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

Courtesy Reminder for
Application Serial No: 16/214,317

Attorney Docket No: USCO-053-03
Customer Number: 152017
Date of Electronic Notification: 03/05/2020

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/214,317	12/10/2018	Hiep V. Nguyen	USCO-053-03	7700

152017 7590 03/05/2020

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

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2883	

NOTIFICATION DATE	DELIVERY MODE
03/05/2020	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

Office Action Summary	Application No. 16/214,317	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 --

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 01/23/2020.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 15-31 is/are pending in the application.

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 15-16,20-22,24 and 27-30 is/are rejected.

8) ☑ Claim(s) 17-19,23,25-26 and 31 is/are objected to.

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

2. With regards to the amendment filed on 01/23/2020, all the requested changes to the claims have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 15-31 are pending.

Response to Arguments

3. Applicant's arguments, see pages 2-5, filed 01/23/2020, with respect to the rejection(s) of claim(s) 15, 16, 19, 21, and 22 under 35 U.S.C. 103 have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

4. Applicant's arguments filed 01/23/2020 with respect to claims 24, 27, 29, and 30 have been fully considered but they are not persuasive. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "a different fiber optic ferrule is paired with each of the different grooves") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claim Rejections - 35 USC § 102

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

> A person shall be entitled to a patent unless –

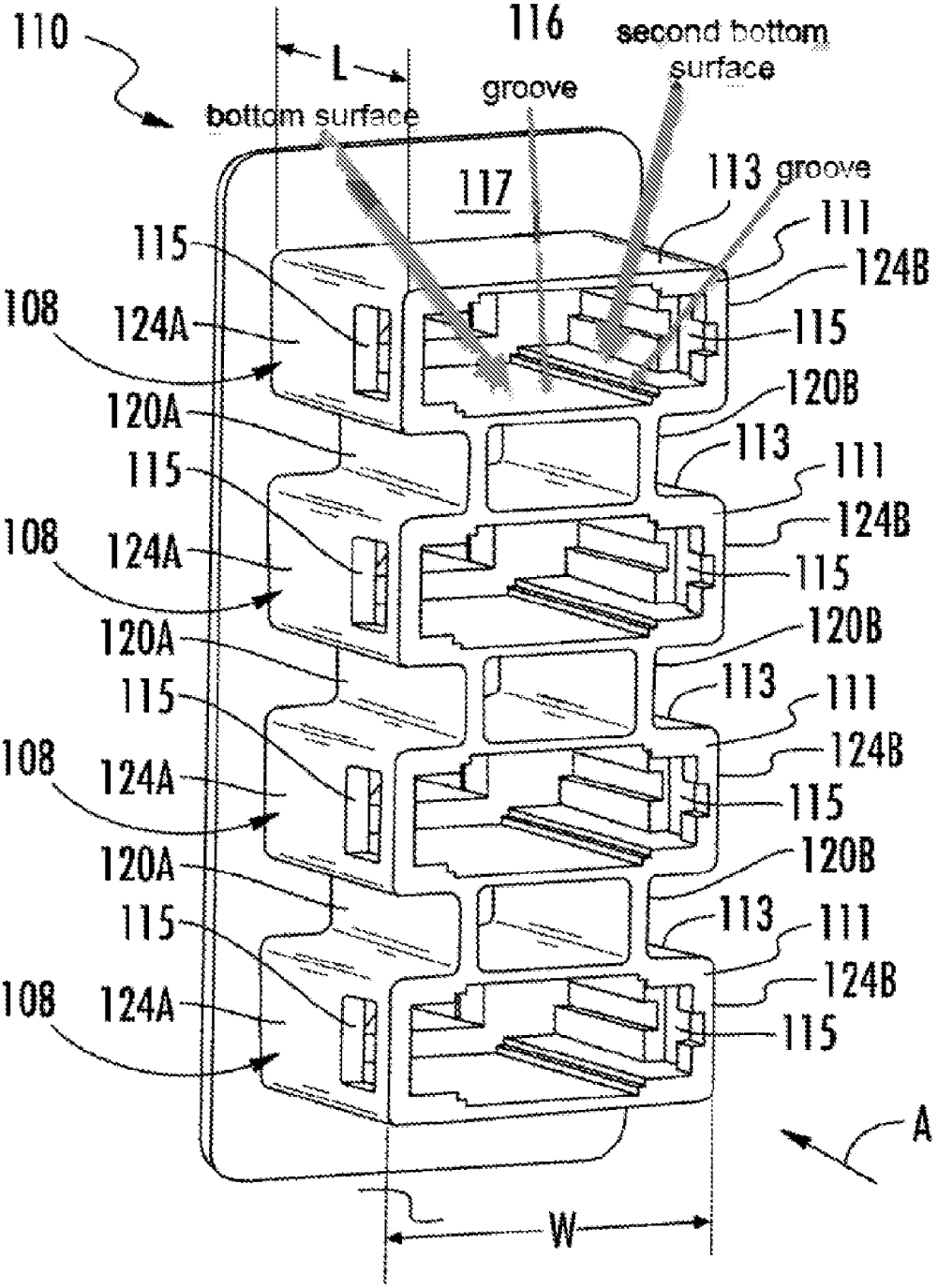
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the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

6. Claim(s) 15, 16, 21, 24, and 29 is is/are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Patent Publication No. US 2014/0241689 A1 to Bradley et al. (hereinafter "Bradley").

In re claim 15, Bradley discloses, see FIGS. 2-5, an adapter (110) for aligning fiber optic ferrules (180) inserted from opposing sides comprising:

a main body (113) having an opening/port (111) defined by two opposing side walls, a top surface and a bottom surface, the opening (111) extending between a first/front side and a second/rear side at surface (117), the first side and the second side at surface (117) separated by a central portion inside of the main body (113); 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 into the central portion from each of the first side and the second side at surface (117). *See* paragraphs [0030]-[0043] of Bradley for further details. A modified FIG. 2A of Bradley has been reproduced below to more clearly show the claimed grooves and bottom surfaces. The claimed top surfaces correspond to upper surfaces within the opening (111) of Bradley that are opposed to the bottom surfaces and which further define additional grooves.



In re claim 16, the opening (111) having at least one groove therein corresponding to one of the aforementioned plurality of grooves and extending in a direction from the first side to the second side at surface (117).

In re claim 21, the adapter (110) is configured to receive a plurality of optical ferrules (180) at the first and second sides.

In re claim 24, Bradley discloses, see FIGS. 2-5, an adapter (110) for aligning fiber optic ferrules (180) inserted from opposing sides comprising;

a main body (110) having an opening (111) extending between a first/front side and a second/rear side at surface (117), the first side and the second side at surface (117) separated by a central portion inside the main body (110), the main body (110) having at least one groove in the opening (111) and extending in a direction from the first side to the second side at surface (117); and

a plurality of grooves disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side at surface (117), each of the plurality of grooves in the top surface capable of corresponding to a different fiber optic ferrule (180) because different ferrules (180) of the same shape may be received by the plurality of grooves. *See* paragraphs [0030]-[0043] of Bradley for further details. *See also* the modified FIG. 2A of Bradley reproduced above which shows the claimed grooves and bottom surfaces. The claimed top surfaces would correspond to upper surfaces within the opening (111) of Bradley that are opposed to the bottom surfaces and which further define additional grooves.

In re claim 29, the adapter (110) is configured to receive a plurality of optical ferrules (180) at the first and second sides.

Claim Rejections - 35 USC § 103

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

8. Claim(s) 24, 27, and 29 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Patent No. 4,645,295 to Pronovost et al. (hereinafter "Pronovost"). Pronovost was applied in a prior Office action.

In re claim 24, Pronovost discloses, see FIGS. 1-3, an adapter (10) for aligning fiber optic ferrules (16) inserted from opposing sides comprising;

a main body (10) having an opening extending between a first side and a second side, the first side and the second side separated by a central portion between recesses (56) inside the main body (10), the main body (10) having at least one groove (62) in the opening and extending in a direction from the first side to the second side; and

a groove/recesss (44) disposed in a top surface and a bottom surface of the central portion between recesses (56), each groove (44) extending into the central portion between recesses (56) from each of the first side and the second side, each groove (44) capable of corresponding to a different fiber optic ferrule (16) because different ferrules (16) of the same shape may be received by the grooves (44). *See* columns 5-6 of Pronovost for further details.

Thus, Pronovost only differs from claim 24 in that he does not teaches a plurality of his grooves (44) disposed in his top surface and bottom surface. The grooves (44) of Pronovost are used to provide "accurate lateral, angular and longitudinal alignment for proper coupling of the fiber optic cables 28 of the two plugs 16". In order to provide additional accuracy of the lateral, angular, and/or longitudinal alignment of his plugs (16), Pronovost would have been modified by

providing a plurality of his grooves (44) disposed in his top surface and bottom surface, thereby obtaining the invention specified by claim 24. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 24 in view of Pronovost.

In re claim 27, as seen in FIGS 1 and 3, the opening in the central portion of the main body (10) is smaller than the opening in the first and second sides due to the presence of shim (70) which partially blocks the opening within the central portion.

In re claim 29, as seen in FIG. 3, the first and second sides are configured to receive a plurality of optical ferrules (16).

9. Claims 20 and 28 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley or Pronovost as applied to claim 15 or 24 above, and further in view of Patent Publication No. US 2002/0172469 A1 to Benner et al. ("Benner"). Benner was cited in a prior Office action.

In re claims 20 and 28, Bradley or Pronovost as applied to claim 15 or 24 only differs in that neither Bradley nor Pronovost teaches an conductive elastomeric gasket encircling an external surface of their adapter (110) or (10) to provide EMI shielding to the adapter (110) or (10). Benner, on the other hand, teaches an conductive elastomeric gasket (62) encircling an external surface of an adapter (10) to provide EMI shielding to the adapter. *See* paragraphs [0025]-[0030] of Benner. In order to prevent EMI interference, an external surface of the adapter (110) or (10) of Bradley or Pronovost would have been modified to be encircled by the gasket (62) of Benner, thereby obtaining the invention specified by claims 20 and 28. Therefore, it would have been

obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claims 20 and 28 in view of Bradley or Pronovost combined with Benner.

10. Claims 22 and 30 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Bradley or Pronovost as applied to claim 15 or 24 above, and further in view of Patent Publication No. US 2008/0131055 A1 Parkman et al. ("Parkman"). Parkman was cited in a prior Office action.

In re claims 22 or 30, Bradley or Pronovost as applied to claim 15 or 24 only differs in that neither teaches that the grooves in the top surface of their central portion have a different width than that of the grooves in the bottom surface of their central portion. Parkman, on the other hand, teaches using channels of different widths in order to provide a more secure and/or a more complex keying configuration. *See* paragraph [0039] of Parkman. In order to provide a more secure and/or more complex keying configuration, Bradley or Pronovost as applied to claim 15 or 24 would have been further modified by providing the grooves in the top surface of their central portion with a different width than that of the grooves in the bottom surface of their central portion, thereby obtaining the invention specified by claim 22 or 30. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 22 or 30 in view of Bradley or Pronovost combined with Parkman.

Allowable Subject Matter

11. Claims 17-19, 23, 25, 26, and 31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this

Office action and to include all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

a. Regarding claims 17, 18, 23, 25, 26, and 31, the primary reason for indicating allowable subject matter is the inclusion of a wall disposed within and across the central portion of the main body and between the first side and the second sides, 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.

b. Regarding claim 19, the primary reason for indicating allowable subject matter is the inclusion of the opening in the central portion of the main body is smaller than the opening in the first and second sides.

Conclusion

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

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

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Omar R Rojas whose telephone number is (571)272-2357. The examiner can normally be reached on Monday-Friday, 10AM-6PM EST.

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

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

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

/Omar R Rojas/
Primary Examiner
Art Unit 2883

or
March 2, 2020

Notice of References Cited	Application/Control No. 16/214,317	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-20140241689-A1	08-2014	Bradley; Mark Alan	G02B6/00	385/135
	B					
	C					
	D					
	E					
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	G					
	H					
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	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
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NON-PATENT DOCUMENTS

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/214,317	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	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 15/855,750	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/22/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	10/17/2019	/ORR/
Checked refs. for 15/855,788	10/17/2019	/ORR/
Updated previous EAST search - See Search History Printout.	02/27/2020	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	02/27/2020	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	02/28/2020	/ORR/

/Omar R Rojas/ Primary Examiner, Art Unit 2883	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/214,317	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	2883

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

/Omar R Rojas/ Primary Examiner, Art Unit 2883	

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S497	0	(11/633327).APP.	USPAT; USOCR	OR	ON	2020/02/27 19:33
S498	81	(US-20040101250-$ or US-20140205247-$ or US-20170160486-$ or US-20180239091-$).did. or (US-3999837-$ or US-4252407-$ or US-6116790-$ or US-6371659-$ or US-6461053-$ or US-6585423-$ or US-7001079-$ or US-9039298-$ or US-9823424-$).did. or (DE-2558445-$ or FR-2296862-$ or BR-7508734-$ or ES-444034-$ or GB-1503979-$ or IT-7869677-$ or CA-1043604-$ or BE-871785-$ or DK-522978-$ or NL-7811579-$ or DE-2849975-$ or GB-2009440-$ or FR-2435053-$ or FR-2446496-$ or CA-1097111-$ or IT-1050771-$ or FR-2446496-$ or FR-2435053-$ or CH-628152-$ or GB-2009440-$ or DE-3112078-$ or FR-2296862-$ or DE-2558445-$ or DE-3112078-$ or IT-1109638-$ or DE-2849975-$).did. or (DK-151733-$ or DK-151733-$ or DK-151733-$ or DE-19626036-$ or WO-9800741-$ or AU-2975197-$ or WO-9928774-$ or EP-0985161-$ or EP-1034445-$ or EP-1092995-$ or EP-1092995-$ or EP-1034445-$ or EP-0985161-$ or ES-2202617-$ or EP-1092995-$ or DE-60010402-$ or DE-60010402-$ or JP-3984293-$ or EP-2138880-$ or JP-4514004-$ or WO-2016053853-$ or WO-2017065999-$ or WO-2017065999-$ or EP-3201668-$ or CN-108351473-$ or CN-208140982-$ or EP-3201668-$).did. or (JP-2001154062-$).did. or (DE-2558445-$ or BE-871785-$ or DE-19626036-$ or WO-9928774-$ or EP-1092995-$ or US-20140205247-$ or CN-104516061-$ or CN-104570229-$ or WO-2016053853-$ or WO-2017065999-$ or US-20180364421-$).did.	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2020/02/27 19:35
S499	1140	(US-20010010741-$ or US-20010016102-$ or US-20010033730-$ or US-20010038737-$ or US-20010043776-$ or US-20010048790-$ or US-20020006253-$ or US-20020012503-$ or US-20020012502-$ or US-20020012501-$ or US-20020012238-$ or US-20020025121-$	US-PGPUB; USPAT; JPO	OR	ON	2020/02/27 19:35

		or US-20020025099-$ or US-20020028055-$ or US-20020031310-$ or US-20020031309-$ or US-20020061171-$ or US-20020064349-$ or US-20020081076-$ or US-20020090177-$ or US-20020094727-$ or US-20020106167-$ or US-20020114581-$ or US-20020118926-$ or US-20020126961-$ or US-20020131720-$).did. or (US-20020150344-$ or US-20020150343-$ or US-20020150353-$ or US-20020150346-$ or US-20020150345-$ or US-20020150342-$ or US-20020159745-$ or US-20020159714-$ or US-20020159712-$ or US-20020168149-$ or US-20020166226-$ or US-20020172469-$ or US-20020177364-$ or US-20020181888-$ or US-20020181884-$ or US-20020186934-$ or US-20020186742-$ or US-20020191881-$ or US-20020197017-$ or US-20020197018-$ or US-20030002816-$ or US-20030002808-$ or US-20030007739-$ or US-20030012512-$ or US-20030031449-$ or US-20030031422-$ or US-20030044122-$).did. or (US-20030044115-$ or US-20030053760-$ or US-20030063868-$ or US-20030063866-$ or US-20030063862-$ or US-20030068135-$ or US-20030072536-$ or US-20030081905-$ or US-20030087505-$ or US-20030091292-$ or US-20030095780-$ or US-20030095779-$ or US-20030103730-$ or US-20030108320-$ or US-20030113086-$ or US-20030128934-$ or US-20030142918-$ or US-20030147597-$ or US-20030147230-$ or US-20030156796-$ or US-20030169975-$ or US-20030169974-$ or US-20030174996-$ or US-20030174972-$ or US-20030174922-$ or US-20030180005-$ or US-20030185520-$).did. or (US-20030189214-$ or US-20030194188-$ or US-20030198029-$ or US-20030231838-$ or US-20040013369-$ or US-20040028340-$ or US-20040033050-$ or US-20040033028-$ or US-20040033027-$ or US-20040036987-$ or US-20040042710-$ or US-20040052471-$ or US-20040054761-$ or US-20040062488-$ or US-20040062486-$ or US-20040072454-$ or US-20040071438-$ or US-20040074852-$ or US-20040081418-$ or US-20040091228-$ or US-20040101253-$ or US-20040105325-$ or US-20040105278-$ or US-20040120652-$ or US-20040131315-$ or US-20040136656-$ or US-20040141692-$).did. or (US-				

		20040151464-$ or US-20040151438-$ or US-20040156592-$ or US-20040161204-$ or US-20040165830-$ or US-20040179787-$ or US-20040184740-$ or US-20040182971-$ or US-20040197053-$ or US-20040202431-$ or US-20040208459-$ or US-20040223701-$ or US-20040240793-$ or US-20040247255-$ or US-20040264873-$ or US-20040266257-$ or US-20040264908-$ or US-20040264876-$ or US-20050008300-$ or US-20050013547-$ or US-20050041928-$ or US-20050069263-$ or US-20050074211-$ or US-20050094948-$ or US-20050094943-$ or US-20050112939-$ or US-20050111796-$).did. or (US-20050118880-$ or US-20050135753-$ or US-20050141817-$ or US-20050185894-$ or US-20050207708-$ or US-20050215119-$ or US-20050220423-$ or US-20050220420-$ or US-20050226586-$ or US-20050232552-$ or US-20050238289-$ or US-20050281526-$ or US-20050281509-$ or US-20050286833-$ or US-20050286835-$ or US-20060013539-$ or US-20060056769-$ or US-20060072878-$ or US-20060083468-$ or US-20060083467-$ or US-20060088248-$ or US-20060093275-$ or US-20060098914-$ or US-20060133758-$ or US-20060140542-$ or US-20060147156-$ or US-20060147155-$).did. or (US-20060154529-$ or US-20060153503-$ or US-20060159401-$ or US-20060159399-$ or US-20060169856-$ or US-20060177182-$ or US-20060197943-$ or US-20060204200-$ or US-20060204180-$ or US-20060245711-$ or US-20060263011-$ or US-20060269205-$ or US-20060269206-$ or US-20060269212-$ or US-20070019913-$ or US-20070036487-$ or US-20070098330-$ or US-20070098329-$ or US-20070105452-$ or US-20070116414-$ or US-20070116411-$ or US-20070140623-$ or US-20070154135-$ or US-20070165984-$ or US-20070183780-$ or US-20070190834-$ or US-20070196053-$).did. or (US-20070196052-$ or US-20070201808-$ or US-20070201798-$ or US-20070212002-$ or US-20070223862-$ or US-20070230874-$ or US-20070263959-$ or US-20070280599-$ or US-20070285194-$ or US-20070297725-$ or US-20080008425-$ or US-20080013897-$ or US-20080013891-$ or US-20080019642-$ or US-20080019656-$ or US-				

		20080044139-$ or US-20080050072-$ or US-20080085082-$ or US-20080095502-$ or US-20080095501-$ or US-20080100456-$ or US-20080170827-$ or US-20080175541-$ or US-20080175550-$ or US-20080175542-$ or US-20080175546-$ or US-20080175545-$).did. or (US-20080175532-$ or US-20080193086-$ or US-20080205825-$ or US-20080240658-$ or US-20080269845-$ or US-20080267566-$ or US-20080273837-$ or US-20080279503-$ or US-20080304792-$ or US-20080310796-$ or US-20080310800-$ or US-20080310795-$ or US-20080317411-$ or US-20090010600-$ or US-20090028507-$ or US-20090034912-$ or US-20090047800-$ or US-20090046981-$ or US-20090060422-$ or US-20090060418-$ or US-20090074359-$ or US-20090103878-$ or US-20090116791-$ or US-20090148101-$ or US-20090156043-$ or US-20090185778-$ or US-20090202214-$).did. or (US-20090214164-$ or US-20090226141-$ or US-20090226137-$ or US-20090232455-$ or US-20090232454-$ or US-20090257722-$ or US-20090257719-$ or US-20090274431-$ or US-20090274432-$ or US-20090285534-$ or US-20090285530-$ or US-20090290838-$ or US-20090304335-$ or US-20100002999-$ or US-20100021111-$ or US-20100029117-$ or US-20100027944-$ or US-20100027943-$ or US-20100046893-$ or US-20100054665-$ or US-20100061681-$ or US-20100074616-$ or US-20100080513-$ or US-20100092134-$ or US-20100092131-$ or US-20100104355-$ or US-20100111484-$).did. or (US-20100129032-$ or US-20100129028-$ or US-20100135618-$ or US-20100141934-$ or US-20100146764-$ or US-20100158444-$ or US-20100183265-$ or US-20100202730-$ or US-20100202737-$ or US-20100209063-$ or US-20100209050-$ or US-20100215318-$ or US-20100215322-$ or US-20100226654-$ or US-20100232757-$ or US-20100239220-$ or US-20100239213-$ or US-20100247057-$ or US-20100247040-$ or US-20100260457-$ or US-20100266245-$ or US-20100272408-$ or US-20100278497-$ or US-20100278488-$ or US-20100284655-$ or US-20100296792-$ or US-20100303408-$).did. or (US-20100322580-$ or US-20100322576-$ or US-20100322554-$ or US-				

		20100329604-$ or US-20100329602-$ or US-20110019964-$ or US-20110038592-$ or US-20110038581-$ or US-20110044583-$ or US-20110058772-$ or US-20110075969-$ or US-20110081798-$ or US-20110081116-$ or US-20110085774-$ or US-20110085765-$ or US-20110091166-$ or US-20110091154-$ or US-20110103797-$ or US-20110116748-$ or US-20110123156-$ or US-20110129186-$ or US-20110142398-$ or US-20110150396-$ or US-20110158593-$ or US-20110158586-$ or US-20110170830-$ or US-20110176777-$).did. or (US-20110188809-$ or US-20110188000-$ or US-20110194828-$ or US-20110200286-$ or US-20110198324-$ or US-20110200294-$ or US-20110206335-$ or US-20110206325-$ or US-20110206324-$ or US-20110211792-$ or US-20110229094-$ or US-20110243508-$ or US-20110243505-$ or US-20110243504-$ or US-20110268391-$ or US-20110293223-$ or US-20110299814-$ or US-20110311186-$ or US-20110317976-$ or US-20120002928-$ or US-20120002925-$ or US-20120033918-$ or US-20120039569-$ or US-20120057831-$ or US-20120057830-$ or US-20120057827-$ or US-20120063735-$).did. or (US-20120069348-$ or US-20120099870-$ or US-20120106901-$ or US-20120114295-$ or US-20120128307-$ or US-20120141084-$ or US-20120155808-$ or US-20120163757-$ or US-20120170895-$ or US-20120195555-$ or US-20120219253-$ or US-20120224823-$ or US-20120237223-$ or US-20120237171-$ or US-20120243831-$ or US-20120243829-$ or US-20120251067-$ or US-20120252244-$ or US-20120251050-$ or US-20120257859-$ or US-20120263426-$ or US-20120294572-$ or US-20120301088-$ or US-20120301080-$ or US-20120321269-$ or US-20120321266-$ or US-20120321254-$).did. or (US-20130011099-$ or US-20130064517-$ or US-20130071068-$ or US-20130071067-$ or US-20130084041-$ or US-20130094827-$ or US-20130094815-$ or US-20130094811-$ or US-20130101257-$ or US-20130108231-$ or US-20130121643-$ or US-20130129285-$ or US-20130156379-$ or US-20130156382-$ or US-20130163937-$ or US-20130163933-$ or US-20130170797-$ or US-20130170796-$ or US-				

		20130183018-$ or US-20130195405-$ or US-20130195418-$ or US-20130209040-$ or US-20130209049-$ or US-20130209052-$ or US-20130209051-$ or US-20130209050-$ or US-20130209041-$).did. or (US-20130216186-$ or US-20130216188-$ or US-20130284844-$ or US-20130287358-$ or US-20130302004-$ or US-20130322828-$ or US-20130323940-$ or US-20130322826-$ or US-20130330957-$ or US-20130343764-$ or US-20130343707-$ or US-20140016902-$ or US-20140023322-$ or US-20140038462-$ or US-20140044394-$ or US-20140064690-$ or US-20140064664-$ or US-20140072297-$ or US-20140072263-$ or US-20140082913-$ or US-20140093210-$ or US-20140104808-$ or US-20140126875-$ or US-20140126874-$ or US-20140124140-$ or US-20140133821-$ or US-20140133803-$).did. or (US-20140141649-$ or US-20140147082-$ or US-20140161394-$ or US-20140161407-$ or US-20140161400-$ or US-20140169732-$ or US-20140178007-$ or US-20140205253-$ or US-20140205247-$ or US-20140219615-$ or US-20140220794-$ or US-20140219619-$ or US-20140241690-$ or US-20140241689-$ or US-20140241688-$ or US-20140241667-$ or US-20140273584-$ or US-20140270646-$ or US-20140294339-$ or US-20140308010-$ or US-20140308008-$ or US-20140321813-$ or US-20140321814-$ or US-20140328063-$ or US-20140334790-$ or US-20140334780-$ or US-20140334778-$).did. or (US-20140348481-$ or US-20140348467-$ or US-20140355936-$ or US-20140376870-$ or US-20150003774-$ or US-20150012072-$ or US-20150030323-$ or US-20150050002-$ or US-20150055917-$ or US-20150055928-$ or US-20150063758-$ or US-20150060539-$ or US-20150078710-$ or US-20150139588-$ or US-20150147033-$ or US-20150147031-$ or US-20150153516-$ or US-20150177467-$ or US-20150185423-$ or US-20150192744-$ or US-20150205060-$ or US-20150205053-$ or US-20150212284-$ or US-20150212279-$ or US-20150219856-$ or US-20150219857-$ or US-20150226923-$).did. or (US-20150234131-$ or US-20150234128-$ or US-20150241650-$ or US-20150247977-$ or US-20150253183-$ or US-20150260927-$ or US-			

		20150268424-$ or US-20150277057-$ or US-20150277061-$ or US-20150277058-$ or US-20150288449-$ or US-20150288447-$ or US-20150286014-$ or US-20150286013-$ or US-20150286011-$ or US-20150285999-$ or US-20150301288-$ or US-20150301293-$ or US-20150309279-$ or US-20150323752-$ or US-20150346452-$ or US-20150346449-$ or US-20150355417-$ or US-20150355414-$ or US-20150362678-$ or US-20150378117-$ or US-20150378111-$).did. or (US-20160004017-$ or US-20160011383-$ or US-20160011376-$ or US-20160018604-$ or US-20160018606-$ or US-20160033723-$ or US-20160041356-$ or US-20160047994-$ or US-20160062051-$ or US-20160070081-$ or US-20160085045-$ or US-20160085035-$ or US-20160085031-$ or US-20160091673-$ or US-20160111808-$ or US-20160109676-$ or US-20160116685-$ or US-20160116683-$ or US-20160116681-$ or US-20160131857-$ or US-20160139342-$ or US-20160139339-$ or US-20160147022-$ or US-20160154190-$ or US-20160161679-$ or US-20160170152-$ or US-20160178860-$).did. or (US-20160178855-$ or US-20160187589-$ or US-20160195683-$ or US-20160195681-$ or US-20160209605-$ or US-20160216454-$ or US-20160216460-$ or US-20160223763-$ or US-20160238798-$ or US-20160238794-$ or US-20160238789-$ or US-20160246011-$ or US-20160252685-$ or US-20160266330-$ or US-20160266329-$ or US-20160266327-$ or US-20160274311-$ or US-20160291259-$ or US-20160306123-$ or US-20160306121-$ or US-20160313513-$ or US-20160320567-$ or US-20160320566-$ or US-20160327757-$ or US-20160324402-$ or US-20160356966-$ or US-20160365685-$).did. or (US-20160370549-$ or US-20160370548-$ or US-20170003459-$ or US-20170035275-$ or US-20170059782-$ or US-20170068063-$ or US-20170082806-$ or US-20170097485-$ or US-20170097471-$ or US-20170102507-$ or US-20170108659-$ or US-20170108430-$ or US-20170123171-$ or US-20170123163-$ or US-20170131481-$ or US-20170139158-$ or US-20170139157-$ or US-20170146749-$ or US-20170153394-$ or US-20170163573-$ or US-20170162978-$ or US-				

		20170160500-$ or US-20170160496-$ or US-20170160486-$ or US-20170160478-$ or US-20170160477-$ or US-20170160476-$).did. or (US-20170168244-$ or US-20170176252-$ or US-20170184800-$ or US-20170192182-$ or US-20170199338-$ or US-20170199336-$ or US-20170205591-$ or US-20170205588-$ or US-20170212310-$ or US-20170212309-$ or US-20170222347-$ or US-20170227727-$ or US-20170227718-$ or US-20170235077-$ or US-20170242198-$ or US-20170242196-$ or US-20170248762-$ or US-20170254962-$ or US-20170254961-$ or US-20170254960-$ or US-20170276887-$ or US-20170276886-$ or US-20170285272-$ or US-20170293091-$ or US-20170299821-$ or US-20170299818-$ or US-20170299817-$).did. or (US-20170307832-$ or US-20170307829-$ or US-20170315307-$ or US-20170315305-$ or US-20170315304-$ or US-20170315303-$ or US-20170331234-$ or US-20170336571-$ or US-20170343742-$ or US-20170343741-$ or US-20170341972-$ or US-20170351038-$ or US-20170351037-$ or US-20170359091-$ or US-20170363815-$ or US-20170363810-$ or US-20170363509-$ or US-20170371118-$ or US-20170371107-$ or US-20180003910-$ or US-20180011261-$ or US-20180017740-$ or US-20180024302-$ or US-20180024301-$ or US-20180024300-$ or US-20180024294-$ or US-20180031782-$).did. or (US-20180031775-$ or US-20180059338-$ or US-20180074277-$ or US-20180081127-$ or US-20180081122-$ or US-20180078781-$ or US-20180095232-$ or US-20180106975-$ or US-20180113268-$ or US-20180113259-$ or US-20180136410-$ or US-20180143384-$ or US-20180143381-$ or US-20180149813-$ or US-20180157002-$ or US-20180180819-$ or US-20180188460-$ or US-20180196204-$ or US-20180210155-$ or US-20180210153-$).did. or (US-3933409-$ or US-3999837-$ or US-4080044-$ or US-4087158-$ or US-4101198-$ or US-4140365-$ or US-4167304-$ or US-4168109-$ or US-4186996-$ or US-4201445-$ or US-4214812-$ or US-4218113-$ or US-4223976-$ or US-4252407-$ or US-4268115-$ or US-4268114-$ or US-4279469-$ or US-4291943-$ or US-4295707-$ or US-4327964-$ or US-4354731-$ or US-				

		4368948-$ or US-4371233-$ or US-4387957-$ or US-4415232-$ or US-4422716-$).did. or (US-4444461-$ or US-4445753-$ or US-4447121-$ or US-4461539-$ or US-4466009-$ or US-4484796-$ or US-4487474-$ or US-4497536-$ or US-4526438-$ or US-4548467-$ or US-4614402-$ or US-4615581-$ or US-4645296-$ or US-4648688-$ or US-4666241-$ or US-4674831-$ or US-4681398-$ or US-4688887-$ or US-4699460-$ or US-4714318-$ or US-4714317-$ or US-4714315-$ or US-4715674-$ or US-4717234-$ or US-4718744-$ or US-4722081-$ or US-4740052-$).did. or (US-4741590-$ or US-4758719-$ or US-4759600-$ or US-4759599-$ or US-4762389-$ or US-4767178-$ or US-4773725-$ or US-4781429-$ or US-4783137-$ or US-4786135-$ or US-4787700-$ or US-4789216-$ or US-4793683-$ or US-4795231-$ or US-4805980-$ or US-4807957-$ or US-4813760-$ or US-4824196-$ or US-4834486-$ or US-4842361-$ or US-4844570-$ or US-4846544-$ or US-4848870-$ or US-4850536-$ or US-4852963-$ or US-4877303-$ or US-4892380-$).did. or (US-4898446-$ or US-4960317-$ or US-4964688-$ or US-4976510-$ or US-4986762-$ or US-4986622-$ or US-4991929-$ or US-4993803-$ or US-4995688-$ or US-4998797-$ or US-5013124-$ or US-5015060-$ or US-5016970-$ or US-5018823-$ or US-5042891-$ or US-5048916-$ or US-5052774-$ or US-5058983-$ or US-5073042-$ or US-5077815-$ or US-5091991-$ or US-5091990-$ or US-5109453-$ or US-5115484-$ or US-5119455-$ or US-5124506-$ or US-5127073-$).did. or (US-5129024-$ or US-5133032-$ or US-5134677-$ or US-5134676-$ or US-5155795-$ or US-5159654-$ or US-5177808-$ or US-5179607-$ or US-5210815-$ or US-5214730-$ or US-5228104-$ or US-5233675-$ or US-5233674-$ or US-5239606-$ or US-5267342-$ or US-5274729-$ or US-5280552-$ or US-5282259-$ or US-5293581-$ or US-5297227-$ or US-5317663-$ or US-5323475-$ or US-5329541-$ or US-5333222-$ or US-5333221-$ or US-5359688-$ or US-5363460-$).did. or (US-5367594-$ or US-5366383-$ or US-5384885-$ or US-5386485-$ or US-5408557-$ or US-5418875-$ or US-5420951-$ or US-5444806-$ or US-5446817-$ or US-5450519-$ or US-5452391-$ or US-5485537-$ or US-5497444-$ or US-5506922-$ or US-5519799-$ or				

		US-5521998-$ or US-5528711-$ or US-5530783-$ or US-5537501-$ or US-5542015-$ or US-5548674-$ or US-5550943-$ or US-5563978-$ or US-5563971-$ or US-5570445-$ or US-5574813-$ or US-5579429-$).did. or (US-5581644-$ or US-5588086-$ or US-5592323-$ or US-5600746-$ or US-5603631-$ or US-5607323-$ or US-5619610-$ or US-5633969-$ or US-5642450-$ or US-5647043-$ or US-5645449-$ or US-5661833-$ or US-5666449-$ or US-5664955-$ or US-5668904-$ or US-5671310-$ or US-5673346-$ or US-5680494-$ or US-5682449-$ or US-5687268-$ or US-5694507-$ or US-5694506-$ or US-5701380-$ or US-5721799-$ or US-5727102-$ or US-5732174-$ or US-5734770-$).did. or (US-5737464-$ or US-5751874-$ or US-5761359-$ or US-5764043-$ or US-5774611-$ or US-5774612-$ or US-5778122-$ or US-5781680-$ or US-5796896-$ or US-5799122-$ or US-5809191-$ or US-5815618-$ or US-5818993-$ or US-5825955-$ or US-5832158-$ or US-5838856-$ or US-5838855-$ or US-5845036-$ or US-5862282-$ or US-5867621-$ or US-5881191-$ or US-5887100-$ or US-5887098-$ or US-5892870-$ or US-5896477-$ or US-5909526-$ or US-5909298-$).did. or (US-5915058-$ or US-5923805-$ or US-5930426-$ or US-5930425-$ or US-5937121-$ or US-5940561-$ or US-5940559-$ or US-5949946-$ or US-5953474-$ or US-5953473-$ or US-5956444-$ or US-5960137-$ or US-5969294-$ or US-5971626-$ or US-5980117-$ or US-5987203-$ or US-5993071-$ or US-6004043-$ or US-6022149-$ or US-6027252-$ or US-6041155-$ or US-6048103-$ or US-6048102-$ or US-6053639-$ or US-6059461-$ or US-6064791-$ or US-6076973-$).did. or (US-6076975-$ or US-6081647-$ or US-6079881-$ or US-6088502-$ or US-6095694-$ or US-6104856-$ or US-6102581-$ or US-6108482-$ or US-6116790-$ or US-6116789-$ or US-6116101-$ or US-6132105-$ or US-6139346-$ or US-6142676-$ or US-6149315-$ or US-6154597-$ or US-6164835-$ or US-6164834-$ or US-6173099-$ or US-6179480-$ or US-6179475-$ or US-6188827-$ or US-6188825-$ or US-6186670-$ or US-6190616-$ or US-6195477-$ or US-6193420-$).did. or (US-6196729-$ or US-6200040-$ or US-6206577-$ or US-6217226-$ or US-6220763-$ or US-6220762-$ or US-6224269-$ or US-6227719-$ or					

US-6227718-$ or US-6240229-$ or US-6238249-$ or US-6243526-$ or US-6247851-$ or US-6247849-$ or US-6256446-$ or US-6259839-$ or US-6264373-$ or US-6264372-$ or US-6267513-$ or US-6273618-$ or US-6290527-$ or US-6301004-$ or US-6302592-$ or US-6309111-$ or US-6318904-$ or US-6318903-$ or US-6334715-$).did. or (US-6349164-$ or US-6347889-$ or US-6347888-$ or US-6354746-$ or US-6357932-$ or US-6361218-$ or US-6364536-$ or US-6367986-$ or US-6367984-$ or US-6371659-$ or US-6377840-$ or US-6375363-$ or US-6384896-$ or US-6382843-$ or US-6382839-$ or US-6389212-$ or US-6402393-$ or US-6402390-$ or US-6402388-$ or US-6409391-$ or US-6412987-$ or US-6419810-$ or US-6422759-$ or US-6425692-$ or US-6425694-$ or US-6431762-$ or US-6437894-$).did. or (US-6435946-$ or US-6445867-$ or US-6456768-$ or US-6457876-$ or US-6461055-$ or US-6461054-$ or US-6461053-$ or US-6466724-$ or US-6464406-$ or US-6467971-$ or US-6467970-$ or US-6471417-$ or US-6471412-$ or US-6474876-$ or US-6478472-$ or US-6481900-$ or US-6481899-$ or US-6485192-$ or US-6497518-$ or US-6497516-$ or US-6501900-$ or US-6508593-$ or US-6526210-$ or US-6524015-$ or US-6527450-$ or US-6533469-$ or US-6543941-$).did. or (US-6554482-$ or US-6558044-$ or US-6561699-$ or US-6572276-$ or US-6572273-$ or US-6582132-$ or US-6595696-$ or US-6601995-$ or US-6612750-$ or US-6619859-$ or US-6619856-$ or US-6632023-$ or US-6634794-$ or US-6644866-$ or US-6667803-$ or US-6695485-$ or US-6702477-$ or US-6702475-$ or US-6786647-$ or US-6789953-$ or US-6793399-$ or US-6840680-$ or US-6856748-$ or US-6895146-$ or US-7232261-$ or US-7435009-$ or US-7530845-$).did. or (US-7585118-$ or US-7588373-$ or US-7706657-$ or US-7738757-$ or US-7972066-$ or US-8070366-$ or US-8206040-$ or US-8517614-$ or US-8588571-$ or US-8953922-$ or US-9229177-$ or US-9229170-$ or US-9291781-$ or US-9316794-$ or US-9323007-$ or US-9448369-$ or US-9453972-$ or US-9482825-$ or US-9551831-$ or US-9625655-$ or US-9632267-$ or US-9638871-$ or US-9638868-$ or US-9645335-$ or US-9658407-$ or US-9671570-$ or US-9671568-$).did. or (US-9678282-$

		or US-9696477-$ or US-9722367-$ or US-9720184-$ or US-9726829-$ or US-9735523-$ or US-9733123-$ or US-9739955-$ or US-9739952-$ or US-9739951-$ or US-9746625-$ or US-9746368-$ or US-9759874-$ or US-9759869-$ or US-9772457-$ or US-9772456-$ or US-9772453-$ or US-9784928-$ or US-9798090-$ or US-9797806-$ or US-9810860-$ or US-9810858-$ or US-9810856-$ or US-9817195-$ or US-9823428-$ or US-9829643-$ or US-9827438-$).did. or (US-9835807-$ or US-9841566-$ or US-9857545-$ or US-9857537-$ or US-9864151-$ or US-9869824-$ or US-9876309-$ or US-9874702-$ or US-9880365-$ or US-9880357-$ or US-9885841-$ or US-9893813-$ or US-9891392-$ or US-9891387-$ or US-9891385-$ or US-9897767-$ or US-9904021-$ or US-9904020-$ or US-9910228-$ or US-9910226-$ or US-9915793-$ or US-9933586-$ or US-9933583-$ or US-9933582-$ or US-9939600-$ or US-9939590-$ or US-9948017-$).did. or (US-9946036-$ or US-10007069-$ or US-10018787-$).did. or (JP-2016095432-$ or JP-2016095410-$ or JP-2016122100-$ or JP-2016177309-$ or JP-2016188927-$ or JP-2017053937-$ or JP-2017090798-$ or JP-2017111444-$ or JP-2017134118-$ or JP-2017138535-$ or JP-2017151338-$ or JP-2017219768-$).did.				
S500	734	(US-20010041030-$ or US-20020025125-$ or US-20020106162-$ or US-20020114589-$ or US-20020159710-$ or US-20030031452-$ or US-20030044127-$ or US-20030044125-$ or US-20030180004-$ or US-20030223703-$ or US-20040008494-$ or US-20040017983-$ or US-20040017981-$ or US-20040038558-$ or US-20040052472-$ or US-20040062498-$ or US-20040105628-$ or US-20040131317-$ or US-20040223699-$ or US-20040228589-$ or US-20050036744-$ or US-20050053342-$ or US-20050111795-$ or US-20050123246-$ or US-20050135755-$ or US-20050135752-$).did. or (US-20050271328-$ or US-20060045430-$ or US-20060051028-$ or US-20060093282-$ or US-20060153504-$ or US-20060193562-$ or US-20060280409-$ or US-20060285807-$ or US-20070058907-$ or US-20070098327-$ or US-20070160327-$ or US-20080069501-$ or US-20080112672-$ or US-20080124031-$ or US-20080131055-$ or US-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2020/02/27 19:35

		20080253719-$ or US-20090003772-$ or US-20090290839-$ or US-20090305542-$ or US-20100322561-$ or US-20110038590-$ or US-20110075971-$ or US-20110091159-$ or US-20110222819-$ or US-20110249942-$ or US-20120027355-$ or US-20120057824-$).did. or (US-20120076459-$ or US-20120082416-$ or US-20120099822-$ or US-20120141070-$ or US-20120251054-$ or US-20120251051-$ or US-20120263423-$ or US-20120263419-$ or US-20120308183-$ or US-20130051749-$ or US-20130064508-$ or US-20130077914-$ or US-20130121645-$ or US-20130129280-$ or US-20130183001-$ or US-20130216189-$ or US-20130230283-$ or US-20130259429-$ or US-20130272671-$ or US-20130308908-$ or US-20140056560-$ or US-20140064665-$ or US-20140064688-$ or US-20140072265-$ or US-20140086545-$ or US-20140147081-$ or US-20140205241-$).did. or (US-20140219614-$ or US-20140219624-$ or US-20140314385-$ or US-20140341510-$ or US-20150003785-$ or US-20150023637-$ or US-20150049989-$ or US-20150071591-$ or US-20150177463-$ or US-20150226926-$ or US-20150241644-$ or US-20150301286-$ or US-20150331201-$ or US-20150338583-$ or US-20150370017-$ or US-20150378112-$ or US-20160004018-$ or US-20160004016-$ or US-20160025937-$ or US-20160077287-$ or US-20160077284-$ or US-20160109661-$ or US-20160131854-$ or US-20160131849-$ or US-20160161680-$ or US-20160178859-$ or US-20160259135-$).did. or (US-20160282566-$ or US-20160282562-$ or US-20160320571-$ or US-20160349464-$ or US-20170059784-$ or US-20170090128-$ or US-20170090127-$ or US-20170102506-$ or US-20170102504-$ or US-20170108653-$ or US-20170115457-$ or US-20170139150-$ or US-20170153398-$ or US-20170184798-$ or US-20170184790-$ or US-20170205587-$ or US-20170219779-$ or US-20170227720-$ or US-20170235060-$ or US-20170242200-$ or US-20170242199-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170261698-$ or US-20170269309-$ or US-20170276883-$).did. or (US-20170276881-$ or US-20170293088-$ or US-20170293087-$ or US-				

		20170307831-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170357060-$ or US-20170357059-$ or US-20170363827-$ or US-20180003903-$ or US-20180011258-$ or US-20180011254-$ or US-20180031774-$ or US-20180052288-$ or US-20180077472-$ or US-20180081128-$ or US-20180081125-$ or US-20180088288-$ or US-20180088287-$ or US-20180088286-$ or US-20180088283-$ or US-20180106973-$ or US-20180156988-$ or US-20180156985-$ or US-20180210154-$).did. or (US-4240695-$ or US-4320938-$ or US-4330172-$ or US-4477146-$ or US-4687291-$ or US-4737009-$ or US-4854664-$ or US-4856866-$ or US-4886335-$ or US-4915472-$ or US-4953929-$ or US-4955976-$ or US-5064268-$ or US-5076656-$ or US-5082346-$ or US-5082344-$ or US-5101463-$ or US-5134673-$ or US-5157749-$ or US-5166995-$ or US-5199093-$ or US-5259052-$ or US-5555332-$ or US-5666456-$ or US-5692080-$ or US-5867894-$).did. or (US-5870515-$ or US-5883995-$ or US-5920670-$ or US-5920669-$ or US-5984533-$ or US-6012852-$ or US-6095695-$ or US-6210045-$ or US-6250817-$ or US-6305849-$ or US-6318902-$ or US-6331079-$ or US-6379052-$ or US-6409392-$ or US-6422761-$ or US-6422760-$ or US-6450698-$ or US-6487343-$ or US-6491442-$ or US-6533465-$ or US-6554486-$ or US-6623172-$ or US-6688782-$ or US-6712521-$ or US-6764222-$ or US-6839583-$ or US-6848834-$).did. or (US-6944378-$ or US-7036996-$ or US-8388235-$ or US-9207454-$ or US-9316791-$ or US-9377591-$ or US-9389368-$ or US-9482820-$ or US-9606303-$ or US-9625657-$ or US-9664864-$ or US-9678283-$ or US-9678286-$ or US-9684134-$ or US-9696497-$ or US-9703062-$ or US-9709753-$ or US-9726830-$ or US-9733436-$ or US-9733434-$ or US-9798096-$ or US-9804342-$ or US-9804340-$ or US-9804337-$ or US-9829650-$ or US-9835808-$ or US-9846283-$).did. or (US-9851512-$ or US-9891390-$ or US-9904019-$ or US-9910229-$ or US-9927582-$ or US-9939589-$ or US-9946037-$).did. or (IT-7819792-$ or FR-2363124-$ or IT-7925110-$ or GB-2057158-$ or FR-2487528-$ or GB-2081468-$ or EP-0061243-$ or DK-208682-$ or GB-8306227-$ or IT-8323399-$ or JP-				

