

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 11,385,415 B2
APPLICATION NO. : 17/145864
DATED : July 12, 2022
INVENTOR(S) : Hiep V. Nguyen et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 7, Line 12: "side; and" should be --side and--.

Signed and Sealed this
Thirtieth Day of August, 2022

Katherine Kelly Vidal
Director of the United States Patent and Trademark Office

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**Page 1 of 1

PATENT NO. : 11,385,415

APPLICATION NO.: 17/145,864

ISSUE DATE : 2022-07-12

INVENTOR(S) : Hiep V. Nguyen; Darrell R. Childers; Michael E. Hughes; Jillcha F. Wakjira; Joseph P. Howard

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

Col. 7, line 12: "side; and" should be --side and--.

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):

Michael L. Leetzow, P.A.
170 Bella Vista Ter Unit D
Nokomis, FL 34275

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 hour 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: Attention Certificate of Corrections Branch, 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.
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.

Electronic Acknowledgement Receipt

EFS ID:	46224113
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	19-JUL-2022
Filing Date:	11-JAN-2021
Time Stamp:	15:24:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	CertCorrectionUSCO05304.pdf	53829	no	1
			54fc8e2fbc63b9a573621bd44456e6e1f3cfd275		

Warnings:

Information:					
2	Request for Certificate of Correction	USCO-053-04_USPTO_SB44_20220719_120954.pdf	175246	no	2
			662c1658d29b3d29e3b2f194c9aa0445bac007e		
Warnings:					
Information:					
Total Files Size (in bytes):			229075		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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)
Serial No.: 17/145,864) Group Art Unit: 2883
Filing Date: January 11, 2021) Examiner: Omar R. Rojas
Title: Alignment Adapter and Alignment Design)
for a Connector Therefor)

Attn: Certificate of Corrections Branch
P.O Box 1450
Alexandria, VA 22313-1450

This is a request for the issuance of a Certificate of Correction for the above patent. One copy of the Form PTO/SB/44 is enclosed. The complete Certificate of Correction involves one (1) page. The error is the fault of the Office.

The error is of a clerical nature and the correction does not constitute new matter or require reexamination. Claim 8 has a typographical error that involves the failure to delete a semicolon. The error, without correction, will materially affect the patent, and, therefore, issuance of the Certificate of Correction under Rule 323 containing the correction is earnestly requested.

Respectfully submitted,

/Michael L. Leetzow/
Michael L. Leetzow, P.A.
Registration No. 35,932
170 Bella Vista Terr Unit D
Nokomis, FL 34275
Telephone: 407/302-9970

Date: July 19, 2022



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 NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/145,864	07/12/2022	11385415	USCO-053-04	5506

152017 7590 06/22/2022
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional inventors):

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) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

US Conec, Ltd, Hickory, NC;

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 USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
17145864	11-Jan-2021	Hiep V. Nguyen	USCO-053-04	5506

TITLE OF INVENTION :

Alignment Adapter and Alignment Design for a Connector Therefor

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2883	059000	
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$1200	\$0	\$1200	15-Jun-2022	\$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
152017 Us Conec Ltd. 1138 25th Street Southeast Hickory NC 28602 UNITED STATES 828-323-8883 ~~officeaction@appcoll.com~~	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status**Change in Entity Status**

- ☐ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27.
Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☒ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☐ If in **addition** to the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____.
The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. Michael L. Leetzow, P.A.
2. Shubhrangshu Sengupta
3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
US Conec, Ltd.	Hickory	NORTH CAROLINA	UNITED STATES	corporation

6.Signature

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 has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Michael L. Leetzow/	Date	06-08-2022
Name	MICHAEL LEETZOW	Registration Number	35932

Electronic Patent Application Fee Transmittal

Application Number:	17145864			
Filing Date:	11-Jan-2021			
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-053-04			
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 APPL ISSUE FEE	1501	1	1200	1200
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
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 (\$)				1200

Electronic Acknowledgement Receipt

EFS ID:	45903780
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	08-JUN-2022
Filing Date:	11-JAN-2021
Time Stamp:	12:04:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1200
RAM confirmation Number	E202268C04434472
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	Issue Fee Payment (PTO-85B)	Web85b.pdf	62440	no	2
			c1751259f69ed57cb56c0914ce2cb1e636fa69ec		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40360	no	2
			4ad6defd391cbd38bd6623385ced32c52f42be50		
Warnings:					
Information:					
Total Files Size (in bytes):			102800		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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

NOTICE OF ALLOWANCE AND FEE(S) DUE

152017 7590 03/15/2022
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

EXAMINER	
ROJAS, OMAR R	
ART UNIT	PAPER NUMBER

2883

DATE MAILED: 03/15/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04	5506

TITLE OF INVENTION: Alignment Adapter and Alignment Design for a Connector Therefor

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	06/15/2022

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

152017 7590 03/15/2022
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04	5506

TITLE OF INVENTION: Alignment Adapter and Alignment Design for a Connector Therefor

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	06/15/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROJAS, OMAR R	2883	385-059000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29☐ Applicant asserting small entity status. See 37 CFR 1.27☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04	5506
152017	7590	03/15/2022	EXAMINER	
Us Conec Ltd. 1138 25th Street Southeast Hickory, NC 28602			ROJAS, OMAR R	
			ART UNIT	PAPER NUMBER
			2883	
DATE MAILED: 03/15/2022				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 30 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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.

Notice of Allowability	Application No. 17/145,864	Applicant(s) Nguyen et al.	
	Examiner Omar R Rojas	Art Unit 2883	AIA (FITF) Status No

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 02/23/2022.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ 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.

3. ☒ The allowed claim(s) is/are 15-28. As a result of the allowed claim(s), 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**.

4. ☐ 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)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)	5. ☒ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.	

/Omar R Rojas/
Primary Examiner, Art Unit 2883

EXAMINER'S AMENDMENT/COMMENT

Notice of Pre-AIA or AIA Status

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

Response to Amendment

With regards to the amendment filed on 02/23/2022, all the requested changes to the claims have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 15-28 are pending.

Terminal Disclaimer

The terminal disclaimer filed on 02/23/2022 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of Patent Nos. 10,890,723 and 10,156,684 has been reviewed and is accepted. The terminal disclaimer has been recorded.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

Regarding claims 15-21, the primary reason for allowance of the claims is the inclusion of a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body, each of the plurality of grooves extending toward a center of the main body.

Regarding claims 22-25, the primary reason for allowance of the claims is the inclusion of a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side

and the second side, each of the plurality of grooves extending toward a center of the adapter.

Regarding claims 26-28, the primary reason for allowance of the claims is the inclusion of each of the first internal grooves having a first width and each of the second internal grooves having a second width, the first width is greater than the second width, and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

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

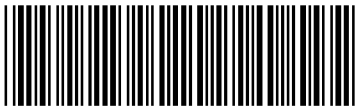
Art Unit: 2883

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 2883

or
March 8, 2022

Issue Classification 	Application/Control No. 17/145,864	Applicant(s)/Patent Under Reexamination Nguyen et al.
	Examiner Omar R Rojas	Art Unit 2883

CPC						
Symbol					Type	Version
G02B	/	6	/	3879	F	2013-01-01
G02B	/	6	/	3817	I	2013-01-01
G02B	/	6	/	3825	I	2013-01-01
G02B	/	6	/	3881	I	2013-01-01
G02B	/	6	/	3885	I	2013-01-01

CPC Combination Sets					
Symbol				Type	Set
	/		/		

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/Omar R Rojas/ Primary Examiner, Art Unit 2883	08 March 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	15	3

Issue Classification 	Application/Control No. 17/145,864	Applicant(s)/Patent Under Reexamination Nguyen et al.
	Examiner Omar R Rojas	Art Unit 2883

INTERNATIONAL CLASSIFICATION			
CLAIMED			
G02B6/38	/	6	/ 38
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/Omar R Rojas/ Primary Examiner, Art Unit 2883 (Primary Examiner)	08 March 2022 (Date)	O.G. Print Claim(s) 15	O.G. Print Figure 3

Issue Classification 	Application/Control No. 17/145,864	Applicant(s)/Patent Under Reexamination Nguyen et al.
	Examiner Omar R Rojas	Art Unit 2883

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE	Total Claims Allowed:					
(Assistant Examiner)	(Date)	14				
/Omar R Rojas/ Primary Examiner, Art Unit 2883 (Primary Examiner)	08 March 2022 (Date)	<table><tr><td>O.G. Print Claim(s)</td><td>O.G. Print Figure</td></tr><tr><td>15</td><td>3</td></tr></table>	O.G. Print Claim(s)	O.G. Print Figure	15	3
O.G. Print Claim(s)	O.G. Print Figure					
15	3					

<i>Search Notes</i> 	Application/Control No. 17/145,864	Applicant(s)/Patent Under Reexamination Nguyen et al.
	Examiner Omar R Rojas	Art Unit 2883

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 16/214,317.	12/15/2021	/ORR/
PE2E SEARCH TOOL (PGPUB,USPAT,FPRS,FIT,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	12/16/2021	/ORR/
Updated previous PE2E Search - See Search History Printout.	03/04/2022	/ORR/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
PGPUB, USPAT - text search	See PE2E SEARCH printout.	03/08/2022	/ORR/

/Omar R Rojas/ Primary Examiner, Art Unit 2883	
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Bibliographic Data

Application No: 17/145,864

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged:

/Omar R Rojas/

Examiner's Signature

Initials

Title:

Alignment Adapter and Alignment Design for a Connector Therefor

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/11/2021	385	2883	USCO-053-04
RULE			

APPLICANTS

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Michael E. Hughes, Hickory, NC, UNITED STATES

Jillcha Fekadu Wakjira, Hickory, NC, UNITED STATES

Joseph P. Howard, Hickory, NC, UNITED STATES

CONTINUING DATA

This application is a CON of 16214317 12/10/2018 PAT 10890723

16214317 is a CON of 15855750 12/27/2017 PAT 10156684

15855750 is a DIV of 14214931 03/15/2014 PAT 9857538

14214931 has PRO of 61789499 03/15/2013

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

04/27/2021

STATE OR COUNTRY

UNITED STATES

ADDRESS

Us Conec Ltd.

1138 25th Street Southeast

Hickory, NC 28602

UNITED STATES

FILING FEE RECEIVED

\$1,820

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L16	77	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	2022/03/04 05:24 PM
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PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
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L1793	37	(Artificial Intelligence) More Like: US-9366829-B2 Text: (US-20130259429-A1 OR CN-106980157-A OR US-20100080517-A1 OR TW-201743090-A OR US-9709753-B1 OR US-20170205586-A1 OR US-5870515-A OR WO-2018226959-A1 OR US-20210191050-A1 OR US-20170307830-A1 OR US-20200103604-A1 OR US-8858089-B2 OR US-20100284656-A1 OR JP-5798177-B2 OR CN-101881864-A OR US-11215767-B2 OR EP-2548061-B1 OR US-8801301-B2 OR US-8376629-B2 OR CN-106980157-B).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	2022/03/04 05:32 PM
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L1795	25	US-6402393-B1 OR CA-2332780-C OR US- 20040218374-A1 OR EP-3590157-A1 OR EP-1168020-B1 OR JP- 3307846-B2 OR US- 20040228634-A1 OR US-6761487-B2 OR US-20040258362-A1 OR US-20030026579- A1 OR US- 20030169971-A1 OR US-6533463-B2 OR US-6412986-B1 OR CN-101960348-A).did. ("6932514").urpn. AND (PGPB USPT USOC).dbnm.	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	2022/03/04 05:32 PM
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PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1791	15	("10156684" OR "20020172469" OR "20050281509" OR "20080131055" OR "20110091158" OR "20120057824" OR "20140241689" OR "4645295" OR "5129024" OR "6293708" OR "6331079" OR "6361218" OR "6406192" OR "9086546" OR "9366829").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/03/04 05:32 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N899	484	((adapter ferrule) AND body AND opening AND central\$3 AND groove).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/03/08 10:25 AM

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 17/145,864	Filing Date 01/11/2021	☐ To be Mailed
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ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(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)	RATE (\$)	ADDITIONAL FEE (\$)	
AMENDMENT	02/23/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA			
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	x \$100 =	0	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 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	
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".						/DORIAN EVANS/		
*** 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.

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	
Application Number	17145864	
Filing Date	11-Jan-2021	
First Named Inventor	Hiep Nguyen	
Attorney Docket Number	USCO-053-04	
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%	
The owner(s) with 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) 10890723 10156684 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) is included with Electronic Terminal Disclaimer request.
- ☒ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

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
- Registration Number 35932
- ☐ A sole inventor
- ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- ☐ A joint inventor; all of whom are signing this request

Signature	/Michael L. Leetzow/
Name	Michael L. Leetzow

*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.

Doc Code: DISQ.E.FILE

Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 17145864

Filing Date: 11-Jan-2021

Applicant/Patent under Reexamination: Nguyen

Electronic Terminal Disclaimer filed on February 23, 2022

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt

EFS ID:	45064933
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	23-FEB-2022
Filing Date:	11-JAN-2021
Time Stamp:	14:16:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	39546	no	2
			f5d87084c170ccb1b6e7915838d3c0c4b64ef6d		

Warnings:

Information:	
Total Files Size (in bytes):	39546
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	

Electronic Patent Application Fee Transmittal

Application Number:	17145864			
Filing Date:	11-Jan-2021			
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-053-04			
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:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	170	170
Total in USD (\$)				170

Electronic Acknowledgement Receipt

EFS ID:	45064878
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	23-FEB-2022
Filing Date:	11-JAN-2021
Time Stamp:	14:13:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 170
RAM confirmation Number	E20222ME13513087
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	Amendment/Request for Reconsideration-After Non-Final Rejection	AmendUSCO05304Feb2022. pdf	76037	no	5
			6ab7faaecf1141f2d1a4af87deb4a5dcc08b3d93		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37935	no	2
			c10d3fa92163856cbb7d7ee56284f98c694670d7		
Warnings:					
Information:					
Total Files Size (in bytes):			113972		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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: 2883
Serial No.:	17/145,864	)	
		)	Examiner: Omar R. Rojas
Filing Date:	January 11, 2021	)	
		)	
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 December 21, 2021, Applicant amends the application as follows:

IN THE CLAIMS:

Claims 1-14. Canceled.

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

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface, the opening extending between the first side and the second side and having a central portion therebetween; and

a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body, each of the plurality of grooves extending toward a center of the main body.

16. (Previously Presented) The adapter according to claim 15, further comprising a groove in one of the top surface and the bottom surface.

17. (Previously Presented) The adapter according to claim 15, further comprising a groove in each of the top and the bottom surfaces.

18. (Previously Presented) The adapter according to claim 15, wherein the opening is smaller in the center of the main body than on the first side and second side.

19. (Previously Presented) The adapter according to claim 15, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules.

20. (Previously Presented) The adapter according to claim 15, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough.

21. (Previously Presented) The adapter according to claim 20, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

22. (Currently Amended) An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising:

~~a first opening formed on an opening extending between a first side and a second side of the adapter, each of the first side and the second side respectively defined and defined by two~~ opposing side walls, a top surface and a bottom surface, the ~~first~~ opening configured to receive at least two fiber optic connectors from the first side and;

~~—— a second opening formed on a second side of the adapter, opposite the first side, and also defined by the two opposing side walls, the top surface and the bottom surface, the second opening~~ configured to receive at least two additional fiber optic connectors from the second side to mate with the at least two fiber optic connectors on the first side; and

a central portion between the first side opening and the second side opening and having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the respective top surface and the bottom surface of the first side opening and the second side opening, each of the plurality of grooves extending toward a center of the adapter.

23. (Currently Amended) The adapter according to claim 22, wherein the first side and the second side of the opening ~~and the second opening~~ are in communication with one another in the central portion, the ~~first opening and the second~~ opening being smaller in the central portion than on the first side and the second side.

24. (Previously Presented) The adapter according to claim 22, wherein the first and second sides are configured to receive a plurality of fiber optic connectors.

25. (Previously Presented) The adapter according to claim 22, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different.

26. (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,

the first top wall having first internal ~~alignment~~ grooves spaced apart along the width and the first bottom wall having second internal ~~alignment~~ grooves spaced apart along the width,

each of the first internal ~~alignment~~ grooves having a first width and each of the second internal ~~alignment~~ grooves having a second width, the first width is greater than the second width, and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

27. (Previously Presented) The adapter according to claim 26, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors.

28. (Previously Presented) The adapter according to claim 26, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough.

REMARKS

In the above-referenced Office Action, the Examiner objected to the specification because a number of terms in the claim were not mentioned in the specification. The Examiner also required a terminal disclaimer to overcome two references.

Applicant has amended the claims to obviate the Examiner's objection to the specification. Applicant will also file concurrently herewith a terminal disclaimer. Thus, all outstanding issues have been resolved and Applicant requests that the Application be passed to issuance.

The Examiner is invited to telephone the undersigned in the event the Examiner would like to discuss the merits of the application or this response.

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: February 23, 2022



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04	5506
152017	7590	12/21/2021	EXAMINER	
Us Conec Ltd. 1138 25th Street Southeast Hickory, NC 28602			ROJAS, OMAR R	
			ART UNIT	PAPER NUMBER
			2883	
			NOTIFICATION DATE	DELIVERY MODE
			12/21/2021	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):

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

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Information Disclosure Statement

2. The prior art documents submitted by applicant(s) in the Information Disclosure Statement(s) ("IDS") filed on 04/12/2021 have all been considered and made of record (note the attached copy of form(s) PTO/SB/08a).

Specification

3. 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 does not mention a "first opening" or a "second opening" as recited by claim 22. The specification also does not use the term "internal alignment grooves" as recited by claim 26. As stated in MPEP § 608.01(o), "[t]he use of a confusing variety of terms for the same thing should not be permitted".

Double Patenting

4. 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.

5. **Claims 15-28 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 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 15-28 in that the patented claims do not recite all of the additional aspects recited in pending claims 15-28. 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 15-28. 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 15-28 in view of claims 1-11 of the '684 patent.

6. Claims 15-28 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 15-28 in that the patented claims do not recite all of the additional aspects recited in pending claims 15-28. 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 15-28. 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 15-28 in view of claims 1-17 of the '723 patent.

Conclusion

7. 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 <https://ppair-my.uspto.gov/pair/PrivatePair>. 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 2883

or
December 16, 2021

Notice of References Cited	Application/Control No. 17/145,864		Applicant(s)/Patent Under Reexamination Nguyen et al.	
	Examiner Omar R Rojas		Art Unit 2883	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.	G02B6/3879	1/1
	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					
	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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*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. 17/145,864	Applicant(s)/Patent Under Reexamination Nguyen et al.
	Examiner Omar R Rojas	Art Unit 2883

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 16/214,317.	12/15/2021	/ORR/
PE2E SEARCH TOOL (PGPUB,USPAT,FPRS,FIT,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	12/16/2021	/ORR/

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

/Omar R Rojas/ Primary Examiner, Art Unit 2883	
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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	4751	G02B6/3831.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	2021/12/16 10:56 AM
L2	2320574	(group\$4 gang\$3 (high ADJ density)) near3 connect\$4	(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	2021/12/16 10:56 AM
L3	323	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	2021/12/16 10:57 AM
L4	6797	G02B6/3879.cpc.	(US-PGPUB; USPAT; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD,	OR	ON	ON	2021/12/16 11:13 AM

			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)				
L5	964	1 AND 4	(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	2021/12/16 11:13 AM
L6	0	G02B6/3881cpc.	(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	2021/12/16 11:47 AM
L7	1603	G02B6/3881.cpc.	(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,	OR	ON	ON	2021/12/16 11:47 AM

			WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	76	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	2021/12/16 11:48 AM
L9	18943	G02B6/3825.cpc.	(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	2021/12/16 11:53 AM
L10	1956	1 AND 9	(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	2021/12/16 11:53 AM
L11	192	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,	OR	ON	ON	2021/12/16 11:53 AM

			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)				
L12	694	10 AND (4 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	2021/12/16 11:54 AM
L13	15	("10156684" "20020172 469" "20050281509" "2 0080131055" "2011009 1158" "20120057824" " 20140241689" "464529 5" "5129024" "6293708" "6331079" "6361218" " 6406192" "9086546" "9 366829").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2021/12/16 12:17 PM
L14	1	("9857538").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/12/16 12:21 PM
L15	1	("10890723").pn.	(USPAT)	OR	ON	ON	2021/12/16 01:54 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

		OR US-20060275007-A1 OR US-20010026661-A1).did. AND PGPB.dbnm.) OR ((US-9366829-B2 OR US-9857538-B2 OR US-10156684-B2 OR US-9310569-B2 OR US-6293708-B1 OR US-5123071-A OR US-4645295-A).did. AND USPT.dbnm.) OR ((CN-202600189-U).did. AND DWPI.dbnm.) OR ((JP-10050400-A).did. AND JPAB.dbnm.)					
L1783	15	("10156684" OR "20020172469" OR "20050281509" OR "20080131055" OR "20110091158" OR "20120057824" OR "20140241689" OR "4645295" OR "5129024" OR "6293708" OR "6331079" OR "6361218" OR "6406192" OR "9086546" OR "9366829").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/12/15 07:28 PM
L1784	9	1783 NOT 1782	(US-PGPUB; USPAT)	OR	ON	ON	2021/12/15 07:28 PM
L1785	40	(Artificial Intelligence) More Like: US-9366829-B2 Text: (US-20130259429-A1 OR US-20100080517-A1 OR US-20100284656-A1 OR US-5870515-A OR CN-101881864-A OR US-8858089-B2 OR US-20200103604-A1 OR US-8801301-B2 OR JP-5798177-B2 OR EP-2548061-B1 OR EP-2249190-A2 OR US-8376629-B2 OR WO-2016077167-A1 OR EP-3218753-A1 OR US-10712509-B2 OR CN-107111074-B OR US-10156684-B2 OR US-20120219254-A1 OR US-20160161680-	(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	2021/12/16 09:07 AM

		A1 OR EP-0927896-A1).did.					
L1786	1	("8801301").pn.	(USPAT)	OR	ON	ON	2021/12/16 09:11 AM
L1787	1	("6932514").pn.	(USPAT)	OR	ON	ON	2021/12/16 09:16 AM
L1788	38	(Artificial Intelligence) More Like: US-6932514-B2 Text: (US-20040141692-A1 OR WO-2014133955-A1 OR EP-2962144-A1 OR JP-2004226984-A OR US-20140241689-A1 OR US-9606303-B2 OR US-7058274-B2 OR DE-60115995-T2 OR US-6402393-B1 OR CA-2332780-C OR EP-1168020-B1 OR US-20040218374-A1 OR JP-3307846-B2 OR US-20040228634-A1 OR US-6761487-B2 OR US-20030169971-A1 OR US-20040258362-A1 OR US-20030026579-A1 OR US-6412986-B1 OR EP-1168020-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	2021/12/16 09:18 AM
L1789	25	("6932514").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/12/16 09:23 AM
L1790	3441	L844 L845 L846 L847	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/12/16 10:22 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N280	136	((adapter ferrule) and body and opening and central\$3 and groove).clm.	(US-PGPUB)	OR	ON	ON	2018/08/02 03:13 PM
N897	169	((adapter ferrule) and body and opening and central\$3 and groove).clm.	(US-PGPUB)	OR	ON	ON	2020/09/01 01:46 PM

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)

Approved for use through 11/30/2020. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	17145864
Filing Date	2021-01-11
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-04

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /ORR/

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	5129024	A	1992-07-01	Honma	
	4	6293708	B1	2001-09-25	Ohtsuka et al.	
	5	6331079	B1	2001-12-01	Grois	
	6	6361218	B1	2002-03-26	Matasek et al.	
	7	6406192	B1	2002-06-18	Chen et al.	
	8	9086546	B2	2015-07-21	Jones	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17145864
Filing Date	2021-01-11
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-04

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	9	9366829	B2	2016-06-14	Czosnowski et al.	
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	1	20020172469	A1	2002-11-21	Benner et al.	
	2	20050281509	A1	2005-12-22	Cox et al.	
	3	20080131055	A1	2008-06-05	Edward et al.	
	4	20110091158		2011-04-01	Iwaya	
	5	20110091158	A1	2011-04-21	Iwaya et al.	
	6	20120057824	A1	2012-03-08	Katoh	
	7	20120057824	A1	2012-03-08	Katoh	
	8	20140241689	A1	2014-08-28	Bradley et al.	

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Application Number		17145864
Filing Date		2021-01-11
First Named Inventor	Hiep V. Nguyen	
Art Unit		
Examiner Name		
Attorney Docket Number	USCO-053-04	

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	1	202600189	CN	U	2012-12-12	Unknown		×
	2	2013179197	WO	A1	2013-12-05	Xue et al.		☐

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Examiner Signature	/Omar R Rojas/
Date Considered	12/15/2021

*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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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04

CONFIRMATION NO. 5506

PUBLICATION NOTICE



OC000000127824778

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

Title:Alignment Adapter and Alignment Design for a Connector Therefor

Publication No.US-2021-0255403-A1

Publication Date:08/19/2021

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/145,864	01/11/2021		1820	USCO-053-04	14	3

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

CONFIRMATION NO. 5506
UPDATED FILING RECEIPT



Date Mailed: 05/14/2021

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.

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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: The patent practitioners associated with Customer Number 152017

Domestic Priority data as claimed by applicant

This application 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.

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: 04/27/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/145,864**

Projected Publication Date: 08/19/2021

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

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/145,864				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	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), (l), 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(j))	14	minus 20 = *				x 100 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 480 =	0.00			
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	1820			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			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.										



