name	Omar R ROJAS		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☒ Other Fees

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (01-22)
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Signature of Registered U.S. Patent Practitioner			
Signature	/Michael L. Leetzow/	Date (YYYY-MM-DD)	2023-12-26
Name	Michael L. Leetzow	Registration Number	35932

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT WITH REQUEST FOR CONTINUED EXAMINATION

In response to the final Office Action mailed on September 19, 2023, and the Advisory Action on December 8, 2023, Applicant amends the application as follows:

IN THE CLAIMS:

1. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall also extending from the first side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Currently Amended) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body, and wherein the adapter is configured to mate at least four fiber optic ferrules in pairs with space for at least two fiber optic ferrules on the first side without any internal walls therebetween and at least two fiber optic ferrules on the second side without any internal walls therebetween, including the first fiber optic ferrule and the second fiber optic ferrule.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Currently Amended) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side,

the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves on each of the first side and the opposing second side within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body and also align an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween to an additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween within the width of the adapter.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. (Currently Amended) An adapter for optical fiber communications, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove,

wherein the first internal groove has a first width and the second internal groove has a second

width, the first width is greater than the second width, wherein the adapter is free of internal walls between the at least two channels on the first side ~~outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height~~.

REMARKS

In the above-referenced Office Action, the Examiner rejected claims 10 and 12-14 under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost; rejected claims 1-4, 6-21 under 35 U.S.C. 102(e) as being anticipated by Patent No. WO2013/179197 to Grinderslev et al.; and rejected claim 11 under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Patent Pub. No. US 2012/0057824 A1 to Katoh; rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684; and rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 and claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684.

With regard to the rejections on the grounds of non-statutory double patenting, Applicant will submit appropriate terminal disclaimers once the claims are in an otherwise allowable state due to the payment that must accompany the disclaimers.

Applicant has amended claims 1, 10, 15, 18, and 21. Thus claims 1-21 are still pending.

The Examiner rejected claims 10 and 12-14 under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost indicating that there is at least one groove in a bottom surface and that four successive pairs of fiber optic ferrules can be mated and generally referred Applicant to columns 3-6. Applicant was not able to find anything related to more than a single pair of fiber optic ferrules being mated from opposite sides. See Col. 4, ll. 1-5. However, to further prosecution, Applicant has amended claim 10 to explicitly require that the adapter has space for at least two fiber optic ferrules on the first side and at least two fiber optic ferrules on the second side. The adapter in Pronovost does not have that feature and has space to only accept one fiber optic ferrule on each side.

The Examiner also appears to interpret the claim language of the at least one groove in the bottom surface as being shown in Fig. 1. However, the claim requires that there be at least one groove in each of the top and bottom walls on both sides of the adapter. That means, as explained before, that there are at least four grooves. Applicant has annotated Fig. 1 to show where the at least one groove 62 in the top surface is missing:

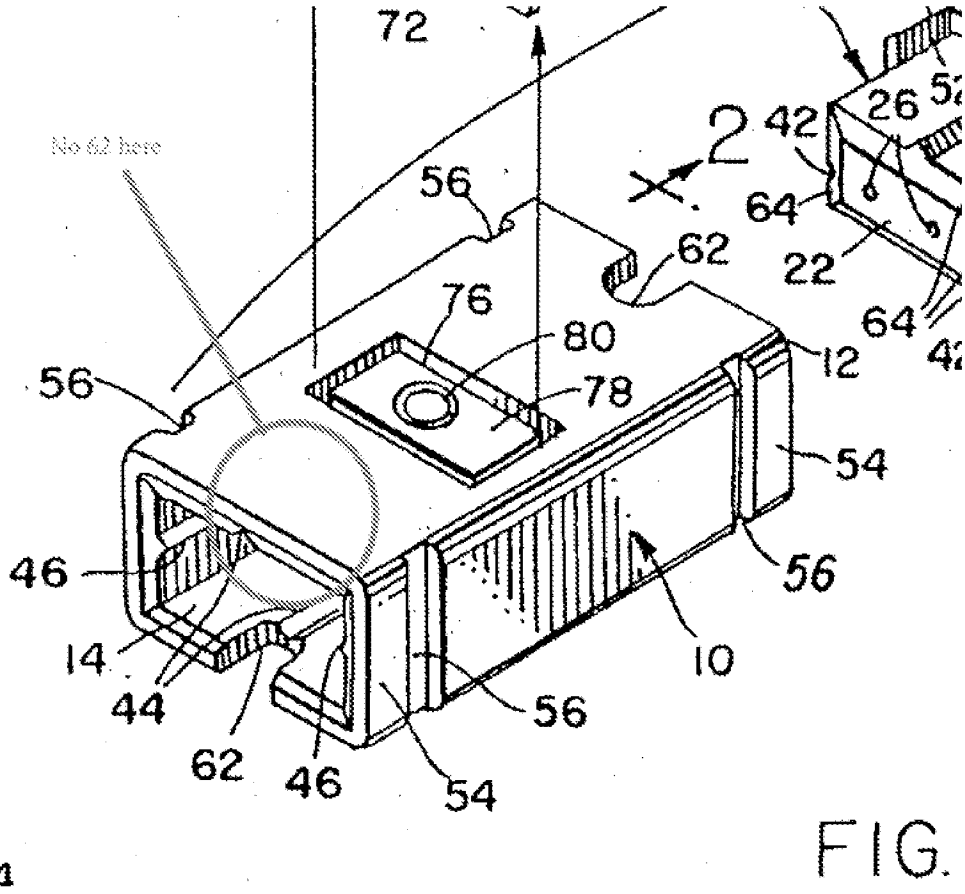


FIG.

Applicant further asserts that the fourth groove below the element 62 on the top right surface is also missing. Cf. Fig. 3 that shows in cross section that there are only two elements 62. For this additional reason, claims 10 and 11-14 are allowable. Claim 21 has similar limitations and is allowable for at least the same reasons.

Next the Examiner rejected claims 1-4, 6-21 under 35 U.S.C. 102(e) as being anticipated by Grinderslev et al. Applicant has amended claim 1 to require that the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween. The Examiner has pointed to reference numeral 2 or a sub-space thereof between the opposing outside walls 11,12. Applicant has amended claims 1, 15, 18, and

21 to require that the fiber optic connectors are next to one another in the opening without any walls between them. Clearly only one of the connectors can be disposed within each of the compartments A and B in Fig. 5. See:

Fig. 4

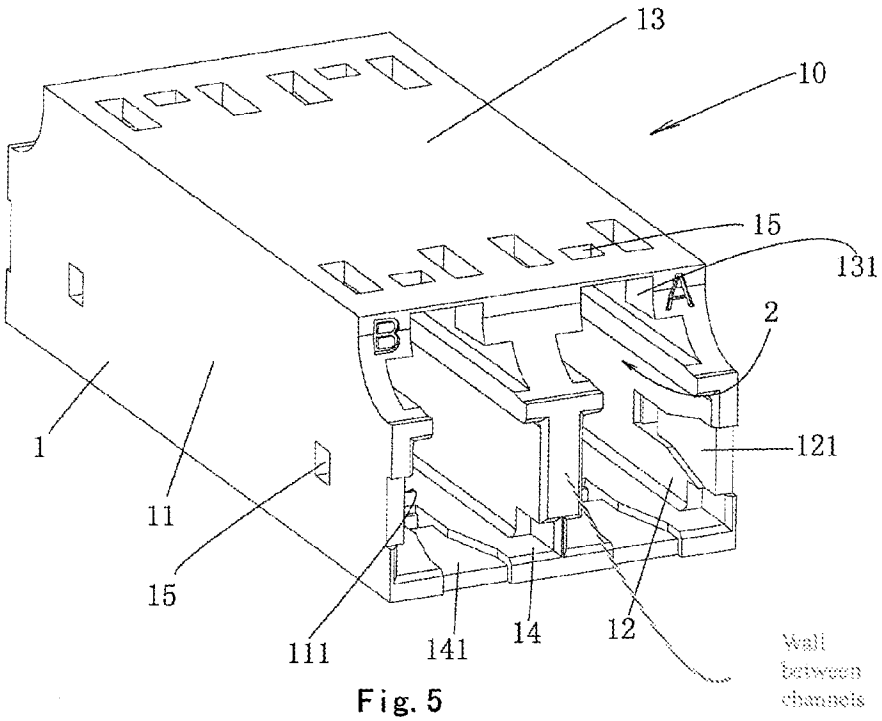


Fig. 5

With only one of the connectors in each of the two channels, there is a wall between the two connectors. For this reason alone, claims 1, 10, 15, 18, and 21 are allowable.

Claims 2-9, depending from claim 1, are allowable for at least the same reasons as claim 1. In fact, Applicant asserts that with all of the claims requiring at least two fiber optic connectors on each side and that there are no walls between the at least two fiber connectors, all of the claims are allowable as the references do not disclose or suggest these claim elements.

Applicant notes that claim 5 was not addressed except as being rejected on the ground of non-statutory double patenting. Thus, claim 5 will be allowable upon the filing of a terminal disclaimer.

With the same amendments to claims 15, and 18, these claims and their dependent claims are allowable for at least the same reasons as claim 1.

Finally, the Examiner rejected claim 11 as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Katoh. Katoh was cited for having keys with different sizes. However, Katoh does not cure the deficiencies of Pronovost noted above for claim 10. Thus, claim 11 is also allowable.

Respectfully submitted,

/Michael L. Leetzow/
Michael L. Leetzow PLLC
Registration No. 35,932
1205 S Keswick Dr.
Troy, VA 22974
Telephone: 407/302-9970

Date: December 26, 2023

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/857,300	Filing Date 07/05/2022	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/26/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/DEBORAH D SCOTT/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05	5557

152017 7590 12/08/2023

US Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
12/08/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@usconec.com
eofficeaction@appcoll.com
michael@leetzow.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 17/857,300	**Applicant(s)** Nguyen et al.	
	Examiner Omar R Rojas	**Art Unit** 2874	**AIA (FITF) Status** No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 28 November 2023 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See Continuation Sheet (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: PTOL-2323.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1-21.
    Claim(s) withdrawn from consideration:_____.

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Continuation of 3. NOTE: Applicant's AFCP 2.0 request in the response filed 11/28/2023 is acknowledged and appreciated. While applicant has addressed claim 10 with respect to the Pronovost reference, applicant has NOT explained how the proposed amendment to claim 10 would overcome the Grinderslev reference which was also applied to claim 10. Furthermore, contrary to applicant's remarks on pages 9-10 of the response, claim 21 has NOT been amended and, therefore, claim 21 is still considered to be anticipated by Grinderslev. Lastly,consideration of the proposed amendment filed 11/28/2023 is further complicated because the proposed changes to claims 1 and 10 differ substantially in scope. For the aforementioned reasons, the proposed amendments filed 11/28/2023 raise new issues that would require additional search and consideration beyond the scope of AFCP 2.0.

AFCP 2.0 Decision

Application No.	Applicant(s)	
17/857,300	Nguyen et al.	
Examiner	**Art Unit**	**AIA (FITF) Status**
Omar R Rojas	2874	No

This is in response to the After Final Consideration Pilot request filed 28 November 2023.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ The request is not the first proper AFCP 2.0 request submitted in response to the most recent final rejection.

   ☐ Other: _____

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☑ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☐ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action . See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☐ 5. Other: _____

   Examiner Note: Please attach an interview summary when necessary as described above.

Senko Ex. 1017, Page 87
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

12/04/2023

DO NOT ENTER: /ORR/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT WITH AFTER FINAL CONSIDERATION REQUEST

In response to the final Office Action mailed on September 19, 2023, Applicant proposes to amend the application as follows:

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Program Request

PTO/SB/434 (3-22)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
USCO-053-05	17/857,300	2022-07-05
First Named Inventor:	**Title:**	
Hiep V. Nguyen	Alignment Adapter and Alignment Design for a Connector Therefor	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the USPTO's patent electronic filing system.
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
    - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
    - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
        - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
        - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
            - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
            - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date	Practitioner Registration No.
/Michael L. Leetzow/	2023-11-28	35932
Name (Print/Typed)	**Telephone Number**	
Michael L. Leetzow	4073029970	

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ * Total of _____ forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**11/28/2023 02:39:23 PM Z ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	63402876	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
USCO-053-05_USPTO_SB434_20231128_142753.pdf	2	After Final Consideration Program Request	258 KB
AFCPPAmendment.pdf	11	Response After Final Action	481 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
USCO-053-05_USPTO_SB434_20231128_	9240FAE7A2461BBCAAAE66F6F3FDF95C5AE1E8904861EC7223EA5756F9F7B30D4CC0FAFD292D1AB899BF874601B5C52AB

142753.pdf	CF41FEF589E5E7C522BA0C937A5F3AD
AFCPPAmendment.pdf	972E293F4AC2BBEC9A5CB864D282F2E6C6F1F0F43A4E3EF8 B119E8F276A40226059AE840209FECE3D956E1F0E7AA458D01 EF904A29BACB93C832A224F102B7C7

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT WITH AFTER FINAL CONSIDERATION REQUEST

In response to the final Office Action mailed on September 19, 2023, Applicant proposes to amend the application as follows:

IN THE CLAIMS:

1. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall also extending from the first side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Currently Amended) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body, and wherein the adapter is configured to mate at least four fiber optic ferrules in pairs with space for at least two fiber optic ferrules on the first side and at least two fiber optic ferrules on the second side, including the first fiber optic ferrule and the second fiber optic ferrule.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Currently Amended) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side, the first fiber optic connector and the second fiber optic connector mating in a region of the

central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves on each of the first side and the opposing second side within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body and also align an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween to an additional fiber optic connector side-by-side with the second fiber optic connector without any internal walls therebetween within the width of the adapter.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. (Previously Presented) An adapter for optical fiber communications, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal

walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

REMARKS

In the above-referenced Office Action, the Examiner rejected claims 10 and 12-14 under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost; rejected claims 1-4, 6-21 under 35 U.S.C. 102(e) as being anticipated by Patent No. WO2013/179197 to Grinderslev et al.; and rejected claim 11 under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Patent Pub. No. US 2012/0057824 A1 to Katoh; rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684; and rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 and claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684.

With regard to the rejections on the grounds of non-statutory double patenting, Applicant will submit appropriate terminal disclaimers once the claims are in an otherwise allowable state due to the payment that must accompany the disclaimers.

Applicant has amended claims 1, 10, 15, and 18. Thus claims 1-21 are still pending.

The Examiner rejected claims 10 and 12-14 under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost indicating that there is at least one groove in a bottom surface and that four successive pairs of fiber optic ferrules can be mated and generally referred Applicant to columns 3-6. Applicant was not able to find anything related to more than one pair of fiber optic ferrules being mated from opposite sides. See Col. 4, ll. 1-5. However, to further prosecution, Applicant has amended claim 10 to explicitly require that the adapter has space for at least two fiber optic ferrules on the first side and at least two fiber optic ferrules on the second side. The adapter in Pronovost does not have that feature and has space to only accept one fiber optic ferrule on each side.

The Examiner also appears to interpret the claim language of the at least one groove in the bottom surface as being shown in Fig. 1. However, the claim requires that there be at least one groove in each of the top and bottom walls on both sides of the adapter. That means, as explained before, that there are at least four grooves. Applicant has annotated Fig. 1 to show where the at least one groove 62 in the top surface is missing:

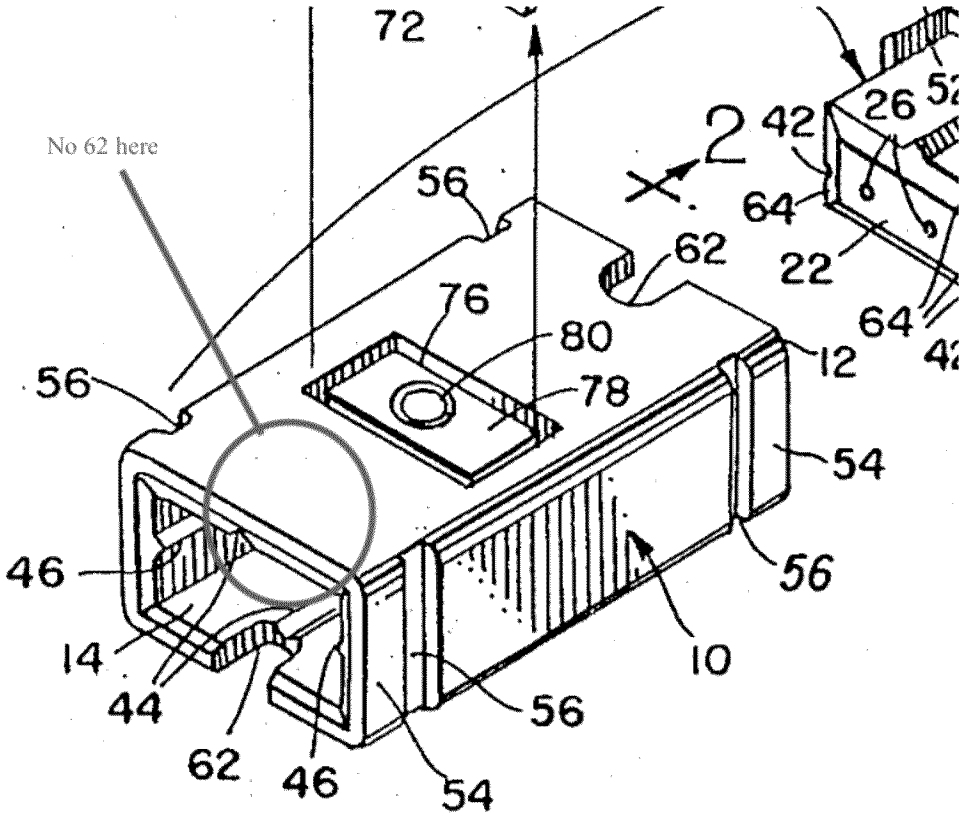


FIG.

Applicant further asserts that the fourth groove below the element 62 on the top right surface is also missing. Cf. Fig. 3 that shows in cross section that there are only two elements 62. For this additional reason, claims 10 and 11-14 are allowable. Claim 21 has similar limitations and is allowable for at least the same reasons.

Next the Examiner rejected claims 1-4, 6-21 under 35 U.S.C. 102(e) as being anticipated by Grinderslev et al. Applicant has amended claim 1 to require that the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector without any internal walls therebetween. The Examiner has pointed to reference numeral 2 or a sub-space thereof between the opposing outside walls 11,12. Applicant has amended claims 1, 15, 18, and

21 to require that the fiber optic connectors are next to one another in the opening without any walls between them. Clearly only one of the connectors can be disposed within each of the compartments A and B in Fig. 5. See:

Fig. 4

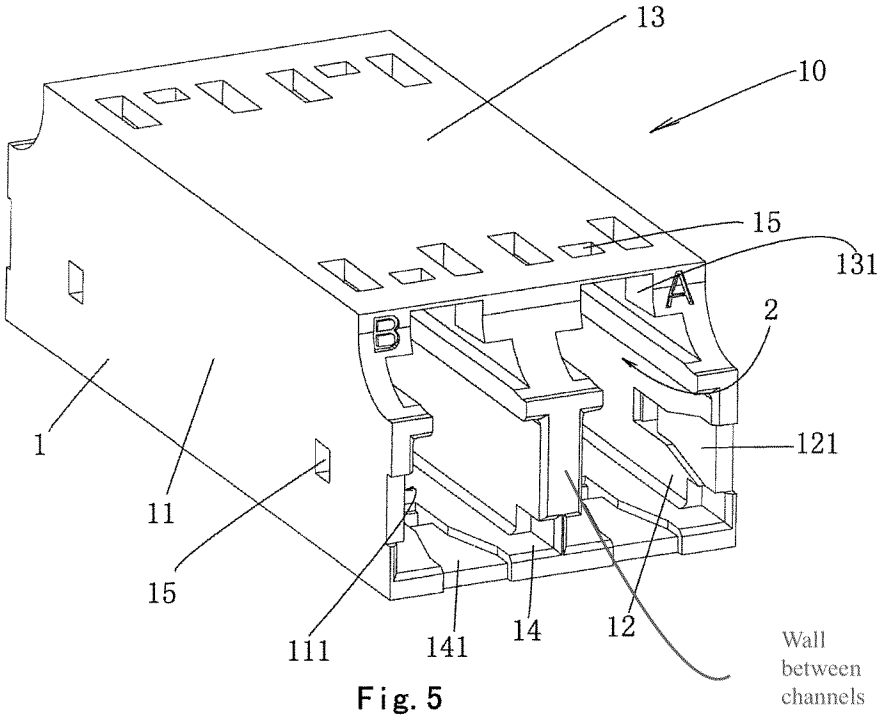


Fig. 5

With only one of the connectors in each of the two channels, there is a wall between the two connectors. For this reason alone, claim 1 is allowable.

Claims 2-9, depending from claim 1, are allowable for at least the same reasons as claim 1. Applicant notes that claim 5 was not addressed except as being rejected on the ground of non-statutory double patenting. Thus, claim 5 will be allowable upon the filing of a terminal disclaimer.

Applicant has made similar amendments to claims 15, and 18. They and their dependent claims are allowable for at least the same reasons as claim 1.

Finally, the Examiner rejected claim 11 as being unpatentable over Pronovost as applied to

claim 10 above, and further in view of Katoh. Katoh was cited for having keys with different sizes. However, Katoh does not cure the deficiencies of Pronovost noted above for claim 10. Thus, claim 11 is also allowable.

Applicant has submitted the form 434 to request consideration under the After Final Consideration Pilot Program 2.0. Applicant looks forward to a discussion with the Examiner about this amendment.

Respectfully submitted,

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Date: November 28, 2023

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/857,300	Filing Date 07/05/2022	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	11/28/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RENEE D HAWKINS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05	5557

152017 7590 09/19/2023

US Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
09/19/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@usconec.com
eofficeaction@appcoll.com
michael@leetzow.com

Office Action Summary	Application No. 17/857,300	Applicant(s) Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on August 18, 2023.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☑ Other: WO-2013179197-A1.

Senko Ex. 1017, Page 106
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

2. With regards to the amendment filed on August 18, 2023, all the requested changes to the claims have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 1-21 are pending.

Response to Arguments

3. Applicant's arguments filed August 18, 2023 with respect to the Pronovost reference have been fully considered but they are not fully persuasive. In the examiner's opinion, Pronovost still reads upon amended claim 10 as indicated below.

4. Applicant's arguments with respect to claim(s) 1-4 and 6-21 have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

Information Disclosure Statement

5. The prior art documents submitted by applicant(s) in the Information Disclosure Statement(s) ("IDS") filed on September 13, 2023 have all been considered and made of record (note the attached copy of form(s) PTO/SB/08a).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claim(s) 10 and 12-14 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Patent No. 4,645,295 to Pronovost (hereinafter "Pronovost"). Pronovost was applied in a prior Office action.

In re claim 10, Pronovost discloses an adapter (10) for aligning fiber optic ferrules (16) inserted from opposing sides, see FIGS. 1-3, comprising:

a main body having an opening extending between a first side (12) and a second side (14), the first side (12) and the second side (14) separated by a central portion; and

at least one groove (62) in a top surface and at least one groove (62) in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side (12) and the second side (14), wherein the adapter (10) is configured such that a first fiber optic ferrule is received at the first side (12) and a second fiber optic ferrule is received at the second side (14) of the adapter (10) for alignment by the at least one groove (62) at the top surface and the bottom surface of the main body, and wherein the adapter (10) is capable of mating at least four fiber optic ferrules (16) in successive pairs, including the first fiber optic ferrule (16) and the second fiber optic ferrule (16). *See* columns 3-6 of Pronovost for further details.

In re claim 12, the first fiber optic ferrule (16) is disposed partially inside a first ferrule holder comprising flaps (48), and wherein the at least one groove (62) is sized to match a projection on an outside surface of the first ferrule holder comprising flaps (48) for alignment.

In re claim 13, the central portion includes a wall (72) extending across the opening in the adapter (10).

In re claim 14, the wall (72) divides the central portion in half.

8. Claim(s) 1-4 and 6-21 is/are rejected under 35 U.S.C. 102(e) as being anticipated by WIPO Publication No. WO 2013/179197 A1 to Grinderslev et al. (hereinafter "Grinderslev").

In re claim 1, Grinderslev discloses an adapter (10), see Figs. 2-5, for holding fiber optic connectors (Fig. 20, 400), the adapter comprising:

a main body (10) having a width and a height and an opening extending longitudinally from a first side to an opposing second side, the main body comprising two opposing side walls (11, 12) spaced apart along the width and a first top wall (13) and a first bottom wall (14) spaced apart along the height, each of the first top wall (13) and the first bottom wall (14) extending widthwise between the two opposing side walls (11, 12);

a central portion inside the main body (1) located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove (131) of the first top wall (13) extending from the first side toward the central portion; and

a second internal groove (141) of the first bottom wall (14) also extending from the first side toward the central portion, wherein the first internal groove (131) has a first maximum width and the second internal groove (141) has a second minimum width, the first maximum width is

greater than the second minimum width, as seen in Fig. 5, wherein the adapter (10) is free of internal walls outwardly of the central portion in a space (interface 2 or a sub-space thereof) between the opposing side walls (11, 12) along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels (2) on the first side to respectively receive the first fiber optic connector (400) and an additional fiber optic connector (400) side-by-side with the first fiber optic connector, and wherein the main body includes at least two channels (2) on the opposing second side to respectively receive the second fiber optic connector (400) and another additional fiber optic (400) connector side-by-side with the second fiber optic connector.

In re claims 2 and 3, as seen in Fig. 22 of Grindeslev, the central portion of the adapter (10) includes a wall at a corresponding portion (202) extending across the opening in the adapter (10) that divides the central portion in half.

In re claim 4, as seen in Fig. 22 of Grindeslev, the wall has corresponding passageways within portion (202) sized to allow respective ferrules (301) from the first fiber optic connector and the second fiber optic connector to engage.

In re claim 6, as seen in Fig. 5 of Grindeslev, the first top wall (13) and the first bottom wall (14) have a smooth plane structure in the central portion.

In re claims 7 and 8, as seen in Fig. 22 of Grindeslev, the central portion of the adapter (10) includes a wall at a corresponding portion (202) extending across the opening in the adapter (10)

with corresponding passageways within portion (202) sized to allow respective ferrules (301) from the first fiber optic connector (400) and the second fiber optic connector (400) to engage.

In re claim 9, the main body (1) has a width to receive one fiber optic connector (400) to four fiber optic connectors (400).

In re claim 10, Grinderslev discloses an adapter (10), see Figs. 2-5, for aligning fiber optic ferrules (Fig. 20, 301) inserted from opposing sides comprising:

a main body (1) having an opening comprising interfaces (2) extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove (131) in a top surface and at least one groove (141) in a bottom surface of the main body (1) extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter (10) is configured such that a first fiber optic ferrule (301) is received at the first side and a second fiber optic ferrule (301) is received at the second side of the adapter (10) for alignment by the at least one groove at the top surface and the bottom surface of the main body (1), and wherein the adapter (10) is configured to mate at least four fiber optic ferrules (301) in pairs, including the first fiber optic ferrule (301) and the second fiber optic ferrule (301). *See* page 1 and pages 7-9 of Grinderslev for further details.

In re claim 11, as seen in Fig. 5 of Grinderslev, the at least one groove (131, 141) is sized differently on the top surface than on the bottom surface.

In re claim 12, as seen in Fig. 20 of Grinderslev, the first fiber optic ferrule (301) is disposed partially inside a first ferrule holder (401), and wherein the at least one groove (131) is sized to match a projection/latch on an outside surface of the first ferrule holder (401) for alignment.

In re claims 13 and 14, as seen in Fig. 22 of Grindeslev, the central portion of the adapter (10) includes a wall at a corresponding portion (202) extending across the opening in the adapter (10) that divides the central portion in half.

In re claim 15, Grinderslev discloses an adapter (10), see Figs. 2-5, for aligning a first fiber optic connector (Fig. 20, 400) having a first fiber optic ferrule (301) inserted from a first side and a second fiber optic connector (400) having a second fiber optic ferrule (301) inserted from a second side, comprising:

a main body (1) having an opening defined by two opposing side walls (11, 12), a top surface and a bottom surface joining the two opposing side walls (11, 12), the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector (400) and the second side configured to receive the second fiber optic connector (400);

a central portion inside the main body (1) located between the first side and the second side, the first fiber optic connector (400) and the second fiber optic connector (400) mating in a region of the central portion; and

a first groove (131) disposed on the top surface and a second groove (141) disposed on the bottom surface on each of the first side and the second side, each of the first groove (131) and the second groove (141) extending toward the central portion from each of the first side and the second side,

wherein the first groove (131) has a dimension different from the second groove (141), see Fig. 5, and wherein the main body (1) includes at least two channels (2) on the first side to respectively receive the first fiber optic connector (400) and an additional fiber optic connector (400) side-by-side with the first fiber optic connector (400), and

wherein the main body (1) includes at least two channels (2) on the second side to respectively receive the second fiber optic connector (400) and another additional fiber optic connector (400) side-by-side with the second fiber optic connector (400). *See* page 1 and pages 7-9 of Grinderslev for further details.

In re claim 16, as seen in Fig. 5 of Grinderslev, the first groove (131) has a maximum width wider than a minimum width of the second groove (141).

In re claim 17, the dimension of the first groove (131) matches a dimension of a projection/latch of the first fiber optic connector (400) for alignment.

In re claim 18, Grinderslev discloses an adapter (10), see Figs. 2-5, for holding fiber optic connectors (Fig. 20, 400), the adapter (10) comprising:

a main body (1) having a width and a height and an opening extending longitudinally from a first side to an opposing second side, the main body (1) comprising two opposing side walls (11, 12) spaced apart along the width and a first top wall (13) and a first bottom wall (14) spaced apart along the height, each of the first top wall (13) and the first bottom wall (14) extending widthwise between the two opposing side walls (11, 12);

a central portion inside the main body (1) located between the first side and the opposing

second side, a first fiber optic connector (400) from the first side mating with a second fiber optic connector (400) from the opposing second side within the central portion; and

a plurality of internal grooves (131) on each of the first side and the opposing second side within a space of the adapter (10), the plurality of internal grooves (131) configured to align the first fiber optic connector (400) and the second fiber optic connector (400) in the main body (1) and also align an additional fiber optic connector (400) side-by-side with the first fiber optic connector (400) to an additional fiber optic connector (400) side-by-side with the second fiber optic connector (400) within the width of the adapter (10).

In re claim 19, the plurality of internal grooves (131) are sized to receive a respective projection/latch on each of the first fiber optic connector (400) and the second fiber optic connector (400) for alignment.

In re claim 20, as seen in Fig. 5 of Grinderslev, the plurality of internal grooves (131) extend longitudinally in a direction toward the central portion.

In re claim 21, Grinderslev discloses an adapter (10), see Figs. 2-5, for optical fiber communications, the adapter (10) comprising:

a main body (1) having a width and a height and an opening extending longitudinally from a first side into the main body (1), the main body (1) comprising two opposing side walls (11, 12) spaced apart along the width and a first top wall (13) and a first bottom wall (14) spaced apart along the height, each of the first top wall (13) and the first bottom wall (14) extending widthwise between the two opposing side walls (11, 12);

a central portion inside the main body (1) located longitudinally inward from the first side,

at least two channels (2) on the first side, each of the at least two channels (2) configured to respectively receive one of at least two fiber optic connectors (Fig. 20, 400) a fiber optic connector (400) from the first side for an optical connection within the central portion,

a first internal groove (131) of the first top wall (13) extending toward the central portion; and

a second internal groove (141) of the first bottom wall (14) extending toward the central portion, the second internal groove (141) being on a same side of the opening as the first internal groove (131), wherein the first internal groove (131) has a first maximum width and the second internal groove (141) has a second minimum width, the first maximum width is greater than the second minimum width, as seen in Fig. 5, wherein the adapter (10) is free of internal walls outwardly of the central portion in a space (interface 2 or a sub-space thereof) between the opposing side walls (11, 12) along the width and between the first top wall (13) and the first bottom wall (14) along the height.

Claim Rejections - 35 USC § 103

9. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly

owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

11. Claim 11 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Patent Pub. No. US 2012/0057824 A1 to KATOH ("Katoh"). Katoh was also applied in a prior Office action.

In re claim 11, Pronovost only differs in that he does not teach his at least one groove (62) is sized differently on the top surface than on the bottom surface. Katoh, on the other hand, teaches a connector (1) having keys (51, 52) that are sized differently on a top surface than on a bottom surface. In order to receive the connector (1) of Katoh, the at least one groove (62) of Pronovost would have been sized differently on the top surface than on the bottom surface, thereby obtaining the invention specified by claim 11. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 11 in view of Pronovost combined with Katoh.

Double Patenting

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either

anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

13. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684 (hereinafter "the '684 patent").**

The '684 parent was also cited by applicant(s) in the IDS. Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-11 of the '684 patent only differ from pending claims 1-21 in that the patented claims do not recite all of the additional aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-11 of the '684 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-11 of the '684 patent.

14. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 (hereinafter "the '723 patent").** Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-17 of the '723 patent only differ from pending claims 1-21 in that the patented claims do not recite all of the additional aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-17 of the '723 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-17 of the '723 patent.

15.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar R. Rojas whose telephone number is (571)272-2357. The examiner can normally be reached on Monday-Friday, 10AM-6PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Hollweg can be reached on 571-270-1739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Omar R Rojas/
Primary Examiner
Art Unit 2874

or
September 13, 2023

Notice of References Cited	Application/Control No. 17/857,300	Applicant(s)/Patent Under Reexamination Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	WO-2013179197-A1	12-2013	WO	GRINDERSLEV S	G02B6/3825
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/857,300	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2874

CPC - Searched*		
Symbol	Date	Examiner
G02B6/3825,3831,3879	09/11/2023	/ORR/

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Checked refs. for 17/145,864.	07/14/2023	/ORR/
G02B6/3825,3831,3879 limited by CPC query - PE2E Search History Printout.	09/11/2023	/ORR/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Senko Ex. 1017, Page 122
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1801	7531	(G02B6/3825).CPC.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2023/09/11 05:20 PM
L1802	4043	G02B6/3831.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/11 05:20 PM
L1803	1818	1801 AND 1802	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2023/09/11 05:21 PM
L1804	7636	(G02B6/3879).CPC.	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/11 05:21 PM
L1805	954	1803 AND 1804	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/11 05:21 PM
L1806	1322	1802 AND 1804	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO,	OR	ON	ON	2023/09/11 07:05 PM

Senko Ex. 1017, Page 123
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

			MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L1807	126	1758 AND 1806	(US-PGPUB; USPAT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/11 07:06 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Senko Ex. 1017, Page 124
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	2874
Examiner Name	Omar R ROJAS
Attorney Docket Number	USCO-053-05

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/ORR/	1	6764222	B1	2004-07-20	Szilagyi et al.	

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/ORR/	1	2013100892	WO	A1	2013-07-04	Tsuzaki et al.		☐

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Receipt date: 09/13/2023

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	17857300
	Filing Date	2022-07-05
	First Named Inventor	Hiep V. Nguyen
	Art Unit	2874
	Examiner Name	Omar R ROJAS
	Attorney Docket Number	USCO-053-05

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 December 2013 (05.12.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/179197 A1

(51) International Patent Classification:
H01R 9/24 (2006.01) *H01R 13/514* (2006.01)
G02B 6/00 (2006.01) *H01R 31/06* (2006.01)
H01R 13/506 (2006.01) *H01R 13/518* (2006.01)
H01R 13/508 (2006.01) *H01R 13/74* (2006.01)

(21) International Application Number:
PCT/IB2013/054312

(22) International Filing Date:
24 May 2013 (24.05.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201220254953.7 31 May 2012 (31.05.2012) CN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

[Continued on next page]

(54) Title: ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

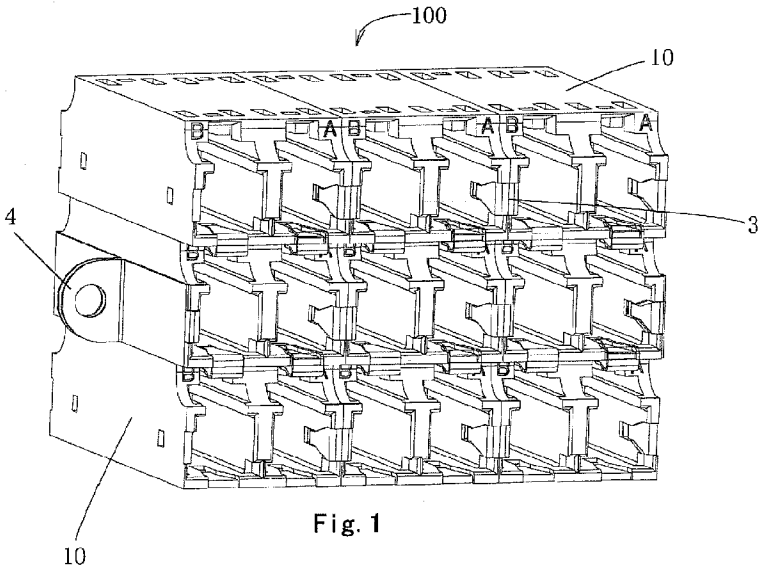


Fig. 1

(57) Abstract: An adapter assembly (100) for coupling with a plurality of connectors, comprising: a plurality of adapters (10) each including a housing, and at least one connection device (3). The housing is formed with at least one interfaces each for coupling with one of the connectors. Adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters are connected with each other by the at least one connection device in a snap-fit manner, so that the plurality of adapters are connected together. The plurality of adapters are connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

WO 2013/179197 A1

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Chinese Patent Application No.201220254953.7 filed on May 31, 2012 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an adapter for a connector applied in a data communication and telecommunication field, more particularly, relates to an adapter for a plug connector, and relates to a connector assembly having the adapter.

Description of the Related Art

In various fiber communication systems, a fiber optic connector is generally used to couple fibers of different fiber optic cables.

Fig.20 is an illustrative perspective view of two conventional fiber optic connectors 400. Fig.21 and Fig.22 show a conventional adapter 200 used with the conventional fiber optic connector 400.

As shown in Figs.20-22, each of the fiber optic connector 400 comprises a connector body 401. A fiber optic cable 300 is inserted from an end of the connector body 401. A ferrule 301 for the fiber of the fiber optic cable 300 is exposed outside from the other end of the connector body 401. The adapter 200 comprises four interfaces 201 and two splicing portions 202. The four interfaces 201 are formed in both ends of the adapter 200 in pairs and configured to receiving the inserted connectors 400, respectively. Each of the splicing portions 202 is disposed between a pair of interfaces 201 for splicing the ferrules 301 of the fiber optic connectors 400 inserted into the pair of interfaces 201. When the fiber optic connector 400 is inserted into the adapter 200, the connector body 401 is received in the interface 201, and the fiber ferrule 301 is inserted into the splicing portion 202 to be spliced with another ferrule 301. Furthermore, the above adapter may be used to receive an electrical connector for electrically connecting two electrical cables in some cases.

As for the above conventional adapter for a plug connector, a flange feature may be formed on the adapter, and the adapter may be fixed on a mounting panel by an installation hole formed in the flange feature. Also, an elastic metal clamp may be provided on the adapter, and the adapter may be fixed on the mounting panel by the elastic metal clamp.

However, the adapters must be individually and respectively mounted on the mounting panel by the flange feature or the elastic metal clamp. If it needs to mount a plurality of adapters on the mounting panel, a certain distance must be kept between two adjacent adapters. Accordingly, the plurality of adapters cannot be arranged on the mounting panel in a high density, decreasing the space utilization efficiency of the mounting panel and wasting the installation space of the mounting panel.

SUMMARY OF THE INVENTION

The present invention has been made to overcome or alleviate at least one aspect of the above mentioned disadvantages.

An object of the present invention is to provide an adapter assembly and a connector assembly having the adapter assembly, in which a plurality of adapters are connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

According to an aspect of the present invention, there is provided an adapter assembly for coupling with a plurality of connectors, comprising: a plurality of adapters each including a housing, and at least one connection device. The housing is formed with at least one interfaces each for coupling with one of the connectors. Adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters are connected with each other by the at least one connection device in a snap-fit manner, so that the plurality of adapters are connected together.

In the above mentioned adapter assembly, the housing of each of the adapters exhibits a substantively cuboid shape and comprises a first vertical wall, a second vertical wall opposite to the first vertical wall, a top wall and a bottom wall for defining the interface; and the connection device is configured to connect the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

In the above mentioned adapter assembly, the connection device is an elastic clamping member configured to clamp the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

In the above mentioned adapter assembly, each of the first vertical wall, the second vertical wall, the top wall and the bottom wall is formed with a recess in an inner side thereof; and the clamping member comprises a pair of clamping arms each constructed to substantively match with that of the recess to be received in the respective recess.

In the above mentioned adapter assembly, each of the clamping members comprises a pair of holding portions protruding toward each other at free ends of the pair of clamping arms; and a distal end of each of the recesses is formed with a through hole running through

the first vertical wall, the second vertical wall, the top wall and the bottom wall for receiving the respective holding portion therein.

In the above mentioned adapter assembly, each of the clamping arms exhibits a substantively triangle shape.

In the above mentioned adapter assembly, the adapter assembly further comprises at least one pair of installation members. One of the pair of installation members is mounted on the first vertical wall or the second vertical wall at the outmost side of a row of adapters. Each of the installation members comprises a body having a first end and a second end opposite to the first end, and the length of the body from the first end to the second end being equal to about an half of a longitudinal length of the adapter; an installation lug perpendicularly extending from the first end of the body; and an auxiliary clamping component formed by bending inward from the second end of the body by about 180 degrees and engaged in the recess of the vertical wall at the outmost side of the row of adapters.

In the above mentioned adapter assembly, an installation hole is provided in the installation lug; and an elastic clamping protrusion is formed on a free end of the auxiliary clamping component.

In the above mentioned adapter assembly, each of the connection devices comprises: at least one first horizontal connection member formed by extending from an outer side of the first vertical wall in a horizontal direction; and at least one second horizontal connection member formed on an outer side of the second vertical wall. The first and second horizontal connection members are configured to be engaged with each other in a snap-fit manner so as to connect the plurality of adapters side by side.

In the above mentioned adapter assembly, the first horizontal connection member comprising: a connection portion formed by extending from the outer side of the first vertical wall in the horizontal direction ; and an engagement portion formed by extending from an end of the connection portion in at least one direction parallel to the first vertical wall; The second horizontal connection member comprising: a receiving groove formed in the second vertical wall and configured to receive the engagement portion of the first horizontal connection member of another adapter; and a first opening communicated with the receiving groove to permit the engagement portion of the another adapter to be inserted into the receiving groove through the first opening.

In the above mentioned adapter assembly, the second horizontal connection member further comprises a second opening communicated with the receiving groove and configured to be fitted with the connection portion of the another adapter, so that the connection portion of the another adapter is allowed to pass through the second opening during inserting the engagement portion of the another adapter into the receiving groove.

In the above mentioned adapter assembly, the engagement portion has a substantively U-shape and comprises two elastic arms and a base connected between ends of the two

elastic arms; and the connection portion is connected between the base and the first vertical wall.

In the above mentioned adapter assembly, a projection is formed on an end of each of the elastic arms; and when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the first opening to block the engagement portion from being further inserted.

In the above mentioned adapter assembly, each of the adapters further comprises: two positioning portions formed by protruding from the second vertical wall and separate from the first opening by a predetermined distance to locate the projection of the another adapter between the second horizontal connection member and the positioning portions when the engagement portion of the another adapter is inserted into the receiving groove.

In the above mentioned adapter assembly, the second horizontal connection member further comprises a third opening communicated with the receiving groove and opposite to the first opening. A projection is formed on an end of each of the elastic arms. When the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove.

In the above mentioned adapter assembly, the first horizontal connection member is disposed in a notch formed in the first vertical wall; and the second horizontal connection member is protruded from the second vertical wall.

In the above mentioned adapter assembly, the adapter assembly further comprises a first installation member and a second installation member. The first installation member comprises a first plate body; and a first auxiliary connection member formed on a first side of the first plate body and configured the same as the first horizontal connection member so as to engage with the second horizontal connection member of one adapter at the outmost side of a row of adapters. The second installation member comprises a second plate body; and a second auxiliary connection member formed on a first side of the second plate body and configured the same as the second horizontal connection member so as to engage with the first horizontal connection member of another adapter at the outmost side of the row of adapters.

In the above mentioned adapter assembly, the first installation member further comprises a first installation lug formed on a second side of the first plate body; and the second installation member further comprises a second installation lug formed on a second side of the second plate body.

In the above mentioned adapter assembly, each of the connection devices comprises: first vertical connection members formed by extending from outer sides of the first and second vertical walls proximate to the top wall or the bottom wall; and second horizontal

connection members formed on outer sides of the first and second vertical walls proximate to the bottom wall or the top wall and configured to be inserted into and fixed in a slot in the first vertical connection member of another adapter. The plurality of adapters are stacked and engaged with each other in a vertical direction by engaging the first vertical connection members of one adapter and the second vertical connection members of the other adapter.

In the above mentioned adapter assembly, each of the first vertical connection members has a substantively U-shape, and comprises: a first arm formed by protruding outward from an upper end or a lower end of the outside of the first or second vertical wall; a second arm located above the top wall or the bottom wall and extending in a direction parallel to the first arm; and a base connected between the first and second arms to form the slot between the first and second arms. Each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the lower end or the upper end of the outside of the first or second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters.

In the above mentioned adapter assembly, a free end of the second arm is formed with a block portion extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms.

In the above mentioned adapter assembly, each of the connection devices comprises a vertical connection member having a substantively L-shape and a receiving groove. The vertical connection member comprises a base vertically extending outward from the top wall or the bottom wall; and a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall. The receiving groove is formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters.

In the above mentioned adapter assembly, each of the adapters further comprises installation members formed by protruding from the first and second vertical walls to mount the adapter assembly on a mounting panel.

According to another aspect of the present invention, there is provided a connector assembly, comprising: the adapter assembly according to the above various embodiments; and a plurality of connectors each coupled into one of the interfaces of the respective adapter.

In the above mentioned connector assembly, the connector is a fiber optic connector.

In various exemplary embodiments of the present invention, a plurality of adapters may be connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, for example, two adjacent adapters may be removably connected together in a snap-fit manner, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

Fig.1 is an illustrative perspective view of an adapter assembly according to a first exemplary embodiment of the present invention;

Fig.2 is an illustrative perspective view of a row of adapters arranged in the middle of the adapter assembly shown in Fig.1;

Fig.3 is an exploded view of a portion of parts of the row of adapters of Fig.2 before being assembled;

Fig.4 is an illustrative perspective view of two rows of adapters arranged at the lower of the adapter assembly shown in Fig.1;

Fig.5 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.1;

Fig.6 is an illustrative perspective view of a connection device of the adapter assembly shown in Fig.1;

Fig.7 is an illustrative perspective view of an installation member of the adapter assembly shown in Fig.1;

Fig.8 is an illustrative perspective view of an adapter assembly according to a second exemplary embodiment of the present invention;

Fig.9 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.8 when viewing from a first side in a first orientation;

Fig.10 is another illustrative perspective view of the adapter of Fig.9 when viewing from the first side in a second orientation;

Fig.11 is an illustrative perspective view of the adapter of Fig.9 when viewing from a second side;

Fig.12 is a local enlarged cross section view of two adjacent connected adapters of the adapter assembly shown in Fig.8 along a line A-A of Fig.10 (or a line B-B of Fig.11), which shows an exemplary embodiment of a first connection form of a first connection member and a second connection member;

Fig.13 is an enlarged cross section view of an exemplary embodiment of another connection form of a first connection member and a second connection member;

Fig.14 is an illustrative perspective view of a first installation member of the adapter assembly shown in Fig.8, as viewed from an inner side;

Fig.15 is another illustrative perspective view of the first installation member of the adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.16 is an illustrative perspective view of a second installation member of the adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.17 is another illustrative perspective view of the second installation member of the

adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.18 is an illustrative perspective view of an adapter assembly according to a third exemplary embodiment of the present invention;

Fig.19 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.18;

Fig.20 is an illustrative perspective view of two conventional fiber optic connectors;

Fig.21 is an illustrative perspective view of a conventional adapter coupled with the conventional fiber optic connectors shown in Fig.20; and

Fig.22 is a cross section view of the adapter of Fig.21 taken along a line C-C.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE IVENTION

Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

The adapter of the present invention may be used with the conventional fiber optic connectors (for example, a LC fiber optic connector) 400 shown in Fig.20 or a fiber optic connector (for example, for splicing, distributing or abutting two fibers of two fiber optic cables) disclosed in Chinese Patent Application No.201210037495.6 filed by the applicant of the present invention. The adapter assembly for coupling with, for example, a plurality of connectors of Fig.20 according to various exemplary embodiments of the present invention comprises a plurality of adapters 10 each including a housing 1 made of, for example, plastic material ; and at least one connection device. The housing 1 may be formed with at least one interfaces 2 each for coupling with one of the connectors. Adjacent walls of the interfaces 2 of two adjacent adapters 10 of the plurality of adapters 10 are connected with each other by the at least one connection device 3 in a snap-fit manner, so that the plurality of adapters 10 are connected together. For example, the plurality of adapters 10 may be connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction.

Figs.1-7 show an illustrative perspective view of an adapter assembly 100 according to a first exemplary embodiment of the present invention.

As shown in Figs.1-7, the adapter assembly 100 may comprise nine adapters 10 arranged in an array of 3 rows and 3 columns. The housing 1 of each of the adapters 10 may exhibit a substantively cuboid shape and comprise a first vertical wall 11, a second vertical wall 12 opposite to the first vertical wall, a top wall 13 and a bottom wall 14 for defining the interface 2. The connection device is configured to connect the adjacent first and second

vertical walls 11, 12 and/or the adjacent top and bottom walls 13, 14 of two adjacent adapters of the plurality of adapters 10. Furthermore, the connection device may be an elastic clamping member 3 configured to clamp the adjacent first and second vertical walls 11, 12 and/or the adjacent top and bottom walls 13, 14 of two adjacent adapters of the plurality of adapters 10.

In another exemplary embodiment, as shown in Fig.5, each of the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14 is formed with a recess 111, 121, 131 or 141 in an inner side thereof, respectively. The recesses 111, 121, 131, 141 may have a substantively same shape. The clamping member 3 comprises a pair of clamping arms 30 each having a shape substantively matched with that of a respective recess 111, 121, 131 or 141, so that the pair of clamping arms 30are received in two respective recess 111, 121, 131, 141. For example, as shown in Figs.2-3, two clamping arms 30 of the clamping member 3 may be received in the recess 121 of the second vertical wall 12 of a first adapter and the recess 111 of the first vertical wall 11 of a second adapter in a same row of adapters 10. In this way, the plurality of adapters 10 can be connected and fixed together in order in a manner of side by side in a horizontal direction. Furthermore, as shown in Fig.4, two clamping arms 30 of the clamping member 3 may be received in the recess 141 of the bottom wall 14 of an upper adapter and the recess 131 of the top wall 13 of a lower adapter in a same column of adapters 10. In this way, the plurality of adapters 10 can be stacked and fixed together in a vertical direction. As shown in Fig. 4, each of the clamping arms 30 may exhibit a substantively triangle shape to facilitate the insertion of the clamping member 3 into the respective recesses. In an exemplary embodiment, the recess 131 in the top wall 13 may be formed in a receiving groove for receiving, for example, a locking member of the connector 400 shown in Fig.20.

Since each of the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14 is formed with a recess 111, 121, 131 or 141 in the inner side thereof, when two adapters 10 are placed together either by arranging them side by side in a direction or by stacking them in the vertical direction, there are always two walls abutting against each other, for example, the second vertical wall 12 of an adapter and the first vertical wall 11 of another adapter abut against each other, or the bottom wall 14 of an adapter and the top wall 13 of another adapter abut against each other. Furthermore, the recesses 121, 111 or the recesses 141, 131 formed in inner surfaces of the walls are juxtaposed relative to each other, so that the clamping arms 30 of the clamping member 3 may be received in the recesses to connect two adjacent adapters 10 together.

Thus, the adapters of the first exemplary embodiment of can be arranged side by side and/or stacked with one over the other by means of the clamping member 3, saving the space for mounting the adapters 10. In a case where the adapters 10 of the adapter assembly 100 of the present invention are stacked with one over the other in the vertical direction, it is especially adapted to the connectors disclosed in Chinese Patent Application

No.201210037495.6 by the applicant of the present invention.

In a further exemplary embodiment, each of the clamping members 3 comprises a pair of holding portions 301 protruding toward each other at free ends of the pair of clamping arms 30. At a distal end of each of recesses is formed with a through hole 15 running through the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14, and each of the holding portions 301 can be received in the respective through hole 15. In this way, the protruding holding portion 301 can enter into the through hole 15 during pushing the clamping member 3 into the recesses, so that the clamping member 3 can be firmly engaged in the recesses. Alternatively, the through hole 15 may be replaced with a notch running through a part of the wall thickness of the housing 1 (or not running through the wall thickness of the housing 1) as long as the notch is deeper than the other parts of the recess.

The adapter assembly according to the first exemplary embodiment of the present invention may further comprise at least one pair of installation members 4. One of the pair of installation members 4 is mounted on the first vertical wall 11 or the second vertical wall 12 at the outmost side of a row of adapters 10. As shown in Fig.7, each of the installation members 4 comprises an elongated body 41 made of, for example, a plate material, an installation lug 42 and an auxiliary clamping component 43. The body 41 has a first end and a second end opposite to the first end, and the length of the body 41 from the first end to the second end is equal to about an half of a longitudinal length of the adapter 10. The installation lug 42 perpendicularly extends from the first end of the body 41. The auxiliary clamping component 43 is formed by bending inward from the second end of the body 41 by about 180 degrees. With this configuration, the auxiliary clamping component 43 is engaged in the recess 111 or 121 of the first vertical wall 11 or the second vertical wall 12 at the outmost side of the row of adapters 10. Also, an installation hole 421 is formed in the installation lug 42. An elastic clamping protrusion 431 for fitting in the through hole 15 is formed on a free end of the auxiliary clamping component 43. Since the length of the body 41 is equal to about an half of the longitudinal length of the adapter 10, two installation members 4 can be mounted on the first vertical wall 11 or the second vertical wall 12 from both ends thereof, respectively, and the installation lugs 42 of two installation members 4 mounted on a same outermost vertical wall abut against each other, so that the entire adapter assembly 100 can be easily mounted on a mounting frame with the installation members 4 as well as connection pieces, for example, bolts or the like which pass through the through holes 15.

Figs.8-17 show an illustrative perspective view of an adapter assembly 100' according to a second exemplary embodiment of the present invention.

In the adapter assembly 100' of the second exemplary embodiment, the housing 1' of each of the adapters 10' may exhibit a substantively cuboid shape and comprise a first vertical wall 11', a second vertical wall 12' opposite to the first vertical wall, a top wall 13'

and a bottom wall 14' for defining the interface 2'. The connection device is configured to connect the adjacent first and second vertical walls 11', 12' of two adjacent adapters 10' of the plurality of adapters 10'. In this way, a plurality of adapters 10' can be fixed together side by side in the horizontal direction.

Furthermore, each of the connection devices comprises at least one first horizontal connection member 31 (please refer to Figs.9-10) and at least one second horizontal connection member 32 (please refer to Fig.11). The first horizontal connection member 31 is formed by extending from an outer side of the first vertical wall 11' in a horizontal direction. The second horizontal connection member 32' is formed on an outer side of the second vertical wall 12'. The first horizontal connection members 31 of one adapter and the second horizontal connection members 32 of the other adapter are configured to be capable of being engaged with each other in a snap-fit manner so as to connect the plurality of adapters 10' side by side in the horizontal direction.

Referring to Figs.9-10, 12, each of the first horizontal connection members 31 comprises a connection portion 311 (please refer to Fig.12) and an engagement portion 312. The connection portion 311 is formed by extending from the outer side of the first vertical wall 11' in the horizontal direction. The engagement portion 312 is formed by extending from an end of the connection portion 311 in at least one direction (for example, as shown in Figs.9, 12, a forward direction, a rearward direction and an upward direction) parallel to the first vertical wall 11'.

Referring to Figs.11-12, each of the second horizontal connection members 32 comprises a receiving groove 321 and a first opening 322 located at an upper end of the receiving groove 321. The receiving groove 321 is formed in the second vertical wall 12' and configured to receive the engagement portion 312 of the first horizontal connection member 31 of another adapter. The first opening 322 is communicated with the receiving groove 321 to permit the engagement portion 312 of the another adapter to be downwardly inserted into the receiving groove 321 through the first opening 322.

Furthermore, the second horizontal connection member 32 may further comprise a second opening 323 extending in the vertical direction. As shown in Figs.11-12, the second opening 323 is communicated with the receiving groove 321 and configured to be fitted with the connection portion 311 of the another adapter to allow the connection portion 311 of the another adapter to pass through the second opening 323 during inserting the engagement portion 312 of the another adapter into the receiving groove 321. In the cross section view of Fig.12, the receiving groove 321 is formed by two substantially L-shaped structures. Two walls of the two L-shaped structures are formed by extending from the second vertical wall 12', the other two walls of the two L-shaped structures extend toward each other to form the second opening 323. On the other hand, as shown in Fig. 9, the engagement portion 312 has a substantively U-shape and comprises two elastic arms 313 and a base 314 connected between ends of the two elastic arms 313. The connection portion 311 is connected between

the base 314 and the first vertical wall 11', as shown in Fig. 13.

Furthermore, a projection 315 is formed on an end of each of the elastic arms 313. When the engagement portion 312 of the another adapter acted as an insertion end is downwardly inserted into the receiving groove 321 through the first opening 322, the projection 315 of the another adapter is exposed outside the first opening 322 to block the engagement portion 312 from being further inserted.

In an exemplary embodiment, as shown in Fig. 11, each of the adapters 10' may further comprises two positioning portions 5. The two positioning portions 5 are formed by protruding from the second vertical wall 12' and separate from the first opening 322 by a predetermined distance to locate the projection 315 of the another adapter between the second horizontal connection member 32 and the positioning portions 5 when the engagement portion 312 of the another adapter is inserted into the receiving groove 321. More specifically, during engaging the engagement portion 312 of the another adapter is inserted into the receiving groove 321, the base 314 and the elastic arms 313 firstly pass through between the two positioning portions 5. After passing through between the two positioning portions 5, the projection 315 is located between the upper end of the second horizontal connection member 32 and the positioning portions 5. In this way, the projection 315 can block the engagement portion 312 from being further downward inserted or being upwardly disengaged from the receiving groove 321. The upper and lower surfaces of the projection 315 may be configured to be sloped guide surfaces, so that the projection 315 can overcome the block of the second horizontal connection member 32 or the positioning portions 5 through the sloped guide surfaces under a relatively larger force.

The above described engagement portion 312 is a U-shaped member with an opening upwardly as shown in the embodiment of Figs.9-10. But the present invention is not limited to this, in another embodiment, the engagement portion 312 may be a U-shaped member with an opening downwardly and a connection portion connected to the uppermost end of a base. In this case, the second opening may be omitted.

In an exemplary embodiment, the second horizontal connection member 32 may further comprise a third opening (not shown) communicated with the receiving groove 321 and opposite to the first opening 322. A projection is formed on an end of each of the elastic arms. When the end of the elastic arm of the another adapter as an insertion end is downwardly inserted into the receiving groove 321, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove 321.

In an exemplary embodiment, the first horizontal connection member 31 is disposed in a notch 112 formed in the first vertical wall 11', and the second horizontal connection member 32 is protruded from the second vertical wall 12'. In this way, when the first and second horizontal connection members 31, 32 are connected together, the first and second vertical walls 11', 12' of two adjacent adapters 10' abut against each other, saving the

mounting space.

In an alternative embodiment, as shown in Fig.13, both the connection portion 311' and the engagement portion 312' of the first horizontal connection member are provided beyond the outer surface of the first vertical wall 11A. The receiving groove 321' of the second horizontal connection member is formed in the second vertical wall 12A, that is, the entire second horizontal connection member is provided not beyond the outer surface of the second vertical wall 12A. In this way, when the first and second horizontal connection members are connected together, the first and second vertical walls 11A, 12B of two adjacent adapters 10' also can abut against each other, thereby saving the mounting space of the adapters.

As shown in Figs.14-17, the adapter assembly 100' according to the second exemplary embodiment of the present invention may further comprise a first installation member 6 and a second installation member 7. The first installation member 6 comprises a first plate body 61 and a first auxiliary connection member 62. The first auxiliary connection member 62 is formed on a first side of the first plate body 61 and configured the same as the first horizontal connection member 31 so as to engage with the second horizontal connection member 32 of one adapter at the outmost side of a row of adapters. In this way, the first installation member 6 can be mounted on the adapter at the outmost side of the row of adapters. The second installation member 7 comprises a second plate body 71 and a second auxiliary connection member 72. The second auxiliary connection member 72 is formed on a first side of the second plate body 71 and configured the same as the second horizontal connection member 32 so as to engage with the first horizontal connection member 31 of another adapter at the outmost side of the row of adapters. In this way, the second installation member 7 can be mounted on the another adapter at the outmost side of the row of adapters.

Furthermore, the first installation member 6 may further comprise a first installation lug 63 formed on a second side of the first plate body 61, and the second installation member may further comprise a second installation lug 73 formed on a second side of the second plate body 71. Each of the first and second installation lugs 63, 73 is provided with at least one installation hole 64, 74, so that the entire adapter assembly 100' can be mounted on the mounting panel (not shown, please refer to Fig.11) by means of connection pieces, for example, bolts or the like.

Figs.18-19 show an illustrative perspective view of an adapter assembly 100'' according to a third exemplary embodiment of the present invention.

As shown in Figs.18-19, the adapter assembly 100'' comprises a plurality of adapters 10''. Each of the adapters 10'' comprises two first vertical connection members 31' and two second vertical connection members 32'. The two first vertical connection members 31' are provided on upper ends outside the first vertical wall 11'' and the second vertical wall, respectively, and the two second vertical connection members 32' are provided on lower

ends outside the first vertical wall 11'' and the second vertical wall, respectively. The two first vertical connection members 31' and the two second vertical connection members 32' can be engaged together, respectively, so that the plurality of adapters 10'' can be stacked one over the other in the vertical direction.

Furthermore, in the adapter assembly 100'', each of the first vertical connection members 31' has a substantively U-shape and comprises a first arm 313', a second arm 314' and a base 315'. The first arm 313' is formed by protruding outward from the upper end of the outside of the first vertical wall 11'' or the second vertical wall. The second arm 314' is located above the top wall 13'' and extends in a direction parallel to the first arm 313'. The base 315' is connected between the first and second arms 313', 314', so that a slot is formed between the first and second arms 313', 314'. Each of the second vertical connection members 32' comprises an elongated protrusion formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms 313', 314' of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm 313' is flush with the upper surface of the top wall 13'', and the lower side of the elongated protrusion is flush with the lower surface of the bottom wall. In this way, when two adjacent adapters are stacked and engaged in the vertical direction, the bottom wall of the upper adapter can abut against the top wall of the lower adapter, thereby saving the mounting space of the entire adapter assembly.

In a further embodiment, a free end of the second arm 314' is formed with a block portion 316' extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms 313', 314'. Also, each of the adapters 10'' further comprises an installation members 8 protruding from the first vertical wall 11'' and the second vertical wall to mount the entire adapter assembly on a mounting panel 101, as shown in Fig. 19.

In an alternative embodiment, each of the first vertical connection members has a substantively U-shape and comprises: a first arm formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall; a second arm located below the bottom wall and extending in a direction parallel to the first arm; and a base connected between the first and second arms to form a slot between the first and second arms. Each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the upper end of the outside of the first vertical wall or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm is flush with the lower surface of the bottom wall, and the upper side of the elongated protrusion is flush with the upper surface of the top wall.

In another alternative embodiment, each of the connection devices comprises a vertical

connection member and a receiving groove. The vertical connection member has a substantively L-shape and comprises: a base vertically extending outward from the top wall or the bottom wall; and a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall. The receiving groove is formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters together in the vertical direction.

According to an exemplary embodiment of another aspect of the present invention, there is provided a connector assembly comprising: an adapter assembly according to the above mentioned embodiments; and a plurality of connectors each coupled into one of the interfaces of the respective adapter. Furthermore, the connector may be a fiber optic connector, for example, a LC fiber optic connector.

According to various exemplary embodiments of the present invention, a plurality of adapters may be connected together in order in a manner of side by side in a horizontal direction and/or stacked with one on the other in a vertical direction, for example, two adjacent adapters may be removably connected together in a snap-fit manner, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally. The entire adapter assembly may be mounted on the mounting panel by means of the installation members. The outer connection features on the adapters may be same with each other, and the inner features of the adapter may be same as those of the conventional adapter, so that the adapters of the present invention may be adapted to couple with the standard LC fiber optic connectors in a high density to optimally utilize the space above a mounting panel. At the same time, the adapters can be assembled in a modularization manner to ensure that an appreciate number of adapters can be quickly assembled together according to various requirements from customers.

Although it has been described the connector of the present invention by using the optical cable as an object to be spliced in the above mentioned embodiments, it should be appreciated for those skilled in this arts that the connector of the present invention may be used to couple two electric cables in some other embodiments. More particularly, for example, in various network communication terminations, such as computer, router, server, digital switch, and so on, having a plug connector and a receptacle connector, the plug connector may be provided with the locking mechanism having a slope arm, a driving arm and a locking protrusion according to the present invention.

It should be appreciated for those skilled in this art that the above embodiments are intended to be illustrated, and not restrictive. For example, many modifications may be made to the above embodiments by those skilled in this art, and various features described in different embodiments may be freely used in combination with each other without conflict in configuration or principle of the present invention, so that more kinds of connector and adapter assemblies can be achieved with overcoming the technical problem of the present invention.

Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

What is claimed is,

1. An adapter assembly (100, 100', 100") for coupling with a plurality of connectors, comprising:

a plurality of adapters (10, 10', 10") each including a housing (1, 1', 1"), the housing being formed with at least one interfaces (2, 2', 2") each for coupling with one of the plurality of connectors; and

at least one connection device each configured to connect adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters in a snap-fit manner, so that the plurality of adapters are connected together.

2. The adapter assembly according to claim 1,

wherein the housing of each of the adapters exhibits a substantively cuboid shape and comprises a first vertical wall (11), a second vertical wall (12) opposite to the first vertical wall, a top wall (13) and a bottom wall (14) for defining the interface (2); and

wherein the connection device is configured to connect the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

3. The adapter assembly according to claim 2,

the connection device is an elastic clamping member configured to clamp the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

4. The adapter assembly according to claim 3,

wherein each of the first vertical wall, the second vertical wall, the top wall and the bottom wall is formed with a recess (111, 121, 131, 141) in an inner side thereof; and

wherein the clamping member comprises a pair of clamping arms (30) each constructed to substantively match with that of the recess to be received in the respective recess.

5. The adapter assembly according to claim 4,

wherein each of the clamping members comprises a pair of holding portions (301) protruding toward each other at free ends of the pair of clamping arms; and

wherein a distal end of each of the recesses is formed with a through hole (15) running through the first vertical wall, the second vertical wall, the top wall and the bottom wall for receiving the respective holding portion therein.