		S5856846-$ or EP-0125398-$ or FR-2535069-$ or WO-8600147-$ or EP-0249237-$ or EP-0262847-$ or EP-0262631-$ or DE-8626183-$ or WO-9015350-$ or EP-0408852-$ or GB-9103604-$ or GB-9106183-$ or CA-2030897-$ or DE-9107960-$ or GB-9206076-$ or CA-2057559-$).did. or (CA-2082276-$ or EP-0633485-$ or EP-0690319-$ or CA-2191600-$ or EP-0696748-$ or EP-0697608-$ or CN-1118443-$ or WO-9627811-$ or EP-0758099-$ or WO-9734176-$ or CA-2198522-$ or EP-0803750-$ or NL-1003147-$ or EP-0807837-$ or CA-2254335-$ or CA-2294930-$ or CA-2262351-$ or EP-0938003-$ or JP-2945144-$ or CA-2324565-$ or GB-9919699-$ or EP-0992819-$ or CA-2284331-$ or GB-0007281-$ or CA-2288249-$ or DE-19728960-$ or EP-1033595-$).did. or (EP-1033594-$ or EP-1039324-$ or EP-1039322-$ or EP-1041416-$ or EP-1041414-$ or JP-3106420-$ or CA-2321428-$ or EP-1091225-$ or WO-0137010-$ or EP-1107031-$ or KR-20010062142-$ or WO-0155762-$ or EP-1124147-$ or WO-0161397-$ or WO-0181965-$ or CA-2350290-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or KR-20020000530-$ or KR-20020001574-$ or CN-1331421-$ or EP-1172672-$ or EP-1172673-$ or KR-20020006481-$ or KR-20020006480-$ or DE-20118858-$).did. or (CA-2418331-$ or KR-20020050140-$ or WO-02056060-$ or WO-02061481-$ or DE-10114144-$ or NL-1018440-$ or WO-03016975-$ or WO-03093883-$ or CA-2484569-$ or EP-1394584-$ or AU-2003291687-$ or EP-1530068-$ or CA-2503690-$ or CN-1677147-$ or CN-1707299-$ or WO-2008006402-$ or EP-1887395-$ or CN-101122658-$ or WO-2008029850-$ or CA-2662854-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or CA-2689768-$ or EP-2206458-$ or WO-2010137426-$ or CA-2762411-$).did. or (EP-2302431-$ or WO-2011139938-$ or WO-2011152874-$ or EP-2444827-$ or WO-2012054174-$ or WO-2012054174-$ or WO-2012151175-$ or GB-201218194-$ or CN-102870023-$ or WO-2013115791-$ or WO-2013115789-$ or WO-2013126068-$ or CA-2912155-$ or WO-2014009463-$ or WO-2014011898-$ or EP-2700992-$ or JP-5433802-$ or WO-2014049469-$ or WO-2014113753-$ or CA-2836675-$ or WO-2014143748-$ or WO-2014165175-$ or WO-2014197701-$				

		or CN-104241938-$ or CA-2917189-$ or EP-2840425-$ or EP-2843452-$).did. or (WO-2015028433-$ or CA-2885821-$ or WO-2015068103-$ or CA-2932688-$ or GB-201507758-$ or WO-2015103783-$ or WO-2015116589-$ or CN-204595258-$ or WO-2015144883-$ or EP-2942653-$ or EP-2947485-$ or WO-2015190211-$ or WO-2016004347-$ or CN-105278047-$ or DE-202013012295-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or CA-2928026-$ or WO-2016043922-$ or JP-5905950-$ or WO-2016067668-$ or EP-3021145-$ or WO-2016082160-$ or WO-2016103821-$ or DE-202016103178-$ or EP-3054333-$).did. or (WO-2016161341-$ or WO-2017038704-$ or JP-6173629-$ or WO-2017180257-$ or CN-206584076-$ or EP-3258301-$ or WO-2018003776-$ or WO-2018004847-$).did. or (JP-54034251-$ or JP-55101904-$ or JP-56066811-$ or JP-56074211-$ or JP-59075218-$ or JP-04214510-$ or JP-04220604-$ or JP-05313040-$ or JP-08015541-$ or JP-09005575-$ or JP-09033756-$ or JP-10104469-$ or JP-11072659-$ or JP-2000089061-$ or JP-2000284146-$ or JP-2000292655-$ or JP-2000310724-$ or JP-2001013372-$ or JP-2001021764-$ or JP-2001242361-$ or JP-2009294343-$ or JP-2012053420-$ or JP-2012078513-$ or JP-2015022131-$).did. or (DE-2805949-$ or DE-2932986-$ or GB-2057158-$ or GB-2081468-$ or EP-61243-$ or GB-2098354-$ or DE-3208797-$ or EP-125398-$ or US-4496213-$ or WO-8600147-$ or EP-249237-$ or EP-262631-$ or US-4953929-$ or WO-9015350-$ or GB-2241794-$ or US-5064268-$ or WO-9117540-$ or EP-458608-$ or US-5101463-$ or EP-490698-$ or EP-505197-$ or EP-430107-$ or EP-660145-$ or EP-660144-$ or EP-663602-$ or EP-663601-$).did. or (WO-9600917-$ or EP-696748-$ or EP-697608-$ or WO-9627811-$ or EP-758099-$ or WO-9734176-$ or EP-803750-$ or US-5692080-$ or WO-9746900-$ or WO-9857208-$ or WO-9947958-$ or GB-2341455-$ or EP-1041416-$ or EP-1041414-$ or EP-1091225-$ or WO-0140839-$ or EP-1107031-$ or EP-1124147-$ or WO-0181965-$ or US-20010041030-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or EP-1172673-$ or EP-1172672-$ or DE-20118858-$ or WO-02056060-$).did. or (US-6422760-$ or WO-02061481-$ or US-20030031437-				

		$ or US-20030044125-$ or WO-03094297-$ or WO-03093883-$ or EP-1394584-$ or US-20040062498-$ or US-20040223699-$ or US-20040228589-$ or US-20050053342-$ or WO-2006022840-$ or US-20060153503-$ or US-20060165352-$ or US-20060193562-$ or EP-1752805-$ or US-20070058907-$ or US-20070077010-$ or US-20070098327-$ or US-20090041411-$ or US-20090060423-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or EP-2206458-$ or WO-2010137426-$ or EP-2302431-$).did. or (US-20110249942-$ or US-20110274437-$ or WO-2011152874-$ or KR-2012000895-$ or US-20120027355-$ or US-20120057824-$ or US-20120082416-$ or EP-2444827-$ or US-20120099822-$ or US-20120251051-$ or US-20120251054-$ or US-20120263419-$ or WO-2012151175-$ or US-20120308183-$ or CN-102870023-$ or TW-201309089-$ or US-20130051749-$ or WO-2013036843-$ or CN-103091793-$ or US-20130121645-$ or WO-2013115789-$ or WO-2013115791-$ or WO-2013122865-$ or WO-2013126068-$ or US-20130230283-$ or US-20130259429-$ or WO-2013155395-$).did. or (WO-2013177234-$ or WO-2014011898-$ or US-20140016901-$ or EP-2700992-$ or JP-5433802-$ or US-20140064688-$ or TW-474924-$ or WO-2014049469-$ or US-20140147081-$ or US-20140153879-$ or ES-1110405-$ or WO-2014113753-$ or EP-2759860-$ or US-20140219624-$ or WO-2014143748-$ or WO-2014165175-$ or US-20140321808-$ or US-20140363131-$ or WO-2014197701-$ or EP-2818903-$ or WO-2015009435-$ or US-20150023637-$ or US-20150049989-$ or WO-2015028433-$ or WO-2015068103-$ or WO-2015070382-$ or US-20150162982-$).did. or (US-20150177463-$ or WO-2015103783-$ or WO-2015116589-$ or US-20150219864-$ or US-20150226926-$ or US-20150226925-$ or US-20150241644-$ or CN-104950402-$ or WO-2015144883-$ or US-20150286012-$ or DE-102015106225-$ or US-20150331201-$ or EP-2947485-$ or WO-2015190211-$ or US-20150378110-$ or US-20160004016-$ or US-20160004018-$ or US-20160025937-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or WO-2016033577-$			

		or WO-2016033578-$ or WO-2016033579-$ or WO-2016033580-$ or WO-2016043922-$ or JP-5905950-$).did. or (US-20160124158-$ or US-20160131854-$ or EP-3021145-$ or US-20160161680-$ or US-20160178852-$ or US-20160178859-$ or US-9377591-$ or US-9389368-$ or EP-3054333-$ or US-20160259135-$ or CN-105978629-$ or US-20160282566-$ or WO-2016161341-$ or US-20160306125-$ or US-9482820-$ or US-20160341908-$ or US-20160341911-$ or US-20160349466-$ or US-20160377819-$ or US-20170031106-$ or US-20170059784-$ or WO-2017038704-$ or US-20170090127-$ or US-20170102504-$ or US-20170115457-$ or US-20170139150-$ or US-20170139156-$).did. or (US-20170153398-$ or US-9678283-$ or US-20170184790-$ or US-9709753-$ or US-20170205587-$ or JP-6173629-$ or US-20170219779-$ or US-9726830-$ or US-20170227720-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170293088-$ or US-20170307830-$ or US-9804340-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170371109-$ or US-20180003903-$ or US-20180011258-$ or US-20180052288-$ or US-20180081128-$ or US-20180106973-$ or US-20180120519-$ or US-20180128988-$).did.				
S501	136	(US-20020176671-$ or US-20040017980-$ or US-20040126118-$ or US-20040197054-$ or US-20070172177-$ or US-20070286554-$ or US-20100008635-$ or US-20100129034-$ or US-20100290745-$ or US-20110116749-$ or US-20110222830-$ or US-20110229096-$ or US-20110229095-$ or US-20110225792-$ or US-20110255831-$ or US-20110262078-$ or US-20110262077-$ or US-20120014648-$ or US-20120063724-$ or US-20120275749-$ or US-20130136402-$ or US-20130315538-$ or US-20140286610-$ or US-20150016781-$ or US-20150110448-$ or US-20160124170-$).did. or (US-20160202429-$ or US-20170045691-$ or US-20170285277-$ or US-20170299820-$ or US-20180120519-$ or US-20180143380-$ or US-20180231722-$ or US-20180239093-$ or US-20180267255-$ or US-20180292618-$ or US-20180292612-$ or US-20180364421-$ or US-20190107679-$ or US-20190107678-$	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2020/02/27 19:35

		or US-20190113691-$ or US-20190137701-$ or US-20190179085-$).did. or (US-5504825-$ or US-5613021-$ or US-5661826-$ or US-6045270-$ or US-6276840-$ or US-6293708-$ or US-6623170-$ or US-6796717-$ or US-6848840-$ or US-6866425-$ or US-6932514-$ or US-6944387-$ or US-6976793-$ or US-7094091-$ or US-7178994-$ or US-7182522-$ or US-7234874-$ or US-7241056-$ or US-7300216-$ or US-7536075-$ or US-7654748-$ or US-7891882-$ or US-7912336-$ or US-8052333-$ or US-8231282-$ or US-8235600-$).did. or (US-8262296-$ or US-8317407-$ or US-8346047-$ or US-8348519-$ or US-8348518-$ or US-8376634-$ or US-8406583-$ or US-8417074-$ or US-8494329-$ or US-8496384-$ or US-8529138-$ or US-8542972-$ or US-8550725-$ or US-8550724-$ or US-8579521-$ or US-8690593-$ or US-8714835-$ or US-8821038-$ or US-8821037-$ or US-8915653-$ or US-8958679-$ or US-9014527-$ or US-9031364-$ or US-9057848-$ or US-9146376-$ or US-9146360-$ or US-9417401-$).did. or (US-9513442-$ or US-9541711-$ or US-9557497-$ or US-9563025-$ or US-9606297-$ or US-9632255-$ or US-9645318-$ or US-9658409-$ or US-9684139-$ or US-9739949-$ or US-9753228-$ or US-9772464-$ or US-9857538-$ or US-9977199-$ or US-9989710-$ or US-10012801-$ or US-10054747-$ or US-10061090-$ or US-10067302-$ or US-10067300-$ or US-10088636-$ or US-10101539-$ or US-10139570-$ or US-10146014-$ or US-10156684-$ or US-10209473-$).did. or (WO-2010083369-$ or EP-2380054-$ or CN-102282495-$ or WO-2014152675-$ or WO-2015043158-$ or CN-104516073-$ or CN-102282495-$ or WO-2018125706-$).did. or (JP-57044113-$).did. or (US-20160327757-$ or US-20170299820-$ or WO-2018125706-$ or US-20190107679-$).did.			
S502	2084	S498 S499 S500 S501	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S503	53523	(ferrule connector) with insert$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2020/02/27 19:35

			IBM_TDB			
S504	65031	G02B6/38$.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S505	2450	S503 and S504	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S506	13830	adapter with (groove channel) with (top bottom upper lower)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S507	96	S505 and S506	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S508	56	S507 not S502	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S509	1110975	(groove channel) with upper with lower	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S510	664254	(groove channel) with top with bottom	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S511	424	S505 and (S509 S510)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S512	307	S511 not (S502 S508)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35

S513	15210	("ferrules" "connectors") with align$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S514	2116	S504 and S513	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S515	339	S514 and (S509 S510)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S516	161	S515 not (S502 S508 S512)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S517	10996	G02B6/3825,3826.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S518	428	S513 and S517	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2020/02/27 19:35
S519	200	S518 not (S502 S508 S512 S516)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S520	25335	("ferrules" "connectors") with align$4 with (groove channel slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S521	674	S520 and S517	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2020/02/27 19:35

			IBM_TDB			
S522	134	S521 not (S502 S508 S512 S516 S519)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S523	2942	S502 S508 S512 S516 S519 S522	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S524	2640	G02B6/3831.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S525	2284	S524 not S523	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:35
S526	3	"67299207".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/27 19:41
S527	38	("20010026661" | "20020167793" | "20040228582" | "20050095899" | "20060140543" | "20080032536" | "20080248691" | "20080311781" | "20110059642" | "20120190230" | "20120257865" | "4186997" | "4376565" | "4448467" | "4580868" | "4645295" | "4711511" | "4904199" | "4979792" | "4986769" | "5166995" | "5183408" | "5265181" | "5289554" | "6149313" | "6257917" | "6538882" | "6634796" | "6910911" | "6994478" | "7182523" | "7325975" | "7374347" | "7476118" | "7674046" | "8167638" | "8262403" | "8724955").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2020/02/27 19:48
S528	2733	ferrule with (mt$2 mpo)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S529	119	S525 and S528	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48

S530	1951553	(slot groove channel key$4) with (upper lower top bottom) with (center central$4 middle through)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S531	35	S525 and S530	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S532	34	S531 not (S529)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S533	8720774	(slot groove channel key$4) with (upper lower top bottom center central$4 middle through)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S534	381	S525 and S533	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S535	267	S534 not (S529 S532)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S536	420	S529 S532 S535	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S537	20045	(multiple plural$4) adj2 (key$4 key$way) with (surface top bottom side wall)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S538	14560	G02B6/3825-3831.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S539	29	S537 and S538	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/02/27 19:48

			DERWENT; IBM_TDB			
S540	16	S539 not (S527 S536)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:48
S541	466	S527 S536 S540	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 19:50
S542	12329	G02B6/3881,3885.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 20:44
S543	12781	G02B6/3879,3825.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 20:44
S544	2703	S543 and S542	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 20:45
S545	1680	S544 not (S523 S525 S541)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/27 20:45
S546	3	"61690020".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/28 17:09
S547	8	"48999326".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/28 17:10
S548	12	"22814831".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/28 17:12
S549	18	("20030108301" | "20030190130" | "20090274432" | "20100111484" | "20120251051" | "20130044978" | "20130051733" | "20140219609" | "20140233893" | "5600747" | "5675682" | "5870515" | "6146023" | "6485189" | "6547585" | "6705765" |	US-PGPUB; USPAT; USOCR	OR	ON	2020/02/28 17:15

		"6857900" | "8858089").PN.				
S550	1	("8801301").PN.	US-PGPUB; USPAT	OR	OFF	2020/02/28 17:15
S551	2	"49235150".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/28 17:16
S552	12329	G02B6/3881,3885.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 17:29
S553	12781	G02B6/3879,3825.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 17:29
S554	22407	S553 S552	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 17:29
S555	523	gang$4 with (adapter adaptor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 17:30
S556	71	S554 and S555	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 17:30
S557	143244	G02B6/38$3.cpc. G02B6/42$3.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 18:35
S558	87	S555 and S557	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/02/28 18:35
S559	16	S558 not S556	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/02/28 18:35

			DERWENT; IBM_TDB			
S560	0	(13/795888).APP.	USPAT; USOCR	OR	ON	2020/02/28 18:46
S561	5	"51388255".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2020/02/28 18:46

EAST Search History (Interference)

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3/2/2020 8:29:58 AM
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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/214,317	Filing Date 12/10/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/23/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/TERRANCE R LAWRENCE/
*** 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.

Electronic Acknowledgement Receipt

EFS ID:	38382578
Application Number:	16214317
International Application Number:	
Confirmation Number:	7700
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-053-03
Receipt Date:	23-JAN-2020
Filing Date:	10-DEC-2018
Time Stamp:	16:16:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	AmendUSCO05303JAN2020.pdf	78251 79a5b4a3c56bdab0a1cd728aa000dd662fb7d037	no	7

Warnings:

Information:	
Total Files Size (in bytes):	78251

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)
		) Group Art Unit: 2883
Serial No.:	16/214,317	)
		) Examiner:Rojas, Omar
Filing Date:	December 10, 2018	)
		)
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 October 23, 2019, Applicant amends the application as follows:

IN THE CLAIMS:

Claims 1-14. Canceled.

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

a main body having an opening defined by two opposing side walls, a top surface and a bottom surface, the opening extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body; 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 into the central portion from each of the first side and the second side.

16. (Previously Presented)The adapter according to claim 15, the opening having at least one groove therein and extending in a direction from the first side to the second side.

17. (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 and second sides to pass therethrough.

18. (Previously Presented) The adapter according to claim 17, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

19. (Previously Presented) The adapter according to claim 15, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

20. (Previously Presented) The adapter according to claim 15, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

21. (Previously Presented) The adapter according to claim 15, wherein the first and second sides are configured to receive a plurality of optical ferrules.

22. (Previously Presented) The adapter according to claim 15, 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.

23. (Previously Presented). The adapter according to claim 18, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

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

a main body having an opening extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body, the main body having at least one groove in the opening and extending in a direction from the first side to the second side; and

a plurality of grooves disposed in a top surface and bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side, each of the plurality of grooves in the top surface corresponding to a different fiber optic ferrule.

25. (Previously Presented) The adapter according to claim 24, 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.

26. (Previously Presented) The adapter according to claim 25, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

27. (Previously Presented) The adapter according to claim 24, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

28. (Previously Presented) The adapter according to claim 24, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

29. (Previously Presented) The adapter according to claim 24, wherein the first and second sides are configured to receive a plurality of optical ferrules.

30. (Previously Presented) The adapter according to claim 24, 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.

31. (Previously Presented). The adapter according to claim 26, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

REMARKS

In the above-referenced Office Action, the Examiner rejected claims 15, 16, 19, 21, 24, 27, and 29 under 35 U.S.C. § 103(a) as being unpatentable over Pronovost et al. (U.S. Patent No. 4,645,295); rejected claims 20 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Pronovost et al. as applied to claim 15 or 24 above, and further in view of Benner et al. (U.S. Patent Publication No. US 2002/0172469 A1); rejected claims 22 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Pronovost et al. as applied to claim 15 or 24 above, and further in view of Parkman et al. (U.S. Patent Publication No. US 2008/0131055 A1); and indicated that claims 17, 18, 23, 25, 26, and 31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Applicant appreciates the notification of allowable claims. Applicant has amended claims 15 and 24 to further define the invention and, for the reasons set forth below, asserts that all of the claims are allowable over the cited references.

The Examiner rejected claims 15, 16, 19, 21, 24, 27, and 29 under 35 U.S.C. § 103(a) as being unpatentable over Pronovost et al. This rejection must be withdrawn based on the amendments to the claims.

First, Applicant has amended claim 15 to clarify the locations of the grooves. Applicant has amended claim 15 to clarify that there are two different top and bottom surfaces in the adapter. The central portion has a different top and bottom surface than does the area by the first and second sides. The plurality of grooves are in the top and bottom surfaces in the central portion. Applicant believed that this was clear in the claim before the amendment, but has made that explicit in the amendment above. These grooves are elements 140,142. See Fig. 3. The at least one groove - element 18 - is in a different part of the adapter and on a different level from the plurality of grooves (140,142).

Turning to the disclosure in Pronovost et al., there is only one groove in the adapter and there are not multiple top and bottom surfaces. To arrive at the claimed adapter, there

would have to be a signifcant reconstruction of the device in Pronovost et al. Simply adding more grooves to the device therein will not arrive at the device in the amended claim 15. Applicant also asserts that assertion by the Examiner that one of skill in the art would add at least one more groove is incorrect. However, given the amendment made above, this issue need not be addressed at this time.

Furthermore, Pronovost et al. has only one level of surfaces which means it does not disclose that there are a pluarlity of grooves in a second top and second bottom surface as required by the claim. For at least this reason, claim 15 and its dependent claims are allowable.

Next, Applicant amended claim 24 to require that there are multiple fiber optic ferrrules that can be used with the claimed adapter. Claim 24 now requires that the plurality of grooves in the top surface correspond to a different fiber optic ferrule. Naturally, each of the plurality of grooves in the bottom surface also correspond to a different fiber optic ferrule since the grooves are paired together. This amendment requires that a different fiber optic ferrule is paired with each of the different grooves, whereas in Provonost et al. there is only one groove and one ferrule. If, as the Examiner alleged, there could be multiple grooves made in the Provonost et al. adapter, there is not sufficient room for multiple fiber optic ferrules. To make such a change would again require an improper reconstruction of the device therein. Thus, claim 24 and its dependent claims are allowable for at least this reason.

With regard to claims 20 and 28, the Examiner cited Benner et al. for the proposition of an elastomeric gasket. However, Benner et al. does not cure the defects of Pronovost et al. and these claims are allowable for the same reasons as claims 15 and 24 noted above.

Next the Examiner rejected claims 22 and 30 citing to Pronovost et al. and Parkman et al. Parkman et al. was cited for the different size of grooves. However, Parkman et al. does not cure the defects of Pronovost et al. noted above and these claims are allowable for at least the same reasons as claims 15 and 24.

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/

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Date: January 23, 2020

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/214,317	12/10/2018	Hiep V. Nguyen	USCO-053-03	7700

152017 7590 10/23/2019

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

EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2883	

NOTIFICATION DATE	DELIVERY MODE
10/23/2019	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

Office Action Summary	Application No. 16/214,317	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 --

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 09/27/2019.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 15-31 is/are pending in the application.

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 15-16,19-22,24 and 27-30 is/are rejected.

8) ☑ Claim(s) 17-18,23,25-26 and 31 is/are objected to.

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

2. With regards to the amendment filed on 09/27/2019, all the requested changes to the claims and specification have been entered. Applicant's constructive efforts to advance prosecution are appreciated. Claim(s) 15-31 are pending.

Response to Arguments

3. Applicant's arguments, see pages 2-5, filed 09/27/2019, with respect to the rejection(s) of claim(s) 15, 16, 19, 21, 22, 24, 27, 29, and 30 under 35 U.S.C. 102(a) or 35 U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Claim Rejections - 35 USC § 103

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

5. Claim(s) 15, 16, 19, 21, 24, 27, and 29 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Patent No. 4,645,295 to Pronovost et al. (hereinafter "Pronovost").

In re claim 15, Pronovost discloses, see FIGS. 1-3, an adapter/socket member (10) for aligning fiber optic ferrules/plugs (16) inserted from opposing sides comprising:

a main body (10) having an opening defined by two opposing side walls (54), a top surface and a bottom surface, the opening extending between a first side and a second side, the first side and the second side separated by a central portion comprising a portion of the main

body (10) between recesses (56) and inside of the main body (10); and

a groove/recesss (44) disposed in a top surface and a bottom surface of the central portion between recesses (56), each groove (44) extending into the central portion between recesses (56) from each of the first side and the second side. *See* columns 5-6 of Pronovost for further details.

Thus, Pronovost only differs from claim 15 in that he does not teaches a plurality of his grooves (44) disposed in his top surface and bottom surface. The grooves (44) of Pronovost are used to provide "accurate lateral, angular and longitudinal alignment for proper coupling of the fiber optic cables 28 of the two plugs 16". In order to provide additional accuracy of the lateral, angular, and/or longitudinal alignment of his plugs (16), Provonost would have been modified by providing a plurality of his grooves (44) disposed in his top surface and bottom surface, thereby obtaining the invention specified by claim 15. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 15 in view of Pronovost.

In re claim 16, the opening having at least one groove (62) therein and extending in a direction from the first side to the second side.

In re claim 19, as seen in FIGS 1 and 3, the opening in the central portion of the main body (10) is smaller than the opening in the first and second sides due to the presence of shim (70) which partially blocks the opening within the central portion.

In re claim 21, as seen in FIG. 3, the first and second sides are configured to receive a plurality

of optical ferrules (16).

In re claim 24, Pronovost discloses, see FIGS. 1-3, an adapter (10) for aligning fiber optic ferrules (16) inserted from opposing sides comprising;

a main body (10) having an opening extending between a first side and a second side, the first side and the second side separated by a central portion between recesses (56) inside the main body (10), the main body (10) having at least one groove (62) in the opening and extending in a direction from the first side to the second side; and

a groove/recesss (44) disposed in a top surface and a bottom surface of the central portion between recesses (56), each groove (44) extending into the central portion between recesses (56) from each of the first side and the second side. *See* columns 5-6 of Pronovost for further details.

Thus, Pronovost only differs from claim 24 in that he does not teaches a plurality of his grooves (44) disposed in his top surface and bottom surface. The grooves (44) of Pronovost are used to provide "accurate lateral, angular and longitudinal alignment for proper coupling of the fiber optic cables 28 of the two plugs 16". In order to provide additional accuracy of the lateral, angular, and/or longitudinal alignment of his plugs (16), Provonost would have been modified by providing a plurality of his grooves (44) disposed in his top surface and bottom surface, thereby obtaining the invention specified by claim 24. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 24 in view of Pronovost.

In re claim 27, as seen in FIGS 1 and 3, the opening in the central portion of the main body (10) is smaller than the opening in the first and second sides due to the presence of shim (70) which partially blocks the opening within the central portion.

In re claim 29, as seen in FIG. 3, the first and second sides are configured to receive a plurality of optical ferrules (16).

6. Claims 20 and 28 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 15 or 24 above, and further in view of Patent Publication No. US 2002/0172469 A1 to Benner et al. ("Benner"). Benner was cited in a prior Office action.

In re claims 20 and 28, Pronovost as applied to claim 15 or 24 only differs in that Pronovost does not teach an conductive elastomeric gasket encircling an external surface of his adapter (10) to provide EMI shielding to the adapter (10). Benner, on the other hand, teaches an conductive elastomeric gasket (62) encircling an external surface of an adapter (10) to provide EMI shielding to the adapter. *See* paragraphs [0025]-[0030] of Benner. In order to prevent EMI interference, an external surface of the adapter (10) of Pronovost or Grinderslev would have been modified to be encircled by the gasket (62) of Benner, thereby obtaining the invention specified by claims 20 and 28. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claims 20 and 28 in view of Pronovost combined with Benner.

7. Claims 22 and 30 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Pronovost as applied to claim 15 or 24 above, and further in view of Patent Publication No. US 2008/0131055 A1 Parkman et al. ("Parkman").

In re claims 22 or 30, Pronovost as applied to claim 15 or 24 only differs in that Pronovost does not teach claims the grooves (44) in the top surface of his central portion have a different width than that of the grooves (44) in the bottom surface of his central portion. Parkman, on the other hand, teaches using channels of different widths in order to provide a more secure and/or a more complex keying configuration. *See* paragraph [0039] of Parkman. In order to provide a more secure and/or more complex keying configuration, Pronovost as applied to claim 15 or 24 would have been further modified by providing the grooves (44) in the top surface of Pronovost with a different width than that of the grooves (44) in his bottom surface, thereby obtaining the invention specified by claim 22 or 30. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 22 or 30 in view of Pronovost combined with Parkman.

Allowable Subject Matter

8. Claims 17, 18, 23, 25, 26, and 31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 17, 18, 23, 25, 26, and 31, the primary reason for indicating allowable subject matter is the inclusion of 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.

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 on Monday-Friday, 10AM-6PM EST.

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

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

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

/Omar R Rojas/
Primary Examiner
Art Unit 2883

or
October 17, 2019

Notice of References Cited	Application/Control No. 16/214,317	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-4645295-A	02-1987	Pronovost; Paul F.	G02B6/3831	385/55
*	B	US-20080131055-A1	06-2008	Parkman; L. Edward	G02B6/3825	385/58
	C					
	D					
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	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	
	W	
	X	

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/214,317	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	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 15/855,750	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/22/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	10/17/2019	/ORR/
Checked refs. for 15/855,788	10/17/2019	/ORR/

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

/Omar R Rojas/ Primary Examiner, Art Unit 2883	

Senko Advanced Components v. US Conec Ltd
Senko EX1023-B
Page 62

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S413	81	(US-20040101250-$ or US-20140205247-$ or US-20170160486-$ or US-20180239091-$).did. or (US-3999837-$ or US-4252407-$ or US-6116790-$ or US-6371659-$ or US-6461053-$ or US-6585423-$ or US-7001079-$ or US-9039298-$ or US-9823424-$).did. or (DE-2558445-$ or FR-2296862-$ or BR-7508734-$ or ES-444034-$ or GB-1503979-$ or IT-7869677-$ or CA-1043604-$ or BE-871785-$ or DK-522978-$ or NL-7811579-$ or DE-2849975-$ or GB-2009440-$ or FR-2435053-$ or FR-2446496-$ or CA-1097111-$ or IT-1050771-$ or FR-2446496-$ or FR-2435053-$ or CH-628152-$ or GB-2009440-$ or DE-3112078-$ or FR-2296862-$ or DE-2558445-$ or DE-3112078-$ or IT-1109638-$ or DE-2849975-$).did. or (DK-151733-$ or DK-151733-$ or DK-151733-$ or DE-19626036-$ or WO-9800741-$ or AU-2975197-$ or WO-9928774-$ or EP-0985161-$ or EP-1034445-$ or EP-1092995-$ or EP-1092995-$ or EP-1034445-$ or EP-0985161-$ or ES-2202617-$ or EP-1092995-$ or DE-60010402-$ or DE-60010402-$ or JP-3984293-$ or EP-2138880-$ or JP-4514004-$ or WO-2016053853-$ or WO-2017065999-$ or WO-2017065999-$ or EP-3201668-$ or CN-108351473-$ or CN-208140982-$ or EP-3201668-$).did. or (JP-2001154062-$).did. or (DE-2558445-$ or BE-871785-$ or DE-19626036-$ or WO-9928774-$ or EP-1092995-$ or US-20140205247-$ or CN-104516061-$ or CN-104570229-$ or WO-2016053853-$ or WO-2017065999-$ or US-20180364421-$).did.	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/10/17 10:17
S414	1140	(US-20010010741-$ or US-20010016102-$ or US-20010033730-$ or US-20010038737-$ or US-20010043776-$ or US-20010048790-$ or US-20020006253-$ or US-20020012503-$ or US-20020012502-$ or US-20020012501-$ or US-20020012238-$ or US-20020025121-$ or US-20020025099-$ or US-20020028055-$ or US-20020031310-$ or US-20020031309-$ or US-	US-PGPUB; USPAT; JPO	OR	ON	2019/10/17 10:17

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		or US-20170160476-$).did. or (US-20170168244-$ or US-20170176252-$ or US-20170184800-$ or US-20170192182-$ or US-20170199338-$ or US-20170199336-$ or US-20170205591-$ or US-20170205588-$ or US-20170212310-$ or US-20170212309-$ or US-20170222347-$ or US-20170227727-$ or US-20170227718-$ or US-20170235077-$ or US-20170242198-$ or US-20170242196-$ or US-20170248762-$ or US-20170254962-$ or US-20170254961-$ or US-20170254960-$ or US-20170276887-$ or US-20170276886-$ or US-20170285272-$ or US-20170293091-$ or US-20170299821-$ or US-20170299818-$ or US-20170299817-$).did. or (US-20170307832-$ or US-20170307829-$ or US-20170315307-$ or US-20170315305-$ or US-20170315304-$ or US-20170315303-$ or US-20170331234-$ or US-20170336571-$ or US-20170343742-$ or US-20170343741-$ or US-20170341972-$ or US-20170351038-$ or US-20170351037-$ or US-20170359091-$ or US-20170363815-$ or US-20170363810-$ or US-20170363509-$ or US-20170371118-$ or US-20170371107-$ or US-20180003910-$ or US-20180011261-$ or US-20180017740-$ or US-20180024302-$ or US-20180024301-$ or US-20180024300-$ or US-20180024294-$ or US-20180031782-$).did. or (US-20180031775-$ or US-20180059338-$ or US-20180074277-$ or US-20180081127-$ or US-20180081122-$ or US-20180078781-$ or US-20180095232-$ or US-20180106975-$ or US-20180113268-$ or US-20180113259-$ or US-20180136410-$ or US-20180143384-$ or US-20180143381-$ or US-20180149813-$ or US-20180157002-$ or US-20180180819-$ or US-20180188460-$ or US-20180196204-$ or US-20180210155-$ or US-20180210153-$).did. or (US-3933409-$ or US-3999837-$ or US-4080044-$ or US-4087158-$ or US-4101198-$ or US-4140365-$ or US-4167304-$ or US-4168109-$ or US-4186996-$ or US-4201445-$ or US-4214812-$ or US-4218113-$ or US-4223976-$ or US-4252407-$ or US-4268115-$ or US-4268114-$ or US-4279469-$ or US-4291943-$ or US-4295707-$ or US-4327964-$ or US-4354731-$ or US-4368948-$ or US-4371233-$ or US-4387957-$ or US-4415232-$ or US-4422716-$).did. or (US-4444461-$ or				

		US-4445753-$ or US-4447121-$ or US-4461539-$ or US-4466009-$ or US-4484796-$ or US-4487474-$ or US-4497536-$ or US-4526438-$ or US-4548467-$ or US-4614402-$ or US-4615581-$ or US-4645296-$ or US-4648688-$ or US-4666241-$ or US-4674831-$ or US-4681398-$ or US-4688887-$ or US-4699460-$ or US-4714318-$ or US-4714317-$ or US-4714315-$ or US-4715674-$ or US-4717234-$ or US-4718744-$ or US-4722081-$ or US-4740052-$).did. or (US-4741590-$ or US-4758719-$ or US-4759600-$ or US-4759599-$ or US-4762389-$ or US-4767178-$ or US-4773725-$ or US-4781429-$ or US-4783137-$ or US-4786135-$ or US-4787700-$ or US-4789216-$ or US-4793683-$ or US-4795231-$ or US-4805980-$ or US-4807957-$ or US-4813760-$ or US-4824196-$ or US-4834486-$ or US-4842361-$ or US-4844570-$ or US-4846544-$ or US-4848870-$ or US-4850536-$ or US-4852963-$ or US-4877303-$ or US-4892380-$).did. or (US-4898446-$ or US-4960317-$ or US-4964688-$ or US-4976510-$ or US-4986762-$ or US-4986622-$ or US-4991929-$ or US-4993803-$ or US-4995688-$ or US-4998797-$ or US-5013124-$ or US-5015060-$ or US-5016970-$ or US-5018823-$ or US-5042891-$ or US-5048916-$ or US-5052774-$ or US-5058983-$ or US-5073042-$ or US-5077815-$ or US-5091991-$ or US-5091990-$ or US-5109453-$ or US-5115484-$ or US-5119455-$ or US-5124506-$ or US-5127073-$).did. or (US-5129024-$ or US-5133032-$ or US-5134677-$ or US-5134676-$ or US-5155795-$ or US-5159654-$ or US-5177808-$ or US-5179607-$ or US-5210815-$ or US-5214730-$ or US-5228104-$ or US-5233675-$ or US-5233674-$ or US-5239606-$ or US-5267342-$ or US-5274729-$ or US-5280552-$ or US-5282259-$ or US-5293581-$ or US-5297227-$ or US-5317663-$ or US-5323475-$ or US-5329541-$ or US-5333222-$ or US-5333221-$ or US-5359688-$ or US-5363460-$).did. or (US-5367594-$ or US-5366383-$ or US-5384885-$ or US-5386485-$ or US-5408557-$ or US-5418875-$ or US-5420951-$ or US-5444806-$ or US-5446817-$ or US-5450519-$ or US-5452391-$ or US-5485537-$ or US-5497444-$ or US-5506922-$ or US-5519799-$ or US-5521998-$ or US-5528711-$ or US-5530783-$ or US-5537501-$ or US-5542015-$ or US-5548674-$ or				

		US-5550943-$ or US-5563978-$ or US-5563971-$ or US-5570445-$ or US-5574813-$ or US-5579429-$).did. or (US-5581644-$ or US-5588086-$ or US-5592323-$ or US-5600746-$ or US-5603631-$ or US-5607323-$ or US-5619610-$ or US-5633969-$ or US-5642450-$ or US-5647043-$ or US-5645449-$ or US-5661833-$ or US-5666449-$ or US-5664955-$ or US-5668904-$ or US-5671310-$ or US-5673346-$ or US-5680494-$ or US-5682449-$ or US-5687268-$ or US-5694507-$ or US-5694506-$ or US-5701380-$ or US-5721799-$ or US-5727102-$ or US-5732174-$ or US-5734770-$).did. or (US-5737464-$ or US-5751874-$ or US-5761359-$ or US-5764043-$ or US-5774611-$ or US-5774612-$ or US-5778122-$ or US-5781680-$ or US-5796896-$ or US-5799122-$ or US-5809191-$ or US-5815618-$ or US-5818993-$ or US-5825955-$ or US-5832158-$ or US-5838856-$ or US-5838855-$ or US-5845036-$ or US-5862282-$ or US-5867621-$ or US-5881191-$ or US-5887100-$ or US-5887098-$ or US-5892870-$ or US-5896477-$ or US-5909526-$ or US-5909298-$).did. or (US-5915058-$ or US-5923805-$ or US-5930426-$ or US-5930425-$ or US-5937121-$ or US-5940561-$ or US-5940559-$ or US-5949946-$ or US-5953474-$ or US-5953473-$ or US-5956444-$ or US-5960137-$ or US-5969294-$ or US-5971626-$ or US-5980117-$ or US-5987203-$ or US-5993071-$ or US-6004043-$ or US-6022149-$ or US-6027252-$ or US-6041155-$ or US-6048103-$ or US-6048102-$ or US-6053639-$ or US-6059461-$ or US-6064791-$ or US-6076973-$).did. or (US-6076975-$ or US-6081647-$ or US-6079881-$ or US-6088502-$ or US-6095694-$ or US-6104856-$ or US-6102581-$ or US-6108482-$ or US-6116790-$ or US-6116789-$ or US-6116101-$ or US-6132105-$ or US-6139346-$ or US-6142676-$ or US-6149315-$ or US-6154597-$ or US-6164835-$ or US-6164834-$ or US-6173099-$ or US-6179480-$ or US-6179475-$ or US-6188827-$ or US-6188825-$ or US-6186670-$ or US-6190616-$ or US-6195477-$ or US-6193420-$).did. or (US-6196729-$ or US-6200040-$ or US-6206577-$ or US-6217226-$ or US-6220763-$ or US-6220762-$ or US-6224269-$ or US-6227719-$ or US-6227718-$ or US-6240229-$ or US-6238249-$ or US-6243526-$ or US-6247851-$ or US-6247849-$ or							

		US-6256446-$ or US-6259839-$ or US-6264373-$ or US-6264372-$ or US-6267513-$ or US-6273618-$ or US-6290527-$ or US-6301004-$ or US-6302592-$ or US-6309111-$ or US-6318904-$ or US-6318903-$ or US-6334715-$).did. or (US-6349164-$ or US-6347889-$ or US-6347888-$ or US-6354746-$ or US-6357932-$ or US-6361218-$ or US-6364536-$ or US-6367986-$ or US-6367984-$ or US-6371659-$ or US-6377840-$ or US-6375363-$ or US-6384896-$ or US-6382843-$ or US-6382839-$ or US-6389212-$ or US-6402393-$ or US-6402390-$ or US-6402388-$ or US-6409391-$ or US-6412987-$ or US-6419810-$ or US-6422759-$ or US-6425692-$ or US-6425694-$ or US-6431762-$ or US-6437894-$).did. or (US-6435946-$ or US-6445867-$ or US-6456768-$ or US-6457876-$ or US-6461055-$ or US-6461054-$ or US-6461053-$ or US-6466724-$ or US-6464406-$ or US-6467971-$ or US-6467970-$ or US-6471417-$ or US-6471412-$ or US-6474876-$ or US-6478472-$ or US-6481900-$ or US-6481899-$ or US-6485192-$ or US-6497518-$ or US-6497516-$ or US-6501900-$ or US-6508593-$ or US-6526210-$ or US-6524015-$ or US-6527450-$ or US-6533469-$ or US-6543941-$).did. or (US-6554482-$ or US-6558044-$ or US-6561699-$ or US-6572276-$ or US-6572273-$ or US-6582132-$ or US-6595696-$ or US-6601995-$ or US-6612750-$ or US-6619859-$ or US-6619856-$ or US-6632023-$ or US-6634794-$ or US-6644866-$ or US-6667803-$ or US-6695485-$ or US-6702477-$ or US-6702475-$ or US-6786647-$ or US-6789953-$ or US-6793399-$ or US-6840680-$ or US-6856748-$ or US-6895146-$ or US-7232261-$ or US-7435009-$ or US-7530845-$).did. or (US-7585118-$ or US-7588373-$ or US-7706657-$ or US-7738757-$ or US-7972066-$ or US-8070366-$ or US-8206040-$ or US-8517614-$ or US-8588571-$ or US-8953922-$ or US-9229177-$ or US-9229170-$ or US-9291781-$ or US-9316794-$ or US-9323007-$ or US-9448369-$ or US-9453972-$ or US-9482825-$ or US-9551831-$ or US-9625655-$ or US-9632267-$ or US-9638871-$ or US-9638868-$ or US-9645335-$ or US-9658407-$ or US-9671570-$ or US-9671568-$).did. or (US-9678282-$ or US-9696477-$ or US-9722367-$ or US-9720184-$ or US-9726829-$ or US-9735523-$ or US-9733123-$ or				

		US-9739955-$ or US-9739952-$ or US-9739951-$ or US-9746625-$ or US-9746368-$ or US-9759874-$ or US-9759869-$ or US-9772457-$ or US-9772456-$ or US-9772453-$ or US-9784928-$ or US-9798090-$ or US-9797806-$ or US-9810860-$ or US-9810858-$ or US-9810856-$ or US-9817195-$ or US-9823428-$ or US-9829643-$ or US-9827438-$).did. or (US-9835807-$ or US-9841566-$ or US-9857545-$ or US-9857537-$ or US-9864151-$ or US-9869824-$ or US-9876309-$ or US-9874702-$ or US-9880365-$ or US-9880357-$ or US-9885841-$ or US-9893813-$ or US-9891392-$ or US-9891387-$ or US-9891385-$ or US-9897767-$ or US-9904021-$ or US-9904020-$ or US-9910228-$ or US-9910226-$ or US-9915793-$ or US-9933586-$ or US-9933583-$ or US-9933582-$ or US-9939600-$ or US-9939590-$ or US-9948017-$).did. or (US-9946036-$ or US-10007069-$ or US-10018787-$).did. or (JP-2016095432-$ or JP-2016095410-$ or JP-2016122100-$ or JP-2016177309-$ or JP-2016188927-$ or JP-2017053937-$ or JP-2017090798-$ or JP-2017111444-$ or JP-2017134118-$ or JP-2017138535-$ or JP-2017151338-$ or JP-2017219768-$).did.				
S415	733	(US-20010041030-$ or US-20020025125-$ or US-20020106162-$ or US-20020114589-$ or US-20020159710-$ or US-20030031452-$ or US-20030044127-$ or US-20030044125-$ or US-20030180004-$ or US-20030223703-$ or US-20040008494-$ or US-20040017983-$ or US-20040017981-$ or US-20040038558-$ or US-20040052472-$ or US-20040062498-$ or US-20040105628-$ or US-20040131317-$ or US-20040223699-$ or US-20040228589-$ or US-20050036744-$ or US-20050053342-$ or US-20050111795-$ or US-20050123246-$ or US-20050135755-$ or US-20050135752-$).did. or (US-20050271328-$ or US-20060045430-$ or US-20060051028-$ or US-20060093282-$ or US-20060153504-$ or US-20060193562-$ or US-20060280409-$ or US-20060285807-$ or US-20070058907-$ or US-20070098327-$ or US-20070160327-$ or US-20080069501-$ or US-20080112672-$ or US-20080124031-$ or US-20080131055-$ or US-20080253719-$ or US-20090003772-$ or US-20090290839-$ or US-20090305542-$ or US-20100322561-$	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/10/17 10:17

		or US-20110038590-$ or US-20110075971-$ or US-20110091159-$ or US-20110222819-$ or US-20110249942-$ or US-20120027355-$ or US-20120057824-$).did. or (US-20120076459-$ or US-20120082416-$ or US-20120099822-$ or US-20120141070-$ or US-20120251054-$ or US-20120251051-$ or US-20120263423-$ or US-20120263419-$ or US-20120308183-$ or US-20130051749-$ or US-20130064508-$ or US-20130077914-$ or US-20130121645-$ or US-20130129280-$ or US-20130183001-$ or US-20130216189-$ or US-20130230283-$ or US-20130259429-$ or US-20130272671-$ or US-20130308908-$ or US-20140056560-$ or US-20140064665-$ or US-20140064688-$ or US-20140072265-$ or US-20140086545-$ or US-20140147081-$ or US-20140205241-$).did. or (US-20140219614-$ or US-20140219624-$ or US-20140314385-$ or US-20140341510-$ or US-20150003785-$ or US-20150023637-$ or US-20150049989-$ or US-20150071591-$ or US-20150177463-$ or US-20150226926-$ or US-20150241644-$ or US-20150301286-$ or US-20150331201-$ or US-20150338583-$ or US-20150370017-$ or US-20150378112-$ or US-20160004018-$ or US-20160004016-$ or US-20160025937-$ or US-20160077287-$ or US-20160077284-$ or US-20160109661-$ or US-20160131854-$ or US-20160131849-$ or US-20160161680-$ or US-20160178859-$ or US-20160259135-$).did. or (US-20160282566-$ or US-20160282562-$ or US-20160320571-$ or US-20160349464-$ or US-20170059784-$ or US-20170090128-$ or US-20170090127-$ or US-20170102506-$ or US-20170102504-$ or US-20170108653-$ or US-20170115457-$ or US-20170139150-$ or US-20170153398-$ or US-20170184798-$ or US-20170184790-$ or US-20170205587-$ or US-20170219779-$ or US-20170227720-$ or US-20170235060-$ or US-20170242200-$ or US-20170242199-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170261698-$ or US-20170269309-$ or US-20170276883-$).did. or (US-20170276881-$ or US-20170293088-$ or US-20170293087-$ or US-20170307831-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170357060-$				

		or US-20170357059-$ or US-20170363827-$ or US-20180003903-$ or US-20180011258-$ or US-20180011254-$ or US-20180031774-$ or US-20180052288-$ or US-20180077472-$ or US-20180081128-$ or US-20180081125-$ or US-20180088288-$ or US-20180088287-$ or US-20180088286-$ or US-20180088283-$ or US-20180106973-$ or US-20180156988-$ or US-20180156985-$ or US-20180210154-$).did. or (US-4240695-$ or US-4320938-$ or US-4330172-$ or US-4477146-$ or US-4687291-$ or US-4737009-$ or US-4854664-$ or US-4856866-$ or US-4886335-$ or US-4915472-$ or US-4953929-$ or US-4955976-$ or US-5064268-$ or US-5076656-$ or US-5082346-$ or US-5082344-$ or US-5101463-$ or US-5134673-$ or US-5157749-$ or US-5166995-$ or US-5199093-$ or US-5259052-$ or US-5555332-$ or US-5666456-$ or US-5692080-$ or US-5867894-$).did. or (US-5870515-$ or US-5883995-$ or US-5920670-$ or US-5920669-$ or US-5984533-$ or US-6012852-$ or US-6095695-$ or US-6210045-$ or US-6250817-$ or US-6305849-$ or US-6318902-$ or US-6331079-$ or US-6379052-$ or US-6409392-$ or US-6422761-$ or US-6422760-$ or US-6450698-$ or US-6487343-$ or US-6491442-$ or US-6533465-$ or US-6554486-$ or US-6623172-$ or US-6688782-$ or US-6712521-$ or US-6764222-$ or US-6839583-$ or US-6848834-$).did. or (US-6944378-$ or US-7036996-$ or US-8388235-$ or US-9207454-$ or US-9316791-$ or US-9377591-$ or US-9389368-$ or US-9482820-$ or US-9606303-$ or US-9625657-$ or US-9664864-$ or US-9678283-$ or US-9678286-$ or US-9684134-$ or US-9696497-$ or US-9703062-$ or US-9709753-$ or US-9726830-$ or US-9733436-$ or US-9733434-$ or US-9798096-$ or US-9804342-$ or US-9804340-$ or US-9804337-$ or US-9829650-$ or US-9835808-$ or US-9846283-$).did. or (US-9851512-$ or US-9891390-$ or US-9904019-$ or US-9910229-$ or US-9927582-$ or US-9939589-$ or US-9946037-$).did. or (IT-7819792-$ or FR-2363124-$ or IT-7925110-$ or GB-2057158-$ or FR-2487528-$ or GB-2081468-$ or EP-0061243-$ or DK-208682-$ or GB-8306227-$ or IT-8323399-$ or JP-S5856846-$ or EP-0125398-$ or FR-2535069-$ or WO-8600147-$ or EP-0249237-$ or EP-0262847-$ or EP-				