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04

CONFIRMATION NO. 5506

FORMALITIES LETTER



OC000000125187526

Date Mailed: 04/28/2021

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- A substitute specification excluding claims in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125 is required. The substitute specification must be submitted with markings and be accompanied by a clean version (without markings) as set forth in 37 CFR 1.125(c) and a statement that the substitute specification contains no new matter (see 37 CFR 1.125(b)). Since a preliminary amendment was present on the filing date of the application and such amendment is part of the original disclosure of the application, the substitute specification must include all of the desired changes made in the preliminary amendment. See 37 CFR 1.115 and 1.215.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

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:

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/tqlam/

Electronic Acknowledgement Receipt

EFS ID:	42703400
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	12-MAY-2021
Filing Date:	11-JAN-2021
Time Stamp:	13:26:23
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no
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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	SubSpecFilingUSCO05304.pdf	57279	no	3
			e01038a4baa85b0d5b31c4934b25ff7a46c3c3ac		

Warnings:

Information:					
2	Specification	USCO05304SPECMarkedup.pdf	172840	no	10
			de10594c6d10977779706a1c0938cf2f3ec96649		
Warnings:					
Information:					
3	Specification	USCO05304SPECCLean.pdf	172358	no	10
			db3d4f5fac7a0489a63dbc3b77c7935b1095c43		
Warnings:					
Information:					
4	Applicant Response to Pre-Exam Formalities Notice	NoticeIncompleteAppUSCO05304.pdf	132293	no	2
			da0e30aa4df74aa4bd358786cbbc58bffb988a1		
Warnings:					
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Total Files Size (in bytes):			534770		
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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, the contents of ~~which is~~ which are hereby incorporated by reference ~~in its~~ 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 in 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.

[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

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.

[0010] 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

[0011] Fig. 1 is a perspective view of one embodiment of an adapter assembly according to the present invention;

[0012] Fig. 2 is an exploded view of the adapter assembly of Fig. 1;

[0013] Fig. 3 is a perspective view of a cut-away view of the adapter of Fig. 1;

[0014] Fig. 4 is a front elevational view of the adapter of Fig 1.;

[0015] 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;

[0016] Fig. 5B is a bottom perspective view of the ferrule holder and ferrule of Fig. 5a;

[0017] Fig. 5C is a front view of the ferrule holder and ferrule of Fig. 5a;

[0018] Fig. 6A is a top perspective view of a plug and ferrule holders according to the present invention;

[0019] Fig. 6B is a bottom perspective view of the plug and ferrule holders of Fig. 6A;

[0020] Fig. 6C is a front elevational view of the plug and ferrule holders of Fig. 6A;

[0021] Fig. 7A is a partial cross sectional view of a portion of a ferrule holder of Fig. 5;

[0022] Fig. 7B is a partial cross sectional view of a portion of the center portion of the adapter;

[0023] Fig. 8 is a cross sectional view of the adapter assembly in the center of the adapter assembly; and

[0024] 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.

[0026] 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.

[0027] 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 than 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**.

[0028] 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**.

[0029] 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 than 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**.

[0030] 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**.

[0031] 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.

[0032] 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**.

[0033] 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

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.

[0034] 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**.

[0035] 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.

[0036] 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 350~~ 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 352 of 152~~ 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 the projections **320,322** could also align in the y direction, given that they are parallel to the surfaces **352**.

[0037] 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**.

[0038] 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.

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, 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 in 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.

[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

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.

[0010] 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

[0011] Fig. 1 is a perspective view of one embodiment of an adapter assembly according to the present invention;

[0012] Fig. 2 is an exploded view of the adapter assembly of Fig. 1;

[0013] Fig. 3 is a perspective view of a cut-away view of the adapter of Fig. 1;

[0014] Fig. 4 is a front elevational view of the adapter of Fig 1.;

[0015] 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;

[0016] Fig. 5B is a bottom perspective view of the ferrule holder and ferrule of Fig. 5a;

[0017] Fig. 5C is a front view of the ferrule holder and ferrule of Fig. 5a;

[0018] Fig. 6A is a top perspective view of a plug and ferrule holders according to the present invention;

[0019] Fig. 6B is a bottom perspective view of the plug and ferrule holders of Fig. 6A;

[0020] Fig. 6C is a front elevational view of the plug and ferrule holders of Fig. 6A;

[0021] Fig. 7A is a partial cross sectional view of a portion of a ferrule holder of Fig. 5;

[0022] Fig. 7B is a partial cross sectional view of a portion of the center portion of the adapter;

[0023] Fig. 8 is a cross sectional view of the adapter assembly in the center of the adapter assembly; and

[0024] 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.

[0026] 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.

[0027] 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 than 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**.

[0028] 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**.

[0029] 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 than 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**.

[0030] 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**.

[0031] 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.

[0032] 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**.

[0033] 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

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.

[0034] 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**.

[0035] 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.

[0036] 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 the projections **320,322** could also align in the y direction, given that they are parallel to the surfaces **352**.

[0037] 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**.

[0038] 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: Unassigned
Serial No.:	17/145,864	)	
		)	Examiner: Unassigned
Filing Date:	January 11, 2021	)	
		)	
Title:	Alignment Adapter and Alignment Design	)	
	for a Connector Therefor	)	

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED PAPERS

In response to the Notice to File Corrected Application Papers mailed on April 28, 2021,

Applicant submits the following response:

IN THE SPECIFICATION:

Please replace the original specification with the attached substitute specification. A clean copy and a marked-up copy pursuant to 37 C.F.R. 1.125 (a) and (b) are attached. No new matter has been added.

REMARKS

Applicant has submitted here with a substitute specification that includes the changes made in the preliminary amendment filed with the application. A clean copy and a marked-up copy of the specification are attached. Applicant has not included any new matter in the substitute specification.

No fees are believed to be due with his filing.

Respectfully submitted,

/Michael L. Leetzow/

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Date: May 12, 2021



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/145,864	01/11/2021	Hiep V. Nguyen	USCO-053-04

CONFIRMATION NO. 5506

FORMALITIES LETTER



OC000000125187526

Date Mailed: 04/28/2021

152017
Us Conec Ltd.
1138 25th Street Southeast
Hickory, NC 28602

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- A substitute specification excluding claims in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125 is required. The substitute specification must be submitted with markings and be accompanied by a clean version (without markings) as set forth in 37 CFR 1.125(c) and a statement that the substitute specification contains no new matter (see 37 CFR 1.125(b)). Since a preliminary amendment was present on the filing date of the application and such amendment is part of the original disclosure of the application, the substitute specification must include all of the desired changes made in the preliminary amendment. See 37 CFR 1.115 and 1.215.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

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:

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Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

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**.

/tqlam/



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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/145,864	01/11/2021		1820	USCO-053-04	14	3

CONFIRMATION NO. 5506

FILING RECEIPT

152017
Us Conec Ltd.
1138 25th Street Southeast
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Date Mailed: 04/28/2021

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)

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Power of Attorney: The patent practitioners associated with Customer Number 152017

Domestic Priority data as claimed by applicant

This application 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.

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: 04/27/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/145,864**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

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 Assets Control, 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).

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technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/145,864				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	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), (l), 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(j))	14	minus 20 = *			OR	x 100 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 480 =	0.00			
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	1820			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	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))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	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))							OR		
	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.										

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	17/145,864
Filing Date	2021-01-11
First Named Inventor	Hiep V. Nguyen
Title	Alignment Adapter and Alignment Design for a Connector Therefor
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-04

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael L. Leetzow/	Date (Optional)	2021-04-14
Name	Michael Leetzow	Registration Number	35932
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)			

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.**

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

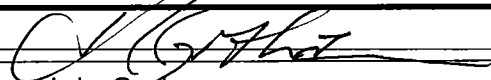
☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone	Email		

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.

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, LtdApplication No./Patent No.: 17/145,864 Filed/Issue Date: 2021-01-11Titled: Alignment Adapter and Alignment Design for a Connector ThereforUS 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. ☒ 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. ☒ 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 055237, Frame 0858, 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.

[Page 1 of 2]

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.

Senko Ex. 1016, Page 110

Senko Advanced Components v. US Conec Ltd.

IPR2024-00805

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/

Signature

Michael Leetzow

Printed or Typed Name

2021-04-14

Date

35932

Title or Registration Number

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.

Electronic Acknowledgement Receipt

EFS ID:	42456307
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	14-APR-2021
Filing Date:	
Time Stamp:	17:55:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	USCO-053-04_USPTO_AIA82_2 0210414_175013.pdf	320903 049d8040be566f325f7d6d28baa2f5521b3 78f90	no	2

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	US_Conec_Ltd_USPTO_AIA96_20210414_175013.pdf	119134	no	3
			1633fd485c422a7c63275b5e6bab0285513a0703		
Warnings:					
Information:					
Total Files Size (in bytes):				440037	
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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)
Serial No.: 17/145,864) Group Art Unit: Unassigned
Filing Date: January 11, 2021) Examiner: Unassigned
Title: Alignment Adapter and Alignment Design)
for a Connector Therefor)

Commissioner for Patents
PO Box 1450
Arlington VA 22313-1450

STATUS INQUIRY

This application was filed on January 11, 2021, and Applicant has not received any correspondence from the Office regarding this application. Applicant is concerned that this application has been forgotten or misplaced in the Office. The application was referred to Level 2 (LARS) by OIPE CSR on January 11, 2021. However, this is the fourth application in a line of applications, and the parent of this case was referred to and cleared by L&R on the same day it was filed. Thus, Applicant does not understand what could be taking so long to clear L&R.

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: April 14, 2021

Electronic Acknowledgement Receipt

EFS ID:	42456109
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	14-APR-2021
Filing Date:	
Time Stamp:	17:41:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for status of Application	StatusLetterUSCO05304.pdf	53477	no	1
			906edb52ae3514033350d734b82bd5d18e95ea50		

Warnings:

Information:	
Total Files Size (in bytes):	53477
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17145864
	Filing Date		2021-01-11
	First Named Inventor	Hiep V. Nguyen	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	USCO-053-04	

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	5129024	A	1992-07-01	Honma	
	4	6293708	B1	2001-09-25	Ohtsuka et al.	
	5	6331079	B1	2001-12-01	Grois	
	6	6361218	B1	2002-03-26	Matasek et al.	
	7	6406192	B1	2002-06-18	Chen et al.	
	8	9086546	B2	2015-07-21	Jones	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	17145864
Filing Date	2021-01-11
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-04

9	9366829	B2	2016-06-14	Czosnowski et al.
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If you wish to add additional U.S. Patent citation information please click the Add button.

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U.S.PATENT APPLICATION PUBLICATIONS

Remove

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20020172469	A1	2002-11-21	Benner et al.	
	2	20050281509	A1	2005-12-22	Cox et al.	
	3	20080131055	A1	2008-06-05	Edward et al.	
	4	20110091158		2011-04-01	Iwaya	
	5	20110091158	A1	2011-04-21	Iwaya et al.	
	6	20120057824	A1	2012-03-08	Katoh	
	7	20120057824	A1	2012-03-08	Katoh	
	8	20140241689	A1	2014-08-28	Bradley et al.	

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	1	202600189	CN	U	2012-12-12	Unknown		×
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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	17145864
Filing Date	2021-01-11
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-04

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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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)	2021-04-12
Name/Print	Michael Leetzow	Registration Number	35932

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(12) 实用新型专利

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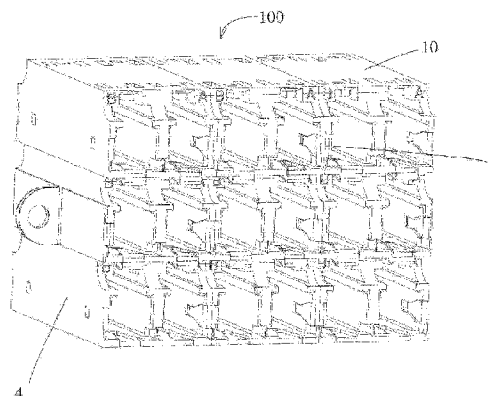
权利要求书 3 页 说明书 9 页 附图 16 页

(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。



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:

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

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。

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

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,从所述第一立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

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描述的适配器组件;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。

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

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

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

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

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，保证客户端根据需求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