6. The adapter assembly according to claim 4,

wherein each of the clamping arms exhibits a substantively triangle shape.

7. The adapter assembly according to any one of claims 3-6, further comprising at least one pair of installation members (4),

wherein one of the pair of installation members is mounted on the first vertical wall or the second vertical wall at the outmost side of a row of adapters,

each of the installation members comprises:

a body (41) having a first end and a second end opposite to the first end, and the length of the body from the first end to the second end being equal to about an half of a longitudinal length of the adapter;

an installation lug (42) perpendicularly extending from the first end of the body; and

an auxiliary clamping component (43) formed by bending inward from the second end of the body by about 180 degrees and engaged in the recess of the vertical wall at the outmost side of the row of adapters.

8. The adapter assembly according to claim 7,

wherein an installation hole (421) is provided in the installation lug; and

wherein an elastic clamping protrusion (431) is formed on a free end of the auxiliary clamping component.

9. The adapter assembly according to claim 2,

wherein each of the connection devices comprises:

at least one first horizontal connection member (31) formed by extending from an outer side of the first vertical wall in a horizontal direction; and

at least one second horizontal connection member (32) formed on an outer side of the second vertical wall,

wherein the first and second horizontal connection members are configured to be engaged with each other in a snap-fit manner so as to connect the plurality of adapters side by side.

10. The adapter assembly according to claim 9,

wherein the first horizontal connection member comprising:

a connection portion (311) formed by extending from the outer side of the first vertical wall in the horizontal direction ; and

an engagement portion (312) formed by extending from an end of the connection portion in at least one direction parallel to the first vertical wall,

wherein the second horizontal connection member comprising:

a receiving groove (321) formed in the second vertical wall and configured to receive the engagement portion of the first horizontal connection member of another

adapter; and

a first opening (322) communicated with the receiving groove to permit the engagement portion of the another adapter to be inserted into the receiving groove through the first opening.

11. The adapter assembly according to claim 10, wherein the second horizontal connection member further comprises a second opening (323) communicated with the receiving groove and configured to be fitted with the connection portion of the another adapter, so that the connection portion of the another adapter is allowed to pass through the second opening during inserting the engagement portion of the another adapter into the receiving groove.

12. The adapter assembly according to claim 11,

wherein the engagement portion has a substantively U-shape and comprises two elastic arms (313) and a base (314) connected between ends of the two elastic arms; and

wherein the connection portion is connected between the base and the first vertical wall.

13. The adapter assembly according to claim 12,

wherein a projection (315) is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the first opening to block the engagement portion from being further inserted.

14. The adapter assembly according to claim 13, wherein each of the adapters further comprises:

two positioning portions (5) formed by protruding from the second vertical wall and separate from the first opening by a predetermined distance to locate the projection of the another adapter between the second horizontal connection member and the positioning portions when the engagement portion of the another adapter is inserted into the receiving groove.

15. The adapter assembly according to claim 12,

wherein the second horizontal connection member further comprises a third opening communicated with the receiving groove and opposite to the first opening,

wherein a projection is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove.

16. The adapter assembly according to any one of claims 9-15,
wherein the first horizontal connection member is disposed in a notch formed in the first vertical wall; and
wherein the second horizontal connection member is protruded from the second vertical wall.

17. The adapter assembly according to claim 16, further comprising:
a first installation member (6) comprising:
a first plate body (61); and
a first auxiliary connection member (62) formed on a first side of the first plate body and configured the same as the first horizontal connection member so as to engage with the second horizontal connection member of one adapter at the outmost side of a row of adapters,
a second installation member (7) comprising:
a second plate body (71); and
a second auxiliary connection member (72) formed on a first side of the second plate body and configured the same as the second horizontal connection member so as to engage with the first horizontal connection member of another adapter at the outmost side of the row of adapters.

18. The adapter assembly according to claim 17,
wherein the first installation member further comprises a first installation lug (63) formed on a second side of the first plate body; and
wherein the second installation member further comprises a second installation lug (73) formed on a second side of the second plate body.

20. The adapter assembly according to claim 2,
wherein each of the connection devices comprises:
first vertical connection members (31') formed by extending from outer sides of the first and second vertical walls proximate to the top wall or the bottom wall; and
second horizontal connection members (32') formed on outer sides of the first and second vertical walls proximate to the bottom wall or the top wall and configured to be inserted into and fixed in a slot in the first vertical connection member of another adapter,
wherein the plurality of adapters are stacked and engaged with each other in a vertical direction by engaging the first vertical connection members of one adapter and the second vertical connection members of the other adapter.

21. The adapter assembly according to claim 20,

wherein each of the first vertical connection members has a substantively U-shape, and comprises:

a first arm (313') formed by protruding outward from an upper end or a lower end of the outside of the first or second vertical wall;

a second arm (314') located above the top wall or the bottom wall and extending in a direction parallel to the first arm; and

a base connected between the first and second arms to form a slot between the first and second arms,

wherein each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the lower end or the upper end of the outside of the first or second vertical wall, and

wherein the elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters.

22. The adapter assembly according to claim 21,

wherein a free end of the second arm is formed with a block portion (316') extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms.

23. The adapter assembly according to claim 2, wherein each of the connection devices comprises:

a vertical connection member having a substantively L-shape, and comprising:

a base vertically extending outward from the top wall or the bottom wall; and

a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall, and

a receiving groove formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters.

24. The adapter assembly according to any one of claims 20-23, wherein each of the adapters further comprises installation members (8) formed by protruding from the first and second vertical walls to mount the adapter assembly on a mounting panel.

25. A connector assembly, comprising:

an adapter assembly according to any one of claims 1-24; and

a plurality of connectors each coupled into one of the interfaces of the respective adapter.

26. The connector assembly according to claim 25, wherein the connector is a fiber optic

connector.

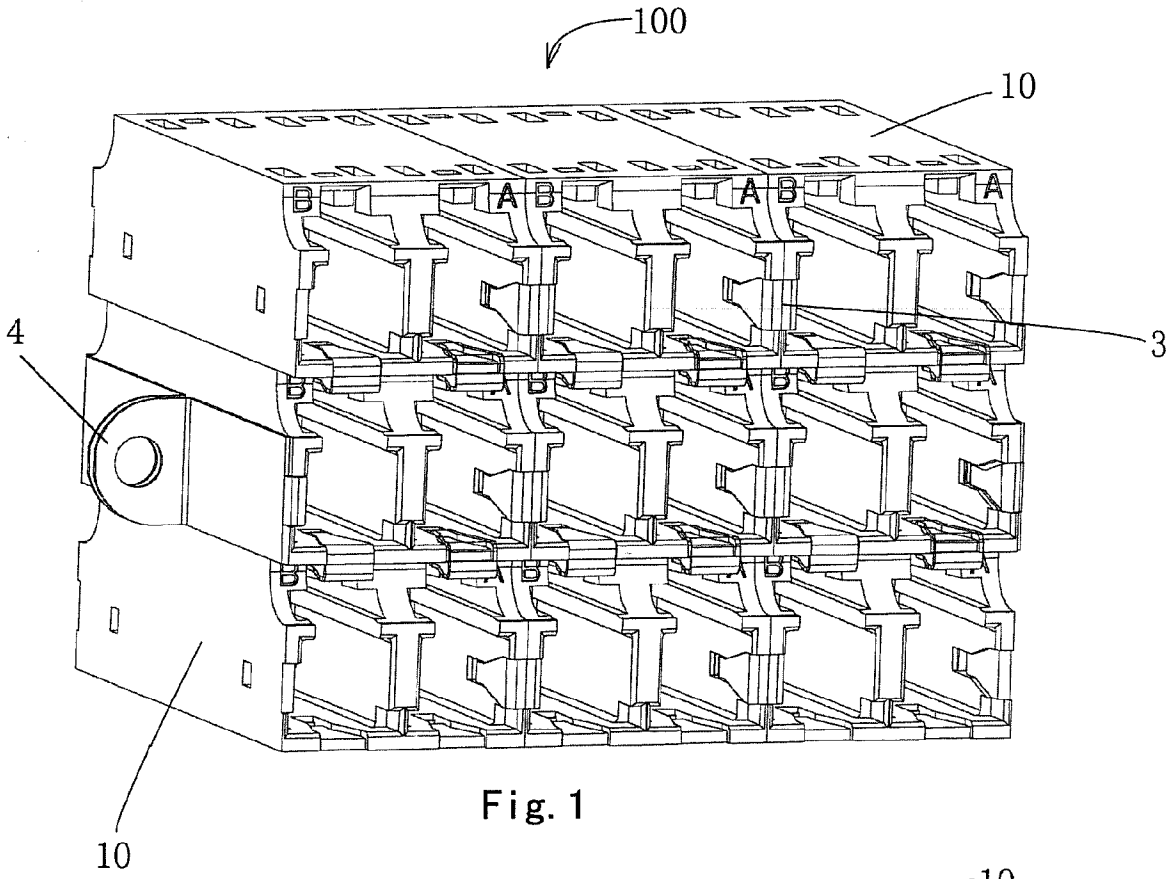


Fig. 1

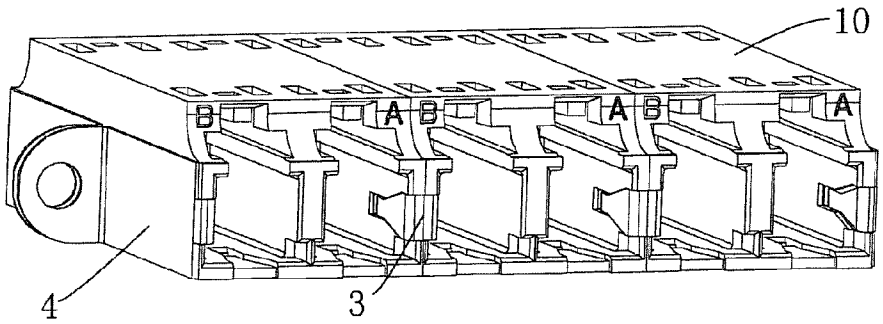


Fig. 2

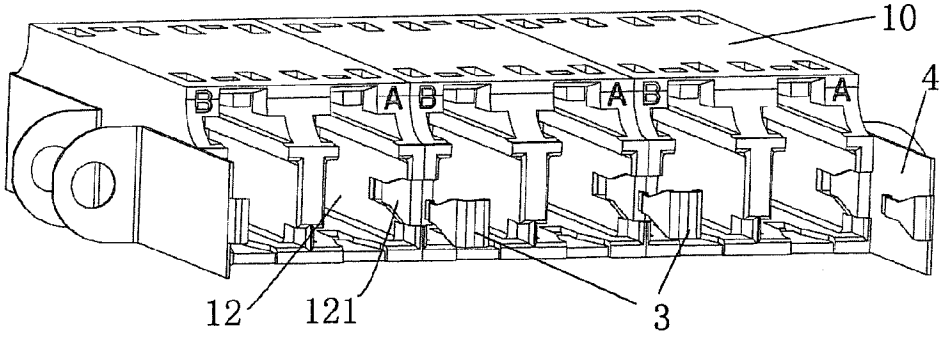


Fig. 3

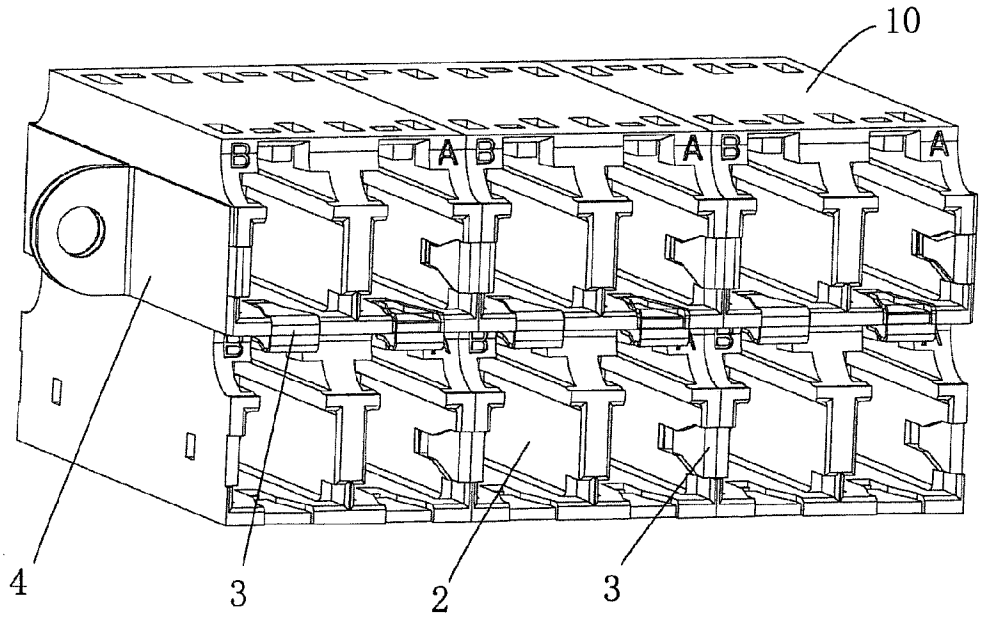


Fig. 4

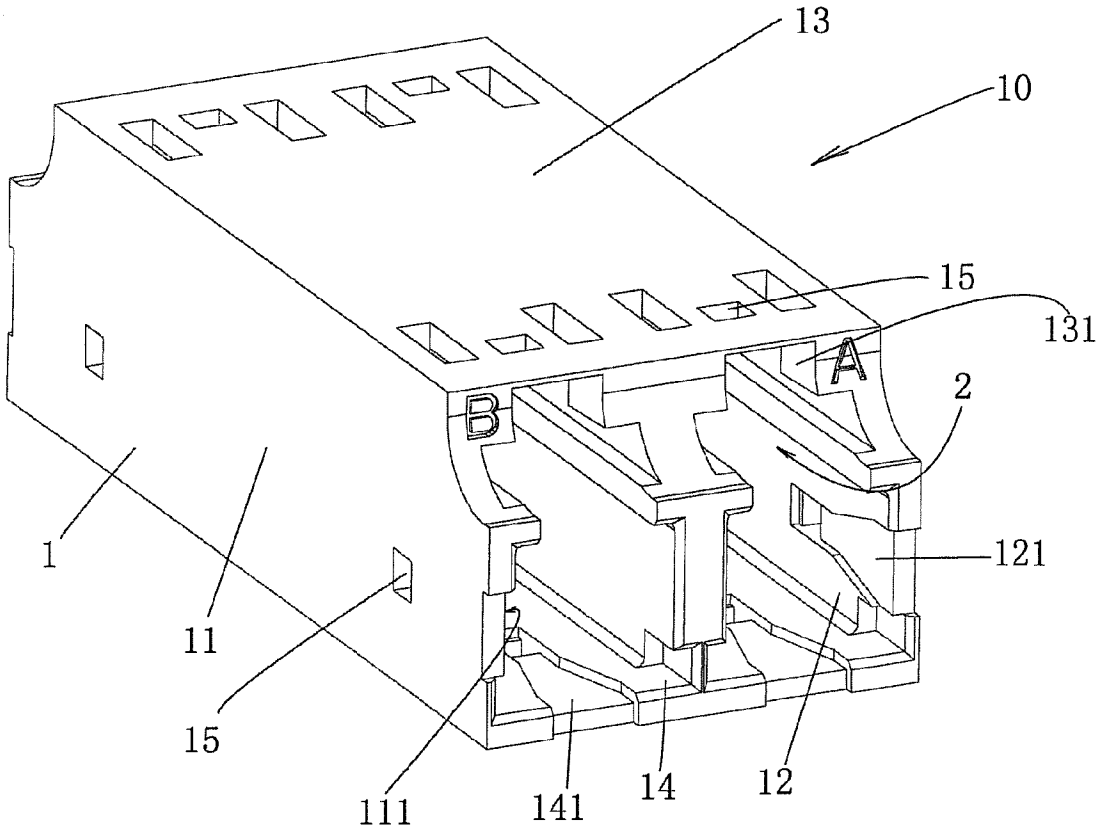


Fig. 5

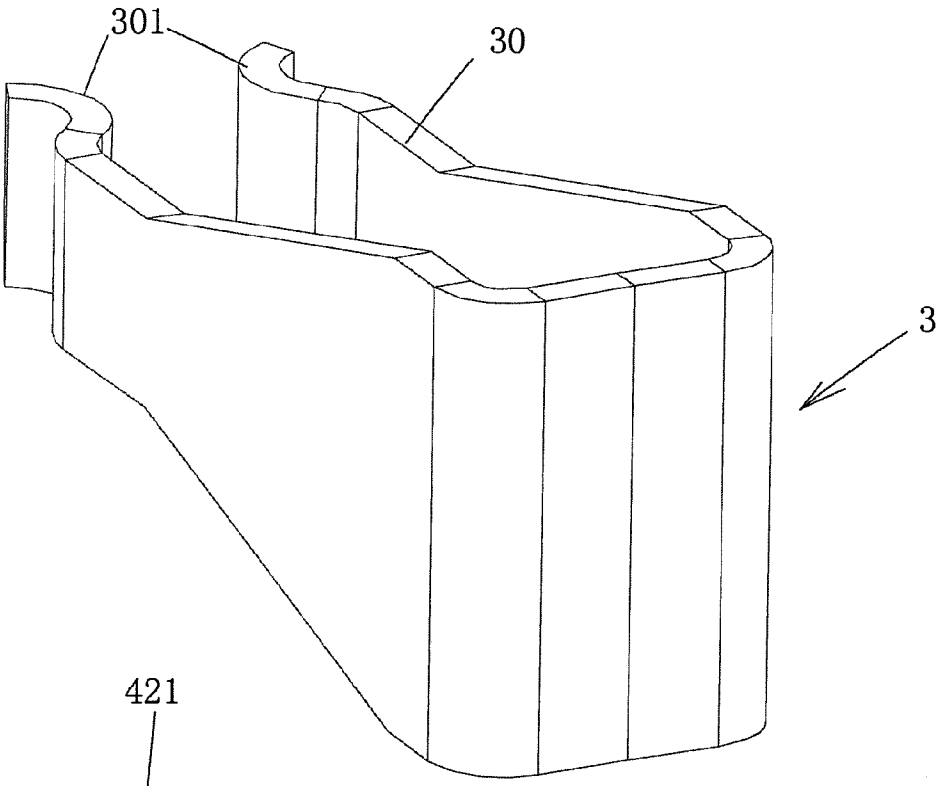


Fig. 6

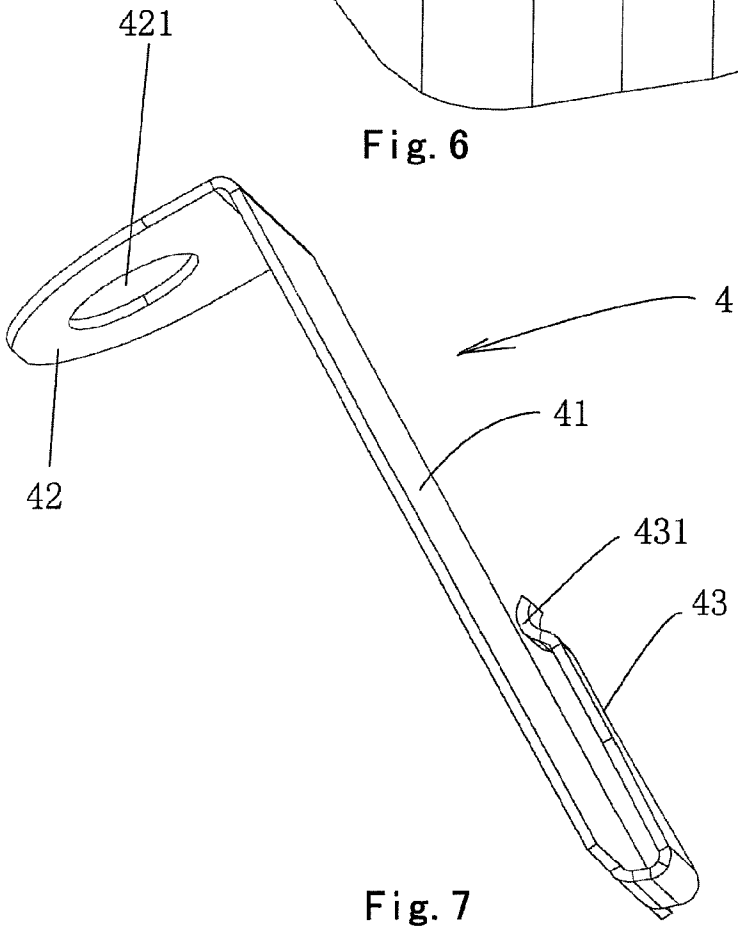


Fig. 7

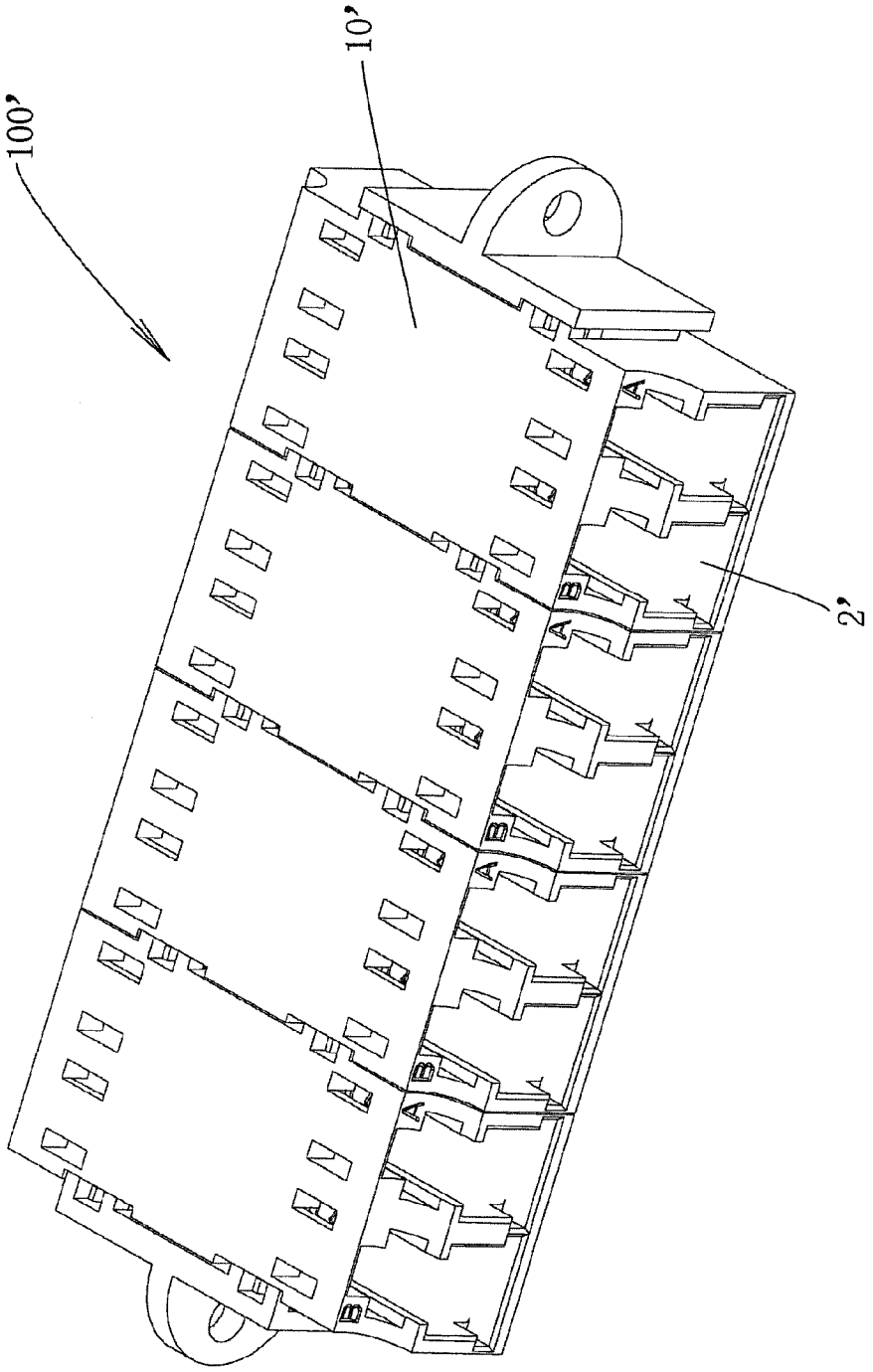


Fig. 8

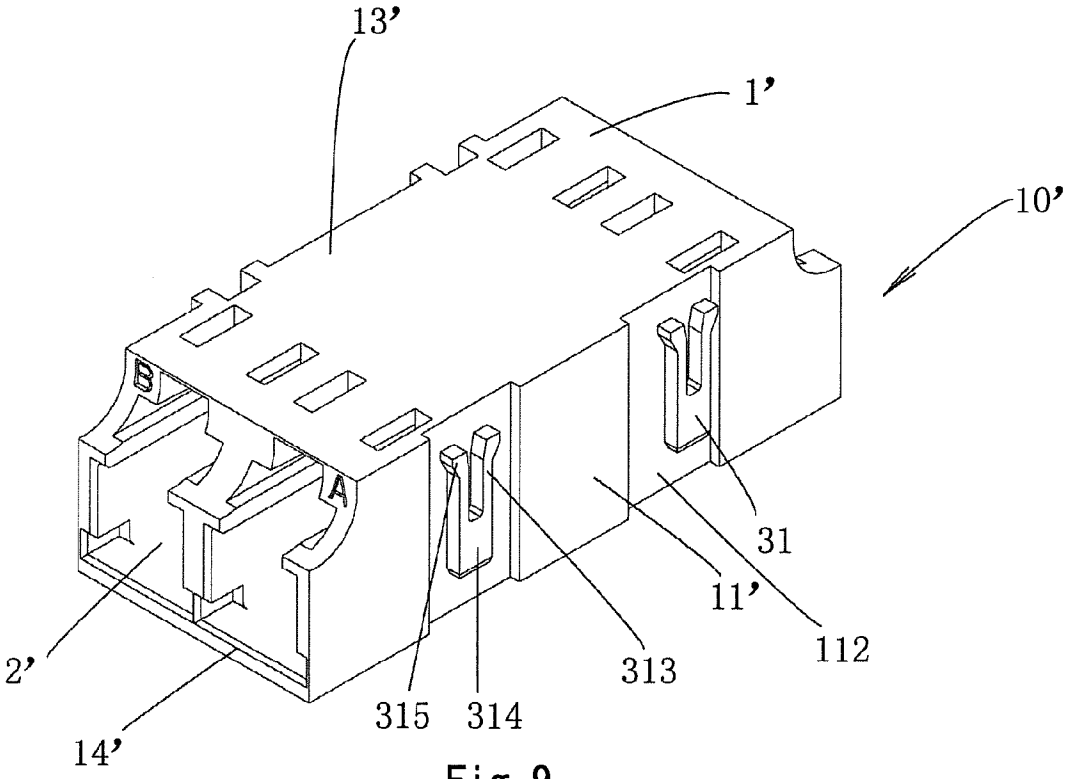


Fig. 9

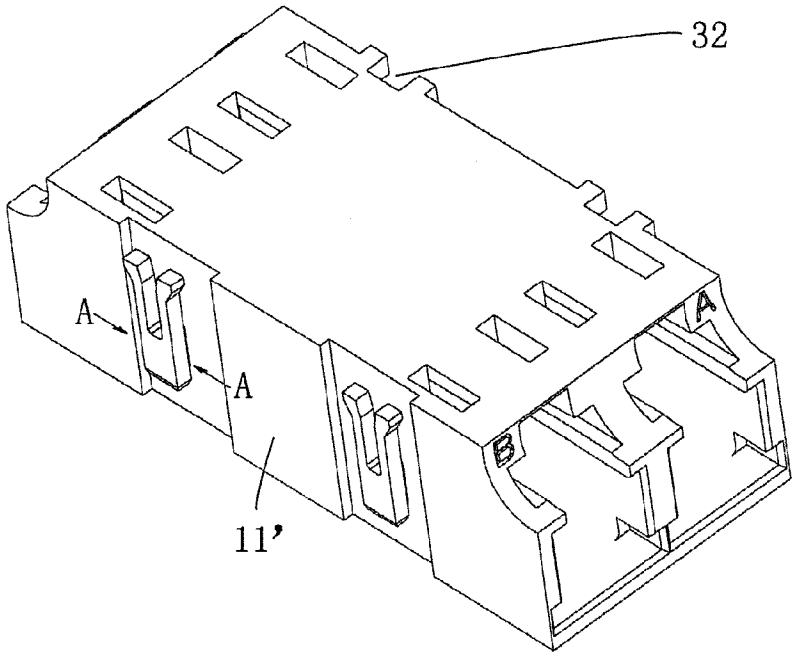


Fig. 10

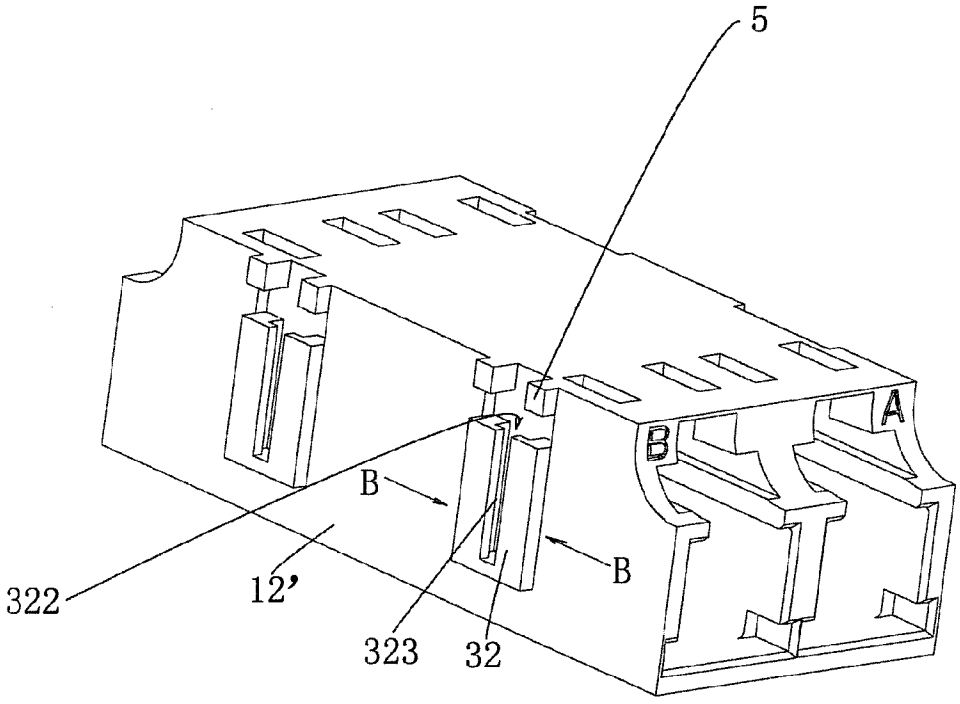


Fig. 11

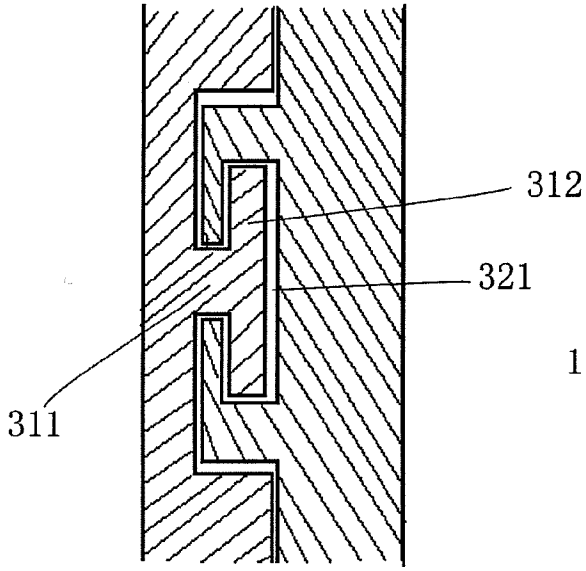


Fig. 12

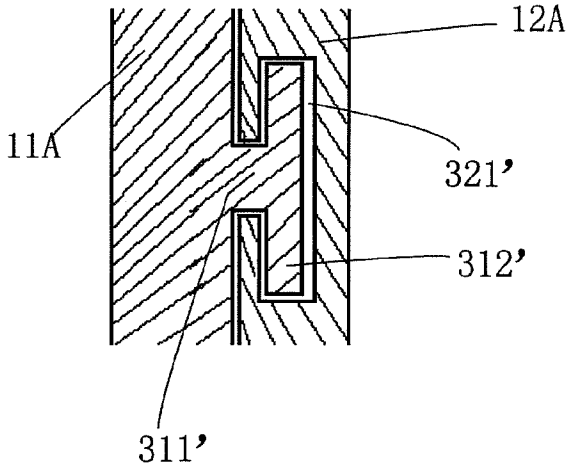


Fig. 13

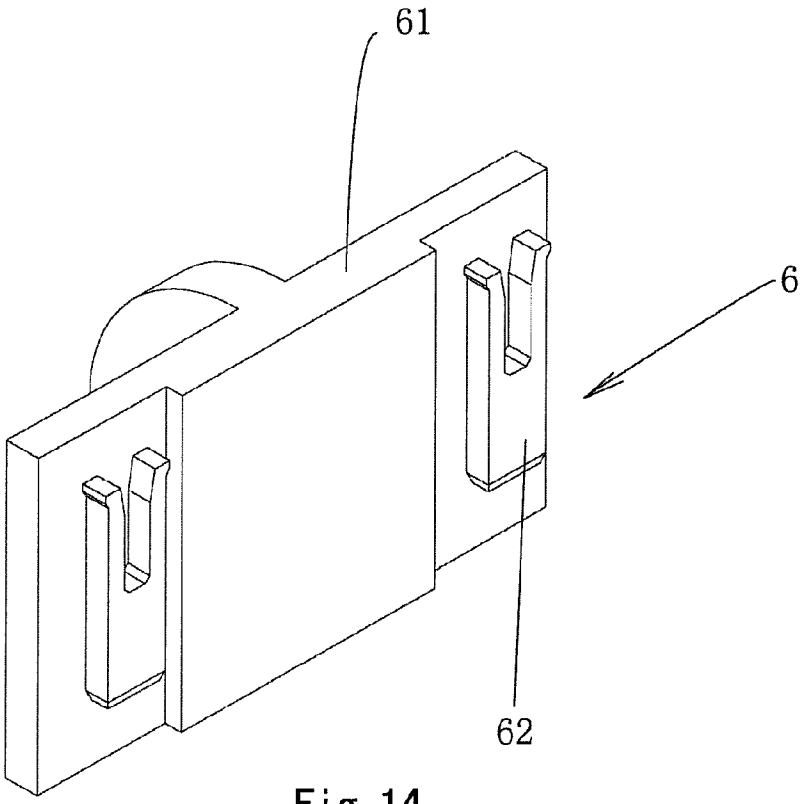


Fig. 14

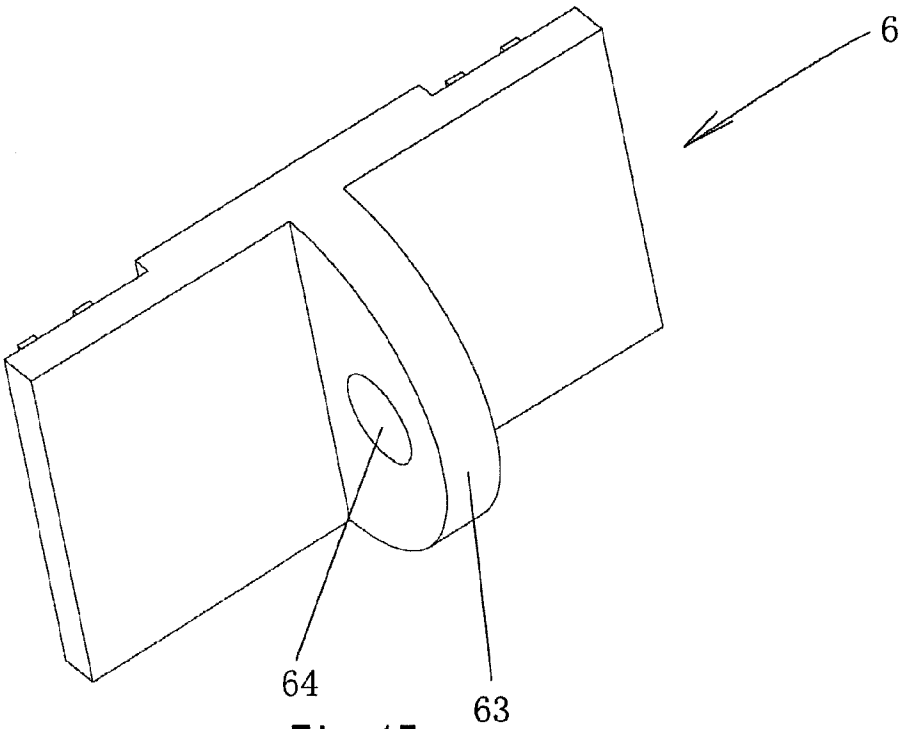


Fig. 15

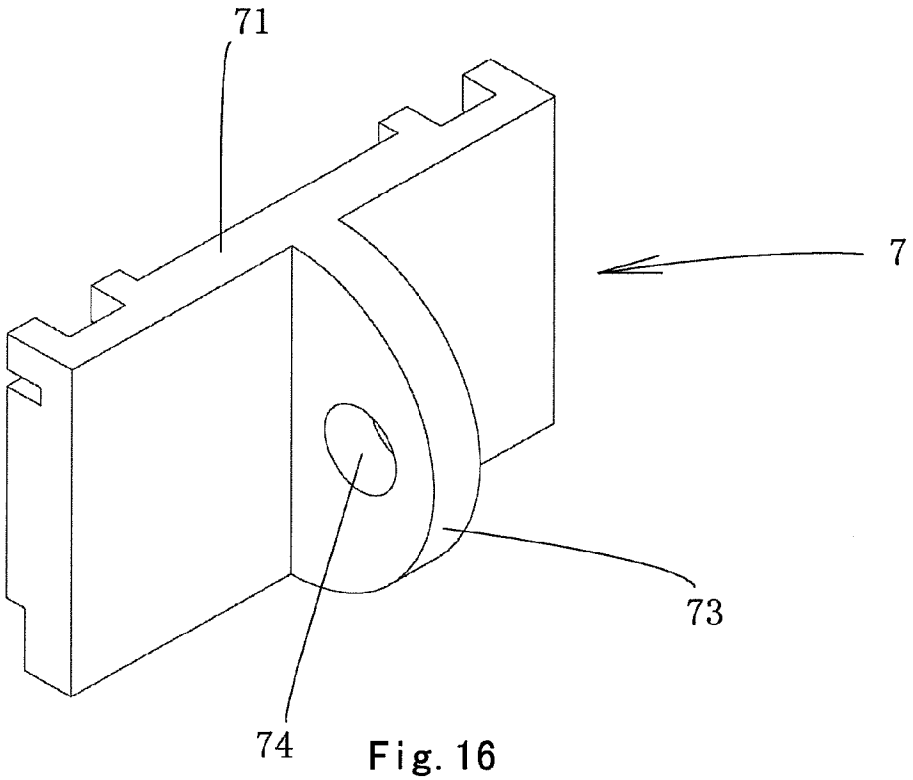


Fig. 16

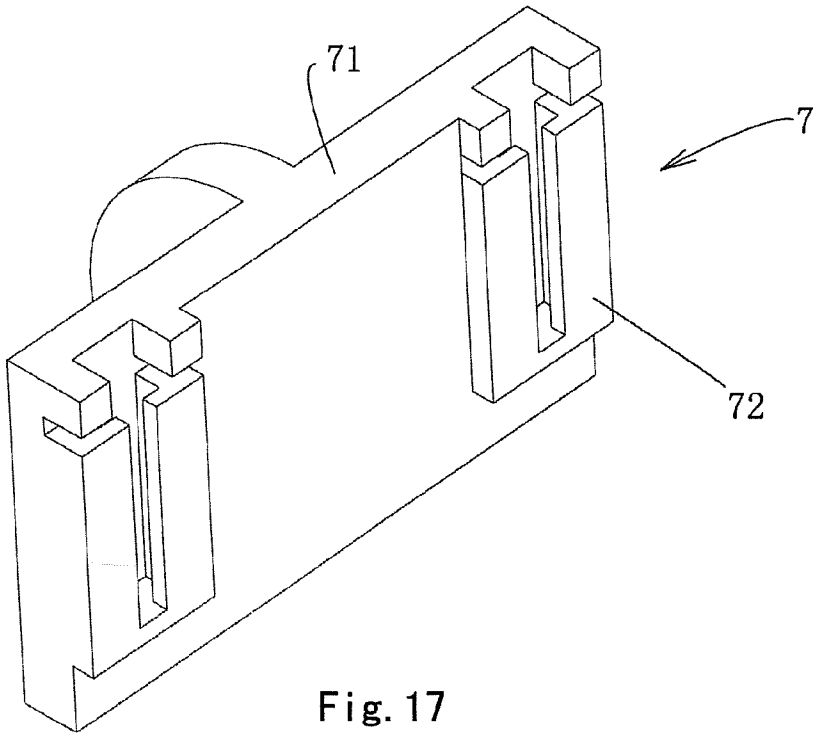


Fig. 17

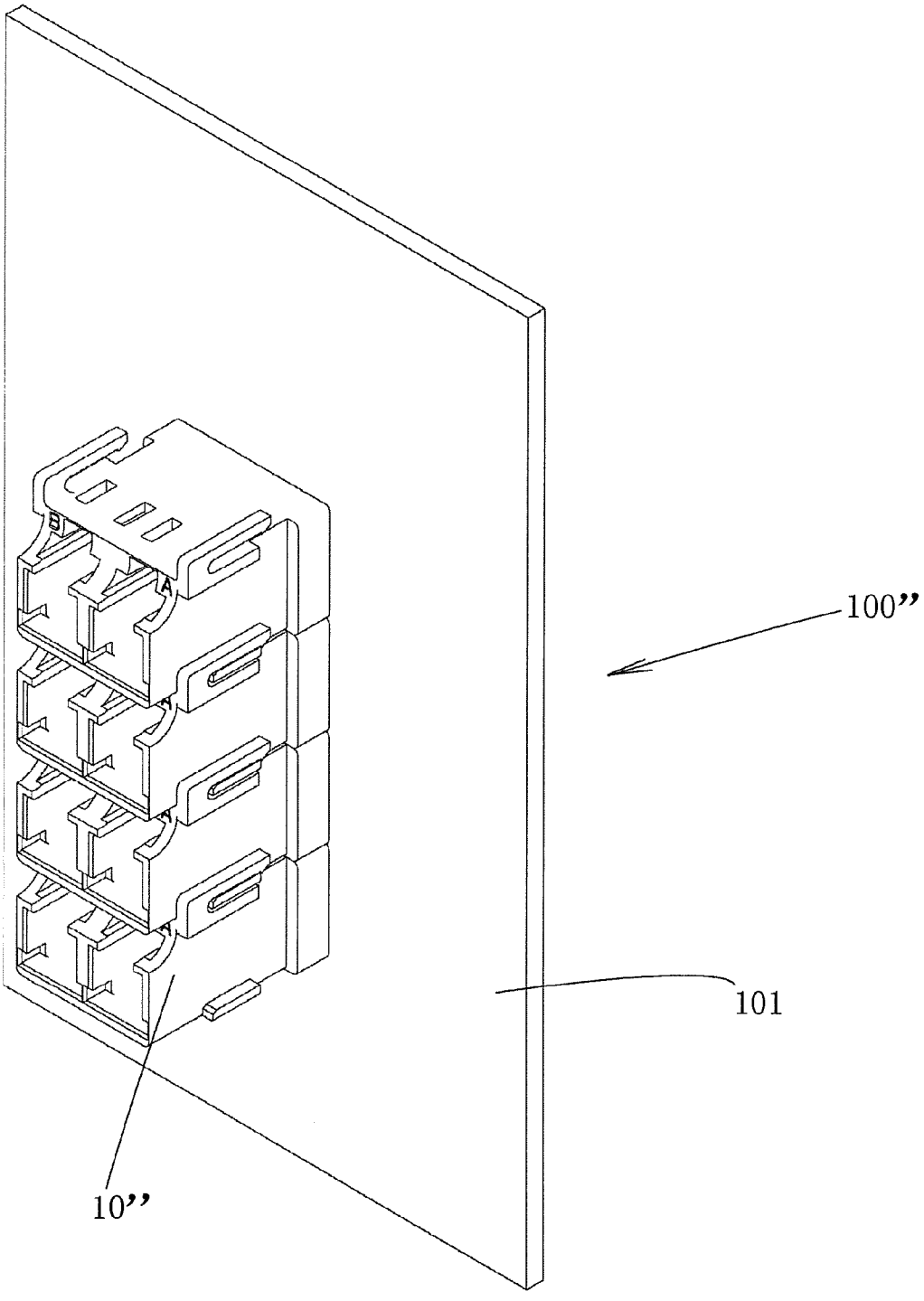


Fig. 18

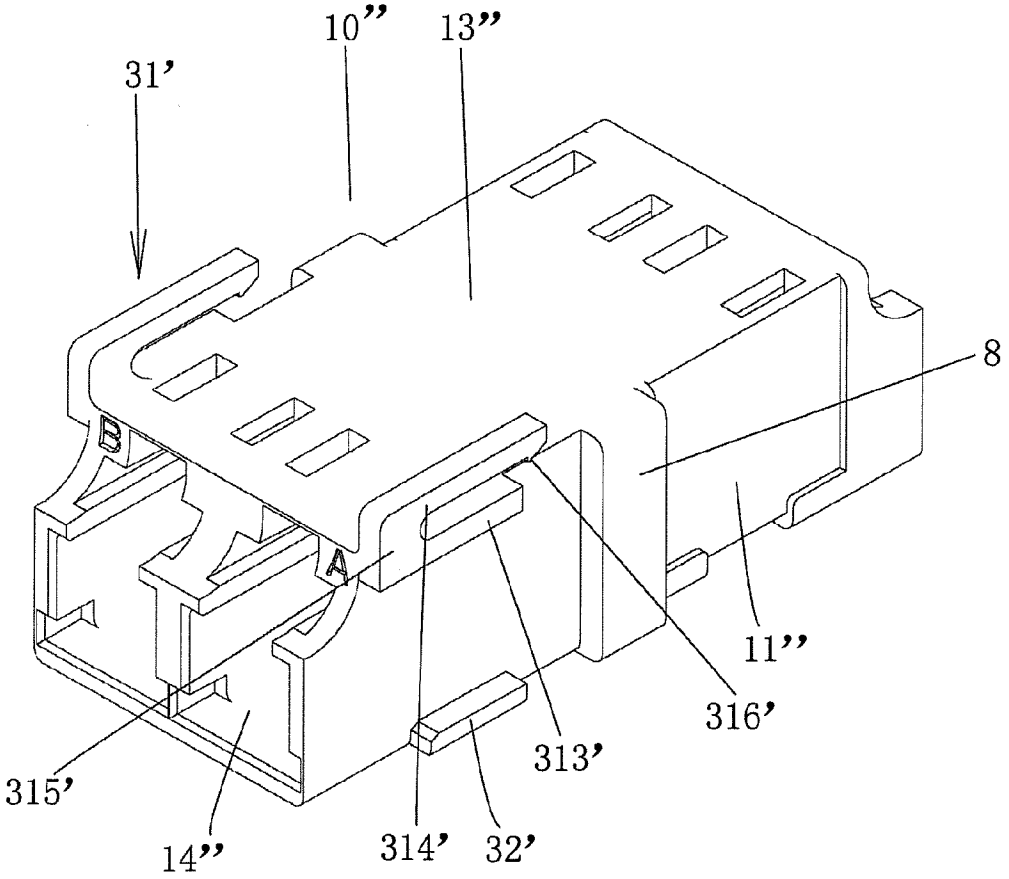


Fig. 19

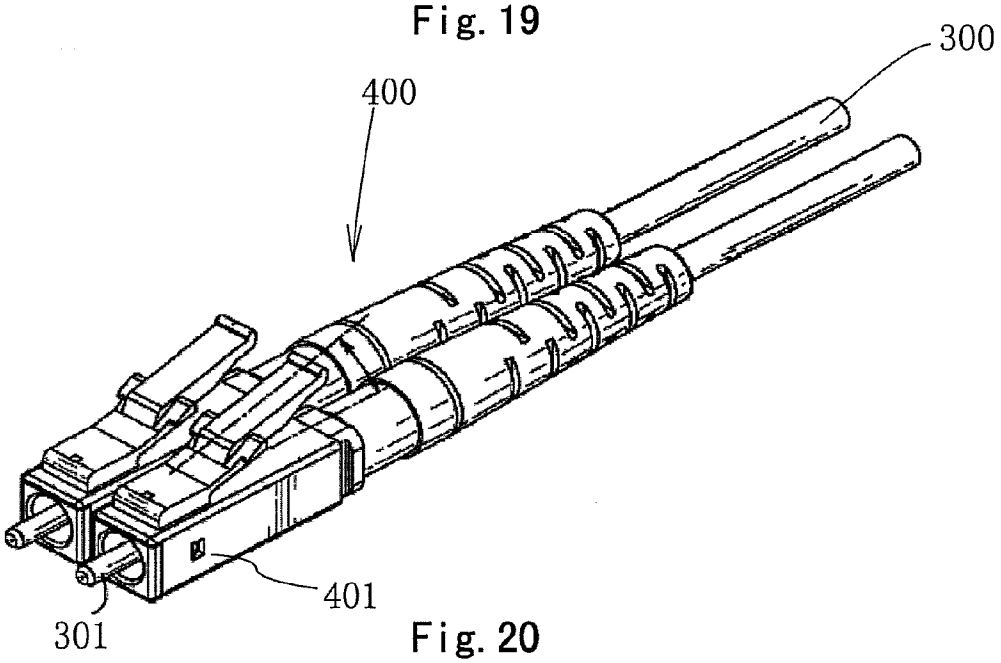


Fig. 20

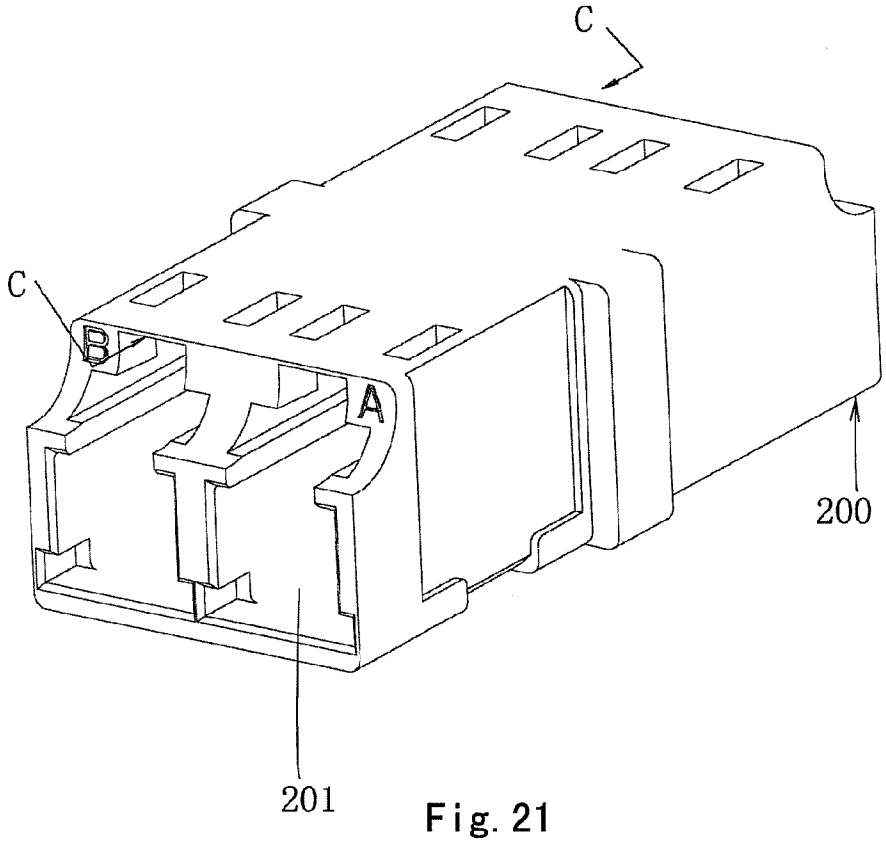


Fig. 21

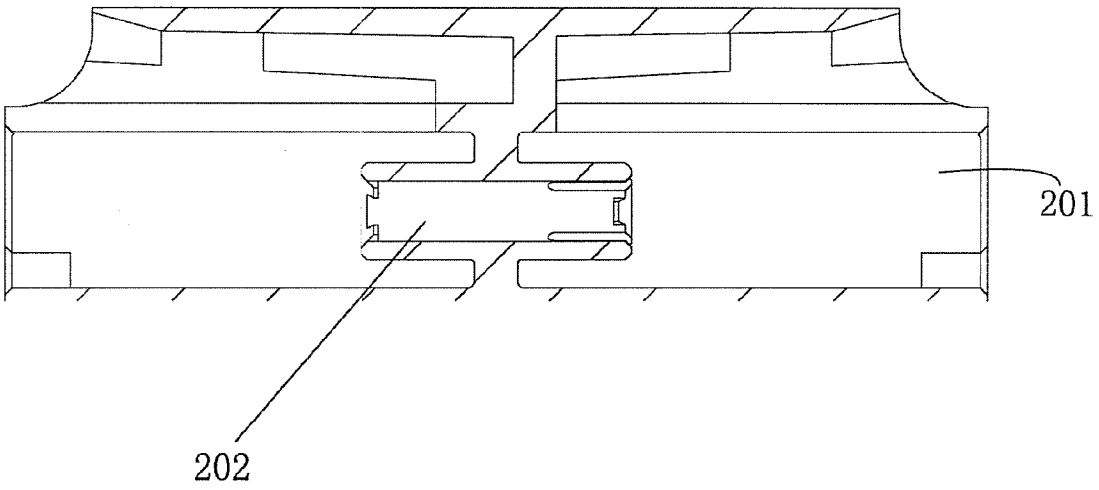


Fig. 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/054312

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R9/24 G02B6/00 H01R13/506 H01R13/508 H01R13/514
H01R31/06
ADD. H01R13/518 H01R13/74
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R G02B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2008/311781 A1 (WOJCIK ALAN F [US] ET AL) 18 December 2008 (2008-12-18) claims 1, 15 , 29 , 30 , 32 , 33 paragraph [0054] - paragraph [0056] figures 18-23	1-6,25 26

X Y A	US 2001/049223 A1 (FUKATSU YUKIHIRO [JP]) 6 December 2001 (2001-12-06) claims 1, 10 paragraph [0033] - paragraph [0035] paragraph [0038] figures 1, 2 , 7 -10	1,2, 9-16,25 26 17

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
4 October 2013	16/10/2013
Name and mailing address of the ISA/	**Authorized officer**
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Stichauer, Libor

Senko Ex. 1017, Page 161
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/054312

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 319 071 B1 (SATO KEI [JP]) 20 November 2001 (2001-11-20)	1,2,9, 16, 20-22, 24,25
Y	column 4, line 24 - line 52 column 5, line 65 - column 6, line 8 column 6, line 50 - column 7, line 6 column 8, line 1 - line 10 figures 3,6, 9, 10, 13, 16	26

X	US 6 361 355 B1 (MATSUOKA YUTAKA [JP] ET AL) 26 March 2002 (2002-03-26)	1,2,9, 16, 20-22, 24,25
Y	column 5, line 19 - column 6, line 46 figures 1, 10	26

X	US 2006/228932 A1 (KOMIYAMA RYUICHI [JP]) 12 October 2006 (2006-10-12)	1,2,9, 16,25
Y	paragraph [0036] - paragraph [0039] paragraph [0041] figures 1, 2 , 3B, 4, 7, 8, 10, 11	26

X	US 2002/026710 A1 (MURAKAMI TAKAO [JP] ET AL) 7 March 2002 (2002-03-07)	1,2, 23-25
Y	claims 1 , 6 paragraph [0025] paragraph [0033] - paragraph [0037] figures	26

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A	paragraphs [0025], [0026], [0030], [0034], [0035] figures 1, 3 , 4 , 7 , 11, 13	1-3,7-9, 16-18,25

A	US 2009/221187 A1 (DALY PETER R [US] ET AL) 3 September 2009 (2009-09-03) figures 20-23	1-3,7-9, 16-18

A	US 2009/258536 A1 (LEE KUO-CHI [TW] ET AL) 15 October 2009 (2009-10-15) paragraph [0025] figures 1-3	1-3,7-9, 16-18

Senko Ex. 1017, Page 162
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/054312

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INTERNATIONAL SEARCH REPORT

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International application No
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Senko Advanced Components v. US Conec Ltd.
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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(Not for submission under 37 CFR 1.99)

Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	2874
Examiner Name	Omar R ROJAS
Attorney Docket Number	USCO-053-05

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Attorney Docket Number	USCO-053-05

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6764222	B1	2004-07-20	Szilagyi et al.	

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	Attorney Docket Number	USCO-053-05

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Name/Print	Michael L. Leetzow	Registration Number	35932

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**09/13/2023 07:30:53 AM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62785756	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
IDS2_Form_20230912_USCO05305.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1252 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
IDS2_Form_20230912_USCO05305.pdf	C3D61E22DD98B2096ADF81F2055FACF75B5D5219D92236FB20A19693971164EC2BA5EE371B64011CB2CAE0BADDD4ABF392D80A82C767DEB9D8684B3796586DC4

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First Named Inventor	Hiep V. Nguyen
Art Unit	2874
Examiner Name	Omar R ROJAS
Attorney Docket Number	USCO-053-05

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	1	6764222	B1	2004-07-20	Szilagyi et al.	

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**09/13/2023 07:14:19 AM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62785735	AUTHORIZED BY	-
CUSTOMER #	152017	FILING DATE	07/05/2022
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Hiep V. Nguyen

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 7852	**E20239C818328701**	**Michael Leetzow**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	260.00	1	260.00
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 July 2013 (04.07.20 13)

W I P O | P C T

(10) International Publication Number
WO 2013/100892 A1

(51) International Patent Classification:
G02B 6/36 (2006.01)

(21) International Application Number:
PCT/US201 1/067336

(22) International Filing Date:
27 December 201 1 (27. 12.201 1)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

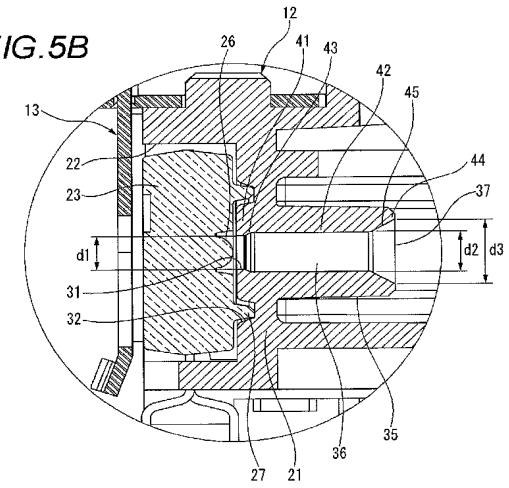
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) **Title:** OPTICAL MODULE

FIG.5B



(57) **Abstract:** An optical module includes: a fiber optic transceiver which includes a light-emitting/receiving surface for transmitting light with an optical fiber; and a housing which includes a holding portion which holds the fiber optic transceiver and a cylindrical portion which has a first opening facing on the light-emitting/receiving surface and a second opening from which the optical fiber is inserted. The cylindrical portion includes a first annular portion which forms the first opening of the cylindrical portion, a second annular portion which has an inner diameter larger than an inner diameter of the first annular portion, and a first interconnecting portion which interconnects edges of the first annular portion and the second annular portion having the different inner diameters. An optical module accepts an optical connector plug with plastic optical fiber without a ferrule; and glass optical fiber or smaller diameter plastic optical fiber both with a ferrule.

WO 2013/100892 A1

DESCRIPTION

Title of the Invention :

OPTICAL MODULE

Technical Field

[0001] The present invention relates to an optical module to which a plug attached to an optical fiber is coupled to thereby enable optical communication.

Background Art

[0002] There is an optical module of a receptacle type constituting a part of an optical connection which is configured to be mounted on a circuit board contained within a device. The optical module includes a housing having a fixing portion to be fixed to the circuit board, and a fiber optic transceiver (FOT: Fiber Optic Transceiver) having a light-emitting element or a light-receiving element (for example, see Patent Literature 1).

Citation List

Patent Literature

[0003] Patent Literature 1 : JP-A-2011-59183

Summary of Invention

Technical Problem

[0004] Some of the optical fibers have different configurations accorded to

their standards. Since an optical fiber accorded to one of the standards can not be coupled to an optical module dedicated to an optical fiber accorded to another standard, it is necessary to prepare an optical module dedicated to the one standard for the optical fiber accorded to the one standard. For example, it is necessary, as to a plastic optical fiber acceded to one standard, to prepare an optical module accorded to the configuration of the plastic optical fiber without a ferrule; and also as to an optical fiber made of glass or a smaller outside diameter (OD) plastic optical fiber both with a ferrule, to prepare an optical module accorded to the configuration of a ferrule to be assembled to the glass optical fiber or a smaller OD plastic optical fiber. Thus, there arises a problem that the model number of the optical module increases.

[0005] The present invention has been made in view of the circumstances and an object of the present invention is to provide an optical module which can be coupled to a plurality of optical fibers accorded to different standards.

Solution to Problem

[0006] In order to attain the object, an optical module according to each aspect of the present invention is configured by any one of the following configurations (1) to (6).

(1) An optical module, including:

a fiber optic transceiver which includes a light-emitting/receiving surface for transmitting light with an optical fiber; and

a housing which includes a holding portion which holds the fiber optic transceiver and a cylindrical portion which has a first opening facing on the

light-emitting/receiving surface and a second opening from which the optical fiber is inserted, wherein

the cylindrical portion includes a first annular portion which forms the first opening of the cylindrical portion, a second annular portion which has an inner diameter larger than an inner diameter of the first annular portion, and a first interconnecting portion which interconnects edges of the first annular portion and the second annular portion having the different inner diameters.

(2) The optical module according to the configuration (1), wherein the first interconnecting portion has a slanted surface.

(3) The optical module according to the configuration (1) or (2), wherein

the cylindrical portion further includes a third annular portion which forms the second opening of the cylindrical portion and has an inner diameter larger than the inner diameter of the second annular portion, and a second interconnecting portion which interconnects edges of the second annular portion and the third annular portion having the different inner diameters.

(4) The optical module according to the configuration (3), wherein the second interconnecting portion has a slanted surface.

(5) The optical module according to any one of the configurations (1) to (4), wherein

the optical fiber to be inserted in the cylindrical portion of the housing includes a plastic optical fiber, and a glass optical fiber which is provided with a ferrule at an end part of the glass optical fiber or a smaller

outside diameter plastic optical fiber which is provided with a ferrule at an end part of the smaller outside diameter plastic optical fiber, and

the inner diameter of the first annular portion is slightly larger than an outer diameter of the plastic optical fiber and smaller than an outer diameter of the ferrule, and the inner diameter of the second annular portion is larger than the outer diameter of the ferrule.

(6) The optical module according to the configuration (5), wherein

an end of the ferrule has a tapered portion which abuts the first interconnecting portion when inserted in the cylindrical portion so that the first interconnecting portion prevents the end of the ferrule from being in contact with the light-emitting/receiving surface of the fiber optic transceiver.

[0007] According to the optical module in the configuration (l), the first annular portion has a cylindrical shape accorded to the shape of one type of the optical fiber. Further, the second annular portion has a cylindrical shape accorded to the shape of another type of the optical fiber. The first interconnecting portion interconnects the first and second annular portions. Thus, in the case of coupling each of the optical fibers with the different standards to the optical module, the single optical module can cope with these optical fibers and so can be coupled to each of these optical fibers of the different standards with good transmission characteristics.

Further, the first interconnecting portion guides the tip end of the one type of the optical fiber without ferrule to the first annular portion at the time of inserting the optical fiber into the cylindrical portion. Thus, the assembling procedure at the time of coupling the optical fiber to the optical

module can be facilitated.

According to the optical module in the configuration (2), the slanted surface of the first interconnecting portion serves as a guide for the one type of the optical fiber and also serves as a stopper for the other type of the optical fiber. Thus, in the case of coupling each of the optical fibers with the different standards to the optical module, the single optical module can cope with these optical fibers and so can be coupled to each of these optical fibers of the different standards with good transmission characteristics. Further, the assembling properties can be enhanced.

According to the optical module in the configuration (3), the tip end of the optical fiber is guided by the second interconnecting portion, whereby the assembling properties can be enhanced.

According to the optical module in the configuration (4), the slanted surface of the second interconnecting portion serves as a guide for the optical fibers, whereby the assembling properties can be enhanced.

According to the optical module in the configuration (5), the first annular portion has a cylindrical shape accorded to the shape of the plastic optical fiber. Further, the first interconnecting portion forms a slanted surface, for example, and the second annular portion has a cylindrical shape accorded to the shape of a ferrule attached to the glass optical fiber or smaller OD plastic optical fiber, both of which use a ferrule. Thus, in the case of coupling each of the optical fibers with the different standards to the optical module, the single optical module can cope with these optical fibers and so can be coupled to each of these optical fibers of the different standards with good transmission characteristics.

According to the optical module in the configuration (6), the first interconnecting portion prevents the end of the ferrule attached to the glass optical fiber from being contact with the light-emitting/receiving surface of the fiber optic transceiver. Thus, even when the optical module copes with the plurality of optical fibers accorded to different standards such as a plastic optical fiber and a glass optical fiber or smaller OD plastic optical fiber, the light-emitting/receiving surface of the fiber optic transceiver is not damaged with the end of the ferrule attached to the glass optical fiber.

Advantageous Effects of Invention

[0008] According to the invention, an optical module capable of coupling with a plurality of optical fibers accorded to different standards can be provided.

[0009] The invention is explained briefly. The details of the invention will be further made clear by reading an embodiment of the invention explained below with reference to drawings.

Brief Description of Drawings

[00 10] Fig. 1 is a perspective view of an optical module according to an embodiment of the invention.

Fig. 2 is a perspective view of the optical module according to the embodiment of the invention seen from a side of an optical port portion.

Fig. 3 is a front view of the optical module according to the embodiment of the invention seen from the side of the optical port portion.

Fig. 4 is a perspective view of the optical module seen from a side of a

holding portion of a housing.

Fig. 5A is a sectional view showing the inner configuration of the optical module.

Fig. 5B is an enlarged sectional view of a part VB in Fig. 5A.

Fig. 6A is a sectional view of the optical module to which an optical fiber made of plastics is coupled.

Fig. 6B is an enlarged sectional view of a part VIB in Fig. 6A.

Fig. 7A is a sectional view of the optical module to which an optical fiber made of glass or small OD plastic optical fiber, of which both use a ferrule, is coupled.

Fig. 7B is an enlarged sectional view of a part VIIB in Fig. 7A.

Fig. 8 is a perspective view of the optical module according to a modified example seen from an optical port portion side.

Description of Embodiments

[0011] Hereinafter, an embodiment of the invention will be explained with reference to drawings.