		0262631-$ or DE-8626183-$ or WO-9015350-$ or EP-0408852-$ or GB-9103604-$ or GB-9106183-$ or CA-2030897-$ or DE-9107960-$ or GB-9206076-$ or CA-2057559-$).did. or (CA-2082276-$ or EP-0633485-$ or EP-0690319-$ or CA-2191600-$ or EP-0696748-$ or EP-0697608-$ or CN-1118443-$ or WO-9627811-$ or EP-0758099-$ or WO-9734176-$ or CA-2198522-$ or EP-0803750-$ or NL-1003147-$ or EP-0807837-$ or CA-2254335-$ or CA-2294930-$ or CA-2262351-$ or EP-0938003-$ or JP-2945144-$ or CA-2324565-$ or GB-9919699-$ or EP-0992819-$ or CA-2284331-$ or GB-0007281-$ or CA-2288249-$ or DE-19728960-$ or EP-1033595-$).did. or (EP-1033594-$ or EP-1039324-$ or EP-1039322-$ or EP-1041416-$ or EP-1041414-$ or JP-3106420-$ or CA-2321428-$ or EP-1091225-$ or WO-0137010-$ or EP-1107031-$ or KR-20010062142-$ or WO-0155762-$ or EP-1124147-$ or WO-0161397-$ or WO-0181965-$ or CA-2350290-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or KR-20020000530-$ or KR-20020001574-$ or CN-1331421-$ or EP-1172672-$ or EP-1172673-$ or KR-20020006481-$ or KR-20020006480-$ or DE-20118858-$).did. or (CA-2418331-$ or KR-20020050140-$ or WO-02056060-$ or WO-02061481-$ or DE-10114144-$ or NL-1018440-$ or WO-03016975-$ or WO-03093883-$ or CA-2484569-$ or EP-1394584-$ or AU-2003291687-$ or EP-1530068-$ or CA-2503690-$ or CN-1677147-$ or CN-1707299-$ or WO-2008006402-$ or EP-1887395-$ or CN-101122658-$ or WO-2008029850-$ or CA-2662854-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or CA-2689768-$ or EP-2206458-$ or WO-2010137426-$ or CA-2762411-$).did. or (EP-2302431-$ or WO-2011139938-$ or WO-2011152874-$ or EP-2444827-$ or WO-2012054174-$ or WO-2012054174-$ or WO-2012151175-$ or GB-201218194-$ or CN-102870023-$ or WO-2013115791-$ or WO-2013115789-$ or WO-2013126068-$ or CA-2912155-$ or WO-2014009463-$ or WO-2014011898-$ or EP-2700992-$ or JP-5433802-$ or WO-2014049469-$ or WO-2014113753-$ or CA-2836675-$ or WO-2014143748-$ or WO-2014165175-$ or WO-2014197701-$ or CN-104241938-$ or CA-2917189-$ or EP-2840425-$ or EP-2843452-$).did. or (WO-2015028433-$ or CA-				

		2885821-$ or WO-2015068103-$ or CA-2932688-$ or GB-201507758-$ or WO-2015103783-$ or WO-2015116589-$ or CN-204595258-$ or WO-2015144883-$ or EP-2942653-$ or EP-2947485-$ or WO-2015190211-$ or WO-2016004347-$ or CN-105278047-$ or DE-202013012295-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or CA-2928026-$ or WO-2016043922-$ or JP-5905950-$ or WO-2016067668-$ or EP-3021145-$ or WO-2016082160-$ or WO-2016103821-$ or DE-202016103178-$ or EP-3054333-$).did. or (WO-2016161341-$ or WO-2017038704-$ or JP-6173629-$ or WO-2017180257-$ or CN-206584076-$ or EP-3258301-$ or WO-2018003776-$ or WO-2018004847-$).did. or (JP-54034251-$ or JP-55101904-$ or JP-56066811-$ or JP-56074211-$ or JP-59075218-$ or JP-04214510-$ or JP-04220604-$ or JP-05313040-$ or JP-08015541-$ or JP-09005575-$ or JP-09033756-$ or JP-10104469-$ or JP-11072659-$ or JP-2000089061-$ or JP-2000284146-$ or JP-2000292655-$ or JP-2000310724-$ or JP-2001013372-$ or JP-2001021764-$ or JP-2001242361-$ or JP-2009294343-$ or JP-2012053420-$ or JP-2012078513-$ or JP-2015022131-$).did. or (DE-2805949-$ or DE-2932986-$ or GB-2057158-$ or GB-2081468-$ or EP-61243-$ or GB-2098354-$ or DE-3208797-$ or EP-125398-$ or US-4496213-$ or WO-8600147-$ or EP-249237-$ or EP-262631-$ or US-4953929-$ or WO-9015350-$ or GB-2241794-$ or US-5064268-$ or WO-9117540-$ or EP-458608-$ or US-5101463-$ or EP-490698-$ or EP-505197-$ or EP-430107-$ or EP-660145-$ or EP-660144-$ or EP-663602-$ or EP-663601-$).did. or (WO-9600917-$ or EP-696748-$ or EP-697608-$ or WO-9627811-$ or EP-758099-$ or WO-9734176-$ or EP-803750-$ or US-5692080-$ or WO-9746900-$ or WO-9857208-$ or WO-9947958-$ or GB-2341455-$ or EP-1041416-$ or EP-1041414-$ or EP-1091225-$ or WO-0140839-$ or EP-1107031-$ or EP-1124147-$ or WO-0181965-$ or US-20010041030-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or EP-1172673-$ or EP-1172672-$ or DE-20118858-$ or WO-02056060-$).did. or (US-6422760-$ or WO-02061481-$ or US-20030031437-$ or US-20030044125-$ or WO-03094297-$ or WO-03093883-$ or EP-1394584-$ or US-20040062498-$ or				

		US-20040223699-$ or US-20040228589-$ or US-20050053342-$ or WO-2006022840-$ or US-20060153503-$ or US-20060165352-$ or US-20060193562-$ or EP-1752805-$ or US-20070058907-$ or US-20070077010-$ or US-20070098327-$ or US-20090041411-$ or US-20090060423-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or EP-2206458-$ or WO-2010137426-$ or EP-2302431-$).did. or (US-20110249942-$ or US-20110274437-$ or WO-2011152874-$ or KR-2012000895-$ or US-20120027355-$ or US-20120057824-$ or US-20120082416-$ or EP-2444827-$ or US-20120099822-$ or US-20120251051-$ or US-20120251054-$ or US-20120263419-$ or WO-2012151175-$ or US-20120308183-$ or CN-102870023-$ or TW-201309089-$ or US-20130051749-$ or WO-2013036843-$ or CN-103091793-$ or US-20130121645-$ or WO-2013115789-$ or WO-2013115791-$ or WO-2013122865-$ or WO-2013126068-$ or US-20130230283-$ or US-20130259429-$ or WO-2013155395-$).did. or (WO-2013177234-$ or WO-2014011898-$ or US-20140016901-$ or EP-2700992-$ or JP-5433802-$ or US-20140064688-$ or TW-474924-$ or WO-2014049469-$ or US-20140147081-$ or US-20140153879-$ or ES-1110405-$ or WO-2014113753-$ or EP-2759860-$ or US-20140219624-$ or WO-2014143748-$ or WO-2014165175-$ or US-20140321808-$ or US-20140363131-$ or WO-2014197701-$ or EP-2818903-$ or WO-2015009435-$ or US-20150023637-$ or US-20150049989-$ or WO-2015028433-$ or WO-2015068103-$ or WO-2015070382-$ or US-20150162982-$).did. or (US-20150177463-$ or WO-2015103783-$ or WO-2015116589-$ or US-20150219864-$ or US-20150226926-$ or US-20150226925-$ or US-20150241644-$ or CN-104950402-$ or WO-2015144883-$ or US-20150286012-$ or DE-102015106225-$ or US-20150331201-$ or EP-2947485-$ or WO-2015190211-$ or US-20150378110-$ or US-20160004016-$ or US-20160004018-$ or US-20160025937-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or WO-2016033577-$ or WO-2016033578-$ or WO-2016033579-$ or WO-2016033580-$ or WO-2016043922-$ or JP-5905950-				

		$).did. or (US-20160124158-$ or US-20160131854-$ or EP-3021145-$ or US-20160161680-$ or US-20160178852-$ or US-20160178859-$ or US-9377591-$ or US-9389368-$ or EP-3054333-$ or US-20160259135-$ or CN-105978629-$ or US-20160282566-$ or WO-2016161341-$ or US-20160306125-$ or US-9482820-$ or US-20160341908-$ or US-20160341911-$ or US-20160349466-$ or US-20160377819-$ or US-20170031106-$ or US-20170059784-$ or WO-2017038704-$ or US-20170090127-$ or US-20170102504-$ or US-20170115457-$ or US-20170139150-$ or US-20170139156-$).did. or (US-20170153398-$ or US-9678283-$ or US-20170184790-$ or US-9709753-$ or US-20170205587-$ or JP-6173629-$ or US-20170219779-$ or US-9726830-$ or US-20170227720-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170293088-$ or US-20170307830-$ or US-9804340-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170371109-$ or US-20180003903-$ or US-20180011258-$ or US-20180052288-$ or US-20180081128-$ or US-20180106973-$ or US-20180120519-$ or US-20180128988-$).did.				
S416	136	(US-20020176671-$ or US-20040017980-$ or US-20040126118-$ or US-20040197054-$ or US-20070172177-$ or US-20070286554-$ or US-20100008635-$ or US-20100129034-$ or US-20100290745-$ or US-20110116749-$ or US-20110222830-$ or US-20110229096-$ or US-20110229095-$ or US-20110225792-$ or US-20110255831-$ or US-20110262078-$ or US-20110262077-$ or US-20120014648-$ or US-20120063724-$ or US-20120275749-$ or US-20130136402-$ or US-20130315538-$ or US-20140286610-$ or US-20150016781-$ or US-20150110448-$ or US-20160124170-$).did. or (US-20160202429-$ or US-20170045691-$ or US-20170285277-$ or US-20170299820-$ or US-20180120519-$ or US-20180143380-$ or US-20180231722-$ or US-20180239093-$ or US-20180267255-$ or US-20180292618-$ or US-20180292612-$ or US-20180364421-$ or US-20190107679-$ or US-20190107678-$ or US-20190113691-$ or US-20190137701-$ or US-20190179085-$).did. or (US-5504825-$ or US-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/10/17 10:17

		5613021-$ or US-5661826-$ or US-6045270-$ or US-6276840-$ or US-6293708-$ or US-6623170-$ or US-6796717-$ or US-6848840-$ or US-6866425-$ or US-6932514-$ or US-6944387-$ or US-6976793-$ or US-7094091-$ or US-7178994-$ or US-7182522-$ or US-7234874-$ or US-7241056-$ or US-7300216-$ or US-7536075-$ or US-7654748-$ or US-7891882-$ or US-7912336-$ or US-8052333-$ or US-8231282-$ or US-8235600-$).did. or (US-8262296-$ or US-8317407-$ or US-8346047-$ or US-8348519-$ or US-8348518-$ or US-8376634-$ or US-8406583-$ or US-8417074-$ or US-8494329-$ or US-8496384-$ or US-8529138-$ or US-8542972-$ or US-8550725-$ or US-8550724-$ or US-8579521-$ or US-8690593-$ or US-8714835-$ or US-8821038-$ or US-8821037-$ or US-8915653-$ or US-8958679-$ or US-9014527-$ or US-9031364-$ or US-9057848-$ or US-9146376-$ or US-9146360-$ or US-9417401-$).did. or (US-9513442-$ or US-9541711-$ or US-9557497-$ or US-9563025-$ or US-9606297-$ or US-9632255-$ or US-9645318-$ or US-9658409-$ or US-9684139-$ or US-9739949-$ or US-9753228-$ or US-9772464-$ or US-9857538-$ or US-9977199-$ or US-9989710-$ or US-10012801-$ or US-10054747-$ or US-10061090-$ or US-10067302-$ or US-10067300-$ or US-10088636-$ or US-10101539-$ or US-10139570-$ or US-10146014-$ or US-10156684-$ or US-10209473-$).did. or (WO-2010083369-$ or EP-2380054-$ or CN-102282495-$ or WO-2014152675-$ or WO-2015043158-$ or CN-104516073-$ or CN-102282495-$ or WO-2018125706-$).did. or (JP-57044113-$).did. or (US-20160327757-$ or US-20170299820-$ or WO-2018125706-$ or US-20190107679-$).did.				
S417	2083	S413 S414 S415 S416	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S418	51256	(ferrule connector) with insert$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S419	60014	G02B6/38$.cpc.	US-PGPUB;	OR	OFF	2019/10/17

			USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:17
S420	2321	S418 and S419	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S421	13178	adapter with (groove channel) with (top bottom upper lower)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S422	87	S420 and S421	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S423	47	S422 not S417	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S424	1045337	(groove channel) with upper with lower	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S425	606454	(groove channel) with top with bottom	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S426	409	S420 and (S424 S425)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S427	300	S426 not (S417 S423)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S428	14761	("ferrules" "connectors") with align$4 with (groove channel)	US-PGPUB; USPAT;	OR	ON	2019/10/17 10:17

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S429	1989	S419 and S428	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S430	323	S429 and (S424 S425)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S431	154	S430 not (S417 S423 S427)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S432	9945	G02B6/3825,3826.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S433	402	S428 and S432	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S434	183	S433 not (S417 S423 S427 S431)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S435	24701	("ferrules" "connectors") with align$4 with (groove channel slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S436	636	S435 and S432	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 10:17
S437	124	S436 not (S417 S423 S427 S431	US-PGPUB;	OR	ON	2019/10/17

		S434)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:17
S438	2891	S417 S423 S427 S431 S434 S437	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:17
S439	2405	G02B6/3831.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:18
S440	2076	S439 not S438	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:18
S441	2630	ferrule with (mt$2 mpo)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:19
S442	114	S440 and S441	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:19
S443	1817868	(slot groove channel key$4) with (upper lower top bottom) with (center central$4 middle through)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:43
S444	30	S440 and S443	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:43
S445	29	S444 not (S442)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 10:44
S446	8305280	(slot groove channel key$4) with (upper lower top bottom center	US-PGPUB; USPAT;	OR	ON	2019/10/17 11:12

		central$4 middle through)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S447	364	S440 and S446	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 11:12
S448	258	S447 not (S442 S445)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 11:13
S449	1	("4645295").PN.	US-PGPUB; USPAT	OR	OFF	2019/10/17 12:57
S450	66	("4645295").URPN.	USPAT	OR	ON	2019/10/17 12:57
S451	38	("20010026661" | "20020167793" | "20040228582" | "20050095899" | "20060140543" | "20080032536" | "20080248691" | "20080311781" | "20110059642" | "20120190230" | "20120257865" | "4186997" | "4376565" | "4448467" | "4580868" | "4645295" | "4711511" | "4904199" | "4979792" | "4986769" | "5166995" | "5183408" | "5265181" | "5289554" | "6149313" | "6257917" | "6538882" | "6634796" | "6910911" | "6994478" | "7182523" | "7325975" | "7374347" | "7476118" | "7674046" | "8167638" | "8262403" | "8724955").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/17 13:12
S452	81	(US-20040101250-$ or US-20140205247-$ or US-20170160486-$ or US-20180239091-$).did. or (US-3999837-$ or US-4252407-$ or US-6116790-$ or US-6371659-$ or US-6461053-$ or US-6585423-$ or US-7001079-$ or US-9039298-$ or US-9823424-$).did. or (DE-2558445-$ or FR-2296862-$ or BR-7508734-$ or ES-444034-$ or GB-1503979-$ or IT-7869677-$ or CA-1043604-$ or BE-871785-$ or DK-522978-$ or NL-7811579-$ or DE-2849975-$ or GB-2009440-$ or FR-2435053-$ or FR-2446496-$ or CA-1097111-$ or IT-1050771-$ or FR-2446496-$ or FR-2435053-$ or CH-628152-$ or GB-2009440-$ or DE-3112078-$ or FR-2296862-$ or DE-2558445-$ or DE-3112078-$ or IT-1109638-$ or DE-2849975-$).did. or (DK-151733-$ or DK-151733-$ or DK-151733-$ or DE-19626036-$ or WO-9800741-$ or AU-2975197-$ or WO-9928774-$ or EP-0985161-$ or EP-1034445-$ or EP-1092995-$ or EP-1092995-$ or EP-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/10/17 13:13

		1034445-$ or EP-0985161-$ or ES-2202617-$ or EP-1092995-$ or DE-60010402-$ or DE-60010402-$ or JP-3984293-$ or EP-2138880-$ or JP-4514004-$ or WO-2016053853-$ or WO-2017065999-$ or WO-2017065999-$ or EP-3201668-$ or CN-108351473-$ or CN-208140982-$ or EP-3201668-$).did. or (JP-2001154062-$).did. or (DE-2558445-$ or BE-871785-$ or DE-19626036-$ or WO-9928774-$ or EP-1092995-$ or US-20140205247-$ or CN-104516061-$ or CN-104570229-$ or WO-2016053853-$ or WO-2017065999-$ or US-20180364421-$).did.				
S453	1140	(US-20010010741-$ or US-20010016102-$ or US-20010033730-$ or US-20010038737-$ or US-20010043776-$ or US-20010048790-$ or US-20020006253-$ or US-20020012503-$ or US-20020012502-$ or US-20020012501-$ or US-20020012238-$ or US-20020025121-$ or US-20020025099-$ or US-20020028055-$ or US-20020031310-$ or US-20020031309-$ or US-20020061171-$ or US-20020064349-$ or US-20020081076-$ or US-20020090177-$ or US-20020094727-$ or US-20020106167-$ or US-20020114581-$ or US-20020118926-$ or US-20020126961-$ or US-20020131720-$).did. or (US-20020150344-$ or US-20020150343-$ or US-20020150353-$ or US-20020150346-$ or US-20020150345-$ or US-20020150342-$ or US-20020159745-$ or US-20020159714-$ or US-20020159712-$ or US-20020168149-$ or US-20020166226-$ or US-20020172469-$ or US-20020177364-$ or US-20020181888-$ or US-20020181884-$ or US-20020186934-$ or US-20020186742-$ or US-20020191881-$ or US-20020197017-$ or US-20020197018-$ or US-20030002816-$ or US-20030002808-$ or US-20030007739-$ or US-20030012512-$ or US-20030031449-$ or US-20030031422-$ or US-20030044122-$).did. or (US-20030044115-$ or US-20030053760-$ or US-20030063868-$ or US-20030063866-$ or US-20030063862-$ or US-20030068135-$ or US-20030072536-$ or US-20030081905-$ or US-20030087505-$ or US-20030091292-$ or US-20030095780-$ or US-20030095779-$ or US-20030103730-$ or US-20030108320-$ or US-20030113086-$ or US-20030128934-$ or US-20030142918-$ or US-20030147597-$ or US-	US-PGPUB; USPAT; JPO	OR	ON	2019/10/17 13:13

		20030147230-$ or US-20030156796-$ or US-20030169975-$ or US-20030169974-$ or US-20030174996-$ or US-20030174972-$ or US-20030174922-$ or US-20030180005-$ or US-20030185520-$).did. or (US-20030189214-$ or US-20030194188-$ or US-20030198029-$ or US-20030231838-$ or US-20040013369-$ or US-20040028340-$ or US-20040033050-$ or US-20040033028-$ or US-20040033027-$ or US-20040036987-$ or US-20040042710-$ or US-20040052471-$ or US-20040054761-$ or US-20040062488-$ or US-20040062486-$ or US-20040072454-$ or US-20040071438-$ or US-20040074852-$ or US-20040081418-$ or US-20040091228-$ or US-20040101253-$ or US-20040105325-$ or US-20040105278-$ or US-20040120652-$ or US-20040131315-$ or US-20040136656-$ or US-20040141692-$).did. or (US-20040151464-$ or US-20040151438-$ or US-20040156592-$ or US-20040161204-$ or US-20040165830-$ or US-20040179787-$ or US-20040184740-$ or US-20040182971-$ or US-20040197053-$ or US-20040202431-$ or US-20040208459-$ or US-20040223701-$ or US-20040240793-$ or US-20040247255-$ or US-20040264873-$ or US-20040266257-$ or US-20040264908-$ or US-20040264876-$ or US-20050008300-$ or US-20050013547-$ or US-20050041928-$ or US-20050069263-$ or US-20050074211-$ or US-20050094948-$ or US-20050094943-$ or US-20050112939-$ or US-20050111796-$).did. or (US-20050118880-$ or US-20050135753-$ or US-20050141817-$ or US-20050185894-$ or US-20050207708-$ or US-20050215119-$ or US-20050220423-$ or US-20050220420-$ or US-20050226586-$ or US-20050232552-$ or US-20050238289-$ or US-20050281526-$ or US-20050281509-$ or US-20050286833-$ or US-20050286835-$ or US-20060013539-$ or US-20060056769-$ or US-20060072878-$ or US-20060083468-$ or US-20060083467-$ or US-20060088248-$ or US-20060093275-$ or US-20060098914-$ or US-20060133758-$ or US-20060140542-$ or US-20060147156-$ or US-20060147155-$).did. or (US-20060154529-$ or US-20060153503-$ or US-20060159401-$ or US-20060159399-$ or US-20060169856-$ or US-20060177182-$ or US-				

		20060197943-$ or US-20060204200-$ or US-20060204180-$ or US-20060245711-$ or US-20060263011-$ or US-20060269205-$ or US-20060269206-$ or US-20060269212-$ or US-20070019913-$ or US-20070036487-$ or US-20070098330-$ or US-20070098329-$ or US-20070105452-$ or US-20070116414-$ or US-20070116411-$ or US-20070140623-$ or US-20070154135-$ or US-20070165984-$ or US-20070183780-$ or US-20070190834-$ or US-20070196053-$).did. or (US-20070196052-$ or US-20070201808-$ or US-20070201798-$ or US-20070212002-$ or US-20070223862-$ or US-20070230874-$ or US-20070263959-$ or US-20070280599-$ or US-20070285194-$ or US-20070297725-$ or US-20080008425-$ or US-20080013897-$ or US-20080013891-$ or US-20080019642-$ or US-20080019656-$ or US-20080044139-$ or US-20080050072-$ or US-20080085082-$ or US-20080095502-$ or US-20080095501-$ or US-20080100456-$ or US-20080170827-$ or US-20080175541-$ or US-20080175550-$ or US-20080175542-$ or US-20080175546-$ or US-20080175545-$).did. or (US-20080175532-$ or US-20080193086-$ or US-20080205825-$ or US-20080240658-$ or US-20080269845-$ or US-20080267566-$ or US-20080273837-$ or US-20080279503-$ or US-20080304792-$ or US-20080310796-$ or US-20080310800-$ or US-20080310795-$ or US-20080317411-$ or US-20090010600-$ or US-20090028507-$ or US-20090034912-$ or US-20090047800-$ or US-20090046981-$ or US-20090060422-$ or US-20090060418-$ or US-20090074359-$ or US-20090103878-$ or US-20090116791-$ or US-20090148101-$ or US-20090156043-$ or US-20090185778-$ or US-20090202214-$).did. or (US-20090214164-$ or US-20090226141-$ or US-20090226137-$ or US-20090232455-$ or US-20090232454-$ or US-20090257722-$ or US-20090257719-$ or US-20090274431-$ or US-20090274432-$ or US-20090285534-$ or US-20090285530-$ or US-20090290838-$ or US-20090304335-$ or US-20100002999-$ or US-20100021111-$ or US-20100029117-$ or US-20100027944-$ or US-20100027943-$ or US-20100046893-$ or US-20100054665-$ or US-20100061681-$ or US-				

		20100074616-$ or US-20100080513-$ or US-20100092134-$ or US-20100092131-$ or US-20100104355-$ or US-20100111484-$).did. or (US-20100129032-$ or US-20100129028-$ or US-20100135618-$ or US-20100141934-$ or US-20100146764-$ or US-20100158444-$ or US-20100183265-$ or US-20100202730-$ or US-20100202737-$ or US-20100209063-$ or US-20100209050-$ or US-20100215318-$ or US-20100215322-$ or US-20100226654-$ or US-20100232757-$ or US-20100239220-$ or US-20100239213-$ or US-20100247057-$ or US-20100247040-$ or US-20100260457-$ or US-20100266245-$ or US-20100272408-$ or US-20100278497-$ or US-20100278488-$ or US-20100284655-$ or US-20100296792-$ or US-20100303408-$).did. or (US-20100322580-$ or US-20100322576-$ or US-20100322554-$ or US-20100329604-$ or US-20100329602-$ or US-20110019964-$ or US-20110038592-$ or US-20110038581-$ or US-20110044583-$ or US-20110058772-$ or US-20110075969-$ or US-20110081798-$ or US-20110081116-$ or US-20110085774-$ or US-20110085765-$ or US-20110091166-$ or US-20110091154-$ or US-20110103797-$ or US-20110116748-$ or US-20110123156-$ or US-20110129186-$ or US-20110142398-$ or US-20110150396-$ or US-20110158593-$ or US-20110158586-$ or US-20110170830-$ or US-20110176777-$).did. or (US-20110188809-$ or US-20110188000-$ or US-20110194828-$ or US-20110200286-$ or US-20110198324-$ or US-20110200294-$ or US-20110206335-$ or US-20110206325-$ or US-20110206324-$ or US-20110211792-$ or US-20110229094-$ or US-20110243508-$ or US-20110243505-$ or US-20110243504-$ or US-20110268391-$ or US-20110293223-$ or US-20110299814-$ or US-20110311186-$ or US-20110317976-$ or US-20120002928-$ or US-20120002925-$ or US-20120033918-$ or US-20120039569-$ or US-20120057831-$ or US-20120057830-$ or US-20120057827-$ or US-20120063735-$).did. or (US-20120069348-$ or US-20120099870-$ or US-20120106901-$ or US-20120114295-$ or US-20120128307-$ or US-20120141084-$ or US-20120155808-$ or US-20120163757-$ or US-20120170895-$ or US-				

		20120195555-$ or US-20120219253-$ or US-20120224823-$ or US-20120237223-$ or US-20120237171-$ or US-20120243831-$ or US-20120243829-$ or US-20120251067-$ or US-20120252244-$ or US-20120251050-$ or US-20120257859-$ or US-20120263426-$ or US-20120294572-$ or US-20120301088-$ or US-20120301080-$ or US-20120321269-$ or US-20120321266-$ or US-20120321254-$).did. or (US-20130011099-$ or US-20130064517-$ or US-20130071068-$ or US-20130071067-$ or US-20130084041-$ or US-20130094827-$ or US-20130094815-$ or US-20130094811-$ or US-20130101257-$ or US-20130108231-$ or US-20130121643-$ or US-20130129285-$ or US-20130156379-$ or US-20130156382-$ or US-20130163937-$ or US-20130163933-$ or US-20130170797-$ or US-20130170796-$ or US-20130183018-$ or US-20130195405-$ or US-20130195418-$ or US-20130209040-$ or US-20130209049-$ or US-20130209052-$ or US-20130209051-$ or US-20130209050-$ or US-20130209041-$).did. or (US-20130216186-$ or US-20130216188-$ or US-20130284844-$ or US-20130287358-$ or US-20130302004-$ or US-20130322828-$ or US-20130323940-$ or US-20130322826-$ or US-20130330957-$ or US-20130343764-$ or US-20130343707-$ or US-20140016902-$ or US-20140023322-$ or US-20140038462-$ or US-20140044394-$ or US-20140064690-$ or US-20140064664-$ or US-20140072297-$ or US-20140072263-$ or US-20140082913-$ or US-20140093210-$ or US-20140104808-$ or US-20140126875-$ or US-20140126874-$ or US-20140124140-$ or US-20140133821-$ or US-20140133803-$).did. or (US-20140141649-$ or US-20140147082-$ or US-20140161394-$ or US-20140161407-$ or US-20140161400-$ or US-20140169732-$ or US-20140178007-$ or US-20140205253-$ or US-20140205247-$ or US-20140219615-$ or US-20140220794-$ or US-20140219619-$ or US-20140241690-$ or US-20140241689-$ or US-20140241688-$ or US-20140241667-$ or US-20140273584-$ or US-20140270646-$ or US-20140294339-$ or US-20140308010-$ or US-20140308008-$ or US-20140321813-$ or US-20140321814-$ or US-20140328063-$ or US-				

		20140334790-$ or US-20140334780-$ or US-20140334778-$).did. or (US-20140348481-$ or US-20140348467-$ or US-20140355936-$ or US-20140376870-$ or US-20150003774-$ or US-20150012072-$ or US-20150030323-$ or US-20150050002-$ or US-20150055917-$ or US-20150055928-$ or US-20150063758-$ or US-20150060539-$ or US-20150078710-$ or US-20150139588-$ or US-20150147033-$ or US-20150147031-$ or US-20150153516-$ or US-20150177467-$ or US-20150185423-$ or US-20150192744-$ or US-20150205060-$ or US-20150205053-$ or US-20150212284-$ or US-20150212279-$ or US-20150219856-$ or US-20150219857-$ or US-20150226923-$).did. or (US-20150234131-$ or US-20150234128-$ or US-20150241650-$ or US-20150247977-$ or US-20150253183-$ or US-20150260927-$ or US-20150268424-$ or US-20150277057-$ or US-20150277061-$ or US-20150277058-$ or US-20150288449-$ or US-20150288447-$ or US-20150286014-$ or US-20150286013-$ or US-20150286011-$ or US-20150285999-$ or US-20150301288-$ or US-20150301293-$ or US-20150309279-$ or US-20150323752-$ or US-20150346452-$ or US-20150346449-$ or US-20150355417-$ or US-20150355414-$ or US-20150362678-$ or US-20150378117-$ or US-20150378111-$).did. or (US-20160004017-$ or US-20160011383-$ or US-20160011376-$ or US-20160018604-$ or US-20160018606-$ or US-20160033723-$ or US-20160041356-$ or US-20160047994-$ or US-20160062051-$ or US-20160070081-$ or US-20160085045-$ or US-20160085035-$ or US-20160085031-$ or US-20160091673-$ or US-20160111808-$ or US-20160109676-$ or US-20160116685-$ or US-20160116683-$ or US-20160116681-$ or US-20160131857-$ or US-20160139342-$ or US-20160139339-$ or US-20160147022-$ or US-20160154190-$ or US-20160161679-$ or US-20160170152-$ or US-20160178860-$).did. or (US-20160178855-$ or US-20160187589-$ or US-20160195683-$ or US-20160195681-$ or US-20160209605-$ or US-20160216454-$ or US-20160216460-$ or US-20160223763-$ or US-20160238798-$ or US-20160238794-$ or US-20160238789-$ or US-20160246011-$ or US-				

		20160252685-$ or US-20160266330-$ or US-20160266329-$ or US-20160266327-$ or US-20160274311-$ or US-20160291259-$ or US-20160306123-$ or US-20160306121-$ or US-20160313513-$ or US-20160320567-$ or US-20160320566-$ or US-20160327757-$ or US-20160324402-$ or US-20160356966-$ or US-20160365685-$).did. or (US-20160370549-$ or US-20160370548-$ or US-20170003459-$ or US-20170035275-$ or US-20170059782-$ or US-20170068063-$ or US-20170082806-$ or US-20170097485-$ or US-20170097471-$ or US-20170102507-$ or US-20170108659-$ or US-20170108430-$ or US-20170123171-$ or US-20170123163-$ or US-20170131481-$ or US-20170139158-$ or US-20170139157-$ or US-20170146749-$ or US-20170153394-$ or US-20170163573-$ or US-20170162978-$ or US-20170160500-$ or US-20170160496-$ or US-20170160486-$ or US-20170160478-$ or US-20170160477-$ or US-20170160476-$).did. or (US-20170168244-$ or US-20170176252-$ or US-20170184800-$ or US-20170192182-$ or US-20170199338-$ or US-20170199336-$ or US-20170205591-$ or US-20170205588-$ or US-20170212310-$ or US-20170212309-$ or US-20170222347-$ or US-20170227727-$ or US-20170227718-$ or US-20170235077-$ or US-20170242198-$ or US-20170242196-$ or US-20170248762-$ or US-20170254962-$ or US-20170254961-$ or US-20170254960-$ or US-20170276887-$ or US-20170276886-$ or US-20170285272-$ or US-20170293091-$ or US-20170299821-$ or US-20170299818-$ or US-20170299817-$).did. or (US-20170307832-$ or US-20170307829-$ or US-20170315307-$ or US-20170315305-$ or US-20170315304-$ or US-20170315303-$ or US-20170331234-$ or US-20170336571-$ or US-20170343742-$ or US-20170343741-$ or US-20170341972-$ or US-20170351038-$ or US-20170351037-$ or US-20170359091-$ or US-20170363815-$ or US-20170363810-$ or US-20170363509-$ or US-20170371118-$ or US-20170371107-$ or US-20180003910-$ or US-20180011261-$ or US-20180017740-$ or US-20180024302-$ or US-20180024301-$ or US-20180024300-$ or US-20180024294-$ or US-20180031782-$).did. or (US-			

		20180031775-$ or US-20180059338-$ or US-20180074277-$ or US-20180081127-$ or US-20180081122-$ or US-20180078781-$ or US-20180095232-$ or US-20180106975-$ or US-20180113268-$ or US-20180113259-$ or US-20180136410-$ or US-20180143384-$ or US-20180143381-$ or US-20180149813-$ or US-20180157002-$ or US-20180180819-$ or US-20180188460-$ or US-20180196204-$ or US-20180210155-$ or US-20180210153-$).did. or (US-3933409-$ or US-3999837-$ or US-4080044-$ or US-4087158-$ or US-4101198-$ or US-4140365-$ or US-4167304-$ or US-4168109-$ or US-4186996-$ or US-4201445-$ or US-4214812-$ or US-4218113-$ or US-4223976-$ or US-4252407-$ or US-4268115-$ or US-4268114-$ or US-4279469-$ or US-4291943-$ or US-4295707-$ or US-4327964-$ or US-4354731-$ or US-4368948-$ or US-4371233-$ or US-4387957-$ or US-4415232-$ or US-4422716-$).did. or (US-4444461-$ or US-4445753-$ or US-4447121-$ or US-4461539-$ or US-4466009-$ or US-4484796-$ or US-4487474-$ or US-4497536-$ or US-4526438-$ or US-4548467-$ or US-4614402-$ or US-4615581-$ or US-4645296-$ or US-4648688-$ or US-4666241-$ or US-4674831-$ or US-4681398-$ or US-4688887-$ or US-4699460-$ or US-4714318-$ or US-4714317-$ or US-4714315-$ or US-4715674-$ or US-4717234-$ or US-4718744-$ or US-4722081-$ or US-4740052-$).did. or (US-4741590-$ or US-4758719-$ or US-4759600-$ or US-4759599-$ or US-4762389-$ or US-4767178-$ or US-4773725-$ or US-4781429-$ or US-4783137-$ or US-4786135-$ or US-4787700-$ or US-4789216-$ or US-4793683-$ or US-4795231-$ or US-4805980-$ or US-4807957-$ or US-4813760-$ or US-4824196-$ or US-4834486-$ or US-4842361-$ or US-4844570-$ or US-4846544-$ or US-4848870-$ or US-4850536-$ or US-4852963-$ or US-4877303-$ or US-4892380-$).did. or (US-4898446-$ or US-4960317-$ or US-4964688-$ or US-4976510-$ or US-4986762-$ or US-4986622-$ or US-4991929-$ or US-4993803-$ or US-4995688-$ or US-4998797-$ or US-5013124-$ or US-5015060-$ or US-5016970-$ or US-5018823-$ or US-5042891-$ or US-5048916-$ or US-5052774-$ or US-5058983-$ or US-5073042-$ or US-5077815-$ or US-5091991-$ or				

		US-5091990-$ or US-5109453-$ or US-5115484-$ or US-5119455-$ or US-5124506-$ or US-5127073-$).did. or (US-5129024-$ or US-5133032-$ or US-5134677-$ or US-5134676-$ or US-5155795-$ or US-5159654-$ or US-5177808-$ or US-5179607-$ or US-5210815-$ or US-5214730-$ or US-5228104-$ or US-5233675-$ or US-5233674-$ or US-5239606-$ or US-5267342-$ or US-5274729-$ or US-5280552-$ or US-5282259-$ or US-5293581-$ or US-5297227-$ or US-5317663-$ or US-5323475-$ or US-5329541-$ or US-5333222-$ or US-5333221-$ or US-5359688-$ or US-5363460-$).did. or (US-5367594-$ or US-5366383-$ or US-5384885-$ or US-5386485-$ or US-5408557-$ or US-5418875-$ or US-5420951-$ or US-5444806-$ or US-5446817-$ or US-5450519-$ or US-5452391-$ or US-5485537-$ or US-5497444-$ or US-5506922-$ or US-5519799-$ or US-5521998-$ or US-5528711-$ or US-5530783-$ or US-5537501-$ or US-5542015-$ or US-5548674-$ or US-5550943-$ or US-5563978-$ or US-5563971-$ or US-5570445-$ or US-5574813-$ or US-5579429-$).did. or (US-5581644-$ or US-5588086-$ or US-5592323-$ or US-5600746-$ or US-5603631-$ or US-5607323-$ or US-5619610-$ or US-5633969-$ or US-5642450-$ or US-5647043-$ or US-5645449-$ or US-5661833-$ or US-5666449-$ or US-5664955-$ or US-5668904-$ or US-5671310-$ or US-5673346-$ or US-5680494-$ or US-5682449-$ or US-5687268-$ or US-5694507-$ or US-5694506-$ or US-5701380-$ or US-5721799-$ or US-5727102-$ or US-5732174-$ or US-5734770-$).did. or (US-5737464-$ or US-5751874-$ or US-5761359-$ or US-5764043-$ or US-5774611-$ or US-5774612-$ or US-5778122-$ or US-5781680-$ or US-5796896-$ or US-5799122-$ or US-5809191-$ or US-5815618-$ or US-5818993-$ or US-5825955-$ or US-5832158-$ or US-5838856-$ or US-5838855-$ or US-5845036-$ or US-5862282-$ or US-5867621-$ or US-5881191-$ or US-5887100-$ or US-5887098-$ or US-5892870-$ or US-5896477-$ or US-5909526-$ or US-5909298-$).did. or (US-5915058-$ or US-5923805-$ or US-5930426-$ or US-5930425-$ or US-5937121-$ or US-5940561-$ or US-5940559-$ or US-5949946-$ or US-5953474-$ or US-5953473-$ or US-5956444-$ or US-5960137-$ or US-5969294-$ or US-5971626-$ or				

		US-5980117-$ or US-5987203-$ or US-5993071-$ or US-6004043-$ or US-6022149-$ or US-6027252-$ or US-6041155-$ or US-6048103-$ or US-6048102-$ or US-6053639-$ or US-6059461-$ or US-6064791-$ or US-6076973-$).did. or (US-6076975-$ or US-6081647-$ or US-6079881-$ or US-6088502-$ or US-6095694-$ or US-6104856-$ or US-6102581-$ or US-6108482-$ or US-6116790-$ or US-6116789-$ or US-6116101-$ or US-6132105-$ or US-6139346-$ or US-6142676-$ or US-6149315-$ or US-6154597-$ or US-6164835-$ or US-6164834-$ or US-6173099-$ or US-6179480-$ or US-6179475-$ or US-6188827-$ or US-6188825-$ or US-6186670-$ or US-6190616-$ or US-6195477-$ or US-6193420-$).did. or (US-6196729-$ or US-6200040-$ or US-6206577-$ or US-6217226-$ or US-6220763-$ or US-6220762-$ or US-6224269-$ or US-6227719-$ or US-6227718-$ or US-6240229-$ or US-6238249-$ or US-6243526-$ or US-6247851-$ or US-6247849-$ or US-6256446-$ or US-6259839-$ or US-6264373-$ or US-6264372-$ or US-6267513-$ or US-6273618-$ or US-6290527-$ or US-6301004-$ or US-6302592-$ or US-6309111-$ or US-6318904-$ or US-6318903-$ or US-6334715-$).did. or (US-6349164-$ or US-6347889-$ or US-6347888-$ or US-6354746-$ or US-6357932-$ or US-6361218-$ or US-6364536-$ or US-6367986-$ or US-6367984-$ or US-6371659-$ or US-6377840-$ or US-6375363-$ or US-6384896-$ or US-6382843-$ or US-6382839-$ or US-6389212-$ or US-6402393-$ or US-6402390-$ or US-6402388-$ or US-6409391-$ or US-6412987-$ or US-6419810-$ or US-6422759-$ or US-6425692-$ or US-6425694-$ or US-6431762-$ or US-6437894-$).did. or (US-6435946-$ or US-6445867-$ or US-6456768-$ or US-6457876-$ or US-6461055-$ or US-6461054-$ or US-6461053-$ or US-6466724-$ or US-6464406-$ or US-6467971-$ or US-6467970-$ or US-6471417-$ or US-6471412-$ or US-6474876-$ or US-6478472-$ or US-6481900-$ or US-6481899-$ or US-6485192-$ or US-6497518-$ or US-6497516-$ or US-6501900-$ or US-6508593-$ or US-6526210-$ or US-6524015-$ or US-6527450-$ or US-6533469-$ or US-6543941-$).did. or (US-6554482-$ or US-6558044-$ or US-6561699-$ or US-6572276-$ or US-6572273-$ or US-6582132-$ or US-6595696-$ or				

		US-6601995-$ or US-6612750-$ or US-6619859-$ or US-6619856-$ or US-6632023-$ or US-6634794-$ or US-6644866-$ or US-6667803-$ or US-6695485-$ or US-6702477-$ or US-6702475-$ or US-6786647-$ or US-6789953-$ or US-6793399-$ or US-6840680-$ or US-6856748-$ or US-6895146-$ or US-7232261-$ or US-7435009-$ or US-7530845-$).did. or (US-7585118-$ or US-7588373-$ or US-7706657-$ or US-7738757-$ or US-7972066-$ or US-8070366-$ or US-8206040-$ or US-8517614-$ or US-8588571-$ or US-8953922-$ or US-9229177-$ or US-9229170-$ or US-9291781-$ or US-9316794-$ or US-9323007-$ or US-9448369-$ or US-9453972-$ or US-9482825-$ or US-9551831-$ or US-9625655-$ or US-9632267-$ or US-9638871-$ or US-9638868-$ or US-9645335-$ or US-9658407-$ or US-9671570-$ or US-9671568-$).did. or (US-9678282-$ or US-9696477-$ or US-9722367-$ or US-9720184-$ or US-9726829-$ or US-9735523-$ or US-9733123-$ or US-9739955-$ or US-9739952-$ or US-9739951-$ or US-9746625-$ or US-9746368-$ or US-9759874-$ or US-9759869-$ or US-9772457-$ or US-9772456-$ or US-9772453-$ or US-9784928-$ or US-9798090-$ or US-9797806-$ or US-9810860-$ or US-9810858-$ or US-9810856-$ or US-9817195-$ or US-9823428-$ or US-9829643-$ or US-9827438-$).did. or (US-9835807-$ or US-9841566-$ or US-9857545-$ or US-9857537-$ or US-9864151-$ or US-9869824-$ or US-9876309-$ or US-9874702-$ or US-9880365-$ or US-9880357-$ or US-9885841-$ or US-9893813-$ or US-9891392-$ or US-9891387-$ or US-9891385-$ or US-9897767-$ or US-9904021-$ or US-9904020-$ or US-9910228-$ or US-9910226-$ or US-9915793-$ or US-9933586-$ or US-9933583-$ or US-9933582-$ or US-9939600-$ or US-9939590-$ or US-9948017-$).did. or (US-9946036-$ or US-10007069-$ or US-10018787-$).did. or (JP-2016095432-$ or JP-2016095410-$ or JP-2016122100-$ or JP-2016177309-$ or JP-2016188927-$ or JP-2017053937-$ or JP-2017090798-$ or JP-2017111444-$ or JP-2017134118-$ or JP-2017138535-$ or JP-2017151338-$ or JP-2017219768-$).did.				
S454	733	(US-20010041030-$ or US-20020025125-$ or US-20020106162-$ or US-20020114589-$ or US-20020159710-$ or US-20030031452-$	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/10/17 13:13

		or US-20030044127-$ or US-20030044125-$ or US-20030180004-$ or US-20030223703-$ or US-20040008494-$ or US-20040017983-$ or US-20040017981-$ or US-20040038558-$ or US-20040052472-$ or US-20040062498-$ or US-20040105628-$ or US-20040131317-$ or US-20040223699-$ or US-20040228589-$ or US-20050036744-$ or US-20050053342-$ or US-20050111795-$ or US-20050123246-$ or US-20050135755-$ or US-20050135752-$).did. or (US-20050271328-$ or US-20060045430-$ or US-20060051028-$ or US-20060093282-$ or US-20060153504-$ or US-20060193562-$ or US-20060280409-$ or US-20060285807-$ or US-20070058907-$ or US-20070098327-$ or US-20070160327-$ or US-20080069501-$ or US-20080112672-$ or US-20080124031-$ or US-20080131055-$ or US-20080253719-$ or US-20090003772-$ or US-20090290839-$ or US-20090305542-$ or US-20100322561-$ or US-20110038590-$ or US-20110075971-$ or US-20110091159-$ or US-20110222819-$ or US-20110249942-$ or US-20120027355-$ or US-20120057824-$).did. or (US-20120076459-$ or US-20120082416-$ or US-20120099822-$ or US-20120141070-$ or US-20120251054-$ or US-20120251051-$ or US-20120263423-$ or US-20120263419-$ or US-20120308183-$ or US-20130051749-$ or US-20130064508-$ or US-20130077914-$ or US-20130121645-$ or US-20130129280-$ or US-20130183001-$ or US-20130216189-$ or US-20130230283-$ or US-20130259429-$ or US-20130272671-$ or US-20130308908-$ or US-20140056560-$ or US-20140064665-$ or US-20140064688-$ or US-20140072265-$ or US-20140086545-$ or US-20140147081-$ or US-20140205241-$).did. or (US-20140219614-$ or US-20140219624-$ or US-20140314385-$ or US-20140341510-$ or US-20150003785-$ or US-20150023637-$ or US-20150049989-$ or US-20150071591-$ or US-20150177463-$ or US-20150226926-$ or US-20150241644-$ or US-20150301286-$ or US-20150331201-$ or US-20150338583-$ or US-20150370017-$ or US-20150378112-$ or US-20160004018-$ or US-20160004016-$ or US-20160025937-$ or US-20160077287-$ or US-20160077284-$ or US-				