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。

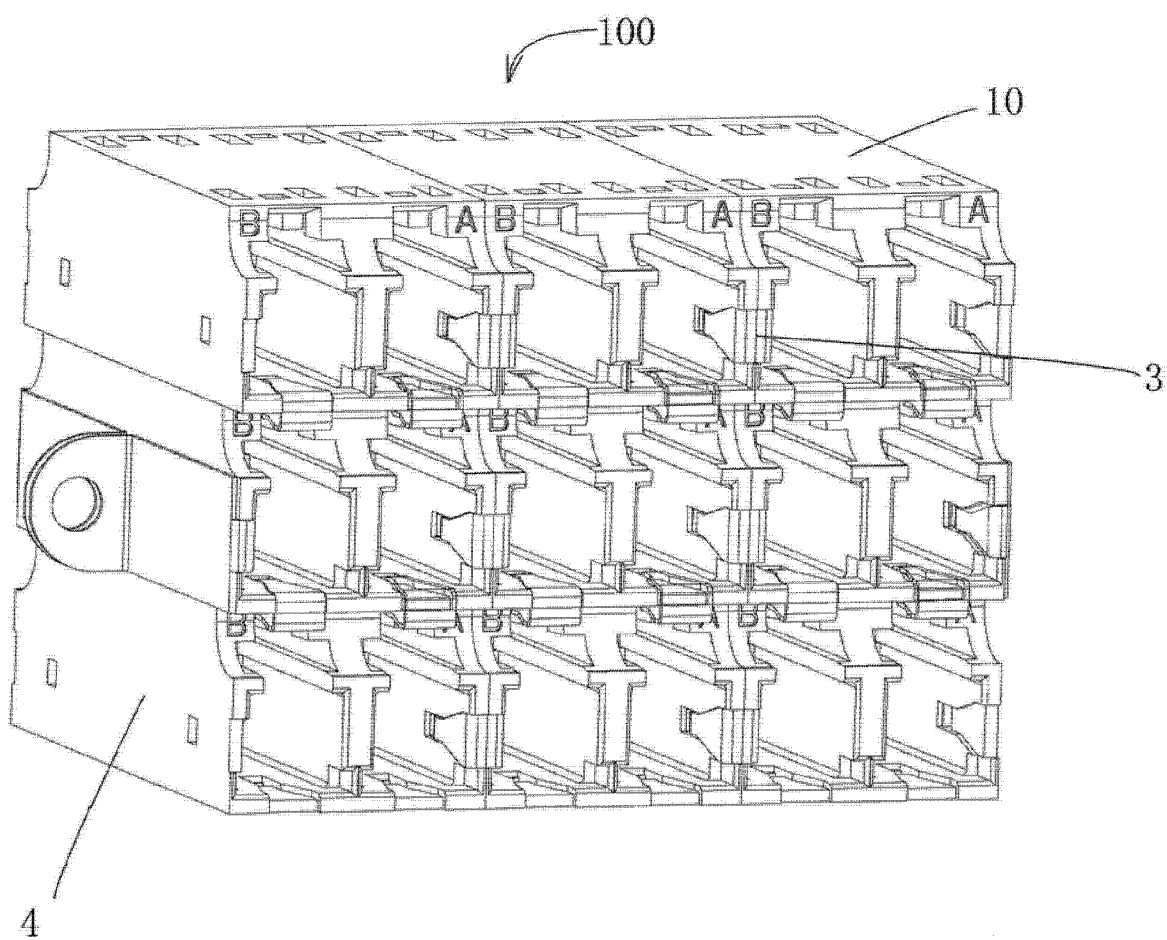


图 1

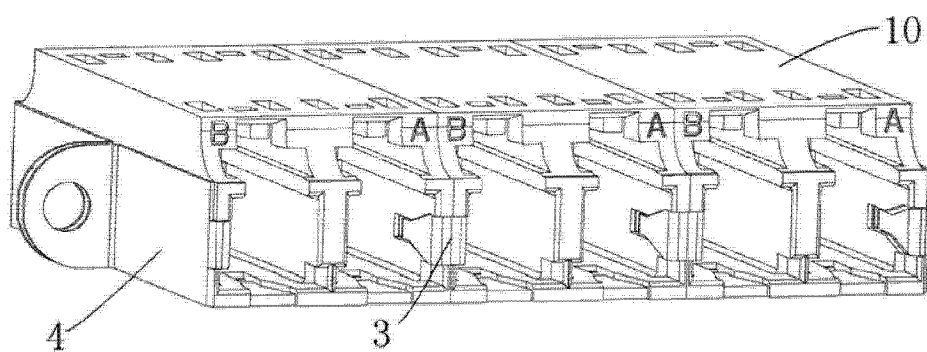


图 2

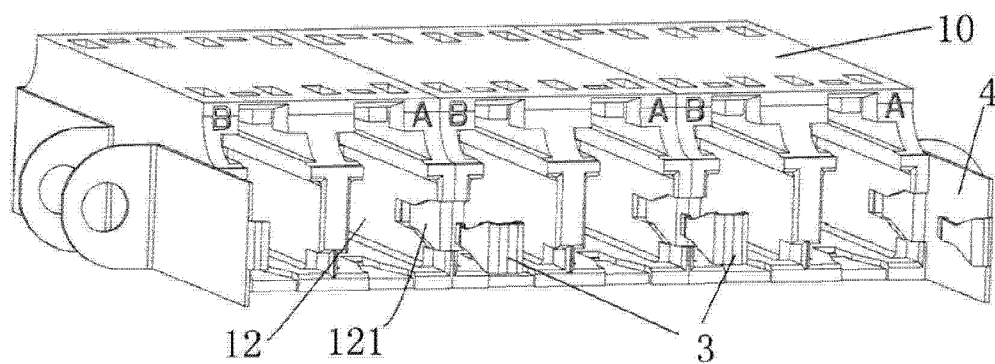


图 3

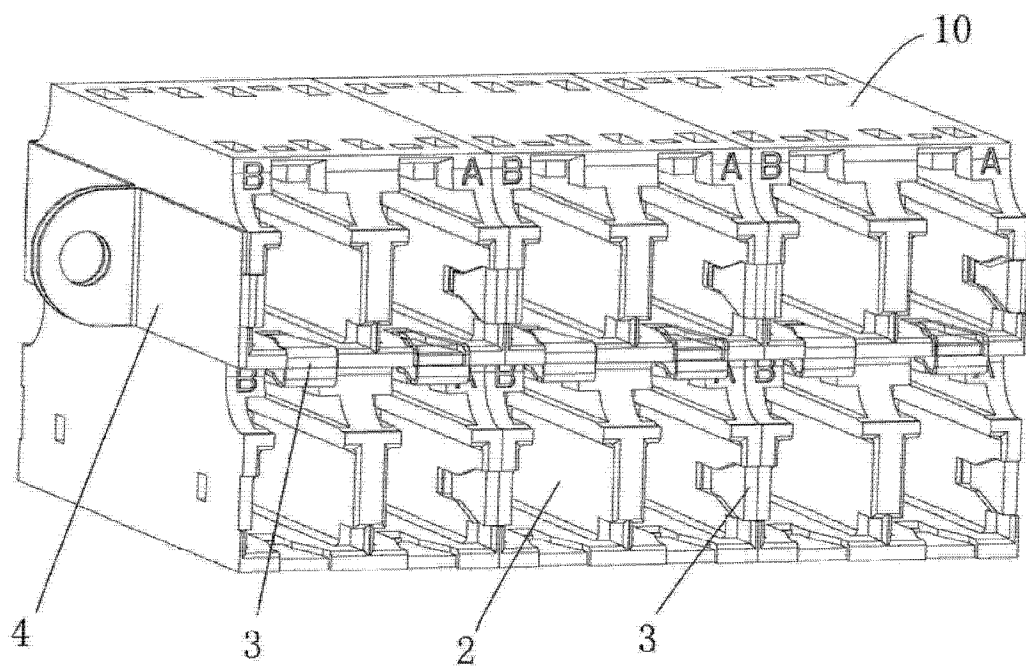


图 4

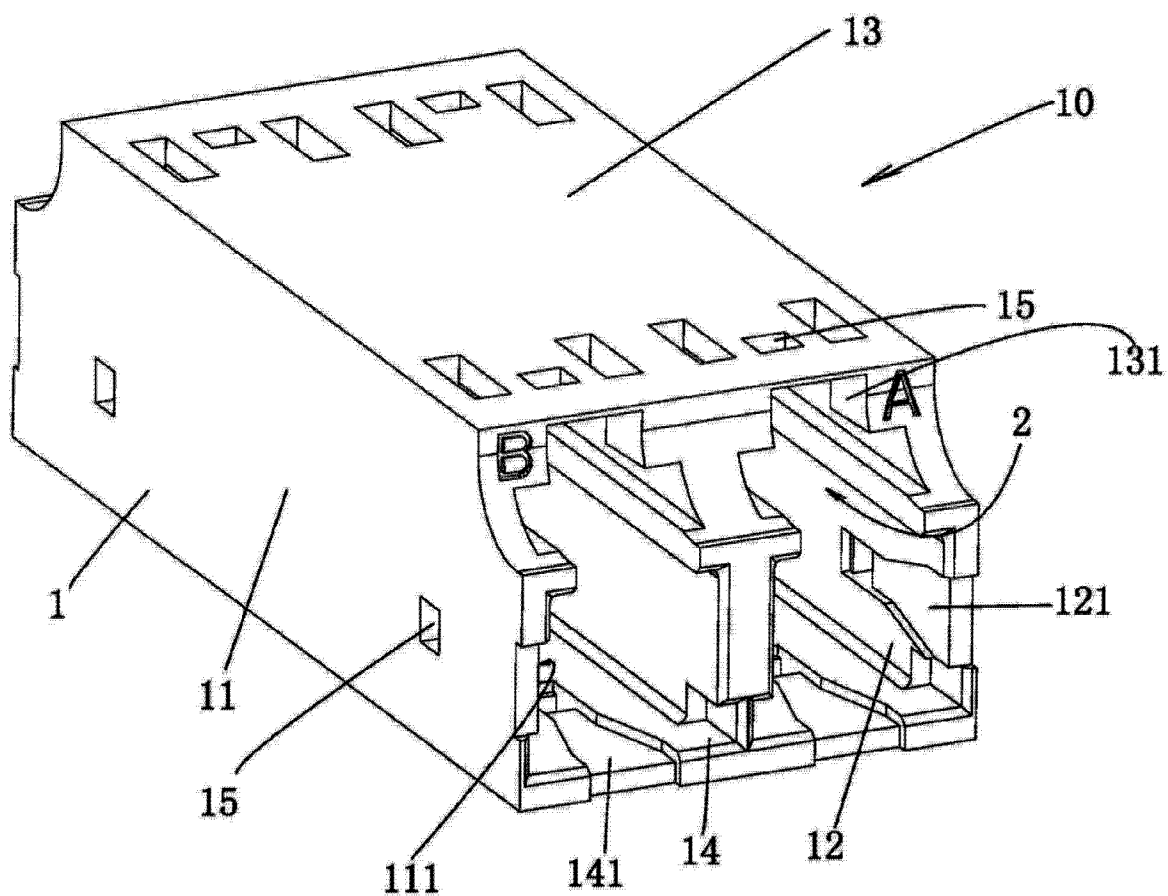


图 5

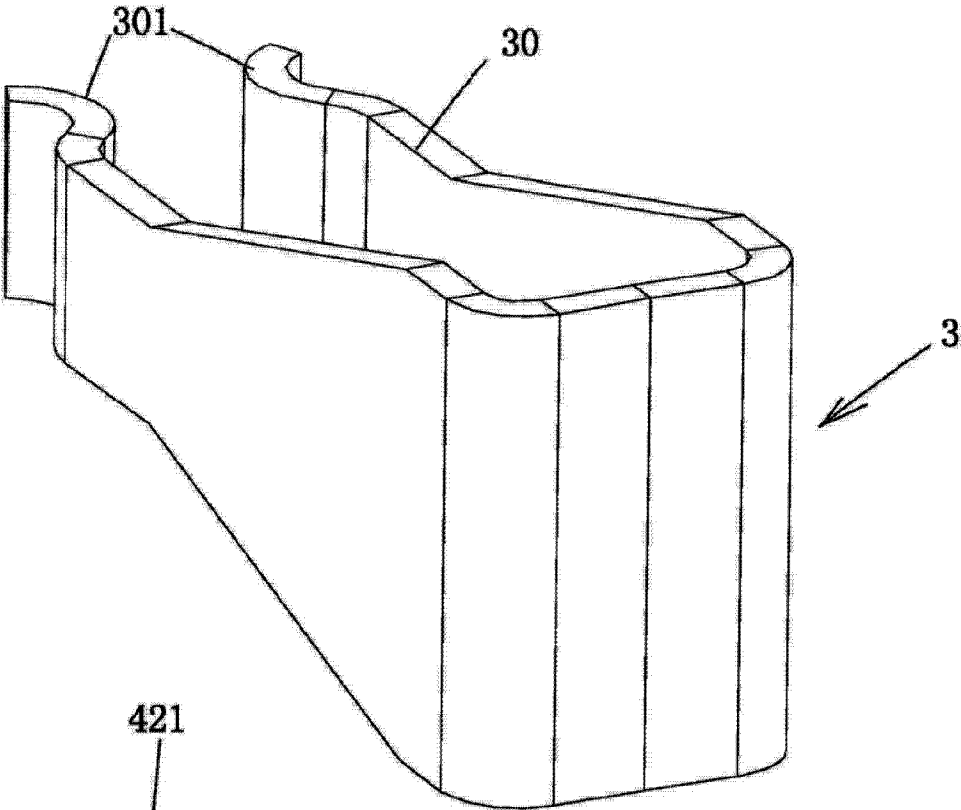


图6

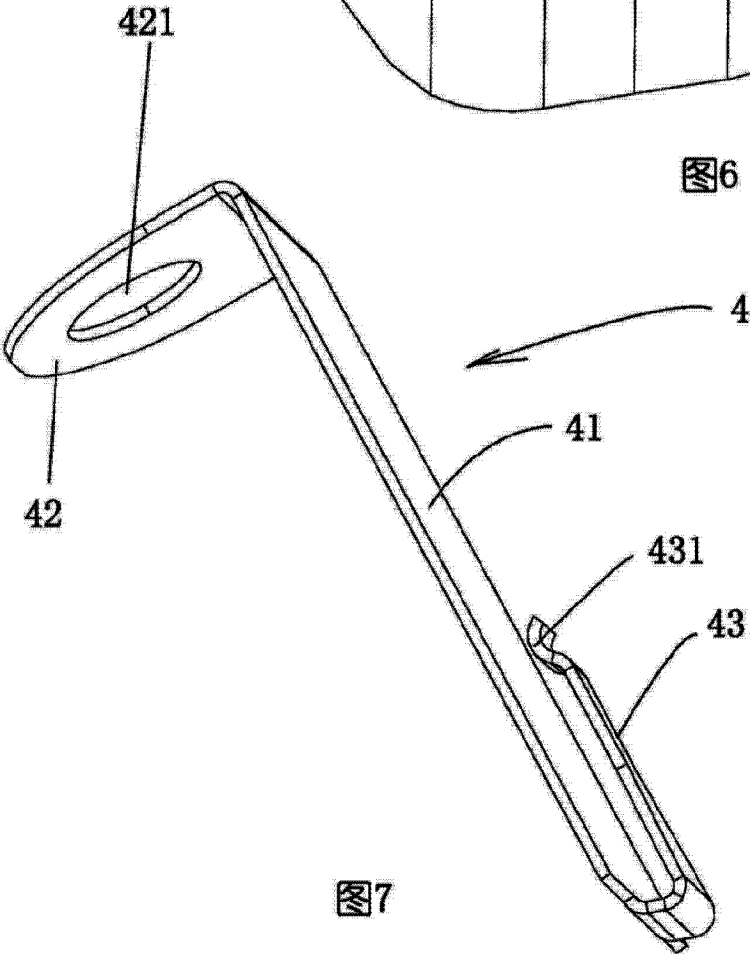


图7

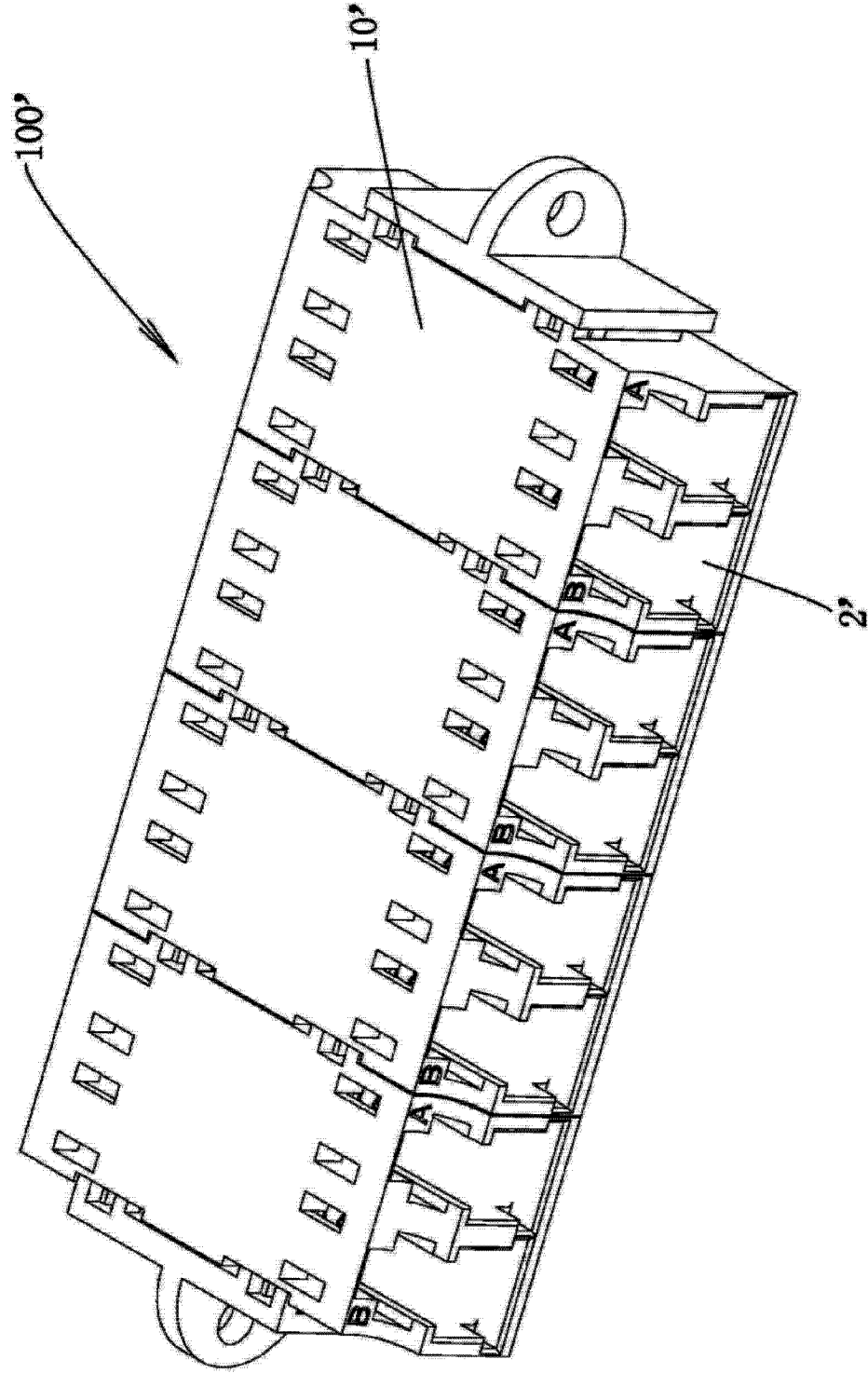
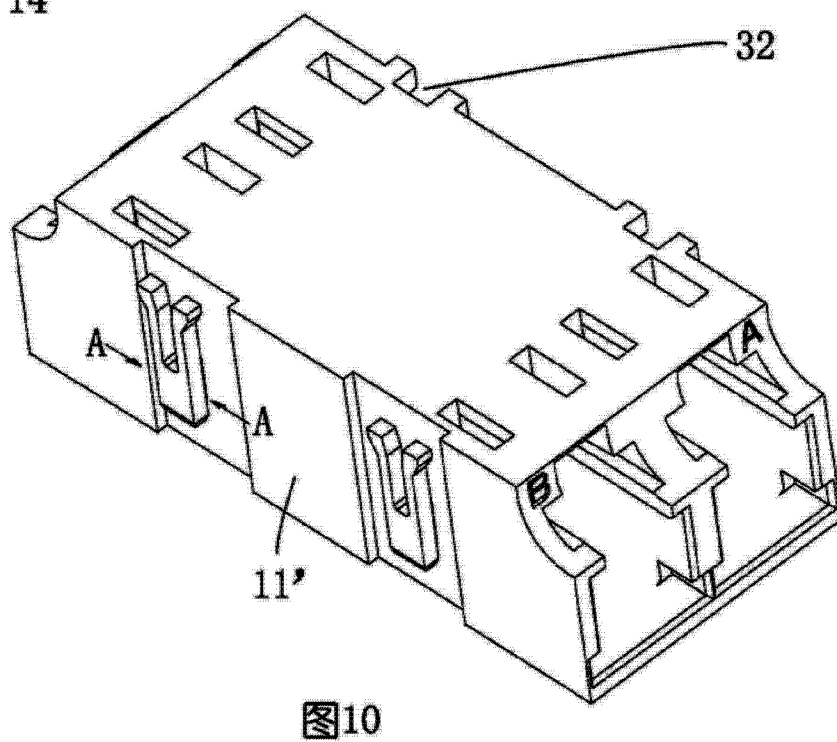
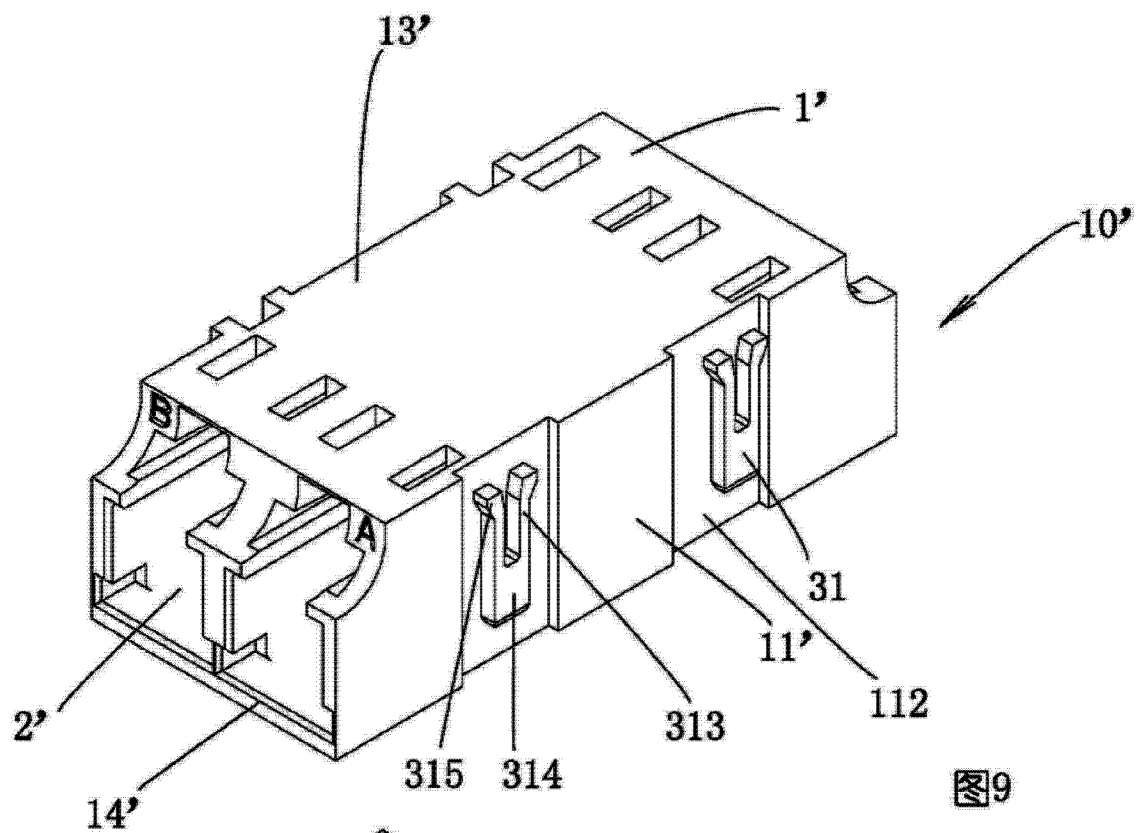


图 8



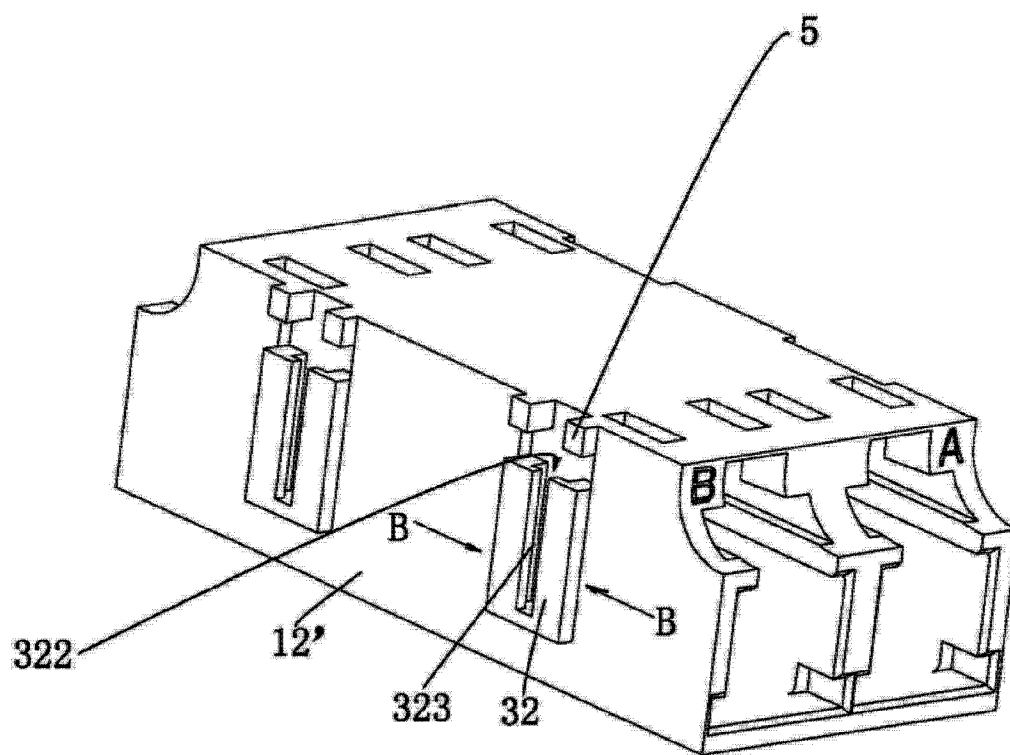


图 11

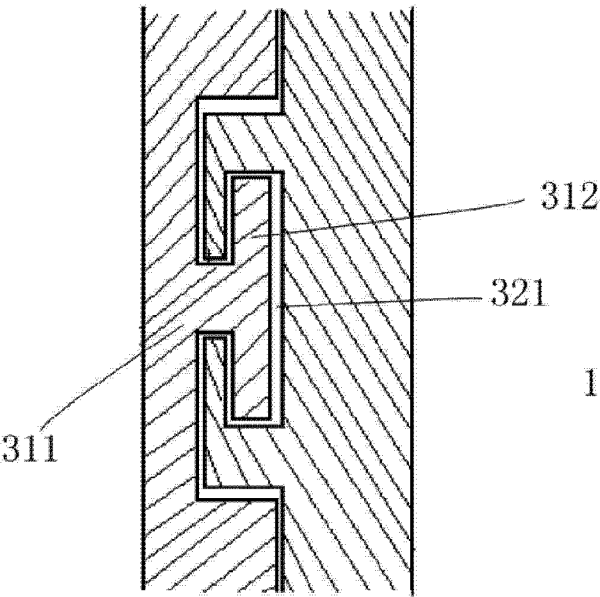
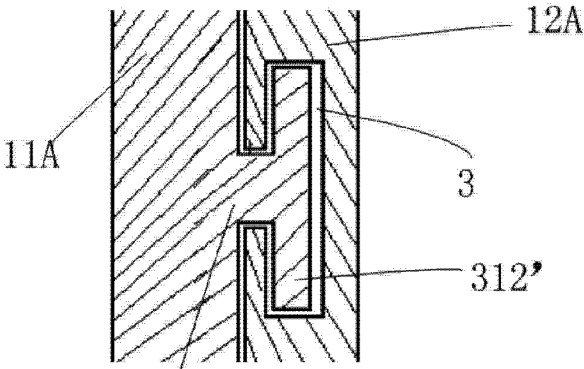


图12



311'