[0012] Fig. 1 is a perspective view of an optical module according to the embodiment of the invention, Fig. 2 is a perspective view of the optical module according to the embodiment of the invention seen from a side of an optical port portion, Fig. 3 is a front view of the optical module according to the embodiment of the invention seen from the side of the optical port portion, Fig. 4 is a perspective view of the optical module seen from a side of a holding portion of a housing, Fig. 5A is a sectional view showing the inner configuration of the optical module and Fig. 5B is an enlarged sectional view

of a part VB in Fig. 5A.

[0013] As shown in Figs. 1 and 2, an optical module 11 according to the embodiment is an optical receptacle constituting a part of an optical connection used for the optical communication for the OA (Office Automation), the FA (Factory Automation) or a vehicle-mounted device etc., for example. The optical module 11 is mounted on a circuit board contained within each of various kinds of devices and includes a housing 12 formed by resin and a shield casing 13 made of metal attached to the one end side of the housing 12.

[0014] As shown in Fig. 3, an optical port portion 14 is formed on the other end side of the housing 12, and an optical plug is inserted into and withdrawn from the optical port portion 14.

[0015] The shield casing 13 includes a front plate portion 13a and side plate portions 13b provided on both the side portions of the front plate portion 13a and is formed in a U-shape in its plan view. Thus, when the shield casing 13 is attached to the housing 12, the shield casing 13 covers the one end and the both side portions on the one end side of the housing 12. Further, in the shield casing 13, a terminal portion 13c extending to the downward side is formed at each of the potions 13b.

[0016] As shown in Figs. 4, 5A and 5B, a partition wall 21 for partitioning the one end side and the other end side is formed in the housing 12.

[0017] The housing 12 has two holding portions 22 each formed in a concave shape on the one end side. An FOT (Fiber Optic Transceiver) 23 as a fiber optic transceiver having a light-emitting element or a light-receiving element is attached to each of the holding portions 22. The FOT 23 has an

element main body 24 and a plurality of leads 25 extended from the element main body 24. In each of the holding portions 22, a notch portion 22a is formed on the downward side of the housing 12 and the leads 25 of the FOT 23 are drawn from the notch portion 22a to the downward side of the housing 12.

[0018] Each of the FOTs 23 is provided with a light reception/emission surface 26 formed in a semispherical shape at the center of the one side surface of the element main body 24. The light reception/emission surface 26 acts as the light emission surface for emitting an optical signal when the FOT 23 includes a light-emitting element, whilst the light reception/emission surface 26 acts as the light reception surface for receiving an optical signal when the FOT 23 includes a light-receiving element.

[0019] In the FOT 23, an annular projection 27 is formed around the light reception/emission surface 26 on the one side surface of the element main body 24 where the light reception/emission surface 26 is provided.

[0020] An opening 31 is formed at the partition wall 21. An annular groove portion 32 is formed around the opening 31 on the surface of the holding portion 22 of the partition wall 21. The annular projection 27 of the FOT 23 to be received within the holding portion 22 is fit into the annular groove portion 32. When the projection 27 is fit into the groove portion 32, the light reception/emission surface 26 of the FOT 23 is disposed so as to be positioned at a position facing on the opening 31. The FOT 23 thus attached to and received within the holding portion 22 of the housing 12 is covered by the shield casing 13 attached to the housing 12.

[0021] In the housing 12, a cylindrical portion 35 protruding on a side of the

optical port portion 14 is formed at the partition wall 21. The cylindrical portion 35 has an insertion hole 36 at the center thereof. One of the openings on the side of the holding portion 22 of the insertion hole 36 is formed as the opening (or first opening) 31 facing on the light reception/emission surface 26 of the FOT 23. The other opening on the opposite side of the insertion hole 36 is formed as an opening (or second opening) 37 from which the optical fiber is inserted.

[0022] The one opening 31 side of the cylindrical portion 35 is formed as a first annular portion 41 having an inner diameter d1 slightly larger than the outer diameter of a plastic optical fiber 51 described later. A second annular portion 42 having an inner diameter d2 larger than the inner diameter d1 of the first annular portion 41 is provided on the other opening 37 side of the cylindrical portion 35. Further, the cylindrical portion 35 has a first interconnecting portion 43 for interconnecting the first annular portion 41 and the second annular portion 42 having the different inner diameters.

[0023] A portion forming the other opening 37 of the cylindrical portion 35 is configured as a third annular portion 44 having an inner diameter d3 larger than the inner diameter d2 of the second annular portion 42. A portion for interconnecting the second annular portion 42 and the third annular portion 44 having the different inner diameters is formed as a second interconnecting portion 45. Each of the first interconnecting portion 43 and the second interconnecting portion 45 is configured to have a tapered shape having an inner diameter reducing toward the FOT 23 side.

[0024] The optical module 11 is mounted on the circuit board within which various kinds of devices are contained. The terminal portions 13c of the

shield casing 13 and the leads 25 of the FOT 23 are inserted into through holes of the circuit board, then soldered and hence electrically coupled to a conductive pattern. The terminal portions 13c of the shield casing 13 are electrically coupled to the conduction pattern as the ground of the circuit board.

[0025] In the optical module 11, optical plugs having optical fibers of the different standards can be coupled to the optical port portion 14. The optical fibers of the different standards include a plastic optical fiber made of plastics and a glass optical fiber made of glass, for example. The plastic optical fiber is excellent in the noise withstanding properties and is a plastic optical fiber (POF), core and clad of which are made of plastics. The glass optical fiber includes one type in which core and clad are each made of glass and a hard polymer clad fiber (HPCF) in which core and clad are respectively made of glass and plastics. The glass optical fiber or smaller OD plastic optical fiber are provided and coupled with a ferrule at the end part including a tip thereof.

[0026] The optical transmission between the FOT 23 and the light reception/emission surface 26 is made possible by coupling the plastic optical fiber or the glass optical fiber to the optical module 11. Further, in the optical module 11, since the FOT 23 attached to and received within the holding portion 22 of the housing 12 is covered by the shield casing 13, good signal transmission can be realized whilst suppressing the influence of electromagnetic noise.

[0027] Next, the explanation will be made as to a case of coupling the plastic optical fiber without a ferrule and the glass optical fiber or smaller OD

plastic optical fiber both with a ferrule to the optical module 11.

[0028] (Coupling with Plastic Optical Fiber without Ferrule)

As shown in Figs. 6A and 6B, a pre-assembled optical plug 61 is attached to an end portion of the plastic optical fiber 51. The plastic optical fiber 51 is covered by a sheath 53 to thereby form an optical cable. The plastic optical fiber 51 is exposed from the sheath 53 at the end portion thereof. The optical plug 61 attached to the end portion of the plastic optical fiber 51 has a housing 63 provided with an insertion hole 62 which opens at the rear end thereof. The plastic optical fiber 51 is inserted into the strength member 67 which is press-fit into insertion hole 62 of the housing 63. In the nature of the plastic optical fiber 51, it is preferable that the tip of the plastic optical fiber 51 is close to or contact with the light-emitting/receiving surface 26 of the FOT 23.

[0029] The insertion hole 62 has a guide portion 64 having its diameter reducing gradually toward the end thereof. The plastic optical fiber 51 inserted into the strength member 67 which is press-fit into insertion hole 62 and is guided toward the center by the guide portion 64. An engagement hole 65 having an inner diameter slightly larger than the outer of the plastic optical fiber 51 is formed closer to the end side than the guide portion 64. The plastic optical fiber 51 guided by the guide portion 64 is inserted into the engagement hole 65. An engagement hole portion 66 having an inner diameter slightly larger than an outer diameter of the cylindrical portion 35 of the optical module 11 is formed at the end of the optical plug 61.

[0030] A latch portion 68 is formed at the housing 63 of the optical plug 61. When the optical plug 61 is inserted into and coupled with the optical port

portion 14 of the optical module 11, the latch portion 68 engages with the housing 12 of the optical module 11 and maintains the coupling state.

[0031] The portion of the plastic optical fiber 51 exposed from the sheath 53 is inserted into the insertion hole 62, then guided toward the center by the guide portion 64 and pushed into the engagement hole 65. Then, the plastic optical fiber 51 is protruded on the engagement hole portion 66 side from the engagement hole 65 and further protruded from the tip end surface of the optical plug 61, whereby the end surface 51a thereof is disposed at a predetermined position from the tip end surface of the optical plug 61.

[0032] The metal strength member 67 is press-fitted into the insertion hole 62 of the optical plug 61. The strength member 67 is fixed with a pressure crimp at section 67a of the strength member 67 to fix the end portion of the sheath 53.

[0033] When the optical plug 61 is inserted into the optical port portion 14 of the optical module 11, the end portion of the plastic optical fiber 51 is inserted from the opening 37 into the second annular portion 42 of the cylindrical portion 35 of the optical module 11. In this case, the end portion of the plastic optical fiber 51 is smoothly guided to the second annular portion 42 by the taper- shaped second interconnecting portion 45.

[0034] When the optical plug 61 is further inserted into the optical port portion 14 of the optical module 11, the cylindrical portion 35 is fit into the engagement hole portion 66 of the optical plug 61.

[0035] Thereafter, the end portion of the plastic optical fiber 51 is inserted into the first annular portion 41 of the cylindrical portion 35 of the optical module 11. In this case, the end portion of the plastic optical fiber 51 is

smoothly guided to the first annular portion 41 by the taper-shaped first interconnecting portion 43 and is aligned at its center. Thus, the end surface 51a of the plastic optical fiber 51 is disposed at the opening 31, whereby the end surface 51a is disposed at a close position or a contact position so as to oppose to the light reception/emission surface 26 of the FOT 23.

[0036] Thus, the optical module 11 is placed in a state that good optical transmission can be realized between the plastic optical fiber 51 and the light reception/emission surface 26 of the FOT 23.

[0037] In this state, the latch portion 68 of the optical plug 61 engages with the housing 12 of the optical module 11 to thereby maintain the coupling state of the optical plug 61 to the optical module 11.

[0038] (Coupling with Glass Optical Fiber with Ferrule or Plastic Optical Fiber with Ferrule)

As shown in Figs. 7A and 7B, also when the glass optical fiber 55 is to be used, the optical plug 61 is attached to the end portion of the glass optical fiber 55. The glass optical fiber 55 is covered by a buffer 56 to thereby form part of an optical cable. The glass optical fiber 55 is exposed from the buffer 56 at the end portion thereof. In the nature of the glass optical fiber 55, it is necessary to adopt the configuration in which the direct contact force is avoided between the tip of the glass optical fiber 55 (and a ferrule 71) and the light-emitting/receiving surface 26 of the FOT 23.

[0039] The optical plug 61 includes a ferrule 71 that is press-fit or made as a part of a flange 69, and a compression spring 70 to urge the ferrule 71 forward. The ferrule 71 is typically made of zirconia ceramic, plastic, or

metal. The ferrule 71 and the flange 69 are sometimes made as one part. The front end of the compression spring 70 abuts the flange 69 and the back end of the compression spring 70 abuts the front end of the strength member 67 which is press-fit into a housing of the optical plug 61.

[0040] Epoxy adhesive, for example, is injected into a capillary hole 73 of the ferrule 71 and the flange 69. The capillary hole 73 is formed around the longitudinal axis of the ferrule 71. The portion of the glass optical fiber 55 exposed from the buffer 56 is inserted into capillary hole 73 of the ferrule 71. The buffer 56 is at the same time inserted into the flange 69, and the epoxy adhesive is cured. The excess fiber outside of the end face of the ferrule 71 is cut; and the end face is polished to a high level finish. The glass optical fiber 55 is therefore attached inside the ferrule 71. The ferrule 71 has an outer diameter larger than the inner diameter d1 (see Fig. 5B) of the first annular portion 41 and smaller than the inner diameter d2 (see Fig. 5B) of the second annular portion 42. The peripheral edge at the tip end portion of the ferrule is configured as a tapered portion 72 having an inner diameter reducing gradually toward the tip end thereof. In the ferrule 71, the end surface 71a thereof is protruded from the tip end surface of the optical plug 61 and disposed at a predetermined position from the tip end surface of the optical plug 61.

[0041] When the optical plug 61 is inserted into the optical port portion 14 of the optical module 11, the end portion of the ferrule 71 attached to the glass optical fiber 55 is inserted from the opening 37 into the second annular portion 42 of the cylindrical portion 35 of the optical module 11. In this case, the end portion of the ferrule 71 is smoothly guided to the second annular

portion 42 by the taper-shaped second interconnecting portion 45.

[0042] When the optical plug 61 is further inserted into the optical port portion 14 of the optical module 11, the cylindrical portion 35 is fit into the engagement hole portion 66 of the optical plug 61.

[0043] Thereafter, when the tapered portion 72 formed at the end portion of the ferrule 71 abuts against the first interconnecting portion 43, the ferrule 71 is aligned at its center and the movement of the ferrule 71 in the insertion direction is restricted. That is, the first interconnecting portion 43 prevents the end portion of the ferrule 71 from being contact with the light-emitting/receiving surface 26 of the FOT 23. Thus, the end surface 71a of the ferrule 71 is disposed at the opening 31, whereby the end surface is disposed at a close position so as to oppose to the light reception/emission surface 26 of the FOT 23.

[0044] Thus, the optical module 11 is placed in a state that good optical transmission can be realized between the glass optical fiber 55 and the light reception/emission surface 26 of the FOT 23.

[0045] In this state, the latch portion 68 of the optical plug 61 engages with the housing 12 of the optical module 11 and is fixed at the mechanical plane MP (shown in Fig. 5A) to thereby maintain the coupling state of the optical plug 61 to the optical module 11.

[0046] Although the description is made as to the glass optical fiber 55 which is provided with the ferrule 71, the optical module 11 can accept another plastic optical fiber which is provided with a ferrule. When a smaller outside diameter (OD) plastic optical fiber rather than the plastic optical fiber 51 is used, it is usual to attach a ferrule at the end part of the

smaller OD plastic optical fiber. In this case, the smaller OD plastic optical fiber with the ferrule is received in the optical module 11, in the different way from receiving the plastic optical fiber 51 without a ferrule shown in Figs. 6A and 6B, but rather in the same way as receiving the glass optical fiber 55 with the ferrule 71, as shown in Figs. 7A and 7B.

[0047] As explained above, according to the optical module of this embodiment, the first annular portion 41 has a cylindrical shape accorded to the shape of the plastic optical fiber 51. Further, the first interconnecting portion 43 has the slanted surface against where the tip end of the ferrule 71 having a diameter reducing toward the tip abuts and the second annular portion 42 has a cylindrical shape accorded to the shape of the ferrule 71. Thus, in the case of coupling the optical module 11 to each of the plastic optical fiber 51, and the glass optical fiber 55 having the ferrule 71 or the smaller OD plastic optical fiber having the ferrule with the different standards, the single optical module 11 can cope with these optical fibers and so can be coupled to each of these optical fibers of the different standards with good transmission characteristics.

[0048] In general, an optical module is not configured to be connectable to both the plastic optical fiber 51, and the glass optical fiber 55 attached to the ferrule 71 or the smaller OD plastic optical fiber with ferrule having the different standards. This is because the suitable distance between the end surface of the optical fiber and the light reception/emission surface 26 of the FOT 23 differs between these optical fibers depending on the type of the optical fiber. Thus, the plastic optical fiber 51 and the glass optical fiber 55 or the smaller OD plastic optical fiber with ferrule are coupled to different

optical modules having different structures, respectively.

[0049] In contrast, according to the optical module 11 of this embodiment, the positions of the end surfaces of the optical fibers of the different standards can be disposed at the positions separated by the suitable distances with respect to the light reception/emission surface 26 of the FOT 23 according to the position of the first annular portion 41 and the shape of the first interconnecting portion 43. Thus, the single optical module 11 can cope with the optical fibers of the different standards and can be coupled to these optical fibers with good transmission characteristics.

[0050] The first interconnecting portion 43 guides the tip end of the plastic optical fiber 51 to the first annular portion 41 at the time of inserting the plastic optical fiber 51 into the cylindrical portion 35. Thus, the assembling procedure at the time of coupling the plastic optical fiber 51 to the optical module 11 can be facilitated.

[0051] Further, the tip end of the plastic optical fiber 51 or the tip end of the ferrule 71 is guided by the second interconnecting portion 45, whereby the assembling properties can be enhanced.

[0052] Although the optical module 11 according to the embodiment is configured that the FOT 23 is covered by the shield casing 13 as the countermeasure to the electromagnetic noise, the optical module may be configured in a manner that, as shown in Fig. 8, a casing 81 made of resin is part of housing 12 to thereby cover the FOT 23 attached to and received within the holding portion 22 of the housing 12 in the casing 81.

[0053] The invention is not limited to the aforesaid embodiment and may be suitably modified and improved, for example. The material, shape, size,

number, disposed position etc. of each of the constituent elements of the aforesaid embodiment are not limited thereto and may be arbitrary so long as the invention is attained.

CLAIMS

1. An optical module, comprising:

a fiber optic transceiver which includes a light-emitting/receiving surface for transmitting light with an optical fiber; and

a housing which includes a holding portion which holds the fiber optic transceiver and a cylindrical portion which has a first opening facing on the light-emitting/receiving surface and a second opening from which the optical fiber is inserted, wherein

the cylindrical portion includes a first annular portion which forms the first opening of the cylindrical portion, a second annular portion which has an inner diameter larger than an inner diameter of the first annular portion, and a first interconnecting portion which interconnects edges of the first annular portion and the second annular portion having the different inner diameters.

2. The optical module according to claim 1, wherein

the first interconnecting portion has a slanted surface.

3. The optical module according to claim 1 or 2, wherein

the cylindrical portion further includes a third annular portion which forms the second opening of the cylindrical portion and has an inner diameter larger than the inner diameter of the second annular portion, and a second interconnecting portion which interconnects edges of the second annular portion and the third annular portion having the different inner

diameters.

4. The optical module according to claim 3, wherein

the second interconnecting portion has a slanted surface.

5. The optical module according to any one of claims 1 to 4, wherein

the optical fiber to be inserted in the cylindrical portion of the housing includes a plastic optical fiber, and a glass optical fiber which is provided with a ferrule at an end part of the glass optical fiber or a smaller outside diameter plastic optical fiber which is provided with a ferrule at an end part of the smaller outside diameter plastic optical fiber, and

the inner diameter of the first annular portion is slightly larger than an outer diameter of the plastic optical fiber and smaller than an outer diameter of the ferrule, and the inner diameter of the second annular portion is larger than the outer diameter of the ferrule.

6. The optical module according to claim 5, wherein

an end of the ferrule has a tapered portion which abuts the first interconnecting portion when inserted in the cylindrical portion so that the first interconnecting portion prevents the end of the ferrule from being in contact with the light-emitting/receiving surface of the fiber optic transceiver.

FIG.1

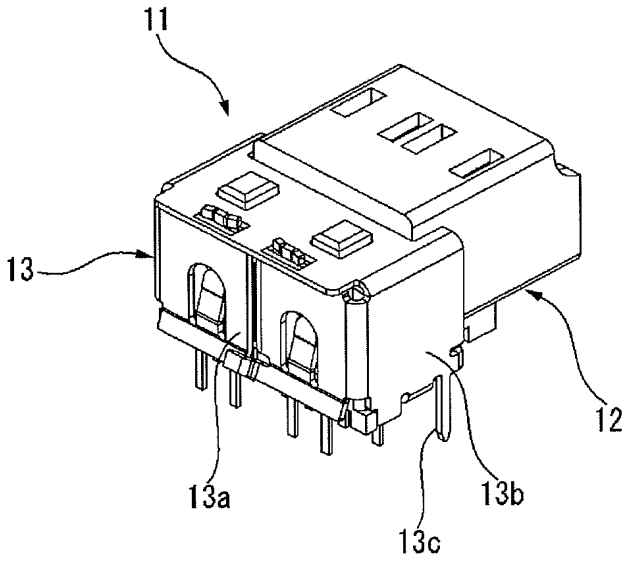


FIG.2

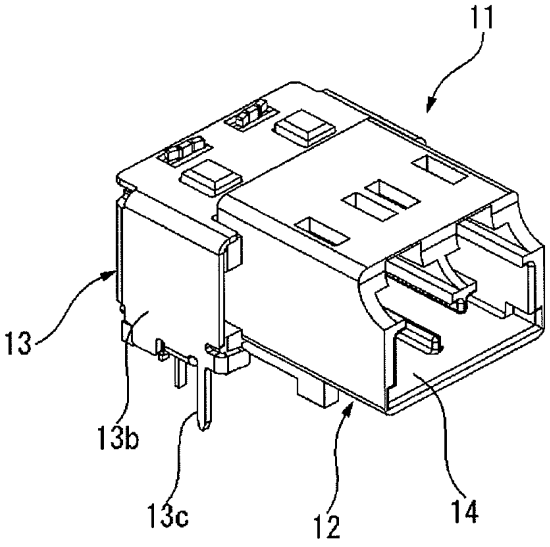


FIG.3

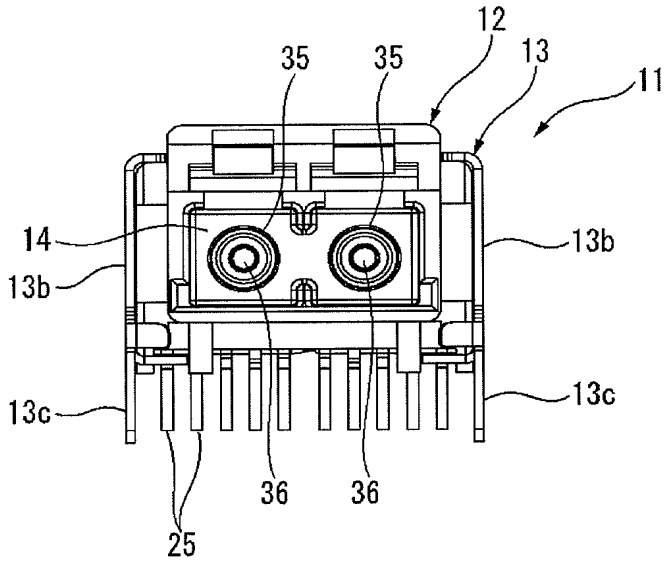


FIG.4

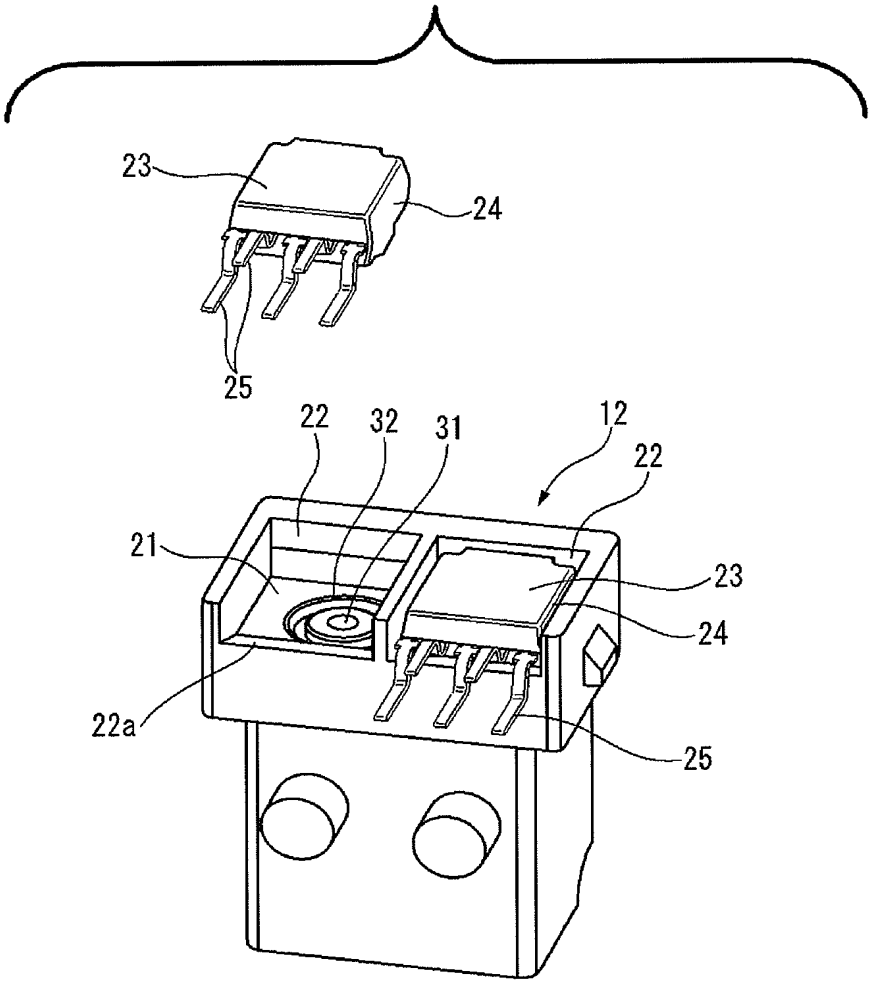


FIG.5A

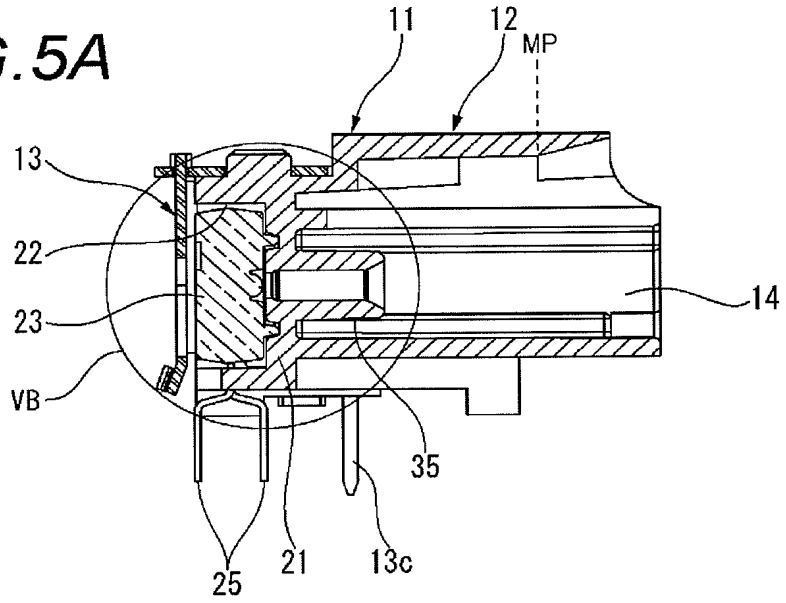

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FIG.5B

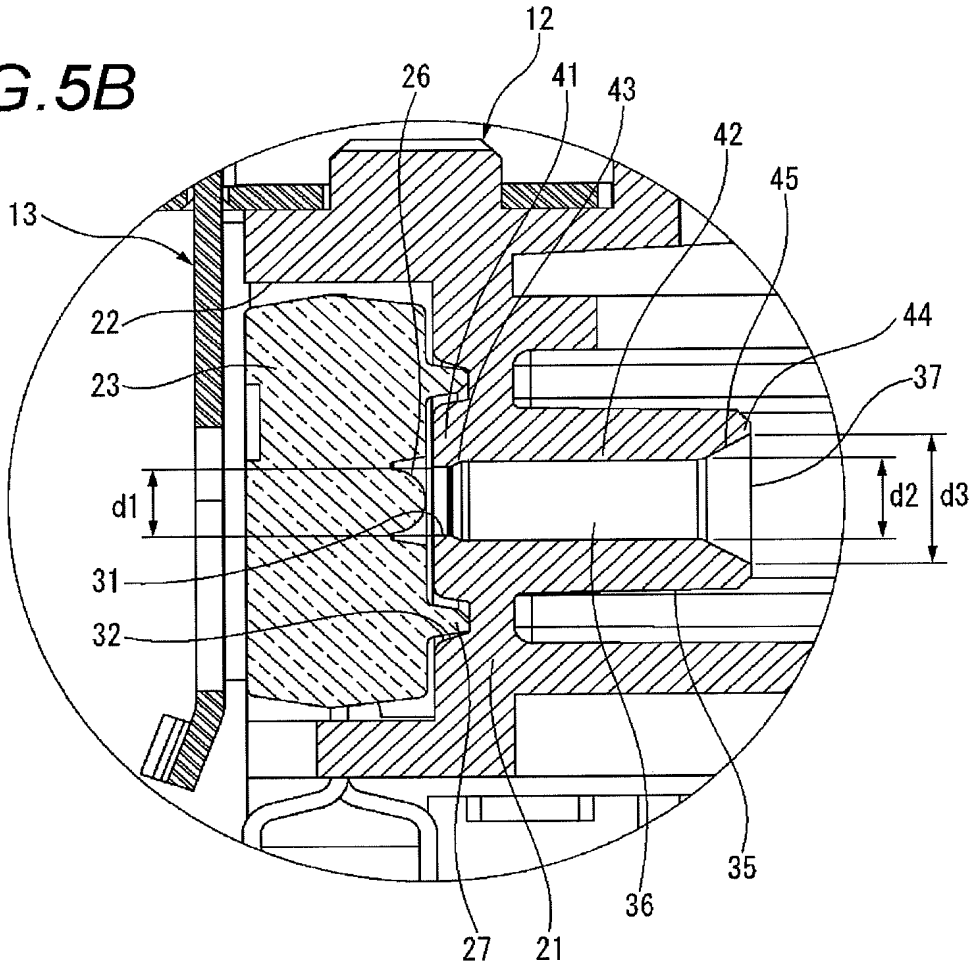

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FIG.6A

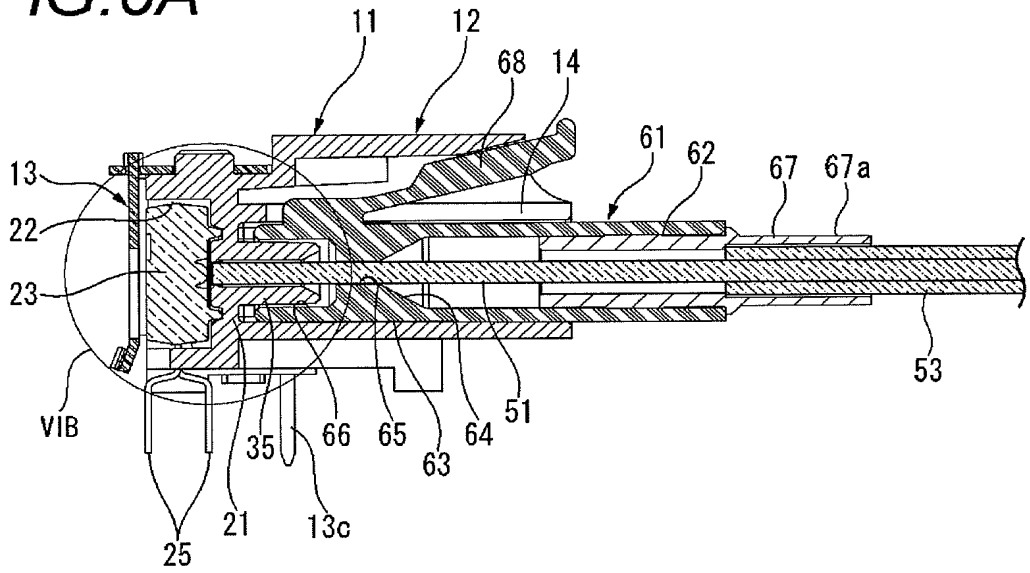

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FIG.6B

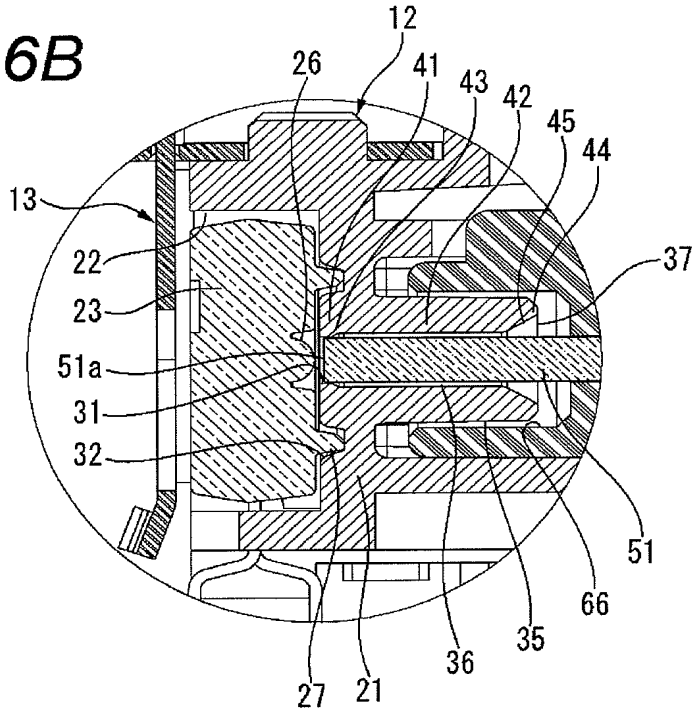

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FIG.7A

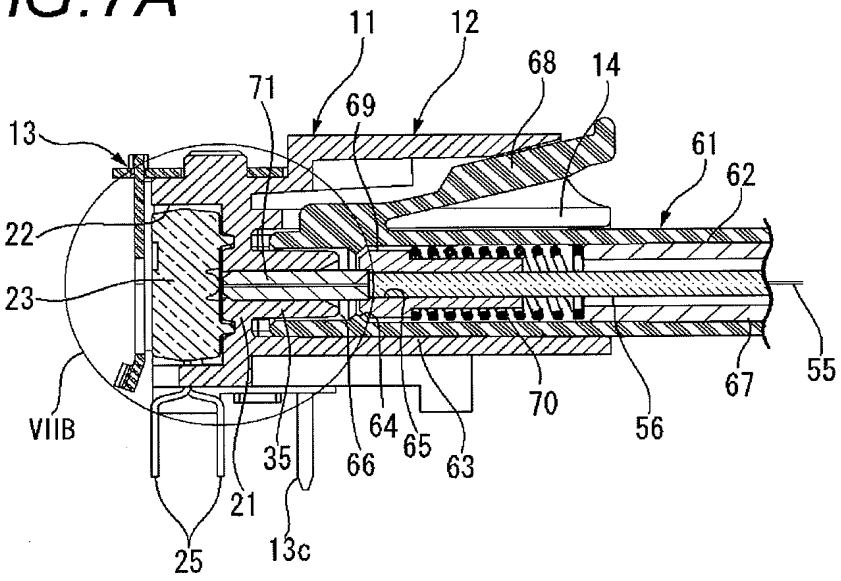

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FIG.7B

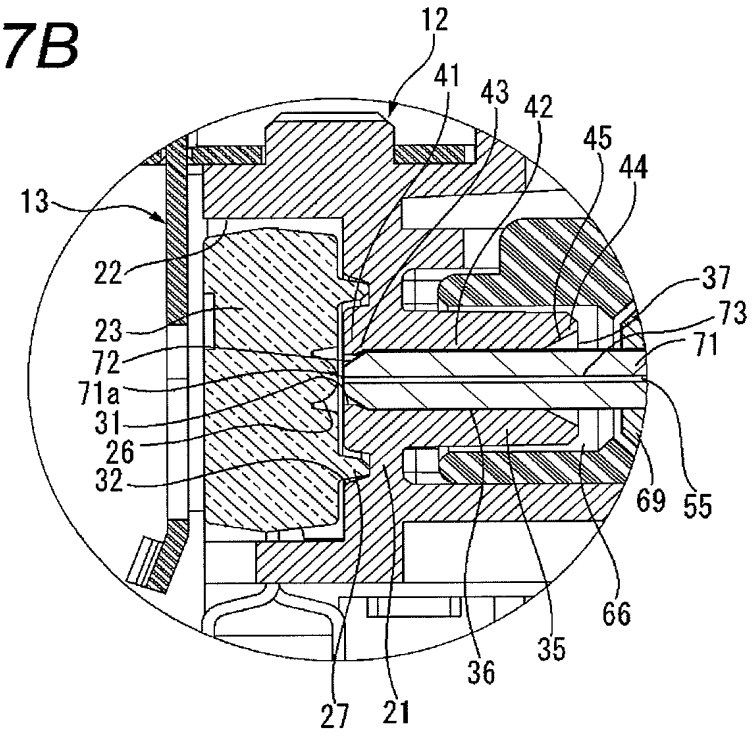
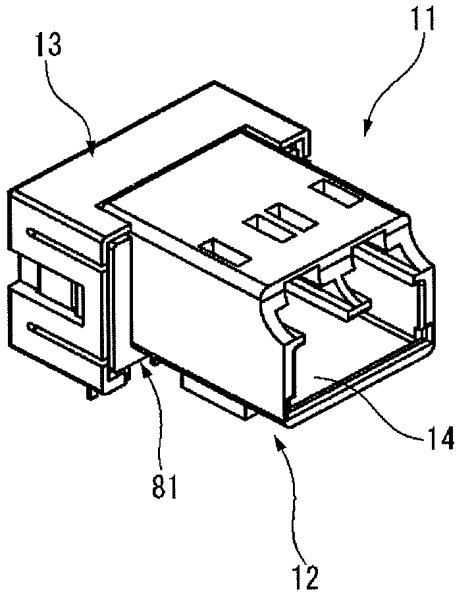

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FIG.8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/67336

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02B 6/36 (2012.01)
USPC - 385/78
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G02B 6/36 (2012.01)
USPC - 385/78

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 385/15,53,55,76,77,78,85,134-137,139

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Database Searched: PubWEST(PGPB,USPT,USOC,EPAB,JPAB), Google Scholar
Search Terms Used: Fiber, optic, transceiver, emitting, receiving, light, connector, coupler, slant, ferrule, slanted

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,936,263 A (Hashizume) 10 August 1999 (10.08.1999), entire document, especially Fig. 1A, Col. 1, lines 20-25; Col. 4, lines 19-25	1-4
X	US 5,195,156 A (Freeman et al.) 16 March 1993 (16.03.1993), entire document, especially Fig. 7; Col. 2, lines 51-55	1-2
A	US 2008/0019643 A1 (Teo et al.) 24 January 2008 (24.01.2008), para. [0028]-[0030], [0037]	1-4
A	US 5,546,212 A (Kunikane et al.) 13 August 1996 (13.08.1996), FIG. 6	1-4

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
25 April 2012 (25.04.2012)

Date of mailing of the international search report
04 JUN 2012

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:
Lee W. Young
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/67336

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 5-6
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. HI Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Senko Ex. 1017, Page 210
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**09/13/2023 07:14:19 AM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62785735	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
IDS2_Form_20230912_USCO05305.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1257 KB
WO2013100892A1.pdf	32	Foreign Reference	402 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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WO2013100892A1.pdf 0AE11DBADCBF4484B946781B2A1A4D49185EDD1A239CAC0076576FBFFE39DCA76C59B56E595D2CCBDF4CC330378EB182E9D687F8F699D2A0FEE14A38318BA835

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**08/18/2023 10:50:44 AM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62638467	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
AmendUSCO05305August.pdf	9	Amendment/Request for Reconsideration-After Non-Final Rejection	184 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
AmendUSCO05305August.pdf	5A85047E14031C59CA255C319D32602C3A04EC5861DDB730E FA61362AFE4DFEBAE10D1F727C140D59FD3F8607017B095DF 5F03E47855F9DAEB625E07D8BCBE8E

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: 2874
Serial No.:	17/857,300	)	
		)	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

AMENDMENT

In response to an Office Action mailed on July 20, 2023, Applicant amends the application as follows:

IN THE CLAIMS:

1. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall also extending from the ~~opposing second~~ first side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Currently Amended) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first

side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body, and wherein the adapter is configured to mate at least four fiber optic ferrules in pairs, including the first fiber optic ferrule and the second fiber optic ferrule.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Currently Amended) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side, the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom

surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove, and wherein the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. (Currently Amended) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves on each of the first side and the opposing second side within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body and also align an additional fiber optic connector side-by-side with the first fiber optic connector to an additional

fiber optic connector side-by-side with the second fiber optic connector within the width of the adapter.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. (Currently Amended) An adapter for optical fiber communications, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors ~~a fiber optic connector~~ from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

REMARKS

In the above-referenced Office Action, the Examiner rejected claims 1-4, 6-10, and 12-21 under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost; and rejected claim 11 under pre-AIA 35 U.S.C. 103(a)[1] as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Patent Pub. No. US 2012/0057824 A1 to Katoh; rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684; and rejected claims 1-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723.

With regard to the rejections on the grounds of non-statutory double patenting, Applicant will submit appropriate terminal disclaimers once the claims are in an otherwise allowable state due to the payment that must accompany the disclaimers.

Applicant has amended claims 1, 10, 15, 18, and 21. Thus claims 1-21 are still pending.

Applicant has amended claim 1 to require that the second internal groove on the first bottom wall extends from the first side toward the central portion like the first internal grove. The Examiner cited element 62 as the first and second internal grooves.[2] However, the two elements 62 in Pronovost are not on the same side of the adapter, rather they are on opposite sides. For this reason alone, claim 1 is allowable.

Applicant has also amended claim 1 to require that the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector, and wherein the main body includes at least two channels on the opposing second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector. Pronovost does not allow for more than 2 fiber optic connectors in total, where amended claim 1 has two channels on each of the first side and the second side, each of

[1] Applicant assumes that the reference to the pre-AIA version of 103 is a typographical error given that the recitation of 103 in the Office Action is the AIA version.

[2] By using the same terms in this response that the Examiner has in the rejections, Applicant is not agreeing with that interpretation. For example, Applicant does not agree that elements 62 are necessarily grooves and retains the right to dispute that term later.

the channels receiving one of the fiber optic connectors. Thus, the adapter in claim 1 can accept 4 fiber optic connectors. For this additional reason, claim 1 is allowable.

Claims 2-9, depending from claim 1, are allowable for at least the same reasons as claim 1. Applicant notes that claim 5 was not addressed except as being rejected on the ground of non-statutory double patenting. Thus, claim 5 will be allowable upon the filing of a terminal disclaimer.

With regard to claim 10, Applicant has amended the claim to require that there is at least one groove in a top surface and at least one groove in a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side. There are only two grooves 62 in the adapter in Pronovost and not the four that are called for in amended claim 10. Thus, claim 10 is allowable.

Applicant has also amended claim 10 to require that the adapter is configured to mate at least four fiber optic ferrules in pairs, including the first fiber optic ferrule and the second fiber optic ferrule. Pronovost only allows for two fiber optic ferrules, one on each side. This provides an additional reason that claim 10 is allowable. Dependent claims 11-14 are allowable for at least the same reasons.

Turning to claim 15, Applicant has amended this claim to require that the main body includes at least two channels on the first side to respectively receive the first fiber optic connector and an additional fiber optic connector side-by-side with the first fiber optic connector, and wherein the main body includes at least two channels on the second side to respectively receive the second fiber optic connector and another additional fiber optic connector side-by-side with the second fiber optic connector. Once again, Pronovost can only receive one fiber optic connector on each side, not the at least two that is called for in claim 15. Thus, this claim is allowable for this reason. Dependent claims 16 and 17 are allowable for at least the same reasons.

Applicant has also amended claim 18, to require that there are a plurality of internal grooves on each of the first side and the opposing second side and that they also align an additional fiber optic connector side-by-side with the first fiber optic connector to an additional fiber optic connector side-by-side with the second fiber optic connector within the width of the

adapter. This amendment requires that there be two fiber optic connectors on each side of the adapter. As noted above, Pronovost only allows for one fiber optic connector on each side. Moreover, there are not a plurality of internal grooves on each the first and second sides. Thus, this claim is allowable for at least these reasons. Dependent claims 19-20 are allowable for at least the same reasons.

Applicant has also amended claim 21 to require that there be at least two channels on the first side, each of the at least two channels configured to respectively receive one of at least two fiber optic connectors from the first side for an optical connection within the central portion. Again, Pronovost only has one fiber optic connector on each side.

Claim 21 also requires a second internal groove of the first bottom wall extending toward the central portion, the second internal groove being on a same side of the opening as the first internal groove. The grooves 62 in Pronovost are not on the same side of the opening as required by the amended claim.

Finally, the Examiner rejected claim 11 as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Katoh. Katoh was cited for having keys with different sizes. However, Katoh does not cure the deficiencies of Pronovost noted above for claim 10. Thus, claim 11 is also allowable.

Applicant submits that the claims as amended are allowable and requests that the application be passed to issuance.

Respectfully submitted,

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Date: August 18, 2023

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/857,300	Filing Date 07/05/2022	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	08/18/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/STEPHEN TYLER HOLLAND/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05	5557

152017 7590 07/20/2023

US Conec Ltd.
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EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
07/20/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docket@usconec.com
eofficeaction@appcoll.com
michael@leetzow.com

Office Action Summary	Application No. 17/857,300	Applicant(s) Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on July 5, 2022 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

2. The prior art documents submitted by applicant(s) in the Information Disclosure Statement(s) ("IDS") filed on June 29, 2023 have all been considered and made of record (note the attached copy of form(s) PTO/SB/08a).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

4. Claim(s) 1-4, 6-10, and 12-21 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Patent No. 4,645,295 to Pronovost (hereinafter "Pronovost"). Pronovost was cited by applicant in the IDS.

In re claim 1, Pronovost discloses an adapter (sleeve member 10) for holding fiber optic connectors (400), see FIGS. 1-3, the adapter (10) comprising:

a main body having a width and a height and an opening extending longitudinally from a first side (12) to an opposing second side (14), the main body comprising two opposing side walls (54) spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls (54);

a central portion inside the main body located between the first side (12) and the opposing second side (14), a first fiber optic connector (16) from the first side (12) mating with a second fiber optic connector (16) from the opposing second side (14) within the central portion,

a first internal groove/keyway (62) of the first top wall extending from the first side (12) toward the central portion; and

a second internal groove (62) of the first bottom wall extending from the opposing second side (14) toward the central portion,

wherein the first internal groove (62) has a variable width due to its curvature including a first maximum width and the second internal groove (62) has a variable width including a second minimum width, the first maximum width is greater than the second minimum width (as seen in FIG. 1), wherein the adapter (10) is free of internal walls outwardly of the central portion in a space between the opposing side walls (54) along the width and between the first top wall and the first bottom wall along the height. *See* columns 3-6 of Pronovost for further details.

In re claim 2, the central portion includes a wall (72) extending across the opening in the adapter (10).

In re claim 3, the wall (72) divides the central portion in half.

In re claim 4, the wall (72) has passageways (84) sized to allow respective ferrules (16) (16) from the first fiber optic connector and the second fiber optic connector to optically engage.

In re claim 6, as seen in FIG. 1 and 3, the first top wall and the first bottom wall have a smooth

plane structure in the central portion.

In re claim 7, Pronovost further discloses a wall (72) in the central portion extending across the opening in the adapter (10).

In re claim 8, the wall (72) has passageways (84) sized to allow respective ferrules (16) (16) from the first fiber optic connector and the second fiber optic connector to optically engage.

In re claim 9, the main body has a width to receive one fiber optic connector (16) to two fiber optic connectors (400).

In re claim 10, Pronovost discloses an adapter (10) for aligning fiber optic ferrules (16) inserted from opposing sides, see FIGS. 1-3, comprising:

a main body having an opening extending between a first side (12) and a second side (14), the first side (12) and the second side (14) separated by a central portion; and

at least one groove (62) in a top surface and a bottom surface of the main body extending longitudinally toward the central portion from each of the first side (12) and the second side (14), wherein the adapter (10) is configured such that a first fiber optic ferrule is received at the first side (12) and a second fiber optic ferrule is received at the second side (14) of the adapter (10) for alignment by the at least one groove (62) at the top surface and the bottom surface of the main body. *See* columns 3-6 of Pronovost for further details.

In re claim 12, the first fiber optic ferrule (16) is disposed partially inside a first ferrule holder

comprising flaps (48), and wherein the at least one groove (62) is sized to match a projection on an outside surface of the first ferrule holder comprising flaps (48) for alignment.

In re claim 13, the central portion includes a wall (72) extending across the opening in the adapter (10).

In re claim 14, the wall (72) divides the central portion in half.

In re claim 15, Pronovost discloses an adapter (10) for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side (12) and a second fiber optic connector having a second fiber optic ferrule inserted from a second side (14), see FIGS. 1-3, comprising:

a main body having an opening defined by two opposing side walls (54), a top surface and a bottom surface joining the two opposing side walls (54), the opening extending between the first side (12) and the second side (14), the first side (12) configured to receive the first fiber optic connector and the second side (14) configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side (12) and the second side (14), the first fiber optic connector (16) and the second fiber optic connector (16) mating in a region of the central portion; and

a first groove (62) disposed on the top surface and a second groove (62) disposed on the bottom surface on each of the first side (12) and the second side (14), each of the first groove (62) and the second groove (62) extending toward the central portion from each of the first side (12) and the second side (14),

wherein the first groove (62) has a maximum width dimension different from a minimum

width dimension of the second groove (62). *See* columns 3-6 of Pronovost for further details.

In re claim 16, the first groove (62) is wider at its widest point than the second groove (62) at its narrowest point.

In re claim 17, the dimension of the first groove (62) matches a dimension of a projection (60) of the first fiber optic connector (16) for alignment.

In re claim 18, Pronovost discloses an adapter (10) for holding fiber optic connectors (400), see FIGS. 1-3, the adapter (10) comprising: a main body having a width and a height and an opening extending longitudinally from a first side (12) to an opposing second side (14), the main body comprising two opposing side walls (54) spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls (54);

a central portion inside the main body located between the first side (12) and the opposing second side (14), a first fiber optic connector (16) from the first side (12) mating with a second fiber optic connector (16) from the opposing second side (14) within the central portion; and

a plurality of internal grooves (62) within a space of the adapter (10), the plurality of internal grooves (62) configured to align the first fiber optic connector (16) and the second fiber optic connector (16) in the main body. *See* columns 3-6 of Pronovost for further details.

In re claim 19, the plurality of internal grooves (62) are sized to receive a respective projection

(60) on each of the first fiber optic connector and the second fiber optic connector for alignment.

In re claim 20, the plurality of internal grooves (62) extend longitudinally in a direction toward the central portion.

In re claim 21, Pronovost discloses an adapter (10) for optical fiber communications, see FIGS. 1-3, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side (12) into the main body, the main body comprising two opposing side walls (54) spaced apart along the width and a first top wall and a first bottom wall spaced apart along the height, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls (54);

a central portion inside the main body located longitudinally inward from the first side (12),

at least two channels/recesses (44) each configured to respectively receive a fiber optic connector (16) from the first side (12) for an optical connection within the central portion,

a first internal groove (62) of the first top wall extending toward the central portion; and

a second internal groove (62) of the first bottom wall extending toward the central portion, wherein the first internal groove (62) has a first maximum width (due to the curvature of the groove 62) and the second internal groove (62) has a second minimum width, the first maximum width is greater than the second minimum width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls (54) along the width and between the first top wall and the first bottom wall along the height. *See*

columns 3-6 of Pronovost for further details.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

7. Claim 11 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 10 above, and further in view of Patent Pub. No. US 2012/0057824 A1 to KATOH ("Katoh"). Katoh was also cited by applicant in the IDS.

In re claim 11, Pronovost only differs in that he does not teach his at least one groove (62) is sized differently on the top surface than on the bottom surface. Katoh, on the other hand, teaches a connector (1) having keys (51, 52) that are sized differently on a top surface than on a bottom surface. In order to receive the connector (1) of Katoh, the at least one groove (62) of Pronovost would have been sized differently on the top surface than on the bottom surface, thereby obtaining the invention specified by claim 11. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the

invention specified by claim 11 in view of Pronovost combined with Katoh.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used.

Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

9. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 10,156,684 (hereinafter "the '684 patent").** The '684 parent was also cited by applicant(s) in the IDS. Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-11 of the '684 patent only differ from pending claims 1-21 in that the patented claims do not recite all of the additional aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-11 of the '684 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-11 of the '684 patent.

10. **Claims 1-21 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 10,890,723 (hereinafter "the '723 patent").** Although the claims at issue are not identical, they are not patentably distinct from each other because both sets of claims are directed to the same underlying embodiment and the same disclosure. Claims 1-17 of the '723 patent only differ from pending claims 1-21 in that the

patented claims do not recite all of the additional aspects recited in pending claims 1-21. It would have been obvious to one of ordinary skill in the art before the effective filing date to modify the invention of claims 1-17 of the '723 patent to include additional unclaimed aspects from the underlying embodiment of the patented claims, thereby obtaining the invention specified by pending claims 1-21. Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date to obtain the invention specified by claims 1-21 in view of claims 1-17 of the '723 patent.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar R. Rojas whose telephone number is (571)272-2357. The examiner can normally be reached on Monday-Friday, 10AM-6PM EST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Hollweg can be reached on 571-270-1739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Omar R Rojas/
Primary Examiner
Art Unit 2874

or
July 15, 2023

Notice of References Cited	Application/Control No. 17/857,300	Applicant(s)/Patent Under Reexamination Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2874	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10890723-B2	01-2021	Nguyen; Hiep V.	G02B6/3885	1/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
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	L					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/857,300	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2874

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Checked refs. for 17/145,864.	07/14/2023	/ORR/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/Omar R Rojas/ Primary Examiner, Art Unit 2874	

Senko Ex. 1017, Page 239
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	OPAP
Examiner Name	Docket CENTRAL
Attorney Docket Number	USCO-053-05

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U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10156684	B2	2018-12-18	Nguyen et al.	
	2	4645295	A	1987-02-24	Pronovost	
	3	5121454	A	1992-06-09	Iwano et al.	
	4	5129024	A	1992-07-01	Honma	
	5	5537501	A	1996-07-16	Iwano et al.	
	6	6293708	B1	2001-09-25	Ohtsuka et al.	
	7	6331079	B1	2001-12-01	Grois	
	8	6361218	B1	2002-03-26	Matasek et al.	

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	Art Unit	OPAP
	Examiner Name	Docket CENTRAL
	Attorney Docket Number	USCO-053-05

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	9	6406192	B1	2002-06-18	Chen et al.	
	10	9086546	B2	2015-07-21	Jones	
	11	9366829	B2	2016-06-14	Czosnowski et al.	

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	1	20020172469	A1	2002-11-21	Benner	
	2	20050281509	A1	2005-12-22	Cox et al.	
	3	20080131055	A1	2008-06-05	Edward et al.	
	4	20110091158	A1	2011-04-21	Iwaya et al.	
	5	20120057824	A1	2012-03-08	Katoh	
	6	20140241689	A1	2014-08-28	Bradley et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(**Not for submission under 37 CFR 1.99)**

Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	OPAP
Examiner Name	Docket CENTRAL
Attorney Docket Number	USCO-053-05

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	202600189	CN	U	2012-12-12	Unknown		☒
	2	2004354693	JP	A	2004-12-16	Nakagawa et al.		☒
	3	2013179197	WO	A1	2013-12-05	Xue et al.		☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Molex Incorporated, HBMT Motherboard Adapter Drawing, dated October 31, 2005	☐

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EXAMINER SIGNATURE

Examiner Signature	/Omar R Rojas/	Date Considered	07/14/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**06/29/2023 05:31:12 PM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62365797	AUTHORIZED BY	-
CUSTOMER #	152017	FILING DATE	07/05/2022
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Hiep V. Nguyen

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 1000	**E20236SH32087243**	**Michael Leetzow**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1202	EACH CLAIM IN EXCESS OF 20	100.00	1	100.00
1201	EACH INDEPENDENT CLAIM IN EXCESS OF THREE	480.00	1	480.00
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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement

Receipt will establish the filing date of the application

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CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
PreliminaryAmend.pdf	7	Preliminary Amendment	130 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
PreliminaryAmend.pdf	7E03D873CF35CC95BBC3DF4EF61A8E4F1188517EA4E2EF22536D2DD575496A8FA0CFFB9307BC985C16C956FD92FB15E3F0CDF31FC2B1B5C3DF8BF5373DD5006E

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	Group Art Unit: 2874
Serial No.:	17/857,300	Examiner: Rojas, Omar R.
Filing Date:	July 5, 2022	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

PRELIMINARY AMENDMENT

Further to the application as filed on July 5, 2022, Applicant amends the application as follows:

IN THE CLAIMS:

1. (Original) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall extending from the opposing second side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

2. (Original) The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. (Original) The adapter of claim 2, wherein the wall divides the central portion in half.

4. (Original) The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. (Original) The adapter of claim 1, wherein the first top wall has a dropped top portion and

the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

6. (Original) The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. (Original) The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. (Original) The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. (Original) The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. (Original) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side,

wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body.

11. (Original) The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. (Original) The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. (Original) The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

14. (Original) The adapter of claim 13, wherein the wall divides the central portion in half.

15. (Original) An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side, the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove.

16. (Original) The adapter of claim 15, wherein the first groove is wider than the second groove.

17. (Original) The adapter of claim 15, wherein the dimension of the first groove matches a

dimension of a projection of the first fiber optic connector for alignment.

18. (Original) An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body.

19. (Original) The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. (Original) The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

21. (New) An adapter for optical fiber communications, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side into the main body, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located longitudinally inward from the first side,

at least two channels each configured to respectively receive a fiber optic connector from the first side for an optical connection within the central portion,

a first internal groove of the first top wall extending toward the central portion; and

a second internal groove of the first bottom wall extending toward the central portion, wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

REMARKS

Applicant has added an extra independent claim to further claim the invention. Additional claim fees have been paid.