		20160109661-$ or US-20160131854-$ or US-20160131849-$ or US-20160161680-$ or US-20160178859-$ or US-20160259135-$).did. or (US-20160282566-$ or US-20160282562-$ or US-20160320571-$ or US-20160349464-$ or US-20170059784-$ or US-20170090128-$ or US-20170090127-$ or US-20170102506-$ or US-20170102504-$ or US-20170108653-$ or US-20170115457-$ or US-20170139150-$ or US-20170153398-$ or US-20170184798-$ or US-20170184790-$ or US-20170205587-$ or US-20170219779-$ or US-20170227720-$ or US-20170235060-$ or US-20170242200-$ or US-20170242199-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170261698-$ or US-20170269309-$ or US-20170276883-$).did. or (US-20170276881-$ or US-20170293088-$ or US-20170293087-$ or US-20170307831-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170357060-$ or US-20170357059-$ or US-20170363827-$ or US-20180003903-$ or US-20180011258-$ or US-20180011254-$ or US-20180031774-$ or US-20180052288-$ or US-20180077472-$ or US-20180081128-$ or US-20180081125-$ or US-20180088288-$ or US-20180088287-$ or US-20180088286-$ or US-20180088283-$ or US-20180106973-$ or US-20180156988-$ or US-20180156985-$ or US-20180210154-$).did. or (US-4240695-$ or US-4320938-$ or US-4330172-$ or US-4477146-$ or US-4687291-$ or US-4737009-$ or US-4854664-$ or US-4856866-$ or US-4886335-$ or US-4915472-$ or US-4953929-$ or US-4955976-$ or US-5064268-$ or US-5076656-$ or US-5082346-$ or US-5082344-$ or US-5101463-$ or US-5134673-$ or US-5157749-$ or US-5166995-$ or US-5199093-$ or US-5259052-$ or US-5555332-$ or US-5666456-$ or US-5692080-$ or US-5867894-$).did. or (US-5870515-$ or US-5883995-$ or US-5920670-$ or US-5920669-$ or US-5984533-$ or US-6012852-$ or US-6095695-$ or US-6210045-$ or US-6250817-$ or US-6305849-$ or US-6318902-$ or US-6331079-$ or US-6379052-$ or US-6409392-$ or US-6422761-$ or US-6422760-$ or US-6450698-$ or US-6487343-$ or US-6491442-$ or US-6533465-$ or US-6554486-$ or US-6623172-$ or US-6688782-$ or				

		US-6712521-$ or US-6764222-$ or US-6839583-$ or US-6848834-$).did. or (US-6944378-$ or US-7036996-$ or US-8388235-$ or US-9207454-$ or US-9316791-$ or US-9377591-$ or US-9389368-$ or US-9482820-$ or US-9606303-$ or US-9625657-$ or US-9664864-$ or US-9678283-$ or US-9678286-$ or US-9684134-$ or US-9696497-$ or US-9703062-$ or US-9709753-$ or US-9726830-$ or US-9733436-$ or US-9733434-$ or US-9798096-$ or US-9804342-$ or US-9804340-$ or US-9804337-$ or US-9829650-$ or US-9835808-$ or US-9846283-$).did. or (US-9851512-$ or US-9891390-$ or US-9904019-$ or US-9910229-$ or US-9927582-$ or US-9939589-$ or US-9946037-$).did. or (IT-7819792-$ or FR-2363124-$ or IT-7925110-$ or GB-2057158-$ or FR-2487528-$ or GB-2081468-$ or EP-0061243-$ or DK-208682-$ or GB-8306227-$ or IT-8323399-$ or JP-S5856846-$ or EP-0125398-$ or FR-2535069-$ or WO-8600147-$ or EP-0249237-$ or EP-0262847-$ or EP-0262631-$ or DE-8626183-$ or WO-9015350-$ or EP-0408852-$ or GB-9103604-$ or GB-9106183-$ or CA-2030897-$ or DE-9107960-$ or GB-9206076-$ or CA-2057559-$).did. or (CA-2082276-$ or EP-0633485-$ or EP-0690319-$ or CA-2191600-$ or EP-0696748-$ or EP-0697608-$ or CN-1118443-$ or WO-9627811-$ or EP-0758099-$ or WO-9734176-$ or CA-2198522-$ or EP-0803750-$ or NL-1003147-$ or EP-0807837-$ or CA-2254335-$ or CA-2294930-$ or CA-2262351-$ or EP-0938003-$ or JP-2945144-$ or CA-2324565-$ or GB-9919699-$ or EP-0992819-$ or CA-2284331-$ or GB-0007281-$ or CA-2288249-$ or DE-19728960-$ or EP-1033595-$).did. or (EP-1033594-$ or EP-1039324-$ or EP-1039322-$ or EP-1041416-$ or EP-1041414-$ or JP-3106420-$ or CA-2321428-$ or EP-1091225-$ or WO-0137010-$ or EP-1107031-$ or KR-20010062142-$ or WO-0155762-$ or EP-1124147-$ or WO-0161397-$ or WO-0181965-$ or CA-2350290-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or KR-20020000530-$ or KR-20020001574-$ or CN-1331421-$ or EP-1172672-$ or EP-1172673-$ or KR-20020006481-$ or KR-20020006480-$ or DE-20118858-$).did. or (CA-2418331-$ or KR-20020050140-$ or WO-02056060-$ or WO-02061481-$ or DE-10114144-$ or NL-1018440-$ or WO-03016975-$ or WO-03093883-$ or CA-2484569-$				

		or EP-1394584-$ or AU-2003291687-$ or EP-1530068-$ or CA-2503690-$ or CN-1677147-$ or CN-1707299-$ or WO-2008006402-$ or EP-1887395-$ or CN-101122658-$ or WO-2008029850-$ or CA-2662854-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or CA-2689768-$ or EP-2206458-$ or WO-2010137426-$ or CA-2762411-$).did. or (EP-2302431-$ or WO-2011139938-$ or WO-2011152874-$ or EP-2444827-$ or WO-2012054174-$ or WO-2012054174-$ or WO-2012151175-$ or GB-201218194-$ or CN-102870023-$ or WO-2013115791-$ or WO-2013115789-$ or WO-2013126068-$ or CA-2912155-$ or WO-2014009463-$ or WO-2014011898-$ or EP-2700992-$ or JP-5433802-$ or WO-2014049469-$ or WO-2014113753-$ or CA-2836675-$ or WO-2014143748-$ or WO-2014165175-$ or WO-2014197701-$ or CN-104241938-$ or CA-2917189-$ or EP-2840425-$ or EP-2843452-$).did. or (WO-2015028433-$ or CA-2885821-$ or WO-2015068103-$ or CA-2932688-$ or GB-201507758-$ or WO-2015103783-$ or WO-2015116589-$ or CN-204595258-$ or WO-2015144883-$ or EP-2942653-$ or EP-2947485-$ or WO-2015190211-$ or WO-2016004347-$ or CN-105278047-$ or DE-202013012295-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or CA-2928026-$ or WO-2016043922-$ or JP-5905950-$ or WO-2016067668-$ or EP-3021145-$ or WO-2016082160-$ or WO-2016103821-$ or DE-202016103178-$ or EP-3054333-$).did. or (WO-2016161341-$ or WO-2017038704-$ or JP-6173629-$ or WO-2017180257-$ or CN-206584076-$ or EP-3258301-$ or WO-2018003776-$ or WO-2018004847-$).did. or (JP-54034251-$ or JP-55101904-$ or JP-56066811-$ or JP-56074211-$ or JP-59075218-$ or JP-04214510-$ or JP-04220604-$ or JP-05313040-$ or JP-08015541-$ or JP-09005575-$ or JP-09033756-$ or JP-10104469-$ or JP-11072659-$ or JP-2000089061-$ or JP-2000284146-$ or JP-2000292655-$ or JP-2000310724-$ or JP-2001013372-$ or JP-2001021764-$ or JP-2001242361-$ or JP-2009294343-$ or JP-2012053420-$ or JP-2012078513-$ or JP-2015022131-$).did. or (DE-2805949-$ or DE-2932986-$ or GB-2057158-$ or GB-2081468-$ or EP-61243-$ or GB-2098354-$ or DE-3208797-$ or EP-125398-$ or US-				

		4496213-$ or WO-8600147-$ or EP-249237-$ or EP-262631-$ or US-4953929-$ or WO-9015350-$ or GB-2241794-$ or US-5064268-$ or WO-9117540-$ or EP-458608-$ or US-5101463-$ or EP-490698-$ or EP-505197-$ or EP-430107-$ or EP-660145-$ or EP-660144-$ or EP-663602-$ or EP-663601-$).did. or (WO-9600917-$ or EP-696748-$ or EP-697608-$ or WO-9627811-$ or EP-758099-$ or WO-9734176-$ or EP-803750-$ or US-5692080-$ or WO-9746900-$ or WO-9857208-$ or WO-9947958-$ or GB-2341455-$ or EP-1041416-$ or EP-1041414-$ or EP-1091225-$ or WO-0140839-$ or EP-1107031-$ or EP-1124147-$ or WO-0181965-$ or US-20010041030-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or EP-1172673-$ or EP-1172672-$ or DE-20118858-$ or WO-02056060-$).did. or (US-6422760-$ or WO-02061481-$ or US-20030031437-$ or US-20030044125-$ or WO-03094297-$ or WO-03093883-$ or EP-1394584-$ or US-20040062498-$ or US-20040223699-$ or US-20040228589-$ or US-20050053342-$ or WO-2006022840-$ or US-20060153503-$ or US-20060165352-$ or US-20060193562-$ or EP-1752805-$ or US-20070058907-$ or US-20070077010-$ or US-20070098327-$ or US-20090041411-$ or US-20090060423-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or EP-2206458-$ or WO-2010137426-$ or EP-2302431-$).did. or (US-20110249942-$ or US-20110274437-$ or WO-2011152874-$ or KR-2012000895-$ or US-20120027355-$ or US-20120057824-$ or US-20120082416-$ or EP-2444827-$ or US-20120099822-$ or US-20120251051-$ or US-20120251054-$ or US-20120263419-$ or WO-2012151175-$ or US-20120308183-$ or CN-102870023-$ or TW-201309089-$ or US-20130051749-$ or WO-2013036843-$ or CN-103091793-$ or US-20130121645-$ or WO-2013115789-$ or WO-2013115791-$ or WO-2013122865-$ or WO-2013126068-$ or US-20130230283-$ or US-20130259429-$ or WO-2013155395-$).did. or (WO-2013177234-$ or WO-2014011898-$ or US-20140016901-$ or EP-2700992-$ or JP-5433802-$ or US-20140064688-$ or TW-474924-$ or WO-2014049469-$ or US-20140147081-$ or US-20140153879-$ or ES-1110405-$ or WO-2014113753-				

		$ or EP-2759860-$ or US-20140219624-$ or WO-2014143748-$ or WO-2014165175-$ or US-20140321808-$ or US-20140363131-$ or WO-2014197701-$ or EP-2818903-$ or WO-2015009435-$ or US-20150023637-$ or US-20150049989-$ or WO-2015028433-$ or WO-2015068103-$ or WO-2015070382-$ or US-20150162982-$).did. or (US-20150177463-$ or WO-2015103783-$ or WO-2015116589-$ or US-20150219864-$ or US-20150226926-$ or US-20150226925-$ or US-20150241644-$ or CN-104950402-$ or WO-2015144883-$ or US-20150286012-$ or DE-102015106225-$ or US-20150331201-$ or EP-2947485-$ or WO-2015190211-$ or US-20150378110-$ or US-20160004016-$ or US-20160004018-$ or US-20160025937-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or WO-2016033577-$ or WO-2016033578-$ or WO-2016033579-$ or WO-2016033580-$ or WO-2016043922-$ or JP-5905950-$).did. or (US-20160124158-$ or US-20160131854-$ or EP-3021145-$ or US-20160161680-$ or US-20160178852-$ or US-20160178859-$ or US-9377591-$ or US-9389368-$ or EP-3054333-$ or US-20160259135-$ or CN-105978629-$ or US-20160282566-$ or WO-2016161341-$ or US-20160306125-$ or US-9482820-$ or US-20160341908-$ or US-20160341911-$ or US-20160349466-$ or US-20160377819-$ or US-20170031106-$ or US-20170059784-$ or WO-2017038704-$ or US-20170090127-$ or US-20170102504-$ or US-20170115457-$ or US-20170139150-$ or US-20170139156-$).did. or (US-20170153398-$ or US-9678283-$ or US-20170184790-$ or US-9709753-$ or US-20170205587-$ or JP-6173629-$ or US-20170219779-$ or US-9726830-$ or US-20170227720-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170293088-$ or US-20170307830-$ or US-9804340-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170371109-$ or US-20180003903-$ or US-20180011258-$ or US-20180052288-$ or US-20180081128-$ or US-20180106973-$ or US-20180120519-$ or US-20180128988-$).did.				
S455	136	(US-20020176671-$ or US-20040017980-$ or US-20040126118-$ or US-20040197054-$ or US-	US-PGPUB; USPAT; FPRS; JPO;	OR	ON	2019/10/17 13:13

		20070172177-$ or US-20070286554-$ or US-20100008635-$ or US-20100129034-$ or US-20100290745-$ or US-20110116749-$ or US-20110222830-$ or US-20110229096-$ or US-20110229095-$ or US-20110225792-$ or US-20110255831-$ or US-20110262078-$ or US-20110262077-$ or US-20120014648-$ or US-20120063724-$ or US-20120275749-$ or US-20130136402-$ or US-20130315538-$ or US-20140286610-$ or US-20150016781-$ or US-20150110448-$ or US-20160124170-$).did. or (US-20160202429-$ or US-20170045691-$ or US-20170285277-$ or US-20170299820-$ or US-20180120519-$ or US-20180143380-$ or US-20180231722-$ or US-20180239093-$ or US-20180267255-$ or US-20180292618-$ or US-20180292612-$ or US-20180364421-$ or US-20190107679-$ or US-20190107678-$ or US-20190113691-$ or US-20190137701-$ or US-20190179085-$).did. or (US-5504825-$ or US-5613021-$ or US-5661826-$ or US-6045270-$ or US-6276840-$ or US-6293708-$ or US-6623170-$ or US-6796717-$ or US-6848840-$ or US-6866425-$ or US-6932514-$ or US-6944387-$ or US-6976793-$ or US-7094091-$ or US-7178994-$ or US-7182522-$ or US-7234874-$ or US-7241056-$ or US-7300216-$ or US-7536075-$ or US-7654748-$ or US-7891882-$ or US-7912336-$ or US-8052333-$ or US-8231282-$ or US-8235600-$).did. or (US-8262296-$ or US-8317407-$ or US-8346047-$ or US-8348519-$ or US-8348518-$ or US-8376634-$ or US-8406583-$ or US-8417074-$ or US-8494329-$ or US-8496384-$ or US-8529138-$ or US-8542972-$ or US-8550725-$ or US-8550724-$ or US-8579521-$ or US-8690593-$ or US-8714835-$ or US-8821038-$ or US-8821037-$ or US-8915653-$ or US-8958679-$ or US-9014527-$ or US-9031364-$ or US-9057848-$ or US-9146376-$ or US-9146360-$ or US-9417401-$).did. or (US-9513442-$ or US-9541711-$ or US-9557497-$ or US-9563025-$ or US-9606297-$ or US-9632255-$ or US-9645318-$ or US-9658409-$ or US-9684139-$ or US-9739949-$ or US-9753228-$ or US-9772464-$ or US-9857538-$ or US-9977199-$ or US-9989710-$ or US-10012801-$ or US-10054747-$ or US-10061090-$ or US-10067302-$ or US-10067300-$ or US-10088636-$ or US-10101539-$ or	DERWENT					

		US-10139570-$ or US-10146014-$ or US-10156684-$ or US-10209473-$).did. or (WO-2010083369-$ or EP-2380054-$ or CN-102282495-$ or WO-2014152675-$ or WO-2015043158-$ or CN-104516073-$ or CN-102282495-$ or WO-2018125706-$).did. or (JP-57044113-$).did. or (US-20160327757-$ or US-20170299820-$ or WO-2018125706-$ or US-20190107679-$).did.				
S456	2083	S452 S453 S454 S455	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S457	51256	(ferrule connector) with insert$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S458	60014	G02B6/38$.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S459	2321	S457 and S458	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S460	13178	adapter with (groove channel) with (top bottom upper lower)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S461	87	S459 and S460	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S462	47	S461 not S456	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S463	1045337	(groove channel) with upper with lower	US-PGPUB; USPAT; USOCR;	OR	ON	2019/10/17 13:13

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S464	606454	(groove channel) with top with bottom	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S465	409	S459 and (S463 S464)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S466	300	S465 not (S456 S462)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S467	14761	("ferrules" "connectors") with align$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S468	1989	S458 and S467	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S469	323	S468 and (S463 S464)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S470	154	S469 not (S456 S462 S466)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S471	9945	G02B6/3825,3826.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S472	402	S467 and S471	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/10/17 13:13

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S473	183	S472 not (S456 S462 S466 S470)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S474	24701	("ferrules" "connectors") with align$4 with (groove channel slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S475	636	S474 and S471	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/10/17 13:13
S476	124	S475 not (S456 S462 S466 S470 S473)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S477	2891	S456 S462 S466 S470 S473 S476	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S478	2405	G02B6/3831.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S479	2076	S478 not S477	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S480	2630	ferrule with (mt$2 mpo)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S481	114	S479 and S480	US-PGPUB;	OR	ON	2019/10/17

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:13
S482	1817868	(slot groove channel key$4) with (upper lower top bottom) with (center central$4 middle through)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S483	30	S479 and S482	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S484	29	S483 not (S481)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S485	8305280	(slot groove channel key$4) with (upper lower top bottom center central$4 middle through)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S486	364	S479 and S485	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S487	258	S486 not (S481 S484)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S488	401	S481 S484 S487	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:13
S489	38	("20010026661" | "20020167793" | "20040228582" | "20050095899" | "20060140543" | "20080032536" | "20080248691" | "20080311781" | "20110059642" | "20120190230" | "20120257865" | "4186997" | "4376565" | "4448467" | "4580868" | "4645295" | "4711511" | "4904199" | "4979792" | "4986769" | "5166995" | "5183408" | "5265181" | "5289554" | "6149313" | "6257917" | "6538882" | "6634796" | "6910911" | "6994478" |	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/17 13:14

		"7182523" | "7325975" | "7374347" | "7476118" | "7674046" | "8167638" | "8262403" | "8724955").PN.				
S490	19451	(multiple plural$4) adj2 (key$4 key$way) with (surface top bottom side wall)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:23
S491	13263	G02B6/3825-3831.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:23
S492	28	S490 and S491	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:24
S493	15	S492 not (S451 S488)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/10/17 13:24
S494	12	"23987517".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/10/17 13:25
S495	0	(11/633327).APP.	USPAT; USOCR	OR	ON	2019/10/17 13:46
S496	2	("20050281509" | "9086546").PN.	US-PGPUB; USPAT	OR	ON	2019/10/17 14:29

EAST Search History (Interference)

< This search history is empty>

10/ 17/ 2019 7:22:23 PM
C:\ Users\ orojas1\ Documents\ EAST\ Workspaces\ 16214317.wsp

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/214,317	Filing Date 12/10/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	09/27/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/AMANDA N FORD/
*** 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.

Electronic Acknowledgement Receipt

EFS ID:	37306317
Application Number:	16214317
International Application Number:	
Confirmation Number:	7700
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-053-03
Receipt Date:	27-SEP-2019
Filing Date:	10-DEC-2018
Time Stamp:	17:10:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	AmendUSCO05303Sept2019.pdf	95922 2eb27507a5dd6d7d21d02de5041a8da2835a989e	no	9

Warnings:

Information:	
Total Files Size (in bytes):	95922

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)
		) Group Art Unit: 2883
Serial No.:	16/214,317	)
		) Examiner:Rojas, Omar
Filing Date:	December 10, 2018	)
		)
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 June 27, 2019, Applicant amends the application as follows:

IN THE SPECIFICATION:

Please replace paragraph [0033] and [0035] as numbered in the publication with the following revised paragraphs:

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 or passageways **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 or passageways **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.

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 or passageways **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.

IN THE CLAIMS:

Claims 1-14. Canceled.

15. (Previously Presented) An adapter for aligning fiber optic ferrules inserted from opposing sides comprising:

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

a plurality of grooves disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side.

16. (Previously Presented)The adapter according to claim 15, the opening having at least one groove therein and extending in a direction from the first side to the second side.

17. (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 and second sides to pass therethrough.

18. (Currently Amended) The adapter according to ~~claim 15~~ claim 17, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

19. (Previously Presented) The adapter according to claim 15, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

20. (Previously Presented) The adapter according to claim 15, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

21. (Previously Presented) The adapter according to claim 15, wherein the first and second sides are configured to receive a plurality of optical ferrules.

22. (Previously Presented) The adapter according to claim 15, 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.

23. (Previously Presented). The adapter according to claim 18, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

24. (Previously Presented) 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 inside the main body, the main body having at least one groove in the opening and extending in a direction from the first side to the second side; and

a plurality of grooves disposed in a top surface and bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side.

25. (Previously Presented) The adapter according to claim 24, 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.

26. (Currently Amended) The adapter according to ~~claim 24~~ claim 25, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

27. (Previously Presented) The adapter according to claim 24, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

28. (Previously Presented) The adapter according to claim 24, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

29. (Previously Presented) The adapter according to claim 24, wherein the first and second sides are configured to receive a plurality of optical ferrules.

30. (Previously Presented) The adapter according to claim 24, 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.

31. (Previously Presented). The adapter according to claim 26, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

REMARKS

In the above-referenced Office Action, the Examiner objected to the specification; rejected claims 18, 23, 26, and 31 under 35 U.S.C. § 112 (b) or 35 U.S.C. § 112 (pre-AIA), second paragraph, as being indefinite; rejected claims 15, 16, 19, 21, 24, 27, and 29 under 35 U.S.C. § 102(b) as being anticipated by Ohtsuka et al. (U.S. Patent No. 6,293,708); rejected claims 15 – 17, 19, 21, 22, 24, 25, 27, 29, and 30 under 35 U.S.C. § 102(b) as being anticipated by Chinese Patent Publication No. CN202600189 (Grinderslev -using WO 2013179197 as a translation); rejected claims 20 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Ohtsuka or Grinderslev as applied to claims 15 or 24 and further in view of Benner et al. (U.S. Patent Publication No. 2002/0172469); and indicated that claims 18, 23, 26 and 31 would be allowable if rewritten to overcome the rejections under 35 U.S.C. § 112 and to include all of the limitations of the base claim and any intervening claims.

Applicant has amended paragraphs [0033] and [0035] to include the term "passageways" as an alternative to "openings." As is clear from the prosecution history of the parent applications, the number of "openings" may lead to confusion as to the identification of certain claim elements. The amendment to the specification clarifies some of the claim elements and assists in reducing any possible confusion.

Applicant has amended claims 18 and 26 to correct the dependencies of those claims. These amendments obviate the rejection under 35 U.S.C. § 112 (b) or 35 U.S.C. § 112 (pre-AIA), second paragraph.

The Examiner then rejected claims 15, 16, 19, 21, 24, 27, and 29 under 35 U.S.C. § 102(b) as being anticipated by Ohtsuka et al. The Examiner stated Ohtsuka discloses

> an adapter (11) for aligning fiber optic ferrules (2, 5) inserted from opposing sides comprising:
>
> a main body having an opening (11a) defined by two opposing side walls, a top surface and a bottom surface, the opening (11a) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body; and
>
> a plurality of grooves (11c- 11f) disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves (11c-11f) extending

into the central portion from each of the first side and the second side. *See* columns 7-10 of Ohtsuka for further details.

Applicant notes that the Examiner has not associated the claimed central portion to any structure in the device in Ohtsuka. A vague reference to three different columns does not provide the Applicant with any real notice as to what the Examiner is considering to be an important part of the claimed invention. Additionally, the grooves that are pointed out by the Examiner do not meet the claim limitations. The alleged plurality of grooves 11c - 11f are not disposed in a top surface and bottom surface of the central portion. As noted above, the Examiner does not indicate what the central portion is in Ohtsuka. Thus, it is difficult to really respond to this rejection.

Second, the plurality of grooves are disposed in four different sides (Applicant need not address what a top and bottom surface are at this point). 11c is on the left and right sides in FIG. 4A, which 11d - 11f are on the top and bottom. The claim requires that the grooves be in the top and bottom. For this additional reason, the rejection must be withdrawn.

Third, Applicant asserts that elements 11d and 11e are not grooves but are openings in the top and bottom portions of the adapter.

Fourth, the grooves do not extend into the central portion from each of the first side and the second side. Element 11c is a semicircular recess to receive the compressed coiled spring 6. As such it starts on one side and terminates long before it reaches the center of the adapter. Since element 11c is only on one side, it certainly does not extend into the central portion from each of the first side and the second side. The same is true with element 11f and it starts on opposite side from element 11 C and does not extend across to the other side.

For at least these reasons, claim 15 and its dependent claims are allowable over Ohtsuka. Claim 24 having similar limitations is also allowable for at least the same reasons. Claims 25 – 31, depending from claim 24 are allowable for at least the same reasons.

Next the Examiner rejected claims 15 – 17, 19, 21, 22, 24, 25, 27, 29, and 30 under 35 U.S.C. § 102(b) as being anticipated by Grinderslev. The Examiner stated that in Figs. 1-5, Grinderslev discloses

> an adapter (10) for aligning fiber optic ferrules (Fig. 20, 301) inserted from opposing sides comprising:
> a main body (1) having an opening comprising interface (2) defined by two opposing side walls, a top surface and a bottom surface, the opening comprising interface (2) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body (l); and
> a plurality of grooves (131, 141) disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves (131, 141) extending into the central portion from each of the first side and the second side. *See* pages 7-10 of the English translation of Grinderslev for further details.

Again, the Examiner has failed to specfically point out the central portion in Grinderslev and merely refers the Applicant to three pages of text. And Applicant notes that page 10 does not even refer to the embodiments in Figs. 1-5, but rather Figs. 8-17.

The grooves 131 and 141 are recesses that are used with clamping arms 30 of the clamping member 3 so that they may be received within those recesses to connect two adajaent adapters together. See Fig. 1. Again, as with Ohtsuka above, the alleged recesses do not meet the claim limitation that the plurality of grooves extend into the central portion from each of the first side and the second side. For at least this reason, claim 15 and its dependent claims, as well as claim 24 and its dependent claims since they have the same limitations, are allowable.

With regard to the dependent claims, those may have other elements or limitations that provide an additional reason for allowance. For example, claim 17 requires a wall with at least one passage. The Examiner has alleged that is shown in Fig. 22. However, Fig. 22 does not disclose the plurality of grooves in the top and bottom surface of the central portion. Thus, this claim is allowable for this additional reason.

For claim 19, the Examiner has again improperly combined the disclosure in Figs. 1-5 with the alternative embodiment in Fig. 22. For the same reasons as discussed with regard to claim 17, this claim is also allowable.

Claim 21 requires that the first and second sides receive a plurality of optical ferrules. The Examiner has alleged that adapter 10 can receive a plurality of optical ferrules. However, the first and second sides are in an opening that is defined by two opposing side walls, a top surface, and a bottom surface. That is not the case for the adapter in Grinderslev. That adapter can receive only one optical ferrule in each opening, albeit that there are six openings in each of the adapters. Thus, this claim is allowable for this additional reason.

The claims depending from claim 24 have similar limitations as do the claims depending from claim 15. Thus, these claims are allowable for the same additional reasons.

Finally, the Examiner rejected claims 20 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Ohtsuka or Grinderslev as applied to claims 15 or 24 and further in view of Benner et al. Benner et al. was cited for the EMI shielding. However, Benner et al. fails to cure the deficiencies of Ohtsuka or Grinderslev. Thus, these claims are allowable by way of their dependence on the independent claims.

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,

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Date: September 27, 2019

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/214,317	12/10/2018	Hiep V. Nguyen	USCO-053-03	7700

152017 7590 **06**/27/2019

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EXAMINER
ROJAS, OMAR R

ART UNIT	PAPER NUMBER
2883	

NOTIFICATION DATE	DELIVERY MODE
06/27/2019	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

Office Action Summary	Application No. 16/214,317	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 --

Period for Reply

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

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

Status

1)☐ Responsive to communication(s) filed on _____.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 15-31 is/are pending in the application.

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 15-31 is/are rejected.

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

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

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

Application Papers

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

11)☑ The drawing(s) filed on 12/10/2018 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☑ Other: CN-202600189-U, WO-2013179197-A1.

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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 12/31/2018 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 the "at least one passage" recited by claim 17.

Claim Rejections - 35 USC § 112

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

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

> The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 18, 23, 26, and 31 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

6. Claim 18 recites the limitation "the at least one passage" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 26 also recites the limitation "the at least one passage" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

8. Claims 23 and 31 are rejected under this section as being dependent upon rejected claim 18 or 26.

9. For purposes of this examination, it is presumed that claim 18 is meant to dependent upon claim 17 which does recite “at least one passage”.

10. For purposes of this examination, it is presumed that claim 26 is meant to dependent upon claim 25 which does recite “at least one passage”.

Claim Rejections - 35 USC § 102

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

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

12. Claim(s) 15, 16, 19, 21, 24, 27, and 29 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Patent No. 6,293,708 to Ohtsuka et al. (hereinafter “Ohtsuka”).

In re claim 15, Ohtsuka discloses, see FIGS. 3-12, an adapter (11) for aligning fiber optic ferrules (2, 5) inserted from opposing sides comprising:

a main body having an opening (11a) defined by two opposing side walls, a top surface and a bottom surface, the opening (11a) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body; and

a plurality of grooves (11c-11f) disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves (11c-11f) extending into the central portion from

each of the first side and the second side. *See* columns 7-10 of Ohtsuka for further details.

In re claim 16, the opening (11a) having at least one groove (11c) therein and extending in a direction from the first side to the second side.

In re claim 19, as seen in FIG. 4B, the opening (11a) in the central portion of the main body is smaller than the opening (11a) in the first and second sides.

In re claim 21, as seen in FIG. 6, the first and second sides are configured to receive a plurality of optical ferrules (2, 5).

In re claim 24, Ohtsuka discloses, see FIGS. 3-12, an adapter (11) for aligning fiber optic ferrules (2, 5) inserted from opposing sides comprising;

a main body having an opening (11a) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body, the main body having at least one groove (11c) in the opening (11a) and extending in a direction from the first side to the second side; and

a plurality of grooves (11d-11f) disposed in a top surface and bottom surface of the central portion, each of the plurality of grooves (11d-11f) extending into the central portion from each of the first side and the second side. *See* columns 7-10 of Ohtsuka for further details.

In re claim 27, as seen in FIG. 4B, the opening (11a) in the central portion of the main body is smaller than the opening (11a) in the first and second sides.

In re claim 29, as seen in FIG. 6, the first and second sides are configured to receive a plurality of optical ferrules (2, 5).

13. Claim(s) 15-17, 19, 21, 22, 24, 25, 27, 29, and 30 is/are rejected under 35 U.S.C. 102(a) as being anticipated by Chinese Patent Publication No. CN 202600189 U to GRINDERSLEV et al. (hereinafter "Grinderslev"). International Publication No. WO 2013/179197 A1 is part of the same patent family as Grinderslev and is being provided with this Office action as an English translation of Grinderslev.

In re claim 15, Grinderslev discloses, see Figs. 1-5, an adapter (10) for aligning fiber optic ferrules (Fig. 20, 301) inserted from opposing sides comprising:

a main body (1) having an opening comprising interface (2) defined by two opposing side walls, a top surface and a bottom surface, the opening comprising interface (2) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body (1); and

a plurality of grooves (131, 141) disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves (131, 141) extending into the central portion from each of the first side and the second side. *See* pages 7-10 of the English translation of Grinderslev for further details.

In re claim 16, the opening comprising interface (2) has at least one groove (111/121) therein and extending in a direction from the first side to the second side.

In re claim 17, the adapter (10) further comprises a wall corresponding to a splicing portion

(202) shown in Fig. 22 that is disposed within and across the central portion of the main body (1) 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 (301) inserted from the first and second sides to pass therethrough.

In re claim 19, the opening comprising interface (2) in the central portion of the main body (1) is inherently smaller than the opening comprising interface (2) in the first and second sides due to the presence of a wall corresponding to a splicing portion (202) shown in Fig. 22.

In re claim 21, the first and second sides are configured to receive a plurality of optical ferrules (301).

In re claim 22, as seen in Fig. 5, the plurality of grooves (131, 141) each have a width that varies and, thus, the grooves (131) in the top surface of the central portion have a first width that is different than a second width of the plurality of grooves (141) in the bottom surface.

In re claim 24, Grinderslev discloses, see Figs. 1-5, an adapter (10) for aligning fiber optic ferrules (Fig. 20, 301) inserted from opposing sides comprising;

a main body (1) having an opening comprising interface (2) extending between a first side and a second side, the first side and the second side separated by a central portion inside the main body (1), the main body (1) having at least one groove (111/121) in the opening comprising interface (2) and extending in a direction from the first side to the second side; and

a plurality of grooves (131-141) disposed in a top surface and bottom surface of the central portion, each of the plurality of grooves (131-141) extending into the central portion from

each of the first side and the second side. *See* pages 7-10 of the English translation of Grinderslev for further details.

In re claim 25, the adapter (10) further comprises a wall corresponding to a splicing portion (202) shown in Fig. 22 that is disposed within and across the central portion of the main body (1) 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 (301) inserted from the first and second sides to pass therethrough.

In re claim 27, the opening comprising interface (2) in the central portion of the main body (1) is inherently smaller than the opening comprising interface (2) in the first and second sides due to the presence of a wall corresponding to a splicing portion (202) shown in Fig. 22.

In re claim 29, the first and second sides are configured to receive a plurality of optical ferrules (301).

In re claim 30, as seen in Fig. 5, the plurality of grooves (131, 141) each have a width that varies and, thus, the grooves (131) in the top surface of the central portion have a first width that is different than a second width of the plurality of grooves (141) in the bottom surface.

Claim Rejections - 35 USC § 103

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

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

15. Claims 20 and 28 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohtsuka or Grinderslev as applied to claim 15 or 24 above, and further in view of Patent Publication No. US 2002/0172469 A1 to Benner et al. ("Benner").

In re claims 20 and 28, Ohtsuka or Grinderslev only differs in that neither reference teaches an conductive elastomeric gasket encircling an external surface of their adapter to provide EMI shielding to the adapter. Benner, on the other hand, teaches an conductive elastomeric gasket (62) encircling an external surface of an adapter (10) to provide EMI shielding to the adapter. *See* paragraphs [0025]-[0030] of Benner. In order to prevent EMI interference, an external surface of the adapter of Ohtsuka or Grinderslev would have been modified to be encircled by the gasket (62) of Benner, thereby obtaining the invention specified by claims 20 and 28. Therefore, it would have been obvious to one ordinary skill in the art before the effective filing date of the claimed invention to obtain the invention specified by claim 20 or 28 in view of Ohtsuka or Grinderslev combined with Benner.

Allowable Subject Matter

16. Claims 18, 23, 26, and 31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

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 on Monday-Friday, 10AM-6PM EST.

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

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

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

/Omar R Rojas/
Primary Examiner
Art Unit 2883

or
June 22, 2019

Notice of References Cited	Application/Control No. 16/214,317	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-6293708-B1	09-2001	Ohtsuka; Kenichiro	G02B6/3825	385/62
*	B	US-20020172469-A1	11-2002	Benner, Ryan T.	G02B6/3825	385/55
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	O	WO-2013179197-A1	12-2013	WO	TONG ZHAOYANG	H01R9/2408
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/214,317	Nguyen et al.
	Examiner	Art Unit
	Omar R Rojas	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 15/855,750	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/21/2019	/ORR/
EAST (PGPUB,USPAT,FPRS,EPAB,JPAB,DWPI,IBMT) - See Search History Printout.	06/22/2019	/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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EAST Search History

EAST Search History (Prior Art)

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S375	219	S370 and S371	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/21 19:25
S374	732	(US-20010041030-$ or US-20020025125-$ or US-20020106162-$ or US-20020114589-$ or US-20020159710-$ or US-20030031452-$ or US-20030044127-$ or US-20030044125-$ or US-20030180004-$ or US-20030223703-$ or US-20040008494-$ or US-20040017983-$ or US-20040017981-$ or US-20040038558-$ or US-20040052472-$ or US-20040062498-$ or US-20040105628-$ or US-20040131317-$ or US-20040223699-$ or US-20040228589-$ or US-20050036744-$ or US-20050053342-$ or US-20050111795-$ or US-20050123246-$ or US-20050135755-$ or US-20050135752-$).did. or (US-20050271328-$ or US-20060045430-$ or US-20060051028-$ or US-20060093282-$ or US-20060153504-$ or US-20060193562-$ or US-20060280409-$ or US-20060285807-$ or US-20070058907-$ or US-20070098327-$ or US-20070160327-$ or US-20080069501-$ or US-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/06/21 19:25

		20080112672-$ or US-20080124031-$ or US-20080131055-$ or US-20080253719-$ or US-20090003772-$ or US-20090290839-$ or US-20090305542-$ or US-20100322561-$ or US-20110038590-$ or US-20110075971-$ or US-20110091159-$ or US-20110222819-$ or US-20110249942-$ or US-20120027355-$ or US-20120057824-$).did. or (US-20120076459-$ or US-20120082416-$ or US-20120099822-$ or US-20120141070-$ or US-20120251054-$ or US-20120251051-$ or US-20120263423-$ or US-20120263419-$ or US-20120308183-$ or US-20130051749-$ or US-20130064508-$ or US-20130077914-$ or US-20130121645-$ or US-20130129280-$ or US-20130183001-$ or US-20130216189-$ or US-20130230283-$ or US-20130259429-$ or US-20130272671-$ or US-20130308908-$ or US-20140056560-$ or US-20140064665-$ or US-20140064688-$ or US-20140072265-$ or US-20140086545-$ or US-20140147081-$ or US-20140205241-$).did. or (US-20140219614-$ or US-20140219624-$ or US-20140314385-$ or US-20140341510-$ or US-20150003785-$ or US-20150023637-$ or US-20150049989-$ or US-20150071591-$ or US-20150177463-$ or US-20150226926-$ or US-20150241644-$ or US-20150301286-$ or US-20150331201-$ or US-20150338583-$ or US-20150370017-$ or US-20150378112-$ or US-20160004018-$ or US-20160004016-$ or US-20160025937-$ or US-20160077287-$ or US-20160077284-$ or US-20160109661-$ or US-20160131854-$ or US-20160131849-$ or US-20160161680-$ or US-20160178859-$ or US-20160259135-$).did. or (US-20160282566-$ or US-20160282562-$ or US-20160320571-$ or US-20160349464-$ or US-20170059784-$ or US-20170090128-$ or US-20170090127-$ or US-20170102506-$ or US-20170102504-$ or US-20170108653-$ or US-20170115457-$ or US-20170139150-$ or US-20170153398-$ or US-20170184798-$ or US-20170184790-$ or US-20170205587-$ or US-20170219779-$ or US-20170227720-$ or US-20170235060-$ or US-20170242200-$ or US-20170242199-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170261698-$ or US-20170269309-$ or US-20170276883-$).did. or (US-				

		20170276881-$ or US-20170293088-$ or US-20170293087-$ or US-20170307831-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170357060-$ or US-20170357059-$ or US-20170363827-$ or US-20180003903-$ or US-20180011258-$ or US-20180011254-$ or US-20180031774-$ or US-20180052288-$ or US-20180077472-$ or US-20180081128-$ or US-20180081125-$ or US-20180088288-$ or US-20180088287-$ or US-20180088286-$ or US-20180088283-$ or US-20180106973-$ or US-20180156988-$ or US-20180156985-$ or US-20180210154-$).did. or (US-4240695-$ or US-4320938-$ or US-4330172-$ or US-4477146-$ or US-4687291-$ or US-4737009-$ or US-4854664-$ or US-4856866-$ or US-4886335-$ or US-4915472-$ or US-4953929-$ or US-4955976-$ or US-5064268-$ or US-5076656-$ or US-5082346-$ or US-5082344-$ or US-5101463-$ or US-5134673-$ or US-5157749-$ or US-5166995-$ or US-5199093-$ or US-5259052-$ or US-5555332-$ or US-5666456-$ or US-5692080-$ or US-5867894-$).did. or (US-5870515-$ or US-5883995-$ or US-5920670-$ or US-5920669-$ or US-5984533-$ or US-6012852-$ or US-6095695-$ or US-6210045-$ or US-6250817-$ or US-6305849-$ or US-6318902-$ or US-6331079-$ or US-6379052-$ or US-6409392-$ or US-6422761-$ or US-6422760-$ or US-6450698-$ or US-6487343-$ or US-6491442-$ or US-6533465-$ or US-6554486-$ or US-6623172-$ or US-6688782-$ or US-6712521-$ or US-6764222-$ or US-6839583-$ or US-6848834-$).did. or (US-6944378-$ or US-7036996-$ or US-8388235-$ or US-9207454-$ or US-9316791-$ or US-9377591-$ or US-9389368-$ or US-9482820-$ or US-9606303-$ or US-9625657-$ or US-9664864-$ or US-9678283-$ or US-9678286-$ or US-9684134-$ or US-9696497-$ or US-9703062-$ or US-9709753-$ or US-9726830-$ or US-9733436-$ or US-9733434-$ or US-9798096-$ or US-9804342-$ or US-9804340-$ or US-9804337-$ or US-9829650-$ or US-9835808-$ or US-9846283-$).did. or (US-9851512-$ or US-9891390-$ or US-9904019-$ or US-9910229-$ or US-9927582-$ or US-9939589-$ or US-9946037-$).did. or (IT-7819792-$ or FR-2363124-$ or IT-7925110-$ or GB-2057158-$ or FR-2487528-$ or GB-2081468-$ or EP-					

		0061243-$ or DK-208682-$ or GB-8306227-$ or IT-8323399-$ or JP-S5856846-$ or EP-0125398-$ or FR-2535069-$ or WO-8600147-$ or EP-0249237-$ or EP-0262847-$ or EP-0262631-$ or DE-8626183-$ or WO-9015350-$ or EP-0408852-$ or GB-9103604-$ or GB-9106183-$ or CA-2030897-$ or DE-9107960-$ or GB-9206076-$ or CA-2057559-$).did. or (CA-2082276-$ or EP-0633485-$ or EP-0690319-$ or CA-2191600-$ or EP-0696748-$ or EP-0697608-$ or CN-1118443-$ or WO-9627811-$ or EP-0758099-$ or WO-9734176-$ or CA-2198522-$ or EP-0803750-$ or NL-1003147-$ or EP-0807837-$ or CA-2254335-$ or CA-2294930-$ or CA-2262351-$ or EP-0938003-$ or JP-2945144-$ or CA-2324565-$ or GB-9919699-$ or EP-0992819-$ or CA-2284331-$ or GB-0007281-$ or CA-2288249-$ or DE-19728960-$ or EP-1033595-$).did. or (EP-1033594-$ or EP-1039324-$ or EP-1039322-$ or EP-1041416-$ or EP-1041414-$ or JP-3106420-$ or CA-2321428-$ or EP-1091225-$ or WO-0137010-$ or EP-1107031-$ or KR-20010062142-$ or WO-0155762-$ or EP-1124147-$ or WO-0161397-$ or WO-0181965-$ or CA-2350290-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or KR-20020000530-$ or KR-20020001574-$ or CN-1331421-$ or EP-1172672-$ or EP-1172673-$ or KR-20020006481-$ or KR-20020006480-$ or DE-20118858-$).did. or (CA-2418331-$ or KR-20020050140-$ or WO-02056060-$ or WO-02061481-$ or DE-10114144-$ or NL-1018440-$ or WO-03016975-$ or WO-03093883-$ or CA-2484569-$ or EP-1394584-$ or AU-2003291687-$ or EP-1530068-$ or CA-2503690-$ or CN-1677147-$ or CN-1707299-$ or WO-2008006402-$ or EP-1887395-$ or CN-101122658-$ or WO-2008029850-$ or CA-2662854-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or CA-2689768-$ or EP-2206458-$ or WO-2010137426-$ or CA-2762411-$).did. or (EP-2302431-$ or WO-2011139938-$ or WO-2011152874-$ or EP-2444827-$ or WO-2012054174-$ or WO-2012054174-$ or WO-2012151175-$ or GB-201218194-$ or CN-102870023-$ or WO-2013115791-$ or WO-2013115789-$ or WO-2013126068-$ or CA-2912155-$ or WO-2014009463-$ or WO-2014011898-$ or EP-2700992-$ or JP-5433802-$ or WO-2014049469-$ or WO-2014113753-$ or CA-2836675-$ or WO-2014143748-$ or WO-2014165175-$ or WO-2014197701-$ or				

		CN-104241938-$ or CA-2917189-$ or EP-2840425-$ or EP-2843452-$).did. or (WO-2015028433-$ or CA-2885821-$ or WO-2015068103-$ or CA-2932688-$ or GB-201507758-$ or WO-2015103783-$ or WO-2015116589-$ or CN-204595258-$ or WO-2015144883-$ or EP-2942653-$ or EP-2947485-$ or WO-2015190211-$ or WO-2016004347-$ or CN-105278047-$ or DE-202013012295-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or CA-2928026-$ or WO-2016043922-$ or JP-5905950-$ or WO-2016067668-$ or EP-3021145-$ or WO-2016082160-$ or WO-2016103821-$ or DE-202016103178-$ or EP-3054333-$).did. or (WO-2016161341-$ or WO-2017038704-$ or JP-6173629-$ or WO-2017180257-$ or CN-206584076-$ or EP-3258301-$ or WO-2018003776-$ or WO-2018004847-$).did. or (JP-54034251-$ or JP-55101904-$ or JP-56066811-$ or JP-56074211-$ or JP-59075218-$ or JP-04214510-$ or JP-04220604-$ or JP-05313040-$ or JP-08015541-$ or JP-09005575-$ or JP-09033756-$ or JP-10104469-$ or JP-11072659-$ or JP-2000089061-$ or JP-2000284146-$ or JP-2000292655-$ or JP-2000310724-$ or JP-2001013372-$ or JP-2001021764-$ or JP-2001242361-$ or JP-2009294343-$ or JP-2012053420-$ or JP-2012078513-$ or JP-2015022131-$).did. or (DE-2805949-$ or DE-2932986-$ or GB-2057158-$ or GB-2081468-$ or EP-61243-$ or GB-2098354-$ or DE-3208797-$ or EP-125398-$ or US-4496213-$ or WO-8600147-$ or EP-249237-$ or EP-262631-$ or US-4953929-$ or WO-9015350-$ or GB-2241794-$ or US-5064268-$ or WO-9117540-$ or EP-458608-$ or US-5101463-$ or EP-490698-$ or EP-505197-$ or EP-430107-$ or EP-660145-$ or EP-660144-$ or EP-663602-$ or EP-663601-$).did. or (WO-9600917-$ or EP-696748-$ or EP-697608-$ or WO-9627811-$ or EP-758099-$ or WO-9734176-$ or EP-803750-$ or US-5692080-$ or WO-9746900-$ or WO-9857208-$ or WO-9947958-$ or GB-2341455-$ or EP-1041416-$ or EP-1041414-$ or EP-1091225-$ or WO-0140839-$ or EP-1107031-$ or EP-1124147-$ or WO-0181965-$ or US-20010041030-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or EP-1172673-$ or EP-1172672-$ or DE-20118858-$ or WO-02056060-$).did. or (US-6422760-$ or WO-02061481-$ or US-20030031437-$ or US-20030044125-$ or WO-03094297-$ or				