图13

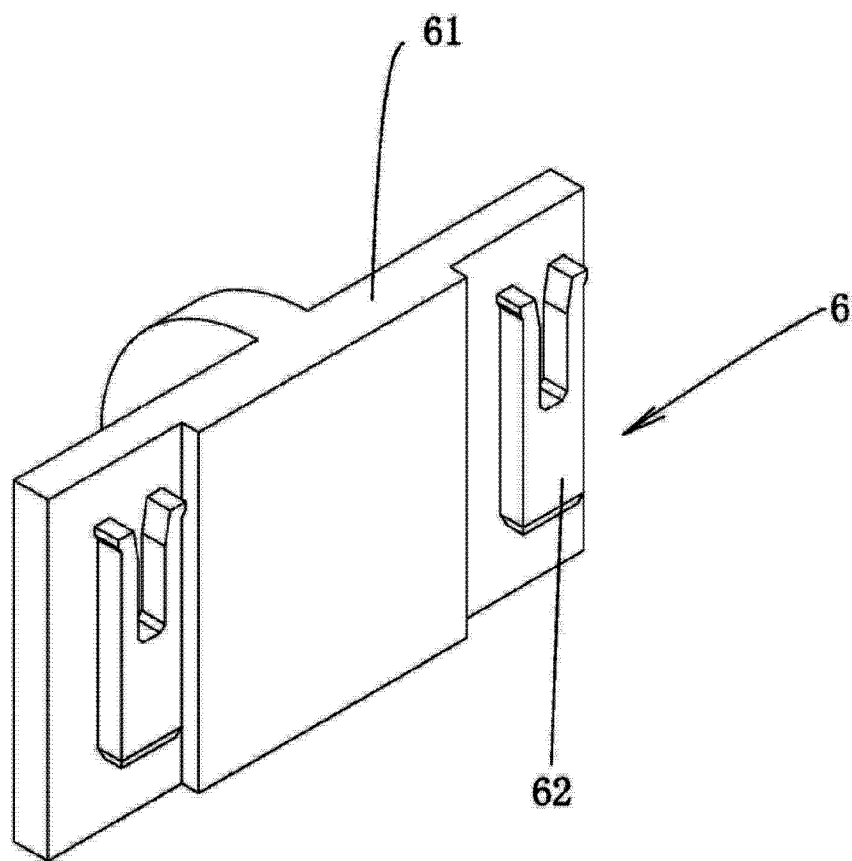


图 14

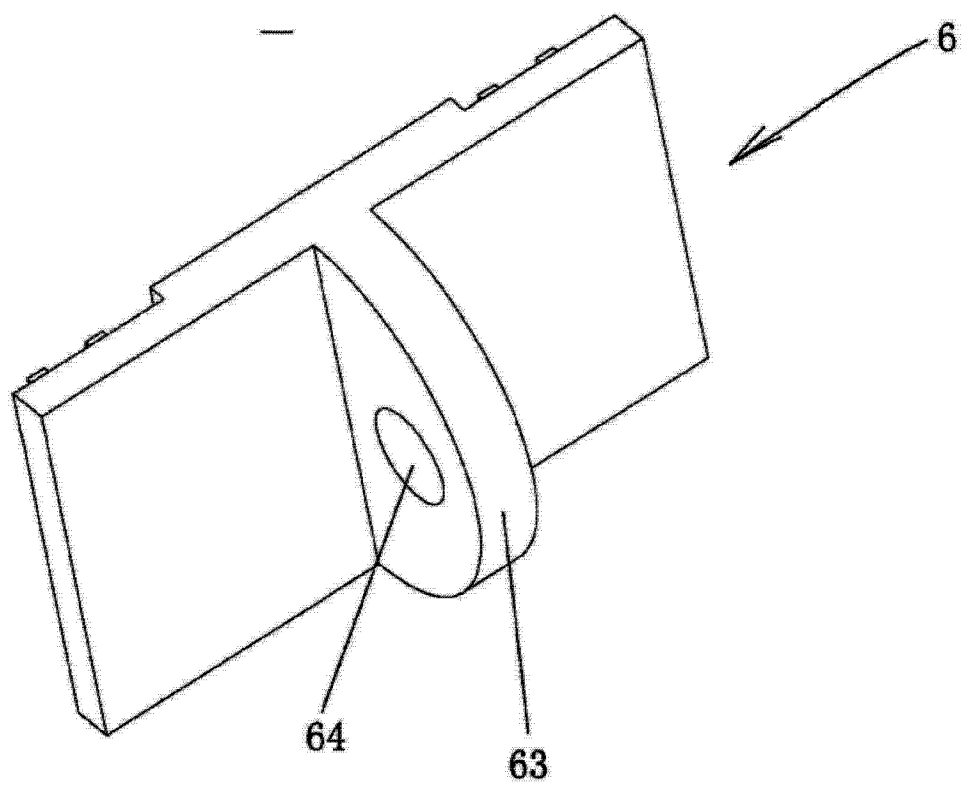


图 15

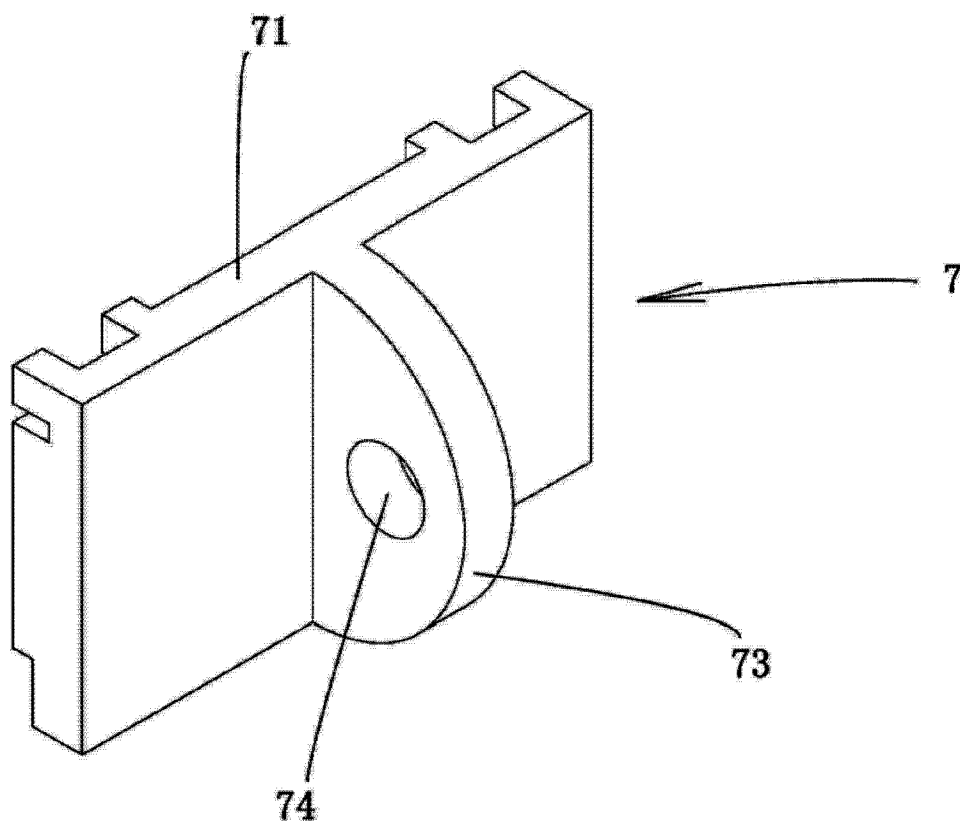


图 16

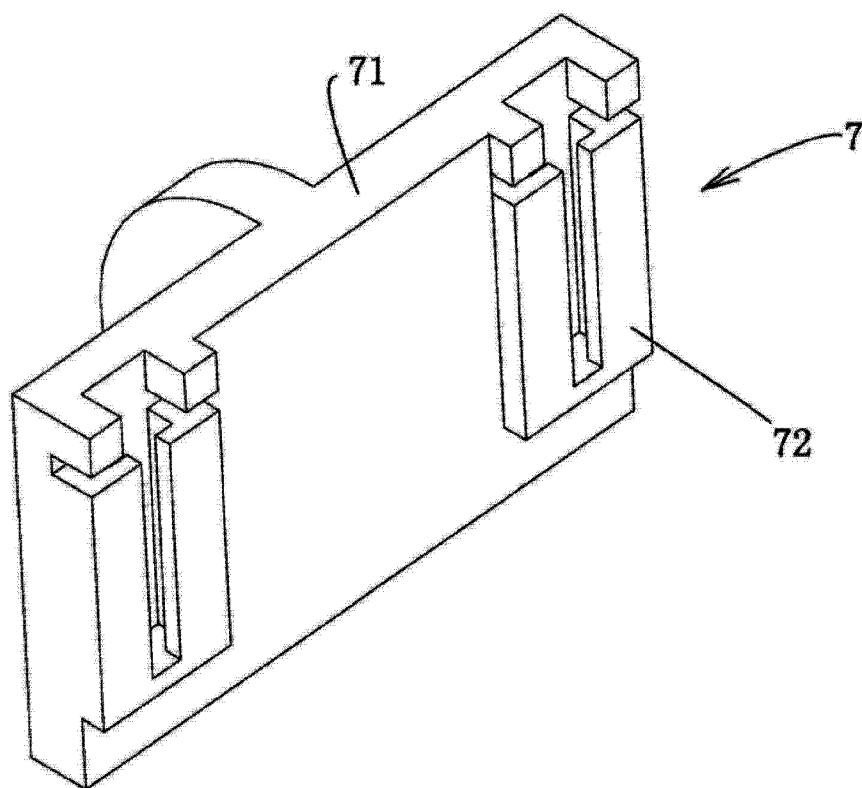


图 17

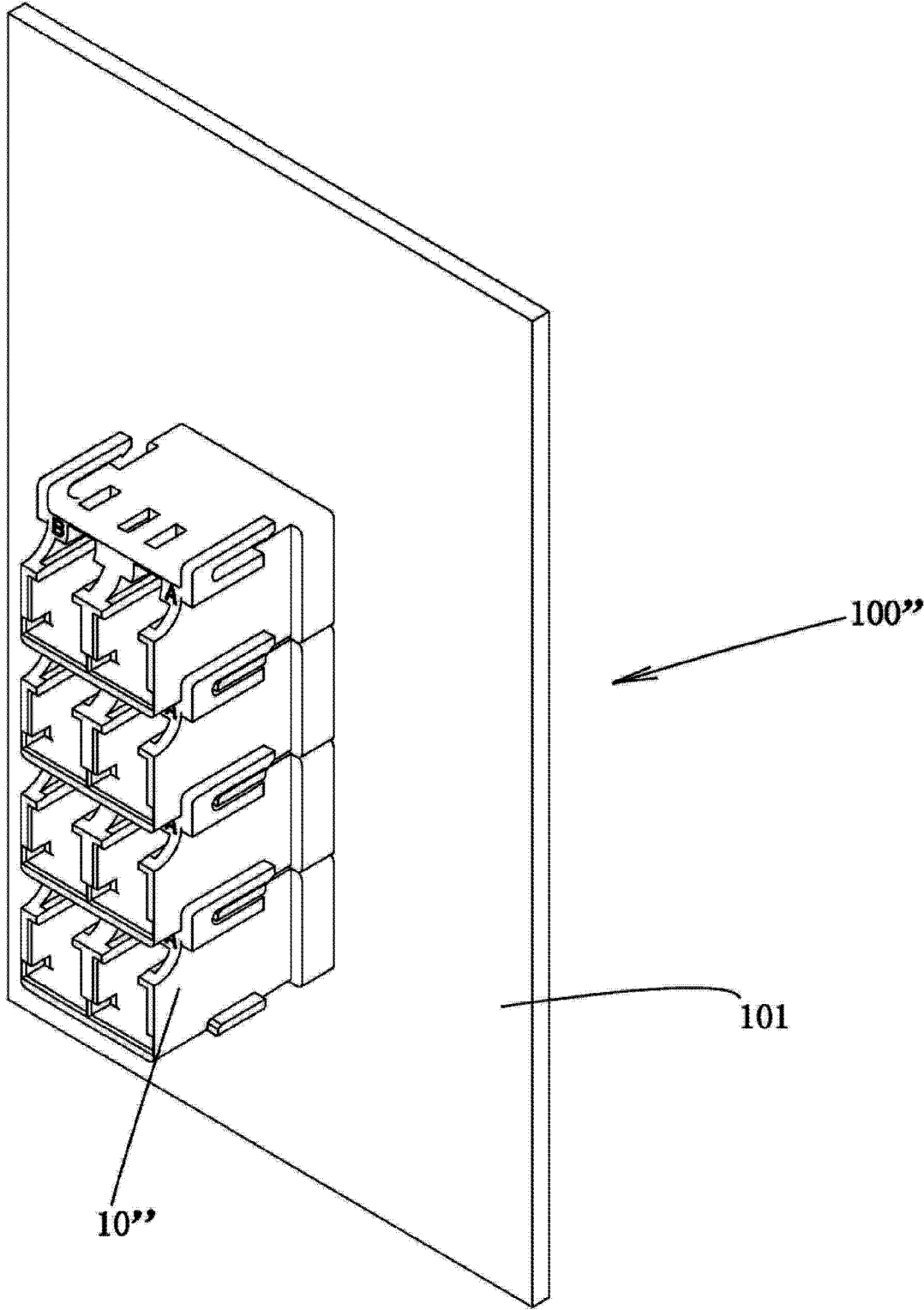


图 18

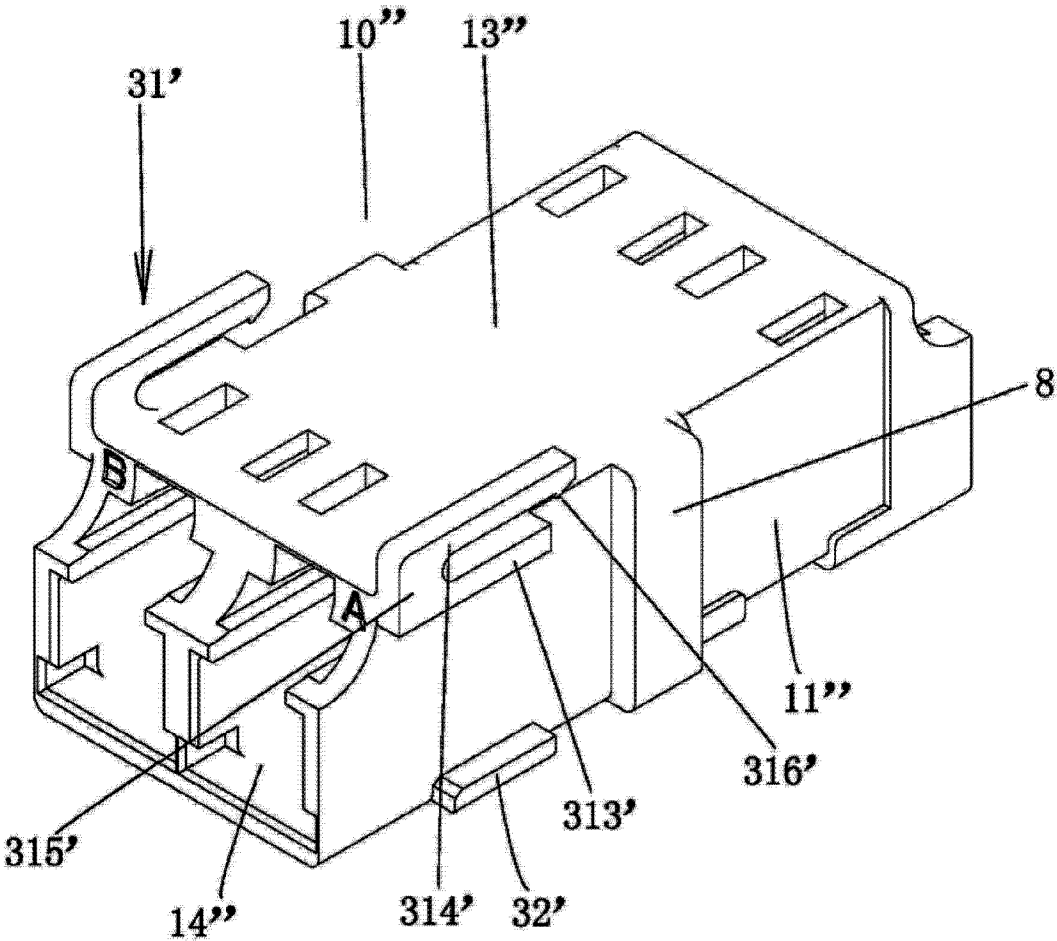


图 19

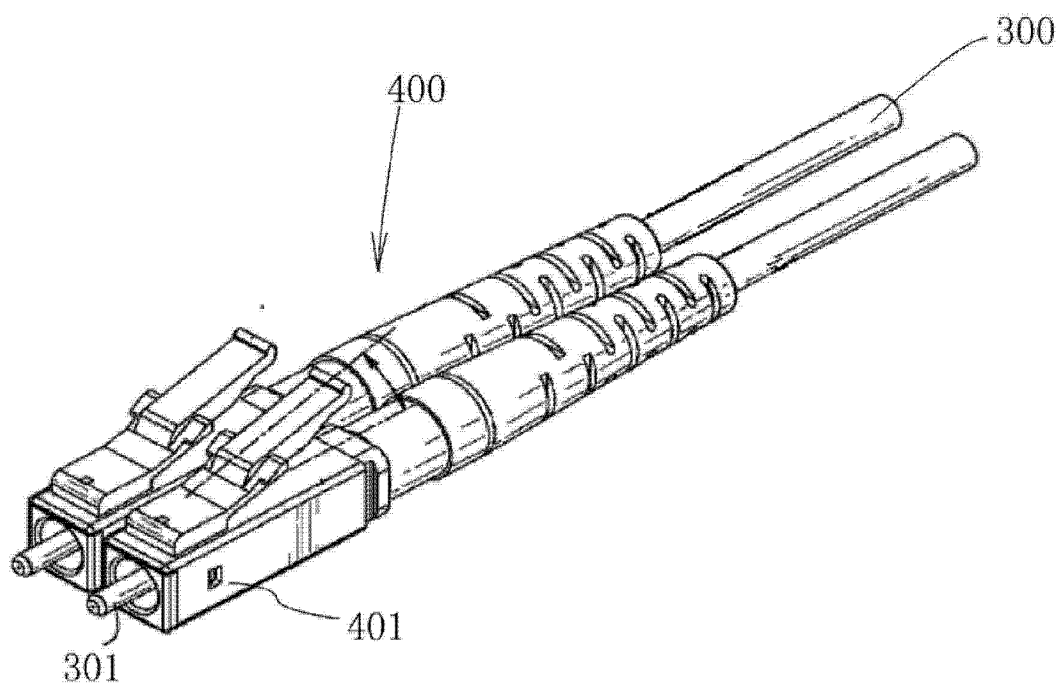


图 20

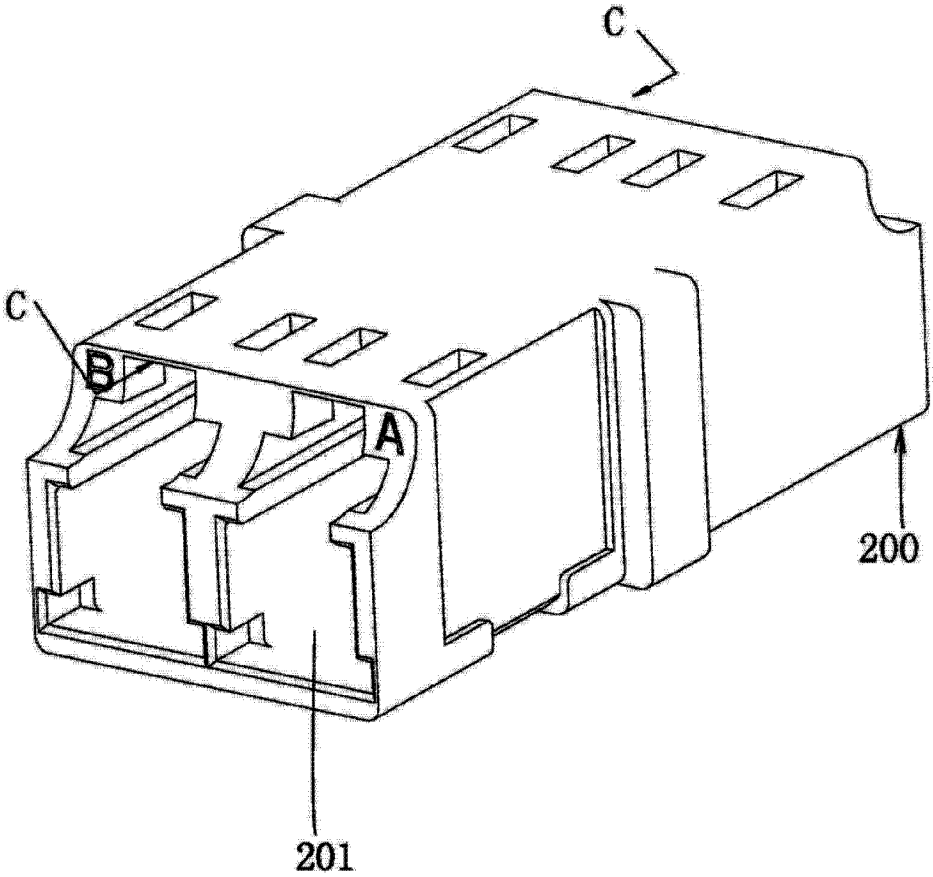


图 21

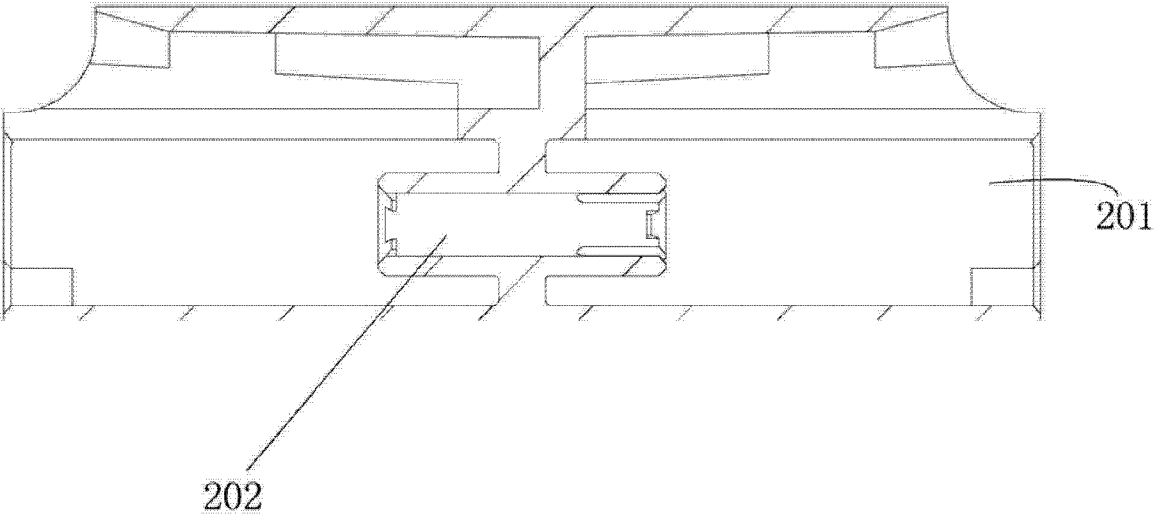


图 22



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G02B 6/00 (2006.01) *H01R* 31/06 (2006.01)
HOIR 13/506 (2006.01) *H01R* 13/518 (2006.01)
HOIR 13/508 (2006.01) *H01R* 13/74 (2006.01)

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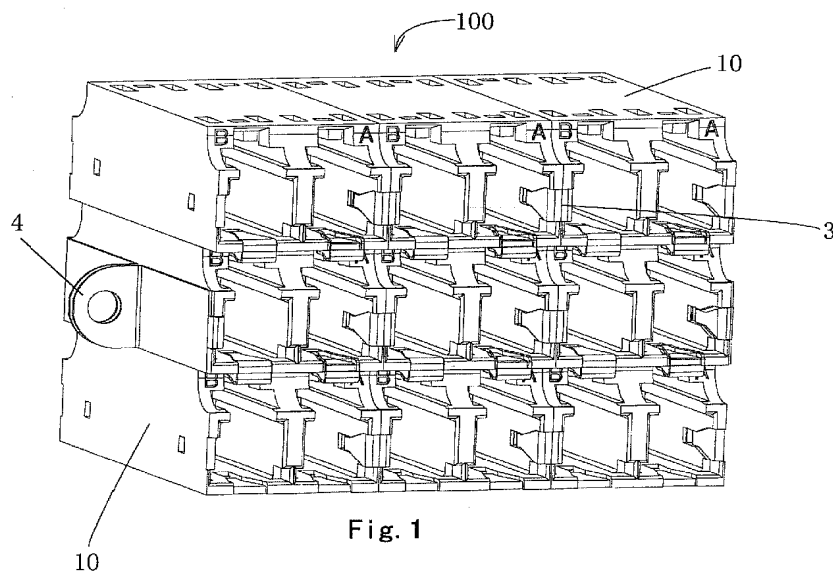


Fig. 1

(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.

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ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

5 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

10 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

20 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.

25 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.

35 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.

5 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
10 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.

15 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
20 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
25 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
30 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
35 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
5 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
10 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
15 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.

20 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
25 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
30 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
35 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:

5 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;

10 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;

15 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;

20 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;

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

30 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. 1), 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;

35 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 INVENTION

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 30 are 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 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
5 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
10 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
15 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
20 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
25 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
30 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.

35 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.

5 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
10 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
15 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
20 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
25 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
30 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
35 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 substantially 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.

5 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
10 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
15 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
20 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
25 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
30 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
35 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:

5 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
10 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
15 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.

20 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.

25 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.
30

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
35 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 (31 1) formed by extending from the outer side of the first vertical wall in the horizontal direction ; and

an engagement portion (3 12) 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.

5

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.

10

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

15

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

20

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:

25

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.

30

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,

35

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

5 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:

10 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,

15 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
20 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

25 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:

30 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
35 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:

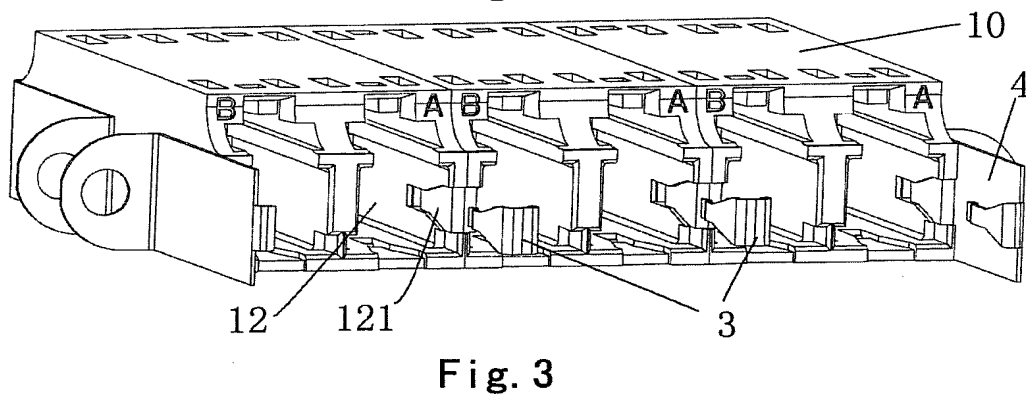
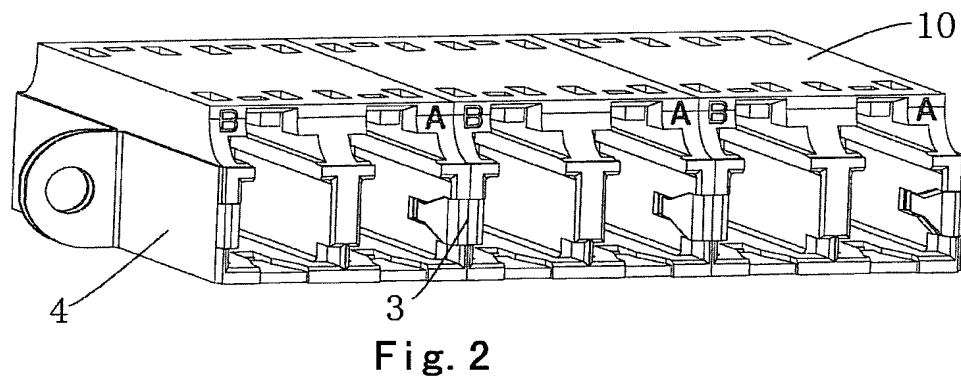
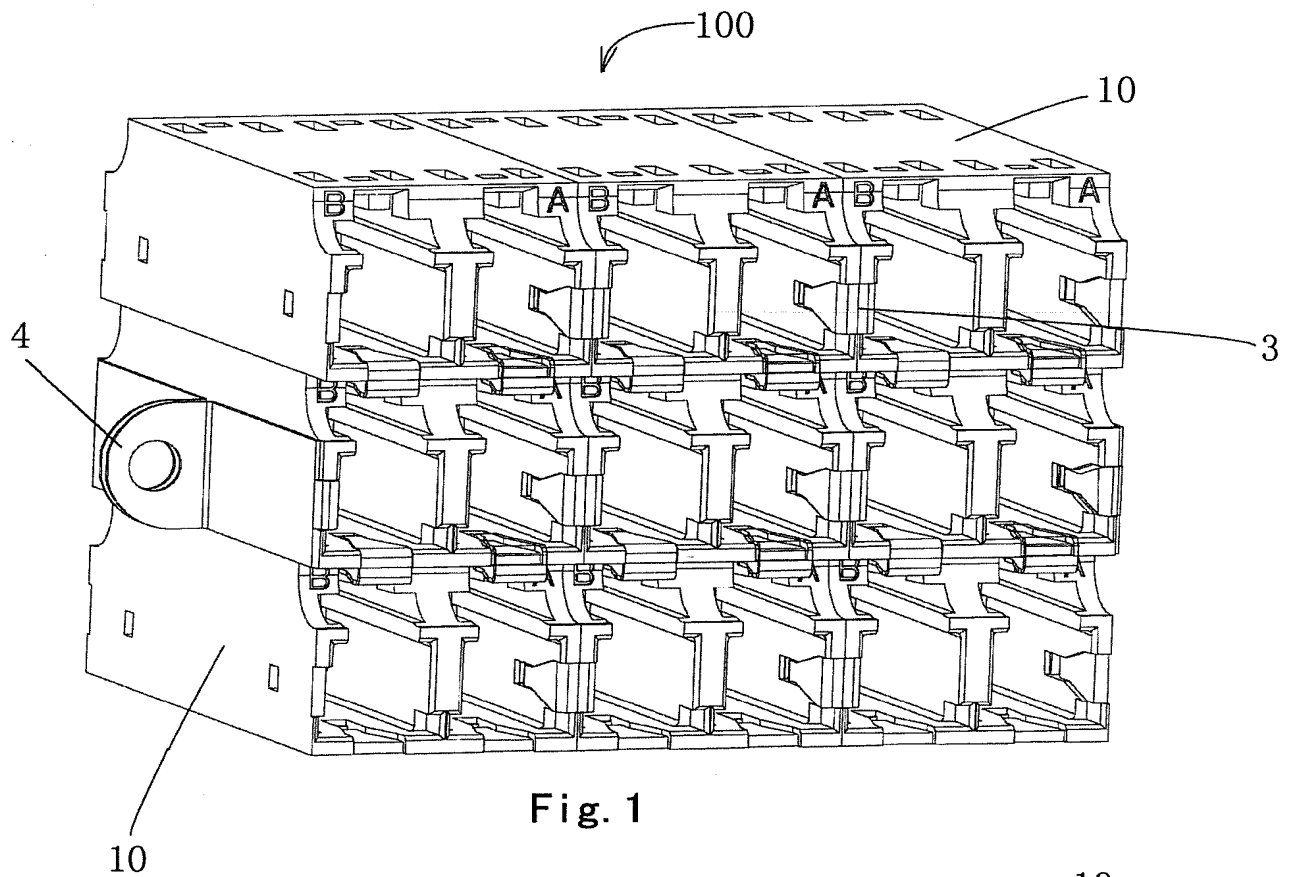
an adapter assembly according to any one of claims 1-24; and

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.

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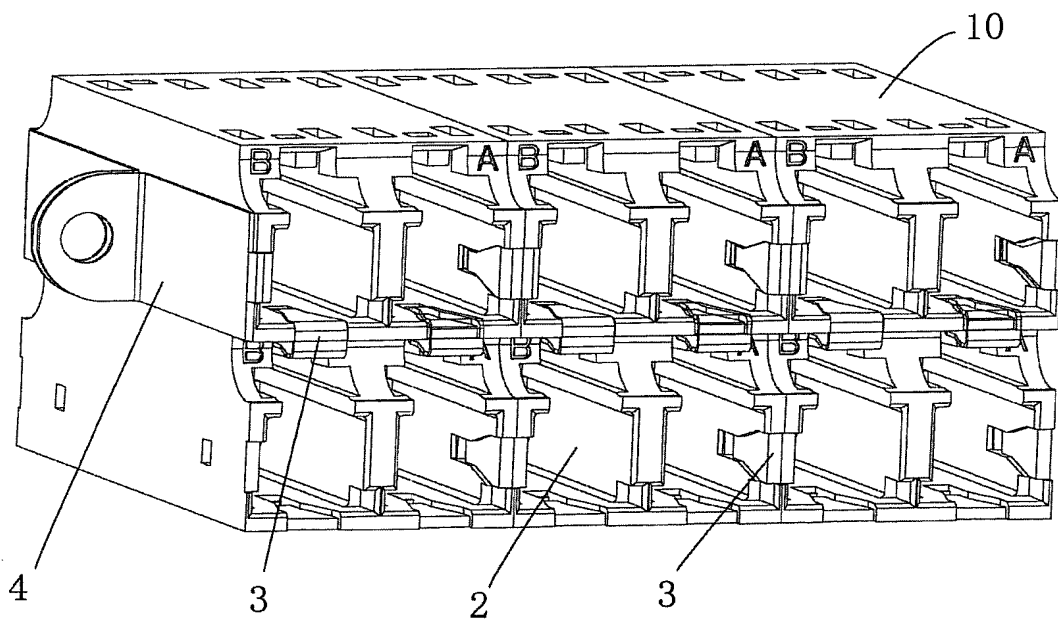