Respectfully submitted,

/Michael L. Leetzow/
Michael L. Leetzow PLLC
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Troy, VA 22974
Telephone: 407/302-9970

Date: June 29, 2023

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**06/29/2023 04:16:16 PM ET**	**USCO-053-05**

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PATENT CENTER #	62364966	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
ForIDS1_EFSFormat_Molex_HBMT.pdf	2	Non Patent Literature	108 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
ForIDS1_EFSFormat_Molex_HBMT.pdf	08F2ED0B46786076048B5C9F5F256EF5482088D9CEE8CE49ECDA38C9467518D82324921322159A6E5545C4A7E3F390AC216E696AEB395B3775942916D8E8565B

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(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2004-354693
(P2004-354693A)
(43)公開日　平成16年12月16日(2004.12.16)

(51)Int.Cl.[7]	F I	テーマコード（参考）
G02B 6/40	G02B 6/40	2H036

審査請求 未請求　請求項の数 6　ＯＬ　（全 11 頁）

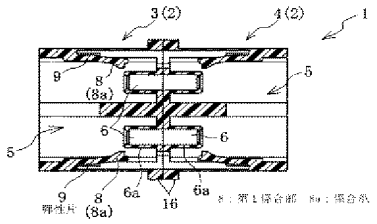
(21)出願番号　特願2003-152314(P2003-152314)
(22)出願日　平成15年5月29日(2003.5.29)

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Ｆターム(参考)　2H036 JA01　QA44　QA47　QA57　QA59

(54)【発明の名称】光コネクタ

(57)【要約】
【課題】２芯型のプラグを装着する型式の光コネクタにおいては、プラグ装着穴の構造・サイズ・形状が１通りに設定されていて、１種類のプラグしか装着することができなかったので、光コネクタの汎用性が低く、異種のプラグを接続するような場合の光学部品の数が多くなる等の問題がある。
【解決手段】光コネクタ１のアダプタ型のコネクタ本体２は、１対の本体分割体３，４を対称に結合して構成され、各本体分割体３，４には型式の異なる２芯型のＭＵ型プラグ，ＬＣ型プラグを択一的に装着可能なプラグ装着穴５が形成され、この本体分割体３，４の内部には、１対のフェルール挿入部６が形成され、これらフェルール挿入部６の軸心間ピッチは、既存のＬＣ型プラグの光ファイバ間ピッチと等しく形成され、ＭＵ型プラグは左右幅を狭く形成してその光ファイバ間ピッチがＬＣ型プラグの光ファイバ間ピッチと等しく形成されている。
【選択図】　図３



【特許請求の範囲】
【請求項1】
２本の光ファイバの端部を保持する２芯型プラグを装着する為のアダプタ型又はレセプタクル型のコネクタ本体を備えた光コネクタにおいて、前記コネクタ本体は、
同種の光ファイバに適用される相互に型式の異なる２芯型の第１，第２プラグを択一的に装着可能に構成された特定プラグ装着穴と、
前記特定プラグ装着穴に装着された第１プラグ又は第２プラグの１対のフェルール先端部が装着される両プラグに共通の１対のフェルール挿入部と、
前記特定プラグ装着穴に装着される第１プラグに係合する複数の第１係合部と、前記特定プラグ装着穴に装着される第２プラグに係合する複数の第２係合部と、を備えたことを特徴とする光コネクタ。
【請求項2】
前記コネクタ本体が、前記特定プラグ装着穴を対向状に１対形成してなるアダプタ型のコネクタ本体であることを特徴とする請求項１に記載の光コネクタ。
【請求項3】
前記コネクタ本体が、１つの前記特定プラグ装着穴を有するレセプタクル型のコネクタ本体であることを特徴とする請求項１に記載の光コネクタ。
【請求項4】
前記第２プラグが２芯型のＬＣ型プラグであり、前記第１プラグが第２プラグの光ファイバ間ピッチと同じ光ファイバ間ピッチを有する２芯型のＭＵ型プラグであることを特徴とする請求項１～３の何れかに記載の光コネクタ。
【請求項5】
前記ＭＵ型プラグの左右の両側部に、１対の第１係合部に係合する１対の係合凹部を形成し、第１係合部は係合凹部に係合解除可能に係合する係合爪からなることを特徴とする請求項４に記載の光コネクタ。
【請求項6】
前記ＬＣ型プラグの１対のレバー部に、２対の第２係合部に係合する２対の係合突起を形成し、第２係合部は係合突起が係合する係合段部であってＬＣ型プラグの上壁部に形成された係合段部からなることを特徴とする請求項４に記載の光コネクタ。

【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は光コネクタに関し、特に型式の異なる２種類のプラグを択一的に接続可能にした光コネクタに関する。
【０００２】
【従来の技術】従来、光通信回路部品としての光コネクタとしては、１対のプラグを接続するアダプタ型光コネクタと、光デバイスに１つのプラグを接続するレセプタクル型光コネクタとがある。アダプタ型光コネクタでは、１対のプラグ装着穴に１対のプラグを装着し、フェルールの端面同士を当接させることで光ファイバを光学的に接続する。レセプタクル型光コネクタでは、１つのプラグ装着穴にプラグを装着し、フェルールの端面を光デバイス側のフェルールの端面に当接させることで光ファイバを光学的に接続する。
【０００３】
ここで、１本の光ファイバを接続する１芯型の光コネクタの他に、双方向光通信等に広く適用されてているように、２本の光ファイバを対にして接続する２芯型の光コネクタも広く実用に供されている。特許文献１，２には、一般的な２芯のレセプタクル型光コネクタが記載されている。
１芯型の光コネクタと同様に、２芯型の光コネクタにおいても、同種の光ファイバに適用されるＭＵ型、ＬＣ型、ＳＣ型など複数種類の光コネクタが実用に供されている。これらの型式が異なる２芯型光コネクタでは、２本の光ファイバの端部を保持するプラグの構造、サイズ、形状、光ファイバ間ピッチ等が異なるため、夫々専用のプラグとコネクタ本体とが採用されている。

【０００４】
例えば、ＭＵ型光コネクタでは光ファイバ間ピッチが４．５ｍｍ又は７．５ｍｍであり、ＬＣ型光コネクタでは光ファイバ間ピッチが６．２５ｍｍであるため、ＭＵ型プラグをＬＣ型光コネクタのプラグ装着穴に装着できず、ＬＣ型プラグをＭＵ型光コネクタのプラグ装着穴に装着することはできなかった。
そこで、例えば、ＭＵ型プラグとＬＣ型プラグとを光学的に接続するためには、ＭＵ型光コネクタと、両端にＭＵ型プラグとＬＣ型プラグを備えたジャンパーと、ＬＣ型光コネクタとを用いて、ＭＵ型プラグをＭＵ型光コネクタに接続し、このＭＵ型光コネクタにジャンパーの一端のＭＵ型プラグを接続すると共にジャンパーの他端のＬＣ型プラグをＬＣ型光コネクタに接続し、このＬＣ型光コネクタに相手側のＬＣ型プラグを接続しなければならなかった。
【０００５】
【特許文献１】特開平５－２１５９４３号公報（図１～図４）
【特許文献２】特開２０００－３１５９２１号公報（図１，図２）
【０００６】
【発明が解決しようとする課題】前記のように、従来の光コネクタでは、光コネクタの型式別に、コネクタ本体のプラグ装着穴の構造・サイズ・形状、プラグの構造・サイズ・形状が１とおりに設定されており、プラグ装着穴に１種類のプラグしか装着することができず、光コネクタの汎用性が低かったため、異種のプラグを接続するような場合に必要な光学部品（光コネクタ、プラグ、ジャンパー等）の数が多くなり、設備経済的に不利であり、接続に多くの労力を要し、光学的な接続個所が多くなる分だけ光学的な接続損失も多くなる等の問題があった。
【０００７】
本発明の目的は、コネクタ本体のプラグ装着穴に２種類のプラグを択一的に装着可能にして汎用性と経済性を高めたアダプタ型又はレセプタクル型の光コネクタを提供することである。
【０００８】
【課題を解決するための手段】請求項１の光コネクタは、２本の光ファイバの端部を保持する２芯型プラグを装着する為のアダプタ型又はレセプタクル型のコネクタ本体を備えた光コネクタにおいて、前記コネクタ本体は、同種の光ファイバに適用される相互に型式の異なる２芯型の第１，第２プラグの両方を択一的に装着可能に構成された特定プラグ装着穴と、前記特定プラグ装着穴に装着された第１プラグ又は第２プラグの１対のフェルール先端部が装着される両プラグに共通の１対のフェルール装着部と、前記特定プラグ装着穴に装着される第１プラグに係合する複数の第１係合部と、前記特定プラグ装着穴に装着される第２プラグに係合する複数の第２係合部とを備えたことを特徴とするものである。
【０００９】
この光コネクタにおいて、コネクタ本体に第１プラグを装着する際に、第１プラグをコネクタ本体の特定プラグ装着穴に装着すると、コネクタ本体の複数の第１係合部が第１プラグに係合し、第１プラグの１対のフェルールの先端部が１対のフェルール挿入部に挿入される。コネクタ本体に第２プラグを装着する際には、第２プラグをコネクタ本体の特定プラグ装着穴に装着すると、コネクタ本体の複数の第２係合部が第２プラグに係合し、第２プラグの１対のフェルールの先端部が１対のフェルール挿入部に挿入される。
【００１０】
尚、前記コネクタ本体がアダプタ型のコネクタ本体である場合には、２芯型のプラグと２芯型のプラグとを接続可能であり、コネクタ本体がレセプタクル型のコネクタ本体である場合には、１つの２芯型のプラグを光学デバイスに接続可能である。
【００１１】
請求項２の光コネクタは、請求項１の発明において、前記コネクタ本体が、前記特定プラグ装着穴を対向状に１対形成してなるアダプタ型のコネクタ本体であることを特徴とするものである。この場合、両方の特定プラグ装着穴に、夫々、２芯型の第１プラグと第２プ

ラグを択一的に装着可能である。そのため、第１プラグ同士の接続、第１プラグと第２プラグの接続、第２プラグ同士の接続の３とおりの接続が可能となる。

【００１２】

請求項３の光コネクタは、請求項１の発明において、前記コネクタ本体が、１つの前記特定プラグ装着穴を有するレセプタクル型のコネクタ本体であることを特徴とするものである。この場合、特定プラグ装着穴に第１プラグを装着したり、第２プラグを装着したりすることができる。

【００１３】

請求項４の光コネクタは、請求項１～３の何れかの発明において、前記第２プラグが２芯のＬＣ型プラグであり、前記第１プラグが第２プラグの光ファイバ間ピッチと同じ光ファイバ間ピッチを有する２芯のＭＵ型プラグであることを特徴とするものである。第１プラグの光ファイバ間ピッチと、第２プラグの光ファイバ間ピッチとが等しく形成されているので、第１，第２プラグの１対のフェルールの先端部が共通の１対のフェルール挿入部に挿入可能である。

【００１４】

請求項５の光コネクタは、請求項４の発明において、前記ＭＵ型プラグの左右の両側部に、１対の第１係合部に係合する１対の係合凹部を形成し、第１係合部は係合凹部に係合解除可能に係合する係合爪からなることを特徴とするものである。ＭＵ型プラグの左右の両側部に１対の係合凹部を形成するため、ＭＵ型プラグの左右幅の中央部には係合凹部を形成する必要がないから、ＭＵ型プラグの左右幅を小さくすることができる。また、ＭＵ型プラグをプラグ装着穴から離脱させる際には、ＭＵ型プラグを離脱側へ引くと係合爪が弾性変形して係合凹部から外れる。

【００１５】

請求項６の光コネクタは、請求項４の発明において、前記ＬＣ型プラグの１対のレバー部に、２対の第２係合部に係合する２対の係合突起を形成し、第２係合部は係合突起が係合する係合段部であってＬＣ型プラグの上壁部に形成された係合段部からなることを特徴とするものである。ＬＣ型プラグをプラグ装着穴に装着する際には、レバー部の弾性変形を介して係合突起が係合段部に係合する。また、ＬＣ型プラグをプラグ装着穴から離脱させる際には、レバー部を操作することで係合突起を係合段部から外し、ＬＣ型プラグを外すことができる。

【００１６】

【発明の実施の形態】以下、本発明の実施の形態について図面を参照しながら説明する。本実施形態は、アダプタ型の光コネクタに本発明を適用した場合の一例である。尚、図１の上方と前方を上方と前方として説明する。図１～図４に示すように、この光コネクタ１は、２本の光ファイバの端部を保持する２芯型プラグを装着するためのアダプタ型のコネクタ本体２を備えたものである。光コネクタ１のコネクタ本体２は、プラグ装着穴５を夫々形成した合成樹脂製の１対の対称な本体分割体３，４を結合した構造のものである。

【００１７】

これら本体分割体３，４が前後に背中合わせ状に結合されてコネクタ本体２となり、１対のプラグ装着穴５が前後に直列状に対称に位置し、各プラグ装着穴５は、同種の光ファイバに適用される相互に型式の異なる２芯型のＭＵ型プラグ２０と２芯型のＬＣ型プラグ４０の両方を択一的に装着可能な特定プラグ装着穴（以下、単に「プラグ装着穴」という）に構成されている。尚、ＭＵ型プラグ２０が第１プラグに相当し、ＬＣ型プラグ４０が第２プラグに相当する。

【００１８】

コネクタ本体２と本体分割体３，４について詳細に説明する。尚、本体分割体４は、本体分割体３と同じ構造であるので同一符号を付して説明を省略する。図１～図４に示すように、本体分割体３には、プラグ装着穴５と、プラグ装着穴５に装着されたＭＵ型プラグ２０のフェルール２１又はＬＣ型プラグ４０のフェルール４１の先端部を相手側のプラグ装着穴５の方へ導く共通の１対のフェルール挿入部６と、プラグ装着穴５に装着されたＭＵ

型プラグ２０の左右両側部の１対の係合凹部２２に係合する１対の第１係合部８と、プラグ装着穴５に装着されたＬＣ型プラグ４０の上面側のレバー部４２の２対の係合突起４４に係合する２対の第２係合部１０（図１２参照）等が形成されている。

【００１９】

プラグ装着穴５は、２芯型のＭＵ型プラグ２０と２芯型のＬＣ型プラグ４０の両方に共通に兼用されるプラグ装着穴であり、底壁１２と左右の側壁１３と上壁１４等で形成されている。プラグ装着穴５の後端側（相手側の本体分割体４側）に仕切壁１５が形成され、この仕切壁１５に、１対のプラグ挿入部６を形成する１対の筒部６ａが前方へ突出するように形成されている。本体分割体３，４から１対の筒部６ａが前後に同心状に突出するため、前後からファイバ挿入部６に挿入された１対のフェルール２１，４１の先端面同士が当接して、２本の光ファイバが先端面同士が光学的に接続されることになる。尚、１対の筒部６ａの軸心間距離が、ＬＣ型プラグ４０の光ファイバ間ピッチ（６．２５ｍｍ）と等しく設定されている。

【００２０】

本体分割体３，４の仕切壁１５同士が面接触状に溶着又は接着され、この状態で本体分割体３，４の１対のフェルール挿入部６，６は連続し同心状になっている（図３、図１０参照）。尚、本体分割体３，４の仕切壁１５同士は複数の凸部を複数の穴に嵌合する構造を併用して固着してもよい。本体分割体３，４には、仕切り壁１５の結合の為とコネクタ本体２を外部の装着のコネクタ取り付け用パネル等に位置決めして固定する為のフランジ１６が形成されている。

【００２１】

次に、ＭＵ型プラグ２０とＬＣ型プラグ４０について説明する。

図５～図６、図１０に示すように、ＭＵ型プラグ２０は、２本の角筒ケース部２４を並べて連結した構造のケース部材２３と、ケース部材２３に内嵌された２つの保持部材２５と、２つの保持部材２５に夫々収容保持された２つのフェルール２１と、これらフェルール２１を弾性付勢するコイルスプリング（図示略）等を有する。ケース部材２３の左右両側壁に開口部が夫々形成され、これら開口部から外部へ露出する保持部材２５の部分に係合凹部２２が夫々形成されている。

また、ＭＵ型プラグ２０の左右両側部には、そのプラグ２０をコネクタ本体２に装着した状態で、本体分割体３の前端に当接する当接部２４ａが形成されている（図１０参照）。

【００２２】

２本の光ファイバケーブル２６がブーツ２７を介して１対の角筒ケース部２４内へ夫々導入され、光ファイバの先端部の被覆を除去した状態の光ファイバがフェルール２１内へ導入されて光ファイバの先端部がフェルール２１の先端部の孔に挿入して保持され、フェルール２１の先端に光ファイバの先端が露出し、フェルール２１の先端面と光ファイバの先端面とが同一面となっている。ＭＵ型プラグ２０のフェルール２１の軸芯間ピッチ、つまり、１対の光ファイバの光ファイバ間ピッチが、ＬＣ型プラグ４０の光ファイバ間ピッチ（６．２５ｍｍ）と等しく設定されている。これを達成するために、従来品のように各角筒ケース部２４の左右両側部に係合凹部２２を形成する代わりに、１対の角筒ケース部２４の相対向する側部（ＭＵ型プラグ２０の左右幅方向中央部の側部）の係合凹部２２を省略して、１対の角筒ケース部２４の間の間隔を従来品よりも小さくし、光ファイバ間ピッチが６．２５ｍｍに設定されている。

【００２３】

図７～図９、図１１、図１２に示すように、ＬＣ型プラグ４０は、１対の角筒ケース部４６を並べて連結した構造のケース部材４５と、２つの角筒ケース部４６に夫々収容保持された１対のフェルール４１と、これらフェルール４１を夫々弾性付勢するコイルスプリング（図示略）等を有する。各角筒ケース部４６の上面側には、その先端部から基端側へ斜め上側へ延びるレバー部４２と、角筒ケース部４６の基端部から先端側へ斜め上側へ延びる操作レバー部４３とが形成され、２つの操作レバー部４３は左右方向に連続させて一体に形成されている。レバー部４２と操作レバー部４３は上下方向に弾性を有し、レバー部

４２には左右両側へ突出する１対の係合突起４４が形成されている。
【００２４】
ＭＵ型プラグ２０の場合と同様に、このＬＣ型プラグ４０においても、２本の光ファイバケーブル４７がブーツ４８を介して１対の角筒ケース部４６内へ夫々導入され、光ファイバの先端部の被覆を除去した状態の光ファイバがフェルール４１内へ導入されて光ファイバの先端部がフェルール４１の先端部の孔に挿入して保持され、フェルール４１の先端に光ファイバの先端が露出し、フェルール４１の先端面と光ファイバの先端面とが同一面となっている。このＬＣ型プラグ４０における光ファイバ間ピッチは、従来品と同様に６．２５ｍｍに設定されている。
【００２５】
図３、図１０に示すように、本体分割体３の左右の側壁部１３には、プラグ装着穴５に装着されるＭＵ型プラグ２０に係合する１対の第１係合部８が形成されている。この１対の第１係合部８は、本体分割体３のプラグ装着穴５に装着されたＭＵ型プラグ２０の左右１対の係合凹部２２に左右両側から係合解除可能に係合する左右１対の係合爪８ａからなる。
この係合爪８ａは、側壁１３に沿って設けられた前後方向向きの弾性片９の後端部に形成され、弾性片９の前端部が側壁１３に一体形成されている。プラグ装着穴５にプラグ２０，４０が装着されていない状態で、各係合爪８ａは弾性片９よりも軸心側へ突出している。
【００２６】
プラグ装着穴５にＭＵ型プラグ２０を着脱する際、ＭＵ型プラグ２０の側面部に係合爪８ａが当接し、その側面部によって係合爪８ａが弾性片９の弾性変形を介して軸心側と反対側へ押動される。プラグ装着穴５にＭＵ型プラグ２０が完全に装着されると、ＭＵ型プラグ２０の１対のフェルール２１の先端部が１対のフェルール挿入部６に挿入されて相手側のプラグ挿入部６にやや突出状に臨み、相手側の１対のフェルール２１又は４１の先端に当接可能となり、１対の係合爪８ａがＭＵ型プラグ２０の１対の係合凹部２２に係合してＭＵ型プラグ２０が保持される。
【００２７】
図１、図１２に示すように、コネクタ本体２の本体分割体３の上壁部には、プラグ装着穴５に装着されたＬＣ型プラグ４０に係合する２対（４つ）の第２係合部１０が、４つの矩形穴１１を介して形成されている。
この２対の第２係合部１０は、プラグ装着穴５に装着されるＬＣ型プラグ４０のレバー部４２の２対の係合突起４４に係合解除可能に係合する２対の係合段部１０ａからなる。プラグ装着穴５の上部には、ＬＣ型プラグ４０の１対のレバー部４２を導入するための左右１対のレバー導入溝１７と、２対の係合突起４４を導入可能な２対のスライダー溝部１７ａが形成され、各スライダー溝１７ａの後端部に１対の係合段部１０ａが形成されている。
【００２８】
プラグ装着穴５にＬＣ型プラグ４０を挿入していくと、１対のレバー部４２が下方へ弾性変形しつつ１対のレバー導入溝１７に導入され、２対の係合突起４４が２対のスライダー溝１７ａに導入され、ＬＣ型プラグ４０がプラグ装着穴５に完全に装着されると、ＬＣ型プラグ４０の１対のフェルール４１の先端部が１対のフェルール挿入部６を挿通して相手側のプラグ挿入部６にやや突出し、この状態で、レバー部４２が復帰して４つの係合突起４４が４つの係合段部１０ａに係合してＬＣ型プラグ４０の装着状態が保持される。
【００２９】
プラグ装着穴５にＬＣ型プラグ４０が装着された状態で、操作レバー部４３を下方へ押動操作すると、１対のレバー部４２が下方へ押動されて、４つの係合突起４４と４つの係合段部１０ａとの係合が解除され、ＬＣ型プラグ４０を引き抜くことができる。尚、プラグ装着穴５にＬＣ型プラグ４０が装着された状態では、１対の係合爪８ａはＬＣ型プラグ４０の左右の側面部に当接して、弾性片９が弾性変形状態を維持する。

【００３０】
１対のプラグ装着穴５の一方にだけ、ＭＵ型プラグ２０又はＬＣ型プラグ４０が装着された状態では、フェルール２１又は４１の先端は、フェルール挿入部６から相手側のプラグ挿入部６へやや突出した状態になる。各プラグ２０，４０において、フェルール２１，４１はコネクタ本体２に対して軸心方向へ小ストロークだけ移動自在で、コイルスプリングにより先端側へ付勢されている。それ故、１対のプラグ装着穴５の両方にプラグ２０，４０が装着されると、片側の１対のフェルール２１又は４１と相手側の１対のフェルール２１又は４１の先端面同士が当接して２本の光ファイバが光学的に接続される。このように、１対の光ファイバを接続可能であるので、この光コネクタ１は、双方向通信用の光ファイバの接続に好適なものである。
【００３１】
上記光コネクタ１の作用・効果について説明する。
この光コネクタ１によれば、１対のプラグ装着穴５が直列状に設けられ、これら両方のプラグ装着穴５が、同種の光ファイバに適用される相互に型式の異なる２芯型のＭＵ型プラグ２０と２芯型のＬＣ型プラグ４０の両方を択一的に装着可能な特定プラグ装着穴に構成されている。
【００３２】
コネクタ本体２のプラグ装着穴５にＭＵ型プラグ２０を装着すると、このＭＵ型プラグ２０の１対の係合凹部２２に１対の第１係合部８が係合して、ＭＵ型プラグ２０が保持される。光コネクタ２のプラグ装着穴５にＬＣ型プラグ４０を装着すると、このＬＣ型プラグ４０の４つの係合突起４４に４つの第２係合部１０が係合して、ＬＣ型プラグ４０が固定される。
【００３３】
この光コネクタ１では、コネクタ本体２に形成された２つのプラグ装着穴５は、共にＭＵ型プラグ２０とＬＣ型プラグ４０に共通のプラグ装着穴であり、各プラグ装着穴５に設けた１対のフェルール挿入部６も、ＭＵ型プラグ２０の１対のフェルール２１の先端部を導入可能であると共に、ＬＣ型プラグ４０の１対のフェルール４１の先端部を導入可能になっている。
【００３４】
そのため、この光コネクタ１により、ＭＵ型プラグ２０－ＭＵ型プラグ４０、ＬＣ型プラグ４０－ＬＣ型プラグ４０、ＭＵ型プラグ２０－ＬＣ型プラグ４０、の３通りの接続が可能になり、接続の方向性も考慮すると、ＬＣ型プラグ４０－ＭＵ型プラグ２０を含めた４通りの接続が可能になり、汎用性に優れる。特に、ＭＵ型プラグ２０とＬＣ型プラグ４０を接続するような場合に、ジャンパーや余分の光コネクタを用いることなく、この光コネクタ１により簡単に接続可能であるので、光ファイバの接続構造を非常に簡単化することでき、設備経済的に有利であり、光学的な接続個所が少なくなるため光学的な接続損失も少なくなる。
【００３５】
１対の第１係合部８は、プラグ装着穴５に装着されるＭＵ型プラグ２０に左右両側から係合解除可能に係合する１対の係合爪８ａからなるので、これら係合爪８ａをＭＵ型プラグ２０に両側から確実に係合させて、ＭＵ型プラグ２０を確実に固定することができる。４つの第２係合部１０は、プラグ装着穴５に装着されるＬＣ型プラグ４０の２つのレバー部４２の４つの係合突起４４に係合解除可能に係合する４つの係合段部１０ａからなるので、これら係合段部１０ａをＬＣ型プラグ４０の係合突起４４に確実に係合させて、ＬＣ型プラグ４０を確実に保持することができる。
【００３６】
次に、前記実施形態を部分的に変更する変更形態について説明する。
１］前記の光コネクタ１では、コネクタ本体２に同構造の１対の特定プラグ装着穴５を形成した例について説明したが、一方のプラグ装着穴５が、ＭＵ型プラグ２０とＬＣ型プラグ４０の両方を択一的に装着可能な特定プラグ装着穴に構成され、他方のプラグ装着穴５

が、ＭＵ型プラグ２０のみ装着可能な構造に構成してもよい。この場合、ＭＵ型プラグ２０－ＭＵ型プラグ２０、ＭＵ型プラグ２０－ＬＣ型プラグ４０、の２パターンの接続が可能になる。尚、前記他方のプラグ装着穴５を、ＭＵ型プラグ２０の代わりに、ＬＣ型プラグ４０のみを装着可能な構造にしてもよい。

【００３７】

２］前記の光コネクタ１では、第１プラグがＭＵ型プラグ２０であり、第２プラグがＬＣ型プラグ４０である場合を例として説明したが、第１プラグがＬＣ型プラグ４０又はＭＵ型プラグ２０であり、第２プラグがＳＣ型プラグであるような光コネクタとすることも可能である。

【００３８】

３］前記の実施形態は、アダプタ型のコネクタ本体２を備えた光コネクタ１を例にして説明したが、本発明の光コネクタは、レセプタクル型のコネクタ本体を備えた光コネクタにも同様に適用可能である。

例えば、図１３に示す光コネクタ１Ａはレセプタクル型のコネクタ本体２Ａを備えた光コネクタであり、この光コネクタ１Ａのコネクタ本体２Ａは、受光機能や発光機能のある光学デバイスＯＤに付随する状態に設けられている。尚、コネクタ本体２Ａの構造は、前記本体分割体３の構造とほぼ同様であるので説明を省略する。図は、コネクタ本体２Ａの１つのプラグ装着穴にＭＵ型プラグ２０を装着した状態を示しているが、前記光コネクタ１の場合と同様に、コネクタ本体２Ａのプラグ装着穴には、ＭＵ型プラグ２０とＬＣ型プラグ４０の両方を択一的に装着可能である。

【００３９】

４］その他、前記図１～図１２に示す実施形態は、一例を示すものに過ぎず、本発明の趣旨を逸脱しない範囲において種々の変更を付加して実施可能である。また、図１３の変更実施形態も、一例を示すものに過ぎず、本発明の趣旨を逸脱しない範囲において種々の変更を付加して実施可能である。

【００４０】

【発明の効果】請求項１の光コネクタによれば、アダプタ型又はレセプタクル型のコネクタ本体に、特定プラグ装着穴と、１対のフェルール装着部と、複数の第１係合部と、複数の第２係合部とを設けたので、同種の光ファイバに適用される異なる２芯型の第１，第２プラグをコネクタ本体に択一的に装着することができ、汎用性と経済性に優れる光コネクタが得られる。その結果、異なる型式のプラグを接続する場合に必要な光学部品（光コネクタ、プラグ、ジャンパー等）の数を減らし、接続の労力を軽減し、設備経済性を高め、光学的な接続損失を減らすことができる。

【００４１】

請求項２の光コネクタによれば、コネクタ本体が、特定プラグ装着穴を対向状に１対形成してなるアダプタ型のコネクタ本体であるので、両方の特定プラグ装着穴に、夫々、２芯型の第１プラグと第２プラグを択一的に装着可能である。そのため、第１プラグ同士の接続、第１プラグと第２プラグの接続、第２プラグ同士の接続の３とおりの接続が可能となり、一層汎用性に優れる光コネクタが得られる。

【００４２】

請求項３の光コネクタによれば、前記コネクタ本体が、１つの特定プラグ装着穴を有するレセプタクル型のコネクタ本体であるので、特定プラグ装着穴に第１プラグを装着したり、第２プラグを装着したりすることができる。

請求項４の光コネクタによれば、第１プラグの光ファイバ間ピッチと、第２プラグの光ファイバ間ピッチとが等しく形成されているので、第１，第２プラグの１対のフェルールの先端部が共通の１対のフェルール挿入部に挿入可能である。

【００４３】

請求項５の光コネクタによれば、ＭＵ型プラグの左右の両側部に、１対の第１係合部に係合する１対の係合凹部を形成し、第１係合部は係合凹部に係合解除可能に係合する係合爪からなるので、ＭＵ型プラグの左右幅の中央部に係合凹部を形成する必要がないから、Ｍ

Ｕ型プラグの左右幅を小さくし、ＭＵ型プラグの光ファイバ間ピッチを、ＬＣ型プラグの光ファイバ間ピッチに一致させることが可能となり、ＭＵ型プラグとＬＣ型プラグを択一的に装着可能な光コネクタとすることができる。

【００４４】

請求項６の光コネクタによれば、ＬＣ型プラグの１対のレバー部に、２対の第２係合部に係合する２対の係合突起を形成し、第２係合部は係合突起が係合する係合段部であってＬＣ型プラグの上壁部に形成された係合段部からなるので、ＬＣ型プラグをコネクタ本体から外す際に、レバー部を操作することで、係合突起を係合段部から外し、ＬＣ型プラグを簡単に外すことができる。

【図面の簡単な説明】

【図１】本発明の実施形態に係る光コネクタのコネクタ本体の斜視図である。

【図２】コネクタ本体の正面図である。

【図３】コネクタ本体の横断平面図である。

【図４】コネクタ本体の縦断面図である。

【図５】ＭＵ型プラグの斜視図である。

【図６】ＭＵ型プラグの正面図である。

【図７】ＬＣ型プラグの斜視図である。

【図８】ＬＣ型プラグの側面図である。

【図９】ＬＣ型プラグの正面図である。

【図１０】光コネクタ（ＭＵ型プラグを装着状態）の横断平面図である。

【図１１】光コネクタ（ＬＣ型プラグ装着状態）の縦断側面図である。

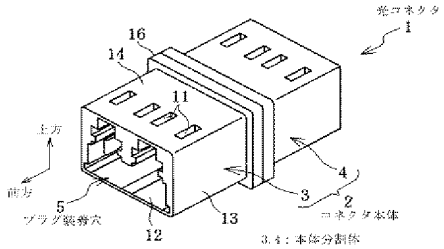
【図１２】光コネクタ（ＬＣ型プラグ装着状態）の縦断側面図である。

【図１３】変更実施形態に係る光コネクタの斜視図である。

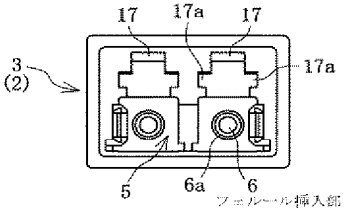
【符号の説明】

１，１Ａ	光コネクタ
２，２Ａ	コネクタ本体
３，４	本体分割体
５	プラグ装着穴
６	フェルール挿入部
８	第１係合部
８ａ	係合爪
９	弾性片
１０	係合段部
２０	ＭＵ型プラグ（第１プラグ）
２１	フェルール
２２	係合凹部
４０	ＬＣ型プラグ（第２プラグ）
４１	フェルール
４２	レバー部
４３	操作レバー部
４４	係合突起

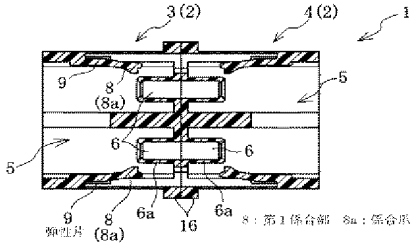
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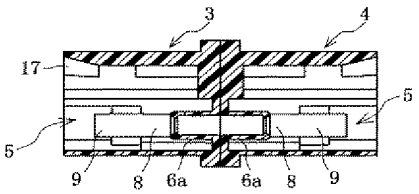
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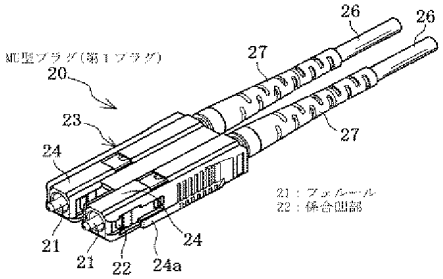
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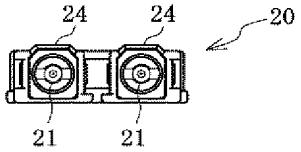
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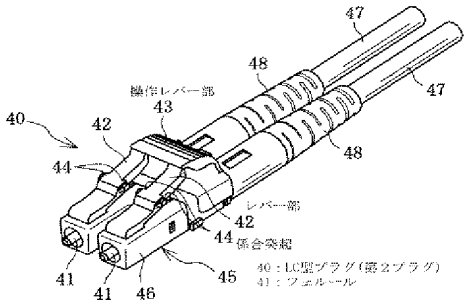
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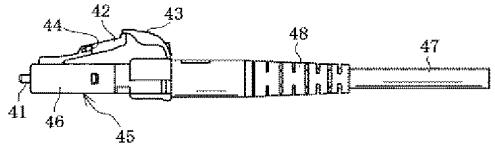
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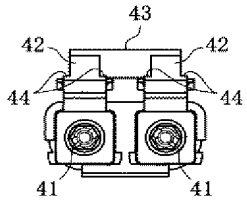
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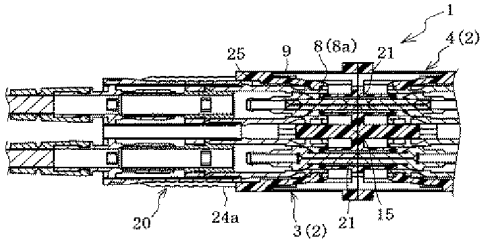
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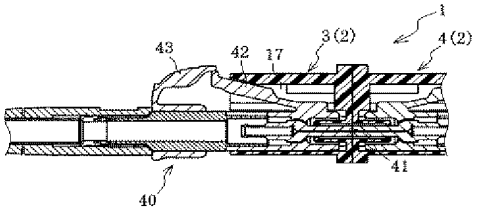
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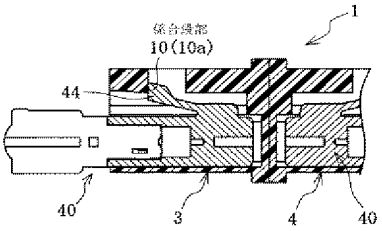
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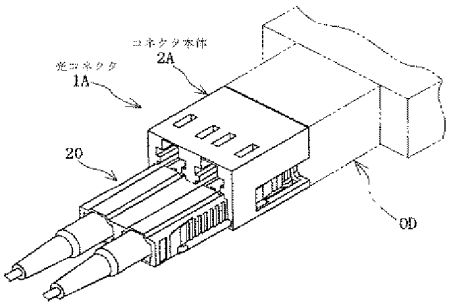
【図11】



【図12】



【図13】



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DESCRIPTION CN202600189U

Adapter Assemblies and Connector Assemblies

[0001]

technical field

[0002]

The utility model relates to an adapter for a connector used in data communication and telecommunication applications, in particular to an adapter for a plug-in connector and a connector assembly with the adapter.

[0003]

Background technique

[0004]

In various optical fiber communication systems, optical fiber connectors are usually used to connect the optical fibers of different optical cables.

FIG. 20 shows a perspective view of a conventional two optical fiber connectors 400 .

21 and 22 illustrate an adapter 200 for use with a fiber optic connector.

Each optical fiber connector 400 includes a connector body 401 from one end of which the optical cable 300 is inserted and a ferrule 301 for an optical fiber of the optical cable 300 exposed from the other end of the connector main body 401 . The adapter 200 includes: four interfaces 201, which are respectively formed in pairs at both ends of the adapter 200, and are configured to accommodate respectively inserted corresponding connectors 400; Between the mating ports 201 , there are ferrules 301 for connecting the connectors respectively inserted into the paired ports 201 . When the optical fiber connector 400 is inserted into the adapter 200 , the connector body 401 is accommodated in the receiving groove 201 , and the ferrule 301 is inserted into the connecting portion 202 to be spliced with another fiber ferrule in the connecting portion 202 . Additionally, the adapters described above are sometimes used to accommodate electrical connectors that electrically connect the wires of two cables.

[0005]

Senko Ex. 1017, Page 268
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

For the above existing adapters applied to plug-in connectors, a flange structure can be provided on the adapter, and the adapter can be fixed on the panel through the mounting holes on the flange structure; an elastic clip made of metal can also be provided on the adapter, Secure the adapter to the panel with elastic clips.

However, no matter using the flange structure or the elastic clip, only one adapter can be independently installed on the panel. If multiple adapters need to be installed on the panel, a predetermined distance needs to be kept between each adapter, and the adjacent adapters on the installation panel cannot be arranged in high density, thereby affecting the installation density of the installation panel and causing waste of installation space.

[0006]

Utility model content

[0007]

The technical problem solved by the utility model is to provide an adapter assembly and a connector assembly including the device adapter assembly. Multiple adapters can be joined sequentially, thereby maximizing the use of the space on the installation panel.

[0008]

According to an embodiment of an aspect of the present invention, there is provided an adapter assembly for connecting multiple connectors, including: multiple adapters, each adapter includes a housing, and at least one pair of connectors is formed in the housing for plug-in connection and at least one engagement device, each engagement device configured to interconnect adjacent walls of the interfaces of two adjacent adapters in a plurality of said adapters in a snap-fit manner to connect said plurality of adapters fixed together.

[0009]

In the above adapter assembly, the housing of each adapter is substantially cuboid, and includes a first vertical wall defining the interface, a second vertical wall opposite to the first vertical wall, a top wall, and a bottom wall, The engaging means is configured to connect adjacent first and second vertical walls, and/or adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

[0010]

In the above adapter assembly, the engaging means is configured to clamp the adjacent first and second vertical walls, and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters. clamping mechanism.

[0011]

In the above adapter assembly, each of the first upright wall, the second upright wall, the top wall, and the bottom wall includes a groove formed on the inner side surface of the housing, the shape of the groove is consistent with that of the clamping structure The shapes of the two clamping arms of the clamping structure substantially cooperate to accommodate the two clamping arms of the clamping structure in two corresponding grooves.

[0012]

In the above adapter assembly, each of the clamping structures includes a retaining portion protruding from the free end of the clamping arm, and the distal end of each groove is formed to pass through the first vertical wall and the second vertical wall. , a

Senko Ex. 1017, Page 269
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

through hole in each of the top wall and the bottom wall, the holding portion can be accommodated in the through hole.

[0013]

In the adapter assembly described above, each clamping arm has a substantially triangular shape.

[0014]

The above adapter assembly further includes at least one pair of mounting mechanisms, one mounting mechanism of each pair of mounting mechanisms is installed on the first vertical wall or the second vertical wall located on the outermost side of a row of adapters, each mounting mechanism includes: a main body, the The length of the main body is about half of the longitudinal length of an adapter, and each main body includes a first end and a second end opposite to the first end; mounting ears, outwardly from the first end vertically extending; and an auxiliary clamping means bent inwardly from said second end at approximately 180 degrees to engage into a groove in the outermost vertical wall.

[0015]

In the above adapter assembly, an installation hole is provided on the installation ear, and an elastic clamping protrusion is provided on the free end of the auxiliary clamping device.

[0016]

In the above adapter assembly, each engaging means includes: at least one first horizontal engaging means extending in the horizontal direction from the outer side of the first wall; and at least one second horizontal engaging means formed on the second vertical wall Externally, the first and second horizontal engagement means are configured to snap-fit each other in shape to engage the plurality of adapters together side-by-side in sequence.

[0017]

In the above-mentioned adapter assembly, the first horizontal joint means includes: a connecting part extending from the outside of the first vertical wall in a horizontal direction; and a joint part extending from an end of the connecting part in at least one direction parallel to The first vertical wall is formed by extending.

The second horizontal coupling device includes: a receiving groove formed on the second vertical wall and configured to receive a coupling portion of the first horizontal coupling device of another adapter; and a first opening communicating with the receiving groove. , the engaging portion of the other adapter can be inserted into the engaging portion through the first opening.

[0018]

In the above adapter assembly, the second horizontal engaging device further includes: a second opening communicating with the accommodating groove and configured to cooperate with the connecting portion of the other adapter, when the other adapter is engaged During the process of inserting the part into the receiving groove, the connecting part of the other adapter passes through the second opening.

[0019]

In the above adapter assembly, the joint part has a substantially U-shape, and includes: two elastic arm parts, and a base part connected between the ends of the two arm parts, and the connecting part connects between the base and the first vertical wall.

[0020]

In the above adapter assembly, the tip of each arm portion is provided with a protrusion, and when the engaging portion of the

Senko Ex. 1017, Page 270
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

other adapter is inserted into the receiving groove as an insertion end, the protrusion of the other adapter is exposed on the outside of the first opening to block further insertion of the joint.

[0021]

In the above adapter assembly, each adapter further includes two positioning parts, respectively protruding from the second vertical wall and leaving a predetermined distance away from the first opening, so that when the joint part of the other adapter is inserted into the When accommodated in the groove, the protruding portion of the other adapter is located between the second engaging device and the positioning portion.

[0022]

In the above adapter assembly, the second horizontal joint device further includes: a third opening communicating with the receiving groove and opposite to the first opening.

The end of each arm is provided with a protrusion, and when the end of the arm of the other adapter is inserted into the receiving groove as an insertion end, the protrusion of the other adapter is exposed on the third opening. outside, so as to prevent the engagement portion of the other adapter from exiting the receiving groove.

[0023]

In the above adapter assembly, the first horizontal engaging device is disposed in a groove formed on the first vertical wall, and the second horizontal engaging device protrudes from the second vertical wall.

[0024]

The adapter assembly described above further includes a first mounting mechanism and a second mounting mechanism.

The first installation mechanism includes: a plate-type first main body part; and a first auxiliary joint means formed on a first side of the first main body part and having the same structure as the first horizontal joint means to be used with the first horizontal joint means. The second horizontal engagement means of an outermost one of the plurality of adapters engages.

The second mounting mechanism includes: a plate-type second main body; and a second auxiliary engaging device formed on a first side of the second main body and having the same structure as the second horizontal engaging device, so as to be the same as the second horizontal engaging device. The first horizontal engagement device of another adapter located on the outermost side among the plurality of adapters is combined.

[0025]

In the above adapter assembly, in the above adapter assembly, the first mounting mechanism further includes a first mounting ear portion formed on the second side of the first body portion; the second mounting mechanism further includes a first mounting ear portion formed on the second side of the first body portion; The second mounting ear portion on the second side of the second main body portion.

[0026]

In the above adapter assembly, both the first mounting ear and the second mounting ear are provided with at least one mounting hole.

[0027]

In the above adapter assembly, each engaging device includes: a first vertical engaging device extending from the outer side of the first vertical wall and the second vertical wall near the top wall or the bottom wall; and a second vertical engaging device

Senko Ex. 1017, Page 271
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

configured On the outside of the second vertical wall and the first vertical wall, close to the bottom wall or the top wall, and configured as a slot for inserting and fixing the first vertical engagement device of another adapter, when the first vertical When the engagement means and the second vertical engagement means are engaged with each other, the plurality of adapters are engaged together in a stacked manner in the vertical direction.

[0028]

In the above adapter assembly, each of the first vertical engaging means has a substantially U-shape and includes: a first arm protruding outward from the upper end or the lower end of the outer sides of the first vertical wall and the second vertical wall forming; a second arm extending parallel to the first arm outside of the top or bottom wall; and a base connected between the first arm and the second arm for The first arm portion and the second arm portion form the slot, and each of the second vertical engaging means includes an elongated protrusion protruding outward from the lower end or the upper end of the outer side of the first vertical wall and the second vertical wall, Wherein the elongated protrusion is receivable in a slot between the first arm and the second arm of the other adapter to engage the two adapters together superimposedly.

[0029]

In the above adapter assembly, the free end of the second arm is provided with an inwardly extending blocking portion to block the elongated protrusion from disengaging from the space between the first arm and the second arm.

[0030]

In the above adapter assembly, each engagement means includes a vertical engagement means and a receiving groove.

The vertical engagement means has a substantially L-shape and includes: a base extending vertically outward from the top or bottom wall; and an arm extending from an end of the base parallel to the top or bottom wall The outer surface is extended.

A receiving groove is formed in the bottom wall or the top wall and is configured to receive the arm portion of another adapter to superimposedly join the two adapters together.

[0031]

In the above adapter assembly, each of the adapters further includes a mounting mechanism protruding from the first vertical wall and the second vertical wall for mounting the adapter assembly on a mounting panel.

[0032]

According to an embodiment of another aspect of the present invention, a connector assembly is provided, including: the adapter assembly described in the various embodiments above; and a plurality of connectors, each of which is connected to an interface of a corresponding adapter .

[0033]

In the above connector assembly, the connector is an optical fiber connector.

[0034]

According to the adapter assembly of the above-mentioned various embodiments of the present invention, a plurality of adapters can be sequentially engaged side by side in the horizontal direction or overlapped in the vertical direction, and two adjacent adapters can be removed through, for example, a snap connection. ground together to maximize the use of space on the mounting panel.

[0035]

Senko Ex. 1017, Page 272
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Description of drawings

[0036]

The utility model will be further described in detail with reference to the accompanying drawings, wherein:

[0037]

Fig. 1 is a schematic perspective view showing an adapter assembly according to a first embodiment of the present invention;

[0038]

Fig. 2 is a schematic perspective view showing the middle row of adapters in the adapter assembly shown in Fig. 1;

[0039]

Fig. 3 is an exploded schematic diagram showing some components of the middle row of adapters shown in Fig. 2 before assembly;

[0040]

Fig. 4 is a three-dimensional schematic view showing the lower two rows of adapters in the adapter assembly shown in Fig. 1;

[0041]

Fig. 5 is a schematic perspective view showing an adapter in the adapter assembly shown in Fig. 1;

[0042]

Fig. 6 is a schematic perspective view showing the engaging device in the adapter assembly shown in Fig. 1;

[0043]

and 7 are schematic perspective views showing the mounting mechanism in the adapter assembly shown in Figure 1;

[0044]

Fig. 8 is a schematic perspective view showing an adapter assembly according to a second embodiment of the present invention;

[0045]

Fig. 9 is a schematic perspective view showing an adapter in the adapter assembly shown in Fig. 8 viewed from a first side;

[0046]

Fig. 10 is another perspective view showing the adapter shown in Fig. 9 viewed from the first side;

[0047]

Senko Ex. 1017, Page 273
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Fig. 11 is a schematic perspective view showing the adapter shown in Fig. 9 viewed from a second side;

[0048]

Figure 12 is a partially enlarged cross-sectional view taken along the A-A line of Figure 10 (or the B-B line of Figure 11) when two adjacent adapters in the adapter assembly shown in Figure 8 are engaged, to illustrate the first engaging means Embodiments of the first type of engagement with the second engagement means;

[0049]

Fig. 13 is an enlarged cross-sectional view showing an embodiment of another engagement mode of the first engagement device and the second engagement device;

[0050]

Fig. 14 is a perspective view showing a first mounting mechanism in the adapter assembly shown in Fig. 8;

[0051]

Fig. 15 is another perspective view showing the first mounting mechanism in the adapter assembly shown in Fig. 8;

[0052]

Fig. 16 is a schematic perspective view showing a second mounting mechanism in the adapter assembly shown in Fig. 8;

[0053]

Fig. 17 is another perspective view showing the second mounting mechanism in the adapter assembly shown in Fig. 18;

[0054]

Fig. 18 is a schematic perspective view showing an adapter assembly according to a third embodiment of the present invention;

[0055]

Figure 19 is a schematic perspective view showing an adapter in the adapter assembly shown in Figure 18;

[0056]

Fig. 20 is a perspective view showing a conventional two optical fiber connectors;

[0057]

Figure 21 is a schematic perspective view showing an existing adapter used in combination with the fiber optic connector shown in Figure 20; and

[0058]

Fig. 22 is a sectional view showing the adapter shown in Fig. 21 taken along line C-C.

[0059]

Senko Ex. 1017, Page 274
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Detailed ways

[0060]

Although the utility model will be fully described with reference to the accompanying drawings that contain preferred embodiments of the utility model, it should be understood that those of ordinary skill in the art can modify the utility model described herein while obtaining the advantages of the utility model. technical effect.

Therefore, it should be understood that the above description is a broad disclosure for those skilled in the art, and its content is not intended to limit the exemplary embodiments described in the present invention.

[0061]

The adapter 100 of the present utility model can be combined with the optical fiber connector 400 (such as LC optical fiber connector) shown in Figure 20 or the connector described in the applicant's Chinese patent application CN201210037495. The optical fibers are spliced, distributed or transferred.

According to various embodiments of the present invention, an adapter assembly for connecting a plurality of connectors such as shown in FIG. At least one pair of interfaces for a plug-in connector is formed in the body; and at least one engagement device, each engagement device is configured to snap fit adjacent walls of the interfaces of two adjacent adapters in a plurality of said adapters interconnected to secure the plurality of adapters together.

For example, multiple adapters are secured together horizontally side by side and/or vertically one above the other.

[0062]

1-7 illustrate an adapter assembly 100 according to a first exemplary embodiment of the present invention.

The adapter assembly 100 includes 3 rows and 3 columns (9 adapters 10 in total).

The housing 1 of each adapter 10 has a substantially rectangular parallelepiped shape and includes a first vertical wall 11 defining an interface 2 , a second vertical wall 12 opposite to the first vertical wall 11 , a top wall 13 and a bottom wall 14 .

The engagement means is configured to connect adjacent first upright walls 11 and second upright walls 12 , and/or adjacent top walls 13 and bottom walls 14 of two adjacent adapters of the plurality of adapters 10 .

Further, the engaging device is configured to clamp the adjacent first vertical wall 11 and the second vertical wall 12 of two adjacent adapters 10, and/or the elastic clamping of the adjacent top wall 13 and bottom wall 14 Institution 3.

[0063]

In a further embodiment, as shown in FIG. 5, each of the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14 includes grooves 111, 121, 131, 141, the shape of the grooves 111, 121, 131, 141 is approximately the same and roughly matched with the shape of the two clamping arms 30 of the clamping structure 3, so as to accommodate the two clamping arms 30 of the clamping structure 3 in two corresponding grooves.

For example, as shown in Figures 2 and 3, the two clamping arms 30 of the clamping structure 3 are accommodated in the groove 121 of the second upright wall 12 of the first adapter and the groove of the first upright wall 11 of the second adapter in the same row 111, so that multiple adapters 10 can be fixed side by side and sequentially.

In addition, as shown in Figure 4, the two clamping arms 30 of the clamping structure 3 are accommodated in the groove 141 of the bottom wall 14 of the upper adapter and the groove 131 of the top wall 13 of the lower adapter in the same row, so that the A plurality of adapters 10 are stacked and fixed together sequentially.

Each clamping arm 30 has a substantially triangular shape, which facilitates pushing the clamping structure 3 into the corresponding groove.

Senko Ex. 1017, Page 275
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

In one embodiment, the groove 131 on the top wall 13 is formed on the top wall of the receiving groove for receiving the locking structure of the connector 400 as shown in FIG. 20 .

[0064]

Since each of the first upright wall 11, the second upright wall 12, the top wall 13 and the bottom wall 14 includes grooves 111, 121, 131, 141 formed on their respective inner side surfaces, when the two adapters 10 are placed When they are together, whether they are stacked or placed side by side, there are two walls, that is, the second vertical wall 12 of one adapter and the first vertical wall 11 of the other adapter are attached together, or the bottom wall 14 of one adapter and the other The top wall 13 of an adapter abuts together, and the grooves 212 and 111, or 141 and 131 formed on their inner surfaces are juxtaposed opposite each other, so that the clamping arm 30 of the clamping structure 3 can Go into these grooves, and hold the two adapters together.

Therefore, the adapter of the first embodiment of the present utility model can utilize the clamping structure 3 to implement stacked arrangement and/or side-by-side arrangement (at least one of stacked arrangement and side-by-side arrangement), which reduces the installation space of the adapter.

When a plurality of adapters in the adapter assembly of the present invention are vertically stacked, it is particularly suitable for installing the connector described in the applicant's Chinese patent application CN201210037495.6.

[0065]

In a further embodiment, each clamping structure 3 includes a holding portion 301 protruding from the free end of the clamping arm 30, and the distal end of each groove is formed through the first vertical wall 11, the second vertical wall 12, the top The through hole 15 of each of the wall 13 and the bottom wall 14 , each holding portion 301 can be accommodated in the corresponding through hole 15 .

In this way, during the process of pushing the clamping structure 3 into the groove, the protruding retaining portion 301 can enter into the through hole 15, which is beneficial to maintain a relatively firm combination between the clamping structure 3 and the groove.

Alternatively, the through hole may not pass through the wall of the housing 1, but just be formed as a deeper depression than other parts of the groove.

[0066]

The adapter assembly 100 of the first embodiment of the present utility model further includes at least one pair of installation mechanisms 4, and one installation mechanism in each pair of installation mechanisms 4 is installed on the first vertical wall 11 or the second vertical wall 12 located on the outermost side of a row of adapters .

As shown in FIG. 7 , each mounting mechanism 4 includes: a long strip-shaped main body portion 41 made of, for example, plate-shaped material, mounting ear portions 42 and auxiliary clamping devices 43 .

The length of the body parts 41 is about half of the longitudinal length of an adapter 10, and each body part 41 includes a first end and a second end opposite the first end.

The mounting ear portion 42 is formed vertically extending outward from the first end of the main body portion 41 .

The auxiliary clamping device 43 is formed by bending inwards about 180 degrees from the second end of the main body 41 to engage in the groove 111 or 121 of the outermost first vertical wall 11 or second vertical wall 12 .

In addition, an installation hole 421 is provided on the installation ear portion 42 , and an elastic clamping protrusion 431 matching with the through hole 15 is provided at the free end of the auxiliary clamping device 43 .

Since the length of the main body part 41 is about half of the longitudinal length of an adapter 10, a mounting mechanism 4 can be respectively installed from the two ends of the first vertical wall 11 and the second vertical wall 12, and the mounting ear

Senko Ex. 1017, Page 276
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

portion 42 positioned on the outside of the same vertical wall is attached to close together, so that the entire adapter assembly 100 is installed on the mounting frame by using the mounting mechanism 4 .

[0067]

8-17 illustrate an adapter assembly 100' according to a second exemplary embodiment of the present invention.

In the adapter assembly 100' of the second embodiment, the housing 1' of each adapter 10' has a substantially rectangular parallelepiped shape, and includes a first vertical wall 11' defined as an interface 2', and an opposite to the first vertical wall 11'. The second vertical wall 12', the top wall 13' and the bottom wall 14'.

The engaging means is configured to connect adjacent first upright walls 11' and second upright walls 12' of two adjacent adapters in the plurality of adapters 10', thereby fixing the plurality of adapters 10' together side by side in the horizontal direction .

[0068]

Further, each joint device includes: at least one first horizontal joint device 31 (Figs. 9 and 10), formed by extending outward in the horizontal direction from the outside of the first vertical wall 11'; and at least one second horizontal joint device 32 (FIG. 11), formed on the outside of the second vertical wall 12 ′, the first horizontal engaging device 31 and the second horizontal engaging device 32 are configured to snap fit each other in shape, so as to align a plurality of adapters 10 ′ in the horizontal direction joined together side by side.

[0069]

Referring to FIGS. 9 , 10 and 12 , each first horizontal engaging device 31 includes: a connecting portion 311 (see FIG. 12) and an engaging portion 312 .

The connection portion 311 is formed extending horizontally from the outside of the first vertical wall 11 ′, and the joint portion 312 is formed from the end of the connection portion 311 in at least one direction (for example, as shown in FIGS. direction and upward direction) extending parallel to the first vertical wall 11'.

Referring to FIGS. 11 and 12 , each second engaging device 32 includes: a receiving groove 321 and a first opening 322 located at the upper end of the receiving groove 321 .

A receiving groove 321 is formed on the second standing wall 12', and is configured to receive the engaging portion 312 of the first horizontal engaging means 31 of another adapter.

The first opening 322 communicates with the receiving groove 321 , and the engaging portion 312 of the other adapter can be inserted into the receiving groove 321 from top to bottom through the first opening 322 .

[0070]

Further, the second horizontal joint device 32 also includes a second opening 323 extending in the vertical direction.

11 and 12, the second opening 323 communicates with the receiving groove 321 and is configured to cooperate with the connecting portion 311 of another adapter. When the connecting portion 312 of the other adapter is inserted into the receiving groove 321, the The connecting portion 311 of the other adapter passes through the second opening 323 .

In the cross-sectional view shown in FIG. 12 , the accommodating groove 321 is defined by two substantially L-shaped structures, wherein two walls of the two L-shaped structures extend from the second vertical wall 12 ′, and the other two walls extend toward each other and The second opening 323 is formed.

On the other hand, the engaging portion 312 has a substantially U-shape, and includes: two elastic arm portions 313, and a base portion 314 connected between the ends of the two arm portions 313, the connecting portion 311 is connected to the base portion 314 and the first vertical wall 11'.

Senko Ex. 1017, Page 277
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[0071]

Furthermore, the end of each arm 313 is provided with a protruding portion 315, and when the engaging portion 312 of another adapter is used as the insertion end and inserted into the receiving groove 321 from top to bottom through the first opening 322, the other adapter The protruding portion 315 is exposed outside the first opening 322 to block further insertion of the engaging portion 312 .

[0072]

In one embodiment, each adapter 10' further includes two positioning parts 5, respectively protruding from the second vertical wall 12' and leaving a predetermined distance away from the first opening 322, so that when the engaging part 312 of another adapter is inserted When being accommodated in the slot 321 , the protruding portion 315 of the other adapter is located between the second horizontal engaging device 32 and the positioning portion 5 .

In this way, the protruding portion 315 blocks the engaging portion 312 from being further inserted into the receiving groove 321 or disengaged upward from the receiving groove 321 .

An inclined guide surface may be provided on the upper and lower surfaces of the protruding portion 315 , so that the protruding portion 315 can break away from the blocking of the second engaging device 32 or the positioning portion 5 through the inclined guiding surface by applying a large force.

[0073]

The above describes the embodiment in which the joint portion 312 is a U-shaped mechanism with an upward opening shown in FIGS. 9 and 10 , but the present invention is not limited thereto.

In another embodiment, the joint part 312 may be a U-shaped mechanism with an opening downward, and the connecting part is connected to the uppermost end of the base part, so that a second opening may not be required.

In this embodiment, the second horizontal engaging device 32 also includes a third opening (not shown) communicating with the receiving groove 321 and opposite to the first opening, and each end of the arm is provided with a protrusion. When the end of the arm of the adapter is used as the insertion end and inserted into the receiving groove 321 from top to bottom through the first opening, the protrusion of the other adapter is exposed outside the third opening to block the joint of the other adapter. Get out of the receiving slot 321 .

[0074]

In the above embodiment, the first horizontal engaging device 31 is disposed in the groove 112 formed on the first vertical wall 11', while the second horizontal engaging device 32 protrudes from the second vertical wall 12'.

In this way, when the first engaging device is engaged with the second engaging device, the first vertical wall 11' and the second vertical wall 12' of two adjacent adapters are close to each other, so as to save space.

[0075]

In another alternative embodiment, as shown in FIG. 13 , the connecting portion 311 ′ and the engaging portion 312 ′ of the first horizontal joint device are both arranged outside the outer surface of the first vertical wall 11A, while the second horizontal joint The receiving groove 321' of the device is formed in the second vertical wall 12A, that is, the entire second horizontal joint device does not protrude beyond the outer surface of the second vertical wall 12A.

In this way, when the first horizontal engaging device is engaged with the second horizontal engaging device, the first vertical wall 11A and the second vertical wall 12A of two adjacent adapters can also be close to each other, so as to save space.

[0076]

Senko Ex. 1017, Page 278
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

The adapter assembly 100' according to the second embodiment of the present invention, as shown in Figs. 14-17 , further includes a first mounting mechanism 6 and a second mounting mechanism 7.

The first mounting mechanism 6 includes a plate-type first main body portion 61 and a first auxiliary engaging device 62 .

The first auxiliary engaging means 62 is formed on the first side of the first main body part 61 and has the same structure as the first horizontal engaging means 31 to be combined with the second horizontal engaging means 32 of the outermost one of the plurality of adapters. , so that the mounting mechanism 6 is mounted on the outermost adapter.

The second mounting mechanism 7 includes a plate-shaped second main body portion 71 and a second auxiliary engaging device 72 .

The second auxiliary engaging means 72 is formed on the first side of the second main body part 71 and has the same structure as the second horizontal engaging means 32, so as to engage with the first level of another adapter located on the outermost side among the plurality of adapters. The means 31 are combined so that the mounting mechanism 7 is mounted on this outermost other adapter.

[0077]

Further, the first installation mechanism 6 also includes a first installation ear portion 63 formed on the second side of the first main body portion 61; the second installation mechanism 7 also includes a second ear portion formed on the second side of the second main body portion 71. The ears 73 are installed.

Both the first mounting ear 6 and the second mounting ear 7 are provided with at least one mounting hole 64 and 74, so as to install the entire adapter assembly 100' on the mounting panel (not shown, see Figure 11) above.

[0078]

Referring to Figures 18 and 19, an adapter assembly 100" according to a third embodiment of the present invention includes a plurality of adapters 10".

Each adapter 10" includes two first vertical engaging devices 31' and two second vertical engaging devices 32', and the two first vertical engaging devices 31' are respectively arranged on the outer sides of the first vertical wall 11" and the second vertical wall. upper end, and two second vertical joint devices 32' are respectively arranged on the lower ends of the first vertical wall 11" and the outer side of the second vertical wall, and the two first vertical joint devices 32' and the two second vertical joint devices 32' can respectively joint, so that a plurality of adapters 10" are stacked one after the other in the vertical direction and joined together.

[0079]

Further, in the adapter assembly 100", each first vertical engaging device 31' has a substantially U-shaped shape, and includes: a first arm portion 313', extending from the upper end of the first vertical wall 11" or the outer side of the second vertical wall Outwardly protruding form; second arm portion 314', extending parallel to the first arm portion 31' outside the upper portion of the top wall 13"; and base portion 315', connected between the first arm portion 313' and the second arm portion 314 'between.

Each second vertical engagement means 32' comprises an elongated protrusion protruding outward from the lower end of the outer side of the first upright wall 11" or the second upright wall, wherein the elongated protrusion can be accommodated in the first arm portion 313' of another adapter and the second arm 314' to join the two adapters together in a superimposed manner.

In addition, the inner side of the first arm portion 313' is flush with the upper surface of the top wall 13", and the lower side of the elongated protrusion is flush with the lower surface of the bottom wall.

In this way, among two vertically adjacent adapters, the bottom wall of the previous adapter can be close to the top wall of the next adapter, thereby reducing the installation space of the entire adapter assembly.

Senko Ex. 1017, Page 279
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[0080]

In a further embodiment, the free end of the second arm 314' is provided with an inwardly extending blocking portion 316' to block the elongated protrusion from between the first arm 313' and the second arm 314'. space escape.

In addition, each adapter 10 ″ also includes a mounting mechanism 8 protruding from the first vertical wall 11 ″ and the second vertical wall, so as to mount the entire adapter assembly 100 ″ on the mounting panel 101 .

[0081]

In an alternative embodiment, each first vertical engaging device has a substantially U-shape and includes: a first arm protruding outward from the lower end of the outer side of the first vertical wall or the second vertical wall forming; a second arm extending outside of the bottom wall parallel to the first arm; and a base connected between the first arm and the second arm.

Each of the second engagement means includes an elongated protrusion protruding outward from an upper end of the outer side of the first vertical wall or the second vertical wall, wherein the elongated protrusion can be accommodated in the first arm and the first arm of the other adapter. between the second arms to engage the two adapters together in a superimposed manner.

In addition, the inner side of the first arm portion is flush with the lower surface of the bottom wall, and the upper side of the elongated protrusion is flush with the upper surface of the top wall.

[0082]

In another alternative embodiment, each engagement means includes a vertical engagement means and a receiving slot.

The vertical engagement means has a substantially L-shape and includes: a base extending vertically outward from the top or bottom wall; and an arm extending from an end of the base parallel to the top or bottom wall The outer surface is extended.

A receiving groove is formed in the bottom wall or the top wall, and is configured to receive the arm portion of another adapter to join the two adapters together in a stacked manner in a vertical direction.

[0083]

According to another embodiment of the present utility model, there is provided a connector assembly, including: the adapter assembly described in the above various embodiments; and a plurality of connectors, each connector is connected to an interface of a corresponding adapter Inside.

Further, the connector is an optical fiber connector, such as an LC optical fiber connector.

[0084]

According to the adapter assembly of the above-mentioned various embodiments of the present invention, multiple adapters can be sequentially engaged side by side in the horizontal direction and/or overlapped in the vertical direction, and two adjacent adapters can be connected through, for example, a snap connection. Removably joined together.

The entire adapter assembly is integrally installed on the installation panel through the installation mechanism.

The external joint structures of each adapter are the same as each other, and the internal structure is the same as that of existing adapters, so that they can be mated with standard LC fiber optic connectors in high density, and the space on the installation panel can be utilized to the maximum extent.

At the same time, each adapter can adopt a modular design to ensure that the client can select an appropriate number of adapters for modular combination according to needs.

[0085]

Senko Ex. 1017, Page 280
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Although the connector of the present invention is described with the optical cable as the connection object in the above embodiments, those skilled in the art can understand that some embodiments of the connector of the present invention can also be applied to connect two cables.

Especially, in various network communication terminals provided with plug and socket connectors such as computers, routers, servers, switches, etc., the plug connector can be provided with the locking mechanism of the present invention with tilting arm, driving arm and locking protrusion.

[0086]

Those skilled in the art can understand that the above-described embodiments are exemplary, and those skilled in the art can improve them, and the structures described in various embodiments do not conflict with each other in terms of structure or principle Free combination can be carried out under the situation of the utility model, so that more kinds of connectors and adapter components can be realized on the basis of solving the technical problem of the utility model.

[0087]

After describing the preferred embodiments of the present utility model in detail, those skilled in the art can clearly understand that various changes and changes can be made without departing from the scope and spirit of the appended claims, and the utility model also Implementation is not limited to the exemplary embodiments set forth in the specification.

Senko Ex. 1017, Page 281
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 December 2013 (05.12.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/179197 A1

(51) International Patent Classification:
H01R 9/24 (2006.01) *H01R 13/514* (2006.01)
G02B 6/00 (2006.01) *H01R 31/06* (2006.01)
H01R 13/506 (2006.01) *H01R 13/518* (2006.01)
H01R 13/508 (2006.01) *H01R 13/74* (2006.01)

(21) International Application Number:
PCT/IB2013/054312

(22) International Filing Date:
24 May 2013 (24.05.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201220254953.7 31 May 2012 (31.05.2012) CN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

[Continued on next page]

(54) Title: ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

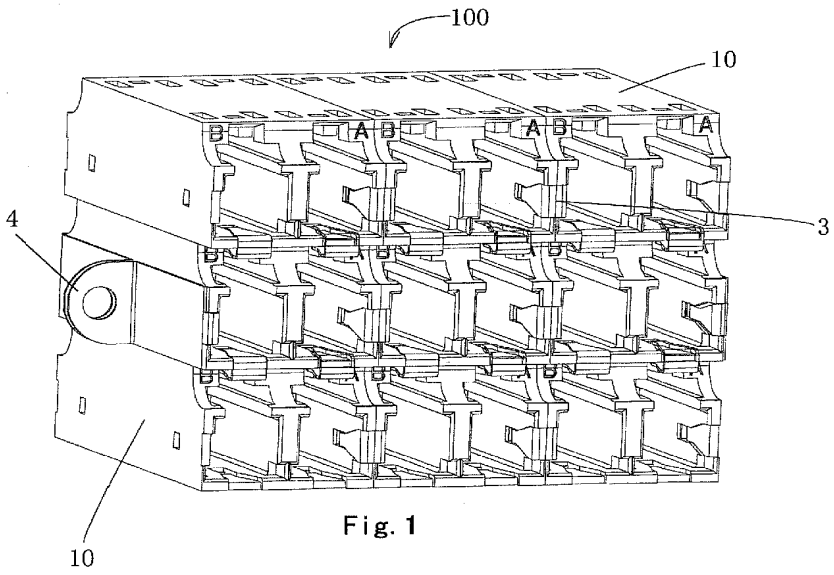


Fig. 1

(57) Abstract: An adapter assembly (100) for coupling with a plurality of connectors, comprising: a plurality of adapters (10) each including a housing, and at least one connection device (3). The housing is formed with at least one interfaces each for coupling with one of the connectors. Adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters are connected with each other by the at least one connection device in a snap-fit manner, so that the plurality of adapters are connected together. The plurality of adapters are connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

WO 2013/179197 A1

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Chinese Patent Application No.201220254953.7 filed on May 31, 2012 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an adapter for a connector applied in a data communication and telecommunication field, more particularly, relates to an adapter for a plug connector, and relates to a connector assembly having the adapter.

Description of the Related Art

In various fiber communication systems, a fiber optic connector is generally used to couple fibers of different fiber optic cables.

Fig.20 is an illustrative perspective view of two conventional fiber optic connectors 400. Fig.21 and Fig.22 show a conventional adapter 200 used with the conventional fiber optic connector 400.

As shown in Figs.20-22, each of the fiber optic connector 400 comprises a connector body 401. A fiber optic cable 300 is inserted from an end of the connector body 401. A ferrule 301 for the fiber of the fiber optic cable 300 is exposed outside from the other end of the connector body 401. The adapter 200 comprises four interfaces 201 and two splicing portions 202. The four interfaces 201 are formed in both ends of the adapter 200 in pairs and configured to receiving the inserted connectors 400, respectively. Each of the splicing portions 202 is disposed between a pair of interfaces 201 for splicing the ferrules 301 of the fiber optic connectors 400 inserted into the pair of interfaces 201. When the fiber optic connector 400 is inserted into the adapter 200, the connector body 401 is received in the interface 201, and the fiber ferrule 301 is inserted into the splicing portion 202 to be spliced with another ferrule 301. Furthermore, the above adapter may be used to receive an electrical connector for electrically connecting two electrical cables in some cases.

As for the above conventional adapter for a plug connector, a flange feature may be formed on the adapter, and the adapter may be fixed on a mounting panel by an installation hole formed in the flange feature. Also, an elastic metal clamp may be provided on the adapter, and the adapter may be fixed on the mounting panel by the elastic metal clamp.

However, the adapters must be individually and respectively mounted on the mounting panel by the flange feature or the elastic metal clamp. If it needs to mount a plurality of adapters on the mounting panel, a certain distance must be kept between two adjacent adapters. Accordingly, the plurality of adapters cannot be arranged on the mounting panel in a high density, decreasing the space utilization efficiency of the mounting panel and wasting the installation space of the mounting panel.

SUMMARY OF THE INVENTION

The present invention has been made to overcome or alleviate at least one aspect of the above mentioned disadvantages.

An object of the present invention is to provide an adapter assembly and a connector assembly having the adapter assembly, in which a plurality of adapters are connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

According to an aspect of the present invention, there is provided an adapter assembly for coupling with a plurality of connectors, comprising: a plurality of adapters each including a housing, and at least one connection device. The housing is formed with at least one interfaces each for coupling with one of the connectors. Adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters are connected with each other by the at least one connection device in a snap-fit manner, so that the plurality of adapters are connected together.

In the above mentioned adapter assembly, the housing of each of the adapters exhibits a substantively cuboid shape and comprises a first vertical wall, a second vertical wall opposite to the first vertical wall, a top wall and a bottom wall for defining the interface; and the connection device is configured to connect the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

In the above mentioned adapter assembly, the connection device is an elastic clamping member configured to clamp the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

In the above mentioned adapter assembly, each of the first vertical wall, the second vertical wall, the top wall and the bottom wall is formed with a recess in an inner side thereof; and the clamping member comprises a pair of clamping arms each constructed to substantively match with that of the recess to be received in the respective recess.

In the above mentioned adapter assembly, each of the clamping members comprises a pair of holding portions protruding toward each other at free ends of the pair of clamping arms; and a distal end of each of the recesses is formed with a through hole running through

the first vertical wall, the second vertical wall, the top wall and the bottom wall for receiving the respective holding portion therein.

In the above mentioned adapter assembly, each of the clamping arms exhibits a substantively triangle shape.

In the above mentioned adapter assembly, the adapter assembly further comprises at least one pair of installation members. One of the pair of installation members is mounted on the first vertical wall or the second vertical wall at the outmost side of a row of adapters. Each of the installation members comprises a body having a first end and a second end opposite to the first end, and the length of the body from the first end to the second end being equal to about an half of a longitudinal length of the adapter; an installation lug perpendicularly extending from the first end of the body; and an auxiliary clamping component formed by bending inward from the second end of the body by about 180 degrees and engaged in the recess of the vertical wall at the outmost side of the row of adapters.

In the above mentioned adapter assembly, an installation hole is provided in the installation lug; and an elastic clamping protrusion is formed on a free end of the auxiliary clamping component.

In the above mentioned adapter assembly, each of the connection devices comprises: at least one first horizontal connection member formed by extending from an outer side of the first vertical wall in a horizontal direction; and at least one second horizontal connection member formed on an outer side of the second vertical wall. The first and second horizontal connection members are configured to be engaged with each other in a snap-fit manner so as to connect the plurality of adapters side by side.

In the above mentioned adapter assembly, the first horizontal connection member comprising: a connection portion formed by extending from the outer side of the first vertical wall in the horizontal direction ; and an engagement portion formed by extending from an end of the connection portion in at least one direction parallel to the first vertical wall; The second horizontal connection member comprising: a receiving groove formed in the second vertical wall and configured to receive the engagement portion of the first horizontal connection member of another adapter; and a first opening communicated with the receiving groove to permit the engagement portion of the another adapter to be inserted into the receiving groove through the first opening.

In the above mentioned adapter assembly, the second horizontal connection member further comprises a second opening communicated with the receiving groove and configured to be fitted with the connection portion of the another adapter, so that the connection portion of the another adapter is allowed to pass through the second opening during inserting the engagement portion of the another adapter into the receiving groove.

In the above mentioned adapter assembly, the engagement portion has a substantively U-shape and comprises two elastic arms and a base connected between ends of the two

elastic arms; and the connection portion is connected between the base and the first vertical wall.

In the above mentioned adapter assembly, a projection is formed on an end of each of the elastic arms; and when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the first opening to block the engagement portion from being further inserted.

In the above mentioned adapter assembly, each of the adapters further comprises: two positioning portions formed by protruding from the second vertical wall and separate from the first opening by a predetermined distance to locate the projection of the another adapter between the second horizontal connection member and the positioning portions when the engagement portion of the another adapter is inserted into the receiving groove.

In the above mentioned adapter assembly, the second horizontal connection member further comprises a third opening communicated with the receiving groove and opposite to the first opening. A projection is formed on an end of each of the elastic arms. When the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove.

In the above mentioned adapter assembly, the first horizontal connection member is disposed in a notch formed in the first vertical wall; and the second horizontal connection member is protruded from the second vertical wall.

In the above mentioned adapter assembly, the adapter assembly further comprises a first installation member and a second installation member. The first installation member comprises a first plate body; and a first auxiliary connection member formed on a first side of the first plate body and configured the same as the first horizontal connection member so as to engage with the second horizontal connection member of one adapter at the outmost side of a row of adapters. The second installation member comprises a second plate body; and a second auxiliary connection member formed on a first side of the second plate body and configured the same as the second horizontal connection member so as to engage with the first horizontal connection member of another adapter at the outmost side of the row of adapters.

In the above mentioned adapter assembly, the first installation member further comprises a first installation lug formed on a second side of the first plate body; and the second installation member further comprises a second installation lug formed on a second side of the second plate body.