		WO-03093883-$ or EP-1394584-$ or US-20040062498-$ or US-20040223699-$ or US-20040228589-$ or US-20050053342-$ or WO-2006022840-$ or US-20060153503-$ or US-20060165352-$ or US-20060193562-$ or EP-1752805-$ or US-20070058907-$ or US-20070077010-$ or US-20070098327-$ or US-20090041411-$ or US-20090060423-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or EP-2206458-$ or WO-2010137426-$ or EP-2302431-$).did. or (US-20110249942-$ or US-20110274437-$ or WO-2011152874-$ or KR-2012000895-$ or US-20120027355-$ or US-20120057824-$ or US-20120082416-$ or EP-2444827-$ or US-20120099822-$ or US-20120251051-$ or US-20120251054-$ or US-20120263419-$ or WO-2012151175-$ or US-20120308183-$ or CN-102870023-$ or TW-201309089-$ or US-20130051749-$ or WO-2013036843-$ or CN-103091793-$ or US-20130121645-$ or WO-2013115789-$ or WO-2013115791-$ or WO-2013122865-$ or WO-2013126068-$ or US-20130230283-$ or US-20130259429-$ or WO-2013155395-$).did. or (WO-2013177234-$ or WO-2014011898-$ or US-20140016901-$ or EP-2700992-$ or JP-5433802-$ or US-20140064688-$ or TW-474924-$ or WO-2014049469-$ or US-20140147081-$ or US-20140153879-$ or ES-1110405-$ or WO-2014113753-$ or EP-2759860-$ or US-20140219624-$ or WO-2014143748-$ or WO-2014165175-$ or US-20140321808-$ or US-20140363131-$ or WO-2014197701-$ or EP-2818903-$ or WO-2015009435-$ or US-20150023637-$ or US-20150049989-$ or WO-2015028433-$ or WO-2015068103-$ or WO-2015070382-$ or US-20150162982-$).did. or (US-20150177463-$ or WO-2015103783-$ or WO-2015116589-$ or US-20150219864-$ or US-20150226926-$ or US-20150226925-$ or US-20150241644-$ or CN-104950402-$ or WO-2015144883-$ or US-20150286012-$ or DE-102015106225-$ or US-20150331201-$ or EP-2947485-$ or WO-2015190211-$ or US-20150378110-$ or US-20160004016-$ or US-20160004018-$ or US-20160025937-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or WO-2016033577-$ or WO-2016033578-$ or WO-2016033579-$ or WO-2016033580-$ or WO-2016043922-$ or				

		JP-5905950-$).did. or (US-20160124158-$ or US-20160131854-$ or EP-3021145-$ or US-20160161680-$ or US-20160178852-$ or US-20160178859-$ or US-9377591-$ or US-9389368-$ or EP-3054333-$ or US-20160259135-$ or CN-105978629-$ or US-20160282566-$ or WO-2016161341-$ or US-20160306125-$ or US-9482820-$ or US-20160341908-$ or US-20160341911-$ or US-20160349466-$ or US-20160377819-$ or US-20170031106-$ or US-20170059784-$ or WO-2017038704-$ or US-20170090127-$ or US-20170102504-$ or US-20170115457-$ or US-20170139150-$ or US-20170139156-$).did. or (US-20170153398-$ or US-9678283-$ or US-20170184790-$ or US-9709753-$ or US-20170205587-$ or JP-6173629-$ or US-20170219779-$ or US-9726830-$ or US-20170227720-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170293088-$ or US-20170307830-$ or US-9804340-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170371109-$ or US-20180003903-$ or US-20180011258-$ or US-20180052288-$ or US-20180081128-$ or US-20180106973-$ or US-20180120519-$ or US-20180128988-$).did.				
S373	1140	(US-20010010741-$ or US-20010016102-$ or US-20010033730-$ or US-20010038737-$ or US-20010043776-$ or US-20010048790-$ or US-20020006253-$ or US-20020012503-$ or US-20020012502-$ or US-20020012501-$ or US-20020012238-$ or US-20020025121-$ or US-20020025099-$ or US-20020028055-$ or US-20020031310-$ or US-20020031309-$ or US-20020061171-$ or US-20020064349-$ or US-20020081076-$ or US-20020090177-$ or US-20020094727-$ or US-20020106167-$ or US-20020114581-$ or US-20020118926-$ or US-20020126961-$ or US-20020131720-$).did. or (US-20020150344-$ or US-20020150343-$ or US-20020150353-$ or US-20020150346-$ or US-20020150345-$ or US-20020150342-$ or US-20020159745-$ or US-20020159714-$ or US-20020159712-$ or US-20020168149-$ or US-20020166226-$ or US-20020172469-$ or US-20020177364-$ or US-20020181888-$ or US-20020181884-$ or US-20020186934-$ or US-20020186742-$ or US-20020191881-$ or US-	US-PGPUB; USPAT; JPO	OR	ON	2019/06/21 19:25

		20020197017-$ or US-20020197018-$ or US-20030002816-$ or US-20030002808-$ or US-20030007739-$ or US-20030012512-$ or US-20030031449-$ or US-20030031422-$ or US-20030044122-$).did. or (US-20030044115-$ or US-20030053760-$ or US-20030063868-$ or US-20030063866-$ or US-20030063862-$ or US-20030068135-$ or US-20030072536-$ or US-20030081905-$ or US-20030087505-$ or US-20030091292-$ or US-20030095780-$ or US-20030095779-$ or US-20030103730-$ or US-20030108320-$ or US-20030113086-$ or US-20030128934-$ or US-20030142918-$ or US-20030147597-$ or US-20030147230-$ or US-20030156796-$ or US-20030169975-$ or US-20030169974-$ or US-20030174996-$ or US-20030174972-$ or US-20030174922-$ or US-20030180005-$ or US-20030185520-$).did. or (US-20030189214-$ or US-20030194188-$ or US-20030198029-$ or US-20030231838-$ or US-20040013369-$ or US-20040028340-$ or US-20040033050-$ or US-20040033028-$ or US-20040033027-$ or US-20040036987-$ or US-20040042710-$ or US-20040052471-$ or US-20040054761-$ or US-20040062488-$ or US-20040062486-$ or US-20040072454-$ or US-20040071438-$ or US-20040074852-$ or US-20040081418-$ or US-20040091228-$ or US-20040101253-$ or US-20040105325-$ or US-20040105278-$ or US-20040120652-$ or US-20040131315-$ or US-20040136656-$ or US-20040141692-$).did. or (US-20040151464-$ or US-20040151438-$ or US-20040156592-$ or US-20040161204-$ or US-20040165830-$ or US-20040179787-$ or US-20040184740-$ or US-20040182971-$ or US-20040197053-$ or US-20040202431-$ or US-20040208459-$ or US-20040223701-$ or US-20040240793-$ or US-20040247255-$ or US-20040264873-$ or US-20040266257-$ or US-20040264908-$ or US-20040264876-$ or US-20050008300-$ or US-20050013547-$ or US-20050041928-$ or US-20050069263-$ or US-20050074211-$ or US-20050094948-$ or US-20050094943-$ or US-20050112939-$ or US-20050111796-$).did. or (US-20050118880-$ or US-20050135753-$ or US-20050141817-$ or US-20050185894-$ or US-20050207708-$ or US-20050215119-$ or US-					

		20050220423-$ or US-20050220420-$ or US-20050226586-$ or US-20050232552-$ or US-20050238289-$ or US-20050281526-$ or US-20050281509-$ or US-20050286833-$ or US-20050286835-$ or US-20060013539-$ or US-20060056769-$ or US-20060072878-$ or US-20060083468-$ or US-20060083467-$ or US-20060088248-$ or US-20060093275-$ or US-20060098914-$ or US-20060133758-$ or US-20060140542-$ or US-20060147156-$ or US-20060147155-$).did. or (US-20060154529-$ or US-20060153503-$ or US-20060159401-$ or US-20060159399-$ or US-20060169856-$ or US-20060177182-$ or US-20060197943-$ or US-20060204200-$ or US-20060204180-$ or US-20060245711-$ or US-20060263011-$ or US-20060269205-$ or US-20060269206-$ or US-20060269212-$ or US-20070019913-$ or US-20070036487-$ or US-20070098330-$ or US-20070098329-$ or US-20070105452-$ or US-20070116414-$ or US-20070116411-$ or US-20070140623-$ or US-20070154135-$ or US-20070165984-$ or US-20070183780-$ or US-20070190834-$ or US-20070196053-$).did. or (US-20070196052-$ or US-20070201808-$ or US-20070201798-$ or US-20070212002-$ or US-20070223862-$ or US-20070230874-$ or US-20070263959-$ or US-20070280599-$ or US-20070285194-$ or US-20070297725-$ or US-20080008425-$ or US-20080013897-$ or US-20080013891-$ or US-20080019642-$ or US-20080019656-$ or US-20080044139-$ or US-20080050072-$ or US-20080085082-$ or US-20080095502-$ or US-20080095501-$ or US-20080100456-$ or US-20080170827-$ or US-20080175541-$ or US-20080175550-$ or US-20080175542-$ or US-20080175546-$ or US-20080175545-$).did. or (US-20080175532-$ or US-20080193086-$ or US-20080205825-$ or US-20080240658-$ or US-20080269845-$ or US-20080267566-$ or US-20080273837-$ or US-20080279503-$ or US-20080304792-$ or US-20080310796-$ or US-20080310800-$ or US-20080310795-$ or US-20080317411-$ or US-20090010600-$ or US-20090028507-$ or US-20090034912-$ or US-20090047800-$ or US-20090046981-$ or US-20090060422-$ or US-20090060418-$ or US-20090074359-$ or US-				

		20090103878-$ or US-20090116791-$ or US-20090148101-$ or US-20090156043-$ or US-20090185778-$ or US-20090202214-$).did. or (US-20090214164-$ or US-20090226141-$ or US-20090226137-$ or US-20090232455-$ or US-20090232454-$ or US-20090257722-$ or US-20090257719-$ or US-20090274431-$ or US-20090274432-$ or US-20090285534-$ or US-20090285530-$ or US-20090290838-$ or US-20090304335-$ or US-20100002999-$ or US-20100021111-$ or US-20100029117-$ or US-20100027944-$ or US-20100027943-$ or US-20100046893-$ or US-20100054665-$ or US-20100061681-$ or US-20100074616-$ or US-20100080513-$ or US-20100092134-$ or US-20100092131-$ or US-20100104355-$ or US-20100111484-$).did. or (US-20100129032-$ or US-20100129028-$ or US-20100135618-$ or US-20100141934-$ or US-20100146764-$ or US-20100158444-$ or US-20100183265-$ or US-20100202730-$ or US-20100202737-$ or US-20100209063-$ or US-20100209050-$ or US-20100215318-$ or US-20100215322-$ or US-20100226654-$ or US-20100232757-$ or US-20100239220-$ or US-20100239213-$ or US-20100247057-$ or US-20100247040-$ or US-20100260457-$ or US-20100266245-$ or US-20100272408-$ or US-20100278497-$ or US-20100278488-$ or US-20100284655-$ or US-20100296792-$ or US-20100303408-$).did. or (US-20100322580-$ or US-20100322576-$ or US-20100322554-$ or US-20100329604-$ or US-20100329602-$ or US-20110019964-$ or US-20110038592-$ or US-20110038581-$ or US-20110044583-$ or US-20110058772-$ or US-20110075969-$ or US-20110081798-$ or US-20110081116-$ or US-20110085774-$ or US-20110085765-$ or US-20110091166-$ or US-20110091154-$ or US-20110103797-$ or US-20110116748-$ or US-20110123156-$ or US-20110129186-$ or US-20110142398-$ or US-20110150396-$ or US-20110158593-$ or US-20110158586-$ or US-20110170830-$ or US-20110176777-$).did. or (US-20110188809-$ or US-20110188000-$ or US-20110194828-$ or US-20110200286-$ or US-20110198324-$ or US-20110200294-$ or US-20110206335-$ or US-20110206325-$ or US-20110206324-$ or US-				

		20110211792-$ or US-20110229094-$ or US-20110243508-$ or US-20110243505-$ or US-20110243504-$ or US-20110268391-$ or US-20110293223-$ or US-20110299814-$ or US-20110311186-$ or US-20110317976-$ or US-20120002928-$ or US-20120002925-$ or US-20120033918-$ or US-20120039569-$ or US-20120057831-$ or US-20120057830-$ or US-20120057827-$ or US-20120063735-$).did. or (US-20120069348-$ or US-20120099870-$ or US-20120106901-$ or US-20120114295-$ or US-20120128307-$ or US-20120141084-$ or US-20120155808-$ or US-20120163757-$ or US-20120170895-$ or US-20120195555-$ or US-20120219253-$ or US-20120224823-$ or US-20120237223-$ or US-20120237171-$ or US-20120243831-$ or US-20120243829-$ or US-20120251067-$ or US-20120252244-$ or US-20120251050-$ or US-20120257859-$ or US-20120263426-$ or US-20120294572-$ or US-20120301088-$ or US-20120301080-$ or US-20120321269-$ or US-20120321266-$ or US-20120321254-$).did. or (US-20130011099-$ or US-20130064517-$ or US-20130071068-$ or US-20130071067-$ or US-20130084041-$ or US-20130094827-$ or US-20130094815-$ or US-20130094811-$ or US-20130101257-$ or US-20130108231-$ or US-20130121643-$ or US-20130129285-$ or US-20130156379-$ or US-20130156382-$ or US-20130163937-$ or US-20130163933-$ or US-20130170797-$ or US-20130170796-$ or US-20130183018-$ or US-20130195405-$ or US-20130195418-$ or US-20130209040-$ or US-20130209049-$ or US-20130209052-$ or US-20130209051-$ or US-20130209050-$ or US-20130209041-$).did. or (US-20130216186-$ or US-20130216188-$ or US-20130284844-$ or US-20130287358-$ or US-20130302004-$ or US-20130322828-$ or US-20130323940-$ or US-20130322826-$ or US-20130330957-$ or US-20130343764-$ or US-20130343707-$ or US-20140016902-$ or US-20140023322-$ or US-20140038462-$ or US-20140044394-$ or US-20140064690-$ or US-20140064664-$ or US-20140072297-$ or US-20140072263-$ or US-20140082913-$ or US-20140093210-$ or US-20140104808-$ or US-20140126875-$ or US-20140126874-$ or US-				

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		5774612-$ or US-5778122-$ or US-5781680-$ or US-5796896-$ or US-5799122-$ or US-5809191-$ or US-5815618-$ or US-5818993-$ or US-5825955-$ or US-5832158-$ or US-5838856-$ or US-5838855-$ or US-5845036-$ or US-5862282-$ or US-5867621-$ or US-5881191-$ or US-5887100-$ or US-5887098-$ or US-5892870-$ or US-5896477-$ or US-5909526-$ or US-5909298-$).did. or (US-5915058-$ or US-5923805-$ or US-5930426-$ or US-5930425-$ or US-5937121-$ or US-5940561-$ or US-5940559-$ or US-5949946-$ or US-5953474-$ or US-5953473-$ or US-5956444-$ or US-5960137-$ or US-5969294-$ or US-5971626-$ or US-5980117-$ or US-5987203-$ or US-5993071-$ or US-6004043-$ or US-6022149-$ or US-6027252-$ or US-6041155-$ or US-6048103-$ or US-6048102-$ or US-6053639-$ or US-6059461-$ or US-6064791-$ or US-6076973-$).did. or (US-6076975-$ or US-6081647-$ or US-6079881-$ or US-6088502-$ or US-6095694-$ or US-6104856-$ or US-6102581-$ or US-6108482-$ or US-6116790-$ or US-6116789-$ or US-6116101-$ or US-6132105-$ or US-6139346-$ or US-6142676-$ or US-6149315-$ or US-6154597-$ or US-6164835-$ or US-6164834-$ or US-6173099-$ or US-6179480-$ or US-6179475-$ or US-6188827-$ or US-6188825-$ or US-6186670-$ or US-6190616-$ or US-6195477-$ or US-6193420-$).did. or (US-6196729-$ or US-6200040-$ or US-6206577-$ or US-6217226-$ or US-6220763-$ or US-6220762-$ or US-6224269-$ or US-6227719-$ or US-6227718-$ or US-6240229-$ or US-6238249-$ or US-6243526-$ or US-6247851-$ or US-6247849-$ or US-6256446-$ or US-6259839-$ or US-6264373-$ or US-6264372-$ or US-6267513-$ or US-6273618-$ or US-6290527-$ or US-6301004-$ or US-6302592-$ or US-6309111-$ or US-6318904-$ or US-6318903-$ or US-6334715-$).did. or (US-6349164-$ or US-6347889-$ or US-6347888-$ or US-6354746-$ or US-6357932-$ or US-6361218-$ or US-6364536-$ or US-6367986-$ or US-6367984-$ or US-6371659-$ or US-6377840-$ or US-6375363-$ or US-6384896-$ or US-6382843-$ or US-6382839-$ or US-6389212-$ or US-6402393-$ or US-6402390-$ or US-6402388-$ or US-6409391-$ or US-6412987-$ or US-6419810-$ or US-6422759-$ or US-6425692-$ or US-6425694-$ or US-				

		6431762-$ or US-6437894-$).did. or (US-6435946-$ or US-6445867-$ or US-6456768-$ or US-6457876-$ or US-6461055-$ or US-6461054-$ or US-6461053-$ or US-6466724-$ or US-6464406-$ or US-6467971-$ or US-6467970-$ or US-6471417-$ or US-6471412-$ or US-6474876-$ or US-6478472-$ or US-6481900-$ or US-6481899-$ or US-6485192-$ or US-6497518-$ or US-6497516-$ or US-6501900-$ or US-6508593-$ or US-6526210-$ or US-6524015-$ or US-6527450-$ or US-6533469-$ or US-6543941-$).did. or (US-6554482-$ or US-6558044-$ or US-6561699-$ or US-6572276-$ or US-6572273-$ or US-6582132-$ or US-6595696-$ or US-6601995-$ or US-6612750-$ or US-6619859-$ or US-6619856-$ or US-6632023-$ or US-6634794-$ or US-6644866-$ or US-6667803-$ or US-6695485-$ or US-6702477-$ or US-6702475-$ or US-6786647-$ or US-6789953-$ or US-6793399-$ or US-6840680-$ or US-6856748-$ or US-6895146-$ or US-7232261-$ or US-7435009-$ or US-7530845-$).did. or (US-7585118-$ or US-7588373-$ or US-7706657-$ or US-7738757-$ or US-7972066-$ or US-8070366-$ or US-8206040-$ or US-8517614-$ or US-8588571-$ or US-8953922-$ or US-9229177-$ or US-9229170-$ or US-9291781-$ or US-9316794-$ or US-9323007-$ or US-9448369-$ or US-9453972-$ or US-9482825-$ or US-9551831-$ or US-9625655-$ or US-9632267-$ or US-9638871-$ or US-9638868-$ or US-9645335-$ or US-9658407-$ or US-9671570-$ or US-9671568-$).did. or (US-9678282-$ or US-9696477-$ or US-9722367-$ or US-9720184-$ or US-9726829-$ or US-9735523-$ or US-9733123-$ or US-9739955-$ or US-9739952-$ or US-9739951-$ or US-9746625-$ or US-9746368-$ or US-9759874-$ or US-9759869-$ or US-9772457-$ or US-9772456-$ or US-9772453-$ or US-9784928-$ or US-9798090-$ or US-9797806-$ or US-9810860-$ or US-9810858-$ or US-9810856-$ or US-9817195-$ or US-9823428-$ or US-9829643-$ or US-9827438-$).did. or (US-9835807-$ or US-9841566-$ or US-9857545-$ or US-9857537-$ or US-9864151-$ or US-9869824-$ or US-9876309-$ or US-9874702-$ or US-9880365-$ or US-9880357-$ or US-9885841-$ or US-9893813-$ or US-9891392-$ or US-9891387-$ or US-9891385-$ or US-9897767-$ or US-9904021-$ or US-				

		9910228-$ or US-9910226-$ or US-9915793-$ or US-9933586-$ or US-9933583-$ or US-9933582-$ or US-9939600-$ or US-9939590-$ or US-9948017-$).did. or (US-9946036-$ or US-10007069-$ or US-10018787-$).did. or (JP-2016095432-$ or JP-2016095410-$ or JP-2016122100-$ or JP-2016177309-$ or JP-2016188927-$ or JP-2017053937-$ or JP-2017090798-$ or JP-2017111444-$ or JP-2017134118-$ or JP-2017138535-$ or JP-2017151338-$ or JP-2017219768-$).did.				
S376	135	S375 not (S372 S373 S374)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/21 19:32
S377	2	"60957473".FMID.	US-PGPUB; USPAT; FPRS	OR	ON	2019/06/21 21:35
S378	136	(US-20020176671-$ or US-20040017980-$ or US-20040126118-$ or US-20040197054-$ or US-20070172177-$ or US-20070286554-$ or US-20100008635-$ or US-20100129034-$ or US-20100290745-$ or US-20110116749-$ or US-20110222830-$ or US-20110229096-$ or US-20110229095-$ or US-20110225792-$ or US-20110255831-$ or US-20110262078-$ or US-20110262077-$ or US-20120014648-$ or US-20120063724-$ or US-20120275749-$ or US-20130136402-$ or US-20130315538-$ or US-20140286610-$ or US-20150016781-$ or US-20150110448-$ or US-20160124170-$).did. or (US-20160202429-$ or US-20170045691-$ or US-20170285277-$ or US-20170299820-$ or US-20180120519-$ or US-20180143380-$ or US-20180231722-$ or US-20180239093-$ or US-20180267255-$ or US-20180292618-$ or US-20180292612-$ or US-20180364421-$ or US-20190107679-$ or US-20190107678-$ or US-20190113691-$ or US-20190137701-$ or US-20190179085-$).did. or (US-5504825-$ or US-5613021-$ or US-5661826-$ or US-6045270-$ or US-6276840-$ or US-6293708-$ or US-6623170-$ or US-6796717-$ or US-6848840-$ or US-6866425-$ or US-6932514-$ or US-6944387-$ or US-6976793-$ or US-7094091-$ or US-7178994-$ or US-7182522-$ or US-7234874-$ or US-7241056-$ or US-7300216-$ or US-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/06/21 21:44

		7536075-$ or US-7654748-$ or US-7891882-$ or US-7912336-$ or US-8052333-$ or US-8231282-$ or US-8235600-$).did. or (US-8262296-$ or US-8317407-$ or US-8346047-$ or US-8348519-$ or US-8348518-$ or US-8376634-$ or US-8406583-$ or US-8417074-$ or US-8494329-$ or US-8496384-$ or US-8529138-$ or US-8542972-$ or US-8550725-$ or US-8550724-$ or US-8579521-$ or US-8690593-$ or US-8714835-$ or US-8821038-$ or US-8821037-$ or US-8915653-$ or US-8958679-$ or US-9014527-$ or US-9031364-$ or US-9057848-$ or US-9146376-$ or US-9146360-$ or US-9417401-$).did. or (US-9513442-$ or US-9541711-$ or US-9557497-$ or US-9563025-$ or US-9606297-$ or US-9632255-$ or US-9645318-$ or US-9658409-$ or US-9684139-$ or US-9739949-$ or US-9753228-$ or US-9772464-$ or US-9857538-$ or US-9977199-$ or US-9989710-$ or US-10012801-$ or US-10054747-$ or US-10061090-$ or US-10067302-$ or US-10067300-$ or US-10088636-$ or US-10101539-$ or US-10139570-$ or US-10146014-$ or US-10156684-$ or US-10209473-$).did. or (WO-2010083369-$ or EP-2380054-$ or CN-102282495-$ or WO-2014152675-$ or WO-2015043158-$ or CN-104516073-$ or CN-102282495-$ or WO-2018125706-$).did. or (JP-57044113-$).did. or (US-20160327757-$ or US-20170299820-$ or WO-2018125706-$ or US-20190107679-$).did.				
S379	10	"2013179197"	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/06/21 21:57
S380	4	("5129024" | "6331079" | "20110091158" | "5921796").PN.	US-PGPUB; USPAT	OR	ON	2019/06/22 09:51
S386	49261	(ferrule connector) with insert$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:30
S385	2082	S381 S382 S383 S384	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 10:30
S384	136	(US-20020176671-$ or US-20040017980-$ or US-20040126118-$ or US-20040197054-$ or US-	US-PGPUB; USPAT; FPRS; JPO;	OR	ON	2019/06/22 10:30

		20070172177-$ or US-20070286554-$ or US-20100008635-$ or US-20100129034-$ or US-20100290745-$ or US-20110116749-$ or US-20110222830-$ or US-20110229096-$ or US-20110229095-$ or US-20110225792-$ or US-20110255831-$ or US-20110262078-$ or US-20110262077-$ or US-20120014648-$ or US-20120063724-$ or US-20120275749-$ or US-20130136402-$ or US-20130315538-$ or US-20140286610-$ or US-20150016781-$ or US-20150110448-$ or US-20160124170-$).did. or (US-20160202429-$ or US-20170045691-$ or US-20170285277-$ or US-20170299820-$ or US-20180120519-$ or US-20180143380-$ or US-20180231722-$ or US-20180239093-$ or US-20180267255-$ or US-20180292618-$ or US-20180292612-$ or US-20180364421-$ or US-20190107679-$ or US-20190107678-$ or US-20190113691-$ or US-20190137701-$ or US-20190179085-$).did. or (US-5504825-$ or US-5613021-$ or US-5661826-$ or US-6045270-$ or US-6276840-$ or US-6293708-$ or US-6623170-$ or US-6796717-$ or US-6848840-$ or US-6866425-$ or US-6932514-$ or US-6944387-$ or US-6976793-$ or US-7094091-$ or US-7178994-$ or US-7182522-$ or US-7234874-$ or US-7241056-$ or US-7300216-$ or US-7536075-$ or US-7654748-$ or US-7891882-$ or US-7912336-$ or US-8052333-$ or US-8231282-$ or US-8235600-$).did. or (US-8262296-$ or US-8317407-$ or US-8346047-$ or US-8348519-$ or US-8348518-$ or US-8376634-$ or US-8406583-$ or US-8417074-$ or US-8494329-$ or US-8496384-$ or US-8529138-$ or US-8542972-$ or US-8550725-$ or US-8550724-$ or US-8579521-$ or US-8690593-$ or US-8714835-$ or US-8821038-$ or US-8821037-$ or US-8915653-$ or US-8958679-$ or US-9014527-$ or US-9031364-$ or US-9057848-$ or US-9146376-$ or US-9146360-$ or US-9417401-$).did. or (US-9513442-$ or US-9541711-$ or US-9557497-$ or US-9563025-$ or US-9606297-$ or US-9632255-$ or US-9645318-$ or US-9658409-$ or US-9684139-$ or US-9739949-$ or US-9753228-$ or US-9772464-$ or US-9857538-$ or US-9977199-$ or US-9989710-$ or US-10012801-$ or US-10054747-$ or US-10061090-$ or US-10067302-$ or US-10067300-$ or US-10088636-$ or US-10101539-$ or US-	DERWENT				

		10139570-$ or US-10146014-$ or US-10156684-$ or US-10209473-$).did. or (WO-2010083369-$ or EP-2380054-$ or CN-102282495-$ or WO-2014152675-$ or WO-2015043158-$ or CN-104516073-$ or CN-102282495-$ or WO-2018125706-$).did. or (JP-57044113-$).did. or (US-20160327757-$ or US-20170299820-$ or WO-2018125706-$ or US-20190107679-$).did.				
S383	732	(US-20010041030-$ or US-20020025125-$ or US-20020106162-$ or US-20020114589-$ or US-20020159710-$ or US-20030031452-$ or US-20030044127-$ or US-20030044125-$ or US-20030180004-$ or US-20030223703-$ or US-20040008494-$ or US-20040017983-$ or US-20040017981-$ or US-20040038558-$ or US-20040052472-$ or US-20040062498-$ or US-20040105628-$ or US-20040131317-$ or US-20040223699-$ or US-20040228589-$ or US-20050036744-$ or US-20050053342-$ or US-20050111795-$ or US-20050123246-$ or US-20050135755-$ or US-20050135752-$).did. or (US-20050271328-$ or US-20060045430-$ or US-20060051028-$ or US-20060093282-$ or US-20060153504-$ or US-20060193562-$ or US-20060280409-$ or US-20060285807-$ or US-20070058907-$ or US-20070098327-$ or US-20070160327-$ or US-20080069501-$ or US-20080112672-$ or US-20080124031-$ or US-20080131055-$ or US-20080253719-$ or US-20090003772-$ or US-20090290839-$ or US-20090305542-$ or US-20100322561-$ or US-20110038590-$ or US-20110075971-$ or US-20110091159-$ or US-20110222819-$ or US-20110249942-$ or US-20120027355-$ or US-20120057824-$).did. or (US-20120076459-$ or US-20120082416-$ or US-20120099822-$ or US-20120141070-$ or US-20120251054-$ or US-20120251051-$ or US-20120263423-$ or US-20120263419-$ or US-20120308183-$ or US-20130051749-$ or US-20130064508-$ or US-20130077914-$ or US-20130121645-$ or US-20130129280-$ or US-20130183001-$ or US-20130216189-$ or US-20130230283-$ or US-20130259429-$ or US-20130272671-$ or US-20130308908-$ or US-20140056560-$ or US-20140064665-$ or US-20140064688-$ or US-20140072265-$ or US-20140086545-$ or US-20140147081-$	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/06/22 10:30

		or US-20140205241-$).did. or (US-20140219614-$ or US-20140219624-$ or US-20140314385-$ or US-20140341510-$ or US-20150003785-$ or US-20150023637-$ or US-20150049989-$ or US-20150071591-$ or US-20150177463-$ or US-20150226926-$ or US-20150241644-$ or US-20150301286-$ or US-20150331201-$ or US-20150338583-$ or US-20150370017-$ or US-20150378112-$ or US-20160004018-$ or US-20160004016-$ or US-20160025937-$ or US-20160077287-$ or US-20160077284-$ or US-20160109661-$ or US-20160131854-$ or US-20160131849-$ or US-20160161680-$ or US-20160178859-$ or US-20160259135-$).did. or (US-20160282566-$ or US-20160282562-$ or US-20160320571-$ or US-20160349464-$ or US-20170059784-$ or US-20170090128-$ or US-20170090127-$ or US-20170102506-$ or US-20170102504-$ or US-20170108653-$ or US-20170115457-$ or US-20170139150-$ or US-20170153398-$ or US-20170184798-$ or US-20170184790-$ or US-20170205587-$ or US-20170219779-$ or US-20170227720-$ or US-20170235060-$ or US-20170242200-$ or US-20170242199-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170261698-$ or US-20170269309-$ or US-20170276883-$).did. or (US-20170276881-$ or US-20170293088-$ or US-20170293087-$ or US-20170307831-$ or US-20170329090-$ or US-20170336577-$ or US-20170343760-$ or US-20170357060-$ or US-20170357059-$ or US-20170363827-$ or US-20180003903-$ or US-20180011258-$ or US-20180011254-$ or US-20180031774-$ or US-20180052288-$ or US-20180077472-$ or US-20180081128-$ or US-20180081125-$ or US-20180088288-$ or US-20180088287-$ or US-20180088286-$ or US-20180088283-$ or US-20180106973-$ or US-20180156988-$ or US-20180156985-$ or US-20180210154-$).did. or (US-4240695-$ or US-4320938-$ or US-4330172-$ or US-4477146-$ or US-4687291-$ or US-4737009-$ or US-4854664-$ or US-4856866-$ or US-4886335-$ or US-4915472-$ or US-4953929-$ or US-4955976-$ or US-5064268-$ or US-5076656-$ or US-5082346-$ or US-5082344-$ or US-5101463-$ or US-5134673-$ or US-5157749-$ or US-					

		5166995-$ or US-5199093-$ or US-5259052-$ or US-5555332-$ or US-5666456-$ or US-5692080-$ or US-5867894-$).did. or (US-5870515-$ or US-5883995-$ or US-5920670-$ or US-5920669-$ or US-5984533-$ or US-6012852-$ or US-6095695-$ or US-6210045-$ or US-6250817-$ or US-6305849-$ or US-6318902-$ or US-6331079-$ or US-6379052-$ or US-6409392-$ or US-6422761-$ or US-6422760-$ or US-6450698-$ or US-6487343-$ or US-6491442-$ or US-6533465-$ or US-6554486-$ or US-6623172-$ or US-6688782-$ or US-6712521-$ or US-6764222-$ or US-6839583-$ or US-6848834-$).did. or (US-6944378-$ or US-7036996-$ or US-8388235-$ or US-9207454-$ or US-9316791-$ or US-9377591-$ or US-9389368-$ or US-9482820-$ or US-9606303-$ or US-9625657-$ or US-9664864-$ or US-9678283-$ or US-9678286-$ or US-9684134-$ or US-9696497-$ or US-9703062-$ or US-9709753-$ or US-9726830-$ or US-9733436-$ or US-9733434-$ or US-9798096-$ or US-9804342-$ or US-9804340-$ or US-9804337-$ or US-9829650-$ or US-9835808-$ or US-9846283-$).did. or (US-9851512-$ or US-9891390-$ or US-9904019-$ or US-9910229-$ or US-9927582-$ or US-9939589-$ or US-9946037-$).did. or (IT-7819792-$ or FR-2363124-$ or IT-7925110-$ or GB-2057158-$ or FR-2487528-$ or GB-2081468-$ or EP-0061243-$ or DK-208682-$ or GB-8306227-$ or IT-8323399-$ or JP-S5856846-$ or EP-0125398-$ or FR-2535069-$ or WO-8600147-$ or EP-0249237-$ or EP-0262847-$ or EP-0262631-$ or DE-8626183-$ or WO-9015350-$ or EP-0408852-$ or GB-9103604-$ or GB-9106183-$ or CA-2030897-$ or DE-9107960-$ or GB-9206076-$ or CA-2057559-$).did. or (CA-2082276-$ or EP-0633485-$ or EP-0690319-$ or CA-2191600-$ or EP-0696748-$ or EP-0697608-$ or CN-1118443-$ or WO-9627811-$ or EP-0758099-$ or WO-9734176-$ or CA-2198522-$ or EP-0803750-$ or NL-1003147-$ or EP-0807837-$ or CA-2254335-$ or CA-2294930-$ or CA-2262351-$ or EP-0938003-$ or JP-2945144-$ or CA-2324565-$ or GB-9919699-$ or EP-0992819-$ or CA-2284331-$ or GB-0007281-$ or CA-2288249-$ or DE-19728960-$ or EP-1033595-$).did. or (EP-1033594-$ or EP-1039324-$ or EP-1039322-$ or EP-1041416-$ or EP-1041414-$ or JP-3106420-$ or CA-2321428-$ or EP-				

		1091225-$ or WO-0137010-$ or EP-1107031-$ or KR-20010062142-$ or WO-0155762-$ or EP-1124147-$ or WO-0161397-$ or WO-0181965-$ or CA-2350290-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or KR-20020000530-$ or KR-20020001574-$ or CN-1331421-$ or EP-1172672-$ or EP-1172673-$ or KR-20020006481-$ or KR-20020006480-$ or DE-20118858-$).did. or (CA-2418331-$ or KR-20020050140-$ or WO-02056060-$ or WO-02061481-$ or DE-10114144-$ or NL-1018440-$ or WO-03016975-$ or WO-03093883-$ or CA-2484569-$ or EP-1394584-$ or AU-2003291687-$ or EP-1530068-$ or CA-2503690-$ or CN-1677147-$ or CN-1707299-$ or WO-2008006402-$ or EP-1887395-$ or CN-101122658-$ or WO-2008029850-$ or CA-2662854-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or CA-2689768-$ or EP-2206458-$ or WO-2010137426-$ or CA-2762411-$).did. or (EP-2302431-$ or WO-2011139938-$ or WO-2011152874-$ or EP-2444827-$ or WO-2012054174-$ or WO-2012054174-$ or WO-2012151175-$ or GB-201218194-$ or CN-102870023-$ or WO-2013115791-$ or WO-2013115789-$ or WO-2013126068-$ or CA-2912155-$ or WO-2014009463-$ or WO-2014011898-$ or EP-2700992-$ or JP-5433802-$ or WO-2014049469-$ or WO-2014113753-$ or CA-2836675-$ or WO-2014143748-$ or WO-2014165175-$ or WO-2014197701-$ or CN-104241938-$ or CA-2917189-$ or EP-2840425-$ or EP-2843452-$).did. or (WO-2015028433-$ or CA-2885821-$ or WO-2015068103-$ or CA-2932688-$ or GB-201507758-$ or WO-2015103783-$ or WO-2015116589-$ or CN-204595258-$ or WO-2015144883-$ or EP-2942653-$ or EP-2947485-$ or WO-2015190211-$ or WO-2016004347-$ or CN-105278047-$ or DE-202013012295-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or CA-2928026-$ or WO-2016043922-$ or JP-5905950-$ or WO-2016067668-$ or EP-3021145-$ or WO-2016082160-$ or WO-2016103821-$ or DE-202016103178-$ or EP-3054333-$).did. or (WO-2016161341-$ or WO-2017038704-$ or JP-6173629-$ or WO-2017180257-$ or CN-206584076-$ or EP-3258301-$ or WO-2018003776-$ or WO-2018004847-$).did. or (JP-54034251-$ or JP-55101904-$ or JP-56066811-$ or JP-56074211-$ or JP-59075218-$ or JP-04214510-$ or JP-04220604-$ or JP-05313040-$ or JP-08015541-$ or JP-09005575-$ or JP-09033756-$ or JP-				

		10104469-$ or JP-11072659-$ or JP-2000089061-$ or JP-2000284146-$ or JP-2000292655-$ or JP-2000310724-$ or JP-2001013372-$ or JP-2001021764-$ or JP-2001242361-$ or JP-2009294343-$ or JP-2012053420-$ or JP-2012078513-$ or JP-2015022131-$).did. or (DE-2805949-$ or DE-2932986-$ or GB-2057158-$ or GB-2081468-$ or EP-61243-$ or GB-2098354-$ or DE-3208797-$ or EP-125398-$ or US-4496213-$ or WO-8600147-$ or EP-249237-$ or EP-262631-$ or US-4953929-$ or WO-9015350-$ or GB-2241794-$ or US-5064268-$ or WO-9117540-$ or EP-458608-$ or US-5101463-$ or EP-490698-$ or EP-505197-$ or EP-430107-$ or EP-660145-$ or EP-660144-$ or EP-663602-$ or EP-663601-$).did. or (WO-9600917-$ or EP-696748-$ or EP-697608-$ or WO-9627811-$ or EP-758099-$ or WO-9734176-$ or EP-803750-$ or US-5692080-$ or WO-9746900-$ or WO-9857208-$ or WO-9947958-$ or GB-2341455-$ or EP-1041416-$ or EP-1041414-$ or EP-1091225-$ or WO-0140839-$ or EP-1107031-$ or EP-1124147-$ or WO-0181965-$ or US-20010041030-$ or EP-1168020-$ or EP-1168018-$ or EP-1168016-$ or EP-1172673-$ or EP-1172672-$ or DE-20118858-$ or WO-02056060-$).did. or (US-6422760-$ or WO-02061481-$ or US-20030031437-$ or US-20030044125-$ or WO-03094297-$ or WO-03093883-$ or EP-1394584-$ or US-20040062498-$ or US-20040223699-$ or US-20040228589-$ or US-20050053342-$ or WO-2006022840-$ or US-20060153503-$ or US-20060165352-$ or US-20060193562-$ or EP-1752805-$ or US-20070058907-$ or US-20070077010-$ or US-20070098327-$ or US-20090041411-$ or US-20090060423-$ or WO-2009110421-$ or WO-2010025180-$ or WO-2010068896-$ or EP-2206458-$ or WO-2010137426-$ or EP-2302431-$).did. or (US-20110249942-$ or US-20110274437-$ or WO-2011152874-$ or KR-2012000895-$ or US-20120027355-$ or US-20120057824-$ or US-20120082416-$ or EP-2444827-$ or US-20120099822-$ or US-20120251051-$ or US-20120251054-$ or US-20120263419-$ or WO-2012151175-$ or US-20120308183-$ or CN-102870023-$ or TW-201309089-$ or US-20130051749-$ or WO-2013036843-$ or CN-103091793-$ or US-20130121645-$ or WO-			