Fig. 4

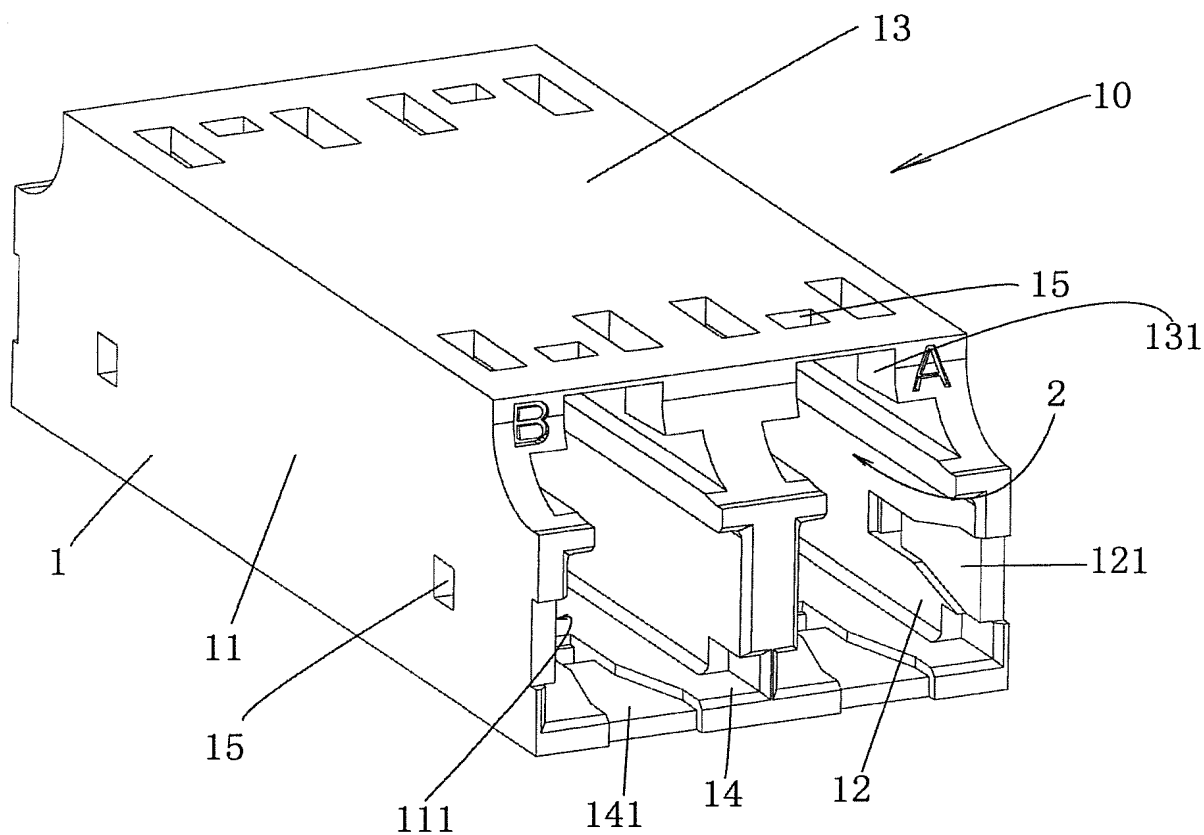


Fig. 5

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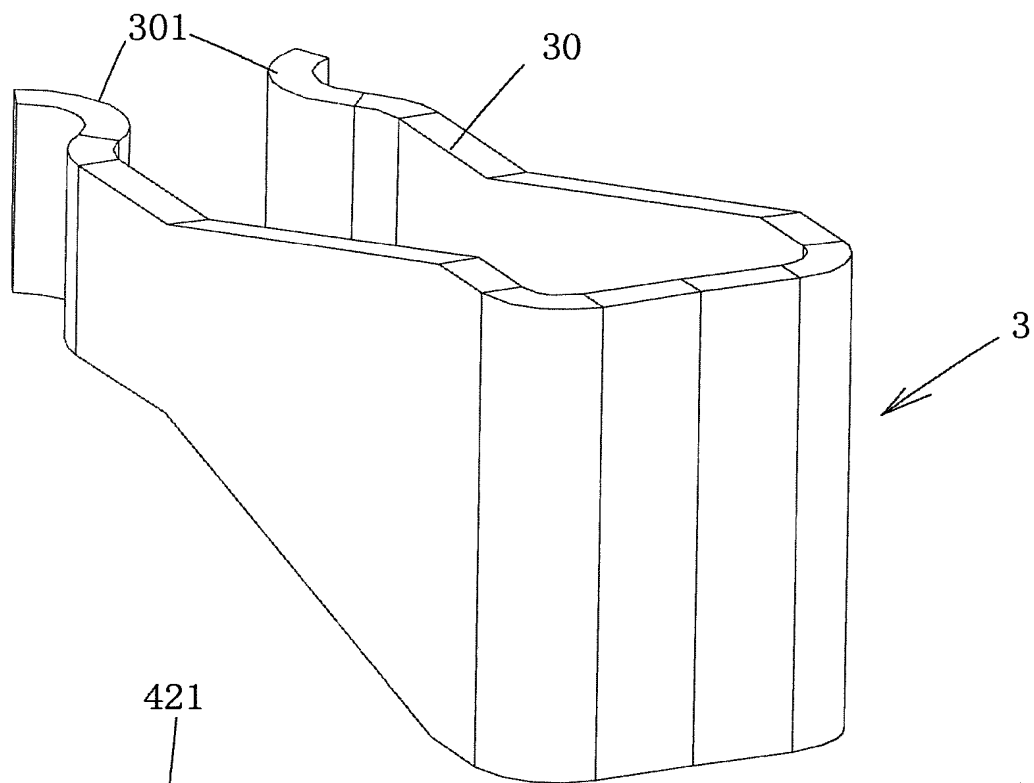


Fig. 6

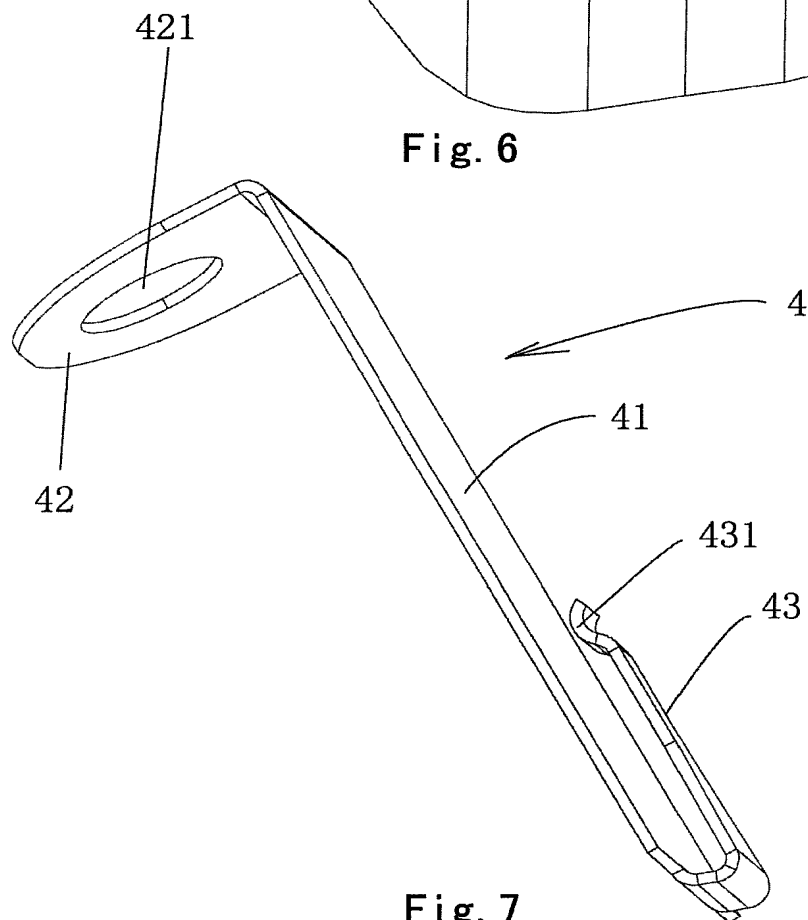


Fig. 7

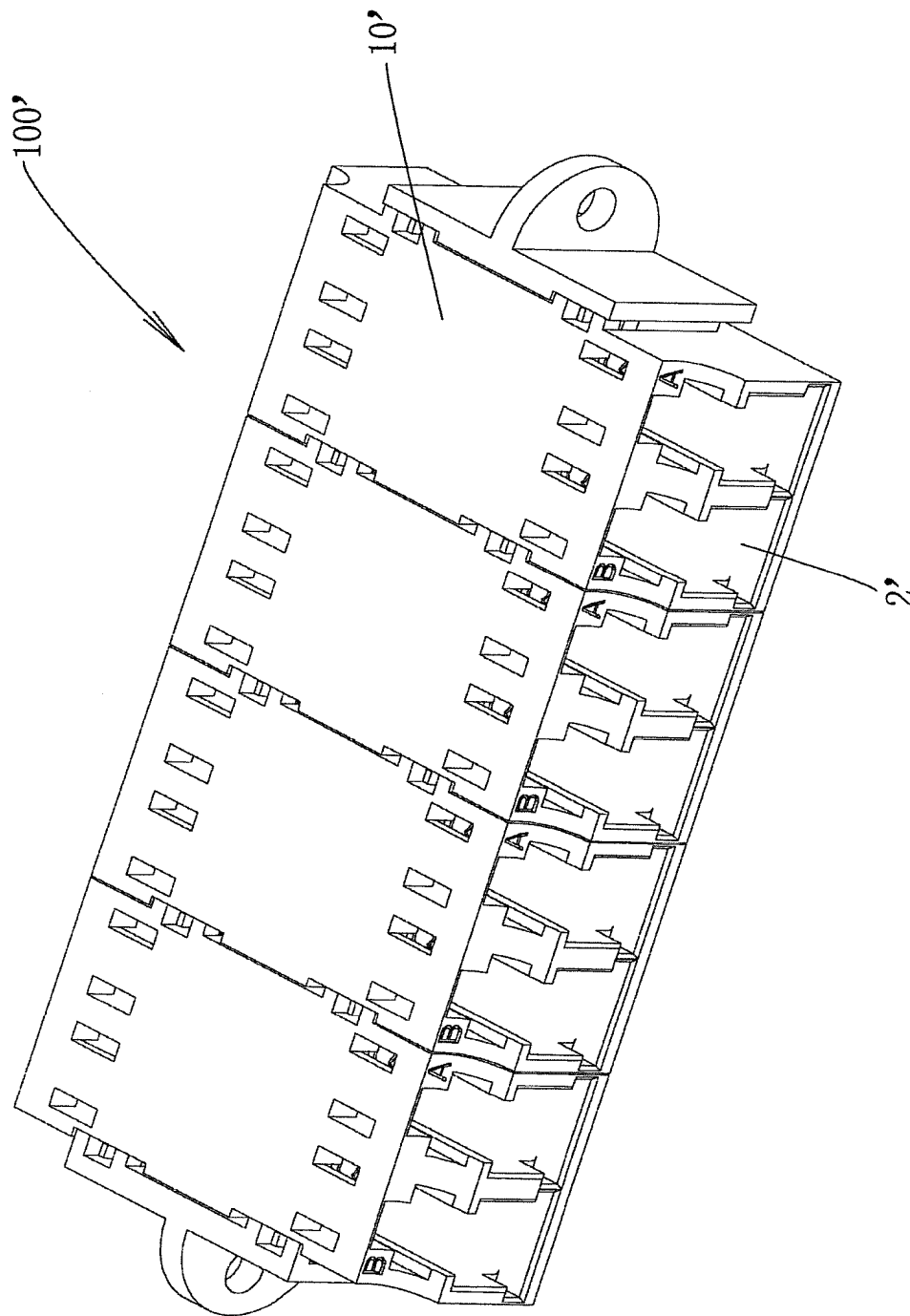


Fig. 8

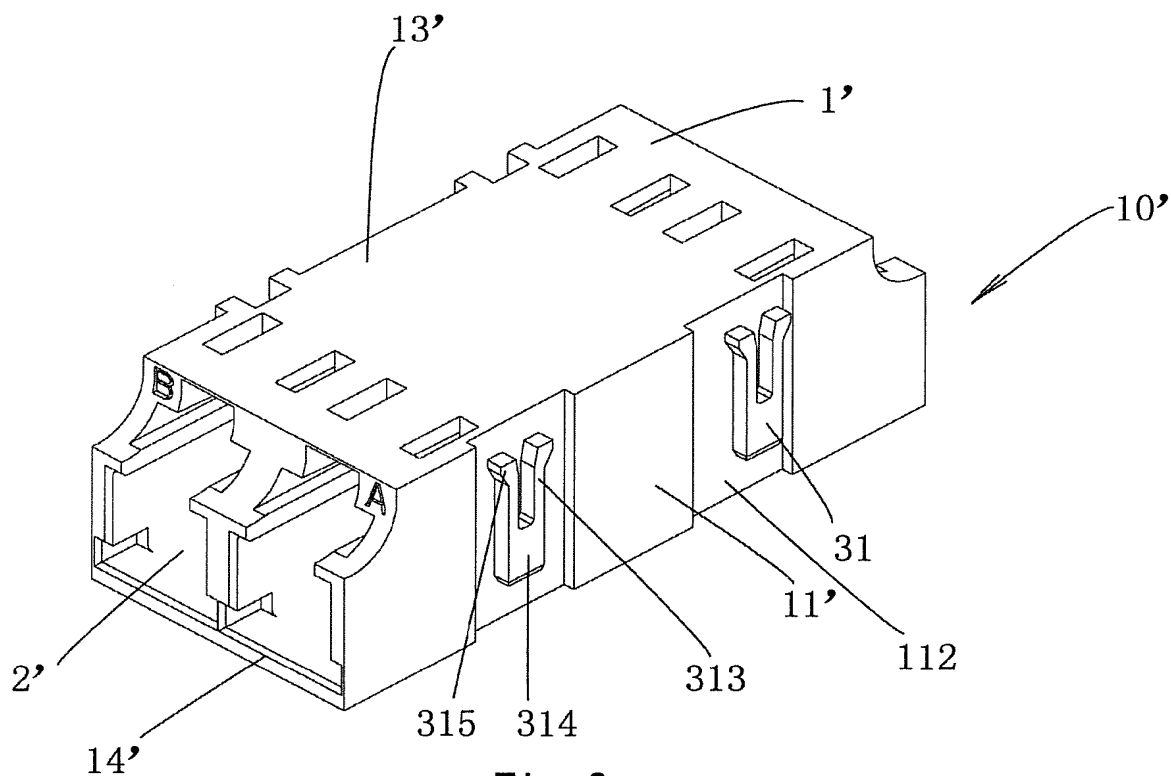


Fig. 9

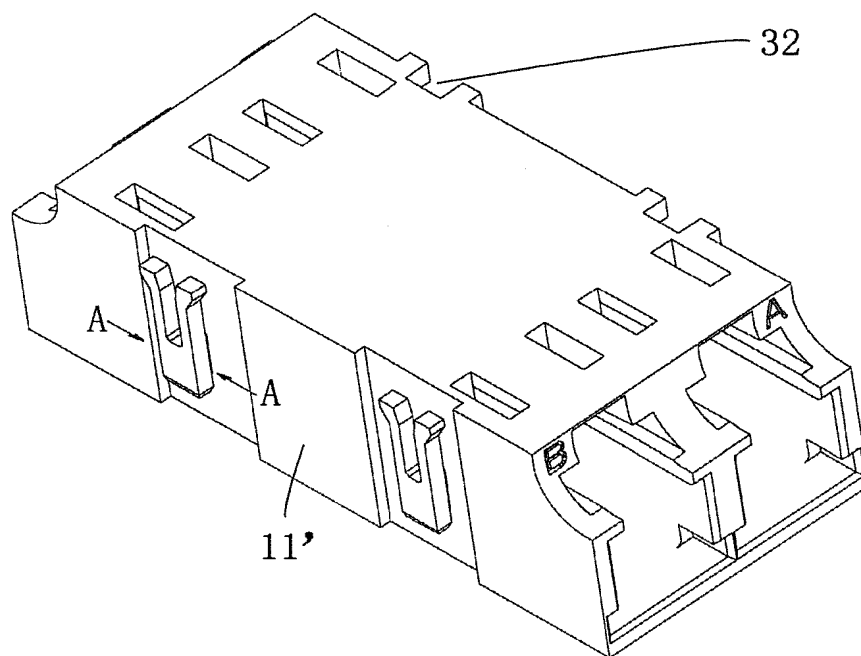


Fig. 10

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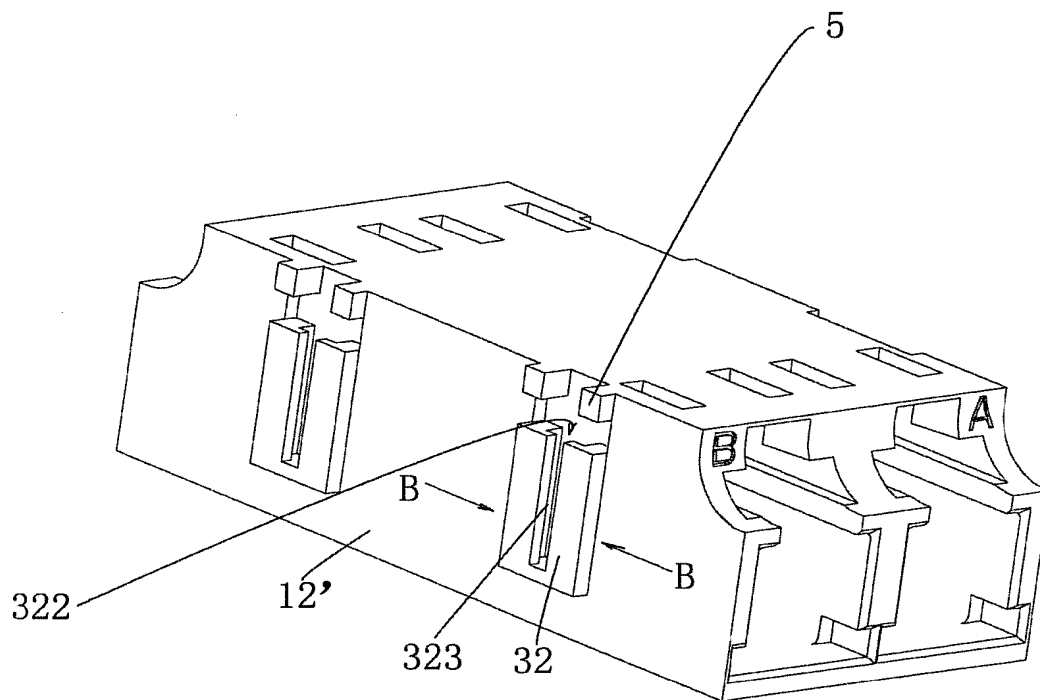


Fig. 11

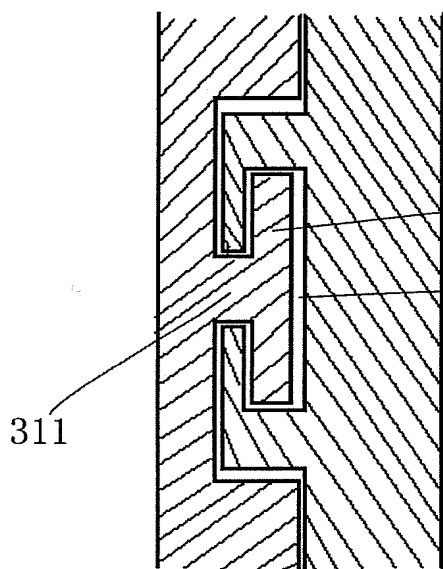


Fig. 12

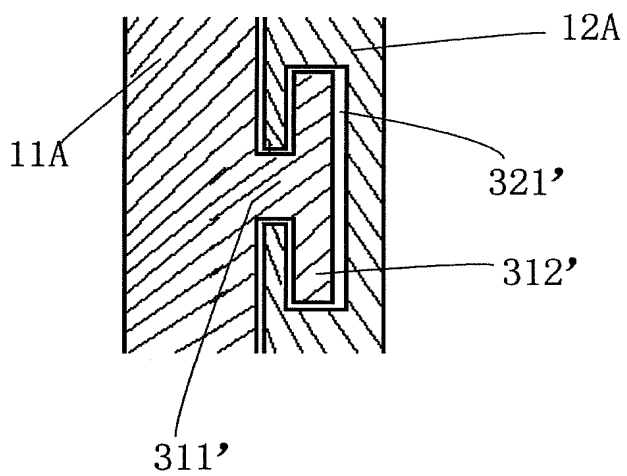


Fig. 13

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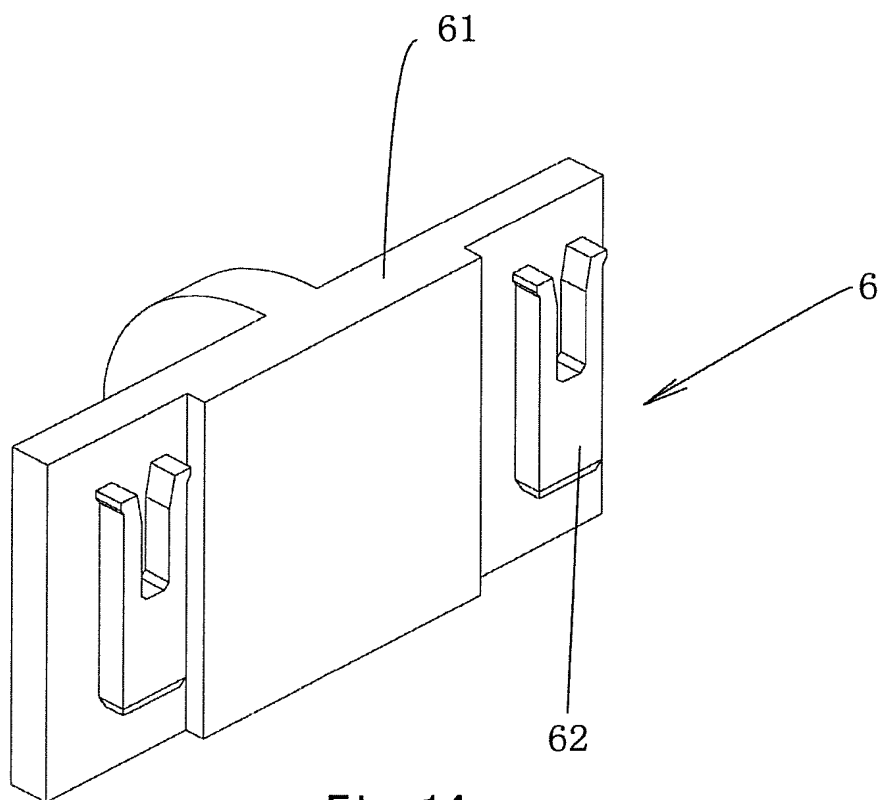


Fig. 14

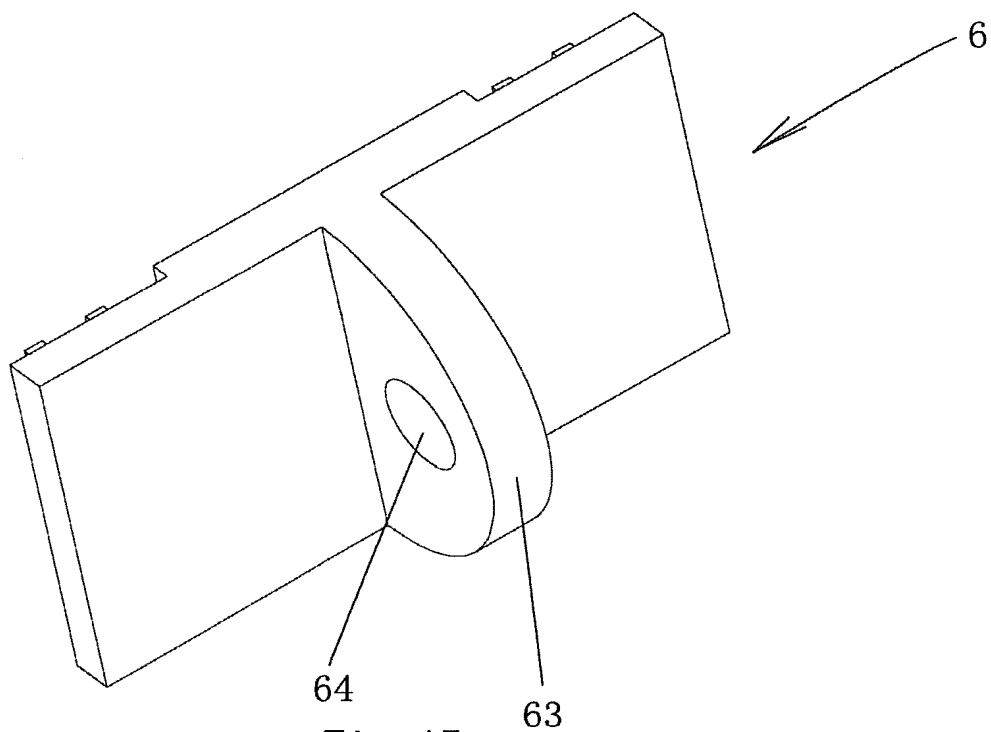
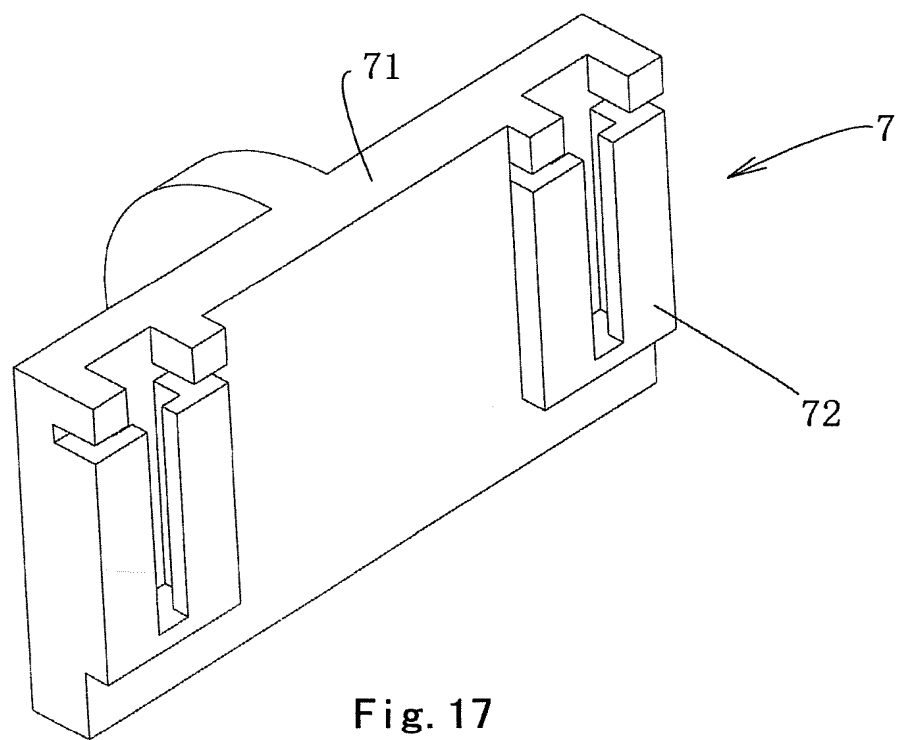
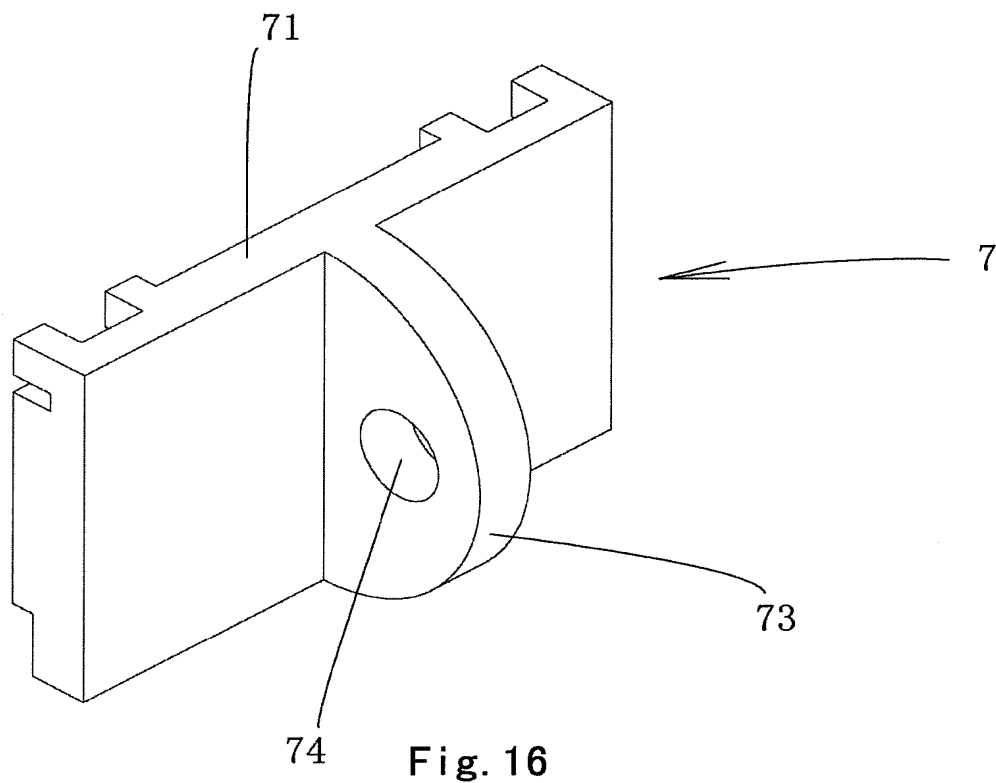