In the above mentioned adapter assembly, each of the connection devices comprises: first vertical connection members formed by extending from outer sides of the first and second vertical walls proximate to the top wall or the bottom wall; and second horizontal

connection members formed on outer sides of the first and second vertical walls proximate to the bottom wall or the top wall and configured to be inserted into and fixed in a slot in the first vertical connection member of another adapter. The plurality of adapters are stacked and engaged with each other in a vertical direction by engaging the first vertical connection members of one adapter and the second vertical connection members of the other adapter.

In the above mentioned adapter assembly, each of the first vertical connection members has a substantively U-shape, and comprises: a first arm formed by protruding outward from an upper end or a lower end of the outside of the first or second vertical wall; a second arm located above the top wall or the bottom wall and extending in a direction parallel to the first arm; and a base connected between the first and second arms to form the slot between the first and second arms. Each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the lower end or the upper end of the outside of the first or second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters.

In the above mentioned adapter assembly, a free end of the second arm is formed with a block portion extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms.

In the above mentioned adapter assembly, each of the connection devices comprises a vertical connection member having a substantively L-shape and a receiving groove. The vertical connection member comprises a base vertically extending outward from the top wall or the bottom wall; and a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall. The receiving groove is formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters.

In the above mentioned adapter assembly, each of the adapters further comprises installation members formed by protruding from the first and second vertical walls to mount the adapter assembly on a mounting panel.

According to another aspect of the present invention, there is provided a connector assembly, comprising: the adapter assembly according to the above various embodiments; and a plurality of connectors each coupled into one of the interfaces of the respective adapter.

In the above mentioned connector assembly, the connector is a fiber optic connector.

In various exemplary embodiments of the present invention, a plurality of adapters may be connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction, for example, two adjacent adapters may be removably connected together in a snap-fit manner, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

Fig.1 is an illustrative perspective view of an adapter assembly according to a first exemplary embodiment of the present invention;

Fig.2 is an illustrative perspective view of a row of adapters arranged in the middle of the adapter assembly shown in Fig.1;

Fig.3 is an exploded view of a portion of parts of the row of adapters of Fig.2 before being assembled;

Fig.4 is an illustrative perspective view of two rows of adapters arranged at the lower of the adapter assembly shown in Fig.1;

Fig.5 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.1;

Fig.6 is an illustrative perspective view of a connection device of the adapter assembly shown in Fig.1;

Fig.7 is an illustrative perspective view of an installation member of the adapter assembly shown in Fig.1;

Fig.8 is an illustrative perspective view of an adapter assembly according to a second exemplary embodiment of the present invention;

Fig.9 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.8 when viewing from a first side in a first orientation;

Fig.10 is another illustrative perspective view of the adapter of Fig.9 when viewing from the first side in a second orientation;

Fig.11 is an illustrative perspective view of the adapter of Fig.9 when viewing from a second side;

Fig.12 is a local enlarged cross section view of two adjacent connected adapters of the adapter assembly shown in Fig.8 along a line A-A of Fig.10 (or a line B-B of Fig.11), which shows an exemplary embodiment of a first connection form of a first connection member and a second connection member;

Fig.13 is an enlarged cross section view of an exemplary embodiment of another connection form of a first connection member and a second connection member;

Fig.14 is an illustrative perspective view of a first installation member of the adapter assembly shown in Fig.8, as viewed from an inner side;

Fig.15 is another illustrative perspective view of the first installation member of the adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.16 is an illustrative perspective view of a second installation member of the adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.17 is another illustrative perspective view of the second installation member of the

adapter assembly shown in Fig.8, as viewed from an outer side;

Fig.18 is an illustrative perspective view of an adapter assembly according to a third exemplary embodiment of the present invention;

Fig.19 is an illustrative perspective view of one adapter of the adapter assembly shown in Fig.18;

Fig.20 is an illustrative perspective view of two conventional fiber optic connectors;

Fig.21 is an illustrative perspective view of a conventional adapter coupled with the conventional fiber optic connectors shown in Fig.20; and

Fig.22 is a cross section view of the adapter of Fig.21 taken along a line C-C.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE IVENTION

Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

The adapter of the present invention may be used with the conventional fiber optic connectors (for example, a LC fiber optic connector) 400 shown in Fig.20 or a fiber optic connector (for example, for splicing, distributing or abutting two fibers of two fiber optic cables) disclosed in Chinese Patent Application No.201210037495.6 filed by the applicant of the present invention. The adapter assembly for coupling with, for example, a plurality of connectors of Fig.20 according to various exemplary embodiments of the present invention comprises a plurality of adapters 10 each including a housing 1 made of, for example, plastic material ; and at least one connection device. The housing 1 may be formed with at least one interfaces 2 each for coupling with one of the connectors. Adjacent walls of the interfaces 2 of two adjacent adapters 10 of the plurality of adapters 10 are connected with each other by the at least one connection device 3 in a snap-fit manner, so that the plurality of adapters 10 are connected together. For example, the plurality of adapters 10 may be connected together in order in a manner of side by side in a horizontal direction and/or stacked in a vertical direction.

Figs.1-7 show an illustrative perspective view of an adapter assembly 100 according to a first exemplary embodiment of the present invention.

As shown in Figs.1-7, the adapter assembly 100 may comprise nine adapters 10 arranged in an array of 3 rows and 3 columns. The housing 1 of each of the adapters 10 may exhibit a substantively cuboid shape and comprise a first vertical wall 11, a second vertical wall 12 opposite to the first vertical wall, a top wall 13 and a bottom wall 14 for defining the interface 2. The connection device is configured to connect the adjacent first and second

vertical walls 11, 12 and/or the adjacent top and bottom walls 13, 14 of two adjacent adapters of the plurality of adapters 10. Furthermore, the connection device may be an elastic clamping member 3 configured to clamp the adjacent first and second vertical walls 11, 12 and/or the adjacent top and bottom walls 13, 14 of two adjacent adapters of the plurality of adapters 10.

In another exemplary embodiment, as shown in Fig.5, each of the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14 is formed with a recess 111, 121, 131 or 141 in an inner side thereof, respectively. The recesses 111, 121, 131, 141 may have a substantively same shape. The clamping member 3 comprises a pair of clamping arms 30 each having a shape substantively matched with that of a respective recess 111, 121, 131 or 141, so that the pair of clamping arms 30are received in two respective recess 111, 121, 131, 141. For example, as shown in Figs.2-3, two clamping arms 30 of the clamping member 3 may be received in the recess 121 of the second vertical wall 12 of a first adapter and the recess 111 of the first vertical wall 11 of a second adapter in a same row of adapters 10. In this way, the plurality of adapters 10 can be connected and fixed together in order in a manner of side by side in a horizontal direction. Furthermore, as shown in Fig.4, two clamping arms 30 of the clamping member 3 may be received in the recess 141 of the bottom wall 14 of an upper adapter and the recess 131 of the top wall 13 of a lower adapter in a same column of adapters 10. In this way, the plurality of adapters 10 can be stacked and fixed together in a vertical direction. As shown in Fig. 4, each of the clamping arms 30 may exhibit a substantively triangle shape to facilitate the insertion of the clamping member 3 into the respective recesses. In an exemplary embodiment, the recess 131 in the top wall 13 may be formed in a receiving groove for receiving, for example, a locking member of the connector 400 shown in Fig.20.

Since each of the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14 is formed with a recess 111, 121, 131 or 141 in the inner side thereof, when two adapters 10 are placed together either by arranging them side by side in a direction or by stacking them in the vertical direction, there are always two walls abutting against each other, for example, the second vertical wall 12 of an adapter and the first vertical wall 11 of another adapter abut against each other, or the bottom wall 14 of an adapter and the top wall 13 of another adapter abut against each other. Furthermore, the recesses 121, 111 or the recesses 141, 131 formed in inner surfaces of the walls are juxtaposed relative to each other, so that the clamping arms 30 of the clamping member 3 may be received in the recesses to connect two adjacent adapters 10 together.

Thus, the adapters of the first exemplary embodiment of can be arranged side by side and/or stacked with one over the other by means of the clamping member 3, saving the space for mounting the adapters 10. In a case where the adapters 10 of the adapter assembly 100 of the present invention are stacked with one over the other in the vertical direction, it is especially adapted to the connectors disclosed in Chinese Patent Application

No.201210037495.6 by the applicant of the present invention.

In a further exemplary embodiment, each of the clamping members 3 comprises a pair of holding portions 301 protruding toward each other at free ends of the pair of clamping arms 30. At a distal end of each of recesses is formed with a through hole 15 running through the first vertical wall 11, the second vertical wall 12, the top wall 13 and the bottom wall 14, and each of the holding portions 301 can be received in the respective through hole 15. In this way, the protruding holding portion 301 can enter into the through hole 15 during pushing the clamping member 3 into the recesses, so that the clamping member 3 can be firmly engaged in the recesses. Alternatively, the through hole 15 may be replaced with a notch running through a part of the wall thickness of the housing 1 (or not running through the wall thickness of the housing 1) as long as the notch is deeper than the other parts of the recess.

The adapter assembly according to the first exemplary embodiment of the present invention may further comprise at least one pair of installation members 4. One of the pair of installation members 4 is mounted on the first vertical wall 11 or the second vertical wall 12 at the outmost side of a row of adapters 10. As shown in Fig.7, each of the installation members 4 comprises an elongated body 41 made of, for example, a plate material, an installation lug 42 and an auxiliary clamping component 43. The body 41 has a first end and a second end opposite to the first end, and the length of the body 41 from the first end to the second end is equal to about an half of a longitudinal length of the adapter 10. The installation lug 42 perpendicularly extends from the first end of the body 41. The auxiliary clamping component 43 is formed by bending inward from the second end of the body 41 by about 180 degrees. With this configuration, the auxiliary clamping component 43 is engaged in the recess 111 or 121 of the first vertical wall 11 or the second vertical wall 12 at the outmost side of the row of adapters 10. Also, an installation hole 421 is formed in the installation lug 42. An elastic clamping protrusion 431 for fitting in the through hole 15 is formed on a free end of the auxiliary clamping component 43. Since the length of the body 41 is equal to about an half of the longitudinal length of the adapter 10, two installation members 4 can be mounted on the first vertical wall 11 or the second vertical wall 12 from both ends thereof, respectively, and the installation lugs 42 of two installation members 4 mounted on a same outermost vertical wall abut against each other, so that the entire adapter assembly 100 can be easily mounted on a mounting frame with the installation members 4 as well as connection pieces, for example, bolts or the like which pass through the through holes 15.

Figs.8-17 show an illustrative perspective view of an adapter assembly 100' according to a second exemplary embodiment of the present invention.

In the adapter assembly 100' of the second exemplary embodiment, the housing 1' of each of the adapters 10' may exhibit a substantively cuboid shape and comprise a first vertical wall 11', a second vertical wall 12' opposite to the first vertical wall, a top wall 13'

and a bottom wall 14' for defining the interface 2'. The connection device is configured to connect the adjacent first and second vertical walls 11', 12' of two adjacent adapters 10' of the plurality of adapters 10'. In this way, a plurality of adapters 10' can be fixed together side by side in the horizontal direction.

Furthermore, each of the connection devices comprises at least one first horizontal connection member 31 (please refer to Figs.9-10) and at least one second horizontal connection member 32 (please refer to Fig.11). The first horizontal connection member 31 is formed by extending from an outer side of the first vertical wall 11' in a horizontal direction. The second horizontal connection member 32' is formed on an outer side of the second vertical wall 12'. The first horizontal connection members 31 of one adapter and the second horizontal connection members 32 of the other adapter are configured to be capable of being engaged with each other in a snap-fit manner so as to connect the plurality of adapters 10' side by side in the horizontal direction.

Referring to Figs.9-10, 12, each of the first horizontal connection members 31 comprises a connection portion 311 (please refer to Fig.12) and an engagement portion 312. The connection portion 311 is formed by extending from the outer side of the first vertical wall 11' in the horizontal direction. The engagement portion 312 is formed by extending from an end of the connection portion 311 in at least one direction (for example, as shown in Figs.9, 12, a forward direction, a rearward direction and an upward direction) parallel to the first vertical wall 11'.

Referring to Figs.11-12, each of the second horizontal connection members 32 comprises a receiving groove 321 and a first opening 322 located at an upper end of the receiving groove 321. The receiving groove 321 is formed in the second vertical wall 12' and configured to receive the engagement portion 312 of the first horizontal connection member 31 of another adapter. The first opening 322 is communicated with the receiving groove 321 to permit the engagement portion 312 of the another adapter to be downwardly inserted into the receiving groove 321 through the first opening 322.

Furthermore, the second horizontal connection member 32 may further comprise a second opening 323 extending in the vertical direction. As shown in Figs.11-12, the second opening 323 is communicated with the receiving groove 321 and configured to be fitted with the connection portion 311 of the another adapter to allow the connection portion 311 of the another adapter to pass through the second opening 323 during inserting the engagement portion 312 of the another adapter into the receiving groove 321. In the cross section view of Fig.12, the receiving groove 321 is formed by two substantially L-shaped structures. Two walls of the two L-shaped structures are formed by extending from the second vertical wall 12', the other two walls of the two L-shaped structures extend toward each other to form the second opening 323. On the other hand, as shown in Fig. 9, the engagement portion 312 has a substantively U-shape and comprises two elastic arms 313 and a base 314 connected between ends of the two elastic arms 313. The connection portion 311 is connected between

the base 314 and the first vertical wall 11', as shown in Fig. 13.

Furthermore, a projection 315 is formed on an end of each of the elastic arms 313. When the engagement portion 312 of the another adapter acted as an insertion end is downwardly inserted into the receiving groove 321 through the first opening 322, the projection 315 of the another adapter is exposed outside the first opening 322 to block the engagement portion 312 from being further inserted.

In an exemplary embodiment, as shown in Fig. 11, each of the adapters 10' may further comprises two positioning portions 5. The two positioning portions 5 are formed by protruding from the second vertical wall 12' and separate from the first opening 322 by a predetermined distance to locate the projection 315 of the another adapter between the second horizontal connection member 32 and the positioning portions 5 when the engagement portion 312 of the another adapter is inserted into the receiving groove 321. More specifically, during engaging the engagement portion 312 of the another adapter is inserted into the receiving groove 321, the base 314 and the elastic arms 313 firstly pass through between the two positioning portions 5. After passing through between the two positioning portions 5, the projection 315 is located between the upper end of the second horizontal connection member 32 and the positioning portions 5. In this way, the projection 315 can block the engagement portion 312 from being further downward inserted or being upwardly disengaged from the receiving groove 321. The upper and lower surfaces of the projection 315 may be configured to be sloped guide surfaces, so that the projection 315 can overcome the block of the second horizontal connection member 32 or the positioning portions 5 through the sloped guide surfaces under a relatively larger force.

The above described engagement portion 312 is a U-shaped member with an opening upwardly as shown in the embodiment of Figs.9-10. But the present invention is not limited to this, in another embodiment, the engagement portion 312 may be a U-shaped member with an opening downwardly and a connection portion connected to the uppermost end of a base. In this case, the second opening may be omitted.

In an exemplary embodiment, the second horizontal connection member 32 may further comprise a third opening (not shown) communicated with the receiving groove 321 and opposite to the first opening 322. A projection is formed on an end of each of the elastic arms. When the end of the elastic arm of the another adapter as an insertion end is downwardly inserted into the receiving groove 321, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove 321.

In an exemplary embodiment, the first horizontal connection member 31 is disposed in a notch 112 formed in the first vertical wall 11', and the second horizontal connection member 32 is protruded from the second vertical wall 12'. In this way, when the first and second horizontal connection members 31, 32 are connected together, the first and second vertical walls 11', 12' of two adjacent adapters 10' abut against each other, saving the

mounting space.

In an alternative embodiment, as shown in Fig.13, both the connection portion 311' and the engagement portion 312' of the first horizontal connection member are provided beyond the outer surface of the first vertical wall 11A. The receiving groove 321' of the second horizontal connection member is formed in the second vertical wall 12A, that is, the entire second horizontal connection member is provided not beyond the outer surface of the second vertical wall 12A. In this way, when the first and second horizontal connection members are connected together, the first and second vertical walls 11A, 12B of two adjacent adapters 10' also can abut against each other, thereby saving the mounting space of the adapters.

As shown in Figs.14-17, the adapter assembly 100' according to the second exemplary embodiment of the present invention may further comprise a first installation member 6 and a second installation member 7. The first installation member 6 comprises a first plate body 61 and a first auxiliary connection member 62. The first auxiliary connection member 62 is formed on a first side of the first plate body 61 and configured the same as the first horizontal connection member 31 so as to engage with the second horizontal connection member 32 of one adapter at the outmost side of a row of adapters. In this way, the first installation member 6 can be mounted on the adapter at the outmost side of the row of adapters. The second installation member 7 comprises a second plate body 71 and a second auxiliary connection member 72. The second auxiliary connection member 72 is formed on a first side of the second plate body 71 and configured the same as the second horizontal connection member 32 so as to engage with the first horizontal connection member 31 of another adapter at the outmost side of the row of adapters. In this way, the second installation member 7 can be mounted on the another adapter at the outmost side of the row of adapters.

Furthermore, the first installation member 6 may further comprise a first installation lug 63 formed on a second side of the first plate body 61, and the second installation member may further comprise a second installation lug 73 formed on a second side of the second plate body 71. Each of the first and second installation lugs 63, 73 is provided with at least one installation hole 64, 74, so that the entire adapter assembly 100' can be mounted on the mounting panel (not shown, please refer to Fig.11) by means of connection pieces, for example, bolts or the like.

Figs.18-19 show an illustrative perspective view of an adapter assembly 100'' according to a third exemplary embodiment of the present invention.

As shown in Figs.18-19, the adapter assembly 100'' comprises a plurality of adapters 10''. Each of the adapters 10'' comprises two first vertical connection members 31' and two second vertical connection members 32'. The two first vertical connection members 31' are provided on upper ends outside the first vertical wall 11'' and the second vertical wall, respectively, and the two second vertical connection members 32' are provided on lower

ends outside the first vertical wall 11'' and the second vertical wall, respectively. The two first vertical connection members 31' and the two second vertical connection members 32' can be engaged together, respectively, so that the plurality of adapters 10'' can be stacked one over the other in the vertical direction.

Furthermore, in the adapter assembly 100'', each of the first vertical connection members 31' has a substantively U-shape and comprises a first arm 313', a second arm 314' and a base 315'. The first arm 313' is formed by protruding outward from the upper end of the outside of the first vertical wall 11'' or the second vertical wall. The second arm 314' is located above the top wall 13'' and extends in a direction parallel to the first arm 313'. The base 315' is connected between the first and second arms 313', 314', so that a slot is formed between the first and second arms 313', 314'. Each of the second vertical connection members 32' comprises an elongated protrusion formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms 313', 314' of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm 313' is flush with the upper surface of the top wall 13'', and the lower side of the elongated protrusion is flush with the lower surface of the bottom wall. In this way, when two adjacent adapters are stacked and engaged in the vertical direction, the bottom wall of the upper adapter can abut against the top wall of the lower adapter, thereby saving the mounting space of the entire adapter assembly.

In a further embodiment, a free end of the second arm 314' is formed with a block portion 316' extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms 313', 314'. Also, each of the adapters 10'' further comprises an installation members 8 protruding from the first vertical wall 11'' and the second vertical wall to mount the entire adapter assembly on a mounting panel 101, as shown in Fig. 19.

In an alternative embodiment, each of the first vertical connection members has a substantively U-shape and comprises: a first arm formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall; a second arm located below the bottom wall and extending in a direction parallel to the first arm; and a base connected between the first and second arms to form a slot between the first and second arms. Each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the upper end of the outside of the first vertical wall or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm is flush with the lower surface of the bottom wall, and the upper side of the elongated protrusion is flush with the upper surface of the top wall.

In another alternative embodiment, each of the connection devices comprises a vertical

connection member and a receiving groove. The vertical connection member has a substantively L-shape and comprises: a base vertically extending outward from the top wall or the bottom wall; and a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall. The receiving groove is formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters together in the vertical direction.

According to an exemplary embodiment of another aspect of the present invention, there is provided a connector assembly comprising: an adapter assembly according to the above mentioned embodiments; and a plurality of connectors each coupled into one of the interfaces of the respective adapter. Furthermore, the connector may be a fiber optic connector, for example, a LC fiber optic connector.

According to various exemplary embodiments of the present invention, a plurality of adapters may be connected together in order in a manner of side by side in a horizontal direction and/or stacked with one on the other in a vertical direction, for example, two adjacent adapters may be removably connected together in a snap-fit manner, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally. The entire adapter assembly may be mounted on the mounting panel by means of the installation members. The outer connection features on the adapters may be same with each other, and the inner features of the adapter may be same as those of the conventional adapter, so that the adapters of the present invention may be adapted to couple with the standard LC fiber optic connectors in a high density to optimally utilize the space above a mounting panel. At the same time, the adapters can be assembled in a modularization manner to ensure that an appreciate number of adapters can be quickly assembled together according to various requirements from customers.

Although it has been described the connector of the present invention by using the optical cable as an object to be spliced in the above mentioned embodiments, it should be appreciated for those skilled in this arts that the connector of the present invention may be used to couple two electric cables in some other embodiments. More particularly, for example, in various network communication terminations, such as computer, router, server, digital switch, and so on, having a plug connector and a receptacle connector, the plug connector may be provided with the locking mechanism having a slope arm, a driving arm and a locking protrusion according to the present invention.

It should be appreciated for those skilled in this art that the above embodiments are intended to be illustrated, and not restrictive. For example, many modifications may be made to the above embodiments by those skilled in this art, and various features described in different embodiments may be freely used in combination with each other without conflict in configuration or principle of the present invention, so that more kinds of connector and adapter assemblies can be achieved with overcoming the technical problem of the present invention.

Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

What is claimed is,

1. An adapter assembly (100, 100', 100") for coupling with a plurality of connectors, comprising:

a plurality of adapters (10, 10', 10") each including a housing (1, 1', 1"), the housing being formed with at least one interfaces (2, 2', 2") each for coupling with one of the plurality of connectors; and

at least one connection device each configured to connect adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters in a snap-fit manner, so that the plurality of adapters are connected together.

2. The adapter assembly according to claim 1,

wherein the housing of each of the adapters exhibits a substantively cuboid shape and comprises a first vertical wall (11), a second vertical wall (12) opposite to the first vertical wall, a top wall (13) and a bottom wall (14) for defining the interface (2); and

wherein the connection device is configured to connect the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

3. The adapter assembly according to claim 2,

the connection device is an elastic clamping member configured to clamp the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

4. The adapter assembly according to claim 3,

wherein each of the first vertical wall, the second vertical wall, the top wall and the bottom wall is formed with a recess (111, 121, 131, 141) in an inner side thereof; and

wherein the clamping member comprises a pair of clamping arms (30) each constructed to substantively match with that of the recess to be received in the respective recess.

5. The adapter assembly according to claim 4,

wherein each of the clamping members comprises a pair of holding portions (301) protruding toward each other at free ends of the pair of clamping arms; and

wherein a distal end of each of the recesses is formed with a through hole (15) running through the first vertical wall, the second vertical wall, the top wall and the bottom wall for receiving the respective holding portion therein.

6. The adapter assembly according to claim 4,

wherein each of the clamping arms exhibits a substantively triangle shape.

7. The adapter assembly according to any one of claims 3-6, further comprising at least one pair of installation members (4),

wherein one of the pair of installation members is mounted on the first vertical wall or the second vertical wall at the outmost side of a row of adapters,

each of the installation members comprises:

a body (41) having a first end and a second end opposite to the first end, and the length of the body from the first end to the second end being equal to about an half of a longitudinal length of the adapter;

an installation lug (42) perpendicularly extending from the first end of the body; and

an auxiliary clamping component (43) formed by bending inward from the second end of the body by about 180 degrees and engaged in the recess of the vertical wall at the outmost side of the row of adapters.

8. The adapter assembly according to claim 7,

wherein an installation hole (421) is provided in the installation lug; and

wherein an elastic clamping protrusion (431) is formed on a free end of the auxiliary clamping component.

9. The adapter assembly according to claim 2,

wherein each of the connection devices comprises:

at least one first horizontal connection member (31) formed by extending from an outer side of the first vertical wall in a horizontal direction; and

at least one second horizontal connection member (32) formed on an outer side of the second vertical wall,

wherein the first and second horizontal connection members are configured to be engaged with each other in a snap-fit manner so as to connect the plurality of adapters side by side.

10. The adapter assembly according to claim 9,

wherein the first horizontal connection member comprising:

a connection portion (311) formed by extending from the outer side of the first vertical wall in the horizontal direction ; and

an engagement portion (312) formed by extending from an end of the connection portion in at least one direction parallel to the first vertical wall,

wherein the second horizontal connection member comprising:

a receiving groove (321) formed in the second vertical wall and configured to receive the engagement portion of the first horizontal connection member of another

adapter; and

a first opening (322) communicated with the receiving groove to permit the engagement portion of the another adapter to be inserted into the receiving groove through the first opening.

11. The adapter assembly according to claim 10, wherein the second horizontal connection member further comprises a second opening (323) communicated with the receiving groove and configured to be fitted with the connection portion of the another adapter, so that the connection portion of the another adapter is allowed to pass through the second opening during inserting the engagement portion of the another adapter into the receiving groove.

12. The adapter assembly according to claim 11,

wherein the engagement portion has a substantively U-shape and comprises two elastic arms (313) and a base (314) connected between ends of the two elastic arms; and

wherein the connection portion is connected between the base and the first vertical wall.

13. The adapter assembly according to claim 12,

wherein a projection (315) is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the first opening to block the engagement portion from being further inserted.

14. The adapter assembly according to claim 13, wherein each of the adapters further comprises:

two positioning portions (5) formed by protruding from the second vertical wall and separate from the first opening by a predetermined distance to locate the projection of the another adapter between the second horizontal connection member and the positioning portions when the engagement portion of the another adapter is inserted into the receiving groove.

15. The adapter assembly according to claim 12,

wherein the second horizontal connection member further comprises a third opening communicated with the receiving groove and opposite to the first opening,

wherein a projection is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove.

16. The adapter assembly according to any one of claims 9-15,
wherein the first horizontal connection member is disposed in a notch formed in the first vertical wall; and
wherein the second horizontal connection member is protruded from the second vertical wall.

17. The adapter assembly according to claim 16, further comprising:
a first installation member (6) comprising:
a first plate body (61); and
a first auxiliary connection member (62) formed on a first side of the first plate body and configured the same as the first horizontal connection member so as to engage with the second horizontal connection member of one adapter at the outmost side of a row of adapters,
a second installation member (7) comprising:
a second plate body (71); and
a second auxiliary connection member (72) formed on a first side of the second plate body and configured the same as the second horizontal connection member so as to engage with the first horizontal connection member of another adapter at the outmost side of the row of adapters.

18. The adapter assembly according to claim 17,
wherein the first installation member further comprises a first installation lug (63) formed on a second side of the first plate body; and
wherein the second installation member further comprises a second installation lug (73) formed on a second side of the second plate body.

20. The adapter assembly according to claim 2,
wherein each of the connection devices comprises:
first vertical connection members (31') formed by extending from outer sides of the first and second vertical walls proximate to the top wall or the bottom wall; and
second horizontal connection members (32') formed on outer sides of the first and second vertical walls proximate to the bottom wall or the top wall and configured to be inserted into and fixed in a slot in the first vertical connection member of another adapter,
wherein the plurality of adapters are stacked and engaged with each other in a vertical direction by engaging the first vertical connection members of one adapter and the second vertical connection members of the other adapter.

21. The adapter assembly according to claim 20,

wherein each of the first vertical connection members has a substantively U-shape, and comprises:

a first arm (313') formed by protruding outward from an upper end or a lower end of the outside of the first or second vertical wall;

a second arm (314') located above the top wall or the bottom wall and extending in a direction parallel to the first arm; and

a base connected between the first and second arms to form a slot between the first and second arms,

wherein each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the lower end or the upper end of the outside of the first or second vertical wall, and

wherein the elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters.

22. The adapter assembly according to claim 21,

wherein a free end of the second arm is formed with a block portion (316') extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms.

23. The adapter assembly according to claim 2, wherein each of the connection devices comprises:

a vertical connection member having a substantively L-shape, and comprising:

a base vertically extending outward from the top wall or the bottom wall; and

a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall, and

a receiving groove formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters.

24. The adapter assembly according to any one of claims 20-23, wherein each of the adapters further comprises installation members (8) formed by protruding from the first and second vertical walls to mount the adapter assembly on a mounting panel.

25. A connector assembly, comprising:

an adapter assembly according to any one of claims 1-24; and

a plurality of connectors each coupled into one of the interfaces of the respective adapter.

26. The connector assembly according to claim 25, wherein the connector is a fiber optic

connector.