		2013115789-$ or WO-2013115791-$ or WO-2013122865-$ or WO-2013126068-$ or US-20130230283-$ or US-20130259429-$ or WO-2013155395-$).did. or (WO-2013177234-$ or WO-2014011898-$ or US-20140016901-$ or EP-2700992-$ or JP-5433802-$ or US-20140064688-$ or TW-474924-$ or WO-2014049469-$ or US-20140147081-$ or US-20140153879-$ or ES-1110405-$ or WO-2014113753-$ or EP-2759860-$ or US-20140219624-$ or WO-2014143748-$ or WO-2014165175-$ or US-20140321808-$ or US-20140363131-$ or WO-2014197701-$ or EP-2818903-$ or WO-2015009435-$ or US-20150023637-$ or US-20150049989-$ or WO-2015028433-$ or WO-2015068103-$ or WO-2015070382-$ or US-20150162982-$).did. or (US-20150177463-$ or WO-2015103783-$ or WO-2015116589-$ or US-20150219864-$ or US-20150226926-$ or US-20150226925-$ or US-20150241644-$ or CN-104950402-$ or WO-2015144883-$ or US-20150286012-$ or DE-102015106225-$ or US-20150331201-$ or EP-2947485-$ or WO-2015190211-$ or US-20150378110-$ or US-20160004016-$ or US-20160004018-$ or US-20160025937-$ or CA-2859345-$ or JP-5860948-$ or WO-2016024014-$ or WO-2016033577-$ or WO-2016033578-$ or WO-2016033579-$ or WO-2016033580-$ or WO-2016043922-$ or JP-5905950-$).did. or (US-20160124158-$ or US-20160131854-$ or EP-3021145-$ or US-20160161680-$ or US-20160178852-$ or US-20160178859-$ or US-9377591-$ or US-9389368-$ or EP-3054333-$ or US-20160259135-$ or CN-105978629-$ or US-20160282566-$ or WO-2016161341-$ or US-20160306125-$ or US-9482820-$ or US-20160341908-$ or US-20160341911-$ or US-20160349466-$ or US-20160377819-$ or US-20170031106-$ or US-20170059784-$ or WO-2017038704-$ or US-20170090127-$ or US-20170102504-$ or US-20170115457-$ or US-20170139150-$ or US-20170139156-$).did. or (US-20170153398-$ or US-9678283-$ or US-20170184790-$ or US-9709753-$ or US-20170205587-$ or JP-6173629-$ or US-20170219779-$ or US-9726830-$ or US-20170227720-$ or US-20170254967-$ or US-20170254966-$ or US-20170261699-$ or US-20170293088-$ or US-20170307830-$ or US-9804340-$ or US-20170329090-$					

		or US-20170336577-$ or US-20170343760-$ or US-20170371109-$ or US-20180003903-$ or US-20180011258-$ or US-20180052288-$ or US-20180081128-$ or US-20180106973-$ or US-20180120519-$ or US-20180128988-$).did.				
S382	1140	(US-20010010741-$ or US-20010016102-$ or US-20010033730-$ or US-20010038737-$ or US-20010043776-$ or US-20010048790-$ or US-20020006253-$ or US-20020012503-$ or US-20020012502-$ or US-20020012501-$ or US-20020012238-$ or US-20020025121-$ or US-20020025099-$ or US-20020028055-$ or US-20020031310-$ or US-20020031309-$ or US-20020061171-$ or US-20020064349-$ or US-20020081076-$ or US-20020090177-$ or US-20020094727-$ or US-20020106167-$ or US-20020114581-$ or US-20020118926-$ or US-20020126961-$ or US-20020131720-$).did. or (US-20020150344-$ or US-20020150343-$ or US-20020150353-$ or US-20020150346-$ or US-20020150345-$ or US-20020150342-$ or US-20020159745-$ or US-20020159714-$ or US-20020159712-$ or US-20020168149-$ or US-20020166226-$ or US-20020172469-$ or US-20020177364-$ or US-20020181888-$ or US-20020181884-$ or US-20020186934-$ or US-20020186742-$ or US-20020191881-$ or US-20020197017-$ or US-20020197018-$ or US-20030002816-$ or US-20030002808-$ or US-20030007739-$ or US-20030012512-$ or US-20030031449-$ or US-20030031422-$ or US-20030044122-$).did. or (US-20030044115-$ or US-20030053760-$ or US-20030063868-$ or US-20030063866-$ or US-20030063862-$ or US-20030068135-$ or US-20030072536-$ or US-20030081905-$ or US-20030087505-$ or US-20030091292-$ or US-20030095780-$ or US-20030095779-$ or US-20030103730-$ or US-20030108320-$ or US-20030113086-$ or US-20030128934-$ or US-20030142918-$ or US-20030147597-$ or US-20030147230-$ or US-20030156796-$ or US-20030169975-$ or US-20030169974-$ or US-20030174996-$ or US-20030174972-$ or US-20030174922-$ or US-20030180005-$ or US-20030185520-$).did. or (US-20030189214-$ or US-20030194188-$ or US-20030198029-$ or US-20030231838-$ or US-20040013369-$	US-PGPUB; USPAT; JPO	OR	ON	2019/06/22 10:30

		or US-20040028340-$ or US-20040033050-$ or US-20040033028-$ or US-20040033027-$ or US-20040036987-$ or US-20040042710-$ or US-20040052471-$ or US-20040054761-$ or US-20040062488-$ or US-20040062486-$ or US-20040072454-$ or US-20040071438-$ or US-20040074852-$ or US-20040081418-$ or US-20040091228-$ or US-20040101253-$ or US-20040105325-$ or US-20040105278-$ or US-20040120652-$ or US-20040131315-$ or US-20040136656-$ or US-20040141692-$).did. or (US-20040151464-$ or US-20040151438-$ or US-20040156592-$ or US-20040161204-$ or US-20040165830-$ or US-20040179787-$ or US-20040184740-$ or US-20040182971-$ or US-20040197053-$ or US-20040202431-$ or US-20040208459-$ or US-20040223701-$ or US-20040240793-$ or US-20040247255-$ or US-20040264873-$ or US-20040266257-$ or US-20040264908-$ or US-20040264876-$ or US-20050008300-$ or US-20050013547-$ or US-20050041928-$ or US-20050069263-$ or US-20050074211-$ or US-20050094948-$ or US-20050094943-$ or US-20050112939-$ or US-20050111796-$).did. or (US-20050118880-$ or US-20050135753-$ or US-20050141817-$ or US-20050185894-$ or US-20050207708-$ or US-20050215119-$ or US-20050220423-$ or US-20050220420-$ or US-20050226586-$ or US-20050232552-$ or US-20050238289-$ or US-20050281526-$ or US-20050281509-$ or US-20050286833-$ or US-20050286835-$ or US-20060013539-$ or US-20060056769-$ or US-20060072878-$ or US-20060083468-$ or US-20060083467-$ or US-20060088248-$ or US-20060093275-$ or US-20060098914-$ or US-20060133758-$ or US-20060140542-$ or US-20060147156-$ or US-20060147155-$).did. or (US-20060154529-$ or US-20060153503-$ or US-20060159401-$ or US-20060159399-$ or US-20060169856-$ or US-20060177182-$ or US-20060197943-$ or US-20060204200-$ or US-20060204180-$ or US-20060245711-$ or US-20060263011-$ or US-20060269205-$ or US-20060269206-$ or US-20060269212-$ or US-20070019913-$ or US-20070036487-$ or US-20070098330-$ or US-20070098329-$ or US-20070105452-$ or US-20070116414-$						

		or US-20070116411-$ or US-20070140623-$ or US-20070154135-$ or US-20070165984-$ or US-20070183780-$ or US-20070190834-$ or US-20070196053-$).did. or (US-20070196052-$ or US-20070201808-$ or US-20070201798-$ or US-20070212002-$ or US-20070223862-$ or US-20070230874-$ or US-20070263959-$ or US-20070280599-$ or US-20070285194-$ or US-20070297725-$ or US-20080008425-$ or US-20080013897-$ or US-20080013891-$ or US-20080019642-$ or US-20080019656-$ or US-20080044139-$ or US-20080050072-$ or US-20080085082-$ or US-20080095502-$ or US-20080095501-$ or US-20080100456-$ or US-20080170827-$ or US-20080175541-$ or US-20080175550-$ or US-20080175542-$ or US-20080175546-$ or US-20080175545-$).did. or (US-20080175532-$ or US-20080193086-$ or US-20080205825-$ or US-20080240658-$ or US-20080269845-$ or US-20080267566-$ or US-20080273837-$ or US-20080279503-$ or US-20080304792-$ or US-20080310796-$ or US-20080310800-$ or US-20080310795-$ or US-20080317411-$ or US-20090010600-$ or US-20090028507-$ or US-20090034912-$ or US-20090047800-$ or US-20090046981-$ or US-20090060422-$ or US-20090060418-$ or US-20090074359-$ or US-20090103878-$ or US-20090116791-$ or US-20090148101-$ or US-20090156043-$ or US-20090185778-$ or US-20090202214-$).did. or (US-20090214164-$ or US-20090226141-$ or US-20090226137-$ or US-20090232455-$ or US-20090232454-$ or US-20090257722-$ or US-20090257719-$ or US-20090274431-$ or US-20090274432-$ or US-20090285534-$ or US-20090285530-$ or US-20090290838-$ or US-20090304335-$ or US-20100002999-$ or US-20100021111-$ or US-20100029117-$ or US-20100027944-$ or US-20100027943-$ or US-20100046893-$ or US-20100054665-$ or US-20100061681-$ or US-20100074616-$ or US-20100080513-$ or US-20100092134-$ or US-20100092131-$ or US-20100104355-$ or US-20100111484-$).did. or (US-20100129032-$ or US-20100129028-$ or US-20100135618-$ or US-20100141934-$ or US-20100146764-$ or US-20100158444-$ or US-20100183265-$ or US-20100202730-$						

		or US-20100202737-$ or US-20100209063-$ or US-20100209050-$ or US-20100215318-$ or US-20100215322-$ or US-20100226654-$ or US-20100232757-$ or US-20100239220-$ or US-20100239213-$ or US-20100247057-$ or US-20100247040-$ or US-20100260457-$ or US-20100266245-$ or US-20100272408-$ or US-20100278497-$ or US-20100278488-$ or US-20100284655-$ or US-20100296792-$ or US-20100303408-$).did. or (US-20100322580-$ or US-20100322576-$ or US-20100322554-$ or US-20100329604-$ or US-20100329602-$ or US-20110019964-$ or US-20110038592-$ or US-20110038581-$ or US-20110044583-$ or US-20110058772-$ or US-20110075969-$ or US-20110081798-$ or US-20110081116-$ or US-20110085774-$ or US-20110085765-$ or US-20110091166-$ or US-20110091154-$ or US-20110103797-$ or US-20110116748-$ or US-20110123156-$ or US-20110129186-$ or US-20110142398-$ or US-20110150396-$ or US-20110158593-$ or US-20110158586-$ or US-20110170830-$ or US-20110176777-$).did. or (US-20110188809-$ or US-20110188000-$ or US-20110194828-$ or US-20110200286-$ or US-20110198324-$ or US-20110200294-$ or US-20110206335-$ or US-20110206325-$ or US-20110206324-$ or US-20110211792-$ or US-20110229094-$ or US-20110243508-$ or US-20110243505-$ or US-20110243504-$ or US-20110268391-$ or US-20110293223-$ or US-20110299814-$ or US-20110311186-$ or US-20110317976-$ or US-20120002928-$ or US-20120002925-$ or US-20120033918-$ or US-20120039569-$ or US-20120057831-$ or US-20120057830-$ or US-20120057827-$ or US-20120063735-$).did. or (US-20120069348-$ or US-20120099870-$ or US-20120106901-$ or US-20120114295-$ or US-20120128307-$ or US-20120141084-$ or US-20120155808-$ or US-20120163757-$ or US-20120170895-$ or US-20120195555-$ or US-20120219253-$ or US-20120224823-$ or US-20120237223-$ or US-20120237171-$ or US-20120243831-$ or US-20120243829-$ or US-20120251067-$ or US-20120252244-$ or US-20120251050-$ or US-20120257859-$ or US-20120263426-$ or US-20120294572-$ or US-20120301088-$				

		or US-20120301080-$ or US-20120321269-$ or US-20120321266-$ or US-20120321254-$).did. or (US-20130011099-$ or US-20130064517-$ or US-20130071068-$ or US-20130071067-$ or US-20130084041-$ or US-20130094827-$ or US-20130094815-$ or US-20130094811-$ or US-20130101257-$ or US-20130108231-$ or US-20130121643-$ or US-20130129285-$ or US-20130156379-$ or US-20130156382-$ or US-20130163937-$ or US-20130163933-$ or US-20130170797-$ or US-20130170796-$ or US-20130183018-$ or US-20130195405-$ or US-20130195418-$ or US-20130209040-$ or US-20130209049-$ or US-20130209052-$ or US-20130209051-$ or US-20130209050-$ or US-20130209041-$).did. or (US-20130216186-$ or US-20130216188-$ or US-20130284844-$ or US-20130287358-$ or US-20130302004-$ or US-20130322828-$ or US-20130323940-$ or US-20130322826-$ or US-20130330957-$ or US-20130343764-$ or US-20130343707-$ or US-20140016902-$ or US-20140023322-$ or US-20140038462-$ or US-20140044394-$ or US-20140064690-$ or US-20140064664-$ or US-20140072297-$ or US-20140072263-$ or US-20140082913-$ or US-20140093210-$ or US-20140104808-$ or US-20140126875-$ or US-20140126874-$ or US-20140124140-$ or US-20140133821-$ or US-20140133803-$).did. or (US-20140141649-$ or US-20140147082-$ or US-20140161394-$ or US-20140161407-$ or US-20140161400-$ or US-20140169732-$ or US-20140178007-$ or US-20140205253-$ or US-20140205247-$ or US-20140219615-$ or US-20140220794-$ or US-20140219619-$ or US-20140241690-$ or US-20140241689-$ or US-20140241688-$ or US-20140241667-$ or US-20140273584-$ or US-20140270646-$ or US-20140294339-$ or US-20140308010-$ or US-20140308008-$ or US-20140321813-$ or US-20140321814-$ or US-20140328063-$ or US-20140334790-$ or US-20140334780-$ or US-20140334778-$).did. or (US-20140348481-$ or US-20140348467-$ or US-20140355936-$ or US-20140376870-$ or US-20150003774-$ or US-20150012072-$ or US-20150030323-$ or US-20150050002-$ or US-20150055917-$ or US-20150055928-$ or US-20150063758-$					

		or US-20150060539-$ or US-20150078710-$ or US-20150139588-$ or US-20150147033-$ or US-20150147031-$ or US-20150153516-$ or US-20150177467-$ or US-20150185423-$ or US-20150192744-$ or US-20150205060-$ or US-20150205053-$ or US-20150212284-$ or US-20150212279-$ or US-20150219856-$ or US-20150219857-$ or US-20150226923-$).did. or (US-20150234131-$ or US-20150234128-$ or US-20150241650-$ or US-20150247977-$ or US-20150253183-$ or US-20150260927-$ or US-20150268424-$ or US-20150277057-$ or US-20150277061-$ or US-20150277058-$ or US-20150288449-$ or US-20150288447-$ or US-20150286014-$ or US-20150286013-$ or US-20150286011-$ or US-20150285999-$ or US-20150301288-$ or US-20150301293-$ or US-20150309279-$ or US-20150323752-$ or US-20150346452-$ or US-20150346449-$ or US-20150355417-$ or US-20150355414-$ or US-20150362678-$ or US-20150378117-$ or US-20150378111-$).did. or (US-20160004017-$ or US-20160011383-$ or US-20160011376-$ or US-20160018604-$ or US-20160018606-$ or US-20160033723-$ or US-20160041356-$ or US-20160047994-$ or US-20160062051-$ or US-20160070081-$ or US-20160085045-$ or US-20160085035-$ or US-20160085031-$ or US-20160091673-$ or US-20160111808-$ or US-20160109676-$ or US-20160116685-$ or US-20160116683-$ or US-20160116681-$ or US-20160131857-$ or US-20160139342-$ or US-20160139339-$ or US-20160147022-$ or US-20160154190-$ or US-20160161679-$ or US-20160170152-$ or US-20160178860-$).did. or (US-20160178855-$ or US-20160187589-$ or US-20160195683-$ or US-20160195681-$ or US-20160209605-$ or US-20160216454-$ or US-20160216460-$ or US-20160223763-$ or US-20160238798-$ or US-20160238794-$ or US-20160238789-$ or US-20160246011-$ or US-20160252685-$ or US-20160266330-$ or US-20160266329-$ or US-20160266327-$ or US-20160274311-$ or US-20160291259-$ or US-20160306123-$ or US-20160306121-$ or US-20160313513-$ or US-20160320567-$ or US-20160320566-$ or US-20160327757-$ or US-20160324402-$ or US-20160356966-$				

		or US-20160365685-$).did. or (US-20160370549-$ or US-20160370548-$ or US-20170003459-$ or US-20170035275-$ or US-20170059782-$ or US-20170068063-$ or US-20170082806-$ or US-20170097485-$ or US-20170097471-$ or US-20170102507-$ or US-20170108659-$ or US-20170108430-$ or US-20170123171-$ or US-20170123163-$ or US-20170131481-$ or US-20170139158-$ or US-20170139157-$ or US-20170146749-$ or US-20170153394-$ or US-20170163573-$ or US-20170162978-$ or US-20170160500-$ or US-20170160496-$ or US-20170160486-$ or US-20170160478-$ or US-20170160477-$ or US-20170160476-$).did. or (US-20170168244-$ or US-20170176252-$ or US-20170184800-$ or US-20170192182-$ or US-20170199338-$ or US-20170199336-$ or US-20170205591-$ or US-20170205588-$ or US-20170212310-$ or US-20170212309-$ or US-20170222347-$ or US-20170227727-$ or US-20170227718-$ or US-20170235077-$ or US-20170242198-$ or US-20170242196-$ or US-20170248762-$ or US-20170254962-$ or US-20170254961-$ or US-20170254960-$ or US-20170276887-$ or US-20170276886-$ or US-20170285272-$ or US-20170293091-$ or US-20170299821-$ or US-20170299818-$ or US-20170299817-$).did. or (US-20170307832-$ or US-20170307829-$ or US-20170315307-$ or US-20170315305-$ or US-20170315304-$ or US-20170315303-$ or US-20170331234-$ or US-20170336571-$ or US-20170343742-$ or US-20170343741-$ or US-20170341972-$ or US-20170351038-$ or US-20170351037-$ or US-20170359091-$ or US-20170363815-$ or US-20170363810-$ or US-20170363509-$ or US-20170371118-$ or US-20170371107-$ or US-20180003910-$ or US-20180011261-$ or US-20180017740-$ or US-20180024302-$ or US-20180024301-$ or US-20180024300-$ or US-20180024294-$ or US-20180031782-$).did. or (US-20180031775-$ or US-20180059338-$ or US-20180074277-$ or US-20180081127-$ or US-20180081122-$ or US-20180078781-$ or US-20180095232-$ or US-20180106975-$ or US-20180113268-$ or US-20180113259-$ or US-20180136410-$ or US-20180143384-$ or US-20180143381-$ or US-20180149813-$				

		or US-20180157002-$ or US-20180180819-$ or US-20180188460-$ or US-20180196204-$ or US-20180210155-$ or US-20180210153-$).did. or (US-3933409-$ or US-3999837-$ or US-4080044-$ or US-4087158-$ or US-4101198-$ or US-4140365-$ or US-4167304-$ or US-4168109-$ or US-4186996-$ or US-4201445-$ or US-4214812-$ or US-4218113-$ or US-4223976-$ or US-4252407-$ or US-4268115-$ or US-4268114-$ or US-4279469-$ or US-4291943-$ or US-4295707-$ or US-4327964-$ or US-4354731-$ or US-4368948-$ or US-4371233-$ or US-4387957-$ or US-4415232-$ or US-4422716-$).did. or (US-4444461-$ or US-4445753-$ or US-4447121-$ or US-4461539-$ or US-4466009-$ or US-4484796-$ or US-4487474-$ or US-4497536-$ or US-4526438-$ or US-4548467-$ or US-4614402-$ or US-4615581-$ or US-4645296-$ or US-4648688-$ or US-4666241-$ or US-4674831-$ or US-4681398-$ or US-4688887-$ or US-4699460-$ or US-4714318-$ or US-4714317-$ or US-4714315-$ or US-4715674-$ or US-4717234-$ or US-4718744-$ or US-4722081-$ or US-4740052-$).did. or (US-4741590-$ or US-4758719-$ or US-4759600-$ or US-4759599-$ or US-4762389-$ or US-4767178-$ or US-4773725-$ or US-4781429-$ or US-4783137-$ or US-4786135-$ or US-4787700-$ or US-4789216-$ or US-4793683-$ or US-4795231-$ or US-4805980-$ or US-4807957-$ or US-4813760-$ or US-4824196-$ or US-4834486-$ or US-4842361-$ or US-4844570-$ or US-4846544-$ or US-4848870-$ or US-4850536-$ or US-4852963-$ or US-4877303-$ or US-4892380-$).did. or (US-4898446-$ or US-4960317-$ or US-4964688-$ or US-4976510-$ or US-4986762-$ or US-4986622-$ or US-4991929-$ or US-4993803-$ or US-4995688-$ or US-4998797-$ or US-5013124-$ or US-5015060-$ or US-5016970-$ or US-5018823-$ or US-5042891-$ or US-5048916-$ or US-5052774-$ or US-5058983-$ or US-5073042-$ or US-5077815-$ or US-5091991-$ or US-5091990-$ or US-5109453-$ or US-5115484-$ or US-5119455-$ or US-5124506-$ or US-5127073-$).did. or (US-5129024-$ or US-5133032-$ or US-5134677-$ or US-5134676-$ or US-5155795-$ or US-5159654-$ or US-5177808-$ or US-5179607-$ or US-5210815-$ or US-5214730-$ or US-5228104-$ or US-5233675-$ or US-					

		5233674-$ or US-5239606-$ or US-5267342-$ or US-5274729-$ or US-5280552-$ or US-5282259-$ or US-5293581-$ or US-5297227-$ or US-5317663-$ or US-5323475-$ or US-5329541-$ or US-5333222-$ or US-5333221-$ or US-5359688-$ or US-5363460-$).did. or (US-5367594-$ or US-5366383-$ or US-5384885-$ or US-5386485-$ or US-5408557-$ or US-5418875-$ or US-5420951-$ or US-5444806-$ or US-5446817-$ or US-5450519-$ or US-5452391-$ or US-5485537-$ or US-5497444-$ or US-5506922-$ or US-5519799-$ or US-5521998-$ or US-5528711-$ or US-5530783-$ or US-5537501-$ or US-5542015-$ or US-5548674-$ or US-5550943-$ or US-5563978-$ or US-5563971-$ or US-5570445-$ or US-5574813-$ or US-5579429-$).did. or (US-5581644-$ or US-5588086-$ or US-5592323-$ or US-5600746-$ or US-5603631-$ or US-5607323-$ or US-5619610-$ or US-5633969-$ or US-5642450-$ or US-5647043-$ or US-5645449-$ or US-5661833-$ or US-5666449-$ or US-5664955-$ or US-5668904-$ or US-5671310-$ or US-5673346-$ or US-5680494-$ or US-5682449-$ or US-5687268-$ or US-5694507-$ or US-5694506-$ or US-5701380-$ or US-5721799-$ or US-5727102-$ or US-5732174-$ or US-5734770-$).did. or (US-5737464-$ or US-5751874-$ or US-5761359-$ or US-5764043-$ or US-5774611-$ or US-5774612-$ or US-5778122-$ or US-5781680-$ or US-5796896-$ or US-5799122-$ or US-5809191-$ or US-5815618-$ or US-5818993-$ or US-5825955-$ or US-5832158-$ or US-5838856-$ or US-5838855-$ or US-5845036-$ or US-5862282-$ or US-5867621-$ or US-5881191-$ or US-5887100-$ or US-5887098-$ or US-5892870-$ or US-5896477-$ or US-5909526-$ or US-5909298-$).did. or (US-5915058-$ or US-5923805-$ or US-5930426-$ or US-5930425-$ or US-5937121-$ or US-5940561-$ or US-5940559-$ or US-5949946-$ or US-5953474-$ or US-5953473-$ or US-5956444-$ or US-5960137-$ or US-5969294-$ or US-5971626-$ or US-5980117-$ or US-5987203-$ or US-5993071-$ or US-6004043-$ or US-6022149-$ or US-6027252-$ or US-6041155-$ or US-6048103-$ or US-6048102-$ or US-6053639-$ or US-6059461-$ or US-6064791-$ or US-6076973-$).did. or (US-6076975-$ or US-6081647-$ or US-6079881-$ or US-6088502-$ or US-6095694-$ or US-					

		6104856-$ or US-6102581-$ or US-6108482-$ or US-6116790-$ or US-6116789-$ or US-6116101-$ or US-6132105-$ or US-6139346-$ or US-6142676-$ or US-6149315-$ or US-6154597-$ or US-6164835-$ or US-6164834-$ or US-6173099-$ or US-6179480-$ or US-6179475-$ or US-6188827-$ or US-6188825-$ or US-6186670-$ or US-6190616-$ or US-6195477-$ or US-6193420-$).did. or (US-6196729-$ or US-6200040-$ or US-6206577-$ or US-6217226-$ or US-6220763-$ or US-6220762-$ or US-6224269-$ or US-6227719-$ or US-6227718-$ or US-6240229-$ or US-6238249-$ or US-6243526-$ or US-6247851-$ or US-6247849-$ or US-6256446-$ or US-6259839-$ or US-6264373-$ or US-6264372-$ or US-6267513-$ or US-6273618-$ or US-6290527-$ or US-6301004-$ or US-6302592-$ or US-6309111-$ or US-6318904-$ or US-6318903-$ or US-6334715-$).did. or (US-6349164-$ or US-6347889-$ or US-6347888-$ or US-6354746-$ or US-6357932-$ or US-6361218-$ or US-6364536-$ or US-6367986-$ or US-6367984-$ or US-6371659-$ or US-6377840-$ or US-6375363-$ or US-6384896-$ or US-6382843-$ or US-6382839-$ or US-6389212-$ or US-6402393-$ or US-6402390-$ or US-6402388-$ or US-6409391-$ or US-6412987-$ or US-6419810-$ or US-6422759-$ or US-6425692-$ or US-6425694-$ or US-6431762-$ or US-6437894-$).did. or (US-6435946-$ or US-6445867-$ or US-6456768-$ or US-6457876-$ or US-6461055-$ or US-6461054-$ or US-6461053-$ or US-6466724-$ or US-6464406-$ or US-6467971-$ or US-6467970-$ or US-6471417-$ or US-6471412-$ or US-6474876-$ or US-6478472-$ or US-6481900-$ or US-6481899-$ or US-6485192-$ or US-6497518-$ or US-6497516-$ or US-6501900-$ or US-6508593-$ or US-6526210-$ or US-6524015-$ or US-6527450-$ or US-6533469-$ or US-6543941-$).did. or (US-6554482-$ or US-6558044-$ or US-6561699-$ or US-6572276-$ or US-6572273-$ or US-6582132-$ or US-6595696-$ or US-6601995-$ or US-6612750-$ or US-6619859-$ or US-6619856-$ or US-6632023-$ or US-6634794-$ or US-6644866-$ or US-6667803-$ or US-6695485-$ or US-6702477-$ or US-6702475-$ or US-6786647-$ or US-6789953-$ or US-6793399-$ or US-6840680-$ or US-6856748-$ or US-6895146-$ or US-7232261-$ or US-				

		7435009-$ or US-7530845-$).did. or (US-7585118-$ or US-7588373-$ or US-7706657-$ or US-7738757-$ or US-7972066-$ or US-8070366-$ or US-8206040-$ or US-8517614-$ or US-8588571-$ or US-8953922-$ or US-9229177-$ or US-9229170-$ or US-9291781-$ or US-9316794-$ or US-9323007-$ or US-9448369-$ or US-9453972-$ or US-9482825-$ or US-9551831-$ or US-9625655-$ or US-9632267-$ or US-9638871-$ or US-9638868-$ or US-9645335-$ or US-9658407-$ or US-9671570-$ or US-9671568-$).did. or (US-9678282-$ or US-9696477-$ or US-9722367-$ or US-9720184-$ or US-9726829-$ or US-9735523-$ or US-9733123-$ or US-9739955-$ or US-9739952-$ or US-9739951-$ or US-9746625-$ or US-9746368-$ or US-9759874-$ or US-9759869-$ or US-9772457-$ or US-9772456-$ or US-9772453-$ or US-9784928-$ or US-9798090-$ or US-9797806-$ or US-9810860-$ or US-9810858-$ or US-9810856-$ or US-9817195-$ or US-9823428-$ or US-9829643-$ or US-9827438-$).did. or (US-9835807-$ or US-9841566-$ or US-9857545-$ or US-9857537-$ or US-9864151-$ or US-9869824-$ or US-9876309-$ or US-9874702-$ or US-9880365-$ or US-9880357-$ or US-9885841-$ or US-9893813-$ or US-9891392-$ or US-9891387-$ or US-9891385-$ or US-9897767-$ or US-9904021-$ or US-9904020-$ or US-9910228-$ or US-9910226-$ or US-9915793-$ or US-9933586-$ or US-9933583-$ or US-9933582-$ or US-9939600-$ or US-9939590-$ or US-9948017-$).did. or (US-9946036-$ or US-10007069-$ or US-10018787-$).did. or (JP-2016095432-$ or JP-2016095410-$ or JP-2016122100-$ or JP-2016177309-$ or JP-2016188927-$ or JP-2017053937-$ or JP-2017090798-$ or JP-2017111444-$ or JP-2017134118-$ or JP-2017138535-$ or JP-2017151338-$ or JP-2017219768-$).did.				
S381	81	(US-20040101250-$ or US-20140205247-$ or US-20170160486-$ or US-20180239091-$).did. or (US-3999837-$ or US-4252407-$ or US-6116790-$ or US-6371659-$ or US-6461053-$ or US-6585423-$ or US-7001079-$ or US-9039298-$ or US-9823424-$).did. or (DE-2558445-$ or FR-2296862-$ or BR-7508734-$ or ES-444034-$ or GB-1503979-$ or IT-7869677-$ or CA-1043604-$ or BE-871785-$ or DK-522978-$ or NL-7811579-$ or DE-2849975-$ or GB-	US-PGPUB; USPAT; FPRS; JPO; DERWENT	OR	ON	2019/06/22 10:30

		2009440-$ or FR-2435053-$ or FR-2446496-$ or CA-1097111-$ or IT-1050771-$ or FR-2446496-$ or FR-2435053-$ or CH-628152-$ or GB-2009440-$ or DE-3112078-$ or FR-2296862-$ or DE-2558445-$ or DE-3112078-$ or IT-1109638-$ or DE-2849975-$).did. or (DK-151733-$ or DK-151733-$ or DK-151733-$ or DE-19626036-$ or WO-9800741-$ or AU-2975197-$ or WO-9928774-$ or EP-0985161-$ or EP-1034445-$ or EP-1092995-$ or EP-1092995-$ or EP-1034445-$ or EP-0985161-$ or ES-2202617-$ or EP-1092995-$ or DE-60010402-$ or DE-60010402-$ or JP-3984293-$ or EP-2138880-$ or JP-4514004-$ or WO-2016053853-$ or WO-2017065999-$ or WO-2017065999-$ or EP-3201668-$ or CN-108351473-$ or CN-208140982-$ or EP-3201668-$).did. or (JP-2001154062-$).did. or (DE-2558445-$ or BE-871785-$ or DE-19626036-$ or WO-9928774-$ or EP-1092995-$ or US-20140205247-$ or CN-104516061-$ or CN-104570229-$ or WO-2016053853-$ or WO-2017065999-$ or US-20180364421-$).did.				
S388	2281	S386 and S387	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 10:31
S387	61575	G02B6/38$.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 10:31
S392	44	S391 not S385	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:32
S391	84	S388 and S389	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:32
S389	12260	adapter with (groove channel) with (top bottom upper lower)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:32
S395	989324	(groove channel) with upper with lower	US-PGPUB;	OR	ON	2019/06/22

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			10:39
S398	295	S397 not (S385 S392)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:40
S397	401	S388 and (S395 S396)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 10:40
S396	550070	(groove channel) with top with bottom	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:40
S401	314	S400 and (S395 S396)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 10:54
S400	1990	S387 and S399	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:54
S399	14431	("ferrules" "connectors") with align$4 with (groove channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:54
S402	148	S401 not (S385 S392 S398)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 10:55
S403	10243	G02B6/3825,3826.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 11:03
S405	171	S404 not (S385 S392 S398 S402)	US-PGPUB;	OR	ON	2019/06/22

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			11:04
S404	383	S399 and S403	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 11:04
S407	607	S406 and S403	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 11:27
S406	24209	("ferrules" "connectors") with align$4 with (groove channel slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 11:27
S408	113	S407 not (S385 S392 S398 S402 S405)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 11:28
L3	35	1 and 2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 17:41
L2	10243	G02B6/3825,3826.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/06/22 17:41
L1	12046	gasket with (shield$4 emi)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/22 17:41

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Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Filing Date	2018-12-10
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-03

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/ORR/	1	5129024		1992-07-01	Honma	
/ORR/	2	6331079		2001-12-01	Grois	

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U.S.PATENT APPLICATION PUBLICATIONS

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
/ORR/	1	20110091158		2011-04-01	Iwaya	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16214317
Filing Date	2018-12-10
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-03

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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Examiner Signature	/Omar R Rojas/	Date Considered	06/22/2019

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(19)中华人民共和国国家知识产权局

(12)实用新型专利

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(45)授权公告日 2012.12.12

(21)申请号 201220254953.7

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代理人 孙纪泉

(51)Int.Cl.
G02B 6/38(2006.01)

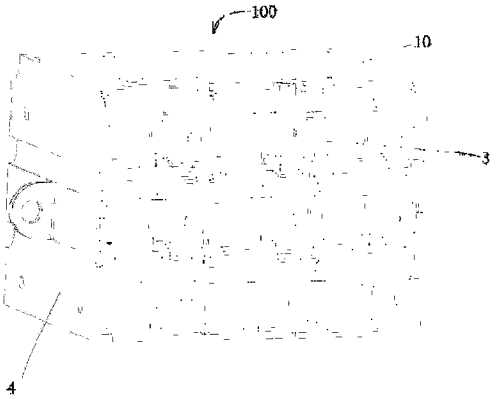
权利要求书 3 页 说明书 9 页 附图 16 页

(54)实用新型名称

适配器组件和连接器组件

(57)摘要

一种用于连接多个连接器的适配器组件，包括：多个适配器，每个适配器包括壳体所述壳体内形成至少一对用于插接连接器的接口；以及至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。由于多个适配器可以在水平方向上并排地依次接合或者在垂直方向上叠置地依次接合，从而最大限度的利用安装面板上的空间。



CN 202600189 U

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：

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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

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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。

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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

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在壳体的内侧表面上的凹槽，所述凹槽的形状与所述夹持结构的两个夹持臂的形状大致配合，以将所述夹持结构的两个夹持臂容纳在两个相应的凹槽中。

[0009] 在上述适配器组件中，每个所述夹持结构包括在所述夹持臂的自由端相向突起形成的保持部，每个所述凹槽的远端形成贯穿所述第一立壁、第二立壁、顶壁和底壁中的每一个的通孔，所述保持部能够容纳在所述通孔中。

[0010] 在上述适配器组件中，每个夹持臂具有大致的三角形形状。

[0011] 上述适配器组件进一步包括至少一对安装机构，每对安装机构中的一个安装机构安装在一排适配器中位于最外侧的第一立壁或者第二立壁上，每个安装机构包括：主体部，所述主体部的长度为一个适配器的纵向长度的大约一半，并且每个主体部包括一个第一端和一个与所述第一端相对的第二端；安装耳部，从所述第一端向外垂直延伸形成；辅助夹持装置，从所述第二端向内弯折大约 180 度形成，以接合到位于最外侧的立壁的凹槽中。

[0012] 在上述适配器组件中，所述安装耳部上设有安装孔，所述辅助夹持装置的自由端设有弹性的夹持突起。

[0013] 在上述适配器组件中，每个接合装置包括：至少一个第一水平接合装置，从所述第一壁外侧在水平方向上延伸形成；以及至少一个第二水平接合装置，形成在所述第二立壁外侧，所述第一水平接合装置和第二水平接合装置被构造成在形状上彼此卡接配合，以将所述多个适配器依次并排地接合在一起。

[0014] 在上述适配器组件中，所述第一水平接合装置包括：连接部，从所述第一立壁外侧在水平方向上延伸形成；以及接合部，从所述连接部的末端在至少一个方向上平行于所述第一立壁延伸形成。所述第二水平接合装置包括：容纳槽，形成在所述第二立壁上，并被构造成容纳另一个适配器的第一水平接合装置的接合部；以及第一开口，与所述容纳槽连通，所述另一个适配器的接合部能够通过所述第一开口插入所述接合部。

[0015] 在上述适配器组件中，所述第二水平接合装置还包括：第二开口，与所述容纳槽连通并被构造成与所述另一个适配器的连接部相配合，在所述另一个适配器的接合部插入所述容纳槽的过程中，所述另一个适配器的连接部穿过所述第二开口。

[0016] 在上述适配器组件中，所述接合部具有大致的 U 形形状，并包括：两个具有弹性的臂部、以及连接在两个所述臂部的端部之间的基部，所述连接部连接在所述基部与所述第一立壁之间。

[0017] 在上述适配器组件中，每个臂部的末端设有突起部，当将所述另一个适配器的接合部作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第一开口的外部，以阻挡所述接合部的进一步插入。

[0018] 在上述适配器组件中，每个适配器进一步包括两个定位部，分别从所述第二立壁上突出形成，并离开所述第一开口预定距离，以当所述另一个适配器的接合部插入所述容纳槽中时，所述另一个适配器的突起部位于所述第二接合装置和所述定位部之间。

[0019] 在上述适配器组件中，所述第二水平接合装置还包括：第三开口，与所述容纳槽连通并与所述第一开口相对。每个臂部的末端设有突起部，当将所述另一个适配器的臂部的末端作为插入端插入所述容纳槽中时，所述另一个适配器的突起部暴露在所述第三开口的外部，以阻挡所述另一个适配器的接合部退出所述容纳槽。

[0020] 在上述适配器组件中，所述第一水平接合装置设置在形成于所述第一立壁上的凹

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槽内，所述第二水平接合装置从所述第二立壁凸出。

[0021] 上述适配器组件进一步包括第一安装机构和第二安装机构。第一安装机构包括：板式的第一主体部；以及第一辅助接合装置，形成在所述第一主体部的第一侧并具有与所述第一水平接合装置相同的结构，以与所述多个适配器中位于最外侧的一个适配器的第二水平接合装置结合。第二安装机构，包括：板式的第二主体部；以及第二辅助接合装置，形成在所述第二主体部的第一侧并具有与所述第二水平接合装置相同的结构，以与所述多个适配器中位于最外侧的另一个适配器的第一水平接合装置结合。

[0022] 在上述适配器组件中，在上述适配器组件中，所述第一安装机构还包括形成在所述第一主体部的第二侧的第一安装耳部；所述第二安装机构还包括形成在所述第二主体部的第二侧的第二安装耳部。

[0023] 在上述适配器组件中，所述第一安装耳部和第二安装耳部都设有至少一个安装孔。

[0024] 在上述适配器组件中，每个接合装置包括：第一垂直接合装置，从所述第一立壁和第二立壁的外侧靠近所述顶壁或底壁处延伸形成；以及第二垂直接合装置，设置在所述第二立壁和第一立壁的外侧靠近所述底壁或顶壁处，并被构造成用于插入并固定另一个适配器的第一垂直接合装置的插槽，当所述第一垂直接合装置和第二垂直接合装置相互接合时使得所述多个适配器在垂直方向上叠层地接合在一起。

[0025] 在上述适配器组件中，每个所述第一垂直接合装置具有大致的U形形状，并包括：第一臂部，从所述第一立壁和第二立壁的外侧的上端或下端向外凸出形成；第二臂部，在所述顶壁或者底壁之外平行于所述第一臂部延伸；以及基部，连接在所述第一臂部和第二臂部之间，以在所述第一臂部和第二臂部形成所述插槽，每个所述第二垂直接合装置包括从所述第一立壁和第二立壁的外侧的下端或者上端向外凸出形成细长突起，其中所述细长突起能够容纳在另一个适配器的第一臂部和第二臂部之间的插槽中，以将两个适配器叠置地接合在一起。

[0026] 在上述适配器组件中，所述第二臂部的自由端设有向内延伸的阻挡部，以阻挡所述细长突起从所述第一臂部和第二臂部之间的空间脱离。

[0027] 在上述适配器组件中，每个接合装置包括垂直接合装置和容纳槽。所述垂直接合装置具有大致的L形形状，并包括：基部，从所述顶壁或者底壁向外垂直延伸；以及臂部，从所述基部的末端平行于所述顶壁或者底壁的外表面延伸。容纳槽形成在所述底壁或者顶壁中，并被构造成容纳另一个适配器的所述臂部，以将两个适配器叠置地接合在一起。

[0028] 在上述适配器组件中，每个所述适配器还包括从所述第一立壁和第二立壁凸出形成的安装机构，以将所述适配器组件安装到安装面板上。

[0029] 根据本发明另一方面的实施例，提供一种连接器组件，包括：上述各种实施例中所述的适配器组件；以及多个连接器，每个连接器连接至相应的适配器的一个接口内。

[0030] 在上述连接器组件中，所述连接器为光纤连接器。

[0031] 根据本实用新型上述各种实施例的适配器组件，多个适配器可以在水平方向上并排地依次接合或者在垂直方向上叠置地依次接合，相邻的两个适配器通过例如卡扣连接方式可移除地接合在一起，能够最大限度的利用安装面板上的空间。

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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

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料制成的壳体，所述壳体内形成至少一对用于插接连接器的接口；以及至少一个接合装置，每个接合装置被构造成将多个所述适配器中两个相邻适配器的接口的相邻壁采用卡接配合方式相互连接，以将所述多个适配器固定在一起。例如，多个适配器在水平方向上并排地和/或在垂直方向上叠置地固定在一起。

[0057] 图 1-7 示出了根据本实用新型的第一种示例性实施例的适配器组件 100。该适配器组件 100 包括 3 排 3 列（共 9 个）适配器 10。每个适配器 10 的壳体 1 呈大致的长方体形，并包括限定成接口 2 的第一立壁 11、与第一立壁 11 相对的第二立壁 12、顶壁 13 和底壁 14。接合装置被构造成连接多个适配器 10 中的两个相邻适配器的相邻的第一立壁 11 和第二立壁 12、和/或者相邻的顶壁 13 和底壁 14。进一步地，所述接合装置被构造成夹持两个相邻适配器 10 的相邻的第一立壁 11 和第二立壁 12、和/或者相邻的顶壁 13 和底壁 14 的弹性的夹持机构 3。

[0058] 在进一步的实施例中，如图 5 所示，第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个包括形成在它们各自的内侧表面上的凹槽 111、121、131、141，凹槽 111、121、131、141 的形状大致相同并且与夹持结构 3 的两个夹持臂 30 的形状大致配合，以将夹持结构 3 的两个夹持臂 30 容纳在两个相应的凹槽中。例如，如图 2 和 3 所示，夹持结构 3 的两个夹持臂 30 容纳在同一排中第一适配器的第二立壁 12 的凹槽 121 和第二适配器的第一立壁 11 的凹槽 111 中，这样可以将多个适配器 10 并排地依次固定在一起。另外，如图 4 所示，夹持结构 3 的两个夹持臂 30 容纳在同一列中上部适配器的底壁 14 的凹槽 141 和下部适配器的顶壁 13 的凹槽 131 中，这样可以将多个适配器 10 叠置地依次固定在一起。每个夹持臂 30 具有大致的三角形形状，这样便于将夹持结构 3 推入相应的凹槽中。在一种实施例中，顶壁 13 上的凹槽 131 形成在用于容纳例如如图 20 所示的连接器 400 的锁定结构的容纳槽的顶壁上。

[0059] 由于在第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个都包括形成在它们各自的内侧表面上的凹槽 111、121、131、141，当两个适配器 10 放置在一起时，无论是叠置放置还是并排放置，都有两个壁，即一个适配器的第二立壁 12 和另一适配器的第一立壁 11 贴靠在一起，或者一个适配器的底壁 14 和另一适配器的顶壁 13 贴靠在一起，并且形成在它们是内表面上的凹槽 212 和 111、或者 141 和 131 彼此相对地并置在一起，从而可以使得夹持结构 3 的夹持臂 30 进入这些凹槽，并将这两个适配器固定在一起。因此，本实用新型的第一实施例的适配器，可以利用夹持结构 3 实现叠置布置和/或并排布置（叠置布置和并排布置中的至少一种），降低了适配器的安装空间。当本实用新型的适配器组件中的多个适配器在垂直方向上叠置时，特别适合于安装本申请人在中国专利申请 CN201210037495.6 中所述的连接器。

[0060] 在进一步的实施例中，每个夹持结构 3 包括在夹持臂 30 的自由端相向突起形成的保持部 301，每个凹槽的远端形成贯穿第一立壁 11、第二立壁 12、顶壁 13 和底壁 14 中的每一个的通孔 15，每个保持部 301 能够容纳在相应的通孔 15 中。这样，在将夹持结构 3 推入凹槽中的过程中，突出的保持部 301 可以进入通孔 15 中，从而有利于保持夹持结构 3 与凹槽之间的相对牢固的结合。可替换地，通孔也可以不穿过壳体 1 的壁，而只是形成为比凹槽的其它部位更往深的凹陷。

[0061] 本实用新型第一实施例的适配器组件 100 进一步包括至少一对安装机构 4，每对

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安装机构 4 中的一个安装机构安装在一排适配器中位于最外侧的第一立壁 11 或者第二立壁 12 上。如图 7 所示，每个安装机构 4 包括：由例如板形材料制成的长条形的主体部 41、安装耳部 42 和辅助夹持装置 43。主体部 41 的长度为一个适配器 10 的纵向长度的大约一半，并且每个主体部 41 包括一个第一端和一个与所述第一端相对的第二端。安装耳部 42 从主体部 41 的第一端向外垂直延伸形成。辅助夹持装置 43 从主体部 41 第二端向内弯折大约 180 度形成，以接合到位于最外侧的第一立壁 11 或者第二立壁 12 的凹槽 111 或者 121 中。另外，安装耳部 42 上设有安装孔 421，辅助夹持装置 43 的自由端设有与通孔 15 配合的弹性的夹持突起 431。由于主体部 41 的长度为一个适配器 10 的纵向长度的大约一半，这样可以从第一立壁 11 和第二立壁 12 的两端分别安装一个安装机构 4，并且位于同一立壁外侧的安装耳部 42 贴靠在一起，从而利用安装机构 4 将整个适配器组件 100 安装在安装架上。

[0062] 图 8-17 示出了根据本实用新型的第二种示例性实施例的适配器组件 100'。在第二实施例的适配器组件 100' 中，每个适配器 10' 的壳体 1' 呈大致的长方体形，并包括限定成接口 2' 的第一立壁 11'、与第一立壁 11' 相对的第二立壁 12'、顶壁 13' 和底壁 14'。接合装置被构造成连接多个适配器 10' 中的两个相邻适配器的相邻的第一立壁 11' 和第二立壁 12'，从而将多个适配器 10' 在水平方向上并排地固定在一起。

[0063] 进一步地，每个接合装置包括：至少一个第一水平接合装置 31（图 9 和 10），从所述第一立壁 11' 外侧在水平方向上向外延伸形成；以及至少一个第二水平接合装置 32（图 11），形成在第二立壁 12' 外侧，第一水平接合装置 31 和第二水平接合装置 32 被构造成在形状上彼此卡接配合，以将多个适配器 10' 在水平方向上依次并排地接合在一起。

[0064] 参见图 9、10 和 12，每个第一水平接合装置 31 包括：连接部 311（参见图 12）和接合部 312。连接部 311 从第一立壁 11' 外侧在水平方向上延伸形成，而接合部 312 从连接部 311 的末端在至少一个方向（例如，如图 9 和 12 所示，在向前的方向、向后的方向和向上的方向）上平行于第一立壁 11' 延伸形成。参见图 11 和 12，每个第二接合装置 32 包括：容纳槽 321 和位于容纳槽 321 上端的第一开口 322。容纳槽 321 形成在第二立壁 12' 上，并被构造成容纳另一个适配器的第一水平接合装置 31 的接合部 312。第一开口 322 与容纳槽 321 连通，所述另一个适配器的接合部 312 能够通过第一开口 322 从上向下插入容纳槽 321。

[0065] 进一步地，第二水平接合装置 32 还包括沿上下方向延伸的第二开口 323。参见图 11 和 12，该第二开口 323 与容纳槽 321 连通并被构造成与另一个适配器的连接部 311 相配合，在所述另一个适配器的接合部 312 插入容纳槽 321 的过程中，所述另一个适配器的连接部 311 穿过第二开口 323。在图 12 所示的剖视图中，容纳槽 321 由两个大致 L 形的结构限定而成，其中两个 L 形结构的两个壁从第二立壁 12' 延伸形成，另两个壁相向延伸并形成第二开口 323。另一方面，接合部 312 具有大致的 U 形形状，并包括：两个具有弹性的臂部 313、以及连接在两个臂部 313 的端部之间的基部 314，连接部 311 连接在基部 314 与第一立壁 11' 之间。

[0066] 更进一步地，每个臂部 313 的末端设有突起部 315，当将另一个适配器的接合部 312 作为插入端经第一开口 322 从上向下插入容纳槽 321 中时，所述另一个适配器的突起部 315 暴露在第一开口 322 的外部，以阻挡接合部 312 的进一步插入。

[0067] 在一种实施例中，每个适配器 10' 进一步包括两个定位部 5，分别从第二立壁 12' 上突出形成，并离开第一开口 322 预定距离，以当另一个适配器的接合部 312 插入容纳槽

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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

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臂部 314’，在顶壁 13”上部之外平行于第一臂部 31’延伸；以及基部 315’，连接在第一臂部 313’和第二臂部 314’之间。每个第二垂直接合装置 32’包括从第一立壁 11”或第二立壁的外侧的下端向外凸出形成细长突起，其中细长突起能够容纳在另一个适配器的第一臂部 313’和第二臂部 314’之间，以将两个适配器叠置地接合在一起。另外，第一臂部 313’的内侧与顶壁 13”的上表面平齐，所述细长突起的下侧与底壁的下表面平齐。这样，在两个上下相邻的适配器中，上一个适配器的底壁可以与下一个适配器的顶壁彼此靠近，从而降低整个适配器组件的安装空间。

[0075] 在进一步的实施例中，第二臂部 314’的自由端设有向内延伸的阻挡部 316’，以阻挡所述细长突起从第一臂部 313’和第二臂部 314’之间的空间脱离。另外，每个适配器 10”还包括从第一立壁 11”和第二立壁凸出形成的安装机构 8，以将整个适配器组件 100”安装到安装面板 101 上。

[0076] 在一种可替换的实施例中，每个第一垂直接合装置具有大致的 U 形形状，并包括：第一臂部，从所述第一立壁或第二立壁的外侧的下端向外凸出形成；第二臂部，在所述底壁之外平行于所述第一臂部延伸；以及基部，连接在所述第一臂部和第二臂部之间。每个所述第二接合装置包括从所述第一立壁或第二立壁的外侧的上端向外凸出形成细长突起，其中所述细长突起能够容纳在另一个适配器的第一臂部和第二臂部之间，以将两个适配器叠置地接合在一起。另外，所述第一臂部的内侧与所述底壁的下表面平齐，所述细长突起的上侧与所述顶壁的上表面平齐。

[0077] 在另一种可替换的实施例中，每个接合装置包括垂直接合装置和容纳槽。所述垂直接合装置具有大致的 L 形形状，并包括：基部，从所述顶壁或者底壁向外垂直延伸；以及臂部，从所述基部的末端平行于所述顶壁或者底壁的外表面延伸。容纳槽形成在所述底壁或者顶壁中，并被构造成容纳另一个适配器的所述臂部，以将两个适配器在垂直方向上叠置地接合在一起。

[0078] 根据本实用新型另一方面的实施例，提供一种连接器组件，包括：上述各种实施例中所述的适配器组件；以及多个连接器，每个连接器连接至相应的适配器的一个接口内。进一步地，连接器为光纤连接器，例如 LC 光纤连接器。

[0079] 根据本实用新型上述各种实施例的适配器组件，多个适配器可以在水平方向上并排地依次接合和 / 或在垂直方向上叠置地依次接合，相邻的两个适配器通过例如卡扣连接方式可移除地接合在一起。整个适配器组件通过安装机构整体安装在安装面板上。各个适配器的外部接合结构彼此相同，内部结构与现有适配器的内部结构相同，从而可以与标准的 LC 光纤连接器进行高密度地配合，最大限度的利用安装面板上的空间。同时各个适配器可以采用模块化的设计，保证客户端根据需要选择合适数量的适配器进行模块化组合。

[0080] 虽然在上面的实施例中以光缆为接续对象对本实用新型的连接器进行了说明，但本领域的技术人员能够理解，本实用新型的连接器的一些实施例也可以应用于连接两条电缆。特别是，在例如计算机、路由器、服务器、交换机等设有插头和插座连接器的各类网络通信终端中，插头连接器可以设置本实用新型的具有倾斜臂、驱动臂和锁定突起的锁定机构。

[0081] 本领域的技术人员可以理解，上面所描述的实施例都是示例性的，并且本领域的技术人员可以对其进行改进，各种实施例中所描述的结构在不发生结构或者原理方面的冲突的情况下可以进行自由组合，从而在解决本实用新型的技术问题的基础上，实现更多种

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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。