Fig. 15



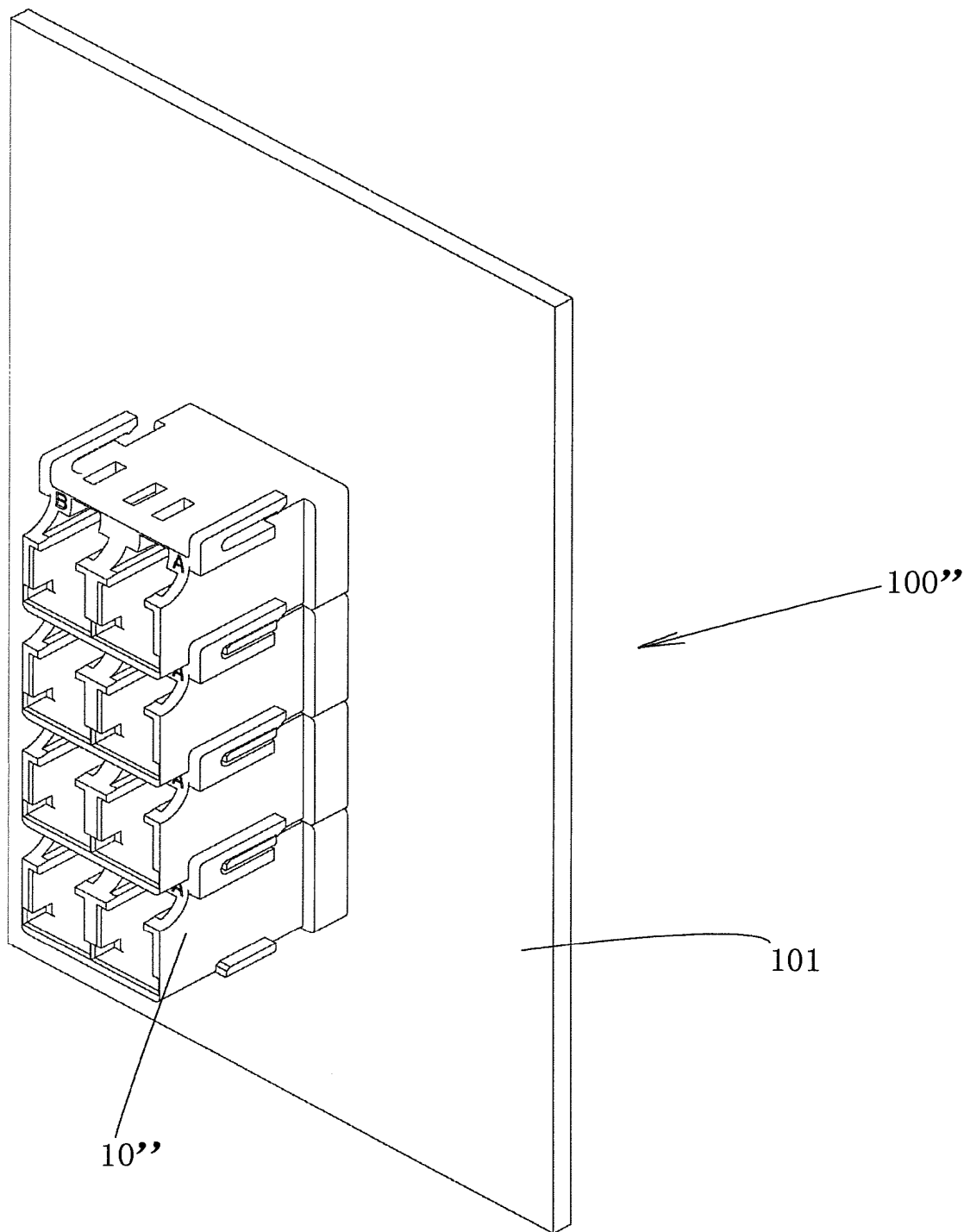


Fig. 18

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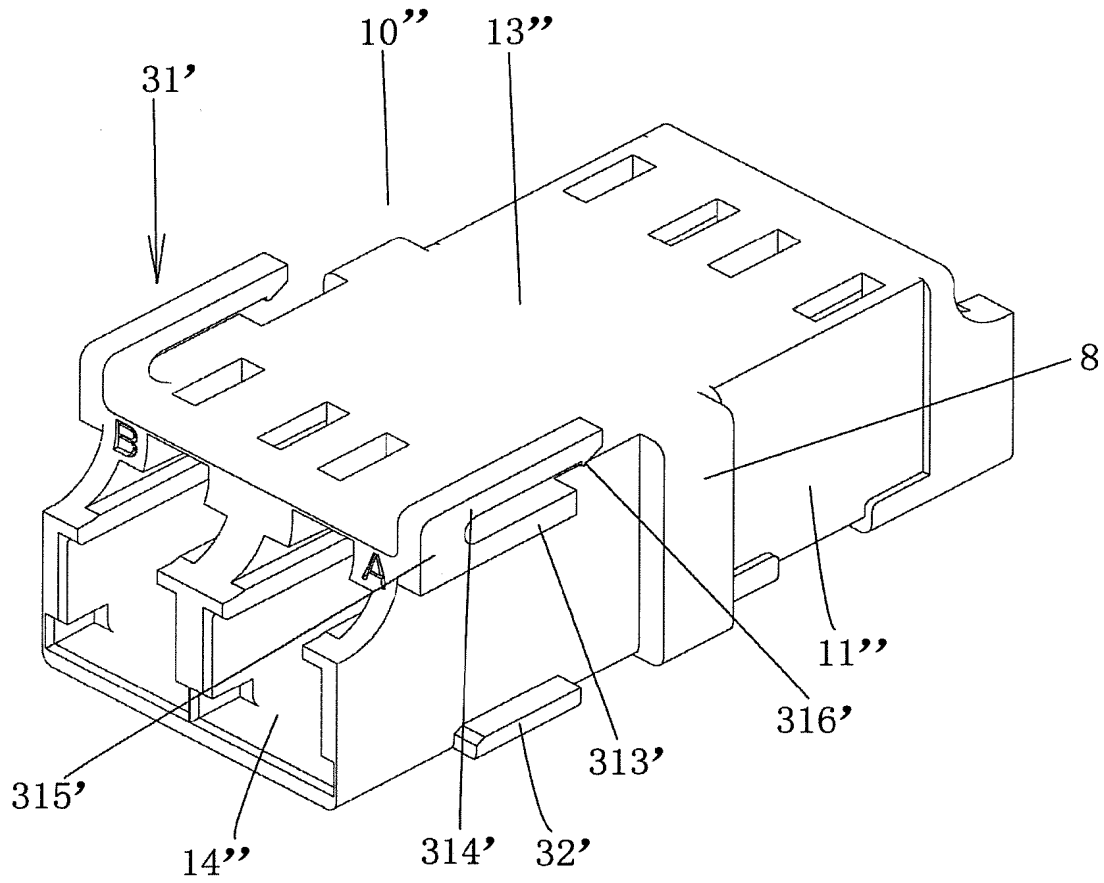


Fig. 19

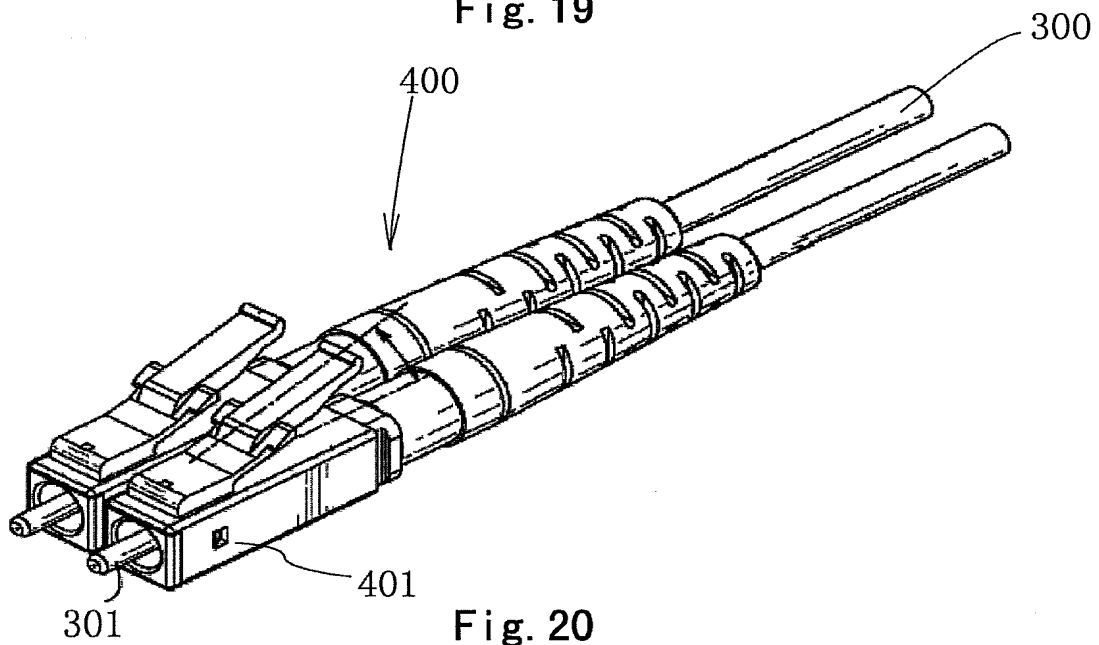


Fig. 20

11/11

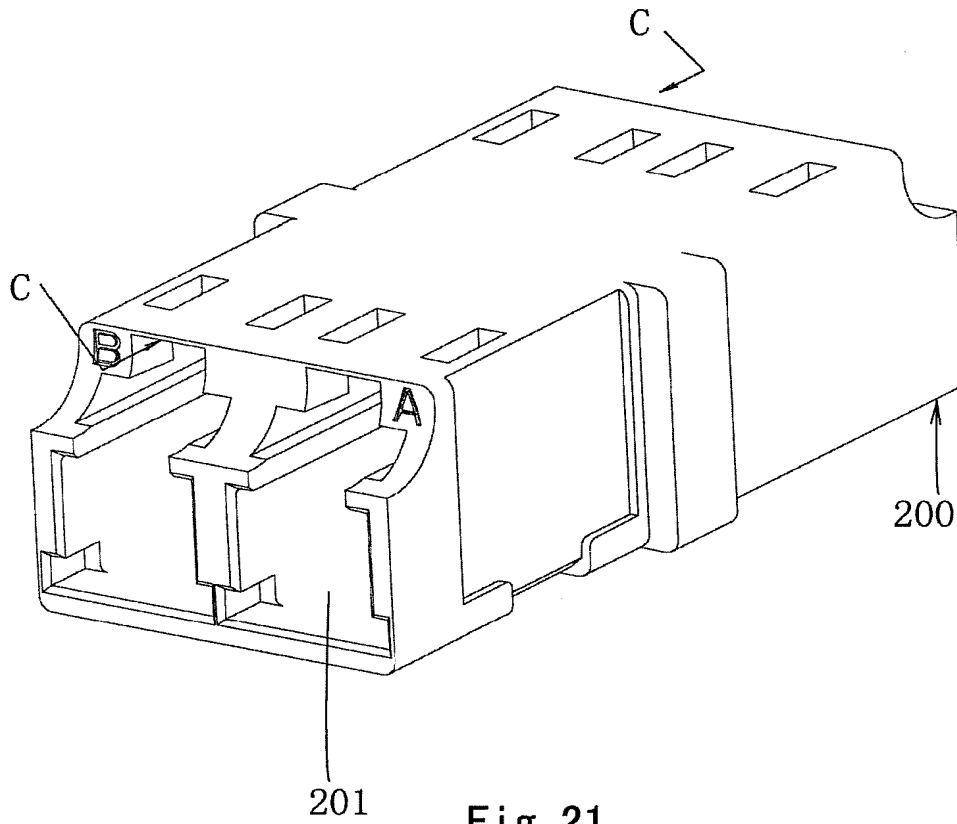


Fig. 21

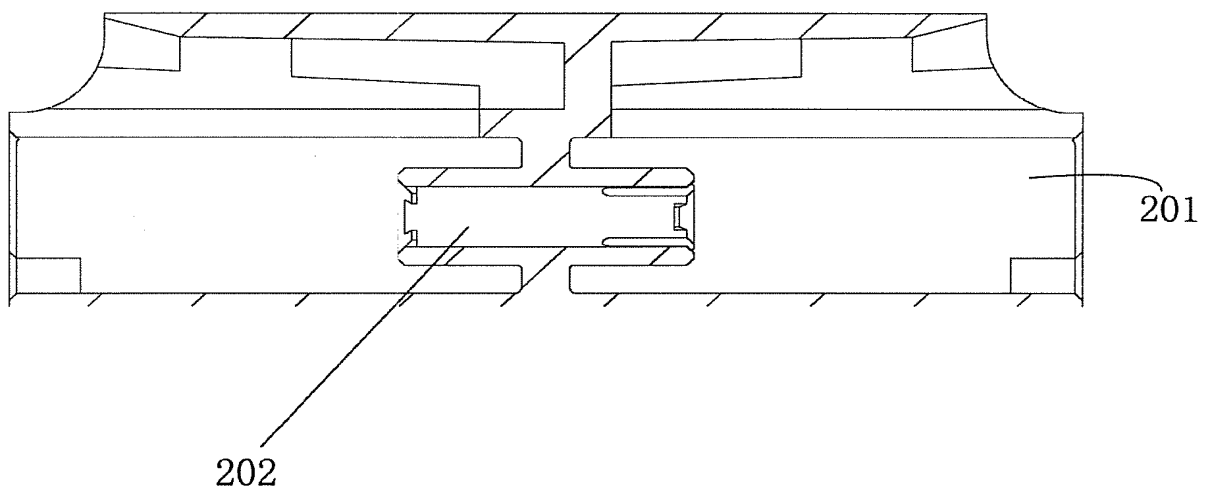


Fig. 22

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2013/054312

A. CLASSIFICATION OF SUBJECT MATTER				
INV.	H01R9/24	G02B6/00	H01R13/506	H01R13/508
	H01R31/06			H01R13/514
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.
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Y	claims 1, 15 , 29 , 30 , 32 , 33 paragraph [0054] - paragraph [0056] figures 18-23	26

X	US 2001/049223 AI (FUKATSU YUKIHI RO [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

	-/- .	

☒ Further documents are listed in the continuation of Box C.	☒ See patent family annex.
* 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 4 October 2013	Date of mailing of the international search report 16/10/2013
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Sti chauer, Li bor

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2013/054312

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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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 -----	
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 26
Y	column 5, line 19 - column 6, line 46 figures 1, 10 -----	
X	US 2006/228932 A1 (KOMI YAMA RYUICHI [JP]) 12 October 2006 (2006-10-12)	1, 2, 9, 16, 25 26
Y	paragraph [0036] - paragraph [0039] paragraph [0041] figures 1, 2, 3B, 4, 7, 8, 10, 11 -----	
X	US 2002/026710 A1 (MURAKAMI TAKAO [JP] ET AL) 7 March 2002 (2002-03-07)	1, 2, 23-25 26
Y	claims 1, 6 paragraph [0025] paragraph [0033] - paragraph [0037] figures -----	
Y	US 2011/300745 A1 (FOLLINGSTAD MICHAEL JAY [US]) 8 December 2011 (2011-12-08)	26
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
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2013/054312

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2013/054312

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 2009258536 AI	15-10- -2009

Electronic Acknowledgement Receipt

EFS ID:	42423857
Application Number:	17145864
International Application Number:	
Confirmation Number:	5506
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-053-04
Receipt Date:	12-APR-2021
Filing Date:	
Time Stamp:	11:35:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	20210411_USCO05304.pdf	1053821	no	5
			68beea086176f2505c4552b383bcaca363cd928c		

Warnings:

Information:					
2	Foreign Reference	CN202600189.pdf	2287737	no	29
			848b23f5ce9214bf282642e651ace5ac494d2854		
Warnings:					
Information:					
3	Foreign Reference	WO2013179197A1.pdf	584061	no	38
			b1dd43e04a280fc265fa168c5a1d17f701ca54e4		
Warnings:					
Information:					
Total Files Size (in bytes):			3925619		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

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 <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	USCO-053-04
	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 <i>See MPEP chapter 600 concerning utility patent application contents.</i>	Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
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 <u>13</u>] 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 <u>10</u>] 6. Inventor's Oath or Declaration [Total Pages <u>5</u>] (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	ACCOMPANYING APPLICATION PAPERS 10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. ☐ 37 CFR 3.73(c) Statement ☐ Power of Attorney (when there is an assignee) 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: _____ _____ _____ _____

***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: <u>152017</u> OR ☐ Correspondence address below					
Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	
Signature	/Michael L. Leetzow/			Date	2021-01-11
Name (Print/Type)	Michael 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.
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.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		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	Fort Mill	State/Province	SC	Country of Residence	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	Hickory	State/Province	NC	Country of Residence	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-053-04
		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	350 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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04	
		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-053-04	Small Entity Status Claimed ☐		
Application Type	Nonprovisional			
Subject Matter	Utility			
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	1	

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		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		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	16214317	2018-12-10		
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)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor		

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-053-04
	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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor		

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor		

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:

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).

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	USCO-053-04
		Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor		

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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		lignment Adapter and Alignment Design for a Connector Therefor		
First Named Inventor/Applicant Name:		Hiep V. Nguyen		
Filer:		MICHAEL LEETZOW		
Attorney Docket Number:		USCO-053-04		
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UTILITY SEARCH FEE	1111	1	700	700
UTILITY EXAMINATION FEE	1311	1	800	800
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Claims:				
Miscellaneous-Filing:				
Petition:				
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ApplicationUSCO05304ForFiling.pdf	1996739	yes	23
			368543110b3dfafed6fac3ff5d512c58d25a6381		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	9	
	Claims		10	12	
	Abstract		13	13	
	Drawings-other than black and white line drawings		14	23	
Warnings:					
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2	Preliminary Amendment	PrelimAmendUSCO05304.pdf	87662	no	7
			28c8c86df98ade5be39bcc504ece6d4a376fd248		
Warnings:					
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3	Drawings-only black and white line drawings	RevisedDwgs05304.pdf	571171	no	10
			96c12595ff48ed1b0b9905ce34c6a8770ad07b00		
Warnings:					
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4	Oath or Declaration filed	SignedDeclarationUSC053.pdf	672007	no	5
			093628670739e9eb21b2ca719e0e7737d1b46301		
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5	Transmittal of New Application	USCO-053-04_USPTO_AIA15_2 0210111_151837.pdf	293586 b7fd7ad89cc12d61fd08047819adc1100f9ae62	no	2
Warnings:					
Information:					
6	Application Data Sheet	USCO-053-04_USPTO_AIA14_2 0210111_151836.pdf	1874604 34e1b34e29ade0f083da773ae058941123eccee0a	no	10
Warnings:					
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7	Fee Worksheet (SB06)	fee-info.pdf	35224 9dd0b9a7b5162e9ad2750a0035145157b7f3fe60	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, the contents of which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

1. 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.

2. 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.

3. Thus, an adapter and adapter assembly with novel alignment features is provided to engage with alignment features on a plug, which in turn assists in aligning the ferrule holders with alignment grooves in the adapter.

SUMMARY OF THE INVENTION

4. 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.

5. 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.

6. 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.

7. 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 the projections from the plurality of ferrule holders to align and orient the ferrule holders in the plug

8. 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.

9. 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

10. Fig. 1 is a perspective view of one embodiment of an adapter assembly according to the present invention;

11. Fig. 2 is an exploded view of the adapter assembly of Fig. 1;

12. Fig. 3 is a perspective view of a cut-away view of the adapter of Fig. 1;

13. Fig. 4 is a front elevational view of the adapter of Fig 1.;

14. 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;

15. Fig. 5B is a bottom perspective view of the ferrule holder and ferrule of Fig. 5a;

16. Fig. 5C is a front view of the ferrule holder and ferrule of Fig. 5a;

17. Fig. 6A is a top perspective view of a plug and ferrule holders according to the present invention;

18. Fig. 6B is a bottom perspective view of the plug and ferrule holders of Fig. 6A;

19. Fig. 6C is a front elevational view of the plug and ferrule holders of Fig. 6A;

20. Fig. 7A is a partial cross sectional view of a portion of a ferrule holder of Fig. 5;

21. Fig. 7B is a partial cross sectional view of a portion of the center portion of the adapter;

22. Fig. 8 is a cross sectional view of the adapter assembly in the center of the adapter assembly; and

23. Fig. 9 is a cross sectional view of the adapter assembly through a ferrule holder and ferrule.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

24. 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.

25. 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.

26. 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 than 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**.

27. 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**.

28. 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 than 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**.

29. 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**.

30. 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.

31. 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**.

32. 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 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.

33. 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**.

34. 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.

35. 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 **350** 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 **352** 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 the projections **320,322** could also align in the y direction, given that they are parallel to the surfaces **352**.

36.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**.

37.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.

We claim:

1. 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;

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.

2. The adapter according to claim 1, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first and second sides to pass therethrough.

3. The adapter according to claim 1, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules and providing EMI shielding.

4. The adapter according to claim 1, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

5. The adapter according to claim 1, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

6. The adapter according to claim 1, wherein the first and second sides are configured to receive a plurality of optical ferrules.

7. The adapter according to claim 1, wherein the plurality of grooves in the top surface of the central portion have a first width and the plurality of grooves in the bottom surface of the central portion have a second width, and the first and second widths are different.

8. An adapter assembly for aligning one plurality of optical ferrules to another plurality of optical ferrules comprising:

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.

9. The adapter assembly according to claim 8, wherein the outside of the plug has at least one projection to engage a groove in the opening in the adapter to align the plug in the opening in the adapter.

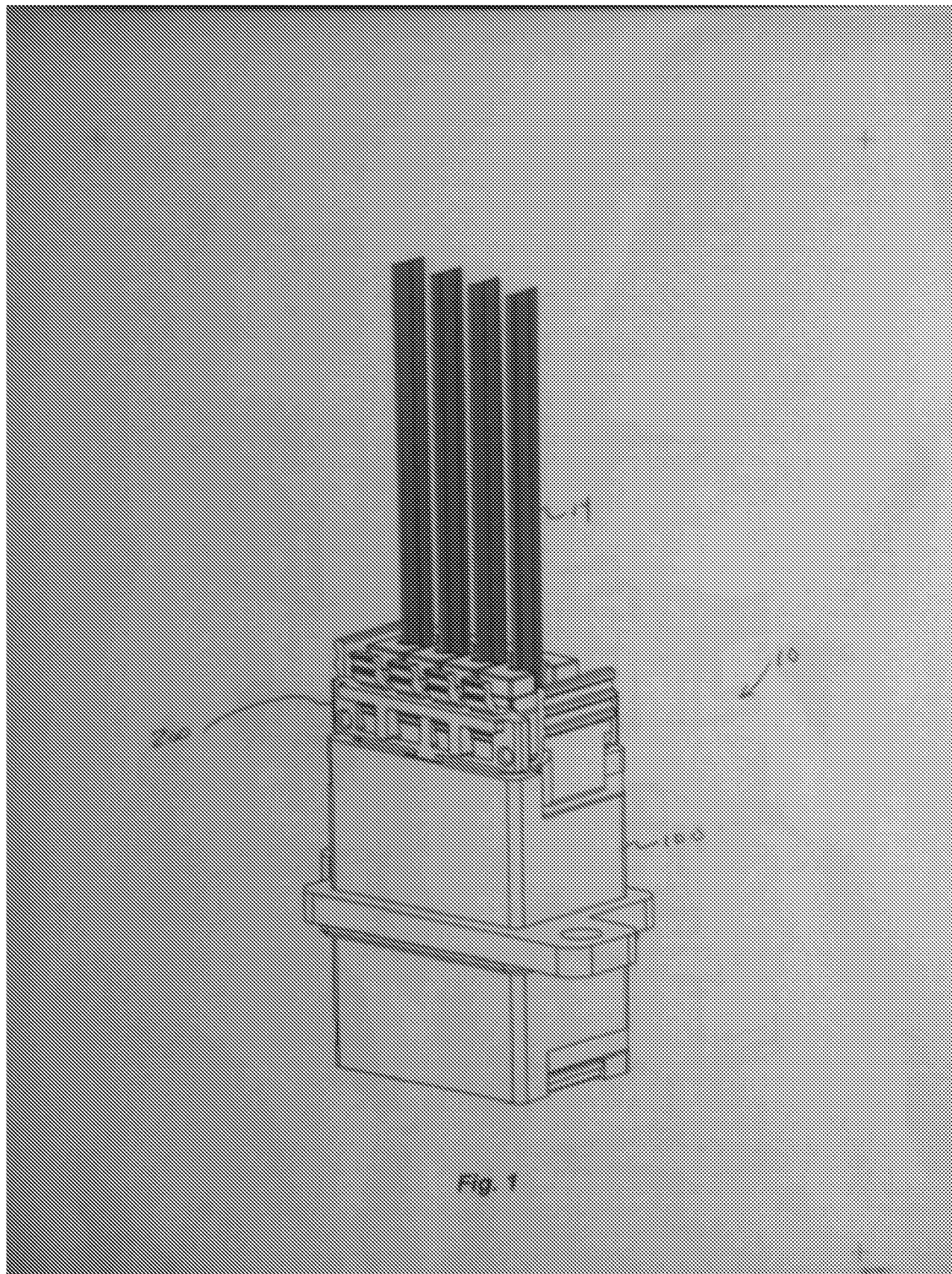
10. The adapter assembly according to claim 9, wherein the projection on the outside of the plug engages the groove in the adapter before the projections on the plurality of ferrule holders engage the plurality of grooves in the adapter.