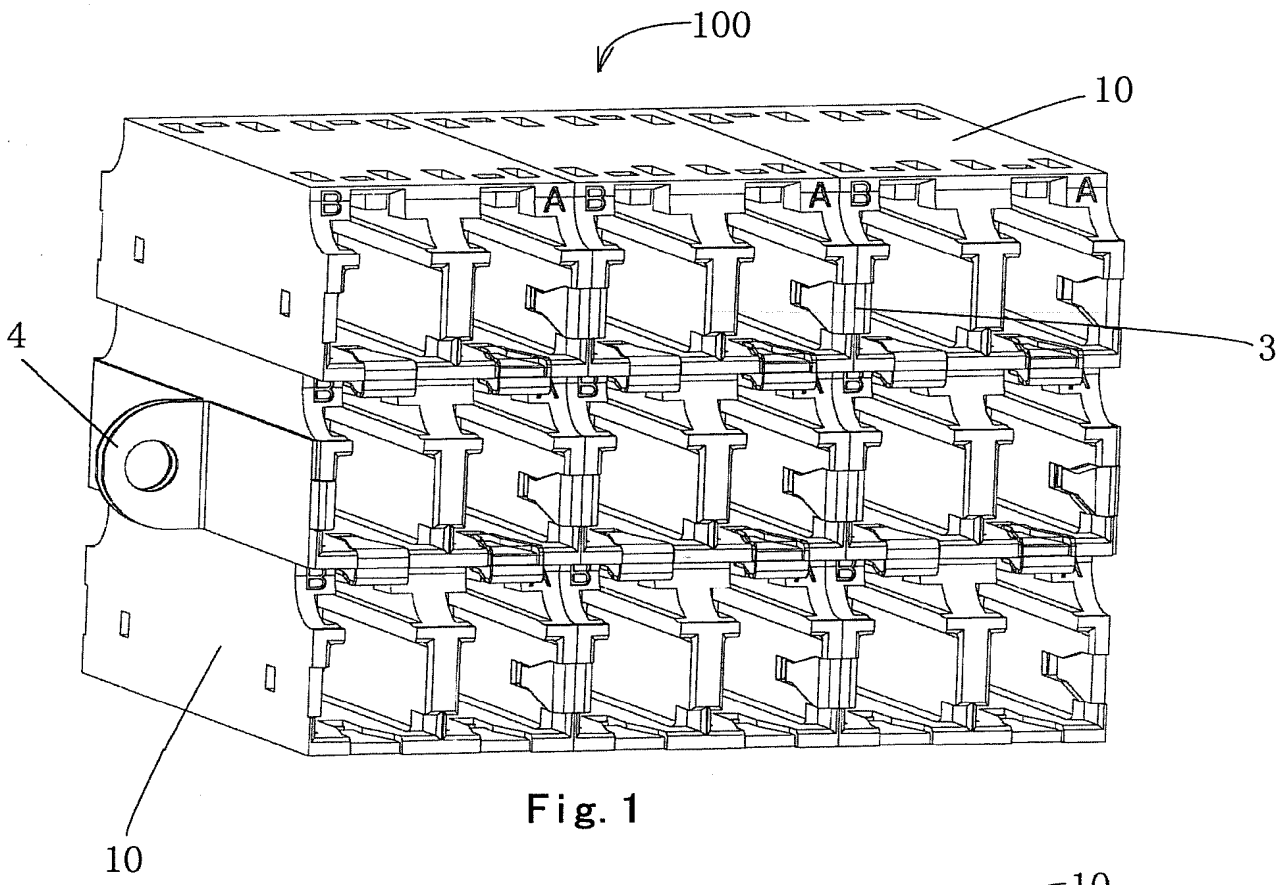


Fig. 1

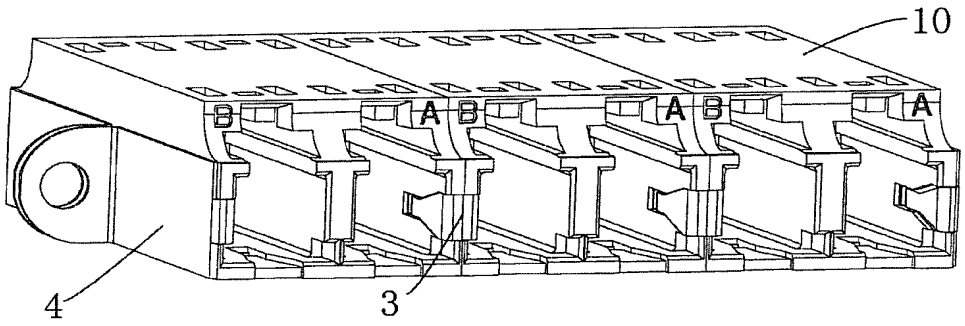


Fig. 2

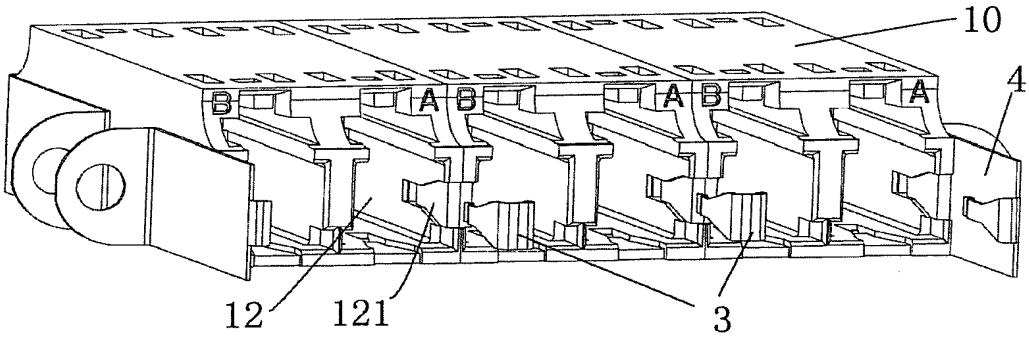


Fig. 3

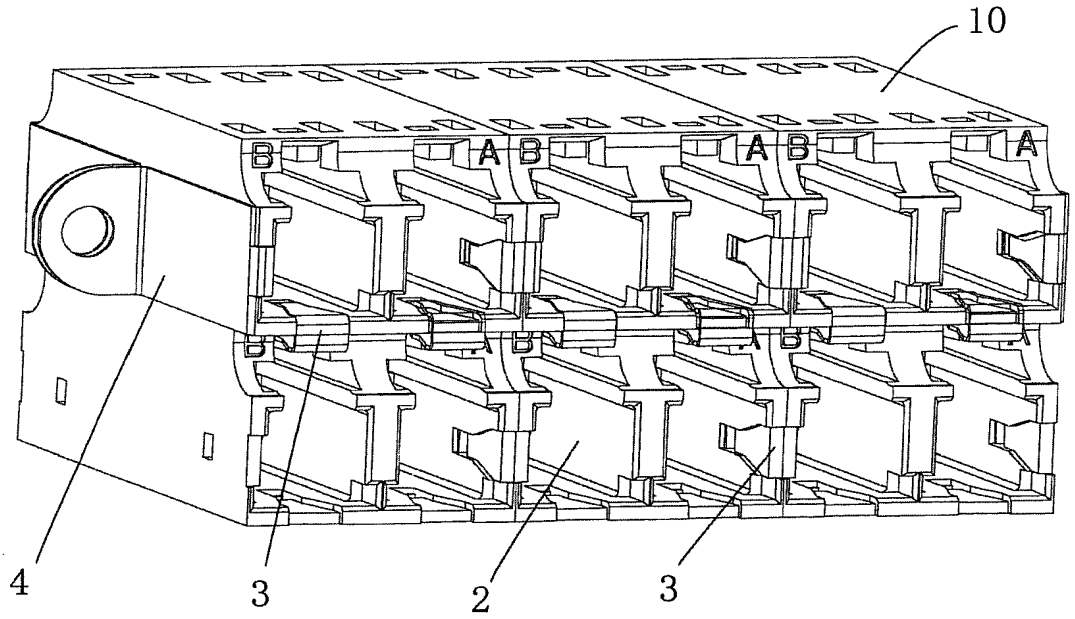


Fig. 4

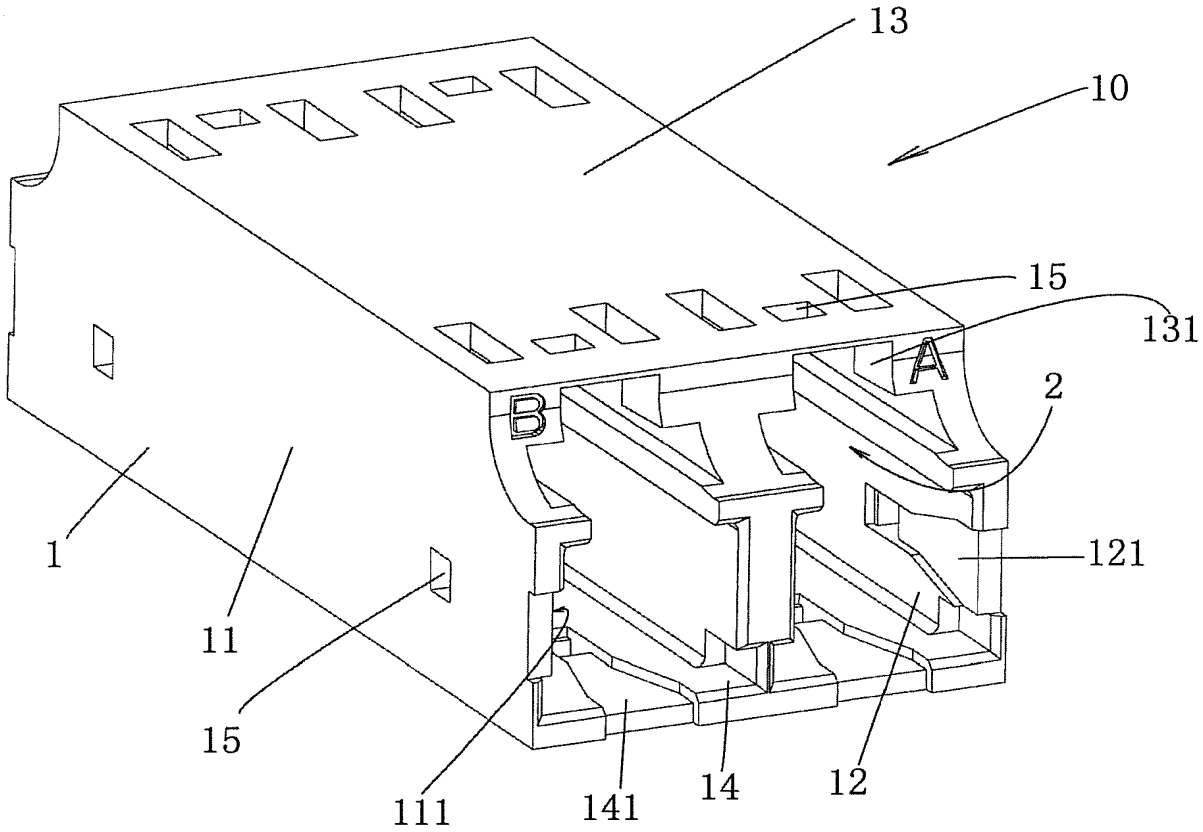


Fig. 5

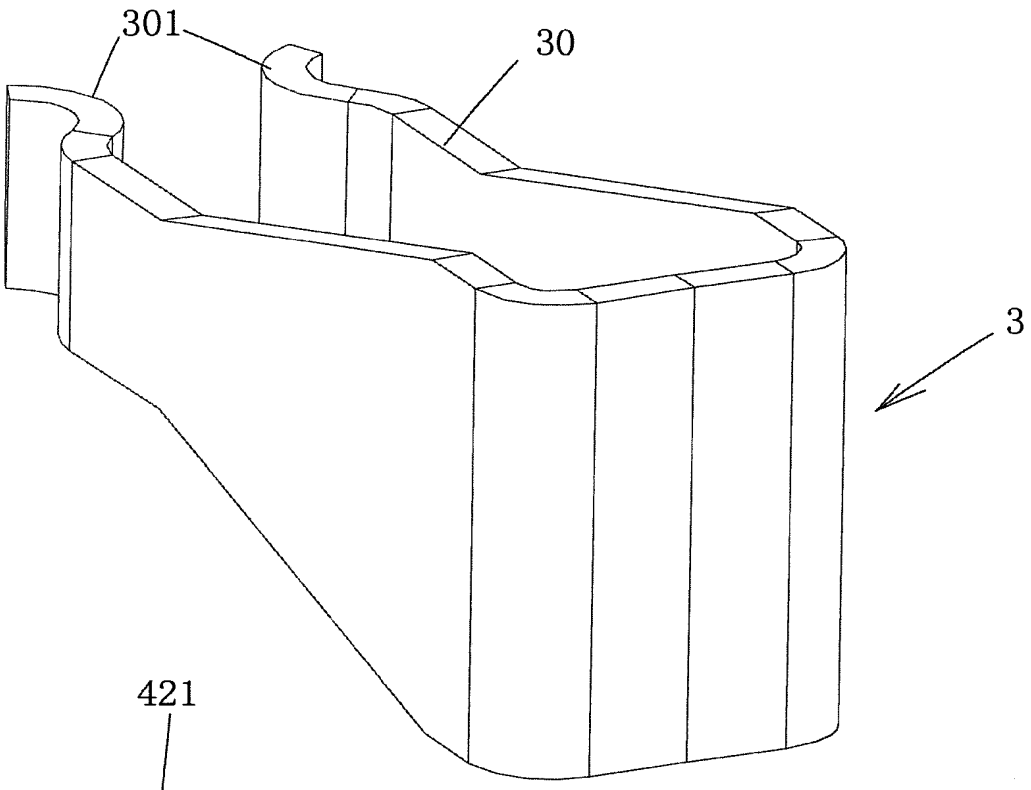


Fig. 6

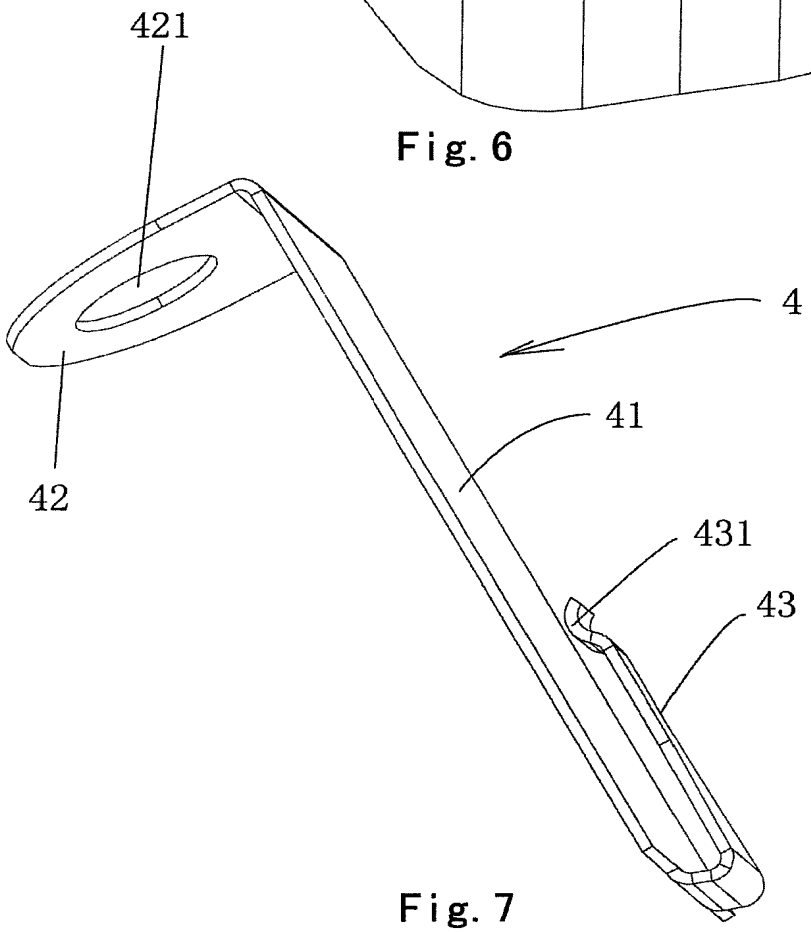


Fig. 7

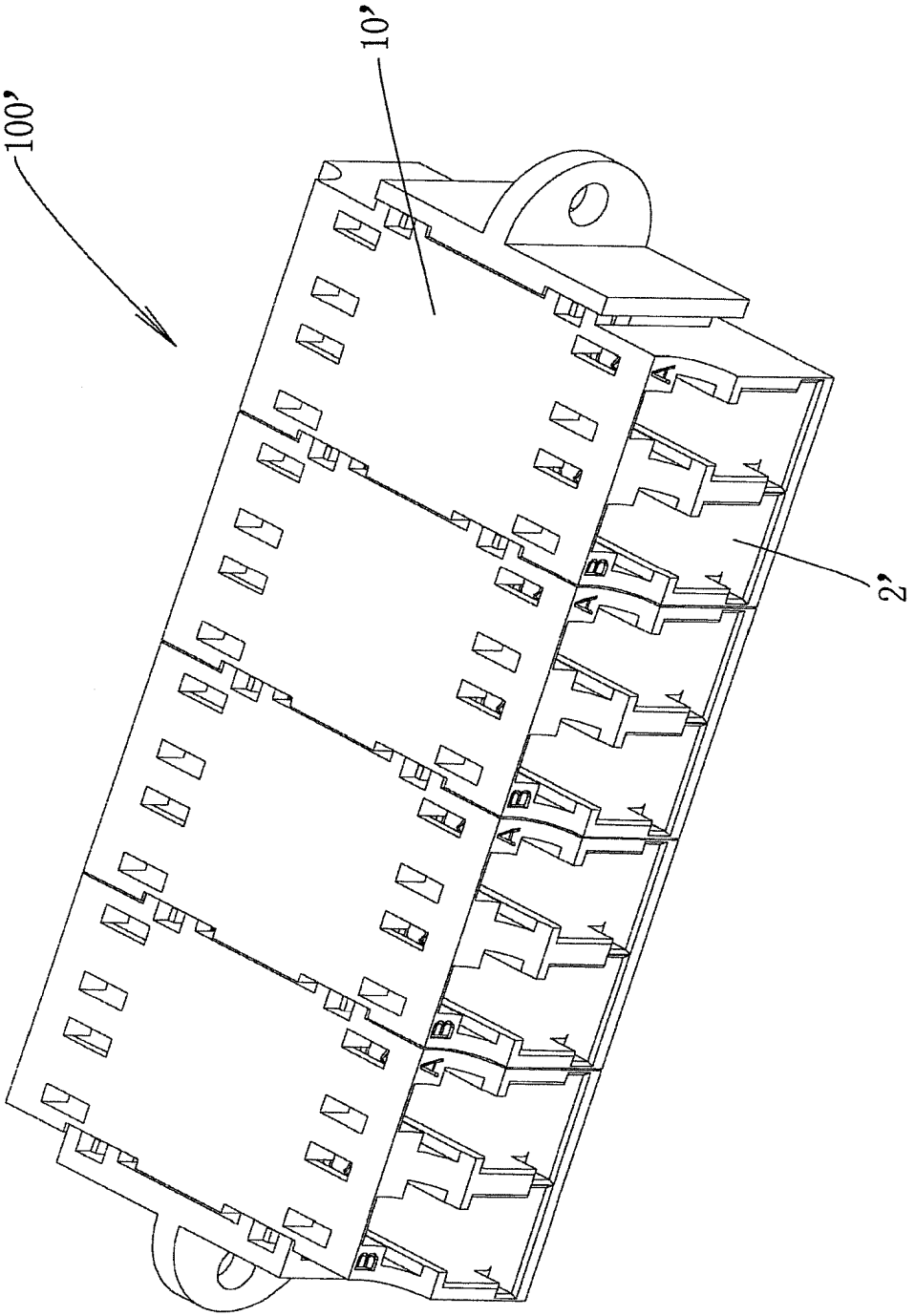


Fig. 8

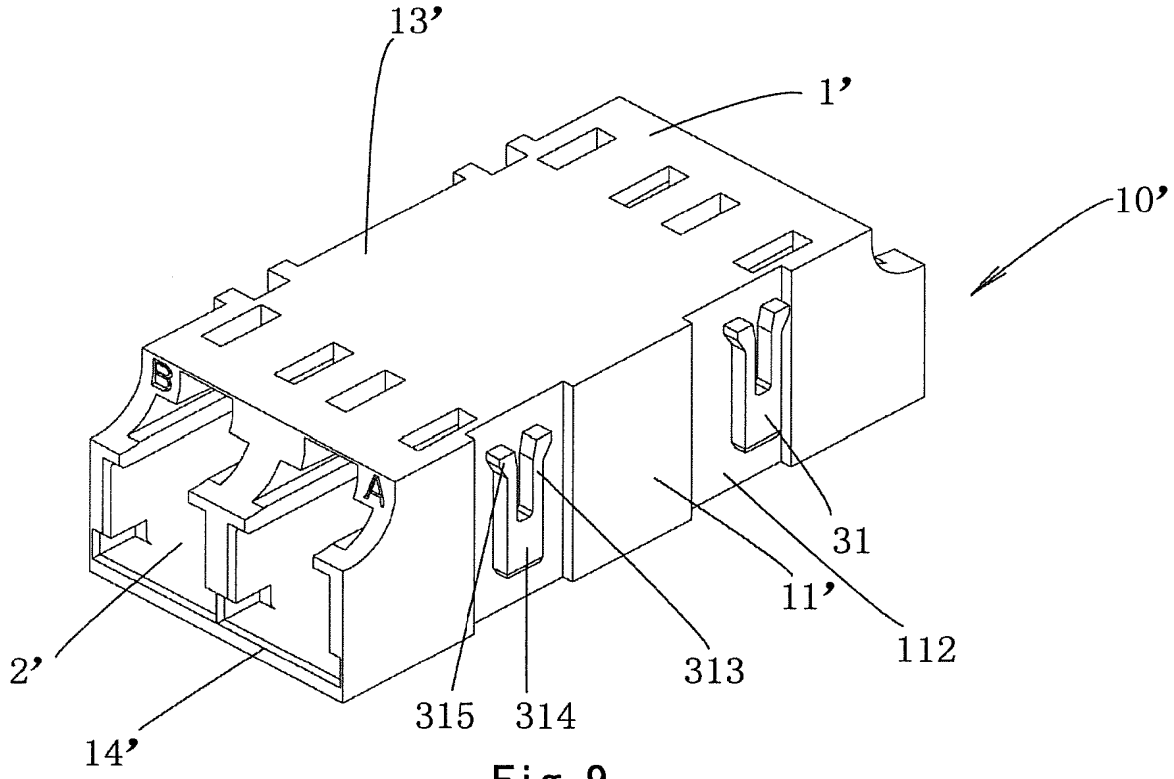


Fig. 9

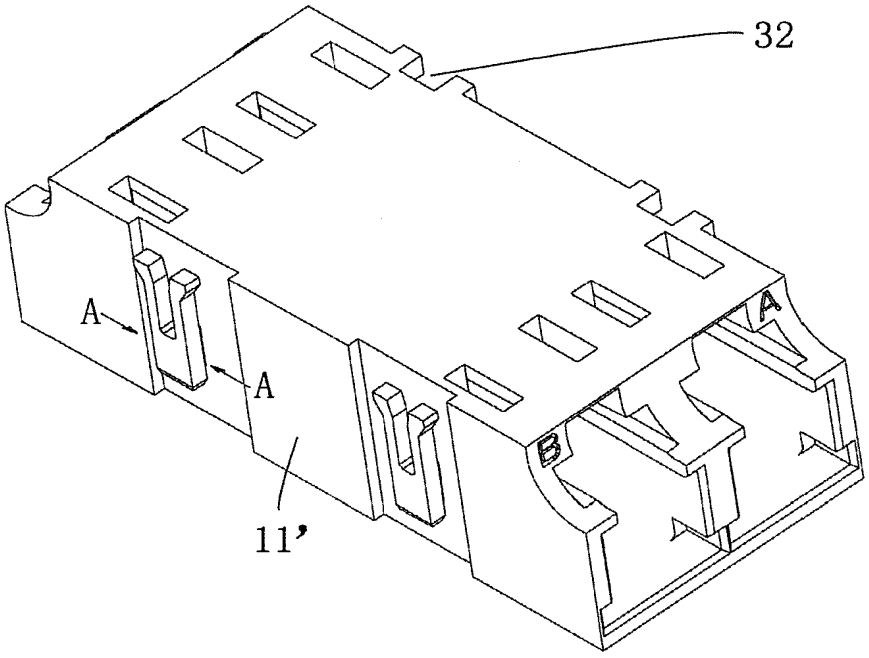


Fig. 10

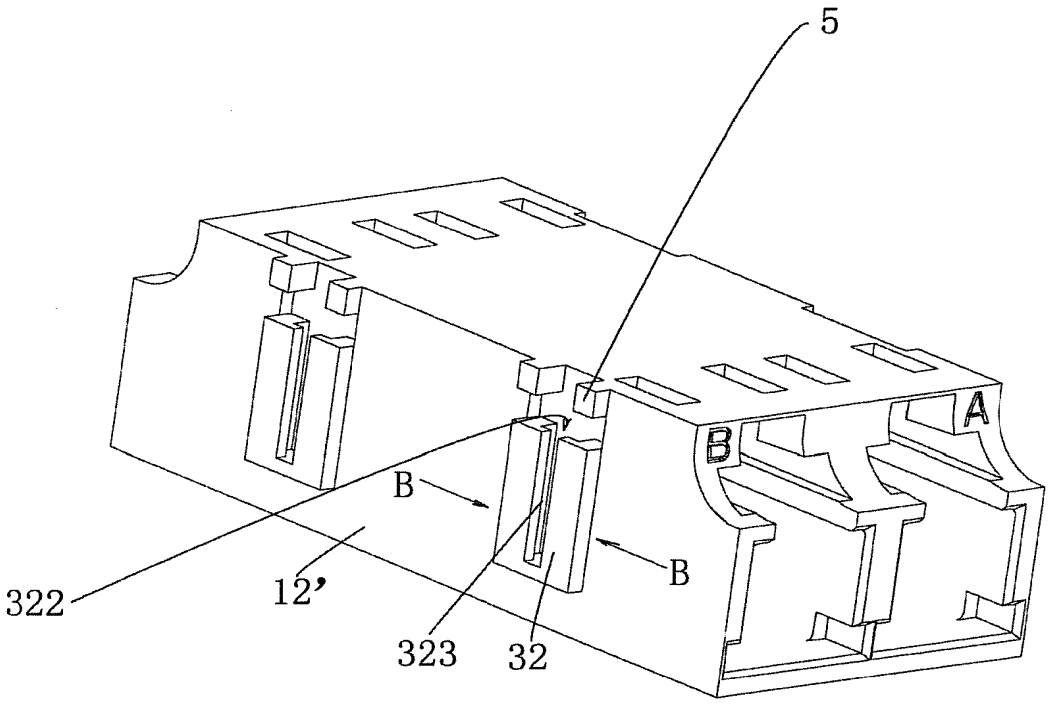


Fig. 11

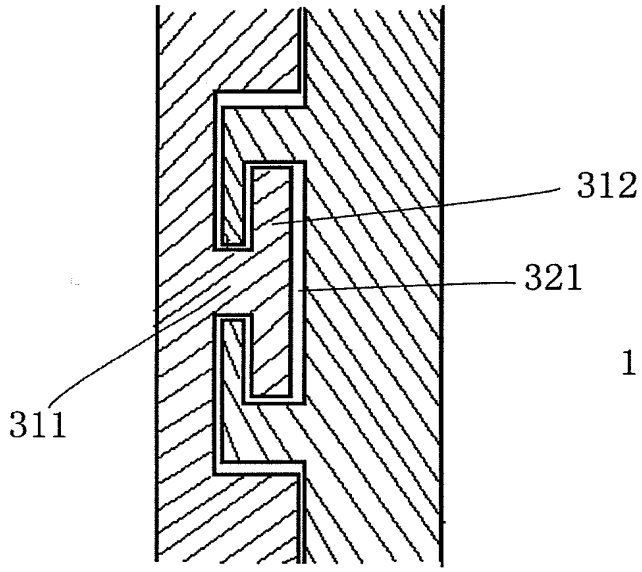


Fig. 12

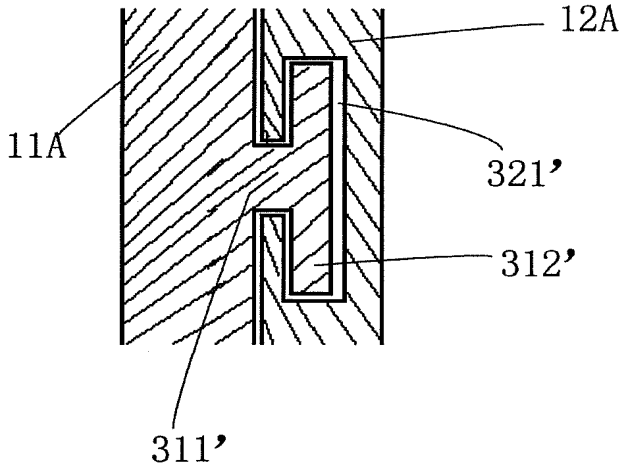


Fig. 13

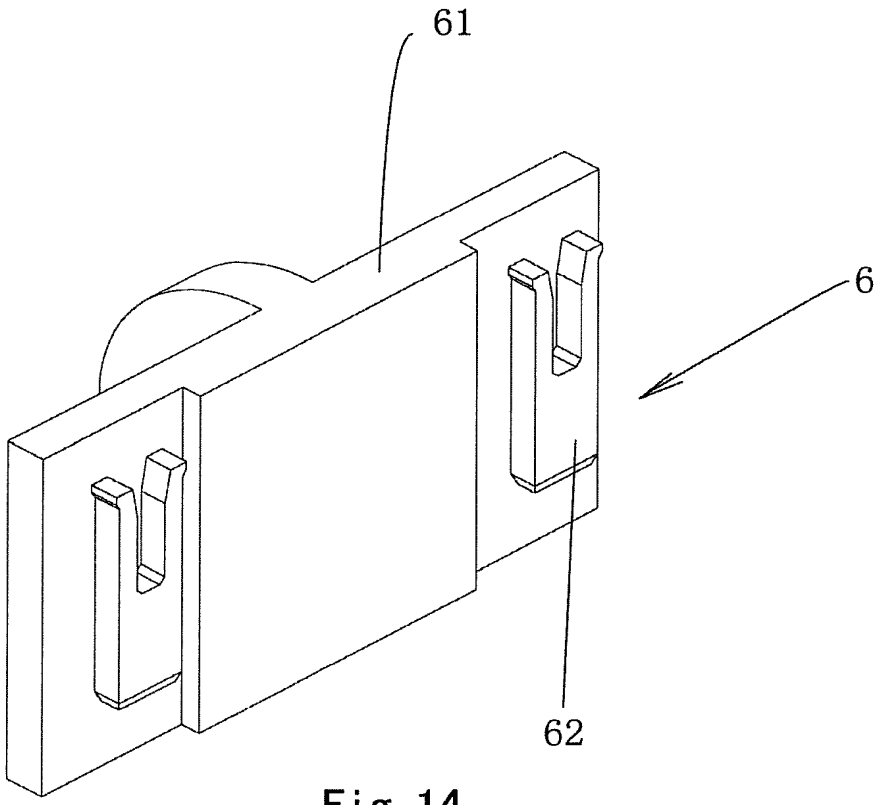


Fig. 14

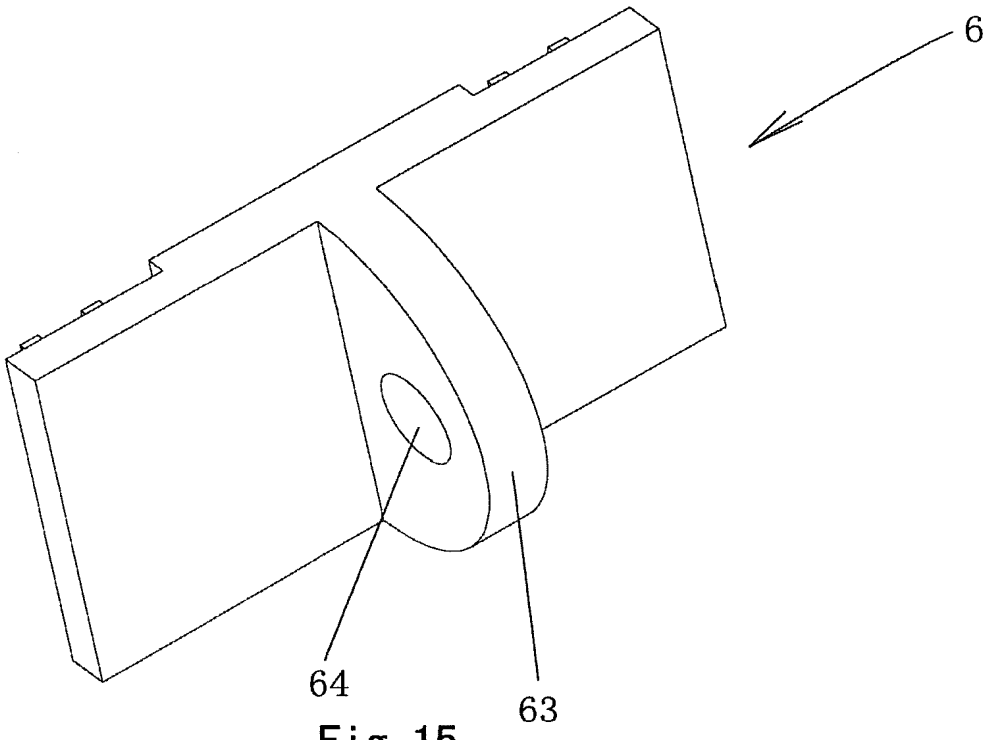


Fig. 15

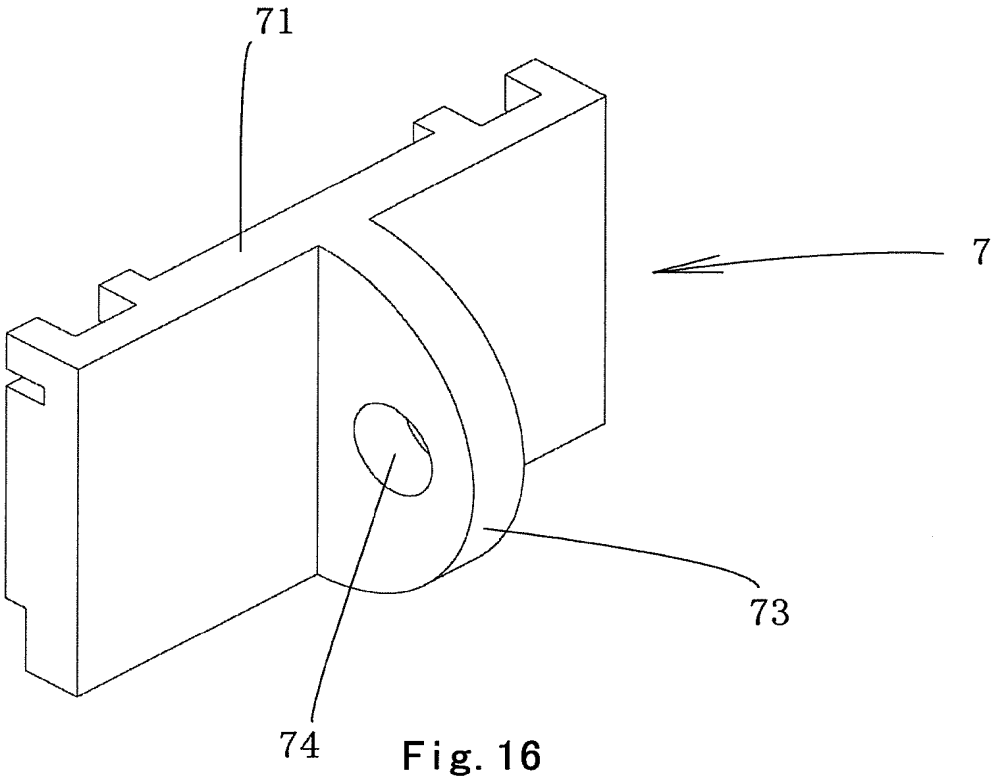


Fig. 16

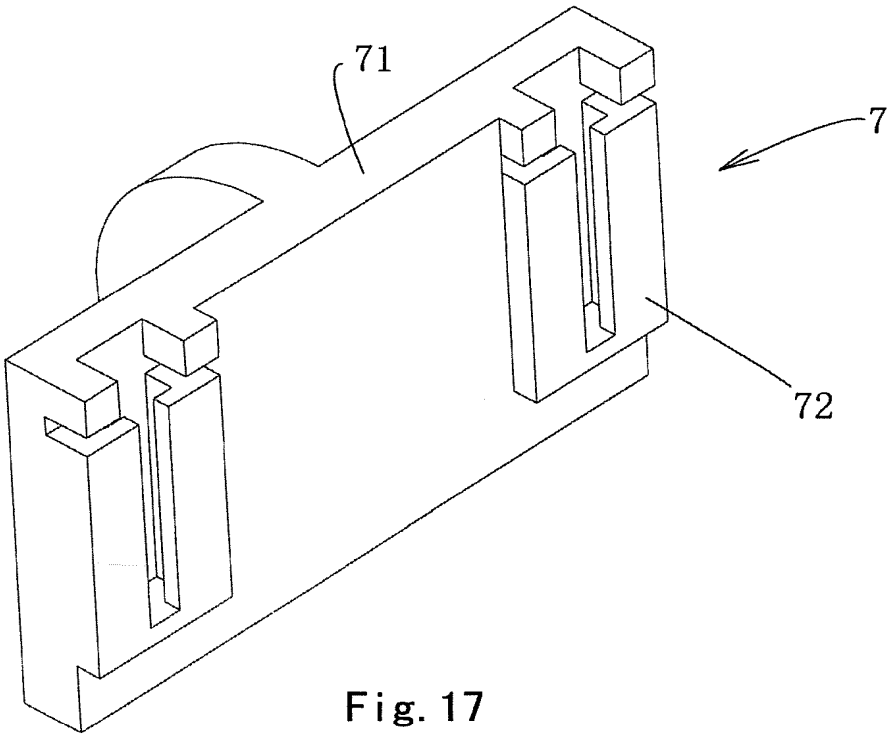


Fig. 17

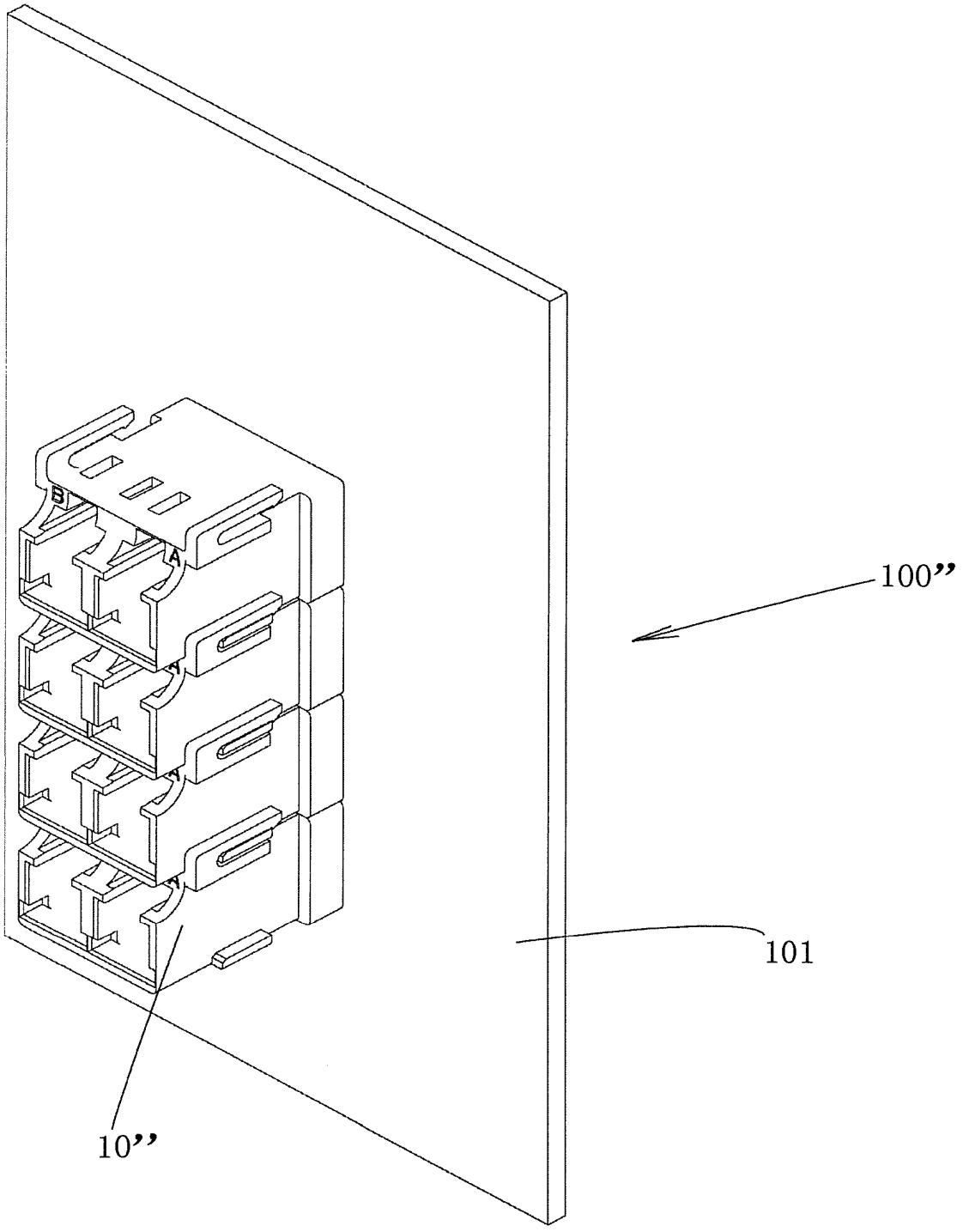


Fig. 18

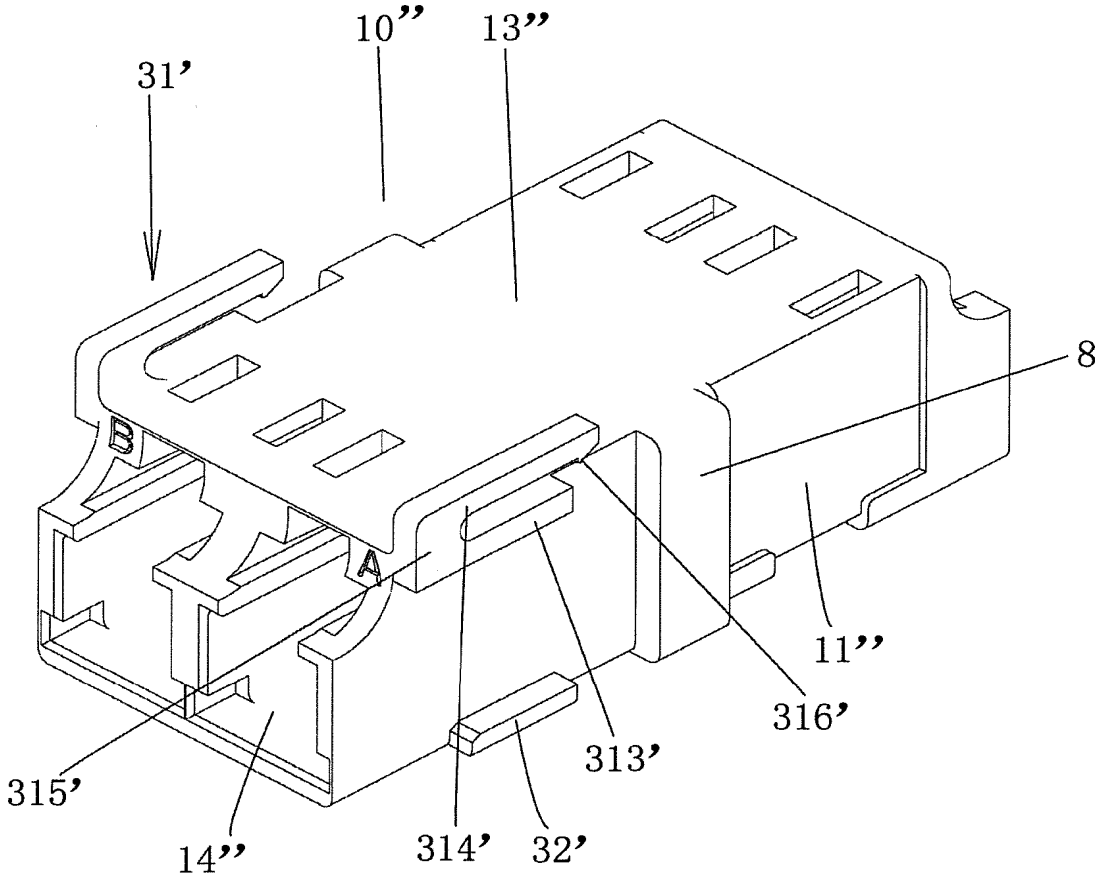


Fig. 19

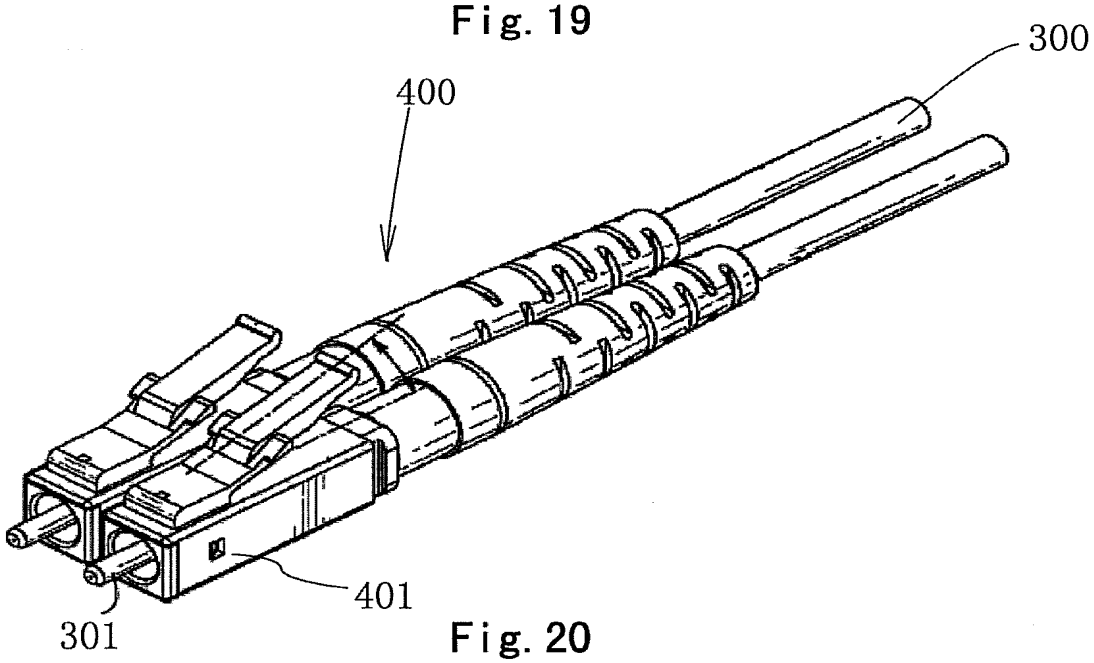


Fig. 20

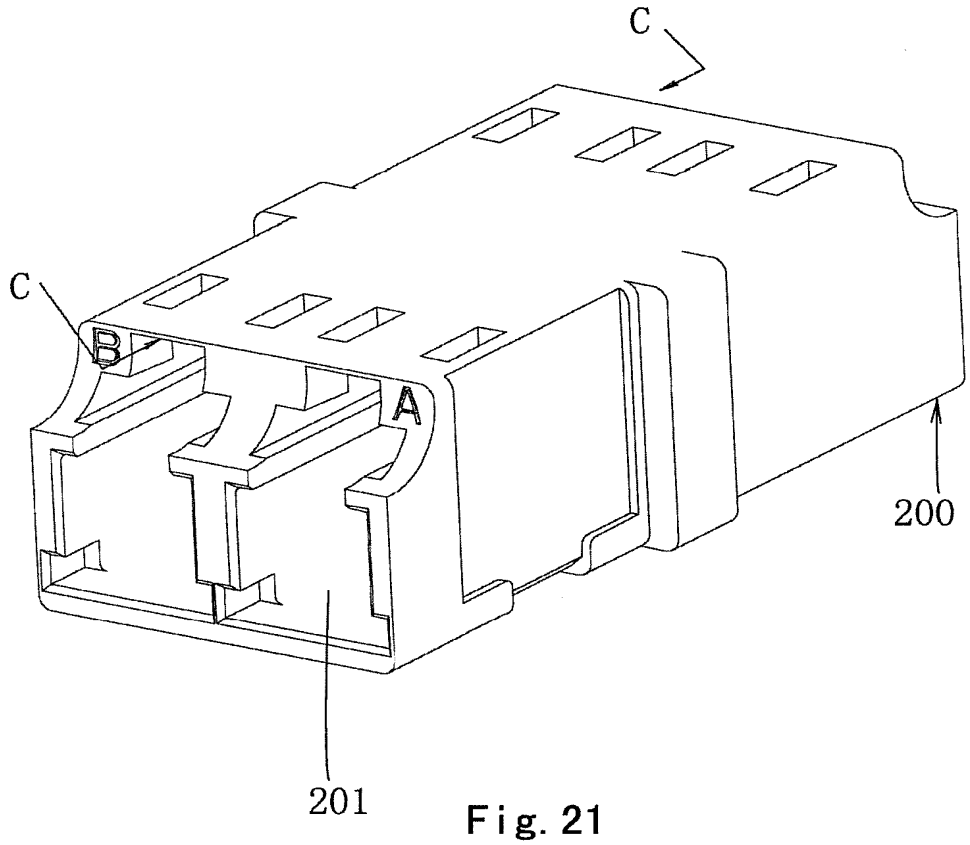


Fig. 21

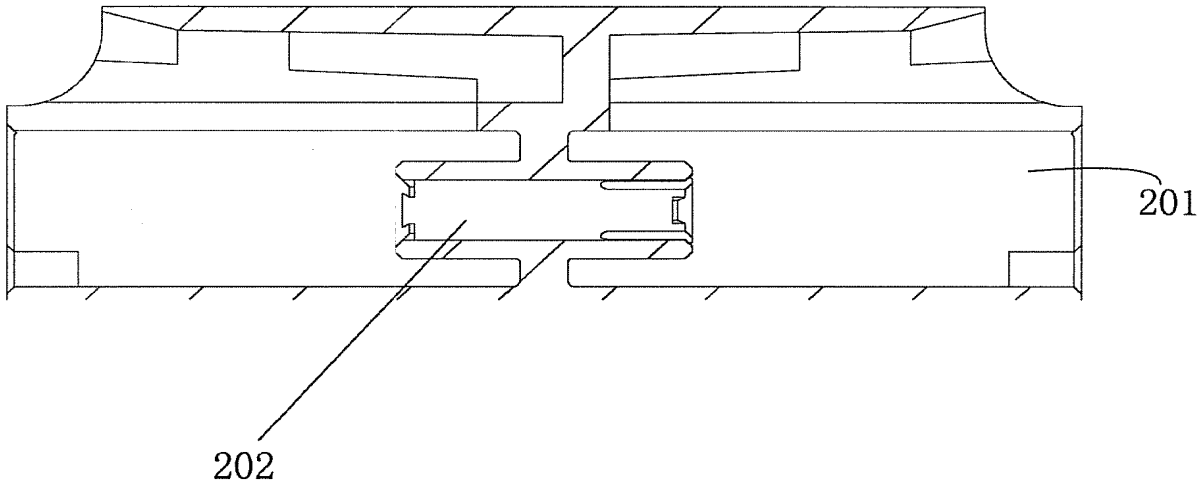


Fig. 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/054312

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R9/24 G02B6/00 H01R13/506 H01R13/508 H01R13/514
H01R31/06
ADD. H01R13/518 H01R13/74
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R G02B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/311781 A1 (WOJCIK ALAN F [US] ET AL) 18 December 2008 (2008-12-18)	1-6,25
Y	claims 1, 15 , 29 , 30 , 32 , 33 paragraph [0054] - paragraph [0056] figures 18-23	26

X	US 2001/049223 A1 (FUKATSU YUKIHIRO [JP]) 6 December 2001 (2001-12-06)	1,2, 9-16,25
Y	claims 1, 10	26
A	paragraph [0033] - paragraph [0035] paragraph [0038] figures 1, 2 , 7 -10	17

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"E" earlier application or patent but published on or after the international filing date

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Date of the actual completion of the international search	Date of mailing of the international search report
4 October 2013	16/10/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Stichauer, Libor

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/054312

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 319 071 B1 (SATO KEI [JP]) 20 November 2001 (2001-11-20)	1,2,9, 16, 20-22, 24,25
Y	column 4, line 24 - line 52 column 5, line 65 - column 6, line 8 column 6, line 50 - column 7, line 6 column 8, line 1 - line 10 figures 3,6, 9, 10, 13, 16	26

X	US 6 361 355 B1 (MATSUOKA YUTAKA [JP] ET AL) 26 March 2002 (2002-03-26)	1,2,9, 16, 20-22, 24,25
Y	column 5, line 19 - column 6, line 46 figures 1, 10	26

X	US 2006/228932 A1 (KOMIYAMA RYUICHI [JP]) 12 October 2006 (2006-10-12)	1,2,9, 16,25
Y	paragraph [0036] - paragraph [0039] paragraph [0041] figures 1, 2 , 3B, 4, 7, 8, 10, 11	26

X	US 2002/026710 A1 (MURAKAMI TAKAO [JP] ET AL) 7 March 2002 (2002-03-07)	1,2, 23-25
Y	claims 1 , 6 paragraph [0025] paragraph [0033] - paragraph [0037] figures	26

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A	paragraphs [0025], [0026], [0030], [0034], [0035] figures 1, 3 , 4 , 7 , 11, 13	1-3,7-9, 16-18,25

A	US 2009/221187 A1 (DALY PETER R [US] ET AL) 3 September 2009 (2009-09-03) figures 20-23	1-3,7-9, 16-18

A	US 2009/258536 A1 (LEE KUO-CHI [TW] ET AL) 15 October 2009 (2009-10-15) paragraph [0025] figures 1-3	1-3,7-9, 16-18

Senko Ex. 1017, Page 317
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

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Information on patent family members

International application No
PCT/IB2013/054312

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DESCRIPTION JP2004354693A

10 optical connector

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14 BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to an optical connector, and more particularly to an optical connector that allows two different types of plugs to be selectively connected. 2. Description of the Related Art Conventionally, optical connectors as optical communication circuit components include an adapter type optical connector for connecting a pair of plugs and a receptacle type optical connector for connecting a single plug to an optical device. . In an adapter-type optical connector, a pair of plugs are attached to a pair of plug attachment holes, and the end faces of ferrules are brought into contact with each other to optically connect optical fibers. In the receptacle type optical connector, a plug is attached to one plug attachment hole, and the end face of the ferrule is brought into contact with the end face of the ferrule on the optical device side to optically connect optical fibers. [0003] Here, in addition to the one-core type optical connector for connecting one optical fiber, two optical fibers are paired and connected as widely applied to two-way optical communication. A two-core type optical connector is also widely put into practical use. Patent Documents 1 and 2 describe general two-core receptacle-type optical connectors. As with single-core optical connectors, also in double-core optical connectors, a plurality of types of optical connectors, such as MU type, LC type, and SC type, which are applied to the same type of optical fiber, are put into practical use. These different types of two-core optical connectors differ in the structure, size, shape, pitch between the optical fibers, etc. of the plugs that hold the ends of the two optical fibers. It is For example, an MU type optical connector has a pitch between optical fibers of 4.5 mm or 7.5 mm, and an LC type optical connector has a pitch of 6.25 mm between optical fibers. Therefore, the LC type plug could not be mounted in the plug mounting hole of the MU type optical connector. Therefore, for example, in order to optically connect an MU-type plug and an LC-type plug, an MU-type optical connector, a jumper having an MU-type plug and an LC-type plug at both ends, and an

Senko Ex. 1017, Page 320
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

LC-type optical connector are used. Then, the MU type plug is connected to the MU type optical connector, the MU type plug at one end of the jumper is connected to the MU type optical connector, the LC type plug at the other end of the jumper is connected to the LC type optical connector, and the LC type plug is connected to the LC type optical connector. The LC type plug on the other side had to be connected to the type optical connector. [Patent Document 1] JP-A-5-215943 (Figs. 1 to 4) [Patent Document 2] JP-A-2000-315921 (Figs. 1 and 2) As described above, in the conventional optical connector, the structure, size, and shape of the plug mounting hole in the connector body and the structure, size, and shape of the plug are set in one way for each type of optical connector. Only one type of plug can be attached to the mounting hole, and the versatility of the optical connector was low. This is disadvantageous in terms of facility economy, requires a lot of labor for connection, and increases optical connection loss as the number of optical connection points increases.

50 SUMMARY OF THE INVENTION An object of the present invention is to provide an adapter type or receptacle type optical connector in which two types of plugs can be alternatively mounted in a plug mounting hole of a connector body to enhance versatility and economic efficiency. be. [0008] An optical connector according to claim 1 comprises an adapter or receptacle type connector body for mounting a two-core type plug holding the ends of two optical fibers. In the optical connector, the connector main body has a specific plug mounting hole configured to selectively mount two-core first and second plugs of different types applied to the same type of optical fiber. a pair of ferrule mounting portions common to both plugs to which a pair of ferrule tip portions of the first plug or the second plug mounted in the specific plug mounting holes are mounted; and a plurality of second engaging portions that engage with the second plug mounted in the specific plug mounting hole. is. In this optical connector, when the first plug is attached to the connector main body, when the first plug is attached to the specific plug attachment hole of the connector main body, the plurality of first engaging portions of the connector main body engage the first plug. They are engaged and the tips of the pair of ferrules of the first plug are inserted into the pair of ferrule inserts. When attaching the second plug to the connector main body, when the second plug is attached to the specific plug attachment hole of the connector main body, the plurality of second engaging portions of the connector main body are engaged with the second plug, and the second plug is attached. are inserted into a pair of ferrule insertion portions. When the connector body is an adapter type connector body, it is possible to connect a 2-core type plug to a 2-core type plug, and when the connector body is a receptacle type connector body, can connect one two-core type plug to an optical device. According to a second aspect of the invention, there is provided an optical connector according to the first aspect of the invention, wherein the connector body is an adapter-type connector body in which a pair of the specific plug mounting holes are formed to face each other. It is. In this case, the two-core type first plug and second plug can be alternatively mounted in both of the specific plug mounting holes. Therefore, three types of connection are possible: connection between the first plugs, connection between the first plug and the second plug, and connection between the second plugs. According to claim 3, the optical connector according to claim 1 is characterized in that the connector main body is a receptacle-type connector main body having one of the specific plug mounting holes.

Senko Ex. 1017, Page 321
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

80 In this case, the first plug or the second plug can be attached to the specific plug attachment hole. According to a fourth aspect of the present invention, there is provided an optical connector according to any one of the first to third aspects, wherein the second plug is a two-core LC type plug, and the first plug is the second plug with a pitch between optical fibers of the second plug. It is characterized by being a two-core MU-type plug having the same pitch between optical fibers as the MU-type plug. Since the pitch between the optical fibers of the first plug is equal to the pitch between the optical fibers of the second plug, the tips of the pair of ferrules of the first and second plugs are common to the pair of ferrule insertion portions. can be inserted into According to a fifth aspect of the present invention, there is provided an optical connector according to the fourth aspect of the invention, in which a pair of engaging recesses for engaging with a pair of first engaging portions are formed on both left and right sides of the MU-type plug. , the first engaging portion comprises an engaging pawl that engages with the engaging recess so as to be disengageable. Since a pair of engaging recesses are formed on the left and right sides of the MU plug, there is no need to form an engaging recess in the center of the lateral width of the MU plug. can do. Further, when the MU-type plug is to be removed from the plug mounting hole, when the MU-type plug is pulled toward the removal side, the engaging claws are elastically deformed and removed from the engaging recess. According to a sixth aspect of the present invention, there is provided an optical connector according to the fourth aspect of the invention, in which two pairs of engaging projections for engaging two pairs of second engaging portions are formed on a pair of lever portions of the LC type plug. The second engaging portion is an engaging stepped portion with which the engaging projection engages and is characterized by comprising an engaging stepped portion formed on the upper wall portion of the LC-type plug. When the LC type plug is mounted in the plug mounting hole, the engaging projection engages with the engaging stepped portion through elastic deformation of the lever portion. Further, when the LC-type plug is removed from the plug mounting hole, the LC-type plug can be removed by operating the lever to disengage the engaging projection from the engaging stepped portion. DETAILED DESCRIPTION OF THE INVENTION Embodiments of the present invention will be described below with reference to the drawings. This embodiment is an example in which the present invention is applied to an adapter-type optical connector. Note that the upper side and the front side in FIG. 1 are described as the upper side and the front side. As shown in FIGS. 1 to 4, this optical connector 1 has an adapter-type connector body 2 for mounting a two-core plug holding the ends of two optical fibers. The connector main body 2 of the optical connector 1 is constructed by connecting a pair of symmetrical synthetic resin main body divisions 3 and 4 each having a plug mounting hole 5 formed therein.

115 The main body divisions 3 and 4 are joined back-to-back to form the connector body 2. A pair of plug mounting holes 5 are symmetrically positioned in series in the front-rear direction. A specific plug mounting hole (hereinafter simply referred to as "plug mounting (referred to as “holes”). The MU type plug 20 corresponds to the first plug, and the LC type plug 40 corresponds to the second plug. The connector main body 2 and main body divisions 3 and 4 will be described in detail. Note that the body divided body 4 has the same structure as the body divided body 3, so the same reference numerals are given and the description thereof is

Senko Ex. 1017, Page 322
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

omitted. As shown in FIGS. 1 to 4, the divided main body 3 has a plug mounting hole 5 and a tip portion of a ferrule 21 of an MU type plug 20 or a ferrule 41 of an LC type plug 40 mounted in the plug mounting hole 5. A common pair of ferrule insertion portions 6 leading to the mating plug mounting hole 5 engages with a pair of engaging recesses 22 on both left and right sides of the MU-type plug 20 mounted in the plug mounting hole 5. A pair of first engaging portions 8 and two pairs of second engaging portions engaging two pairs of engaging projections 44 of a lever portion 42 on the upper surface side of an LC-type plug 40 mounted in a plug mounting hole 5. 10 (see FIG. 12) and the like are formed. The plug mounting hole 5 is a plug mounting hole commonly used for both the two-core MU plug 20 and the two-core LC plug 40, and includes a bottom wall 12, left and right side walls 13 and an upper It is formed by the wall 14 and the like. A partition wall 15 is formed on the rear end side of the plug mounting hole 5 (on the mating body divided body 4 side). It is formed so as to protrude to the Since the pair of tubular portions 6a protrude concentrically forward and backward from the body segments 3 and 4, the tip surfaces of the pair of ferrules 21 and 41 inserted into the fiber insertion portion 6 from the front and rear come into contact with each other. The end surfaces of the two optical fibers are optically connected to each other. The distance between the axial centers of the pair of cylindrical portions 6a is set equal to the pitch between the optical fibers of the LC plug 40 (6.25 mm). The partition walls 15 of the main body divisions 3 and 4 are welded or adhered to each other in surface contact, and in this state, the pair of ferrule inserting portions 6 and 6 of the main division bodies 3 and 4 are continuous and concentric. (See FIGS. 3 and 10). Incidentally, the partition walls 15 of the main body divisions 3 and 4 may be fixed together using a structure in which a plurality of protrusions are fitted into a plurality of holes.

145 The body divisions 3 and 4 are formed with flanges 16 for joining the partition wall 15 and for positioning and fixing the connector body 2 to an external connector mounting panel or the like. Next, the MU type plug 20 and the LC type plug 40 will be explained. As shown in FIGS. 5 to 6 and 10, the MU-type plug 20 includes a case member 23 having a structure in which two square tubular case portions 24 are arranged side by side and connected, and two holding members fitted inside the case member 23. 25, two ferrules 21 housed and held in two holding members 25, and a coil spring (not shown) for elastically biasing these ferrules 21, and the like. Openings are formed in the left and right side walls of the case member 23, respectively, and engaging recesses 22 are formed in portions of the holding member 25 exposed to the outside from these openings. Further, on both left and right sides of the MU-type plug 20, contact portions 24a are formed to contact the front end of the body divided body 3 when the plug 20 is attached to the connector body 2 (see FIG. 10). Two optical fiber cables 26 are introduced into the pair of square cylindrical case portions 24 via boots 27, respectively, and the optical fibers from which the coating at the tip of the optical fiber is removed are introduced into the ferrule 21. The tip of the optical fiber is inserted and held in the hole at the tip of the ferrule 21, the tip of the optical fiber is exposed at the tip of the ferrule 21, and the tip face of the ferrule 21 and the tip face of the optical fiber are flush with each other. It has become. The pitch between the axial centers of the ferrules 21 of the MU-type plug 20, that is, the pitch between the optical fibers of the pair of optical fibers, is

Senko Ex. 1017, Page 323
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

set equal to the pitch between the optical fibers of the LC-type plug 40 (6.25 mm). In order to achieve this, instead of forming the engaging recesses 22 on the left and right sides of each square tubular case portion 24 as in the conventional product, the pair of square tubular case portions 24 on opposite side portions (MU type By omitting the engaging recess 22 on the lateral side of the plug 20, the distance between the pair of rectangular cylindrical case portions 24 is made smaller than that of the conventional product, and the pitch between the optical fibers is 6.25 mm. is set to As shown in FIGS. 7 to 9, 11 and 12, the LC type plug 40 includes a case member 45 having a structure in which a pair of square tubular case portions 46 are arranged and connected, and two square tubular case portions. It has a pair of ferrules 41 housed and held in 46, and coil springs (not shown) for elastically biasing these ferrules 41, respectively. On the upper surface side of each rectangular tube case 46, a lever part 42 extending obliquely upward from the tip end toward the base end, and an operation lever part 43 extending diagonally upward from the base end of the square tube case part 46 toward the tip side. , and the two operation lever portions 43 are integrally formed so as to be continuous in the left-right direction.

179 The lever portion 42 and the operating lever portion 43 have elasticity in the vertical direction, and the lever portion 42 is formed with a pair of engaging protrusions 44 that protrude to both left and right sides. As in the case of the MU-type plug 20, also in this LC-type plug 40, two optical fiber cables 47 are introduced into a pair of square cylindrical case portions 46 via boots 48, respectively, and the optical fibers are connected to each other. is introduced into the ferrule 41, the tip of the optical fiber is inserted into the hole at the tip of the ferrule 41 and held, and the tip of the optical fiber is inserted into the tip of the ferrule 41. The end surface of the ferrule 41 and the end surface of the optical fiber are flush with each other. The pitch between optical fibers in this LC type plug 40 is set to 6.25 mm as in the conventional product. As shown in FIGS. 3 and 10, left and right side wall portions 13 of the body divided body 3 are provided with a pair of first engaging portions for engaging an MU-type plug 20 mounted in the plug mounting hole 5. 8 is formed. The pair of first engaging portions 8 are engaged with a pair of left and right engaging recesses 22 of an MU-type plug 20 mounted in the plug mounting hole 5 of the main body divided body 3 so as to be disengageable from both left and right sides. It consists of a pair of right and left engaging claws 8a. The engaging claw 8 a is formed at the rear end of a longitudinally oriented elastic piece 9 provided along the side wall 13 , and the front end of the elastic piece 9 is integrally formed with the side wall 13 . When the plugs 20 and 40 are not mounted in the plug mounting holes 5, each engaging claw 8a protrudes further toward the axial center than the elastic piece 9. As shown in FIG. When the MU-type plug 20 is attached to or detached from the plug mounting hole 5, the engaging claw 8a abuts against the side surface of the MU-type plug 20, and the side surface causes the engaging claw 8a to elastically deform the elastic piece 9. is pushed to the side opposite to the shaft center side. When the MU-type plug 20 is completely mounted in the plug-mounting hole 5, the tips of the pair of ferrules 21 of the MU-type plug 20 are inserted into the pair of ferrule insertion portions 6 to be inserted into the mating plug insertion portion 6. The pair of engaging claws 8a are engaged with the pair of engaging recesses 22 of the MU-type plug 20 to engage with the tips of the

Senko Ex. 1017, Page 324
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

pair of ferrules 21 or 41 on the mating side. A mold plug 20 is retained. As shown in FIGS. 1 and 12, two pairs (four) of LC-type plugs 40 fitted in the plug fitting holes 5 are provided on the upper wall of the split body 3 of the connector body 2 . is formed through four rectangular holes 11 . The two pairs of second engaging portions 10 are engaged with two pairs of engaging protrusions 44 of the lever portion 42 of the LC plug 40 mounted in the plug mounting hole 5 so as to be disengageable. It consists of a step portion 10a.

212 Above the plug mounting hole 5 are a pair of left and right lever introduction grooves 17 for introducing a pair of lever portions 42 of the LC type plug 40, and two pairs of sliders into which two pairs of engaging projections 44 can be introduced. A groove portion 17a is formed, and a pair of engaging stepped portions 10a is formed at the rear end portion of each slider groove 17a. As the LC type plug 40 is inserted into the plug mounting hole 5, the pair of lever portions 42 are elastically deformed downward and introduced into the pair of lever introduction grooves 17, and the two pairs of engaging projections 44 are engaged. are introduced into the two pairs of slider grooves 17a, and when the LC type plug 40 is completely mounted in the plug mounting hole 5, the tips of the pair of ferrules 41 of the LC type plug 40 engage the pair of ferrule insertion portions 6. The LC type plug 40 is attached by inserting the LC type plug 40 and projecting slightly into the mating plug insertion portion 6. In this state, the lever portion 42 returns and the four engaging projections 44 engage the four engaging stepped portions 10a. state is preserved. When the operating lever portion 43 is pushed downward while the LC type plug 40 is mounted in the plug mounting hole 5, the pair of lever portions 42 are pushed downward and the four engaging projections are engaged. The engagement between 44 and the four engagement stepped portions 10a is released, and the LC type plug 40 can be pulled out. When the LC type plug 40 is mounted in the plug mounting hole 5, the pair of engaging claws 8a abut on the left and right side surfaces of the LC type plug 40, and the elastic piece 9 maintains the elastically deformed state. . When the MU-type plug 20 or the LC-type plug 40 is mounted only in one of the pair of plug mounting holes 5, the tip of the ferrule 21 or 41 extends from the ferrule insertion part 6 to the mating plug insertion part. It will protrude slightly to 6. In each plug 20, 40, the ferrules 21, 41 are axially movable by a small stroke with respect to the connector body 2, and are urged toward the distal end by a coil spring. Therefore, when the plugs 20 and 40 are attached to both of the pair of plug attachment holes 5, the tip surfaces of the pair of ferrules 21 or 41 on one side and the pair of ferrules 21 or 41 on the other side come into contact with each other. two optical fibers are optically connected. Since a pair of optical fibers can be connected in this manner, the optical connector 1 is suitable for connecting optical fibers for two-way communication. The operation and effect of the optical connector 1 will be described. According to this optical connector 1, a pair of plug mounting holes 5 are provided in series. It is configured as a specific plug mounting hole to which both the plug 20 and the two-core LC type plug 40 can be alternatively mounted.

244 When the MU type plug 20 is mounted in the plug mounting hole 5 of the connector main body 2, the pair of first engaging portions 8 are engaged with the pair of engaging recesses 22 of the MU type plug 20, thereby connecting the MU. A mold plug 20 is retained. When the LC type plug 40 is mounted in the plug mounting hole 5 of the optical connector 2, the

Senko Ex. 1017, Page 325
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

four second engaging portions 10 are engaged with the four engaging projections 44 of the LC type plug 40, and the LC type plug 40 is fixed. be done. In this optical connector 1, the two plug mounting holes 5 formed in the connector main body 2 are common plug mounting holes for the MU type plug 20 and the LC type plug 40. A pair of ferrule inserting portions 6 are also capable of inserting the tips of the pair of ferrules 21 of the MU-type plug 20 and the tips of the pair of ferrules 41 of the LC-type plug 40. . Therefore, this optical connector 1 enables three types of connections: MU type plug 20 to MU type plug 40, LC type plug 40 to LC type plug 40, and MU type plug 20 to LC type plug 40. Considering the directivity of the connection, four types of connection including the LC type plug 40 and the MU type plug 20 are possible, and the versatility is excellent. In particular, when connecting the MU type plug 20 and the LC type plug 40, the optical fiber connection structure can be easily connected without using a jumper or an extra optical connector. This is advantageous in terms of facility economy, and since the number of optical connection points is reduced, the optical connection loss is also reduced. The pair of first engaging portions 8 is composed of a pair of engaging claws 8a that engage the MU-type plug 20 mounted in the plug mounting hole 5 so as to be disengageably engaged from both left and right sides. The engaging claws 8a can be reliably engaged with the MU-type plug 20 from both sides so that the MU-type plug 20 can be securely fixed. The four second engaging portions 10 have four engaging stepped portions that disengageably engage with the four engaging projections 44 of the two lever portions 42 of the LC-type plug 40 mounted in the plug mounting hole 5. 10a, the engaging stepped portions 10a can be reliably engaged with the engaging projections 44 of the LC plug 40, and the LC plug 40 can be held securely. [0036] Next, a modification that partially modifies the above embodiment will be described. 1] In the optical connector 1 described above, an example in which a pair of specific plug mounting holes 5 having the same structure are formed in the connector main body 2 has been described. , and the other plug mounting hole 5 may be structured so that only the MU-type plug 20 can be mounted.

274 In this case, two patterns of connection of MU type plug 20 to MU type plug 20 and MU type plug 20 to LC type plug 40 are possible. It should be noted that the other plug mounting hole 5 may have a structure in which only the LC type plug 40 can be mounted instead of the MU type plug 20 . 2] In the above optical connector 1, the case where the first plug is the MU type plug 20 and the second plug is the LC type plug 40 has been described as an example. It is also possible to have an optical connector in which the MU type plug 20 is used and the second plug is an SC type plug. 3] In the above embodiment, the optical connector 1 provided with the adapter type connector main body 2 was explained as an example, but the optical connector of the present invention can be applied to an optical connector provided with a receptacle type connector main body. equally applicable. For example, an optical connector 1A shown in FIG. 13 is an optical connector having a receptacle-type connector main body 2A. It is The structure of the connector main body 2A is substantially the same as that of the main body divided body 3, so the explanation thereof will be omitted. The figure shows a state in which the MU-type plug 20 is mounted in one plug mounting hole of the connector main body 2A. Both 20 and LC type plug 40 can be attached alternatively. 4] In addition, the embodiments shown in FIGS. 1 to 12 are merely examples, and can be

Senko Ex. 1017, Page 326
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

implemented with various modifications without departing from the scope of the present invention. Also, the modified embodiment of FIG. 13 is merely an example, and various modifications can be made without departing from the scope of the present invention. INDUSTRIAL APPLICABILITY According to the optical connector of claim 1, an adapter type or receptacle type connector body has a specific plug mounting hole, a pair of ferrule mounting portions, and a plurality of first engaging portions. , and a plurality of second engaging portions, different two-core type first and second plugs applied to the same type of optical fiber can be selectively attached to the connector main body. An economical optical connector can be obtained. As a result, it reduces the number of optical components (optical connectors, plugs, jumpers, etc.) required to connect different types of plugs, reduces connection effort, improves facility economy, and reduces optical connection loss. be able to.
301 According to the optical connector of claim 2, since the connector main body is an adapter-type connector main body in which a pair of specific plug mounting holes are formed facing each other, both specific plug mounting holes are provided with A two-core type first plug and second plug can be attached alternatively. Therefore, three types of connection, ie, connection between the first plugs, connection between the first plug and the second plug, and connection between the second plugs, are possible, and an optical connector with further excellent versatility can be obtained. According to the optical connector of claim 3, the connector main body is a receptacle-type connector main body having one specific plug mounting hole. You can attach a plug. According to the optical connector of claim 4, since the pitch between the optical fibers of the first plug and the pitch between the optical fibers of the second plug are equal, the tip ends of the pair of ferrules of the first and second plugs are equal. are insertable into a pair of ferrule inserts with common parts. According to the optical connector of claim 5, a pair of engaging recesses to engage with a pair of first engaging portions are formed on both left and right side portions of the MU-type plug. is formed of an engaging pawl that releasably engages with the engaging recess, so there is no need to form an engaging recess in the center of the lateral width of the MU plug. , the pitch between the optical fibers of the MU-type plug can be made to match the pitch between the optical fibers of the LC-type plug, and the optical connector can be selectively attached to the MU-type plug or the LC-type plug. According to the optical connector of claim 6, the pair of lever portions of the LC type plug are formed with two pairs of engaging protrusions that engage with the two pairs of second engaging portions. The portion is an engaging stepped portion with which the engaging projection engages and is formed on the upper wall portion of the LC type plug. Therefore, when removing the LC type plug from the connector body, the lever portion is operated. By doing so, the engaging protrusion can be removed from the engaging step portion, and the LC plug can be easily removed. While the present invention has been described with reference to what are presently considered to be the preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. FIG. 2 is a front view of a connector body; 3 is a cross-sectional plan view of the connector body; FIG. 4 is a longitudinal sectional view of a connector body; FIG. FIG. 5 is a perspective view of an MU-type plug; FIG. FIG. 6 is a front view of an MU-type plug; 7 is a perspective view of an LC-type plug; FIG. 8 is a side view of an LC-type plug; FIG. FIG. 9 is a

Senko Ex. 1017, Page 327
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

front view of an LC-type plug;

333 10 is a cross-sectional plan view of an optical connector (with an MU-type plug attached); FIG. 11 is a longitudinal side view of an optical connector (with an LC plug attached); FIG. FIG. 12 is a longitudinal side view of an optical connector (with an LC plug attached); 13 is a perspective view of an optical connector according to a modified embodiment; FIG. [Description of Reference Symbols] 1, 1A Optical connectors 2, 2A Connector main bodies 3, 4 Main body divided body 5 Plug mounting hole 6 Ferrule insertion part 8 First engaging part 8a Engaging claw 9 Elastic piece 10 Engaging stepped part 20 MU type Plug (first plug) 21 ferrule 22 engagement recess 40 LC type plug (second plug) 41 ferrule 42 lever portion 43 operation lever portion 44 engagement projection

Senko Ex. 1017, Page 328
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/857,300	**06/29/2023 03:29:04 PM ET**	**USCO-053-05**

Title of Invention

Alignment Adapter and Alignment Design for a Connector Therefor

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5557	FILED BY	Michael Leetzow
PATENT CENTER #	62363792	FILING DATE	07/05/2022
CUSTOMER #	152017	FIRST NAMED INVENTOR	Hiep V. Nguyen
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
20230629_USCO05305.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	1253 KB
WO2013179197A1.pdf	38	Foreign Reference	1766 KB
CN202600189U.pdf	29	Foreign Reference	2512 KB
JP2004354693A.pdf	12	Foreign Reference	457 KB
translateJP2004354693Filing.pdf	9	Foreign Reference	112 KB
202600189-Desc-en.pdf	14	Foreign Reference	142 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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(19)中华人民共和国国家知识产权局

(12)实用新型专利

(10)授权公告号 CN 202600189 U
(45)授权公告日 2012.12.12

(21)申请号 201220254953.7

(22)申请日 2012.05.31

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(51)Int.Cl.
G02B 6/38(2006.01)

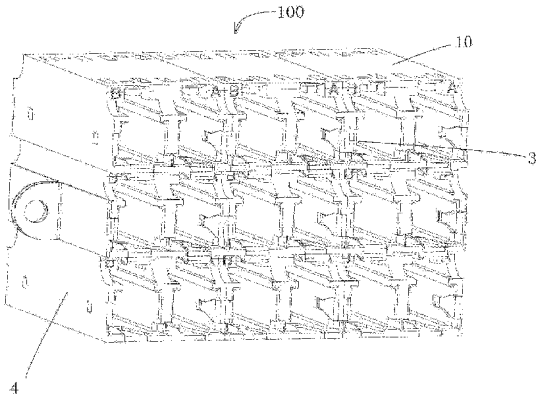
权利要求书 3 页 说明书 9 页 附图 16 页

(54)实用新型名称

适配器组件和连接器组件

(57)摘要

一种用于连接多个连接器的适配器组件，包括：多个适配器，每个适配器包括壳体所述壳体内形成至少一对用于插接连接器的接口；以及至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。由于多个适配器可以在水平方向上并排地依次接合或者在垂直方向上叠置地依次接合，从而最大限度的利用安装面板上的空间。



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1. 一种用于连接多个连接器的适配器组件，其特征在于，包括：

多个适配器，每个适配器包括壳体所述壳体内形成至少一对用于插接连接器的接口；以及

至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。

2. 如权利要求 1 所述的适配器组件，其特征在于，每个所述适配器的壳体呈大致的长方体形，并包括限定成所述接口的第一立壁、与所述第一立壁相对的第二立壁、顶壁和底壁，所述接合装置被构造成连接多个适配器中的两个相邻适配器的相邻的第一立壁和第二立壁、和 / 或者相邻的顶壁和底壁。

3. 如权利要求 2 所述的适配器组件，其特征在于，所述接合装置被构造成夹持多个适配器中的两个相邻适配器的相邻的第一立壁和第二立壁、和 / 或者相邻的顶壁和底壁的弹性的夹持机构。

4. 如权利要求 3 所述的适配器组件，其特征在于，所述第一立壁、第二立壁、顶壁和底壁中的每一个包括形成在壳体的内侧表面上的凹槽，所述凹槽的形状与所述夹持结构的两个夹持臂的形状大致配合，以将所述夹持结构的两个夹持臂容纳在两个相应的凹槽中。

5. 如权利要求 4 所述的适配器组件，其特征在于，每个所述夹持结构包括在所述夹持臂的自由端相向突起形成的保持部，每个所述凹槽的远端形成贯穿所述第一立壁、第二立壁、顶壁和底壁中的每一个的通孔，所述保持部能够容纳在所述通孔中。

6. 如权利要求 4 所述的适配器组件，其特征在于，每个夹持臂具有大致的三角形形状。

7. 如权利要求 3-6 中的任一项所述的适配器组件，其特征在于，进一步包括至少一对安装机构，每对安装机构中的一个安装机构安装在一排适配器中位于最外侧的第一立壁或者第二立壁上，每个安装机构包括：

主体部，所述主体部的长度为一个适配器的纵向长度的大约一半，并且每个主体部包括一个第一端和一个与所述第一端相对的第二端；

安装耳部，从所述第一端向外垂直延伸形成；

辅助夹持装置，从所述第二端向内弯折大约 180 度形成，以接合到位于最外侧的立壁的凹槽中。

8. 如权利要求 7 所述的适配器组件，其特征在于，所述安装耳部上设有安装孔，所述辅助夹持装置的自由端设有弹性的夹持突起。

9. 如权利要求 2 所述的适配器组件，其特征在于，每个接合装置包括：

至少一个第一水平接合装置，从所述第一壁外侧在水平方向上延伸形成；以及

至少一个第二水平接合装置，形成在所述第二立壁外侧，所述第一水平接合装置和第二水平接合装置被构造成在形状上彼此卡接配合，以将所述多个适配器依次并排地接合在一起。

10. 如权利要求 9 所述的适配器组件，其特征在于，

所述第一水平接合装置包括：

连接部，从所述第一立壁外侧在水平方向上延伸形成；以及

接合部，从所述连接部的末端在至少一个方向上平行于所述第一立壁延伸形成，

所述第二水平接合装置包括：

Senko Ex. 1017, Page 333
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

容纳槽，形成在所述第二立壁上，并被构造成容纳另一个适配器的第一水平接合装置的接合部；以及

第一开口，与所述容纳槽连通，所述另一个适配器的接合部能够通过所述第一开口插入所述接合部。

11. 如权利要求 10 所述的适配器组件，其特征在于，所述第二水平接合装置还包括：第二开口，与所述容纳槽连通并被构造成与所述另一个适配器的连接部相配合，在所述另一个适配器的接合部插入所述容纳槽的过程中，所述另一个适配器的连接部穿过所述第二开口。

12. 如权利要求 11 所述的适配器组件，其特征在于，所述接合部具有大致的 U 形形状，并包括：两个具有弹性的臂部、以及连接在两个所述臂部的端部之间的基部，所述连接部连接在所述基部与所述第一立壁之间。

13. 如权利要求 12 所述的适配器组件，其特征在于，每个臂部的末端设有突起部，当将所述另一个适配器的接合部作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第一开口的外部，以阻挡所述接合部的进一步插入。

14. 如权利要求 13 所述的适配器组件，其特征在于，每个适配器进一步包括两个定位部，分别从所述第二立壁上突出形成，并离开所述第一开口预定距离，以当所述另一个适配器的接合部插入所述容纳槽中时，所述另一个适配器的突起部位于所述第二接合装置和所述定位部之间。

15. 如权利要求 12 所述的适配器组件，其特征在于，所述第二水平接合装置还包括：第三开口，与所述容纳槽连通并与所述第一开口相对，

每个臂部的末端设有突起部，当将所述另一个适配器的臂部的末端作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第三开口的外部，以阻挡所述另一个适配器的接合部退出所述容纳槽。

16. 如权利要求 9-15 中的任一项所述的适配器组件，其特征在于，所述第一水平接合装置设置在形成于所述第一立壁上的凹槽内，所述第二水平接合装置从所述第二立壁凸出。

17. 如权利要求 16 所述的适配器组件，其特征在于，进一步包括：

第一安装机构，包括：

板式的第一主体部 (61)；以及

第一辅助接合装置 (62)，形成在所述第一主体部的第一侧并具有与所述第一水平接合装置相同的结构，以与所述多个适配器中位于最外侧的一个适配器的第二水平接合装置结合，

第二安装机构，包括：

板式的第二主体部；以及

第二辅助接合装置，形成在所述第二主体部的第一侧并具有与所述第二水平接合装置相同的结构，以与所述多个适配器中位于最外侧的另一个适配器的第一水平接合装置结合。

18. 如权利要求 17 所述的适配器组件，其特征在于，所述第一安装机构还包括形成在所述第一主体部的第二侧的第一安装耳部；所述第二安装机构还包括形成在所述第二主体

Senko Ex. 1017, Page 334
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

部的第二侧的第二安装耳部。

19. 如权利要求 18 所述的适配器组件，其特征在于，所述第一安装耳部和第二安装耳部都设有至少一个安装孔。

20. 如权利要求 2 所述的适配器组件，其特征在于，每个接合装置包括：

第一垂直接合装置，从所述第一立壁和第二立壁的外侧靠近所述顶壁或底壁处延伸形成；以及

第二垂直接合装置，设置在所述第二立壁和第一立壁的外侧靠近所述底壁或顶壁处，并被构造成用于插入并固定另一个适配器的第一垂直接合装置的插槽，

当所述第一垂直接合装置和第二垂直接合装置相互接合时使得所述多个适配器在垂直方向上叠层地接合在一起。

21. 如权利要求 20 所述的适配器组件，其特征在于，

每个所述第一垂直接合装置具有大致的 U 形形状，并包括：

第一臂部，从所述第一立壁和第二立壁的外侧的上端或下端向外凸出形成；

第二臂部，在所述顶壁或者底壁之外平行于所述第一臂部延伸；以及

基部，连接在所述第一臂部和第二臂部之间，以在所述第一臂部和第二臂部形成所述插槽，

每个所述第二垂直接合装置包括从所述第一立壁和第二立壁的外侧的下端或者上端向外凸出形成细长突起，

其中所述细长突起能够容纳在另一个适配器的第一臂部和第二臂部之间的插槽中，以将两个适配器叠置地接合在一起。

22. 如权利要求 21 所述的适配器组件，其特征在于，所述第二臂部的自由端设有向内延伸的阻挡部，以阻挡所述细长突起从所述第一臂部和第二臂部之间的空间脱离。

23. 如权利要求 2 所述的适配器组件，其特征在于，

每个接合装置包括：

垂直接合装置，所述垂直接合装置具有大致的 L 形形状，并包括：

基部，从所述顶壁或者底壁向外垂直延伸；以及

臂部，从所述基部的末端平行于所述顶壁或者底壁的外表面延伸；

容纳槽，形成在所述底壁或者顶壁中，并被构造成容纳另一个适配器的所述臂部，以将两个适配器叠置地接合在一起。

24. 如权利要求 20-23 中的任一项所述的适配器组件，其特征在于，每个所述适配器还包括从所述第一立壁和第二立壁凸出形成的安装机构 (8)，以将所述适配器组件安装到安装面板上。

25. 一种连接器组件，其特征在于，包括：

如权利要求 1-24 中任一项所述的适配器组件；以及

多个连接器，每个连接器连接至相应的适配器的一个接口内。

26. 如权利要求 25 所述的连接器组件，其特征在于，所述连接器为光纤连接器。

Senko Ex. 1017, Page 335
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

适配器组件和连接器组件

技术领域

[0001] 本实用新型涉及一种用于数据通信和电信应用中的用于连接器的适配器，特别是涉及一种用于插拔式连接器的适配器、以及具有这种适配器的连接器组件。

背景技术

[0002] 在各类光纤通信系统中，通常使用光纤连接器将不同光缆的光纤实现对接。图 20 出了一种现有的两个光纤连接器 400 的立体示意图。图 21 和 22 示出了与光纤连接器结合使用的适配器 200。每个光纤连接器 400 包括连接器主体 401，光缆 300 从连接器主体 401 的一端插入，用于光缆 300 的光纤的插芯 (ferrule)301 从连接器主体 401 的另一端露出。适配器 200 包括 ：四个接口 201，分别成对地形成在适配器 200 的两端，并被构造成分别容纳被插入的相应连接器 400 ；以及两个接续部 202，每个接续部 202 设置在一对接口 201 之间，用于连接分别插入到成对的接口 201 中的连接器的插芯 301。当将光纤连接器 400 插入到适配器 200 中时，连接器主体 401 容纳在容纳槽 201 中，插芯 301 插入到接续部 202 中以与接续部 202 中的另一光纤的插芯进行接续。另外，上述适配器有时候也可用于容纳将两条电缆的导线实现电连接的电连接器。

[0003] 对于上述现有的应用于插拔型连接器的适配器，可在适配器上设置法兰结构，通过法兰结构上的安装孔将适配器固定在面板上 ；也可以在适配器设置金属制造的弹性夹，通过弹性夹将适配器固定到面板上。但无论采用法兰结构或者弹性夹，都只能将一个适配器独立地安装在面板上。如果需要在面板上安装多个适配器，各个适配器之间需要保持预定的距离，安装面板上相邻的适配器不能实现高密度排布，从而影响了安装面板的安装密度，造成安装空间的浪费。

实用新型内容

[0004] 本实用新型所解决的技术问题在于提供一种适配器组件和包括装置适配器组件的连接器组件，多个适配器可依次接合，从而最大限度的利用安装面板上的空间。

[0005] 根据本实用新型的一个方面的实施例，提供一种用于连接多个连接器的适配器组件，包括 ：多个适配器，每个适配器包括壳体所述壳体内形成至少一对用于插接连接器的接口 ；以及至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。

[0006] 在上述适配器组件中，每个所述适配器的壳体呈大致的长方体形，并包括限定成所述接口的第一立壁、与所述第一立壁相对的第二立壁、顶壁和底壁，所述接合装置被构造成连接多个适配器中的两个相邻适配器的相邻的第一立壁和第二立壁、和 / 或者相邻的顶壁和底壁。

[0007] 在上述适配器组件中，所述接合装置被构造成夹持多个适配器中的两个相邻适配器的相邻的第一立壁和第二立壁、和 / 或者相邻的顶壁和底壁的弹性的夹持机构。

[0008] 在上述适配器组件中，所述第一立壁、第二立壁、顶壁和底壁中的每一个包括形成

Senko Ex. 1017, Page 336
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

在壳体的内侧表面上的凹槽，所述凹槽的形状与所述夹持结构的两个夹持臂的形状大致配合，以将所述夹持结构的两个夹持臂容纳在两个相应的凹槽中。

[0009] 在上述适配器组件中，每个所述夹持结构包括在所述夹持臂的自由端相向突起形成的保持部，每个所述凹槽的远端形成贯穿所述第一立壁、第二立壁、顶壁和底壁中的每一个的通孔，所述保持部能够容纳在所述通孔中。

[0010] 在上述适配器组件中，每个夹持臂具有大致的三角形形状。

[0011] 上述适配器组件进一步包括至少一对安装机构，每对安装机构中的一个安装机构安装在一排适配器中位于最外侧的第一立壁或者第二立壁上，每个安装机构包括：主体部，所述主体部的长度为一个适配器的纵向长度的大约一半，并且每个主体部包括一个第一端和一个与所述第一端相对的第二端；安装耳部，从所述第一端向外垂直延伸形成；辅助夹持装置，从所述第二端向内弯折大约 180 度形成，以接合到位于最外侧的立壁的凹槽中。

[0012] 在上述适配器组件中，所述安装耳部上设有安装孔，所述辅助夹持装置的自由端设有弹性的夹持突起。

[0013] 在上述适配器组件中，每个接合装置包括：至少一个第一水平接合装置，从所述第一壁外侧在水平方向上延伸形成；以及至少一个第二水平接合装置，形成在所述第二立壁外侧，所述第一水平接合装置和第二水平接合装置被构造成在形状上彼此卡接配合，以将所述多个适配器依次并排地接合在一起。

[0014] 在上述适配器组件中，所述第一水平接合装置包括：连接部，从所述第一立壁外侧在水平方向上延伸形成；以及接合部，从所述连接部的末端在至少一个方向上平行于所述第一立壁延伸形成。所述第二水平接合装置包括：容纳槽，形成在所述第二立壁上，并被构造成容纳另一个适配器的第一水平接合装置的接合部；以及第一开口，与所述容纳槽连通，所述另一个适配器的接合部能够通过所述第一开口插入所述接合部。

[0015] 在上述适配器组件中，所述第二水平接合装置还包括：第二开口，与所述容纳槽连通并被构造成与所述另一个适配器的连接部相配合，在所述另一个适配器的接合部插入所述容纳槽的过程中，所述另一个适配器的连接部穿过所述第二开口。

[0016] 在上述适配器组件中，所述接合部具有大致的 U 形形状，并包括：两个具有弹性的臂部、以及连接在两个所述臂部的端部之间的基部，所述连接部连接在所述基部与所述第一立壁之间。

[0017] 在上述适配器组件中，每个臂部的末端设有突起部，当将所述另一个适配器的接合部作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第一开口的外部，以阻挡所述接合部的进一步插入。

[0018] 在上述适配器组件中，每个适配器进一步包括两个定位部，分别从所述第二立壁上突出形成，并离开所述第一开口预定距离，以当所述另一个适配器的接合部插入所述容纳槽中时，所述另一个适配器的突起部位于所述第二接合装置和所述定位部之间。

[0019] 在上述适配器组件中，所述第二水平接合装置还包括：第三开口，与所述容纳槽连通并与所述第一开口相对。每个臂部的末端设有突起部，当将所述另一个适配器的臂部的末端作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第三开口的外部，以阻挡所述另一个适配器的接合部退出所述容纳槽。

[0020] 在上述适配器组件中，所述第一水平接合装置设置在形成于所述第一立壁上的凹

Senko Ex. 1017, Page 337
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

槽内，所述第二水平接合装置从所述第二立壁凸出。

[0021] 上述适配器组件进一步包括第一安装机构和第二安装机构。第一安装机构包括：板式的第一主体部；以及第一辅助接合装置，形成在所述第一主体部的第一侧并具有与所述第一水平接合装置相同的结构，以与所述多个适配器中位于最外侧的一个适配器的第二水平接合装置结合。第二安装机构，包括：板式的第二主体部；以及第二辅助接合装置，形成在所述第二主体部的第一侧并具有与所述第二水平接合装置相同的结构，以与所述多个适配器中位于最外侧的另一个适配器的第一水平接合装置结合。

[0022] 在上述适配器组件中，在上述适配器组件中，所述第一安装机构还包括形成在所述第一主体部的第二侧的第一安装耳部；所述第二安装机构还包括形成在所述第二主体部的第二侧的第二安装耳部。

[0023] 在上述适配器组件中，所述第一安装耳部和第二安装耳部都设有至少一个安装孔。

[0024] 在上述适配器组件中，每个接合装置包括：第一垂直接合装置，从所述第一立壁和第二立壁的外侧靠近所述顶壁或底壁处延伸形成；以及第二垂直接合装置，设置在所述第二立壁和第一立壁的外侧靠近所述底壁或顶壁处，并被构造成用于插入并固定另一个适配器的第一垂直接合装置的插槽，当所述第一垂直接合装置和第二垂直接合装置相互接合时使得所述多个适配器在垂直方向上叠层地接合在一起。

[0025] 在上述适配器组件中，每个所述第一垂直接合装置具有大致的 U 形形状，并包括：第一臂部，从所述第一立壁和第二立壁的外侧的上端或下端向外凸出形成；第二臂部，在所述顶壁或者底壁之外平行于所述第一臂部延伸；以及基部，连接在所述第一臂部和第二臂部之间，以在所述第一臂部和第二臂部形成所述插槽，每个所述第二垂直接合装置包括从所述第一立壁和第二立壁的外侧的下端或者上端向外凸出形成细长突起，其中所述细长突起能够容纳在另一个适配器的第一臂部和第二臂部之间的插槽中，以将两个适配器叠置地接合在一起。

[0026] 在上述适配器组件中，所述第二臂部的自由端设有向内延伸的阻挡部，以阻挡所述细长突起从所述第一臂部和第二臂部之间的空间脱离。

[0027] 在上述适配器组件中，每个接合装置包括垂直接合装置和容纳槽。所述垂直接合装置具有大致的 L 形形状，并包括：基部，从所述顶壁或者底壁向外垂直延伸；以及臂部，从所述基部的末端平行于所述顶壁或者底壁的外表面延伸。容纳槽形成在所述底壁或者顶壁中，并被构造成容纳另一个适配器的所述臂部，以将两个适配器叠置地接合在一起。

[0028] 在上述适配器组件中，每个所述适配器还包括从所述第一立壁和第二立壁凸出形成的安装机构，以将所述适配器组件安装到安装面板上。

[0029] 根据本发明另一方面的实施例，提供一种连接器组件，包括：上述各种实施例中所述的适配器组件；以及多个连接器，每个连接器连接至相应的适配器的一个接口内。

[0030] 在上述连接器组件中，所述连接器为光纤连接器。

[0031] 根据本实用新型上述各种实施例的适配器组件，多个适配器可以在水平方向上并排地依次接合或者在垂直方向上叠置地依次接合，相邻的两个适配器通过例如卡扣连接方式可移除地接合在一起，能够最大限度的利用安装面板上的空间。

Senko Ex. 1017, Page 338
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

附图说明

[0032] 本实用新型将参照附图来进一步详细说明，其中：

[0033] 图 1 是示出根据本实用新型的第一种实施例的适配器组件的立体示意图；

[0034] 图 2 是示出图 1 所示适配器组件中中间一排适配器的立体示意图；

[0035] 图 3 是示出图 2 所示的中间一排适配器在组装之前的部分部件的分解示意图；

[0036] 图 4 是示出图 1 所示适配器组件中下部两排适配器的立体示意图；

[0037] 图 5 是示出图 1 所示适配器组件中一个适配器的立体示意图；

[0038] 图 6 是示出图 1 所示适配器组件中的接合装置的立体示意图；

[0039] 与 7 是示出图 1 所示适配器组件中的安装机构的立体示意图；

[0040] 图 8 是示出根据本实用新型的第二种实施例的适配器组件的立体示意图；

[0041] 图 9 是示出图 8 所示的适配器组件中一个适配器在第一侧观察的一种立体示意图；

[0042] 图 10 是示出图 9 所示的适配器在第一侧观察的另一种立体示意图；

[0043] 图 11 是示出图 9 所示的适配器在第二侧观察的一种立体示意图；

[0044] 图 12 是示出图 8 所示的适配器组件中的两个相邻的适配器接合时沿图 10 的 A-A 线（或者图 11 的 B-B 线）剖开的局部放大剖视图，以示出第一接合装置与第二接合装置的第一种接合方式的实施例；

[0045] 图 13 是示出第一接合装置与第二接合装置的另一种接合方式的实施例的放大剖视图；

[0046] 图 14 是示出图 8 所示的适配器组件中的第一安装机构的一种立体示意图；

[0047] 图 15 是示出图 8 所示的适配器组件中的第一安装机构的另一种立体示意图；

[0048] 图 16 是示出图 8 所示的适配器组件中的第二安装机构的一种立体示意图；

[0049] 图 17 是示出图 18 所示的适配器组件中的第二安装机构的另一种立体示意图；

[0050] 图 18 是示出根据本实用新型的第三种实施例的适配器组件的立体示意图；

[0051] 图 19 是示出图 18 所示的适配器组件中一个适配器的立体示意图；

[0052] 图 20 是示出一种现有的两个光纤连接器的立体示意图；

[0053] 图 21 是示出了与图 20 所示的光纤连接器结合使用的现有的适配器的立体示意图；以及

[0054] 图 22 是示出图 21 所示的适配器沿 C-C 线剖开的剖视图。

具体实施方式

[0055] 虽然将参照含有本实用新型的较佳实施例的附图充分描述本实用新型，但在此描述之前应了解本领域的普通技术人员可修改本文中所描述的实用新型，同时获得本实用新型的技术效果。因此，须了解以上的描述对本领域的普通技术人员而言为一广泛的揭示，且其内容不在于限制本实用新型所描述的示例性实施例。

[0056] 本实用新型的适配器 100 可与例如图 20 所示的光纤连接器 400（例如 LC 光纤连接器）结合或者本申请人在中国专利申请 CN201210037495.6 中所述的连接器，将例如两条光缆 300 的光纤进行接续、分配或者转接。根据本实用新型的各种实施例的用于连接多个例如图 20 所示的连接器的适配器组件，包括：多个适配器，每个适配器包括例如由塑料材

Senko Ex. 1017, Page 339
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

料制成的壳体，所述壳体内形成至少一对用于插接连接器的接口；以及至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。例如，多个适配器在水平方向上并排地和／或在垂直方向上叠置地固定在一起。

[0057] 图 1-7 示出了根据本实用新型的第一种示例性实施例的适配器组件 100。该适配器组件 100 包括 3 排 3 列（共 9 个）适配器 10。每个适配器 10 的壳体 1 呈大致的长方体形，并包括限定成接口 2 的第一立壁 11、与第一立壁 11 相对的第二立壁 12、顶壁 13 和底壁 14。接合装置被构造成连接多个适配器 10 中的两个相邻适配器的相邻的第一立壁 11 和第二立壁 12、和／或者相邻的顶壁 13 和底壁 14。进一步地，所述接合装置被构造成夹持两个相邻适配器 10 的相邻的第一立壁 11 和第二立壁 12、和／或者相邻的顶壁 13 和底壁 14 的弹性的夹持机构 3。

[0058] 在进一步的实施例中，如图 5 所示，第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个包括形成在它们各自的内侧表面上的凹槽 111、121、131、141，凹槽 111、121、131、141 的形状大致相同并且与夹持结构 3 的两个夹持臂 30 的形状大致配合，以将夹持结构 3 的两个夹持臂 30 容纳在两个相应的凹槽中。例如，如图 2 和 3 所示，夹持结构 3 的两个夹持臂 30 容纳在同一排中第一适配器的第二立壁 12 的凹槽 121 和第二适配器的第一立壁 11 的凹槽 111 中，这样可以将多个适配器 10 并排地依次固定在一起。另外，如图 4 所示，夹持结构 3 的两个夹持臂 30 容纳在同一列中上部适配器的底壁 14 的凹槽 141 和下部适配器的顶壁 13 的凹槽 131 中，这样可以将多个适配器 10 叠置地依次固定在一起。每个夹持臂 30 具有大致的三角形形状，这样便于将夹持结构 3 推入相应的凹槽中。在一种实施例中，顶壁 13 上的凹槽 131 形成在用于容纳例如如图 20 所示的连接器 400 的锁定结构的容纳槽的顶壁上。

[0059] 由于在第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个都包括形成在它们各自的内侧表面上的凹槽 111、121、131、141，当两个适配器 10 放置在一起时，无论是叠置放置还是并排放置，都有两个壁，即一个适配器的第二立壁 12 和另一适配器的第一立壁 11 贴靠在一起，或者一个适配器的底壁 14 和另一适配器的顶壁 13 贴靠在一起，并且形成在它们是内表面上的凹槽 212 和 111、或者 141 和 131 彼此相对地并置在一起，从而可以使得夹持结构 3 的夹持臂 30 进入这些凹槽，并将这两个适配器固定在一起。因此，本实用新型的第一实施例的适配器，可以利用夹持结构 3 实现叠置布置和／或并排布置（叠置布置和并排布置中的至少一种），降低了适配器的安装空间。当本实用新型的适配器组件中的多个适配器在垂直方向上叠置时，特别适合于安装本申请人在中国专利申请 CN201210037495.6 中所述的连接器。

[0060] 在进一步的实施例中，每个夹持结构 3 包括在夹持臂 30 的自由端相向突起形成的保持部 301，每个凹槽的远端形成贯穿第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个的通孔 15，每个保持部 301 能够容纳在相应的通孔 15 中。这样，在将夹持结构 3 推入凹槽中的过程中，突出的保持部 301 可以进入通孔 15 中，从而有利于保持夹持结构 3 与凹槽之间的相对牢固的结合。可替换地，通孔也可以不穿过壳体 1 的壁，而只是形成为比凹槽的其它部位更往深的凹陷。