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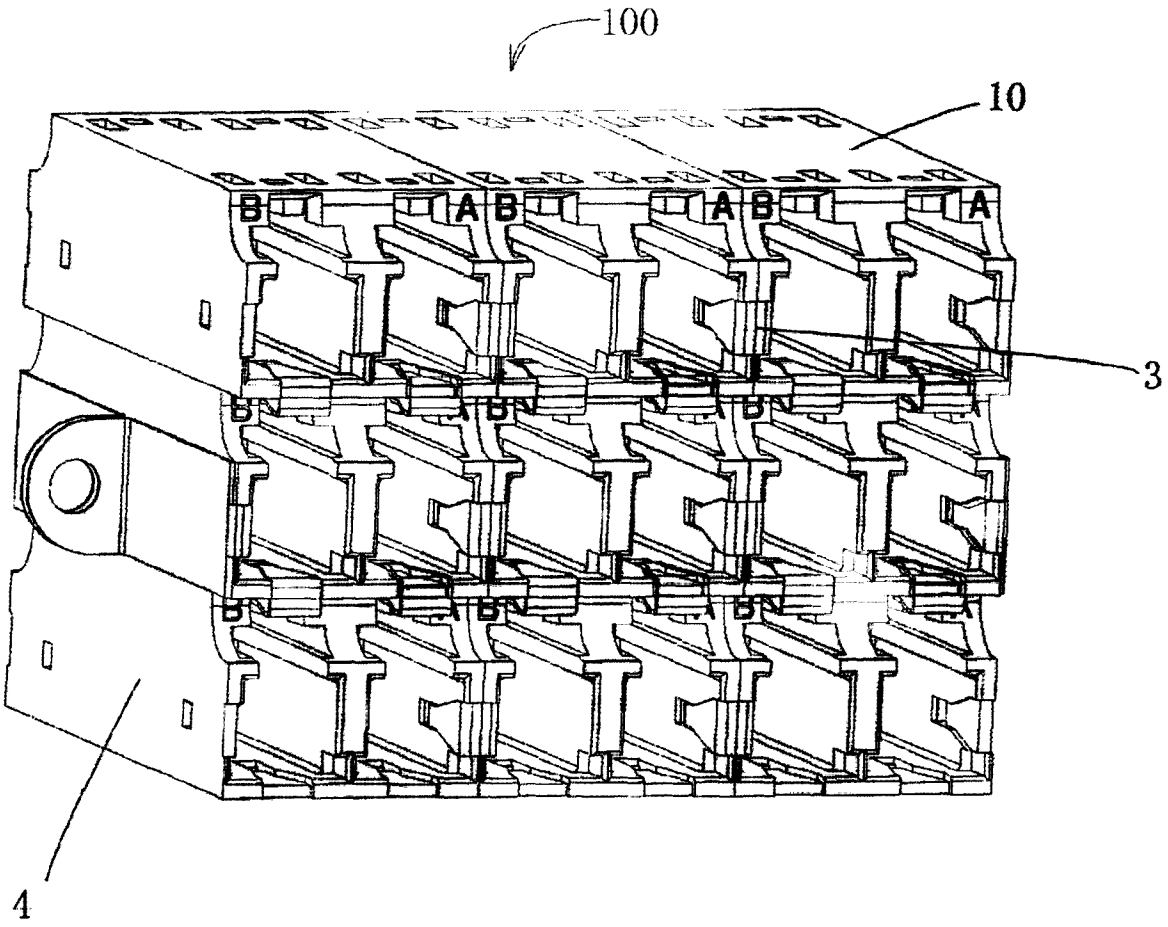

图 1

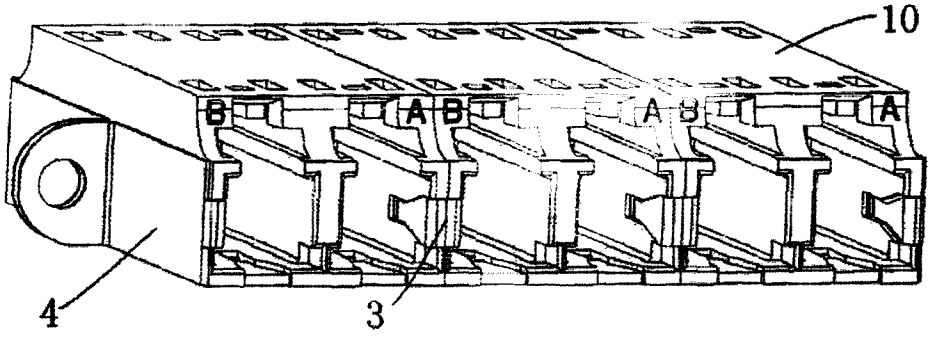

图 2

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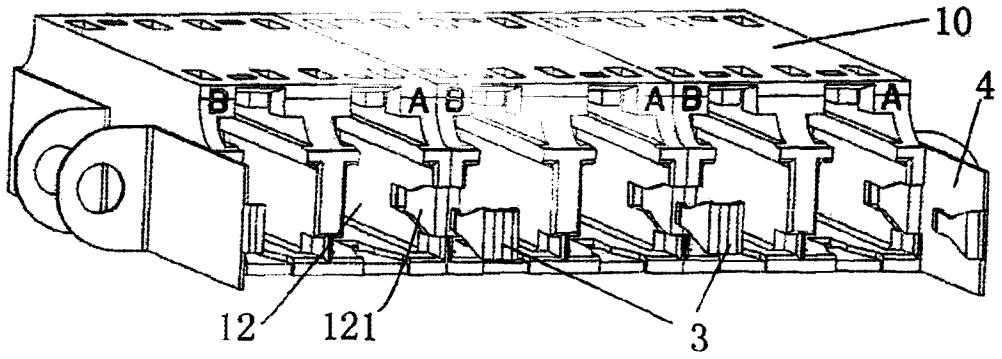

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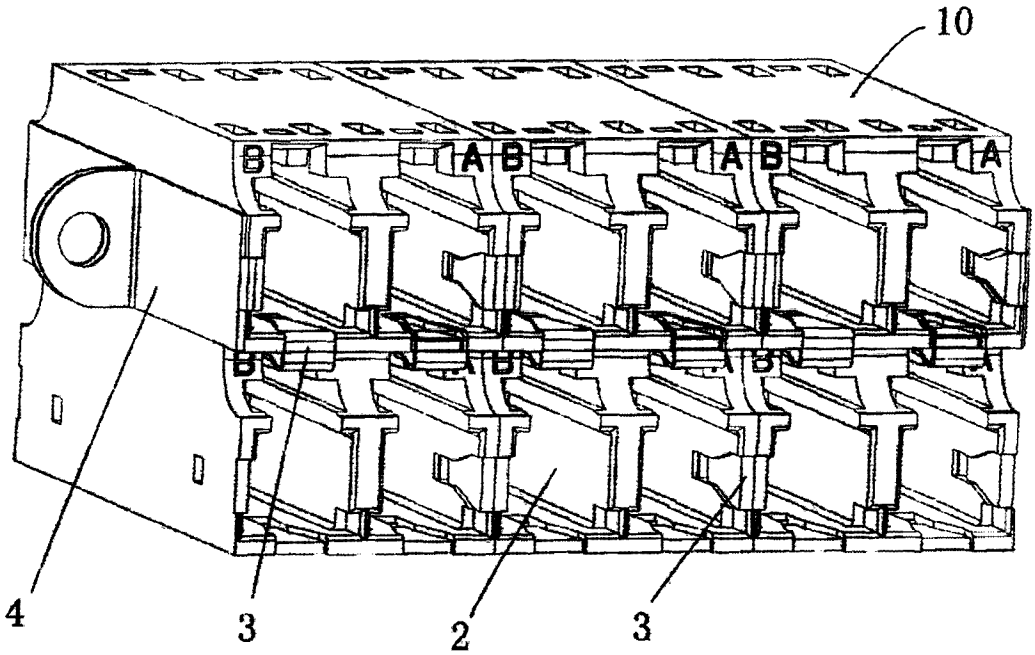

图 4

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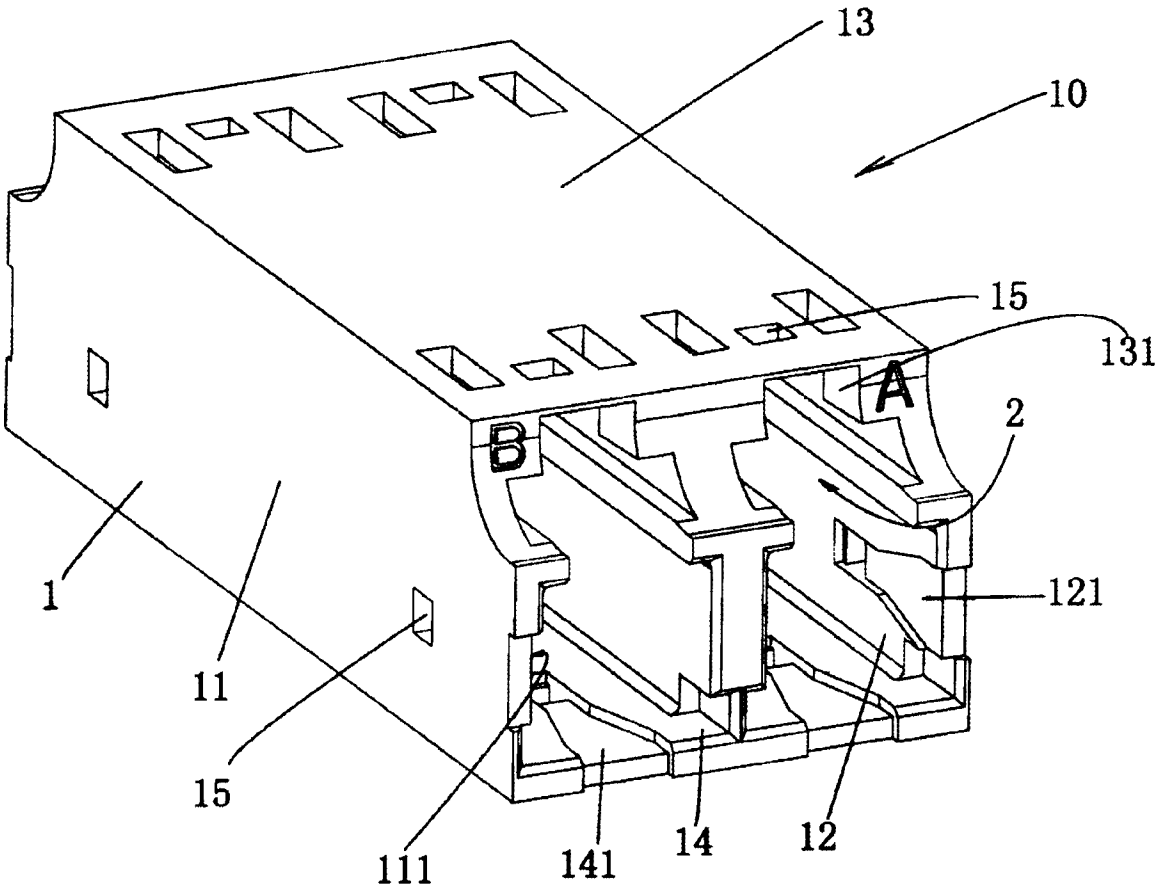

图 5

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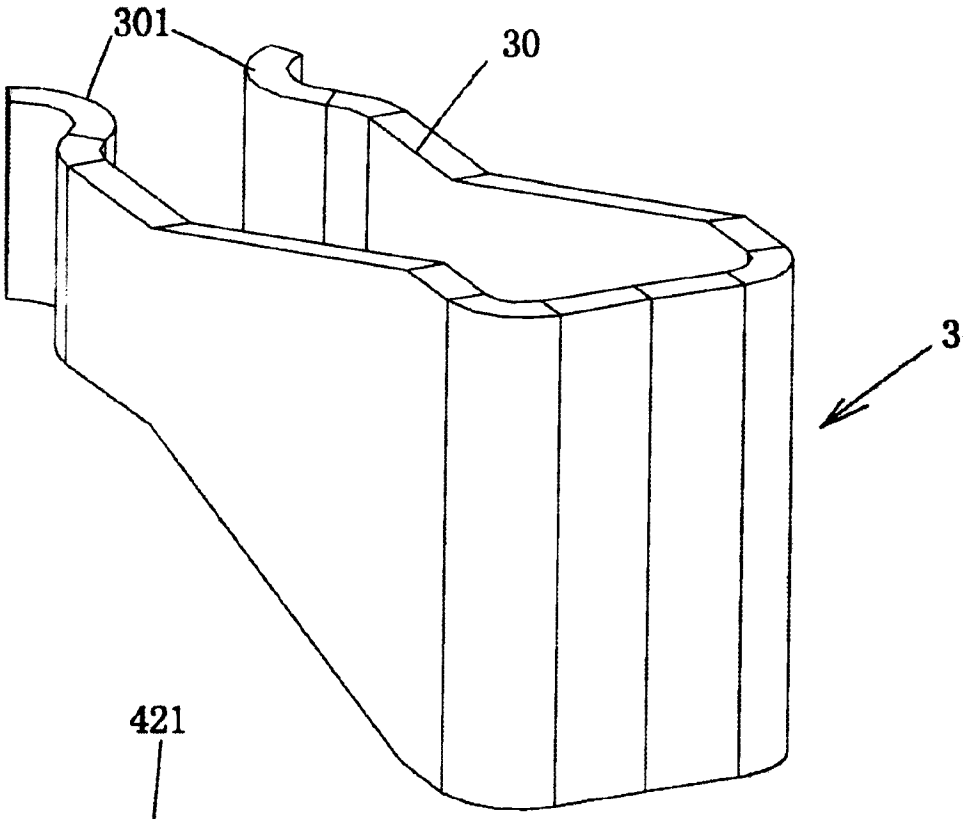

图6

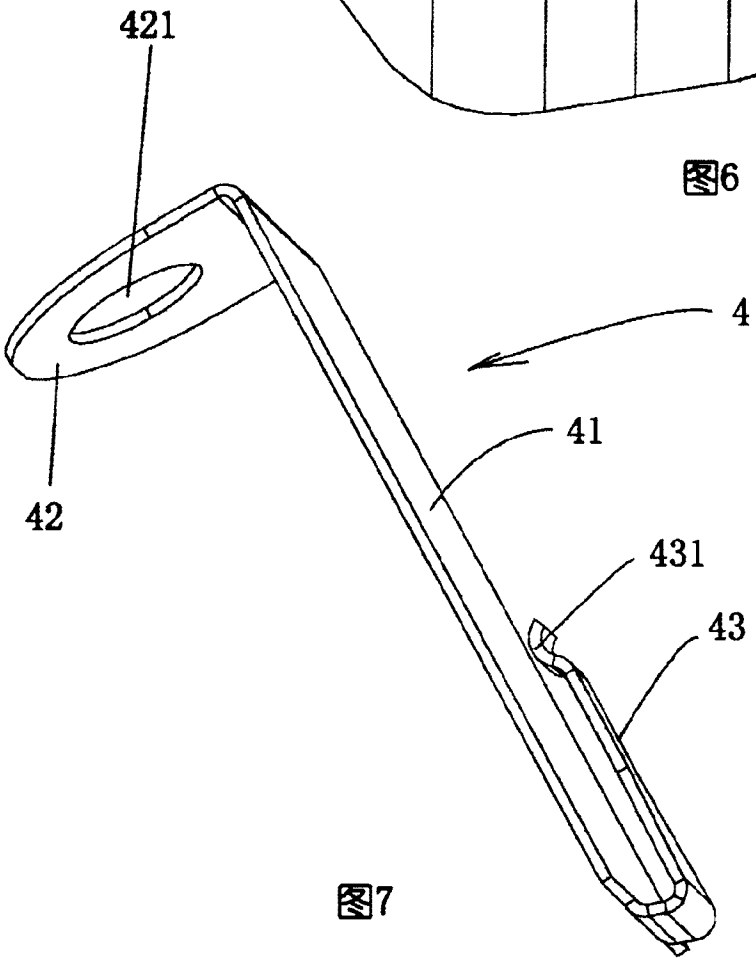

图7

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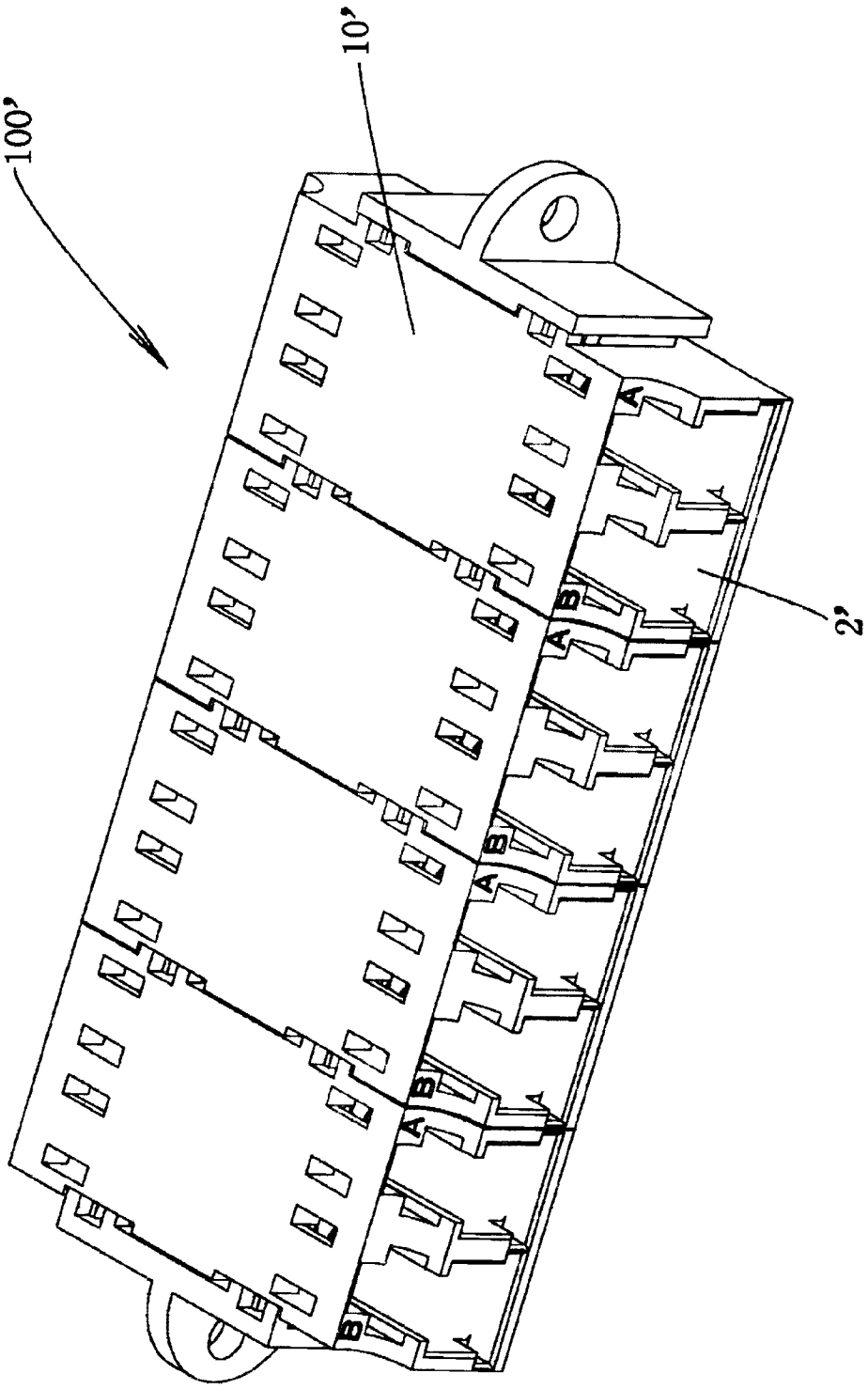

图 8

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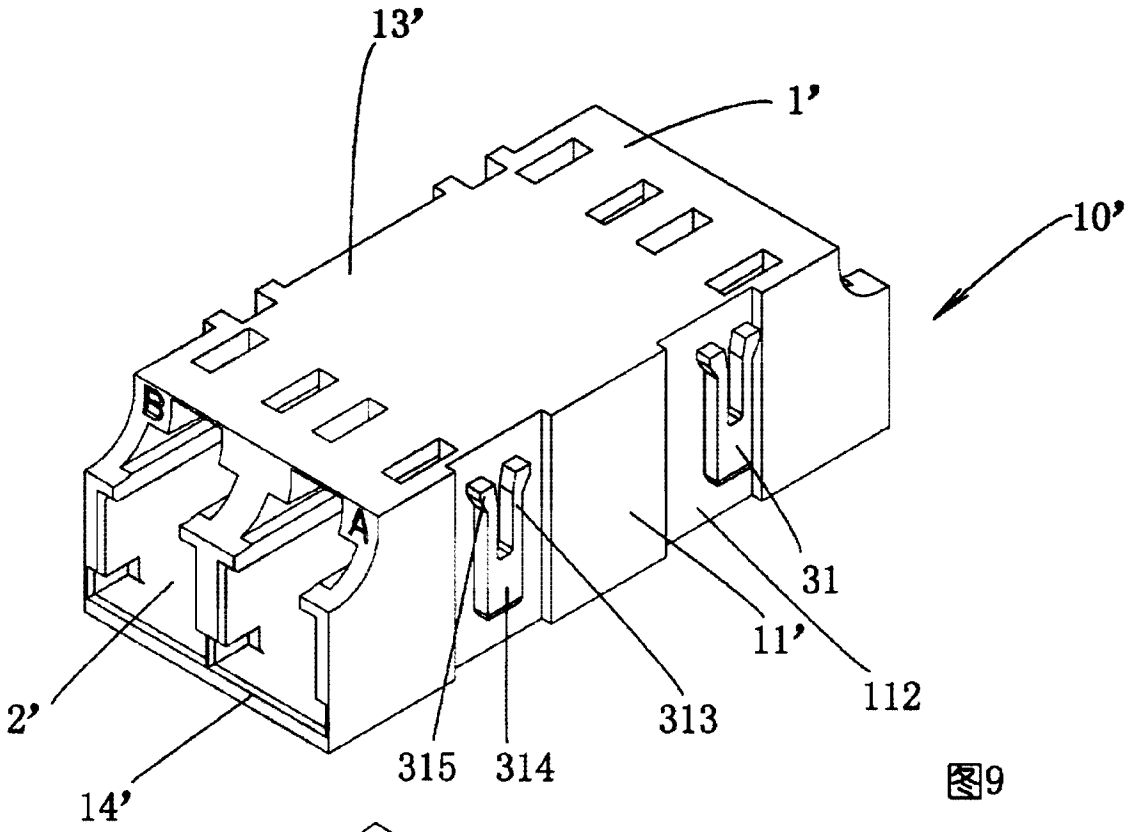

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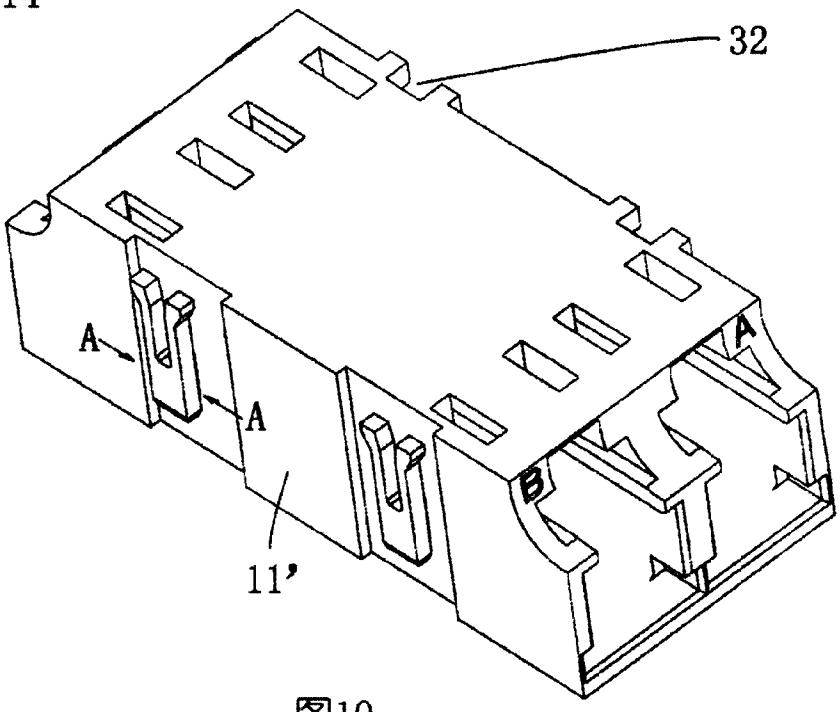

图10

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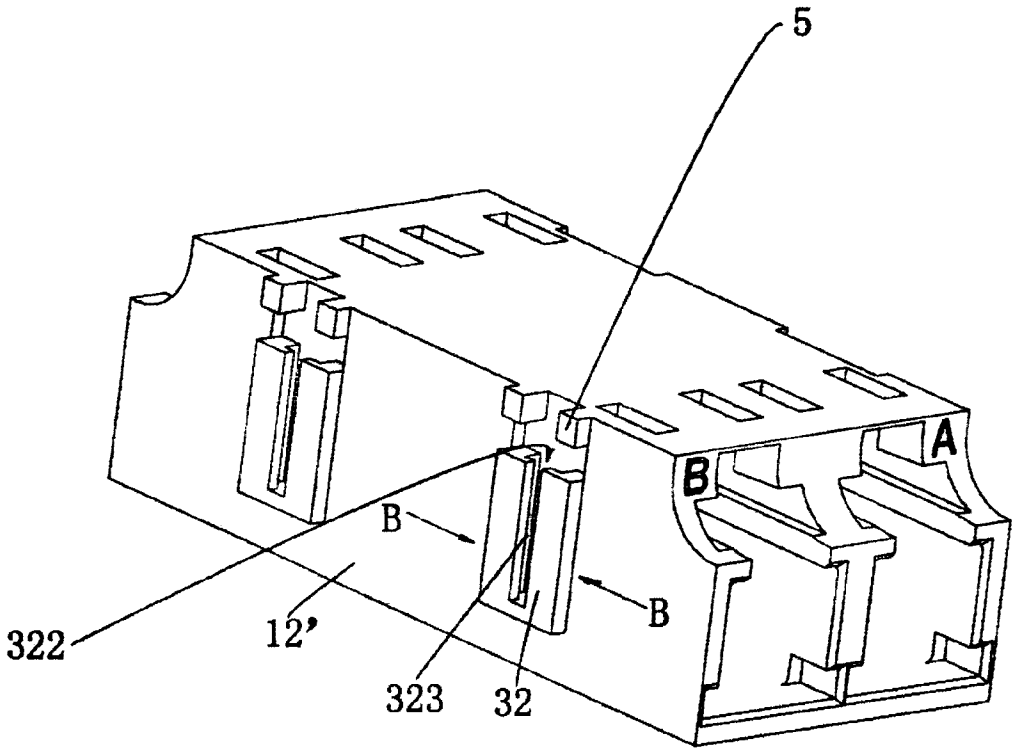

图 11

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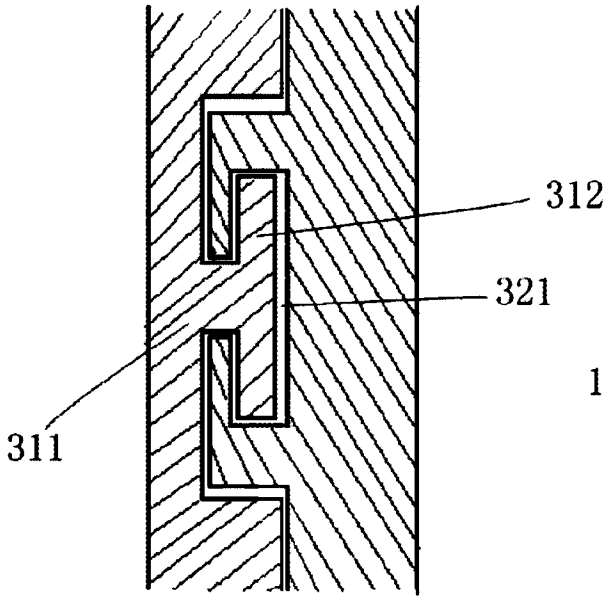

图12

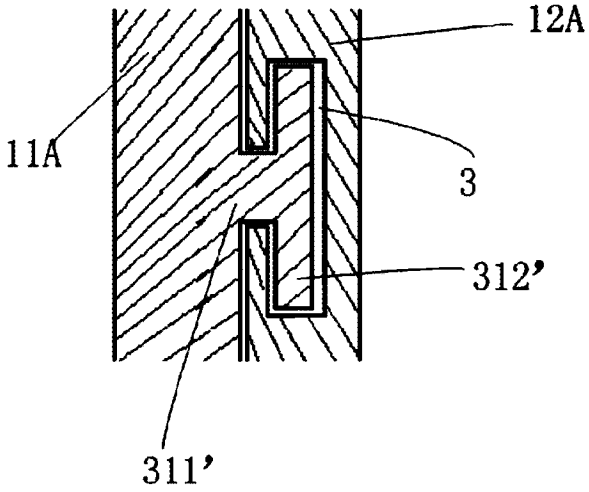

图13

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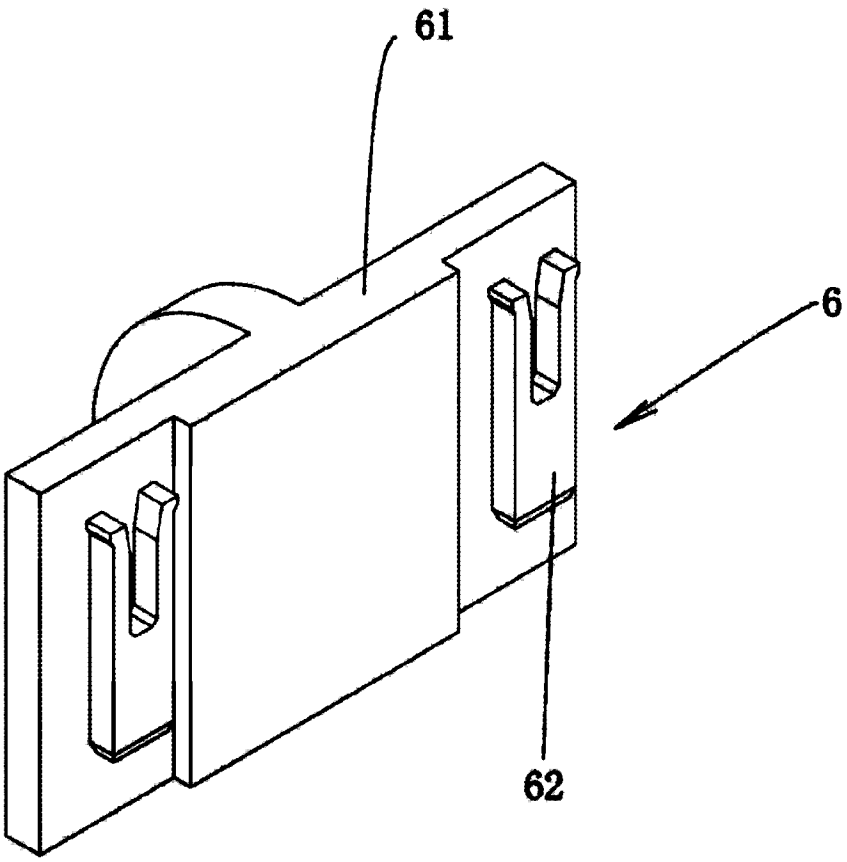

图 14

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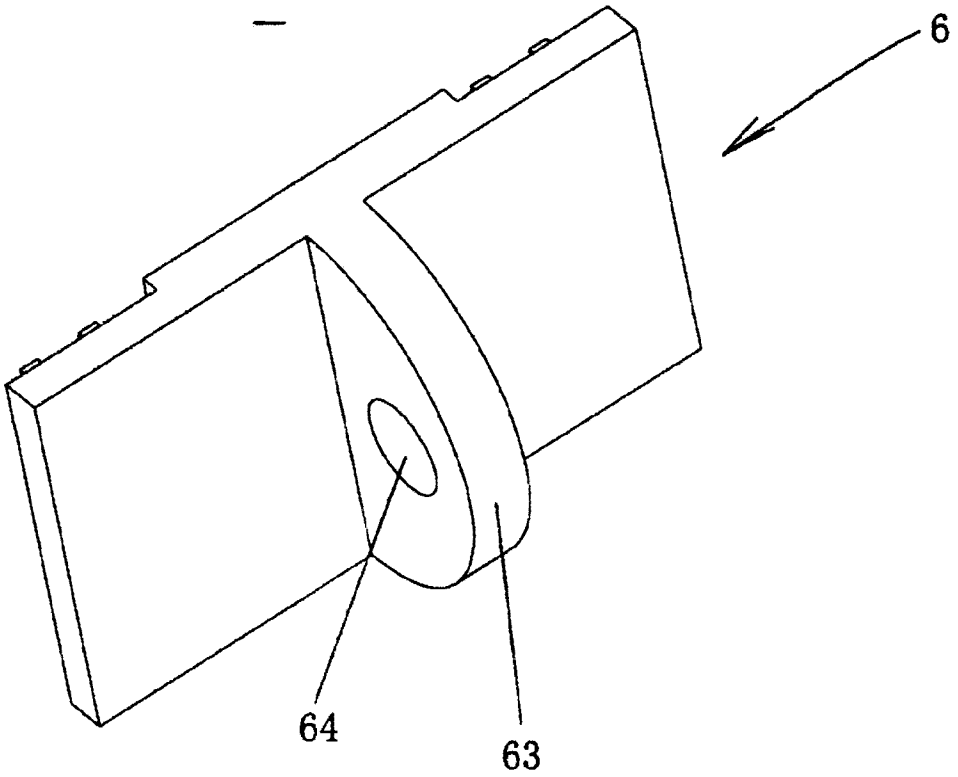

图 15

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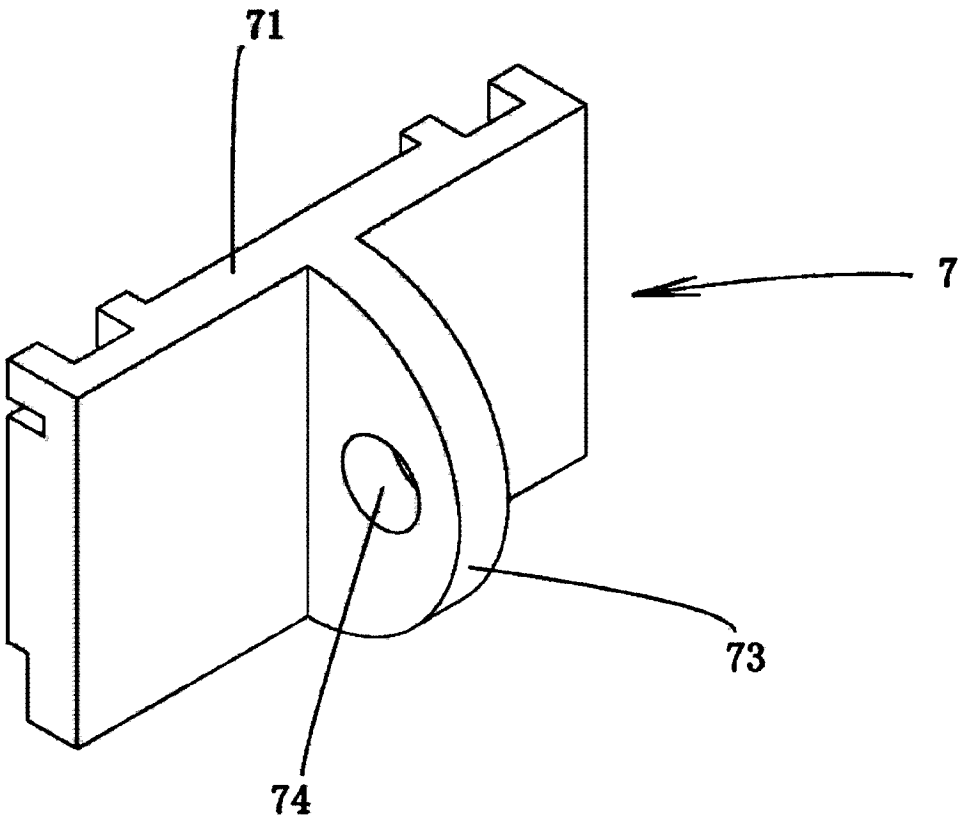

图 16

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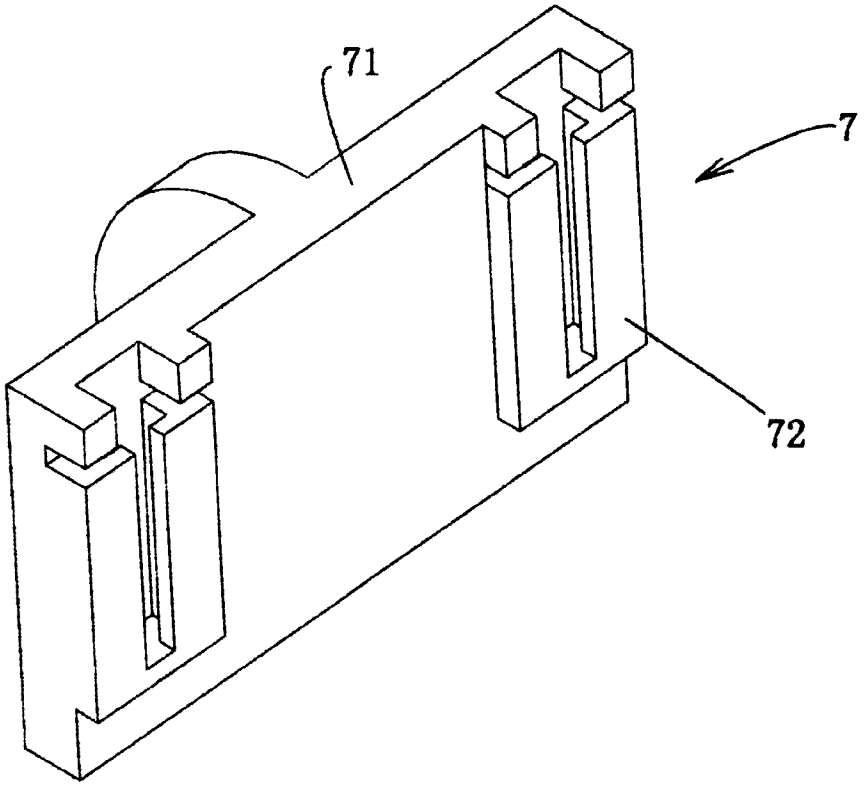

图 17

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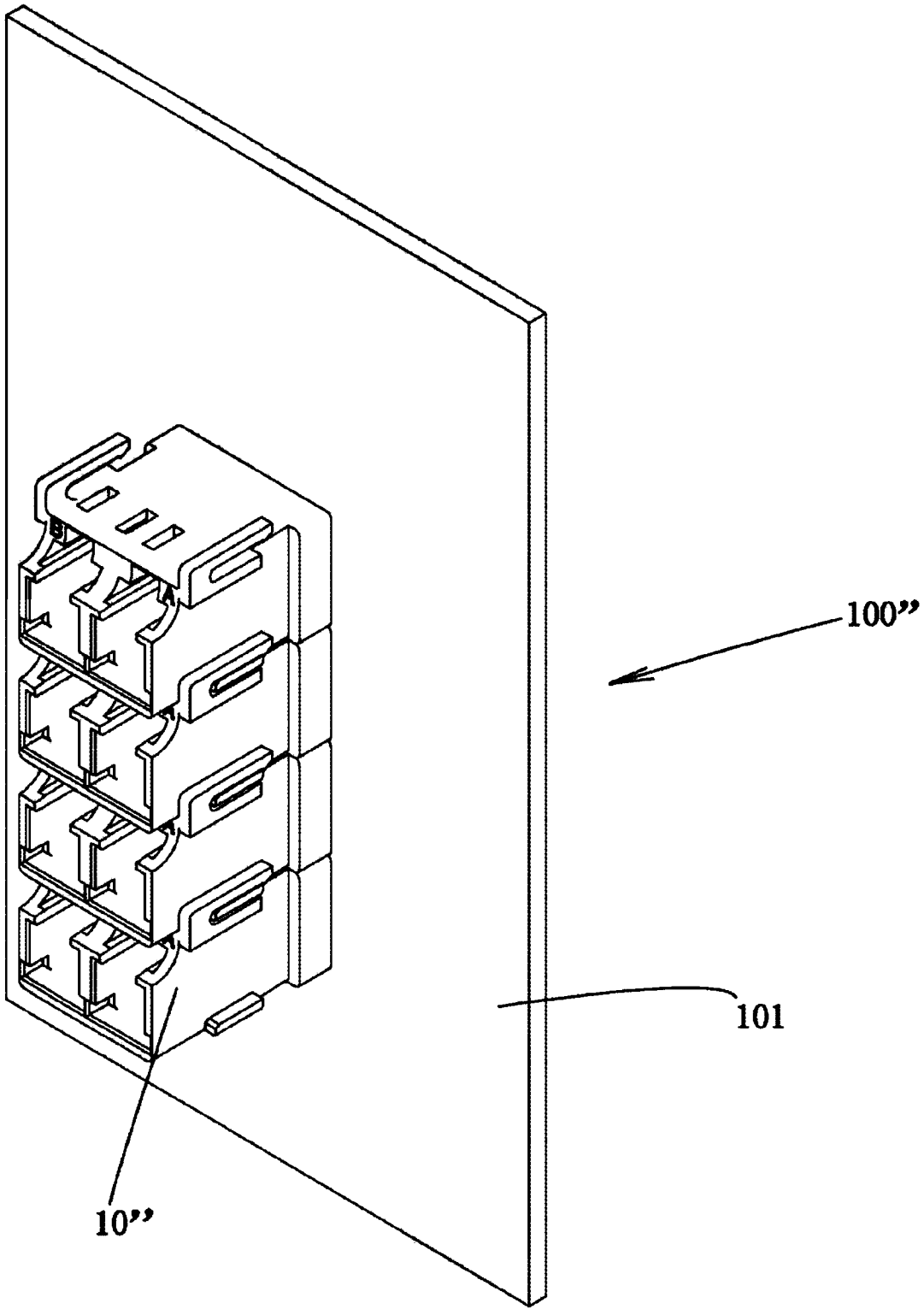

图 18

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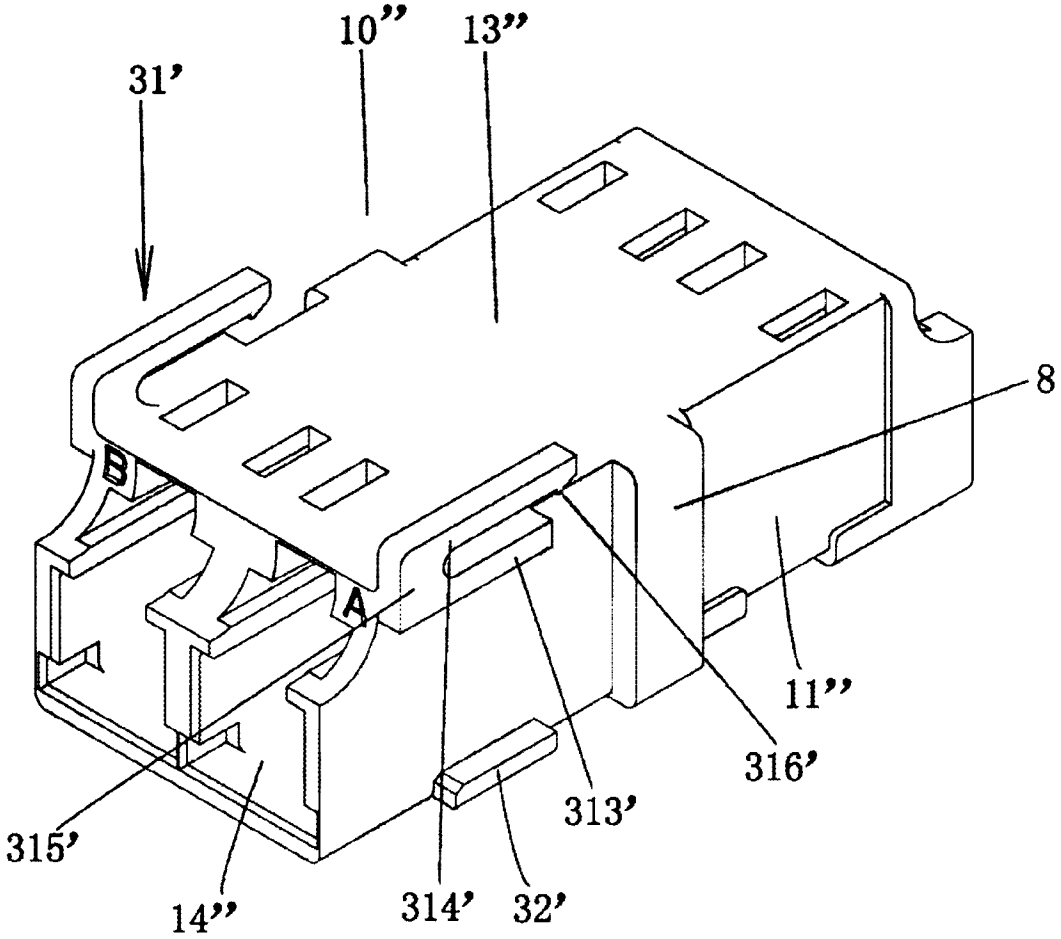

图 19

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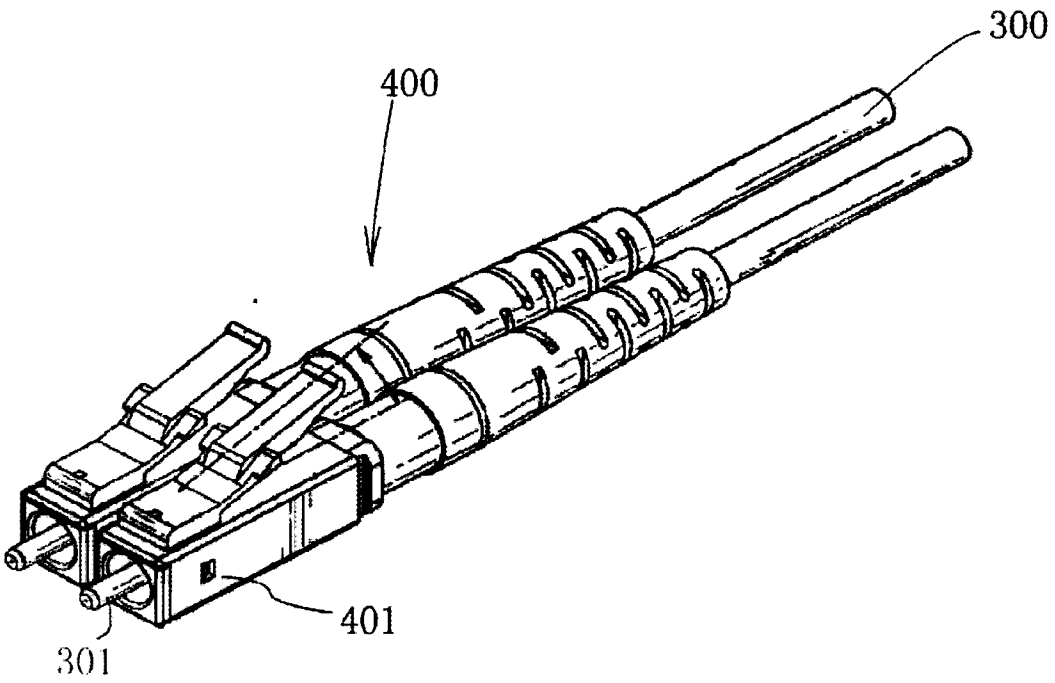

图 20

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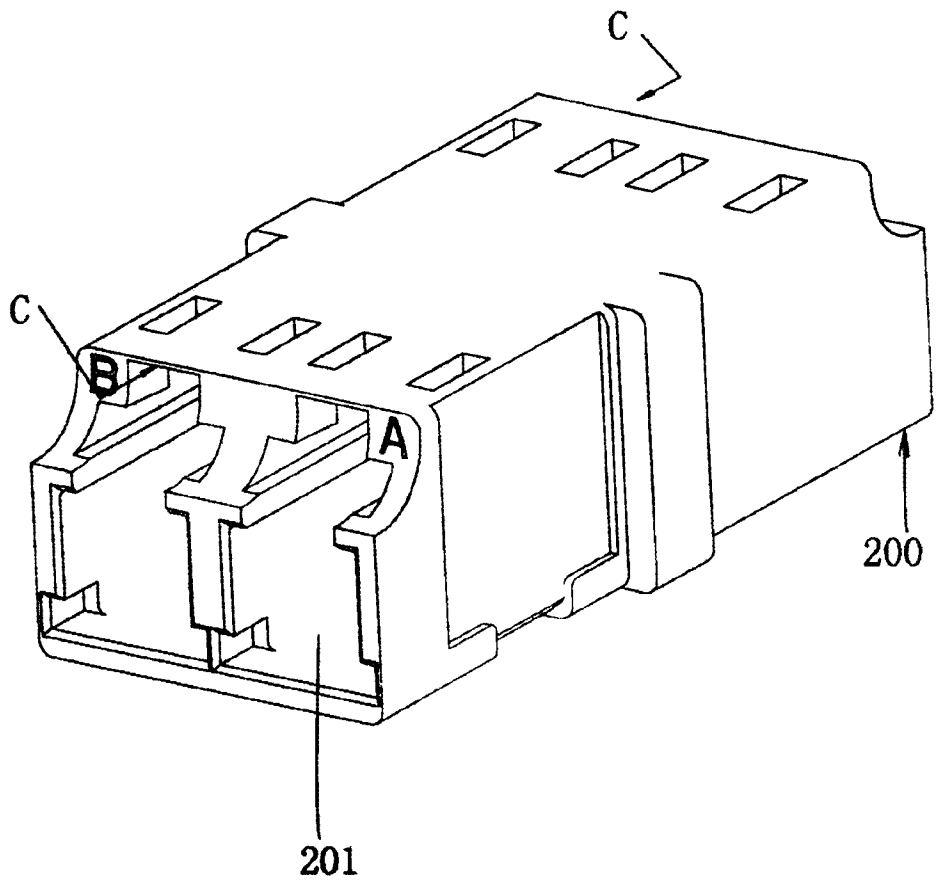

图 21

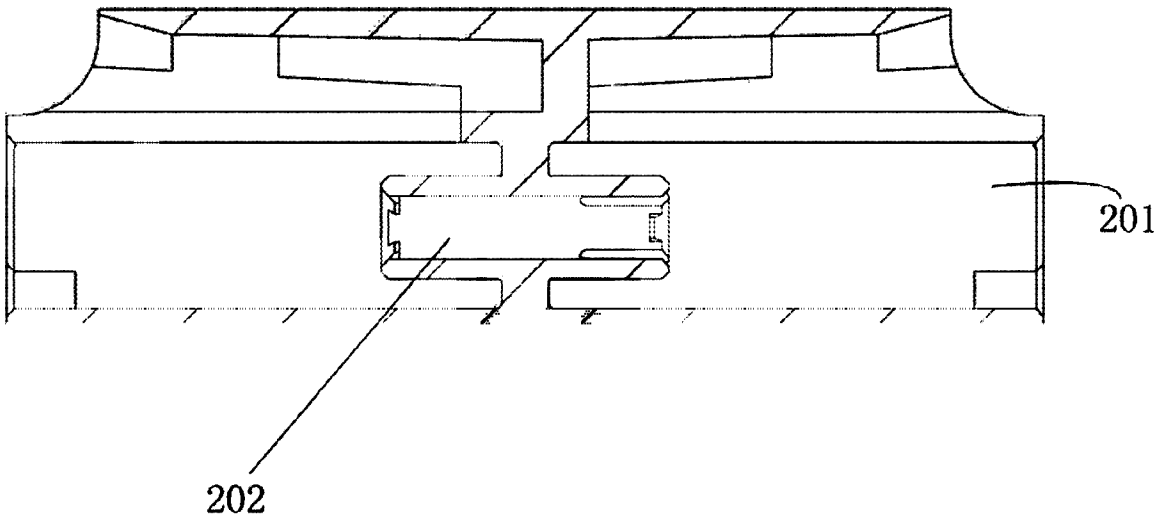

图 22

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(54) Title: ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

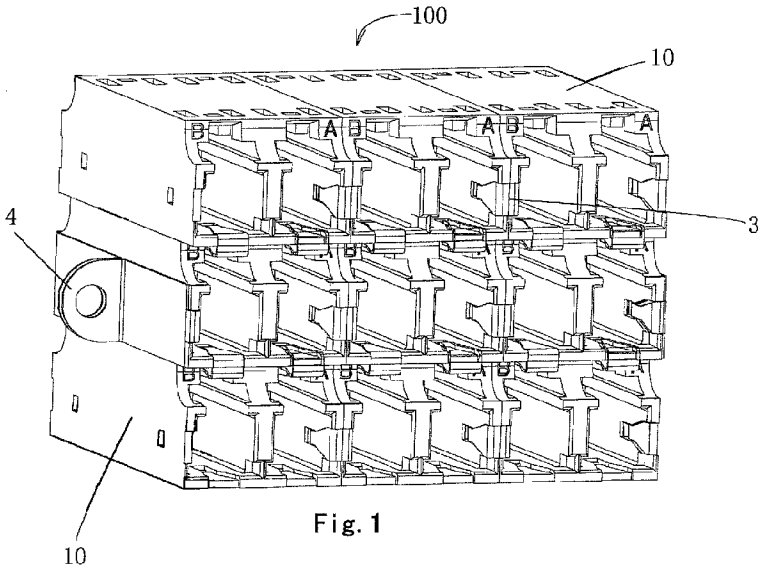

Fig. 1

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

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

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Published:

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ADAPTER ASSEMBLY AND CONNECTOR ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

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

BACKGROUND OF THE INVENTION

Field of the Invention

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

Description of the Related Art

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

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

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

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

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

SUMMARY OF THE INVENTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BRIEF DESCRIPTION OF THE DRAWINGS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE IVENTION

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

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

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

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

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

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

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

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

No.201210037495.6 by the applicant of the present invention.