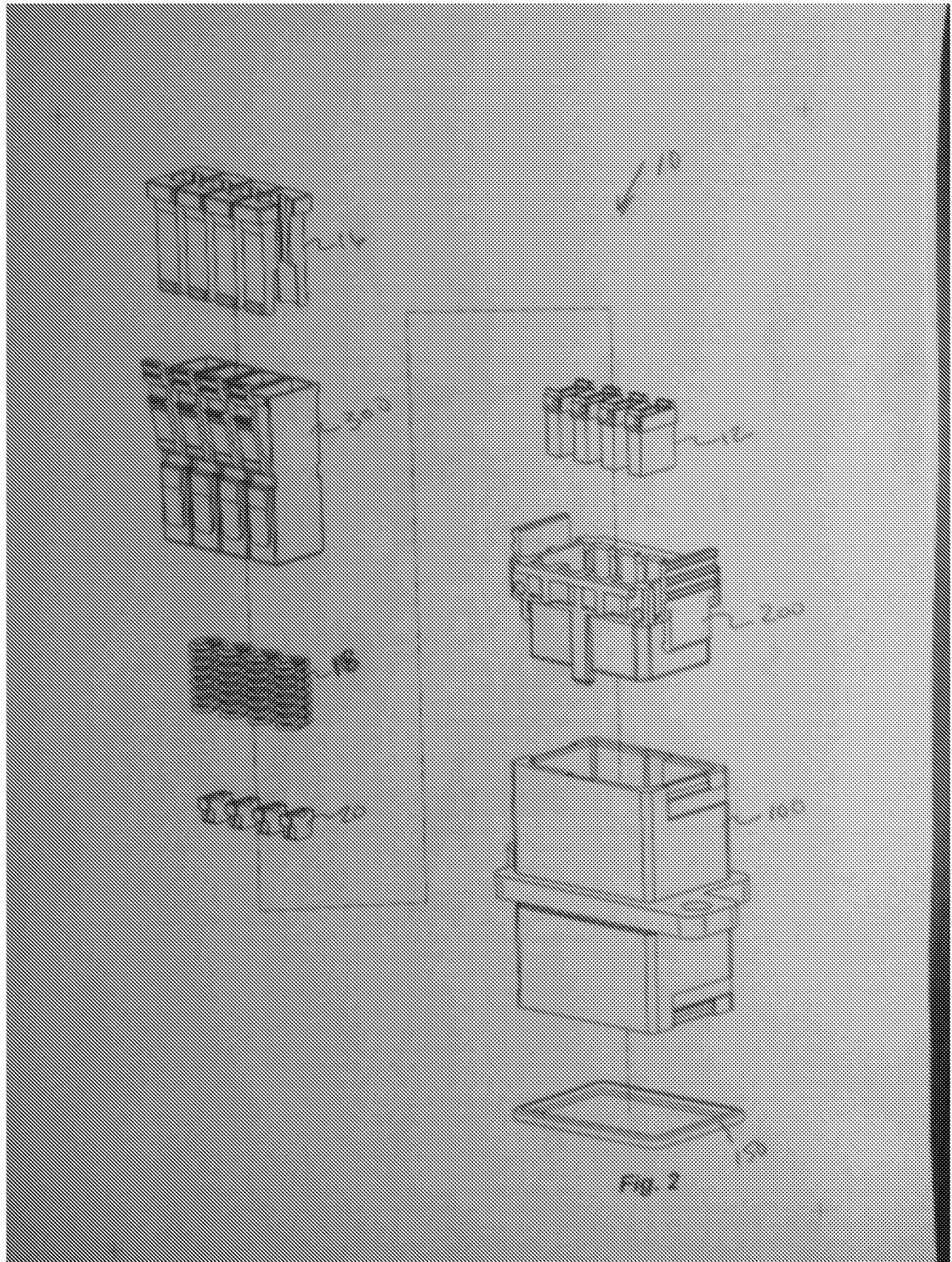
11. The adapter assembly according to claim 8, wherein the grooves act as a keyway.

12. A ferrule holder comprising:
- 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.
13. The ferrule holder according to claim 12, where the projected also engage a groove in a plug.
14. A fiber optic connector comprising:
- 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 the projections from the plurality of ferrule holders to align and orient the ferrule holders in the plug.

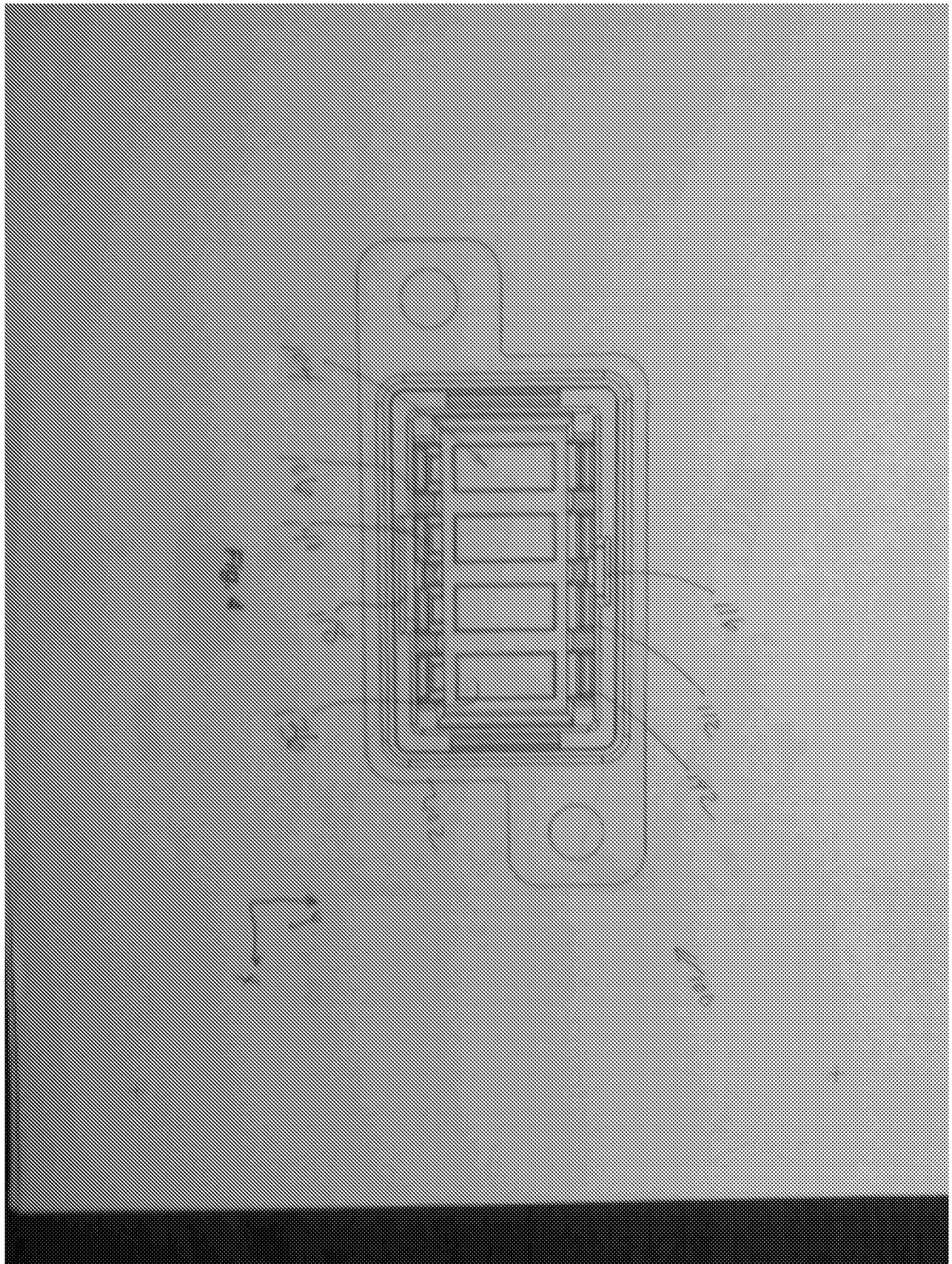
ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR
ABSTRACT OF THE DISCLOSURE

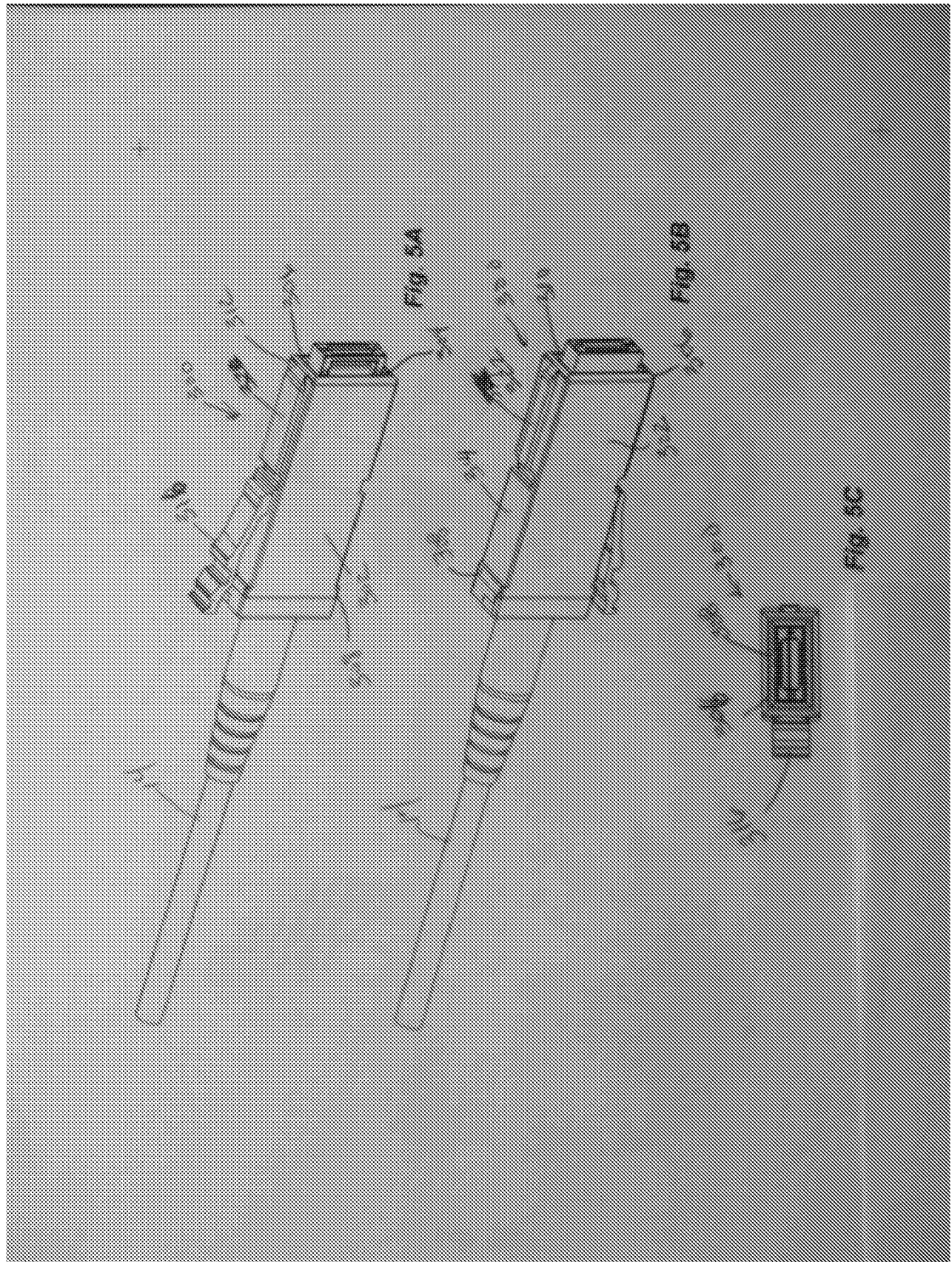
An adapter with novel alignment features engages alignment features on a plug, providing general alignment of the ferrule holders and ferrules in the plug. After the plug engages the adapter, the ferrule holders engage a second set of alignment features in the adapter to provide fine alignment for the ferrules.











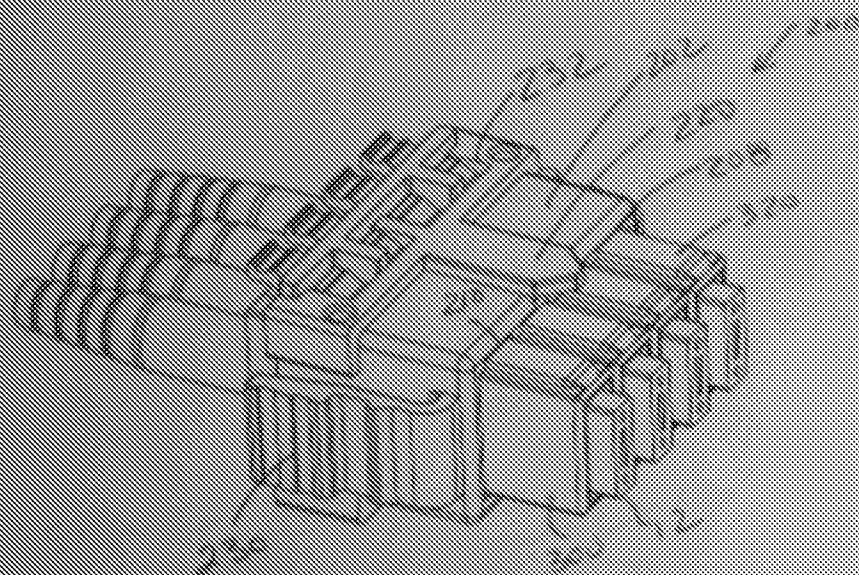


Fig. 6A

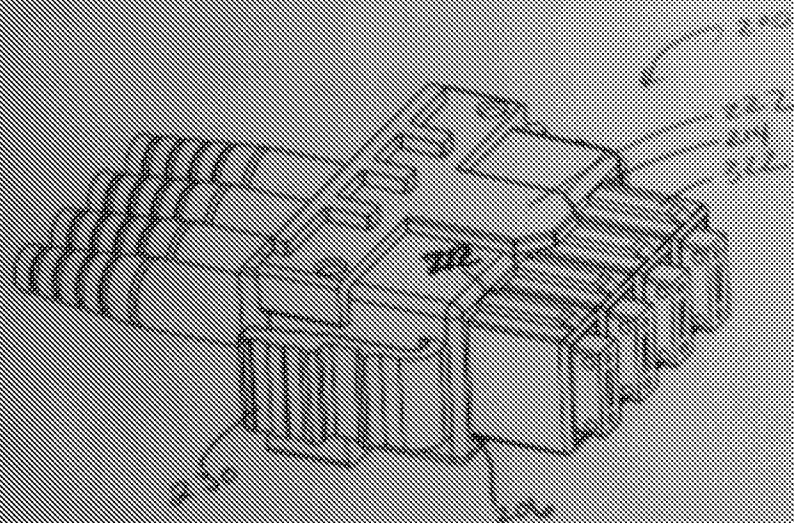
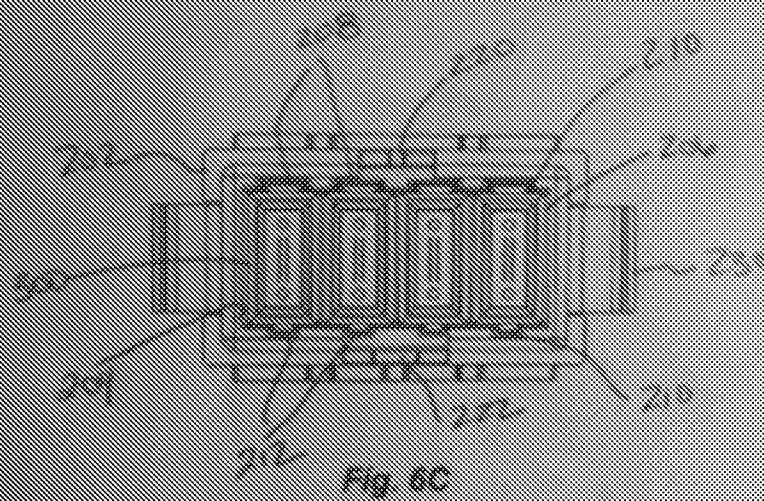