[0061] 本实用新型第一实施例的适配器组件 100 进一步包括至少一对安装机构 4，每对

Senko Ex. 1017, Page 340
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

安装机构 4 中的一个安装机构安装在一排适配器中位于最外侧的第一立壁 11 或者第二立壁 12 上。如图 7 所示，每个安装机构 4 包括 ：由例如板形材料制成的长条形的主体部 41、安装耳部 42 和辅助夹持装置 43。主体部 41 的长度为一个适配器 10 的纵向长度的大约一半，并且每个主体部 41 包括一个第一端和一个与所述第一端相对的第二端。安装耳部 42 从主体部 41 的第一端向外垂直延伸形成。辅助夹持装置 43 从主体部 41 第二端向内弯折大约 180 度形成，以接合到位于最外侧的第一立壁 11 或者第二立壁 12 的凹槽 111 或者 121 中。另外，安装耳部 42 上设有安装孔 421，辅助夹持装置 43 的自由端设有与通孔 15 配合的弹性的夹持突起 431。由于主体部 41 的长度为一个适配器 10 的纵向长度的大约一半，这样可以从第一立壁 11 和第二立壁 12 的两端分别安装一个安装机构 4，并且位于同一立壁外侧的安装耳部 42 贴靠在一起，从而利用安装机构 4 将整个适配器组件 100 安装在安装架上。

[0062] 图 8-17 示出了根据本实用新型的第二种示例性实施例的适配器组件 100’。在第二实施例的适配器组件 100’ 中，每个适配器 10’ 的壳体 1’ 呈大致的长方体形，并包括限定成接口 2’ 的第一立壁 11’、与第一立壁 11’ 相对的第二立壁 12’、顶壁 13’ 和底壁 14’。接合装置被构造成连接多个适配器 10’ 中的两个相邻适配器的相邻的第一立壁 11’ 和第二立壁 12’，从而将多个适配器 10’ 在水平方向上并排地固定在一起。

[0063] 进一步地，每个接合装置包括 ：至少一个第一水平接合装置 31（图 9 和 10），从所述第一立壁 11’ 外侧在水平方向上向外延伸形成 ；以及至少一个第二水平接合装置 32（图 11），形成在第二立壁 12’ 外侧，第一水平接合装置 31 和第二水平接合装置 32 被构造成在形状上彼此卡接配合，以将多个适配器 10’ 在水平方向上依次并排地接合在一起。

[0064] 参见图 9、10 和 12，每个第一水平接合装置 31 包括 ：连接部 311（参见图 12）和接合部 312。连接部 311 从第一立壁 11’外侧在水平方向上延伸形成，而接合部 312 从连接部 311 的末端在至少一个方向（例如，如图 9 和 12 所示，在向前的方向、向后的方向和向上的方向）上平行于第一立壁 11’延伸形成。参见图 11 和 12，每个第二接合装置 32 包括 ：容纳槽 321 和位于容纳槽 321 上端的第一开口 322。容纳槽 321 形成在第二立壁 12’上，并被构造成容纳另一个适配器的第一水平接合装置 31 的接合部 312。第一开口 322 与容纳槽 321 连通，所述另一个适配器的接合部 312 能够通过第一开口 322 从上向下插入容纳槽 321。

[0065] 进一步地，第二水平接合装置 32 还包括沿上下方向延伸的第二开口 323。参见图 11 和 12，该第二开口 323 与容纳槽 321 连通并被构造成与另一个适配器的连接部 311 相配合，在所述另一个适配器的接合部 312 插入容纳槽 321 的过程中，所述另一个适配器的连接部 311 穿过第二开口 323。在图 12 所示的剖视图中，容纳槽 321 由两个大致 L 形的结构限定而成，其中两个 L 形结构的两个壁从第二立壁 12’延伸形成，另两个壁相向延伸并形成第二开口 323。另一方面，接合部 312 具有大致的 U 形形状，并包括 ：两个具有弹性的臂部 313、以及连接在两个臂部 313 的端部之间的基部 314，连接部 311 连接在基部 314 与第一立壁 11’ 之间。

[0066] 更进一步地，每个臂部 313 的末端设有突起部 315，当将另一个适配器的接合部 312 作为插入端经第一开口 322 从上向下插入容纳槽 321 中时，所述另一个适配器的突起部 315 暴露在第一开口 322 的外部，以阻挡接合部 312 的进一步插入。

[0067] 在一种实施例中，每个适配器 10’ 进一步包括两个定位部 5，分别从第二立壁 12’ 上突出形成，并离开第一开口 322 预定距离，以当另一个适配器的接合部 312 插入容纳槽

Senko Ex. 1017, Page 341
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

321 中时，所述另一个适配器的突起部 315 位于第二水平接合装置 32 和定位部 5 之间。这样，突起部 315 将阻挡接合部 312 进一步插入容纳槽 321 或者向上从容纳槽 321 脱离。可以在突起部 315 的上下表面设置成倾斜的引导面，以通过施加较大的力，能够通过倾斜的引导面使突起部 315 脱离第二接合装置 32 或定位部 5 的阻挡。

[0068] 上面描述了接合部 312 为图 9 和 10 所示的开口向上的 U 形机构的实施例，但本实用新型并不局限于此。在另一种实施例中，接合部 312 可以是开口向下的 U 形机构，而且连接部连接至基部的最上端，这样可以不需要设置第二开口。在此实施例中，第二水平接合装置 32 还包括与容纳槽 321 连通并与第一开口相对第三开口（未示出），并且每个臂部的末端设有突起部，当将另一个适配器的臂部的末端作为插入端经过第一开口从上向下插入容纳槽 321 中时，所述另一个适配器的突起部暴露在第三开口的外部，以阻挡所述另一个适配器的接合部退出容纳槽 321。

[0069] 在上述实施例中，第一水平接合装置 31 设置在形成于第一立壁 11’上的凹槽 112 内，而第二水平接合装置 32 从第二立壁 12’凸出。这样，当第一接合装置与第二接合装置接合时，两个相邻的适配器的第一立壁 11’和第二立壁 12’彼此靠近，以节约空间。

[0070] 在另一种可替换的实施例中，如图 13 所示，第一水平接合装置的连接部 311’和接合部 312’都设置在第一立壁 11A 的外表面之外，而第二水平接合装置的容纳槽 321’形成于第二立壁 12A 内，即整个第二水平接合装置都不超出第二立壁 12A 的外表面之外。这样，当第一水平接合装置与第二水平接合装置接合时，两个相邻的适配器的第一立壁 11A 和第二立壁 12A 也能够彼此靠近，以节约空间。

[0071] 根据本实用新型的第二实施例的适配器组件 100’，如图 14-17 所示，还包括第一安装机构 6 和第二安装机构 7。第一安装机构 6 包括板式的第一主体部 61 以及第一辅助接合装置 62。第一辅助接合装置 62 形成在第一主体部 61 的第一侧并具有与第一水平接合装置 31 相同的结构，以与多个适配器中位于最外侧的一个适配器的第二水平接合装置 32 结合，从而将安装机构 6 安装在该最外侧的适配器上。第二安装机构 7，包括板式的第二主体部 71 和第二辅助接合装置 72。第二辅助接合装置 72 形成在第二主体部 71 的第一侧并具有与第二水平接合装置 32 相同的结构，以与所述多个适配器中位于最外侧的另一个适配器的第一水平接合装置 31 结合，从而将安装机构 7 安装在该最外侧的另一适配器上。

[0072] 进一步地，第一安装机构 6 还包括形成在第一主体部 61 的第二侧的第一安装耳部 63；第二安装机构 7 还包括形成在第二主体部 71 的第二侧的第二安装耳部 73。第一安装耳部 6 和第二安装耳部 7 都设有至少一个安装孔 64 和 74，以通过例如螺栓之类的连接部件将整个适配器组件 100’安装在安装面板（未示出，可参见图 11）上。

[0073] 参见图 18 和 19，根据本实用新型的第三实施例的适配器组件 100”，包括多个适配器 10”。每个适配器 10”包括两个第一垂直接合装置 31’和两个第二垂直接合装置 32’，两个第一垂直接合装置 31’分别设置在第一立壁 11”和第二立壁的外侧的上端，而且两个第二垂直接合装置 32’分别设置在第一立壁 11”和第二立壁的外侧的下端，两个第一垂直接合装置 32’和两个第二垂直接合装置 32’可分别接合，使得多个适配器 10”在垂直方向上依次叠置地接合在一起。

[0074] 进一步地，在适配器组件 100”中，每个第一垂直接合装置 31’具有大致的 U 形形状，并包括：第一臂部 313’，从第一立壁 11”或第二立壁的外侧的上端向外凸出形成；第二

Senko Ex. 1017, Page 342
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

臂部 314’，在顶壁 13”上部之外平行于第一臂部 31’延伸；以及基部 315’，连接在第一臂部 313’和第二臂部 314’之间。每个第二垂直接合装置 32’包括从第一立壁 11”或第二立壁的外侧的下端向外凸出形成细长突起，其中细长突起能够容纳在另一个适配器的第一臂部 313’和第二臂部 314’之间，以将两个适配器叠置地接合在一起。另外，第一臂部 313’的内侧与顶壁 13”的上表面平齐，所述细长突起的下侧与底壁的下表面平齐。这样，在两个上下相邻的适配器中，上一个适配器的底壁可以与下一个适配器的顶壁彼此靠近，从而降低整个适配器组件的安装空间。

[0075] 在进一步的实施例中，第二臂部 314’的自由端设有向内延伸的阻挡部 316’，以阻挡所述细长突起从第一臂部 313’和第二臂部 314’之间的空间脱离。另外，每个适配器 10”还包括从第一立壁 11”和第二立壁凸出形成的安装机构 8，以将整个适配器组件 100”安装到安装面板 101 上。

[0076] 在一种可替换的实施例中，每个第一垂直接合装置具有大致的 U 形形状，并包括：第一臂部，从所述第一立壁或第二立壁的外侧的下端向外凸出形成；第二臂部，在所述底壁之外平行于所述第一臂部延伸；以及基部，连接在所述第一臂部和第二臂部之间。每个所述第二接合装置包括从所述第一立壁或第二立壁的外侧的上端向外凸出形成细长突起，其中所述细长突起能够容纳在另一个适配器的第一臂部和第二臂部之间，以将两个适配器叠置地接合在一起。另外，所述第一臂部的内侧与所述底壁的下表面平齐，所述细长突起的上侧与所述顶壁的上表面平齐。

[0077] 在另一种可替换的实施例中，每个接合装置包括垂直接合装置和容纳槽。所述垂直接合装置具有大致的 L 形形状，并包括：基部，从所述顶壁或者底壁向外垂直延伸；以及臂部，从所述基部的末端平行于所述顶壁或者底壁的外表面延伸。容纳槽形成在所述底壁或者顶壁中，并被构造成容纳另一个适配器的所述臂部，以将两个适配器在垂直方向上叠置地接合在一起。

[0078] 根据本实用新型另一方面的实施例，提供一种连接器组件，包括：上述各种实施例中所述的适配器组件；以及多个连接器，每个连接器连接至相应的适配器的一个接口内。进一步地，连接器为光纤连接器，例如 LC 光纤连接器。

[0079] 根据本实用新型上述各种实施例的适配器组件，多个适配器可以在水平方向上并排地依次接合和 / 或在垂直方向上叠置地依次接合，相邻的两个适配器通过例如卡扣连接方式可移除地接合在一起。整个适配器组件通过安装机构整体安装在安装面板上。各个适配器的外部接合结构彼此相同，内部结构与现有适配器的内部结构相同，从而可以与标准的 LC 光纤连接器进行高密度地配合，最大限度的利用安装面板上的空间。同时各个适配器可以采用模块化的设计，保证客户端根据需要选择合适数量的适配器进行模块化组合。

[0080] 虽然在上面的实施例中以光缆为接续对象对本实用新型的连接器进行了说明，但本领域的技术人员能够理解，本实用新型的连接器的一些实施例也可以应用于连接两条电缆。特别是，在例如计算机、路由器、服务器、交换机等设有插头和插座连接器的各类网络通信终端中，插头连接器可以设置本实用新型的具有倾斜臂、驱动臂和锁定突起的锁定机构。

[0081] 本领域的技术人员可以理解，上面所描述的实施例都是示例性的，并且本领域的技术人员可以对其进行改进，各种实施例中所描述的结构在不发生结构或者原理方面的冲突的情况下可以进行自由组合，从而在解决本实用新型的技术问题的基础上，实现更多种

Senko Ex. 1017, Page 343
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

连接器和适配器组件。

[0082] 在详细说明本实用新型的较佳实施例之后，熟悉本领域的技术人员可清楚的了解，在不脱离随附权利要求的保护范围与精神下可进行各种变化与改变，且本实用新型亦不受限于说明书中所举示例性实施例的实施方式。

Senko Ex. 1017, Page 344
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

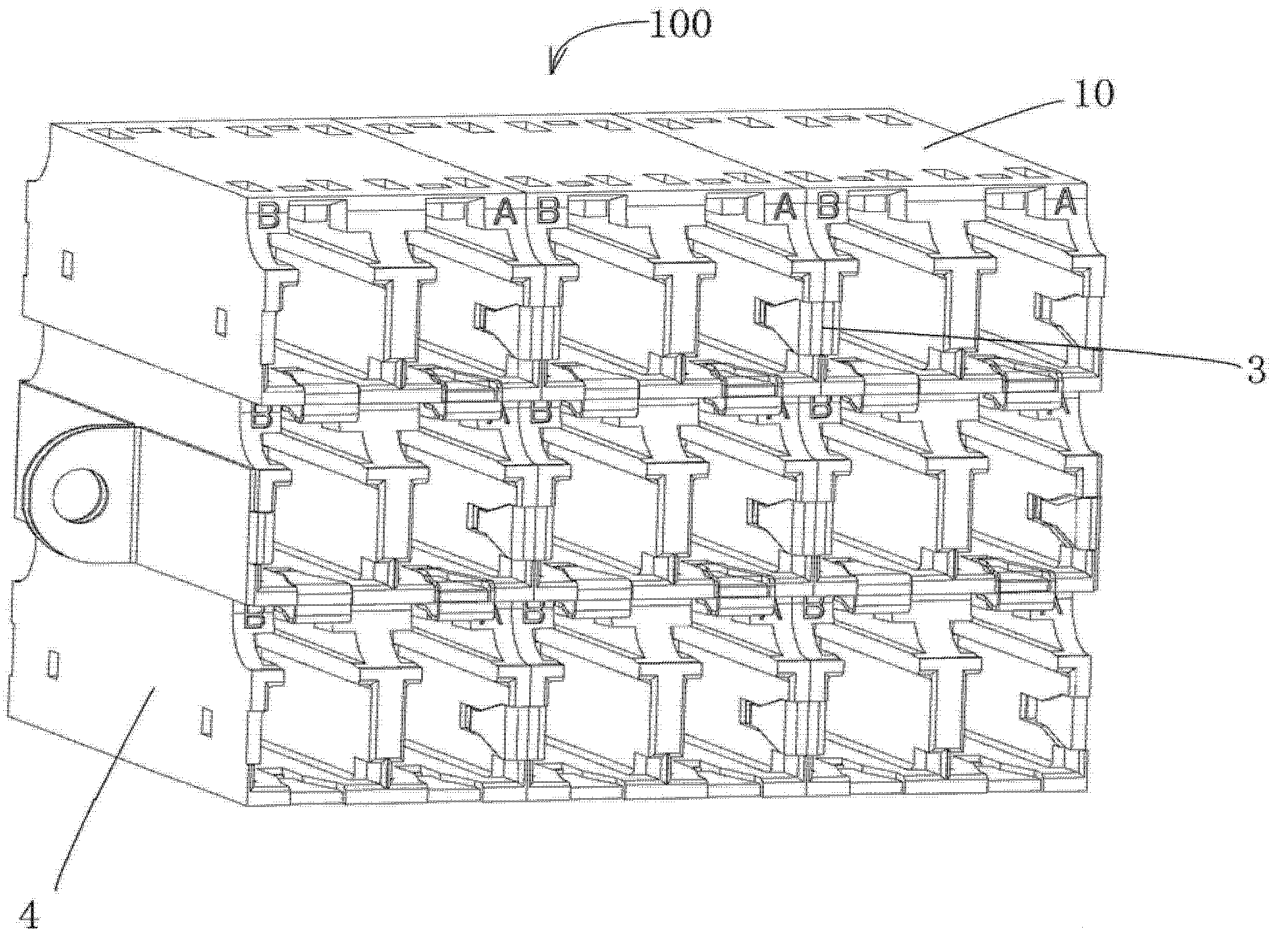


图 1

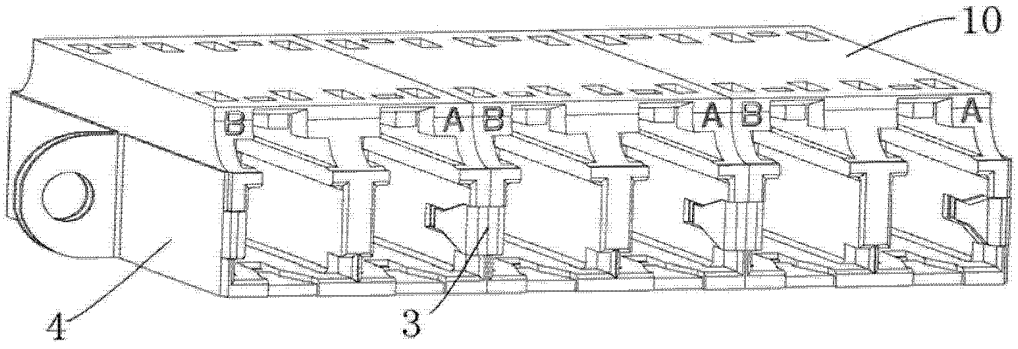


图 2

Senko Ex. 1017, Page 345
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

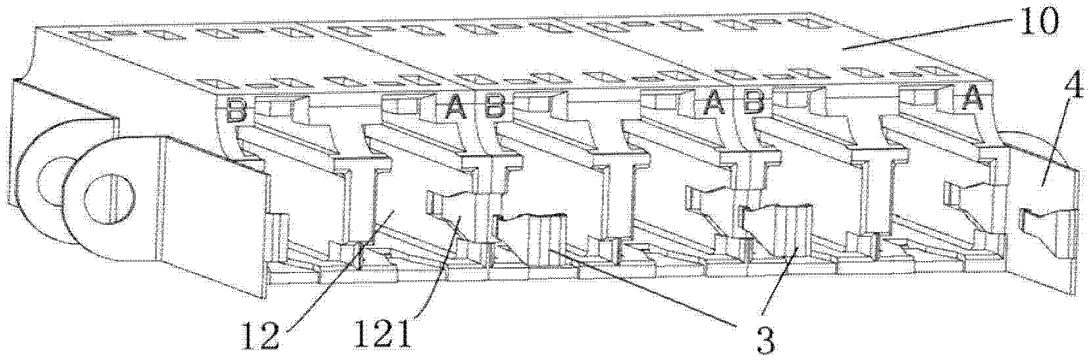


图 3

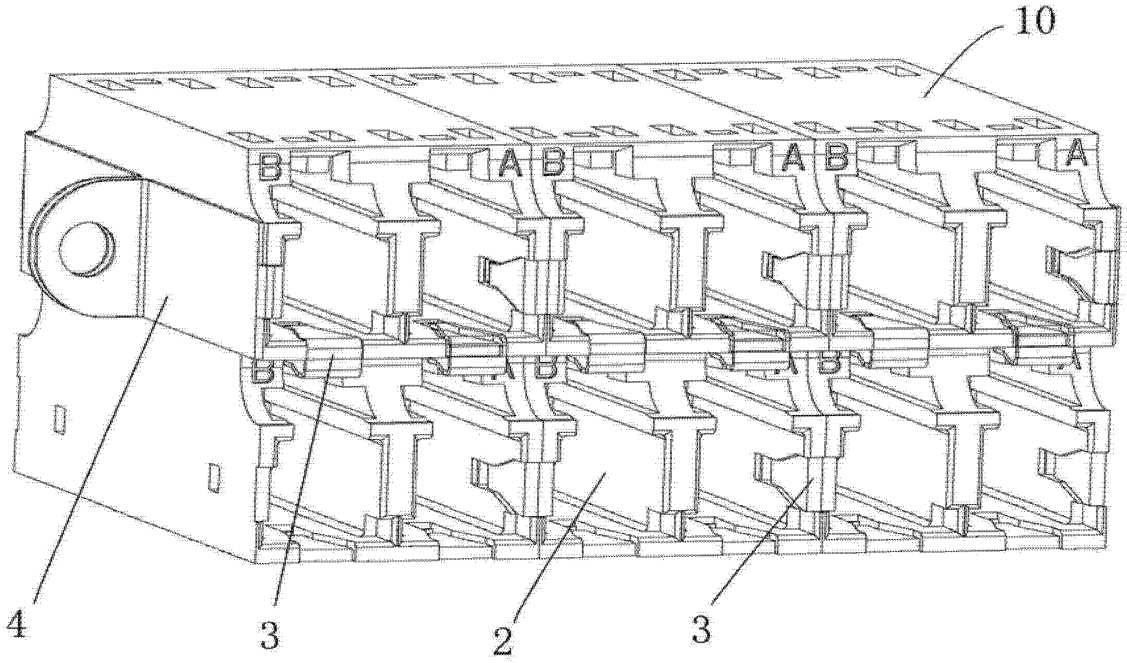


图 4

Senko Ex. 1017, Page 346
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

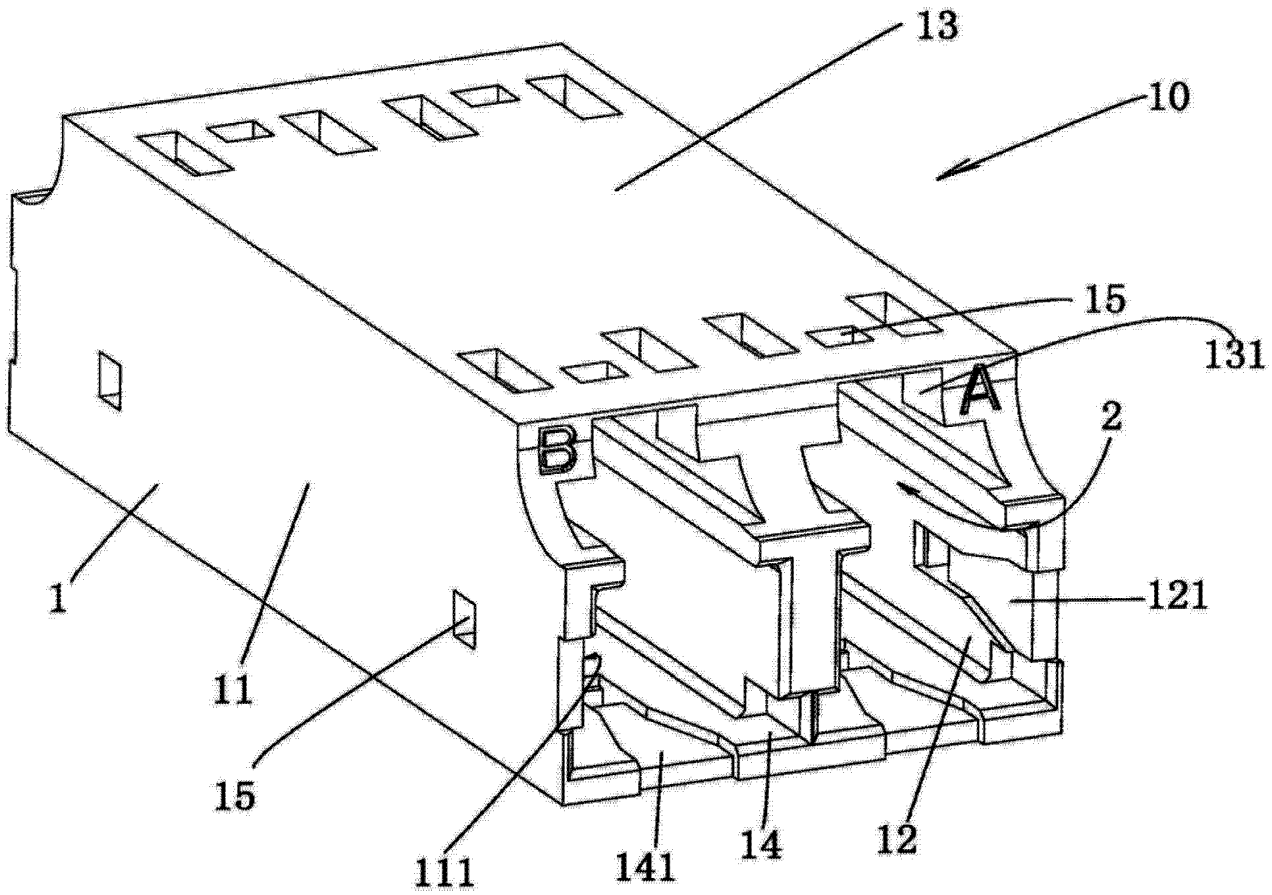


图 5

Senko Ex. 1017, Page 347
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

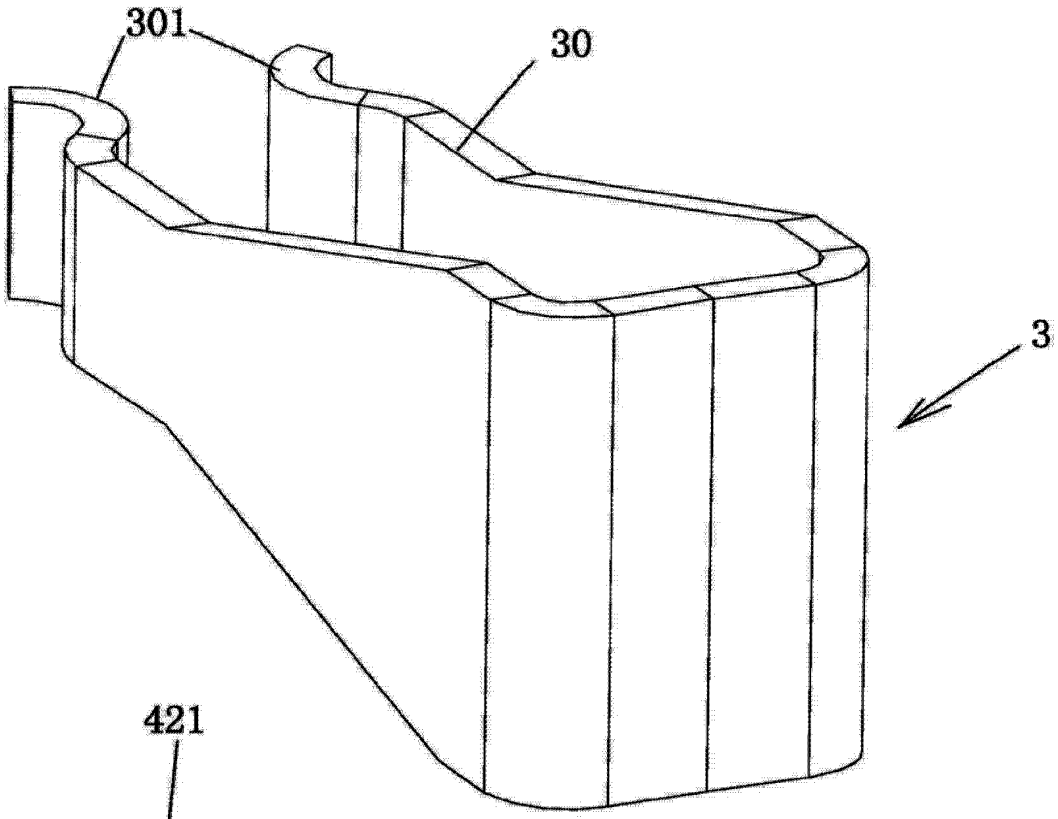


图6

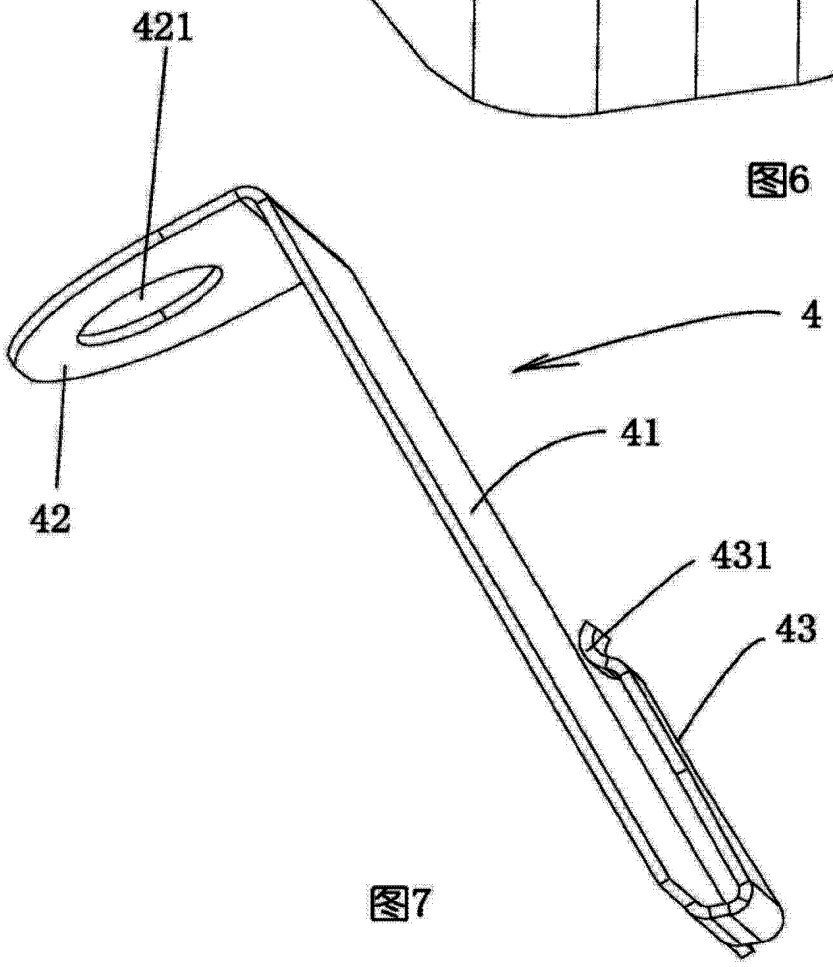


图7

Senko Ex. 1017, Page 348
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

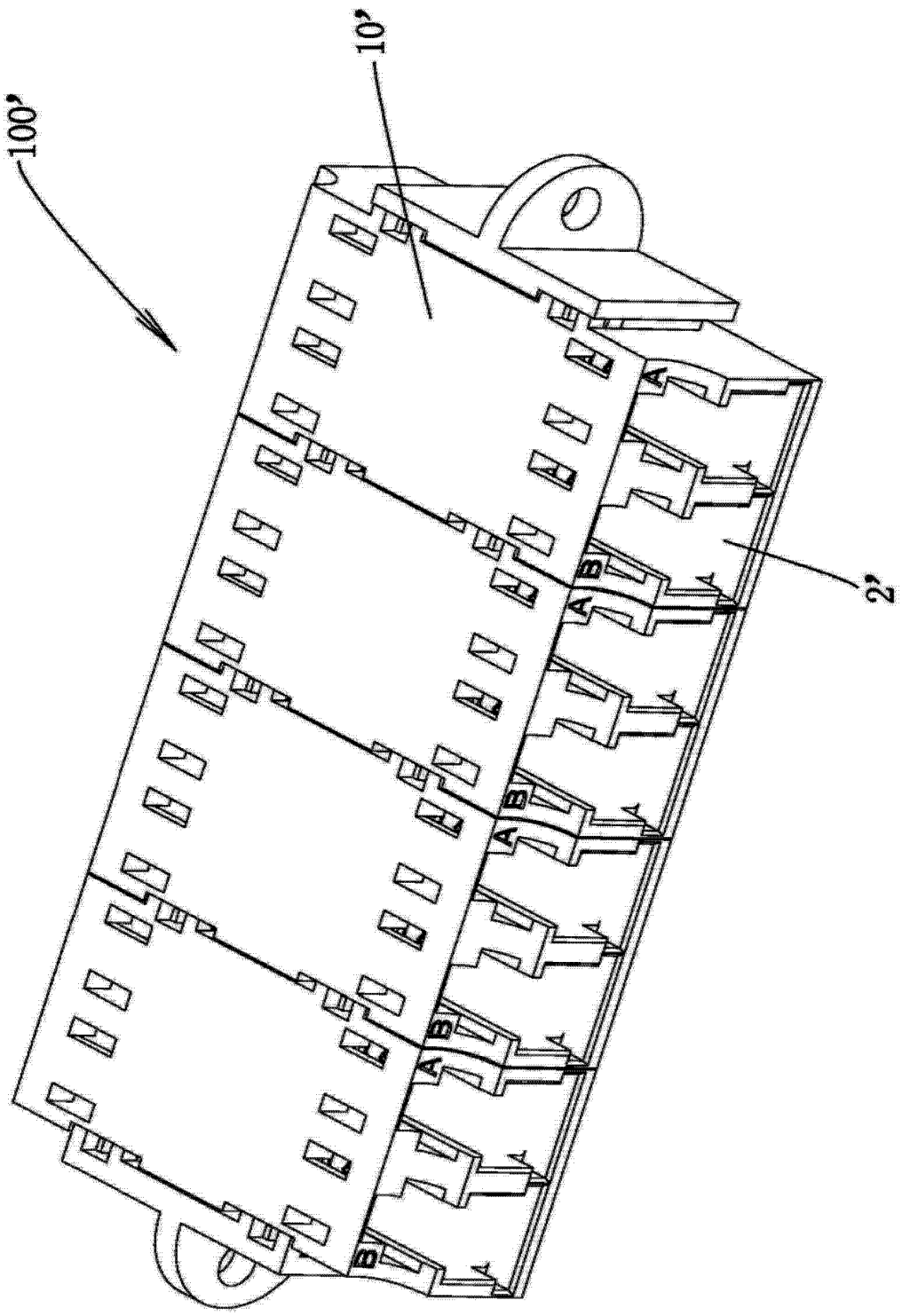


图 8

Senko Ex. 1017, Page 349
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

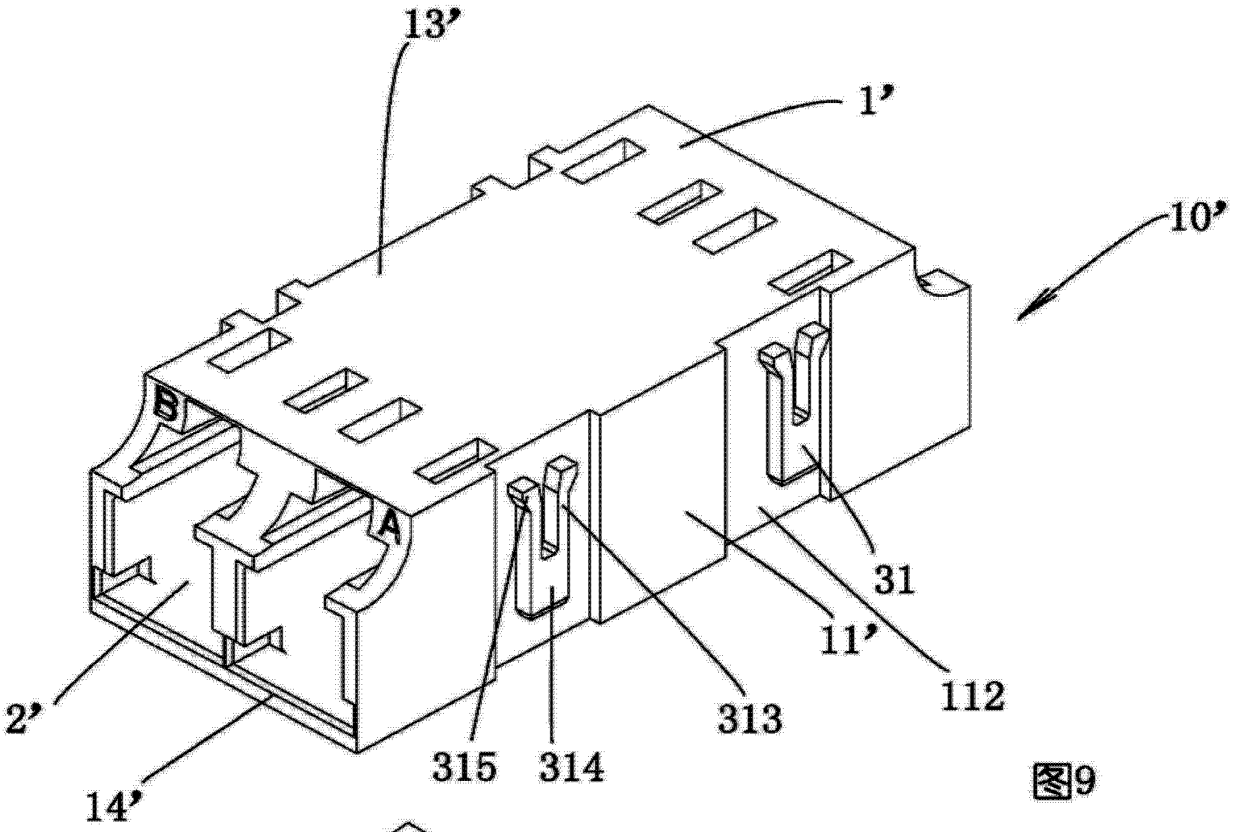


图9

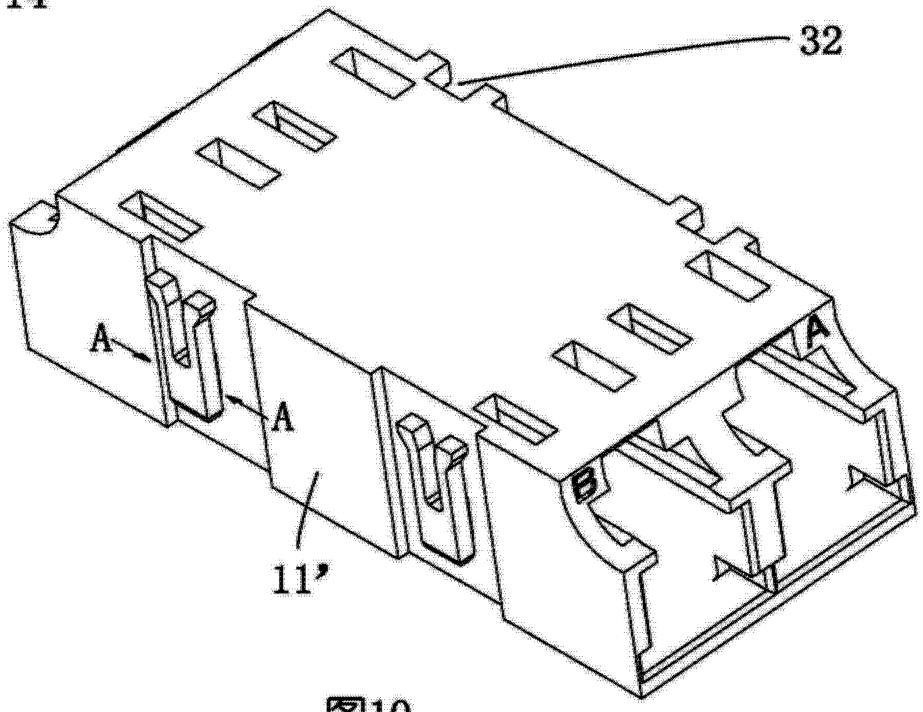


图10

Senko Ex. 1017, Page 350
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

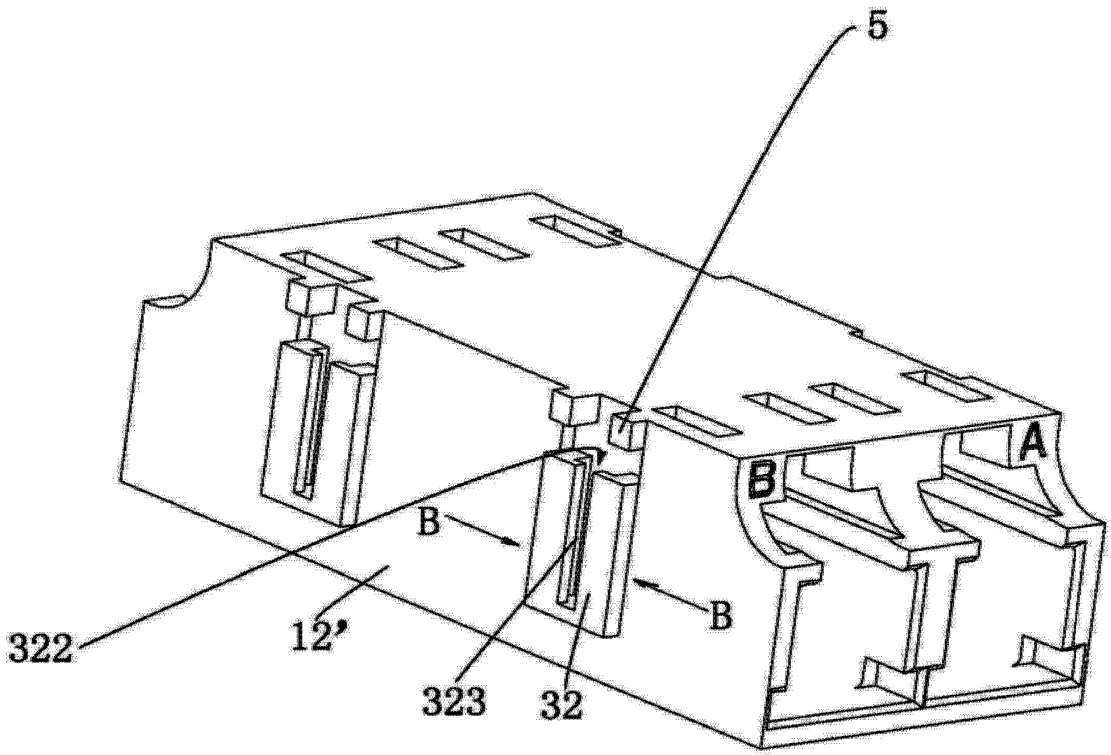


图 11

Senko Ex. 1017, Page 351
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

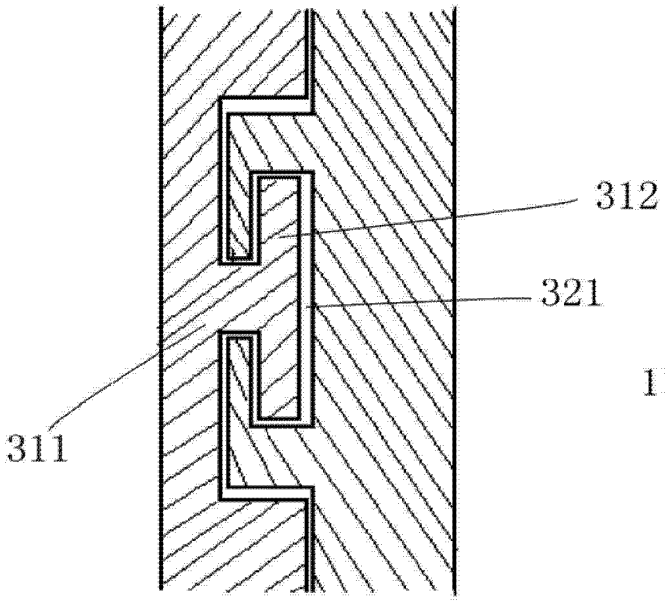


图12

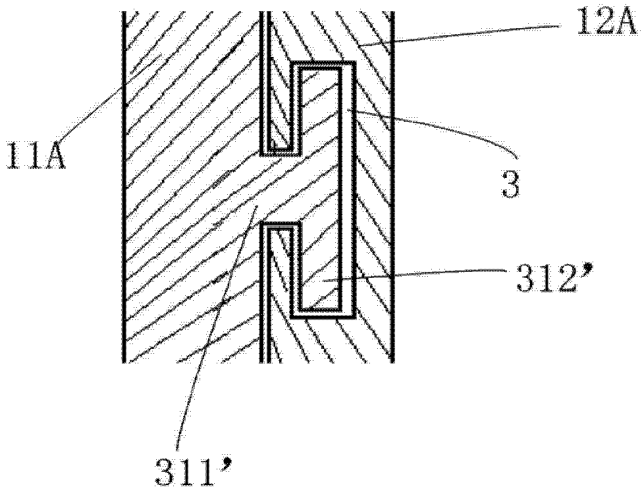


图13

Senko Ex. 1017, Page 352
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

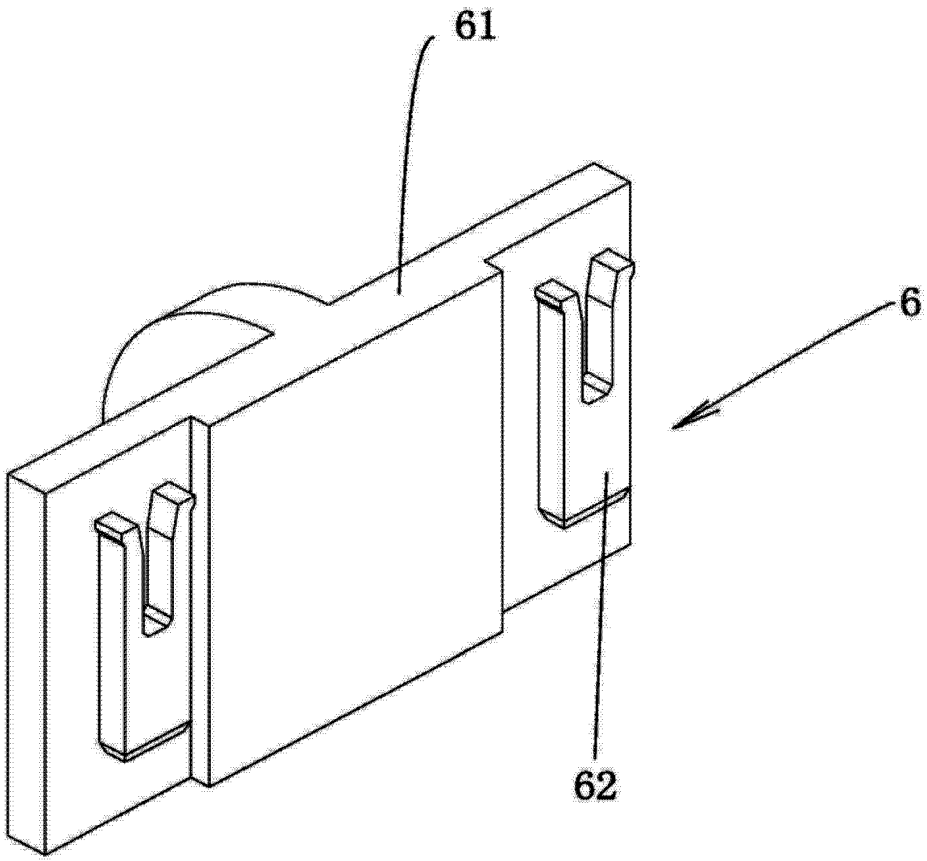


图 14

Senko Ex. 1017, Page 353
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

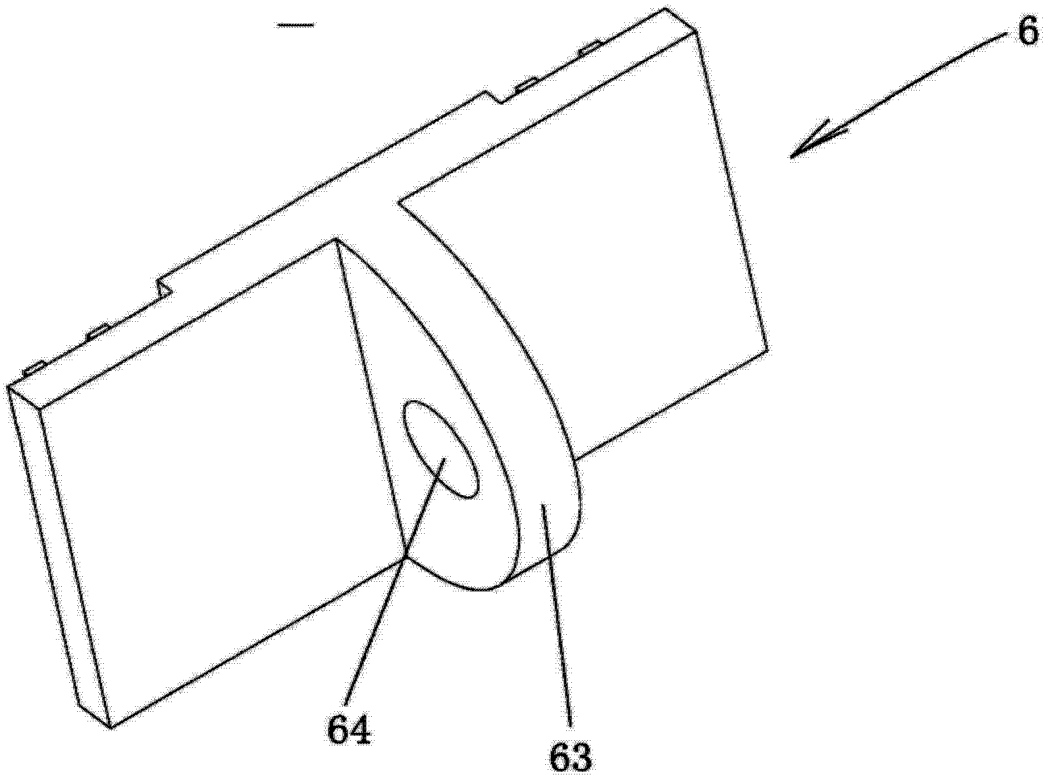


图 15

Senko Ex. 1017, Page 354
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

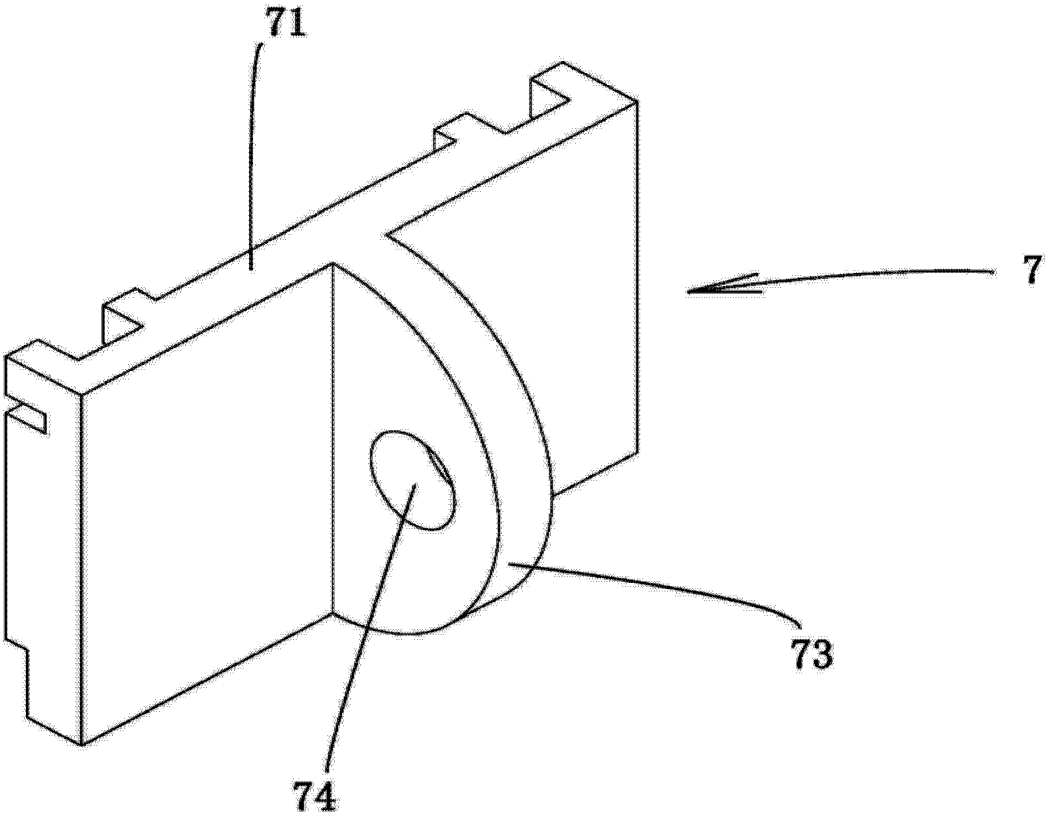


图 16

Senko Ex. 1017, Page 355
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

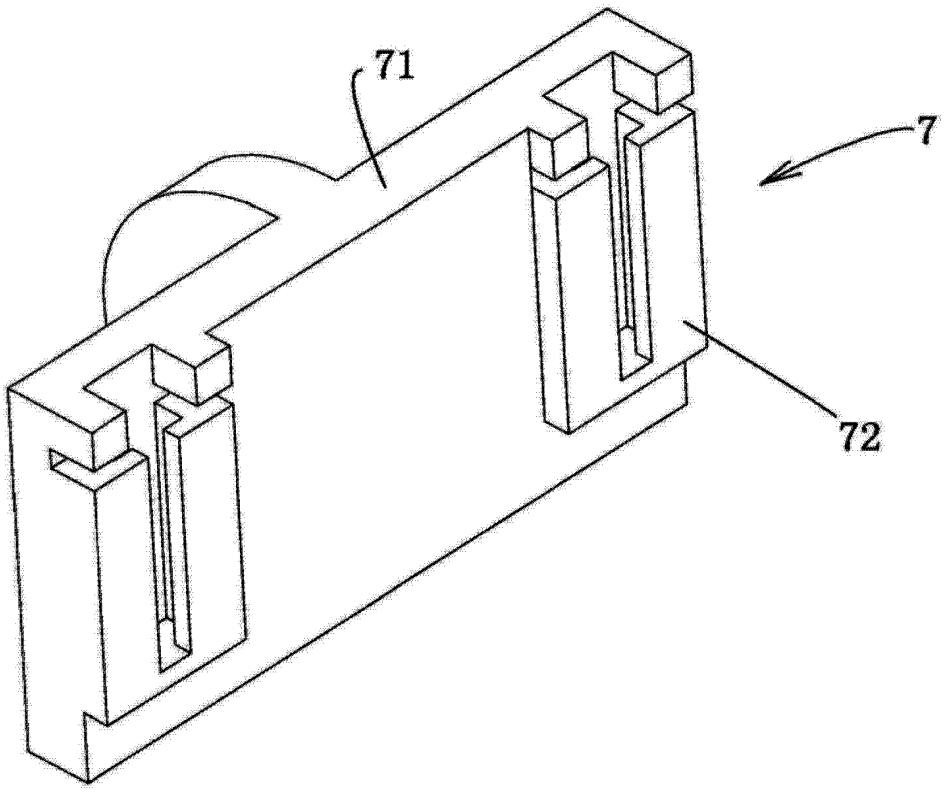


图 17

Senko Ex. 1017, Page 356
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

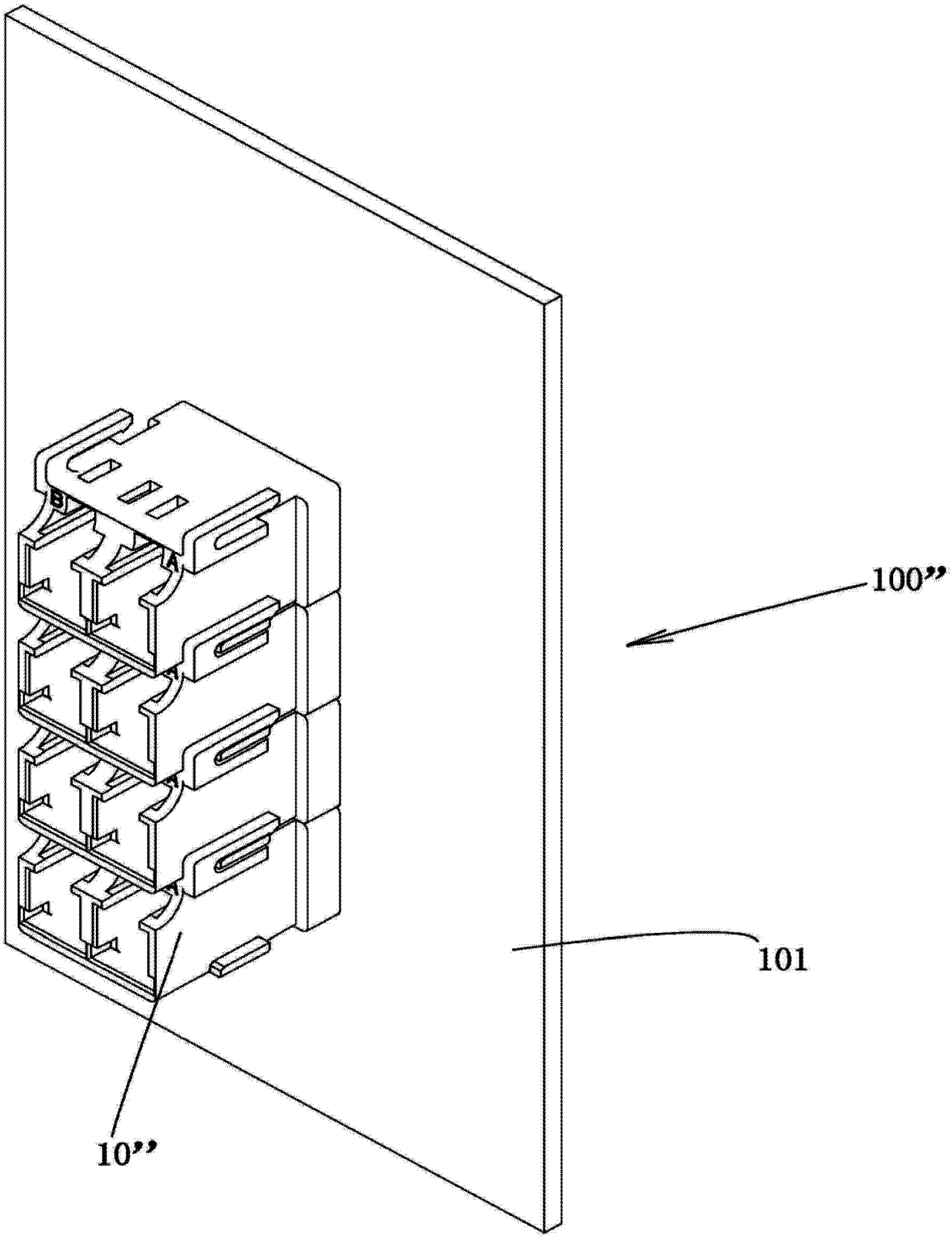


图 18

Senko Ex. 1017, Page 357
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

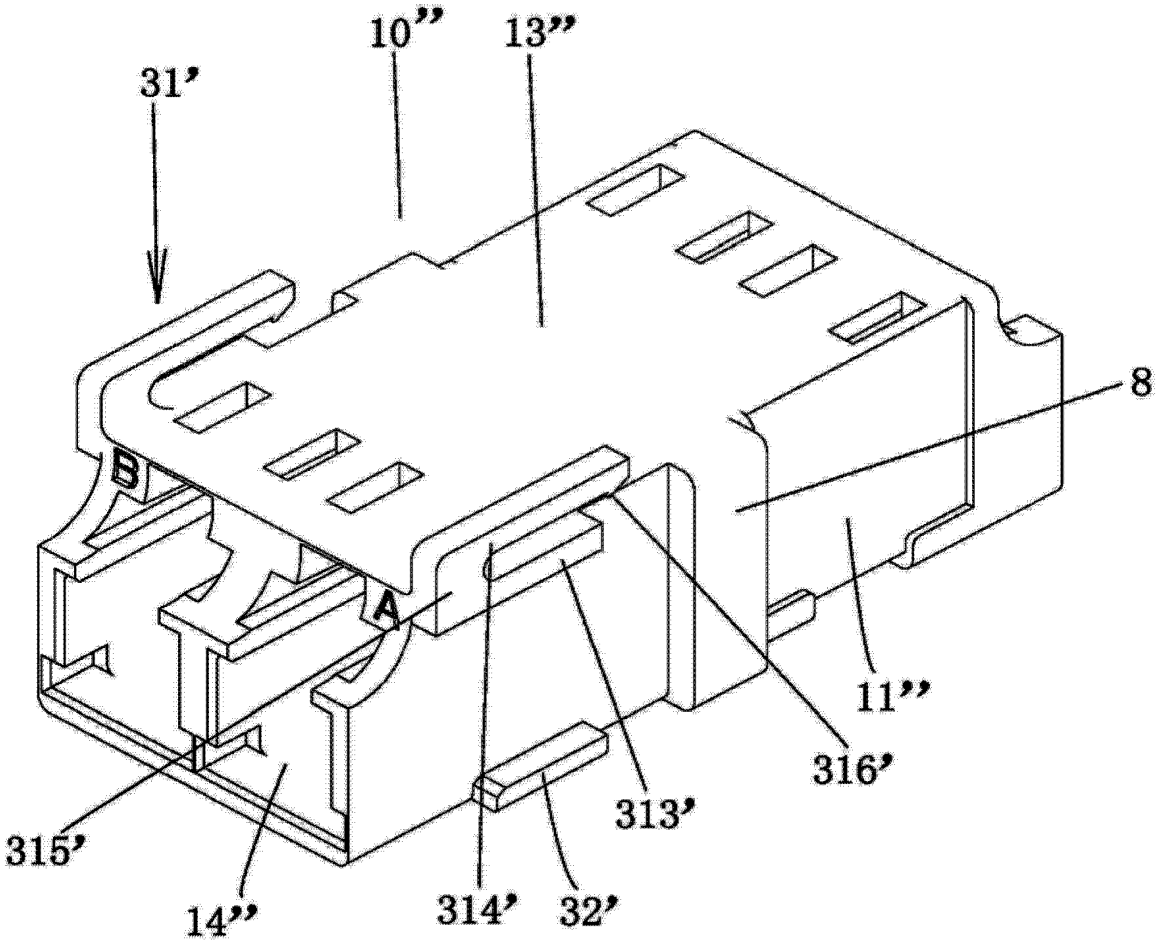


图 19

Senko Ex. 1017, Page 358
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

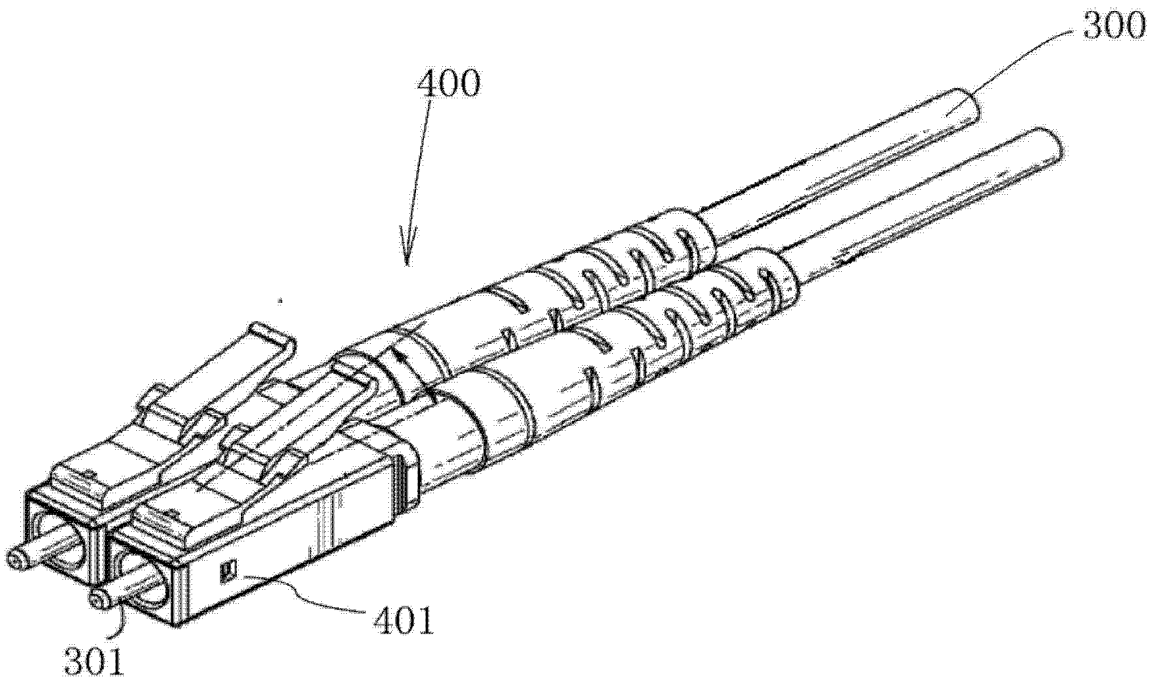


图 20

Senko Ex. 1017, Page 359
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

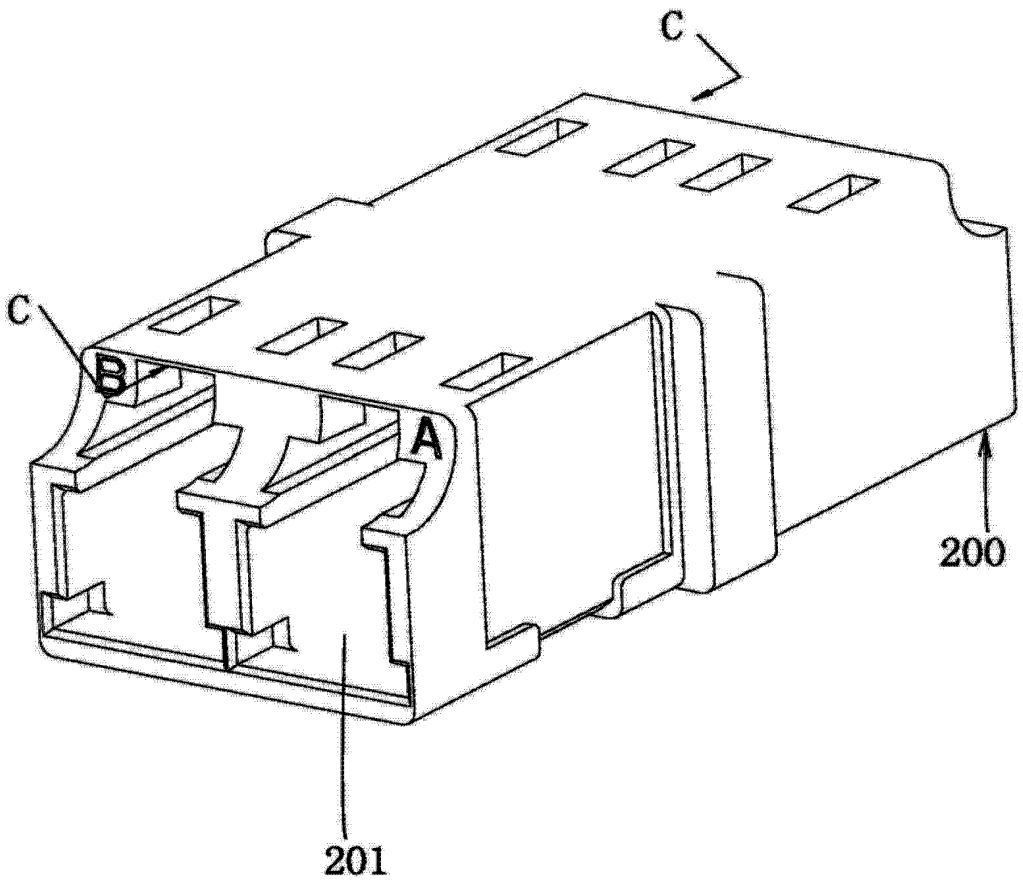


图 21

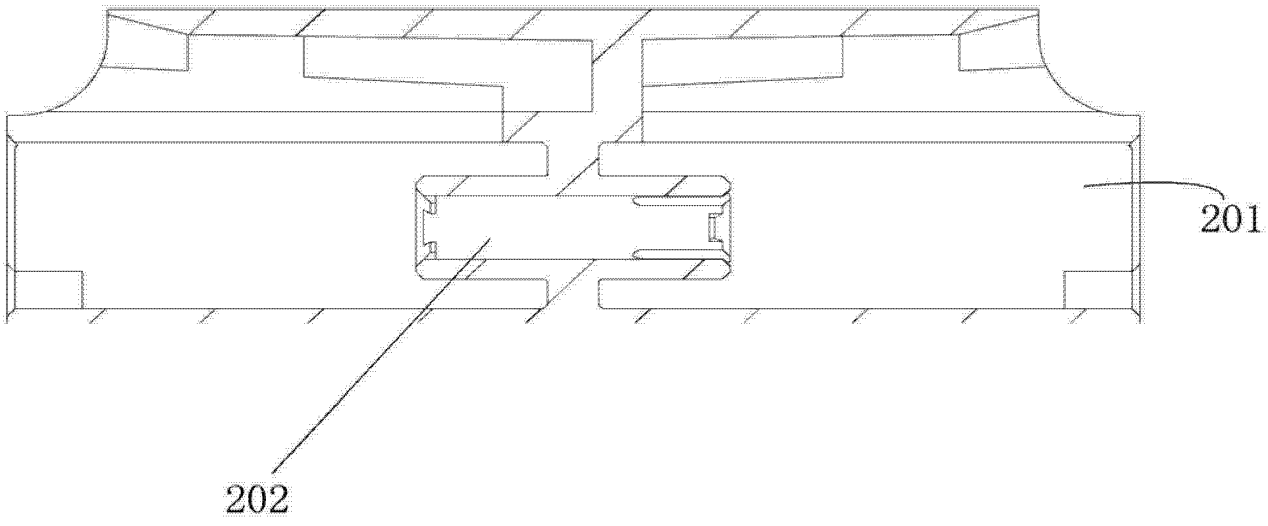


图 22

Senko Ex. 1017, Page 360
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

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(Not for submission under 37 CFR 1.99)

Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	OPAP
Examiner Name	Docket CENTRAL
Attorney Docket Number	USCO-053-05

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	2	4645295	A	1987-02-24	Pronovost	
	3	5121454	A	1992-06-09	Iwano et al.	
	4	5129024	A	1992-07-01	Honma	
	5	5537501	A	1996-07-16	Iwano et al.	
	6	6293708	B1	2001-09-25	Ohtsuka et al.	
	7	6331079	B1	2001-12-01	Grois	
	8	6361218	B1	2002-03-26	Matasek et al.	