Fig. 6B



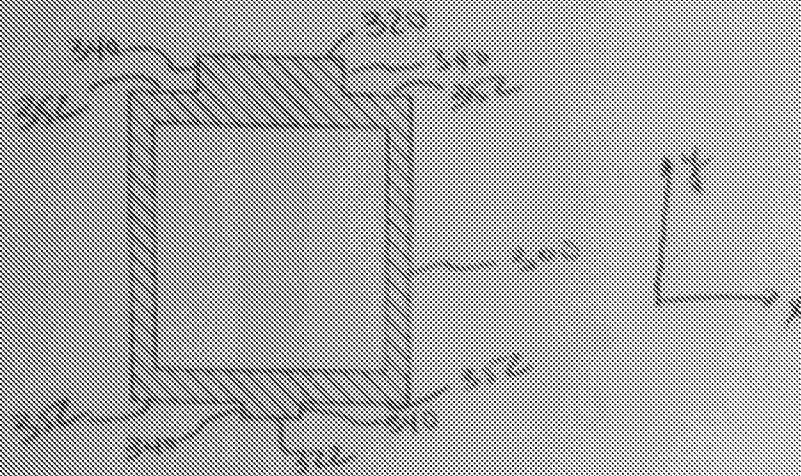


Fig. 7A

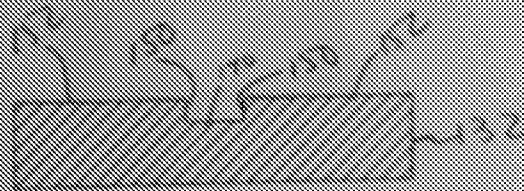


Fig. 7B

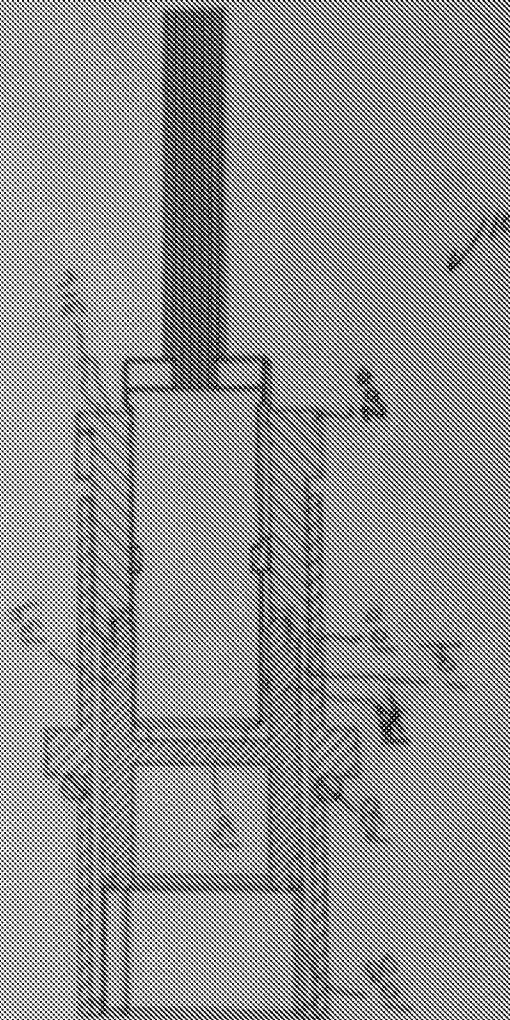


Fig. 3

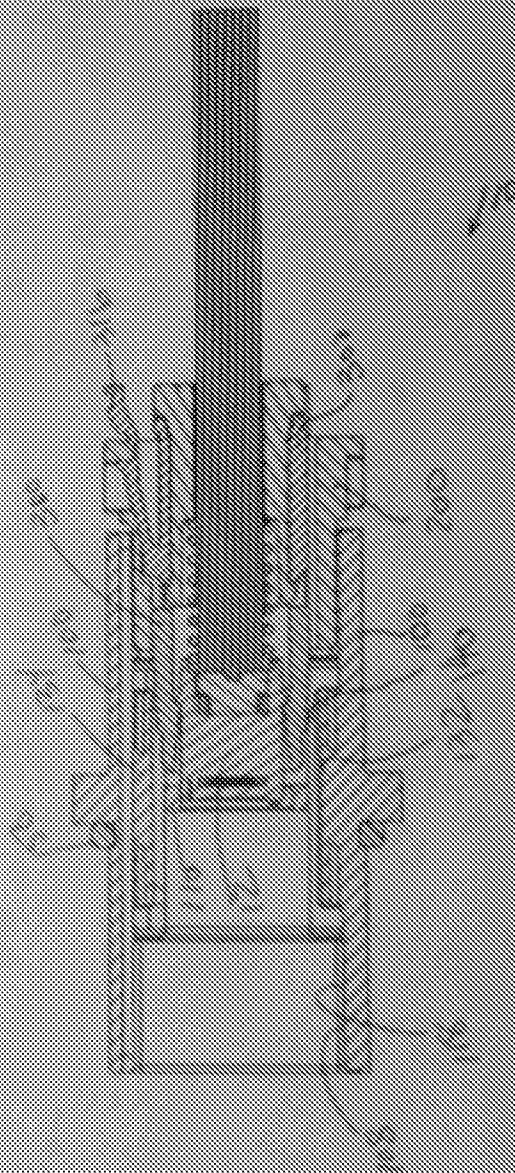


Fig. 9

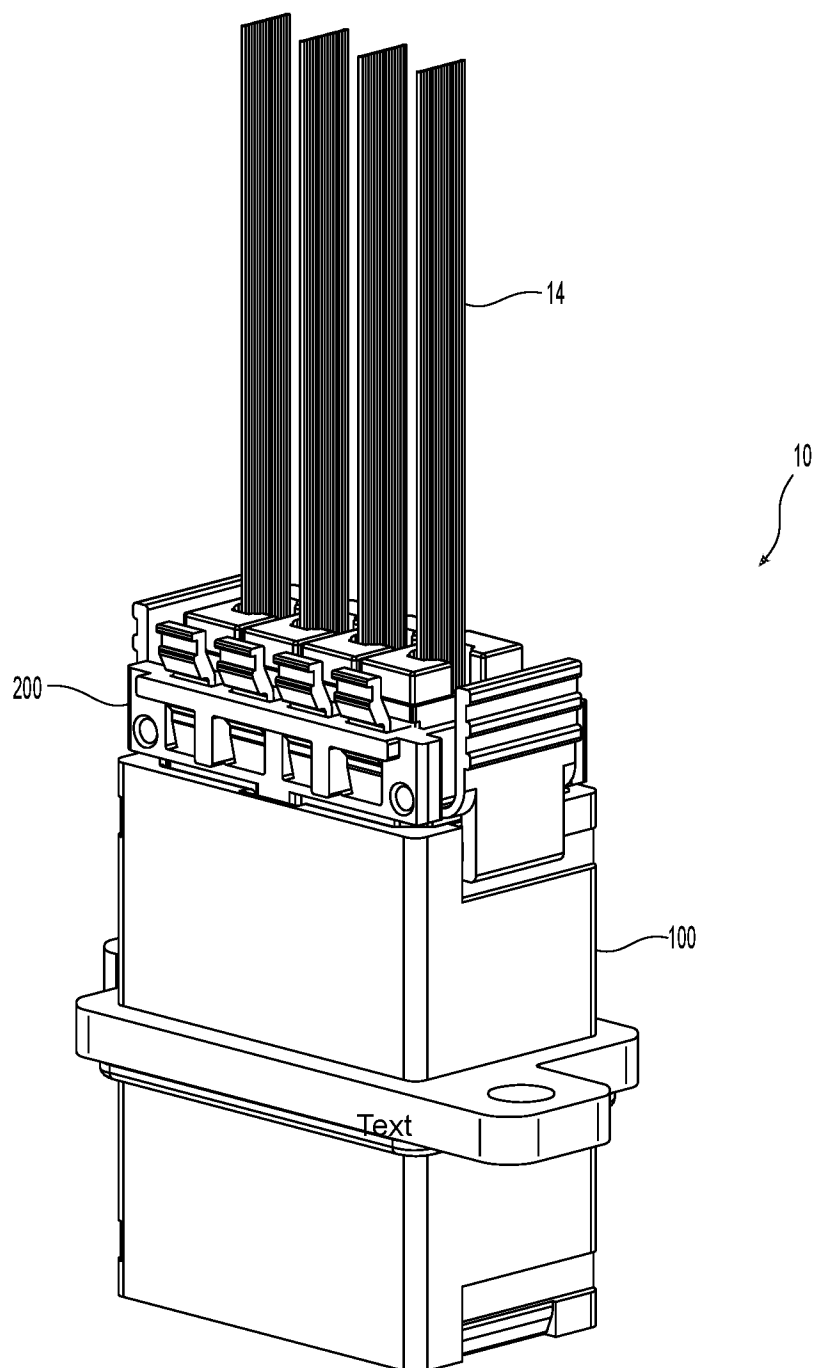


Fig. 1

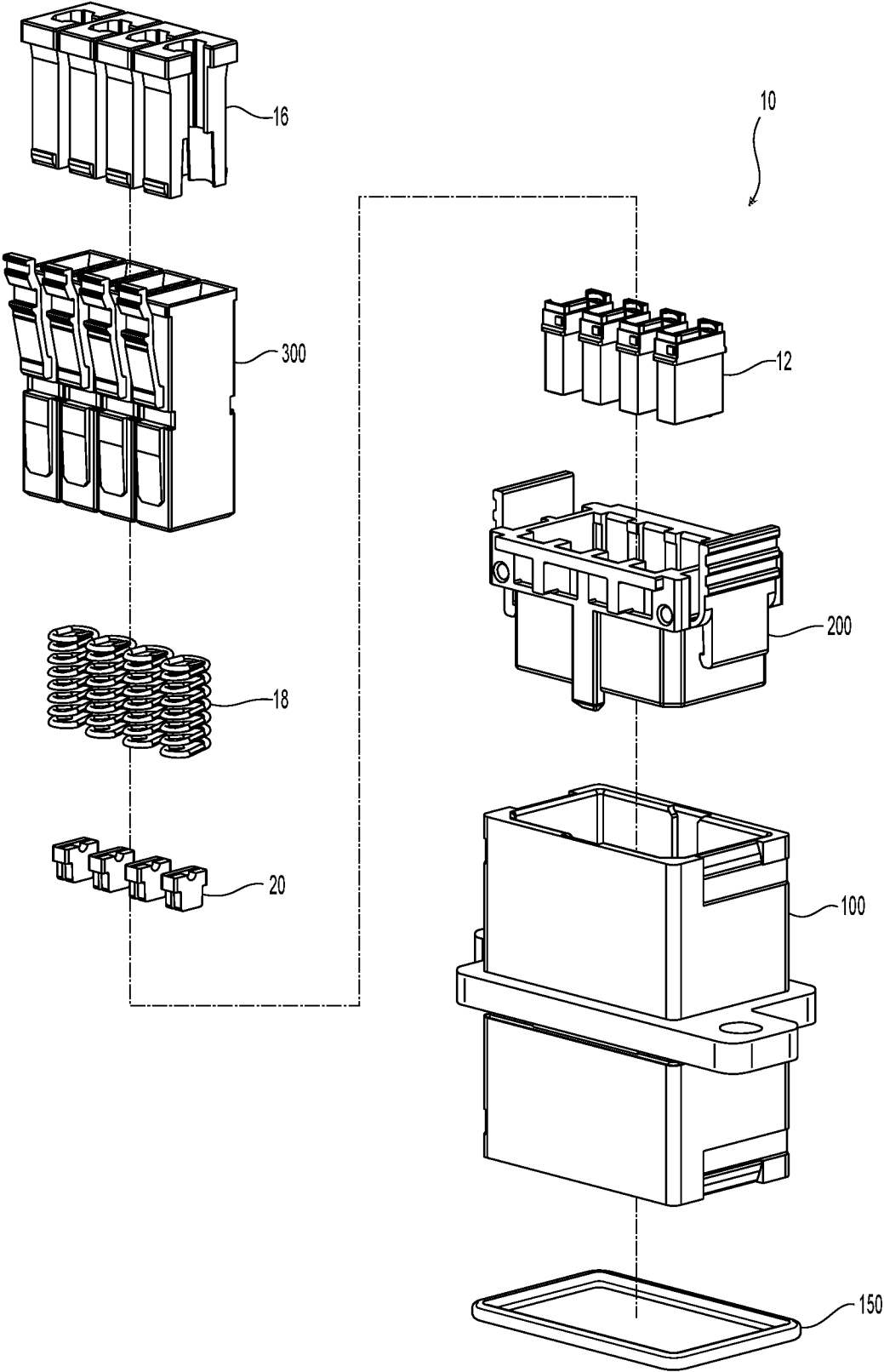


Fig. 2

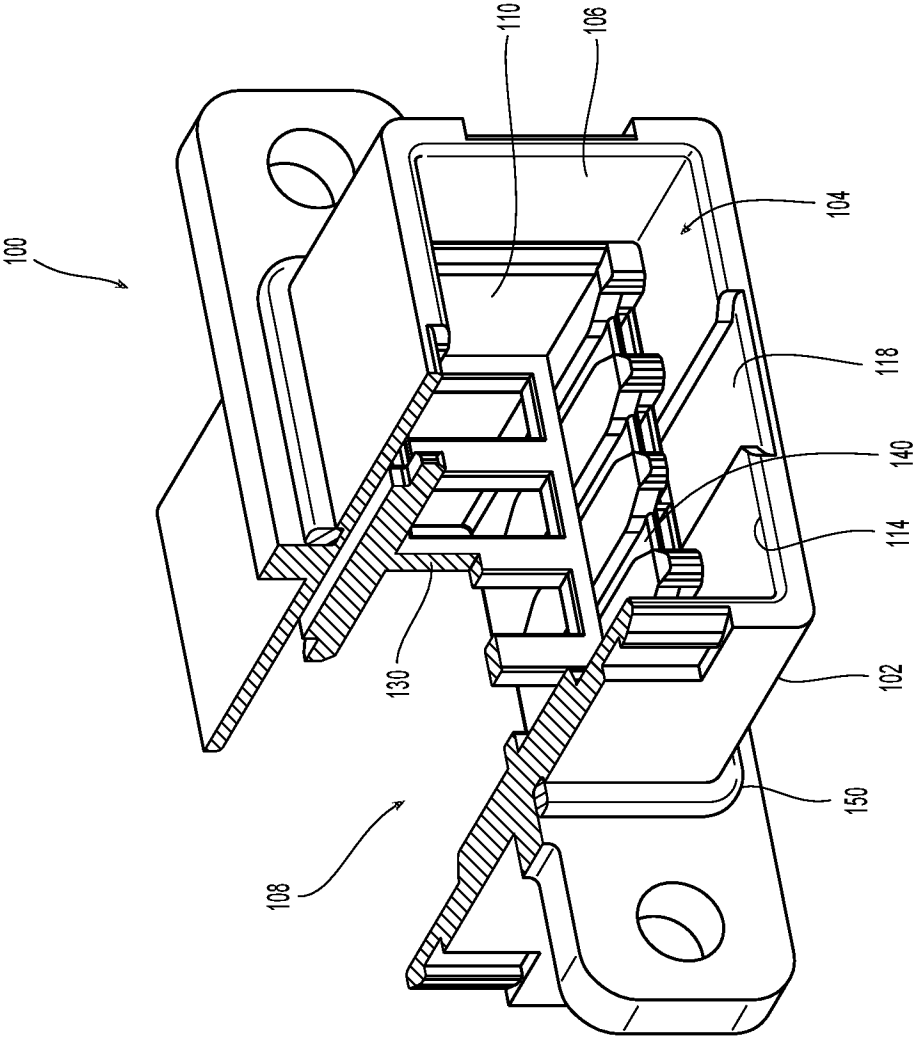


Fig. 3

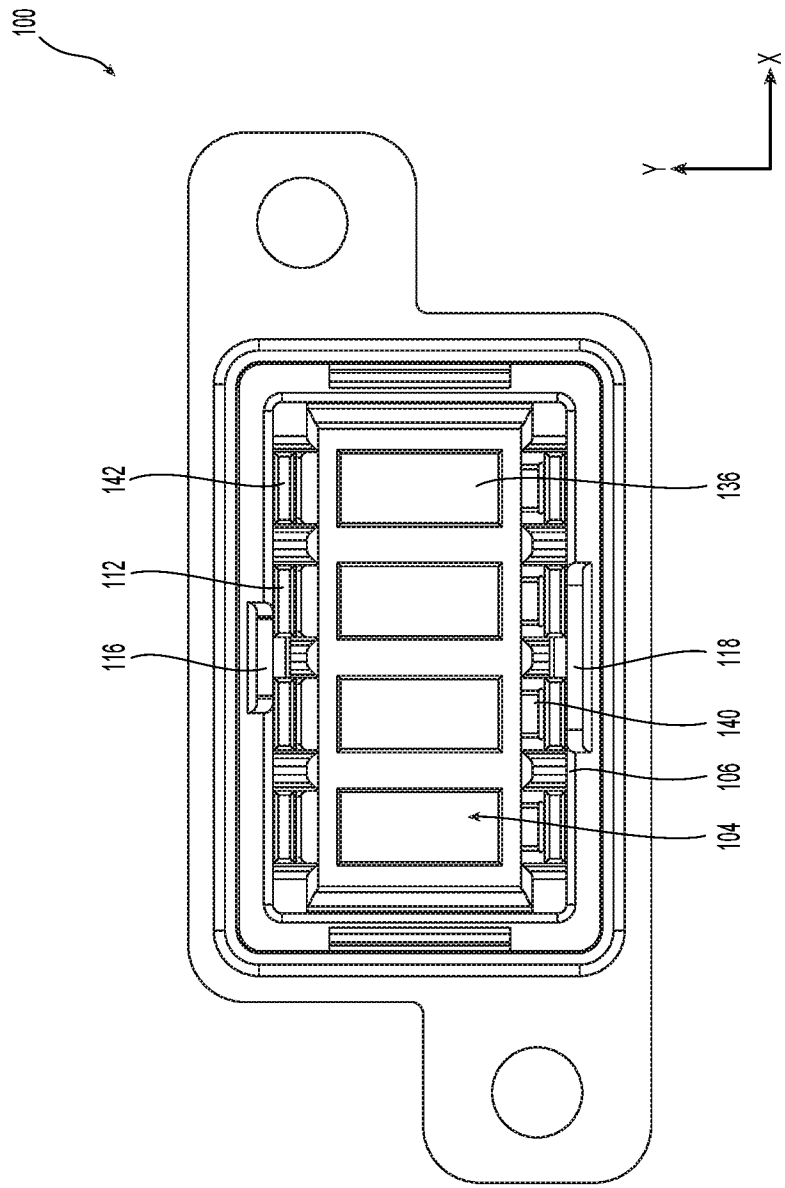
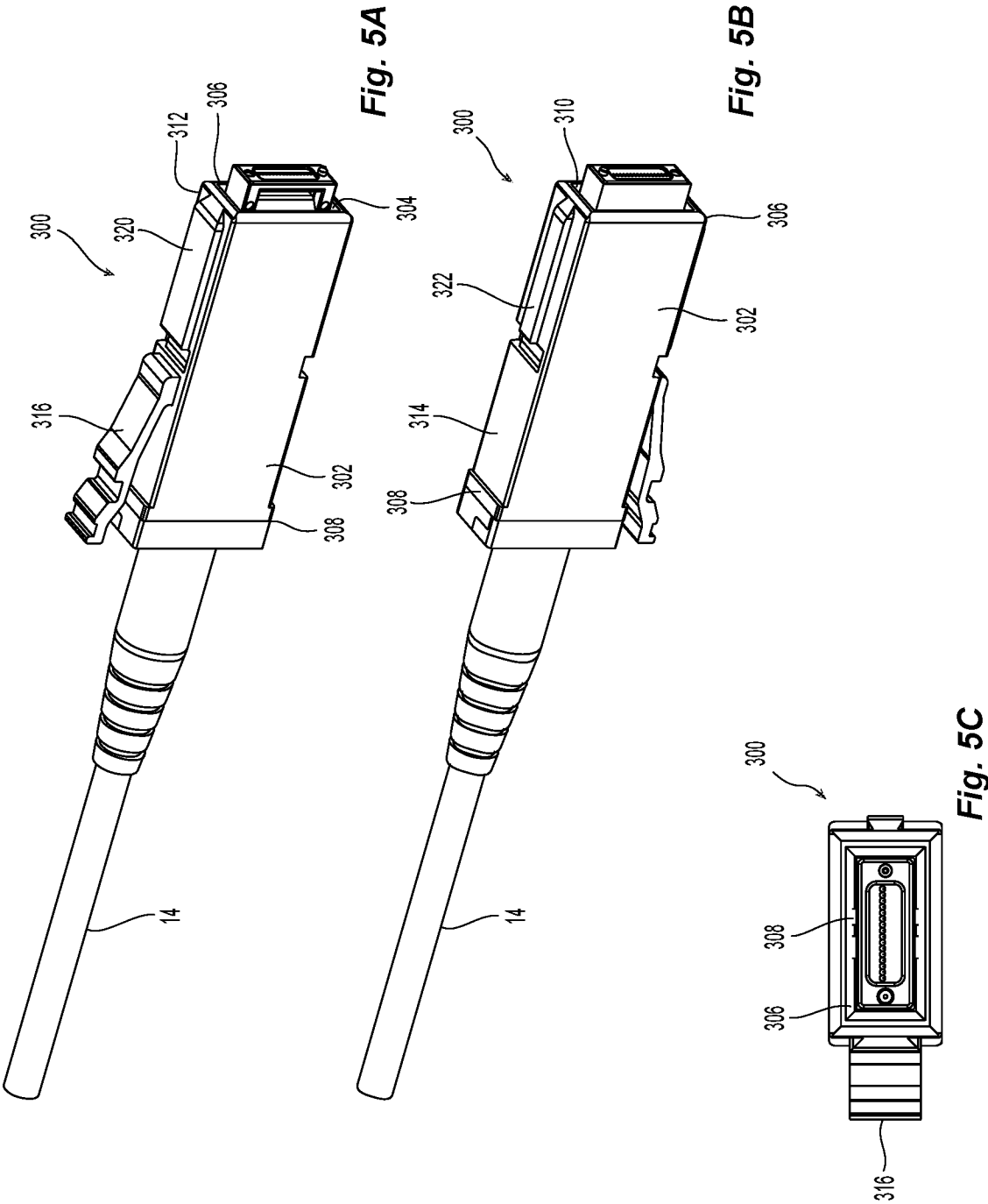
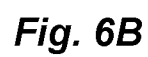
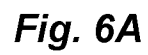


Fig. 4







Senko Ex. 1016, Page 238
Senko Advanced Components v. US Conec Ltd.
IPR2024-00805

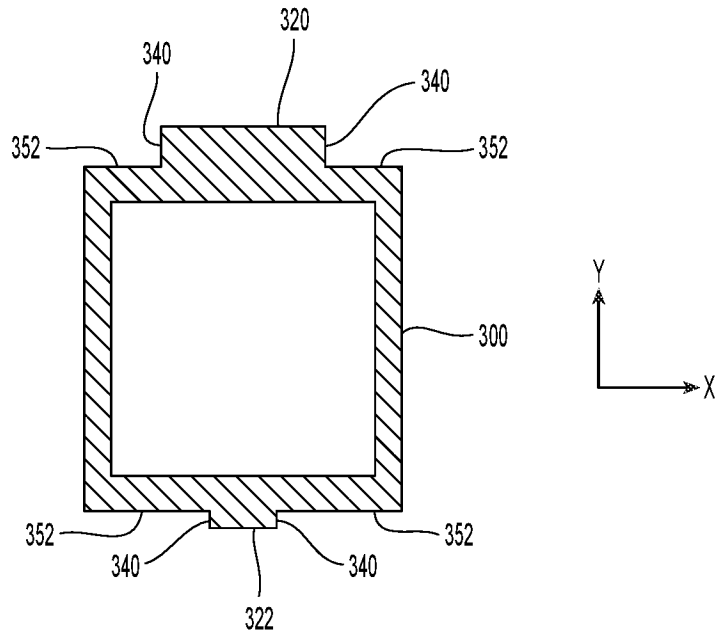


Fig. 7A

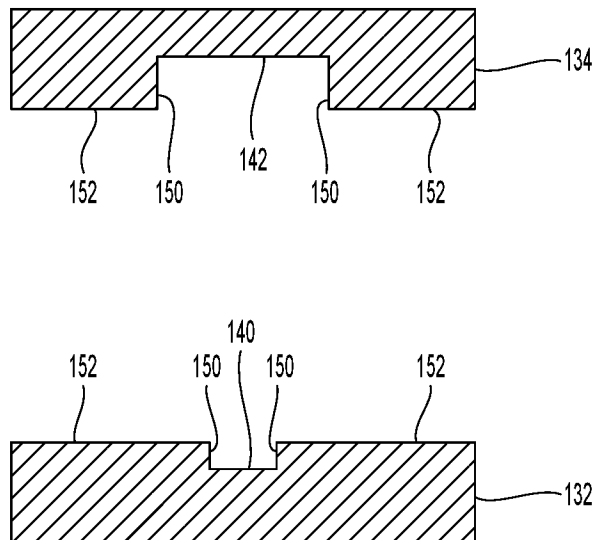


Fig. 7B

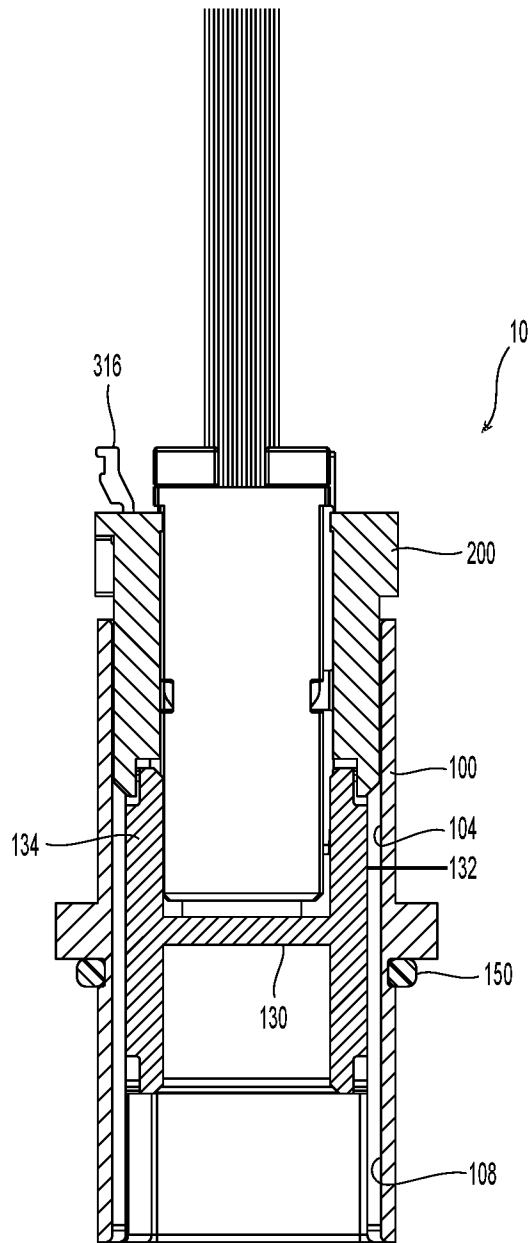


Fig. 8

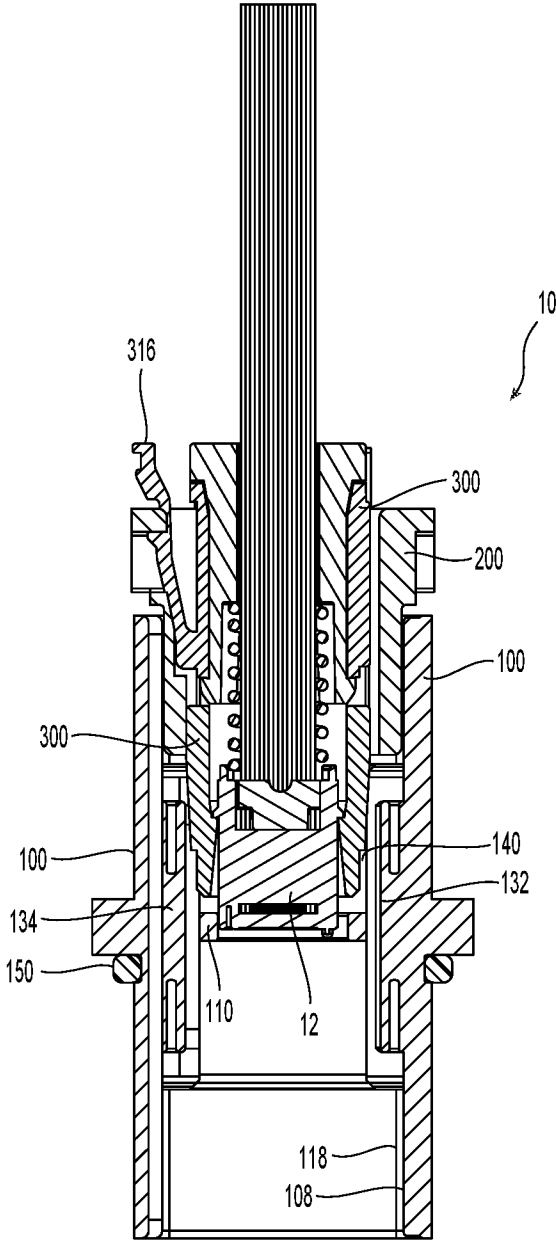


Fig. 9

**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

☒ 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: Talcha Wakjira Date (Optional): 7/28/2014
Signature: Talcha Wakjira

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/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Darrell R. Chidlers

Date (Optional): 7/28/2014

Signature: Darrell R. Chidlers

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/01 form for each additional inventor.

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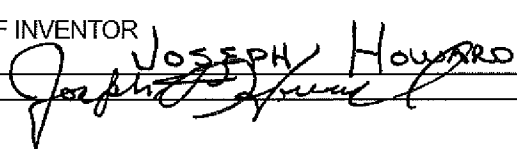
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LEGAL NAME OF INVENTOR

Inventor:

Signature:

JOSEPH HOWARD Date (Optional) : 7/28/2014


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/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: HIEP V. NGUYEN

Date (Optional) : 7/22/14

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/01 form for each additional inventor.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
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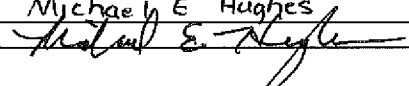
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LEGAL NAME OF INVENTOR

Inventor: Michael E Hughes Date (Optional): 8-26-2014
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/01 form for each additional inventor.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: Unassigned
Serial No.:	Cont. of 16/214,317	)	
		)	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

PRELIMINARY AMENDMENT

Prior to the Examination of the present application and calculation of fees, Applicant amends the application as follows:

IN THE SPECIFICATION:

Please replace the first paragraph with the following revised paragraph:

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, the contents of ~~which is~~ which are hereby incorporated by reference ~~in its~~ in their entirety.

Please replace paragraph [0036] with the revised new paragraph:

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 **350**~~ 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 ~~**352** of **152**~~ of **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 the projections **320,322** could also align in the y direction, given that they are parallel to the surfaces **352**.

IN THE DRAWINGS:

Please replace all of the prior drawings with the replacement drawings attached hereto. Applicant has replaced the drawings with better wire-form drawings with the reference numerals correctly applied. No new matter has been added.

IN THE CLAIMS:

Claims 1-14. Canceled.

15. (New) An adapter for aligning a first fiber optic ferrule inserted from a first side and a second fiber optic ferrule inserted from a second side comprising:

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface, the opening extending between the first side and the second side and having a central portion therebetween; and

a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the top surface and the bottom surface in the main body, each of the plurality of grooves extending toward a center of the main body.

16. (New) The adapter according to claim 15, further comprising a groove in one of the top surface and the bottom surface.

17. (New) The adapter according to claim 15, further comprising a groove in each of the top and the bottom surfaces.

18. (New) The adapter according to claim 15, wherein the opening is smaller in the center of the main body than on the first side and second side.

19. (New) The adapter according to claim 15, wherein the first side and second side are configured to receive a plurality of fiber optic ferrules.

20. (New) The adapter according to claim 15, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough.

21. (New) The adapter according to claim 20, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

22. (New) An adapter for fiber optic connectors with a multi-fiber ferrule, the adapter comprising:

a first opening formed on a first side of the adapter and defined by two opposing side walls, a top surface and a bottom surface, the first opening configured to receive at least two fiber optic connectors;

a second opening formed on a second side of the adapter, opposite the first side, and also defined by the two opposing side walls, the top surface and the bottom surface, the second opening configured to receive at least two additional fiber optic connectors to mate with the at least two fiber optic connectors on the first side; and

a central portion between the first opening and the second opening and having a plurality of grooves disposed in a second top surface and a plurality of grooves disposed in a second bottom surface of the central portion, the second top surface and the second bottom surface being different from the top surface and the bottom surface of the first opening and the second opening, each of the plurality of grooves extending toward a center of the adapter.

23. (New) The adapter according to claim 22, wherein the first opening and the second opening are in communication with one another in the central portion, the first opening and the second opening being smaller in the central portion than on the first side and the second side.

24. (New) The adapter according to claim 22, wherein the first and second sides are configured to receive a plurality of fiber optic connectors.

25. (New) The adapter according to claim 22, wherein the plurality of grooves in the second top surface of the central portion have a first width and the plurality of grooves in the second bottom surface of the central portion have a second width, and the first and second widths are different.

26. (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 first top wall having first internal alignment grooves spaced apart along the width and the first bottom wall having second internal alignment grooves spaced apart along the width,

each of the first internal alignment grooves having a first width and each of the second internal alignment grooves having a second width, the first width is greater than the second width, and the adapter is free of internal walls between a space for two fiber optic connectors adjacent one another on a same side of the adapter in the opening between the opposing side walls along the width and between the first top wall and the first bottom wall along the height.

27. (New) The adapter according to claim 26, wherein the first side and the second side are configured to receive a plurality of fiber optic connectors.

28. (New) The adapter according to claim 26, further comprising a wall disposed within and across the central portion of the main body and between the first side and the second side, the wall having at least one passage therein to allow at least a portion of the fiber optic ferrules inserted from the first side and second side to pass therethrough.

REMARKS

The present application has been filed to pursue additional claims. Applicant has also submitted all new drawings as were filed in the original case and subsequently corrected in a later-filed case. No new matter was added to the replacement drawings.

Applicant has also amended the specification as amended during prosecution of the other related cases.

The Examiner is invited to telephone the undersigned in the event the Examiner would like to discuss the merits of the application or this response.

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: January 11, 2021

SCORE Placeholder Sheet for IFW Content

Application Number: 17145864

Document Date: 01/11/2021

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

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