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	Application Number	17857300
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	Art Unit	OPAP
	Examiner Name	Docket CENTRAL
	Attorney Docket Number	USCO-053-05

	9	6406192	B1	2002-06-18	Chen et al.	
	10	9086546	B2	2015-07-21	Jones	
	11	9366829	B2	2016-06-14	Czosnowski et al.	

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	1	20020172469	A1	2002-11-21	Benner	
	2	20050281509	A1	2005-12-22	Cox et al.	
	3	20080131055	A1	2008-06-05	Edward et al.	
	4	20110091158	A1	2011-04-21	Iwaya et al.	
	5	20120057824	A1	2012-03-08	Katoh	
	6	20140241689	A1	2014-08-28	Bradley et al.	

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Art Unit	OPAP
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	1	202600189	CN	U	2012-12-12	Unknown		☒
	2	2004354693	JP	A	2004-12-16	Nakagawa et al.		☒
	3	2013179197	WO	A1	2013-12-05	Xue et al.		☐

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	1	Molex Incorporated, HBMT Motherboard Adapter Drawing, dated October 31, 2005	☐

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Application Number	17857300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Art Unit	OPAP
Examiner Name	Docket CENTRAL
Attorney Docket Number	USCO-053-05

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael L. Leetzow/	Date (YYYY-MM-DD)	2023-06-29
Name/Print	Michael L. Leetzow	Registration Number	35932

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ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/29/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
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☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/29/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 20	= 1		x $100 =	100
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 4	= 1		x $480 =	480
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	580

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RENEE D HAWKINS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05

CONFIRMATION NO. 5557

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

POA ACCEPTANCE LETTER

OC000000135674560

Date Mailed: 08/09/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/04/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/aabranyos/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/857,300	07/05/2022	2883	2300	USCO-053-05	20	4

CONFIRMATION NO. 5557

UPDATED FILING RECEIPT

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

OC000000135594411

Date Mailed: 08/05/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Hiep V. Nguyen, Fort Mill, SC;
Darrell R. Childers, Hickory, NC;
Michael E. Hughes, Hickory, NC;
Jillcha Fekadu Wakjira, Hickory, NC;
Joseph P. Howard, Hickory, NC;

Applicant(s)

US Conec Ltd., Hickory, NC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 17/145,864 01/11/2021 PAT 11385415
which is a CON of 16/214,317 12/10/2018 PAT 10890723
which is a CON of 15/855,750 12/27/2017 PAT 10156684
which is a DIV of 14/214,931 03/15/2014 PAT 9857538
which claims benefit of 61/789,499 03/15/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Senko Ex. 1017, Page 369
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/27/2022

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/857,300**

Projected Publication Date: 11/10/2022

Non-Publication Request: No

Early Publication Request: No

Title

Alignment Adapter and Alignment Design for a Connector Therefor

Preliminary Class

385

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

Senko Ex. 1017, Page 370
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Senko Ex. 1017, Page 372
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/857,300

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	700
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 480 =	480
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2300

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	17/857,300
Filing Date	2022-07-05
First Named Inventor	Hiep V. Nguyen
Title	Alignment Adapter and Alignment Design for a Connector Therefor
Art Unit	2883
Examiner Name	
Attorney Docket Number	USCO-053-05

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael L. Leetzow/	Date (Optional)	2022-08-04
Name	Michael L. Leetzow	Registration Number	35932
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	US Conec Ltd.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/AIA/80 (07-12)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 152017

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

■ The address associated with Customer Number: 152017

OR

☐

Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address: US Conec, Ltd.
1138 25th Street SE
Hickory, NC 28603

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	
Name	Joseph L. Graham	Telephone	828 267 6323
Title	President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: US Conec Ltd.

Application No./Patent No.: 17/857,300 Filed/Issue Date: 2022-07-05

Titled: Alignment Adapter and Alignment Design for a Connector Therefor

US Conec Ltd., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. [x] The assignee of the entire right, title, and interest.

2. [ ] An assignee of less than the entire right, title, and interest (check applicable box):

   [ ] The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   [ ] There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. [ ] The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. [ ] The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. [x] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 060697, Frame 0494, or for which a copy thereof is attached.

B. [ ] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael L. Leetzow/	2022-08-04
Signature	Date
Michael L. Leetzow	35932
Printed or Typed Name	Title or Registration Number

Electronic Acknowledgement Receipt

EFS ID:	46345806
Application Number:	17857300
International Application Number:	
Confirmation Number:	5557
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Customer Number:	152017
Filer:	MICHAEL LEETZOW
Filer Authorized By:	
Attorney Docket Number:	USCO-053-05
Receipt Date:	04-AUG-2022
Filing Date:	05-JUL-2022
Time Stamp:	17:14:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POAUSCO05305.pdf	263028 f0c3306e1af87d7703e344b8bfd50a6310eaec7f	no	2

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	AssigneeStatement.pdf	100685 f5943c7537b856c4491dc4497d8ba3359bb80e60	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	363713	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: Unassigned
Serial No.:	17/857,300	)	
		)	Examiner: Unassigned
Filing Date:	Filed Herewith	)	
		)	
Title:	Alignment Adapter and Alignment Design for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

RESPONSE TO NOTICE OF MISSING PARTS

In response to the Notice of Missing Parts mailed on July 28, 2022, Applicant hereby provides notice that the extra claim fee required therein has been paid and the application is ready for examination.

Respectfully submitted,

/Michael L. Leetzow/
Michael L. Leetzow
Registration No. 35,932
Michael L. Leetzow, P.A.
170 Bella Vista Terr Unit D
Nokomis, FL 34275
Telephone: 407/302-9970

Date: August 2, 2022

Electronic Patent Application Fee Transmittal

Application Number:	17857300
Filing Date:	05-Jul-2022
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Filer:	MICHAEL LEETZOW
Attorney Docket Number:	USCO-053-05

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	480	480
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt

EFS ID:	46323703
Application Number:	17857300
International Application Number:	
Confirmation Number:	5557
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Customer Number:	152017
Filer:	MICHAEL LEETZOW
Filer Authorized By:	
Attorney Docket Number:	USCO-053-05
Receipt Date:	02-AUG-2022
Filing Date:	05-JUL-2022
Time Stamp:	14:23:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$480
RAM confirmation Number	E202282E32283921
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	ResponseNoticeMissingParts05305.pdf	97757 6c46d83c8ec3a2c8fb531aa9591388559924f3bf	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38014 315d670bab3f7ac366c73ed8893308d9e573343f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	135771		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/857,300	07/05/2022		1820	USCO-053-05	20	4

CONFIRMATION NO. 5557

FILING RECEIPT

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

OC000000135460303

Date Mailed: 07/28/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Hiep V. Nguyen, Fort Mill, SC;
Darrell R. Childers, Hickory, NC;
Michael E. Hughes, Hickory, NC;
Jillcha Fekadu Wakjira, Hickory, NC;
Joseph P. Howard, Hickory, NC;

Applicant(s)

US Conec Ltd., Hickory, NC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 17/145,864 01/11/2021 PAT 11385415
which is a CON of 16/214,317 12/10/2018 PAT 10890723
which is a CON of 15/855,750 12/27/2017 PAT 10156684
which is a DIV of 14/214,931 03/15/2014 PAT 9857538
which claims benefit of 61/789,499 03/15/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Senko Ex. 1017, Page 385
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/27/2022
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/857,300**
Projected Publication Date: 11/03/2022
Non-Publication Request: No
Early Publication Request: No
Title

Alignment Adapter and Alignment Design for a Connector Therefor

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative,

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Senko Ex. 1017, Page 388
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/857,300

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	700
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 480 =	480
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2300

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/857,300	07/05/2022	Hiep V. Nguyen	USCO-053-05

CONFIRMATION NO. 5557

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

FORMALITIES LETTER

OC000000135460304

Date Mailed: 07/28/2022

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of $ **480** as an undiscounted entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. No entity status discount is in effect. If applicant is qualified for small entity status, a written assertion of small entity status must be submitted to establish small entity status. (See 37 CFR 1.27). If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **480** for **1** independent claims over 3.
- $(**0**) previous unapplied payment amount.
- $ **480** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

REPLY VIA ELECTRONIC FILING

A reply may be submitted via electronic filing only by registered users of the appropriate USPTO patent electronic filing system and must include:

- A separate document having the document description, "**Applicant response to Pre-Exam Formalities Notice**"; and
- the item(s) for which a reply period is set forth above.

For more information about electronic filing, contact the Patent Electronic Business Center (EBC) at 1-866-217-9197 or visit at https://www.uspto.gov/ebc.

NOTE: If the reply is not being submitted electronically, a copy of this notice must be included.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mphongsavan/

Senko Ex. 1017, Page 391
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

PTO/AIA/15 (10-17)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	USCO-053-05
First Named Inventor	Hiep V. Nguyen
Title	Alignment Adapter and Alignment Design for a Connector Therefor
Priority Mail Express® Label No.	Via EFS Web

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✔] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✔] **Specification** [*Total Pages* 14] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✔] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 10]
6. **Inventor's Oath or Declaration** [*Total Pages* 5] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [✔] A copy from a prior application (37 CFR 1.63(d))
7. [✔] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ADDRESS TO:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [ ] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [✔] **Other:** Application contains amendments to spec and drawings made in prior applications

Note*: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[✘] The address associated with Customer Number: 152017 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Michael L. Leetzow/	Date	2022-07-05
Name (Print/Type)	Michael L. Leetzow	Registration No. (Attorney/Agent)	35932

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Filer:	MICHAEL LEETZOW
Attorney Docket Number:	USCO-053-05

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	320	320
UTILITY SEARCH FEE	1111	1	700	700
UTILITY EXAMINATION FEE	1311	1	800	800
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1820**

Electronic Acknowledgement Receipt

EFS ID:	46111981
Application Number:	17857300
International Application Number:	
Confirmation Number:	5557
Title of Invention:	ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Customer Number:	152017
Filer:	MICHAEL LEETZOW
Filer Authorized By:	
Attorney Docket Number:	USCO-053-05
Receipt Date:	05-JUL-2022
Filing Date:	
Time Stamp:	12:11:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1820
RAM confirmation Number	E202275C12293559
Deposit Account	
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1		ApplicationUSCO-05305Final.pdf	268867 dea3506f04a5fbb8876a7737583178f7ccc814dd	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	9
	Claims	10	13
	Abstract	14	14

Warnings:					
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2	Drawings-only black and white line drawings	FinalDwgs05305.pdf	466750 3a88b2d7cc15a3c27e825813f8801b2f2a2344f9	no	10
Warnings:					
Information:					
3	Oath or Declaration filed	SignedDeclarationUSC053.pdf	672007 093628670739e9eb21b2ca719e0e7737d1b46301	no	5
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4	Application Data Sheet	USCO-053-05_USPTO_AIA14_20220701_154854.pdf	2278120 ca6d7f028d85695443e31ff0b020bb5d0e4e37ac	no	10
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5	Transmittal of New Application	USCO-053-05_USPTO_AIA15_20220701_154854.pdf	299644 41b713ec762642f1b1af160f54fbfcf752c4199d	no	2

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6	Fee Worksheet (SB06)	fee-info.pdf	43795 410b446ab36647ad2ec5de07636ff29b2a7a7b08	no	2
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ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR

BACKGROUND OF THE INVENTION

REFERENCE TO RELATED CASE

[0001] This application claims priority under 35 U.S.C. § 119 (e) to provisional application no. 61/789,499 filed on March 15, 2013, claims priority to U.S. Patent Application No. 14/214,931 filed on March 15, 2014, now U.S. Patent No. 9,857,538, under 35 U.S.C. § 120, claims priority to U.S. Patent Application No. 15/855,750, filed on December 27, 2017, now U.S. Patent No. 10,156,684, under 35 U.S.C. § 120, and also to U.S. Patent Application No. 16/214,317, filed on December 10, 2018, to be issued as U.S. Patent No. 10,890,723, under 35 U.S.C. § 120, and to U.S. Patent Application No. 17/145,864, filed on January 11, 2021, the contents of which are hereby incorporated by reference in their entirety.

FIELD OF THE INVENTION

[0002] There is a need for fiber optic connectors with fiber optic ferrules that are ganged together with a tight pitch between those fiber optic ferrules. Such a design allows for many fiber optic ferrules to be connected simultaneously while occupying less space. In addition, it allows the fiber optic ferrules to be organized in a prearranged routing of the optical fibers so that the complexity of fiber optic connector routing is reduced for the user. Typically, these ganged fiber optic ferrules are mounted into a single housing and the housings are then mated to one another. The alignment between a pair of ferrules to be mated is complex and requires tight tolerances because there is a tolerance stack-up that includes the true position of the fiber optic ferrule relative to the housing. By requiring a tight tolerance of the housing relative to the fiber optic ferrule, the designs are expensive to design, maintain, and to scale to various fiber optic ferrule counts. It is also difficult to scale to very large arrays of fiber optic ferrules within one housing due to the true position tolerance required for every fiber optic ferrule to the housings and also the larger distances from the fiber optic ferrules to the housings.

[0003] An alternative way to align the ferrules to each other is to align the ferrule holders to one another through features in the adapter. Rather than using the sides of the ferrule holder to align the ferrule holder to the adapter, top and bottom keys on the ferrule holder

align the ferrule holder relative to the adapter in the x-direction. The orientation of the ferrule holder is controlled by the width difference between the top and the bottom key. The height of the ferrule holder aligns the ferrule holder in the y direction. A plug is used to assemble a plurality of the ferrule holders together. The ferrule holders protrude through the plug so the ferrule holder features can be aligned in the adapter after the plug engages the adapter and aligns the ferrule holders with their own structures. The alignment in the X and Y directions between the ferrule holder and the adapter are maintained within 100 microns, preferably within 50 microns. The ferrule holders are relatively loosely held within the plug so as to not over constrain the ferrule holders in the adapter (greater than 100 microns). The grooves within the adapter that aligns the ferrule holders is one continuous feature for both sides of the adapter and the mating ferrule holders. By making the groove one continuous feature for both sides, the alignment the mating ferrule holders is guaranteed. The size of the groove is critical but the true position of the alignment feature relative to the adapter-to-plug alignment feature is not critical. By using this alignment mechanism, large arrays of ferrule holders can be manufactured. Only the size of the alignment mechanism in the ferrule holder and the size of the alignment mechanism in the adapter must be maintained. The true position tolerances are significantly reduced.

[0004] Thus, an adapter and adapter assembly with novel alignment features is provided to engage with alignment features on a plug, which is turn assists in aligning the ferrule holders with alignment grooves in the adapter.

SUMMARY OF THE INVENTION

[0005] The present invention is directed to an adapter for aligning fiber optic ferrules inserted from opposing sides that includes a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion, at least one groove in a top surface and a bottom surface of the first side and the second side, and a plurality of grooves disposed in a top surface and the bottom surface of the central portion, each of the plurality of grooves extending through the central portion from the first side to the second side.

Senko Ex. 1017, Page 400
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[0006] According to another aspect of the present invention, adapter assembly for aligning one plurality of optical ferrules to another plurality of optical ferrules includes an adapter having an opening extending between a first side and a second side, the adapter having a plurality of grooves in the opening and extending in a direction from the first side to the second side, a plurality of ferrule holders, each of the plurality of ferrule holders having a central opening extending from a first end to a second end to resiliently retain a fiber optic ferrule therein, each of the plurality of ferrule holders having an opening in first end and in communication with the central opening, the second end opposite the first end and through which optical fibers extend, each of the plurality of ferrule holders having a projection on opposite outside surfaces to engage a corresponding groove in the adapter, and a plug having an outside surface and an inside surface, the inside surface defining an opening through the plug to hold a plurality of ferrule holders therein adjacent one another, the plug having grooves in the inside surface to engage the projections from the plurality of ferrule holders to align and orient the ferrule holders in the plug.

[0007] In yet another aspect, a ferrule holder includes a main body having a central opening to resiliently retain a fiber optic ferrule therein, a central opening in the main body and extending from a first end to a second end to resiliently retain a fiber optic ferrule therein, the first end having an opening therein and in communication with the central opening, the second end opposite the first end and through which optical fibers extend, and a projection on opposite outside surfaces of the main body to engage a corresponding groove in an adapter.

[0008] The present invention is also directed to a fiber optic connector that includes a plurality of ferrule holders, each of the plurality of ferrule holders having a central opening extending from a first end to a second end to resiliently retain a fiber optic ferrule therein, the ferrule holder having an opening in first end in communication with the central opening, the second end opposite the first end and through which optical fibers extend, each of the plurality of ferrule holders having a projection on opposite outside surfaces to engage a corresponding groove in the adapter, and a plug having an outside surface and an inside surface, the inside surface defining an opening through the plug to hold a plurality of ferrule holders therein adjacent one another, the plug having grooves in the inside surface to engage

Senko Ex. 1017, Page 401
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

the projections from the plurality of ferrule holders to align and orient the ferrule holders in the plug.

[0009] Additional features and advantages of the invention will be set forth in the detailed description which follows, and in part will be readily apparent to those skilled in the art from that description or recognized by practicing the invention as described herein, including the detailed description which follows, the claims, as well as the appended drawings.

[00010] It is to be understood that both the foregoing general description and the following detailed description of the present embodiments of the invention, and are intended to provide an overview or framework for understanding the nature and character of the invention as it is claimed. The accompanying drawings are included to provide a further understanding of the invention, and are incorporated into and constitute a part of this specification. The drawings illustrate various embodiments of the invention and, together with the description, serve to explain the principles and operations of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[00011] Fig. 1 is a perspective view of one embodiment of an adapter assembly according to the present invention;

[00012] Fig. 2 is an exploded view of the adapter assembly of Fig. 1;

[00013] Fig. 3 is a perspective view of a cut-away view of the adapter of Fig. 1;

[00014] Fig. 4 is a front elevational view of the adapter of Fig 1.;

[00015] Fig. 5A is a top perspective view of one embodiment of a ferrule holder and ferrule that can be used in the adapter assembly of Fig. 1;

[00016] Fig. 5B is a bottom perspective view of the ferrule holder and ferrule of Fig. 5a;

[00017] Fig. 5C is a front view of the ferrule holder and ferrule of Fig. 5a;

[00018] Fig. 6A is a top perspective view of a plug and ferrule holders according to the present invention;

[00019] Fig. 6B is a bottom perspective view of the plug and ferrule holders of Fig. 6A;

[00020] Fig. 6C is a front elevational view of the plug and ferrule holders of Fig. 6A;

[00021] Fig. 7A is a partial cross sectional view of a portion of a ferrule holder of Fig. 5

Senko Ex. 1017, Page 402
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[00022] Fig. 7B is a partial cross sectional view of a portion of the center portion of the adapter;

[00023] Fig. 8 is a cross sectional view of the adapter assembly in the center of the adapter assembly; and

[00024] Fig. 9 is a cross sectional view of the adapter assembly through a ferrule holder and ferrule.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[00025] Reference will now be made in detail to the present preferred embodiment(s) of the invention, examples of which are illustrated in the accompanying drawings. Whenever possible, the same reference numerals will be used throughout the drawings to refer to the same or like parts.

[00026] Referring to Figs. 1 and 2, one embodiment of an adapter assembly **10** is illustrated. The adapter assembly **10** includes an adapter **100**, a plug **200** and a ferrule holder **300**. The adapter assembly **10** is used to align ferrules **12** to other ferrules in a tightly controlled manner and in a tighter space than has been possible before. The ferrules **12** are typically multi-fiber ferrules, particularly MT type ferrules, but the present invention may include other types of ferrules. The ferrules **12** are disposed within the ferrule holder **300** and have optical fibers **14** secured therein, which may be loose optical fibers, ribbonized optical fibers, or optical fibers in any other configuration. The ferrules **12** are resiliently held in the ferrule holders **300** using a spring push **16** that engages a spring **18**. The spring **18** then presses on a pin keeper **20**, as is known in the art, to bias the ferrules **12** forward in the ferrule holder **300**. As is described in more detail below, the ferrules **12** are held somewhat loosely within the ferrule holder **300** so that they can move relative to the ferrule holder **300** to align with other ferrules **12** that are inserted in the adapter **100** from the other side. Similarly, the ferrule holders **300** are inserted into the plug **200** and they are also loosely held in the plug **200**. That is, there is typically more than **100** microns of movement in the x and y directions (See Fig. 4.) available to the ferrule holder **300** in the plug **200**, as explained in more detail below.

Senko Ex. 1017, Page 403
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[00027] As illustrated in Figs. 5A-C, the ferrule holder **300** has a main body **302** with a central opening **304** that extends from a first end **306** to a second end **308** to house the fiber optic ferrules **12**. The first end **306** has an opening **310** therein to allow access to the ferrule **12**. The ferrule **12** may or may not exit the main body **302**. That is, the ferrule **12** may extend beyond the main body **302** as shown in the figures or it may be flush with the first end **306**. second end **308** allows for the optical fibers **14** (shown in Fig. 5A and 5B to have a boot and a covering) to exit the ferrule holder **300**. The ferrule holder **300** has a top surface **312** and a bottom surface **314**, with a cantilevered latch **316** to engage the plug **200**. The top surface **312** has a projection **320** and the bottom surface **314** has a projection **322**. The projections **320,322** are preferably elongated and have a chamfered front end. The projections **320,322** are used to engage grooves in the plug **200** and the adapter **100** to position the ferrule holders **300** with precision in the adapter **100**. The projection **320** has a width that is different that the width of projection **322** so as to act as a key in inserting the ferrule holder **300** in the plug **200**. While the projection **320** is wider than projection **322**, it could be opposite in that projection **320** is more narrow than projection **322**. The projections **320,322** are preferably on the top and the bottom surfaces **312,314** of the ferrule holder **300** to allow, as illustrated below, more ferrule holders to be inserted into the adapter **100** and the plug **200**. The projections **320,322** are used to position the ferrules **12** in the adapter in the x and y directions, eliminating the need for side walls to position the ferrule holders **300** and the ferrules **12**.

[00028] The plug **200** will now be described relative to Figs. 6A-6C. The plug **200** has an outside surface **202** and an inside surface **204**. The inside surface **204** defines an opening **206** therethrough to allow the ferrule holders **300** to be inserted therein. The inside surface **204** has a plurality of grooves **208** on a top side **210** and a corresponding plurality of grooves **212** on the bottom side **214**. The grooves **208** and **212** are dimensioned to accept the projections **320,322** from the ferrule holders **300**. It should be noted that the ferrule holders **300** are adjacent to one another, that is side-by-side without any material from the plug **200** therebetween. Applicant means that by using the term adjacent herein, there is no structure that comes between the neighboring ferrule holders **300**.

Senko Ex. 1017, Page 404
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

[00029] The outside surface **202** also has a projection **220** on the top of the plug **200**, seen in Fig. 6A, and also a projection **222** on the bottom of the plug **200**, seen in Fig. 6B. Again, as with the projections **320,322**, projection **220** has a width that is different that the width of projection **222** so as to act as a key in inserting the plug **200** into the adapter **100**. While the projection **220** is narrower than projection **222**, it could be opposite in that projection **220** is wider than projection **222**.

[00030] The plug **200** also has two cantilevered latches **230** on the sides to engage corresponding structure on the adapter **100**. There are also latch receptacles **232** on the top side of the plug **200** to engage the latches **316** of the ferrule holders **300**.

[00031] As noted above, the grooves **208** and **212** in plug **200** are dimensioned to accept the projections **320,322** from the ferrule holders **300**. There is sufficient movement in the ferrule holders **300** relative to the plug **200** that when the plug **200** and ferrule holders **300** as assembled is inserted into the adapter **100**, that the ferrule holders **300** can move to allow the projections **320,322** from the ferrule holders **300** to engage corresponding grooves in the adapter **100** as described below in more detail.

[00032] Returning to Figs. 3 and 4, the adapter **100** is illustrated in more detail. The adapter **100** has a main body **102** with an opening **104** extending between a first side **106** and a second side **108**. The first side **106** and a second side **108** are separated by a central portion **110**. The first side **106** has a top surface **112** and a bottom surface **114**. The top surface **112** has a groove **116** and the bottom surface **114** has a groove **118**. The grooves **116,118** correspond to the projections **220,222** from the plug **200**. The location of the wider groove in the adapter **100** will correspond with the wider projection on the plug **200**.

[00033] The adapter has the center portion **110**. Center portion **110** preferably has a wall **130** that extends across the opening **104** in the adapter **100** and divides the center portion **110** in half. The center portion **110** also has a raised bottom portion **132** and a dropped top portion **134** that narrows the opening **104** in the center portion **110**. The wall **130** preferably extends from the raised bottom portion **132** and a dropped top portion **134** or it may be excluded completely if there is no EMI concerns with the adapter **100**. The wall **130** has a plurality of openings **136** that are sized to allow the ferrules **12** to pass therethrough to engage a corresponding ferrule **12**. As noted above, if the ferrules **12** only extend to the end

Senko Ex. 1017, Page 405
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

of the ferrule holder **330**, then the openings **136** should be sized to allow the ferrule holders to also extend therethrough. The adapter **100** may also have an elastomeric gasket **150** that encircles an external surface of the adapter **100** to provide EMI shielding.

[00034] The raised bottom portion **132** and a dropped top portion **134** also have a plurality of grooves **140**, **142**, respectively, that extend completely across the central portion **110**. The grooves **140**, **142** are like those in the plug **200**, in that they are to engage the projections **320,322** from the ferrule holders **300**. The grooves **140**,**142** preferably extend completely across the center portion **110** as they are formed with the same insert in the mold. Therefore, the grooves **140**,**142** are sure to align the ferrule holders **300** on each side of the adapter **100** as they are inserted into the adapter **100**.

[00035] As the plug **200** with the ferrule holders **300** positioned therein are inserted into the adapter **100**, the projections **220,222** from the plug **200** engage the grooves **116,118** on the top surface **112** and the bottom surface **114** to roughly align the ferrule holders **300** with the center portion **110** and the plurality of grooves **140** in particular. Then, as the plug **200** is inserted farther into the adapter **100**, the projections **320,322** from the ferrule holders **300** engage plurality of grooves **140**, **142** to align the ferrule holders **300** with the adapter and the openings **136** in the wall **130**. When a plug **200** is inserted on the second side, the ferrules in the ferrule holders on the other side will be in alignment with the first side.

[00036] The position of the ferrule holders **300** on the first side **106** of the adapter relative to the ferrule holders **300** on the second side **108** is what allows the optical ferrules to be aligned with one another. There is no need, as discussed above, to worry about the stacking of tolerances as in the prior art. The positioning of the projections **320,322** on the ferrule holders **300** relative to the plurality of grooves **140**, **142** is important. With reference to Figs. 7A and 7B, the projections **320,322** are used to control the x and y locations of the ferrule holders **300**. The surfaces **340** of the projections **320,322** (Fig. 7A) align with the surfaces **150** in the adapter (Fig. 7B) to control the x direction of the ferrule holder **300** relative to the adapter **100**. The surfaces **352** of the ferrule holder **300** align with the surfaces **152** of the raised bottom portion **132** and the dropped top portion **134** of the center portion **110** to control the y direction of the ferrule holder **300** relative to the adapter **100**. The surfaces of

Senko Ex. 1017, Page 406
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

the projections **320,322** could also align in the y direction, given that they are parallel to the surfaces **352**.

[00037] A cross section of the adapter assembly **10** is illustrated in Fig. 8 through the center of the adapter assembly. This illustrates the projections **220,200** in the openings **116,118** of the adapter **100**. Fig. 9 is a cross sectional view of the adapter assembly **10** through a ferrule holder and ferrule illustrating the engagement of the projections **320,322** in the openings **140**, **142**.

[00038] It will be apparent to those skilled in the art that various modifications and variations can be made to the present invention without departing from the spirit and scope of the invention. Thus it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Senko Ex. 1017, Page 407
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

We claim:

1. An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion,

a first internal groove of the first top wall extending from the first side toward the central portion; and

a second internal groove of the first bottom wall extending from the opposing second side toward the central portion,

wherein the first internal groove has a first width and the second internal groove has a second width, the first width is greater than the second width, wherein the adapter is free of internal walls outwardly of the central portion in a space between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

2. The adapter of claim 1, wherein the central portion includes a wall extending across the opening in the adapter.

3. The adapter of claim 2, wherein the wall divides the central portion in half.

4. The adapter of claim 2, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

5. The adapter of claim 1, wherein the first top wall has a dropped top portion and the first bottom wall has a raised bottom portion for mitigating electromagnetic interference (EMI).

Senko Ex. 1017, Page 408
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

6. The adapter of claim 1, wherein the first top wall and the first bottom wall have a smooth plane structure in the central portion.

7. The adapter of claim 6, further comprising a wall in the central portion extending across the opening in the adapter.

8. The adapter of claim 7, wherein the wall has passageways sized to allow respective ferrules from the first fiber optic connector and the second fiber optic connector to engage.

9. The adapter of claim 1, wherein the main body has a width to receive one fiber optic connector to four fiber optic connectors.

10. An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion; and

at least one groove in a top surface and a bottom surface of the main body extending longitudinally toward the central portion from each of the first side and the second side, wherein the adapter is configured such that a first fiber optic ferrule is received at the first side and a second fiber optic ferrule is received at the second side of the adapter for alignment by the at least one groove at the top surface and the bottom surface of the main body.

11. The adapter of claim 10, wherein the at least one groove is sized differently on the top surface than on the bottom surface.

12. The adapter of claim 10, wherein the first fiber optic ferrule is disposed partially inside a first ferrule holder, and

wherein the at least one groove is sized to match a projection on an outside surface of the first ferrule holder for alignment.

13. The adapter of claim 10, wherein the central portion includes a wall extending across the opening in the adapter.

Senko Ex. 1017, Page 409
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

14. The adapter of claim 13, wherein the wall divides the central portion in half.

15. An adapter for aligning a first fiber optic connector having a first fiber optic ferrule inserted from a first side and a second fiber optic connector having a second fiber optic ferrule inserted from a second side, comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface joining the two opposing side walls, the opening extending between the first side and the second side, the first side configured to receive the first fiber optic connector and the second side configured to receive the second fiber optic connector;

a central portion inside the main body located between the first side and the second side, the first fiber optic connector and the second fiber optic connector mating in a region of the central portion; and

a first groove disposed on the top surface and a second groove disposed on the bottom surface on each of the first side and the second side, each of the first groove and the second groove extending toward the central portion from each of the first side and the second side,

wherein the first groove has a dimension different from the second groove.

16. The adapter of claim 15, wherein the first groove is wider than the second groove.

17. The adapter of claim 15, wherein the dimension of the first groove matches a dimension of a projection of the first fiber optic connector for alignment.

18. An adapter for holding fiber optic connectors, the adapter comprising:

a main body having a width and a height and an opening extending longitudinally from a first side to an opposing second side, 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, each of the first top wall and the first bottom wall extending widthwise between the two opposing side walls;

Senko Ex. 1017, Page 410
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

a central portion inside the main body located between the first side and the opposing second side, a first fiber optic connector from the first side mating with a second fiber optic connector from the opposing second side within the central portion; and

a plurality of internal grooves within a space of the adapter, the plurality of internal grooves configured to align the first fiber optic connector and the second fiber optic connector in the main body.

19. The adapter of claim 18, wherein the plurality of internal grooves are sized to receive a respective projection on each of the first fiber optic connector and the second fiber optic connector for alignment.

20. The adapter of claim 18, wherein the plurality of internal grooves extend longitudinally in a direction toward the central portion.

Senko Ex. 1017, Page 411
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR

ABSTRACT OF THE DISCLOSURE

An adapter with novel alignment features engages alignment features on a plug, providing general alignment of the ferrule holders and ferrules in the plug. After the plug engages the adapter, the ferrule holders engage a second set of alignment features in the adapter to provide fine alignment for the ferrules.

Senko Ex. 1017, Page 412
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

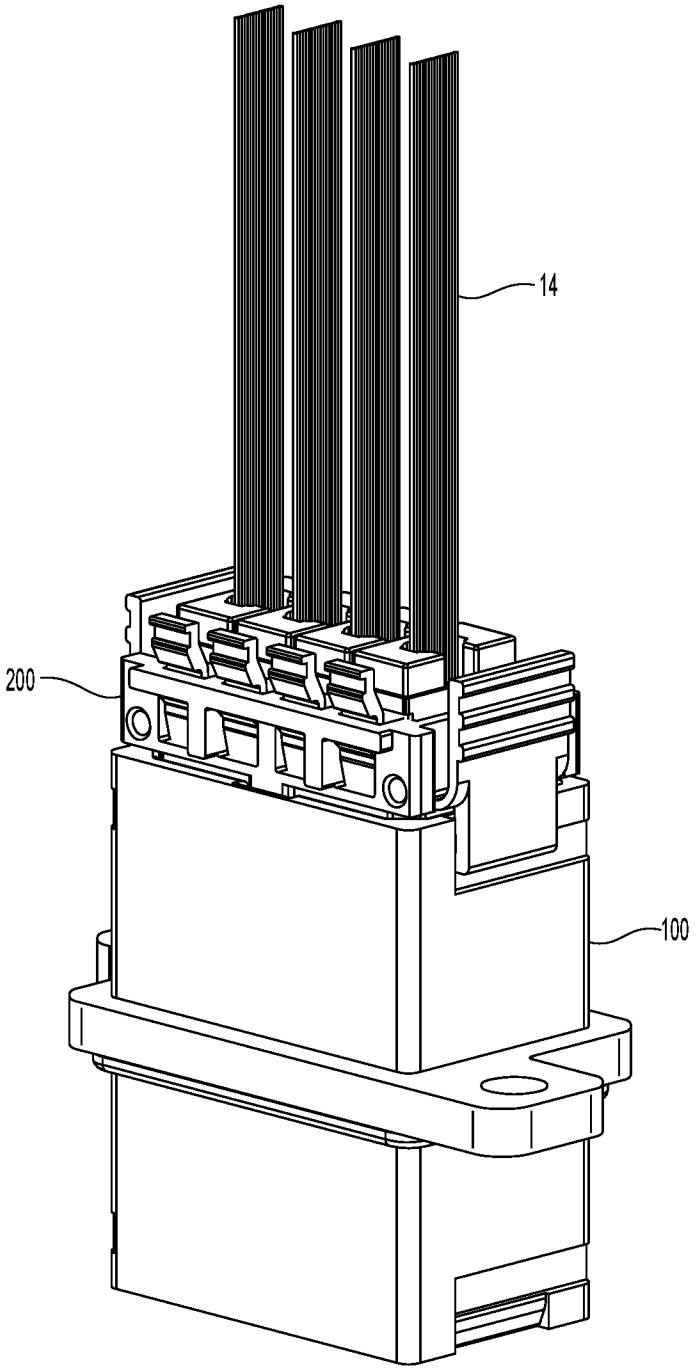


Fig. 1

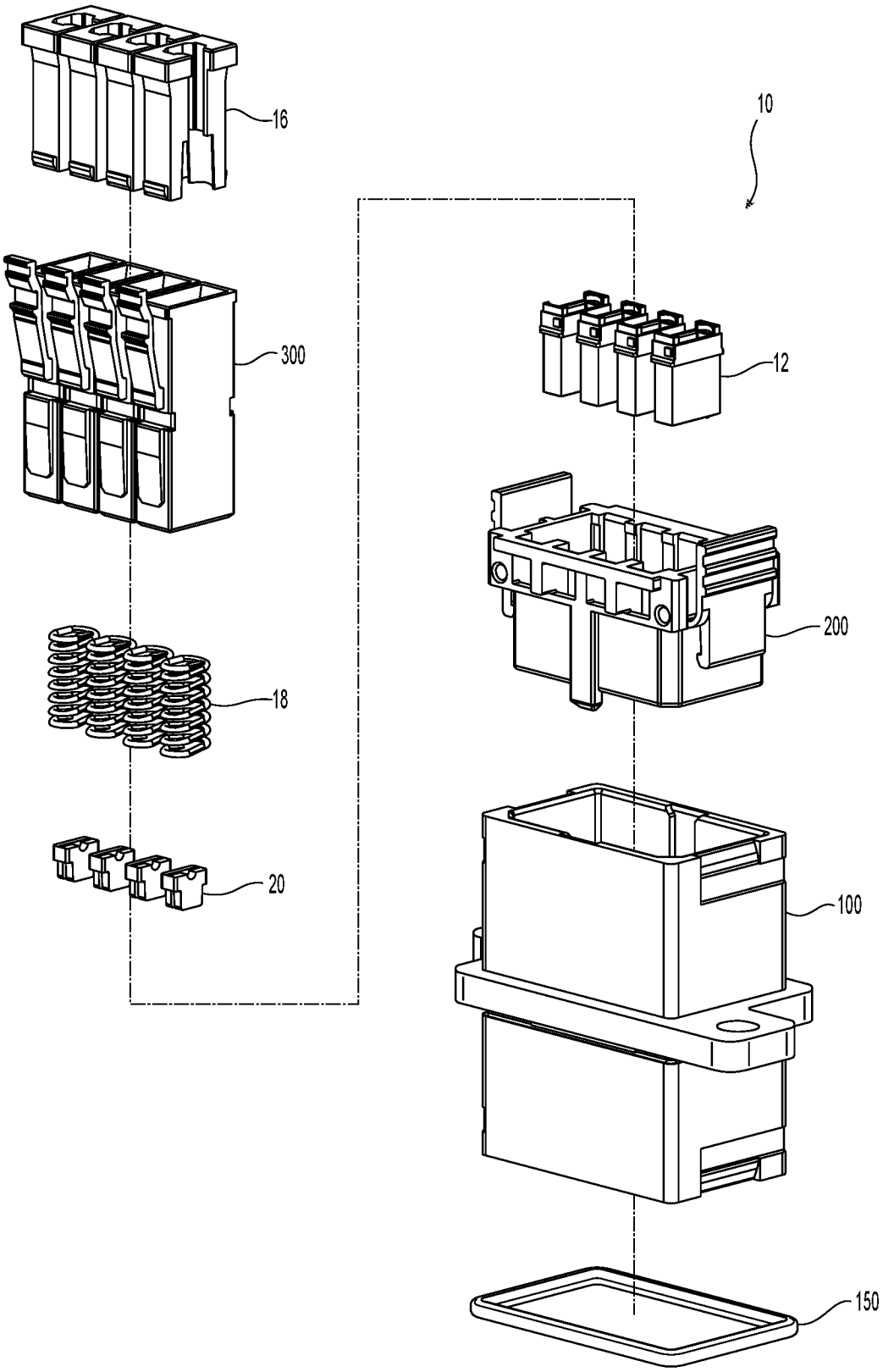


Fig. 2

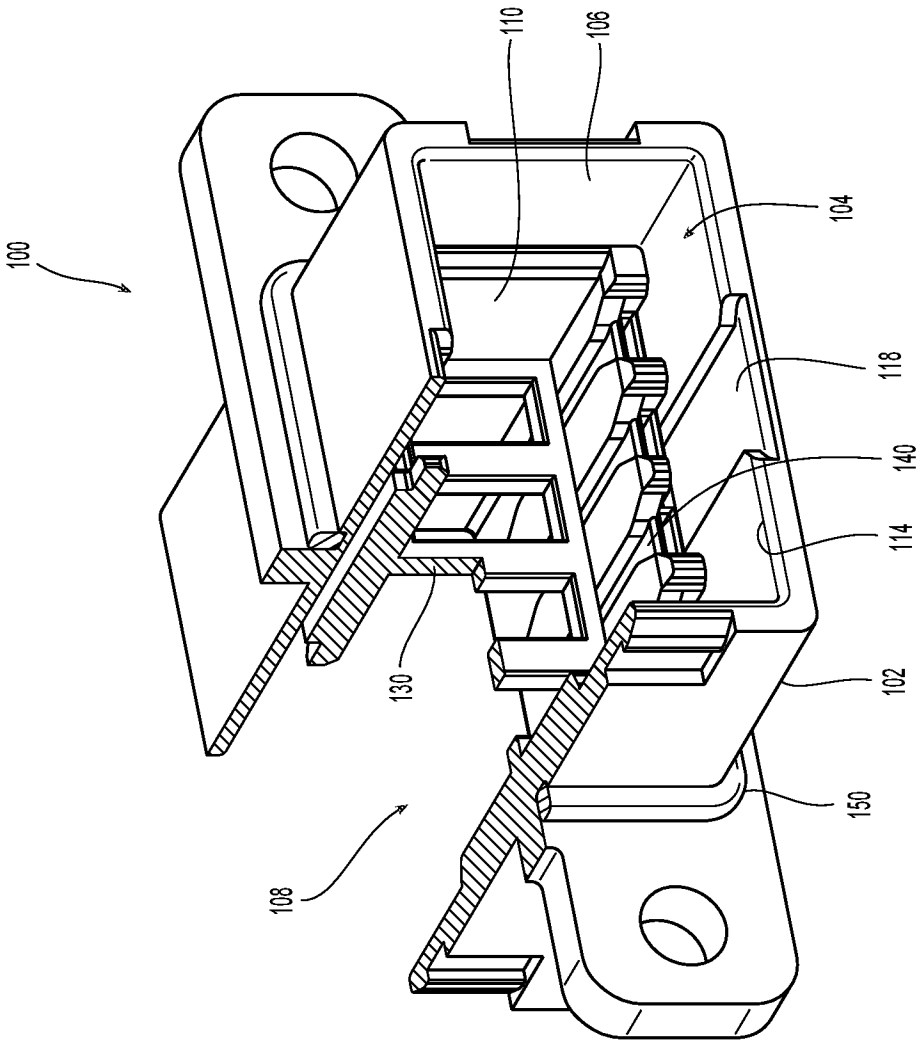


Fig. 3

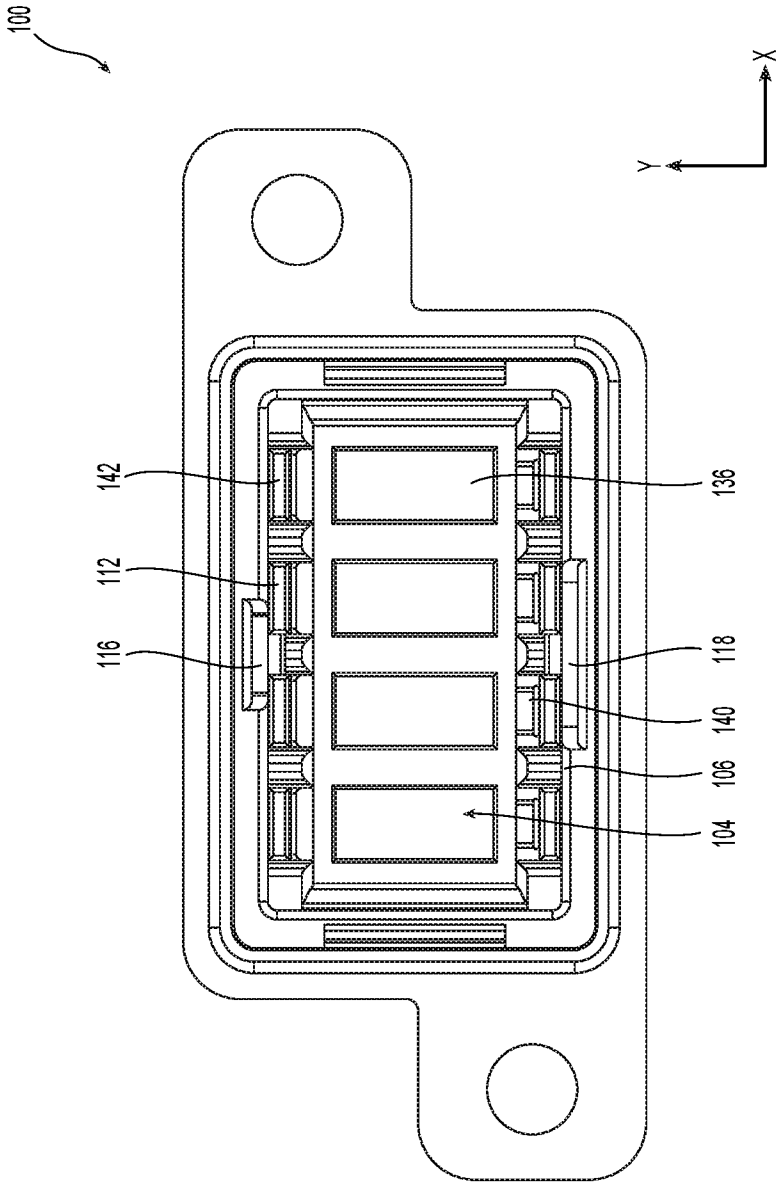


Fig. 4

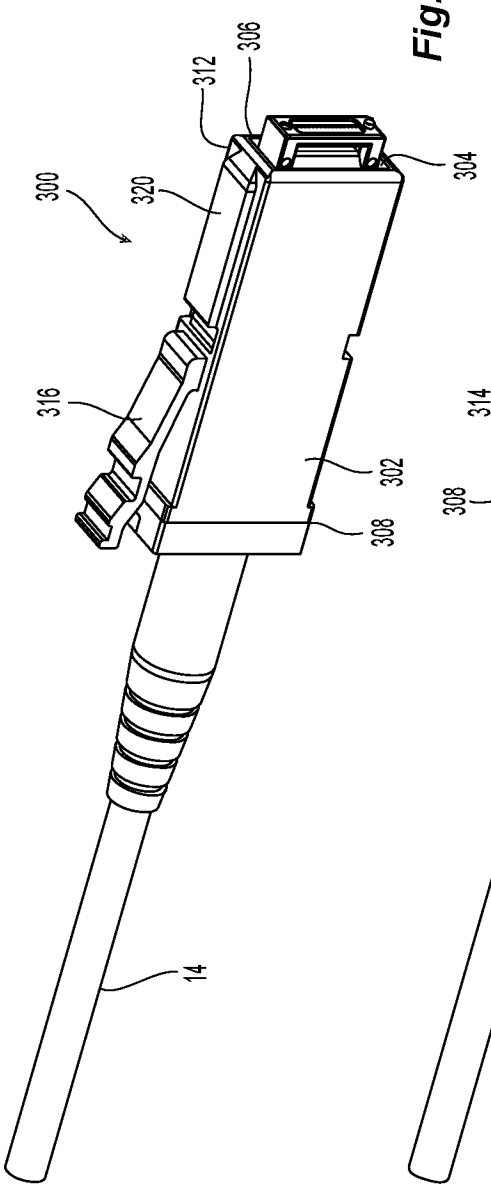


Fig. 5A

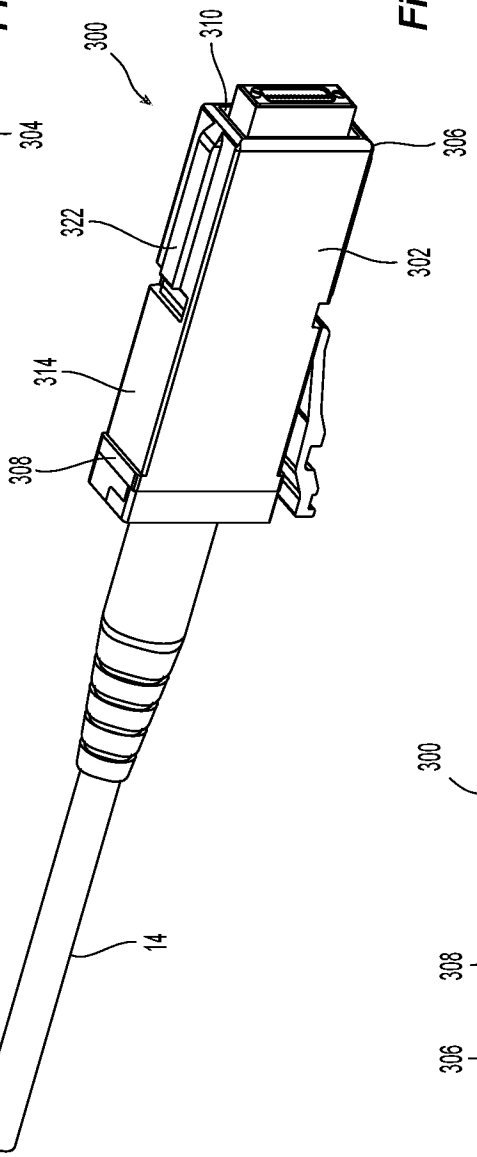


Fig. 5B

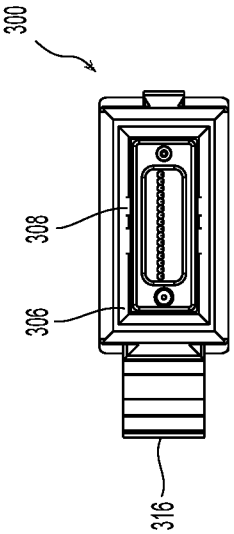


Fig. 5C

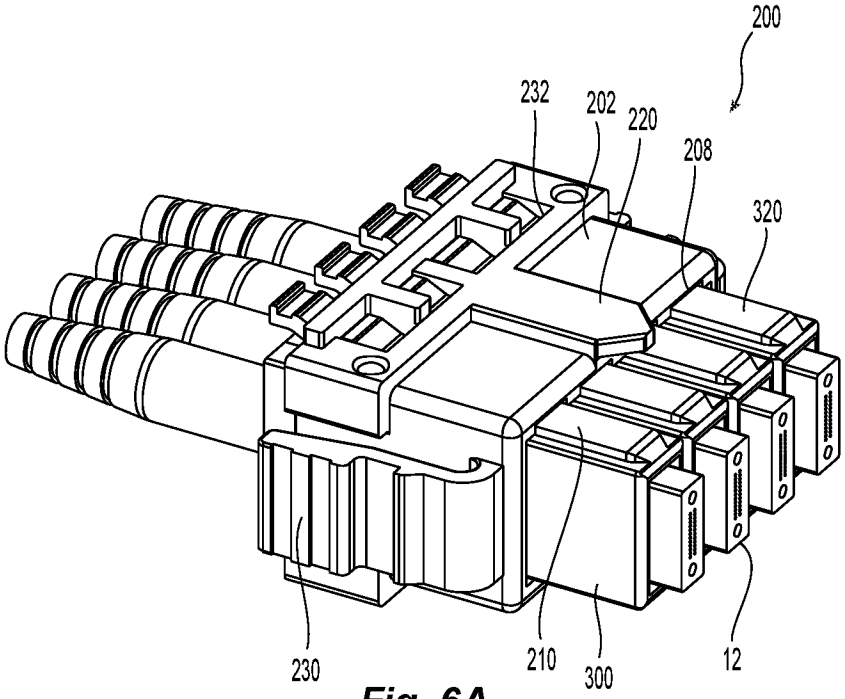

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Fig. 6A

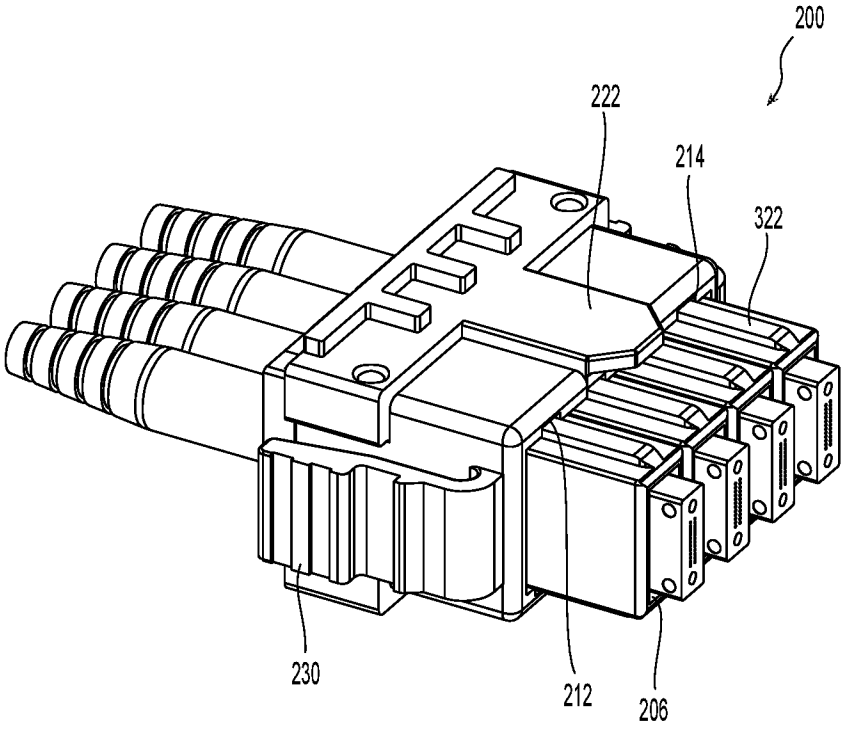

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Fig. 6B

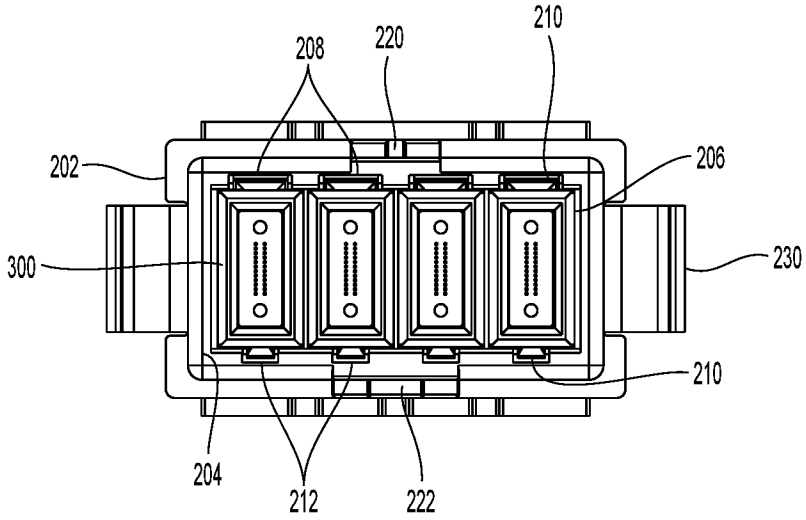


Fig. 6C

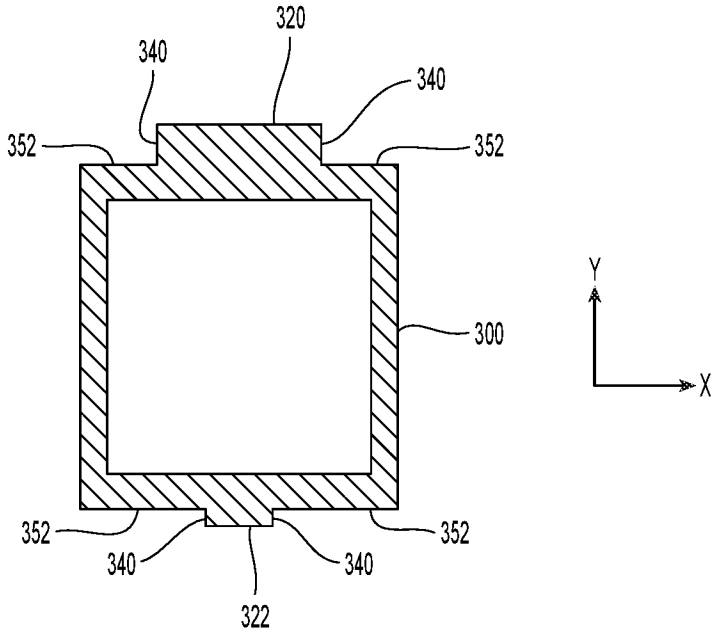

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Fig. 7A

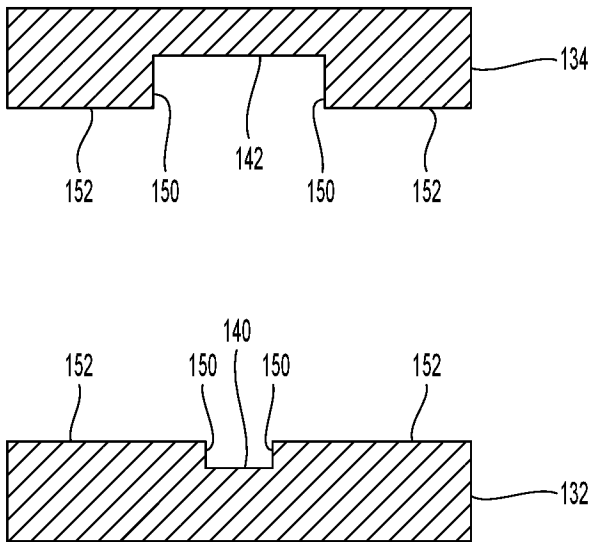

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Fig. 7B

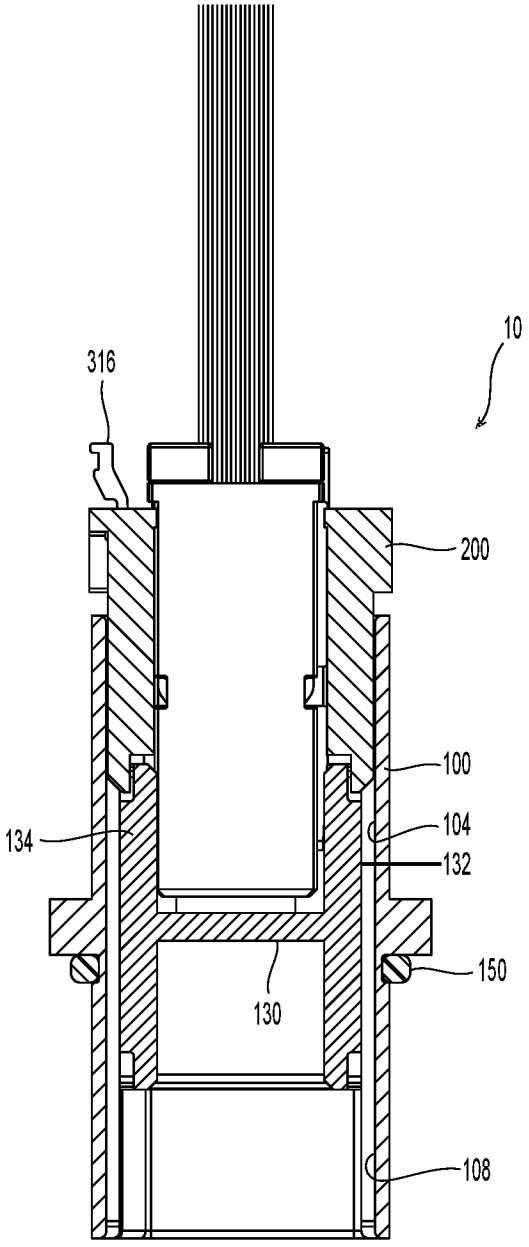


Fig. 8

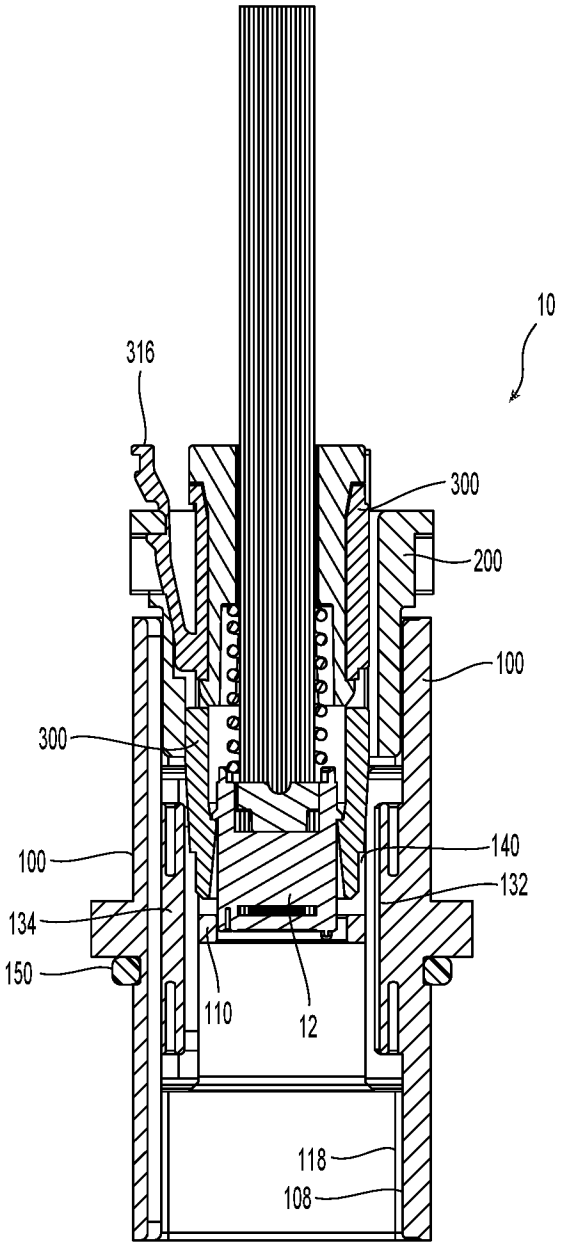


Fig. 9

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

x United States application or PCT international application number 14/214,931

filed on March 15, 2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understood the contents of the application, and

I am aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Jitka Waltr Date (Optional): 7/28/2014

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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LEGAL NAME OF INVENTOR

Inventor: Darrell R. Childers Date (Optional): 7/28/2014

Signature: Darrell R. Childers

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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LEGAL NAME OF INVENTOR

Inventor: JOSEPH HOWARD Date (Optional): 7/25/2014

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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LEGAL NAME OF INVENTOR

Inventor: HIEP V. NGUYEN Date (Optional): 7/28/14

Signature: Hiep V. Nguyen

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Michael E Hughes Date (Optional): 8-26-2014

Signature: Michael E. Hughes

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

PTO/AIA/14 (01-22)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hiep	V.	Nguyen	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Fort Mill	SC	US

Mailing Address of Inventor:

Address 1	1102 Queen Anne's Cove
Address 2	
City	Fort Mill
State/Province	SC
Postal Code	29708
Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Darrell	R.	Childers	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hickory	NC	US

Mailing Address of Inventor:

Address 1	364 6th St. NW
Address 2	
City	Hickory
State/Province	NC
Postal Code	28601
Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael	E.	Hughes	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

City	Hickory	State/Province	NC	Country of Residence	US

Mailing Address of Inventor:

Address 1	850 16th Ave Ln. NW		
Address 2			
City	Hickory	State/Province	NC
Postal Code	28601	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jillcha	Fekadu	Wakjira	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Hickory	State/Province	NC	Country of Residence	US

Mailing Address of Inventor:

Address 1	2032 19th Ave Cir NE		
Address 2			
City	Hickory	State/Province	NC
Postal Code	28601	Country	US

Inventor 5 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Joseph	P.	Howard	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Hickory	State/Province	NC	Country of Residence	US

Mailing Address of Inventor:

Address 1	1363 Homestead Dr.		
Address 2			
City	Hickory	State/Province	NC
Postal Code	28602	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Senko Ex. 1017, Page 429
Senko Advanced Components v. US Conec Ltd.
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

Customer Number	152017		
Email Address	michael@leetzow.com	Add Email	Remove Email
Email Address	ssengupta@usconec.com	Add Email	Remove Email

Application Information:

Title of the Invention	Alignment Adapter and Alignment Design for a Connector Therefor		
Attorney Docket Number	USCO-053-05	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	152017		

PTO/AIA/14 (01-22)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
	Continuation of	17145864	2021-01-11	

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17145864	Continuation of	16214317	2018-12-10	10890723	2021-01-12

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16214317	Continuation of	15855750	2017-12-27	10156684	2018-12-18

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15855750	Division of	14214931	2014-03-15	9857538	2018-01-02

Prior Application Status	Expired			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
14214931	Claims benefit of provisional	61789499	2013-03-15	

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-05
	Application Number	
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Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	US Conec Ltd.		
Mailing Address Information For Applicant:			
Address 1	1138 25th Street SE		
Address 2			
City	Hickory	**State/Province**	NC
Country	US	Postal Code	28603
Phone Number		Fax Number	
Email Address	ssengupta@usconec.com		

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Michael L. Leetzow/			Date (YYYY-MM-DD)	2022-07-05
First Name	Michael	Last Name	Leetzow	Registration Number	35932

Additional Signature may be generated within this form by selecting the Add button. Add

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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.