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

The adapter assembly according to the first exemplary embodiment of the present invention may further comprise at least one pair of installation members 4. One of the pair of installation members 4 is mounted on the first vertical wall 11 or the second vertical wall 12 at the outmost side of a row of adapters 10. As shown in Fig.7, each of the installation members 4 comprises an elongated body 41 made of, for example, a plate material, an installation lug 42 and an auxiliary clamping component 43. The body 41 has a first end and a second end opposite to the first end, and the length of the body 41 from the first end to the second end is equal to about an half of a longitudinal length of the adapter 10. The installation lug 42 perpendicularly extends from the first end of the body 41. The auxiliary clamping component 43 is formed by bending inward from the second end of the body 41 by about 180 degrees. With this configuration, the auxiliary clamping component 43 is engaged in the recess 111 or 121 of the first vertical wall 11 or the second vertical wall 12 at the outmost side of the row of adapters 10. Also, an installation hole 421 is formed in the installation lug 42. An elastic clamping protrusion 431 for fitting in the through hole 15 is formed on a free end of the auxiliary clamping component 43. Since the length of the body 41 is equal to about an half of the longitudinal length of the adapter 10, two installation members 4 can be mounted on the first vertical wall 11 or the second vertical wall 12 from both ends thereof, respectively, and the installation lugs 42 of two installation members 4 mounted on a same outermost vertical wall abut against each other, so that the entire adapter assembly 100 can be easily mounted on a mounting frame with the installation members 4 as well as connection pieces, for example, bolts or the like which pass through the through holes 15.

Figs.8-17 show an illustrative perspective view of an adapter assembly 100' according to a second exemplary embodiment of the present invention.

In the adapter assembly 100' of the second exemplary embodiment, the housing 1' of each of the adapters 10' may exhibit a substantively cuboid shape and comprise a first vertical wall 11', a second vertical wall 12' opposite to the first vertical wall, a top wall 13'

and a bottom wall 14' for defining the interface 2'. The connection device is configured to connect the adjacent first and second vertical walls 11', 12' of two adjacent adapters 10' of the plurality of adapters 10'. In this way, a plurality of adapters 10' can be fixed together side by side in the horizontal direction.

Furthermore, each of the connection devices comprises at least one first horizontal connection member 31 (please refer to Figs.9-10) and at least one second horizontal connection member 32 (please refer to Fig.11). The first horizontal connection member 31 is formed by extending from an outer side of the first vertical wall 11' in a horizontal direction. The second horizontal connection member 32' is formed on an outer side of the second vertical wall 12'. The first horizontal connection members 31 of one adapter and the second horizontal connection members 32 of the other adapter are configured to be capable of being engaged with each other in a snap-fit manner so as to connect the plurality of adapters 10' side by side in the horizontal direction.

Referring to Figs.9-10, 12, each of the first horizontal connection members 31 comprises a connection portion 311 (please refer to Fig.12) and an engagement portion 312. The connection portion 311 is formed by extending from the outer side of the first vertical wall 11' in the horizontal direction. The engagement portion 312 is formed by extending from an end of the connection portion 311 in at least one direction (for example, as shown in Figs.9, 12, a forward direction, a rearward direction and an upward direction) parallel to the first vertical wall 11'.

Referring to Figs.11-12, each of the second horizontal connection members 32 comprises a receiving groove 321 and a first opening 322 located at an upper end of the receiving groove 321. The receiving groove 321 is formed in the second vertical wall 12' and configured to receive the engagement portion 312 of the first horizontal connection member 31 of another adapter. The first opening 322 is communicated with the receiving groove 321 to permit the engagement portion 312 of the another adapter to be downwardly inserted into the receiving groove 321 through the first opening 322.

Furthermore, the second horizontal connection member 32 may further comprise a second opening 323 extending in the vertical direction. As shown in Figs.11-12, the second opening 323 is communicated with the receiving groove 321 and configured to be fitted with the connection portion 311 of the another adapter to allow the connection portion 311 of the another adapter to pass through the second opening 323 during inserting the engagement portion 312 of the another adapter into the receiving groove 321. In the cross section view of Fig.12, the receiving groove 321 is formed by two substantially L-shaped structures. Two walls of the two L-shaped structures are formed by extending from the second vertical wall 12', the other two walls of the two L-shaped structures extend toward each other to form the second opening 323. On the other hand, as shown in Fig. 9, the engagement portion 312 has a substantively U-shape and comprises two elastic arms 313 and a base 314 connected between ends of the two elastic arms 313. The connection portion 311 is connected between

the base 314 and the first vertical wall 11', as shown in Fig. 13.

Furthermore, a projection 315 is formed on an end of each of the elastic arms 313. When the engagement portion 312 of the another adapter acted as an insertion end is downwardly inserted into the receiving groove 321 through the first opening 322, the projection 315 of the another adapter is exposed outside the first opening 322 to block the engagement portion 312 from being further inserted.

In an exemplary embodiment, as shown in Fig. 11, each of the adapters 10' may further comprises two positioning portions 5. The two positioning portions 5 are formed by protruding from the second vertical wall 12' and separate from the first opening 322 by a predetermined distance to locate the projection 315 of the another adapter between the second horizontal connection member 32 and the positioning portions 5 when the engagement portion 312 of the another adapter is inserted into the receiving groove 321. More specifically, during engaging the engagement portion 312 of the another adapter is inserted into the receiving groove 321, the base 314 and the elastic arms 313 firstly pass through between the two positioning portions 5. After passing through between the two positioning portions 5, the projection 315 is located between the upper end of the second horizontal connection member 32 and the positioning portions 5. In this way, the projection 315 can block the engagement portion 312 from being further downward inserted or being upwardly disengaged from the receiving groove 321. The upper and lower surfaces of the projection 315 may be configured to be sloped guide surfaces, so that the projection 315 can overcome the block of the second horizontal connection member 32 or the positioning portions 5 through the sloped guide surfaces under a relatively larger force.

The above described engagement portion 312 is a U-shaped member with an opening upwardly as shown in the embodiment of Figs.9-10. But the present invention is not limited to this, in another embodiment, the engagement portion 312 may be a U-shaped member with an opening downwardly and a connection portion connected to the uppermost end of a base. In this case, the second opening may be omitted.

In an exemplary embodiment, the second horizontal connection member 32 may further comprise a third opening (not shown) communicated with the receiving groove 321 and opposite to the first opening 322. A projection is formed on an end of each of the elastic arms. When the end of the elastic arm of the another adapter as an insertion end is downwardly inserted into the receiving groove 321, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove 321.

In an exemplary embodiment, the first horizontal connection member 31 is disposed in a notch 112 formed in the first vertical wall 11', and the second horizontal connection member 32 is protruded from the second vertical wall 12'. In this way, when the first and second horizontal connection members 31, 32 are connected together, the first and second vertical walls 11', 12' of two adjacent adapters 10' abut against each other, saving the

mounting space.

In an alternative embodiment, as shown in Fig.13, both the connection portion 311' and the engagement portion 312' of the first horizontal connection member are provided beyond the outer surface of the first vertical wall 11A. The receiving groove 321' of the second horizontal connection member is formed in the second vertical wall 12A, that is, the entire second horizontal connection member is provided not beyond the outer surface of the second vertical wall 12A. In this way, when the first and second horizontal connection members are connected together, the first and second vertical walls 11A, 12B of two adjacent adapters 10' also can abut against each other, thereby saving the mounting space of the adapters.

As shown in Figs.14-17, the adapter assembly 100' according to the second exemplary embodiment of the present invention may further comprise a first installation member 6 and a second installation member 7. The first installation member 6 comprises a first plate body 61 and a first auxiliary connection member 62. The first auxiliary connection member 62 is formed on a first side of the first plate body 61 and configured the same as the first horizontal connection member 31 so as to engage with the second horizontal connection member 32 of one adapter at the outmost side of a row of adapters. In this way, the first installation member 6 can be mounted on the adapter at the outmost side of the row of adapters. The second installation member 7 comprises a second plate body 71 and a second auxiliary connection member 72. The second auxiliary connection member 72 is formed on a first side of the second plate body 71 and configured the same as the second horizontal connection member 32 so as to engage with the first horizontal connection member 31 of another adapter at the outmost side of the row of adapters. In this way, the second installation member 7 can be mounted on the another adapter at the outmost side of the row of adapters.

Furthermore, the first installation member 6 may further comprise a first installation lug 63 formed on a second side of the first plate body 61, and the second installation member may further comprise a second installation lug 73 formed on a second side of the second plate body 71. Each of the first and second installation lugs 63, 73 is provided with at least one installation hole 64, 74, so that the entire adapter assembly 100' can be mounted on the mounting panel (not shown, please refer to Fig.11) by means of connection pieces, for example, bolts or the like.

Figs.18-19 show an illustrative perspective view of an adapter assembly 100'' according to a third exemplary embodiment of the present invention.

As shown in Figs.18-19, the adapter assembly 100'' comprises a plurality of adapters 10''. Each of the adapters 10'' comprises two first vertical connection members 31' and two second vertical connection members 32'. The two first vertical connection members 31' are provided on upper ends outside the first vertical wall 11'' and the second vertical wall, respectively, and the two second vertical connection members 32' are provided on lower

ends outside the first vertical wall 11'' and the second vertical wall, respectively. The two first vertical connection members 31' and the two second vertical connection members 32' can be engaged together, respectively, so that the plurality of adapters 10'' can be stacked one over the other in the vertical direction.

Furthermore, in the adapter assembly 100'', each of the first vertical connection members 31' has a substantively U-shape and comprises a first arm 313', a second arm 314' and a base 315'. The first arm 313' is formed by protruding outward from the upper end of the outside of the first vertical wall 11'' or the second vertical wall. The second arm 314' is located above the top wall 13'' and extends in a direction parallel to the first arm 313'. The base 315' is connected between the first and second arms 313', 314', so that a slot is formed between the first and second arms 313', 314'. Each of the second vertical connection members 32' comprises an elongated protrusion formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms 313', 314' of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm 313' is flush with the upper surface of the top wall 13'', and the lower side of the elongated protrusion is flush with the lower surface of the bottom wall. In this way, when two adjacent adapters are stacked and engaged in the vertical direction, the bottom wall of the upper adapter can abut against the top wall of the lower adapter, thereby saving the mounting space of the entire adapter assembly.

In a further embodiment, a free end of the second arm 314' is formed with a block portion 316' extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms 313', 314'. Also, each of the adapters 10'' further comprises an installation members 8 protruding from the first vertical wall 11'' and the second vertical wall to mount the entire adapter assembly on a mounting panel 101, as shown in Fig. 19.

In an alternative embodiment, each of the first vertical connection members has a substantively U-shape and comprises: a first arm formed by protruding outward from the lower end of the outside of the first vertical wall 11'' or the second vertical wall; a second arm located below the bottom wall and extending in a direction parallel to the first arm; and a base connected between the first and second arms to form a slot between the first and second arms. Each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the upper end of the outside of the first vertical wall or the second vertical wall. The elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters in the vertical direction. Also, an inner side of the first arm is flush with the lower surface of the bottom wall, and the upper side of the elongated protrusion is flush with the upper surface of the top wall.

In another alternative embodiment, each of the connection devices comprises a vertical

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

According to an exemplary embodiment of another aspect of the present invention, there is provided a connector assembly comprising: an adapter assembly according to the above mentioned embodiments; and a plurality of connectors each coupled into one of the interfaces of the respective adapter. Furthermore, the connector may be a fiber optic connector, for example, a LC fiber optic connector.

According to various exemplary embodiments of the present invention, a plurality of adapters may be connected together in order in a manner of side by side in a horizontal direction and/or stacked with one on the other in a vertical direction, for example, two adjacent adapters may be removably connected together in a snap-fit manner, so that the space above a mounting panel for mounting the plurality of adapters can be utilized optimally. The entire adapter assembly may be mounted on the mounting panel by means of the installation members. The outer connection features on the adapters may be same with each other, and the inner features of the adapter may be same as those of the conventional adapter, so that the adapters of the present invention may be adapted to couple with the standard LC fiber optic connectors in a high density to optimally utilize the space above a mounting panel. At the same time, the adapters can be assembled in a modularization manner to ensure that an appreciate number of adapters can be quickly assembled together according to various requirements from customers.

Although it has been described the connector of the present invention by using the optical cable as an object to be spliced in the above mentioned embodiments, it should be appreciated for those skilled in this arts that the connector of the present invention may be used to couple two electric cables in some other embodiments. More particularly, for example, in various network communication terminations, such as computer, router, server, digital switch, and so on, having a plug connector and a receptacle connector, the plug connector may be provided with the locking mechanism having a slope arm, a driving arm and a locking protrusion according to the present invention.

It should be appreciated for those skilled in this art that the above embodiments are intended to be illustrated, and not restrictive. For example, many modifications may be made to the above embodiments by those skilled in this art, and various features described in different embodiments may be freely used in combination with each other without conflict in configuration or principle of the present invention, so that more kinds of connector and adapter assemblies can be achieved with overcoming the technical problem of the present invention.

Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

What is claimed is,

1. An adapter assembly (100, 100', 100") for coupling with a plurality of connectors, comprising:

a plurality of adapters (10, 10', 10") each including a housing (1, 1', 1"), the housing being formed with at least one interfaces (2, 2', 2") each for coupling with one of the plurality of connectors; and

at least one connection device each configured to connect adjacent walls of the interfaces of two adjacent adapters of the plurality of adapters in a snap-fit manner, so that the plurality of adapters are connected together.

2. The adapter assembly according to claim 1,

wherein the housing of each of the adapters exhibits a substantively cuboid shape and comprises a first vertical wall (11), a second vertical wall (12) opposite to the first vertical wall, a top wall (13) and a bottom wall (14) for defining the interface (2); and

wherein the connection device is configured to connect the adjacent first and second vertical walls and/or the adjacent top and bottom walls of two adjacent adapters of the plurality of adapters.

3. The adapter assembly according to claim 2,

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

4. The adapter assembly according to claim 3,

wherein each of the first vertical wall, the second vertical wall, the top wall and the bottom wall is formed with a recess (111, 121, 131, 141) in an inner side thereof; and

wherein the clamping member comprises a pair of clamping arms (30) each constructed to substantively match with that of the recess to be received in the respective recess.

5. The adapter assembly according to claim 4,

wherein each of the clamping members comprises a pair of holding portions (301) protruding toward each other at free ends of the pair of clamping arms; and

wherein a distal end of each of the recesses is formed with a through hole (15) running through the first vertical wall, the second vertical wall, the top wall and the bottom wall for receiving the respective holding portion therein.

6. The adapter assembly according to claim 4,

wherein each of the clamping arms exhibits a substantively triangle shape.

7. The adapter assembly according to any one of claims 3-6, further comprising at least one pair of installation members (4),

wherein one of the pair of installation members is mounted on the first vertical wall or the second vertical wall at the outmost side of a row of adapters,

each of the installation members comprises:

a body (41) having a first end and a second end opposite to the first end, and the length of the body from the first end to the second end being equal to about an half of a longitudinal length of the adapter;

an installation lug (42) perpendicularly extending from the first end of the body; and

an auxiliary clamping component (43) formed by bending inward from the second end of the body by about 180 degrees and engaged in the recess of the vertical wall at the outmost side of the row of adapters.

8. The adapter assembly according to claim 7,

wherein an installation hole (421) is provided in the installation lug; and

wherein an elastic clamping protrusion (431) is formed on a free end of the auxiliary clamping component.

9. The adapter assembly according to claim 2,

wherein each of the connection devices comprises:

at least one first horizontal connection member (31) formed by extending from an outer side of the first vertical wall in a horizontal direction; and

at least one second horizontal connection member (32) formed on an outer side of the second vertical wall,

wherein the first and second horizontal connection members are configured to be engaged with each other in a snap-fit manner so as to connect the plurality of adapters side by side.

10. The adapter assembly according to claim 9,

wherein the first horizontal connection member comprising:

a connection portion (311) formed by extending from the outer side of the first vertical wall in the horizontal direction ; and

an engagement portion (312) formed by extending from an end of the connection portion in at least one direction parallel to the first vertical wall,

wherein the second horizontal connection member comprising:

a receiving groove (321) formed in the second vertical wall and configured to receive the engagement portion of the first horizontal connection member of another

adapter; and

a first opening (322) communicated with the receiving groove to permit the engagement portion of the another adapter to be inserted into the receiving groove through the first opening.

11. The adapter assembly according to claim 10, wherein the second horizontal connection member further comprises a second opening (323) communicated with the receiving groove and configured to be fitted with the connection portion of the another adapter, so that the connection portion of the another adapter is allowed to pass through the second opening during inserting the engagement portion of the another adapter into the receiving groove.

12. The adapter assembly according to claim 11,

wherein the engagement portion has a substantively U-shape and comprises two elastic arms (313) and a base (314) connected between ends of the two elastic arms; and

wherein the connection portion is connected between the base and the first vertical wall.

13. The adapter assembly according to claim 12,

wherein a projection (315) is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the first opening to block the engagement portion from being further inserted.

14. The adapter assembly according to claim 13, wherein each of the adapters further comprises:

two positioning portions (5) formed by protruding from the second vertical wall and separate from the first opening by a predetermined distance to locate the projection of the another adapter between the second horizontal connection member and the positioning portions when the engagement portion of the another adapter is inserted into the receiving groove.

15. The adapter assembly according to claim 12,

wherein the second horizontal connection member further comprises a third opening communicated with the receiving groove and opposite to the first opening,

wherein a projection is formed on an end of each of the elastic arms; and

wherein when the engagement portion of the another adapter acted as an insertion end is inserted into the receiving groove, the projection of the another adapter is exposed outside the third opening to block the engagement portion of the another adapter from being retreated from the receiving groove.

16. The adapter assembly according to any one of claims 9-15,
wherein the first horizontal connection member is disposed in a notch formed in the first vertical wall; and
wherein the second horizontal connection member is protruded from the second vertical wall.

17. The adapter assembly according to claim 16, further comprising:
a first installation member (6) comprising:
a first plate body (61); and
a first auxiliary connection member (62) formed on a first side of the first plate body and configured the same as the first horizontal connection member so as to engage with the second horizontal connection member of one adapter at the outmost side of a row of adapters,
a second installation member (7) comprising:
a second plate body (71); and
a second auxiliary connection member (72) formed on a first side of the second plate body and configured the same as the second horizontal connection member so as to engage with the first horizontal connection member of another adapter at the outmost side of the row of adapters.

18. The adapter assembly according to claim 17,
wherein the first installation member further comprises a first installation lug (63) formed on a second side of the first plate body; and
wherein the second installation member further comprises a second installation lug (73) formed on a second side of the second plate body.

20. The adapter assembly according to claim 2,
wherein each of the connection devices comprises:
first vertical connection members (31') formed by extending from outer sides of the first and second vertical walls proximate to the top wall or the bottom wall; and
second horizontal connection members (32') formed on outer sides of the first and second vertical walls proximate to the bottom wall or the top wall and configured to be inserted into and fixed in a slot in the first vertical connection member of another adapter,
wherein the plurality of adapters are stacked and engaged with each other in a vertical direction by engaging the first vertical connection members of one adapter and the second vertical connection members of the other adapter.

21. The adapter assembly according to claim 20,

wherein each of the first vertical connection members has a substantively U-shape, and comprises:

a first arm (313') formed by protruding outward from an upper end or a lower end of the outside of the first or second vertical wall;

a second arm (314') located above the top wall or the bottom wall and extending in a direction parallel to the first arm; and

a base connected between the first and second arms to form a slot between the first and second arms,

wherein each of the second vertical connection members comprises an elongated protrusion formed by protruding outward from the lower end or the upper end of the outside of the first or second vertical wall, and

wherein the elongated protrusion is configured to be received in the slot between the first and second arms of the another adapter to stack and engage two adapters.

22. The adapter assembly according to claim 21,

wherein a free end of the second arm is formed with a block portion (316') extending inward to prevent the elongated portion from being disengaged from the slot between the first and second arms.

23. The adapter assembly according to claim 2, wherein each of the connection devices comprises:

a vertical connection member having a substantively L-shape, and comprising:

a base vertically extending outward from the top wall or the bottom wall; and

a arm extending from an end of the base in a direction parallel to an outer surface of the top wall or the bottom wall, and

a receiving groove formed in the bottom wall or the top wall and configured to receive the arm of another adapter to stack and engage two adapters.

24. The adapter assembly according to any one of claims 20-23, wherein each of the adapters further comprises installation members (8) formed by protruding from the first and second vertical walls to mount the adapter assembly on a mounting panel.

25. A connector assembly, comprising:

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

a plurality of connectors each coupled into one of the interfaces of the respective adapter.

26. The connector assembly according to claim 25, wherein the connector is a fiber optic

connector.

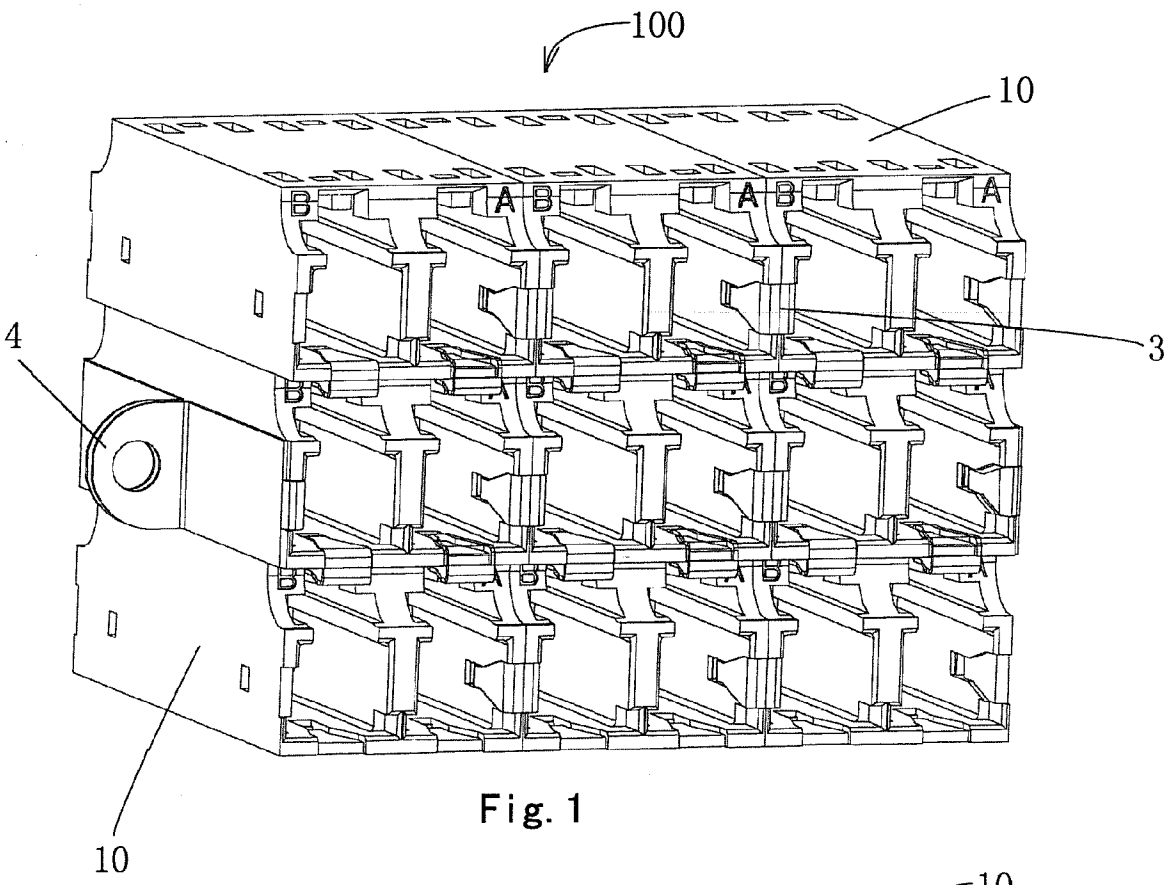

Fig. 1

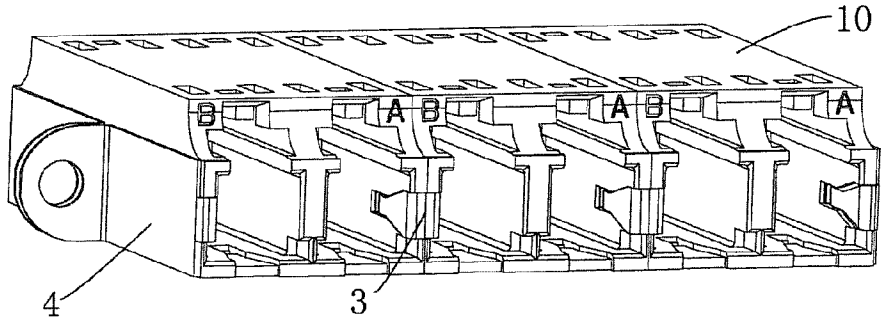

Fig. 2

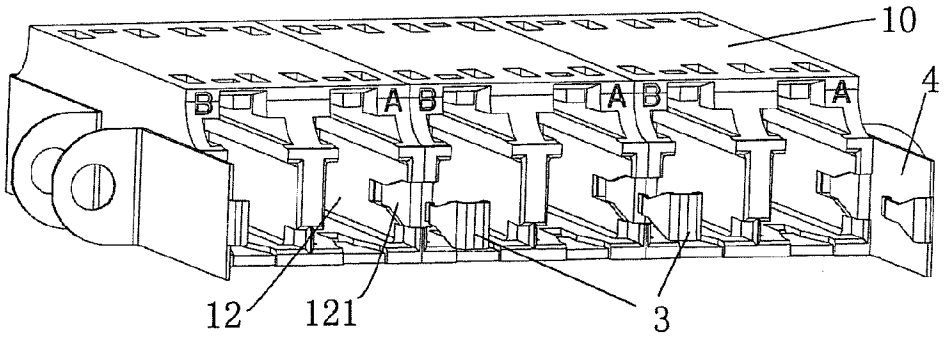

Fig. 3

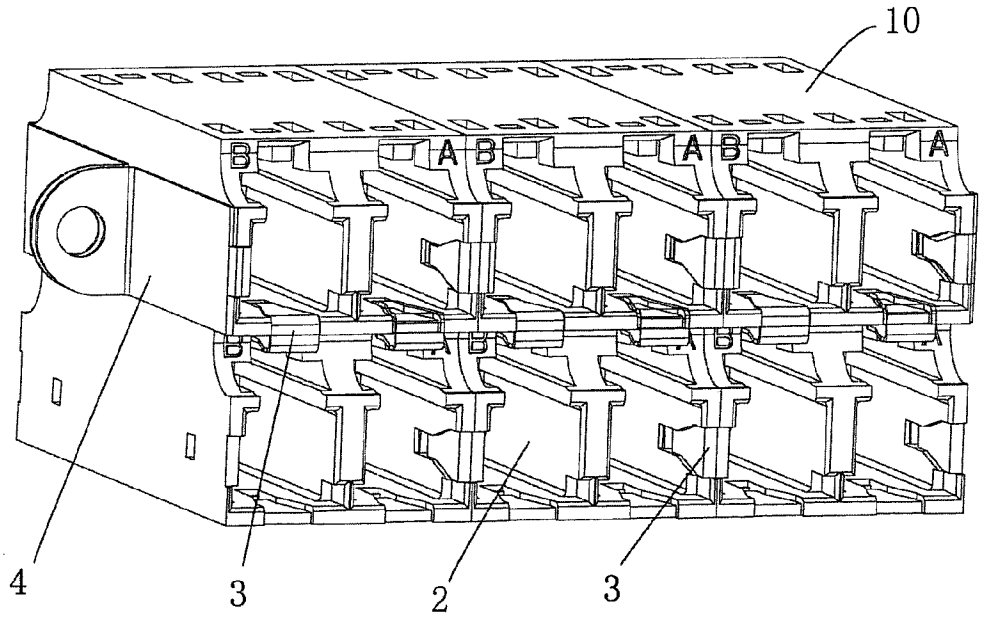

Fig. 4

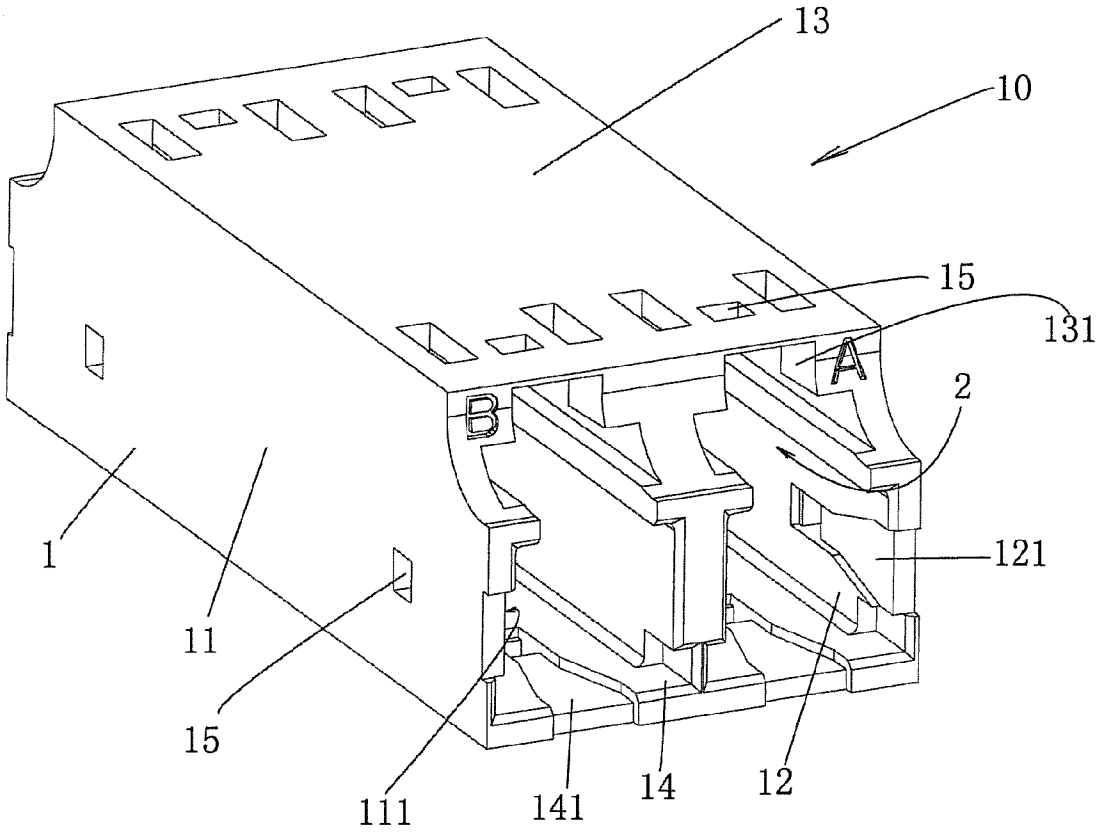

Fig. 5

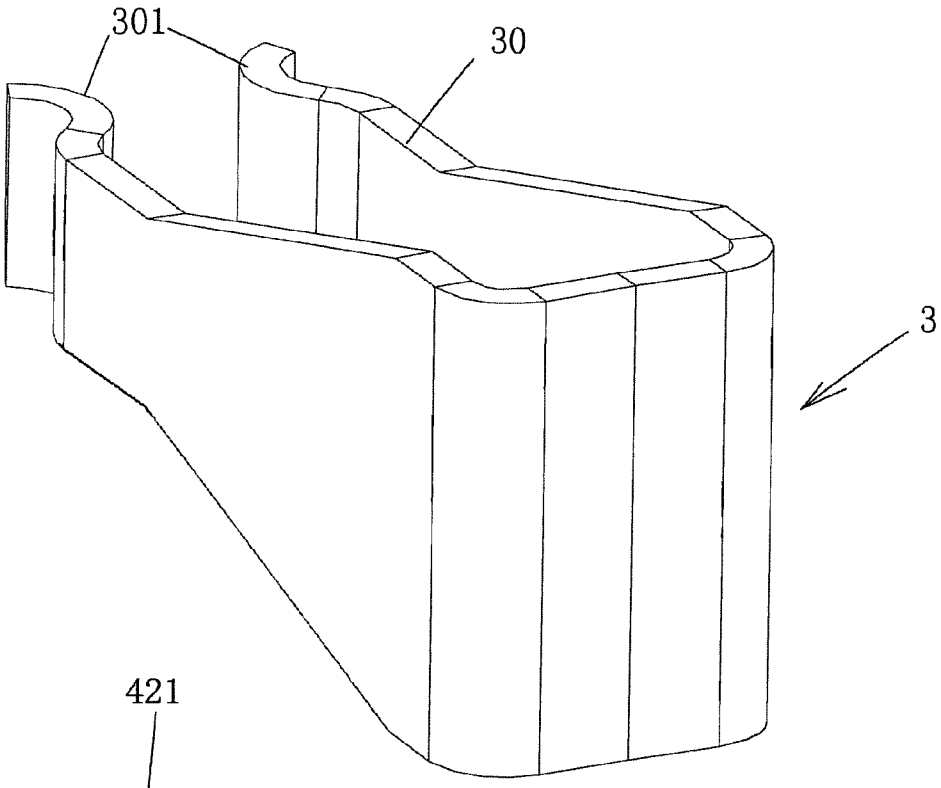

Fig. 6

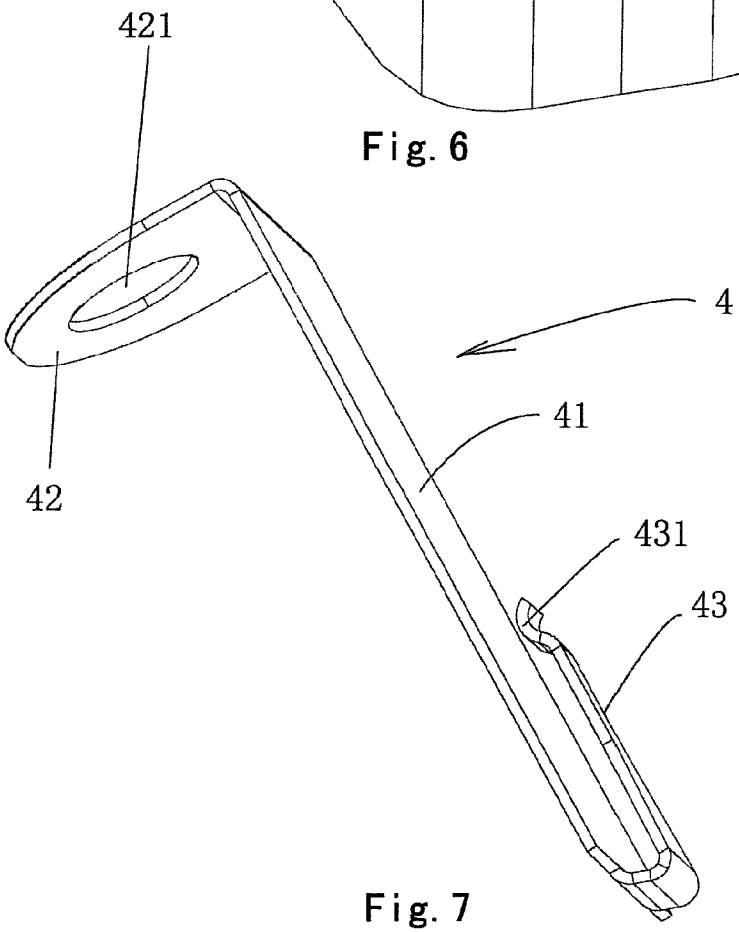

Fig. 7

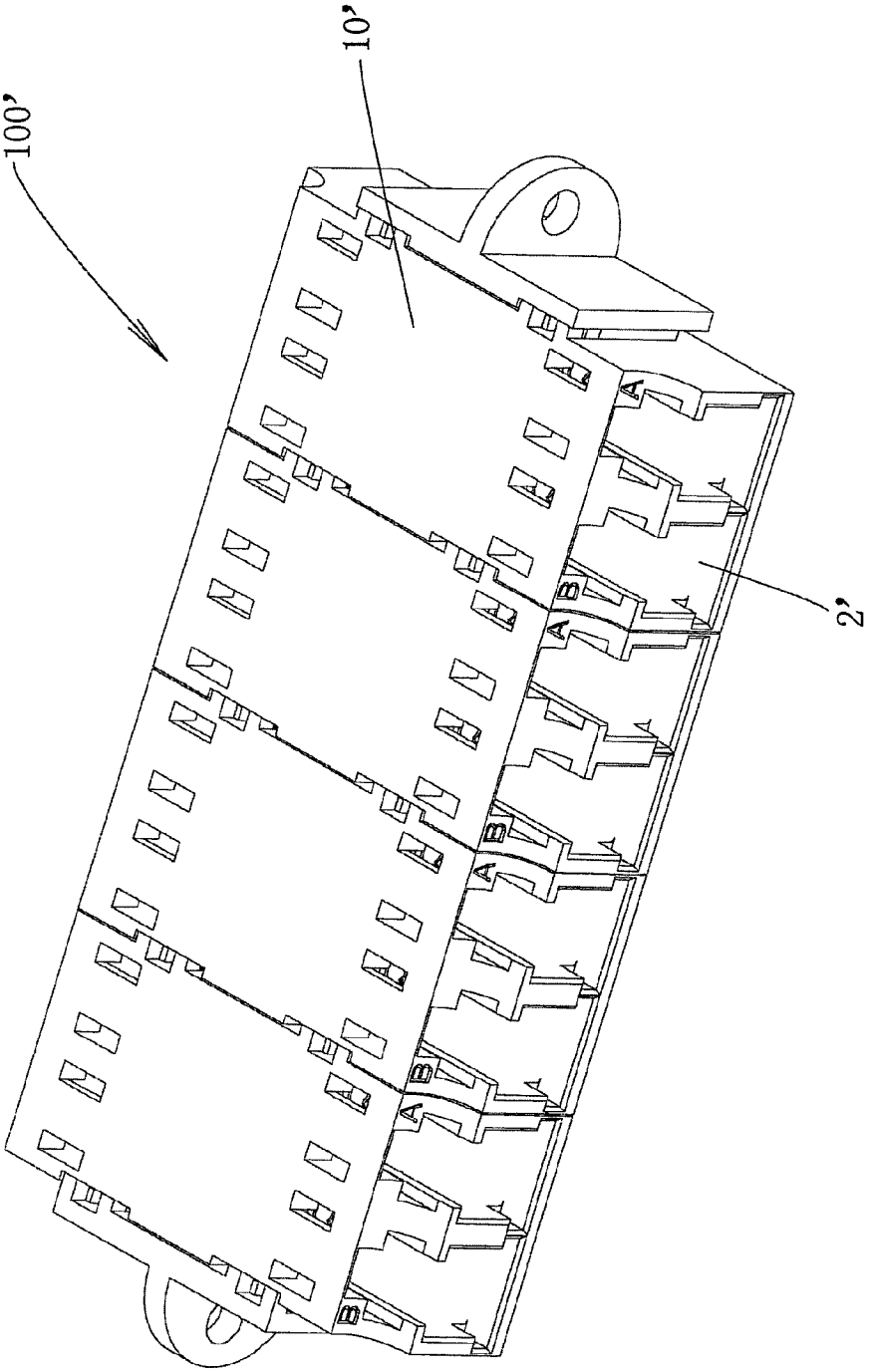

Fig. 8

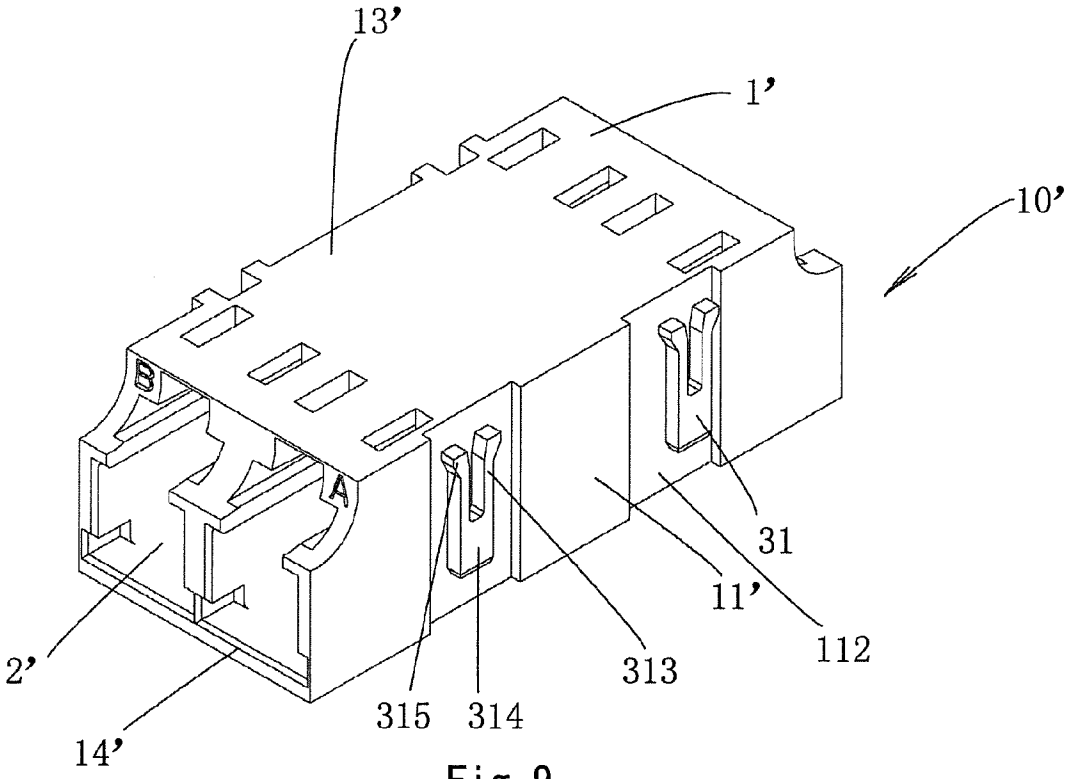

Fig. 9

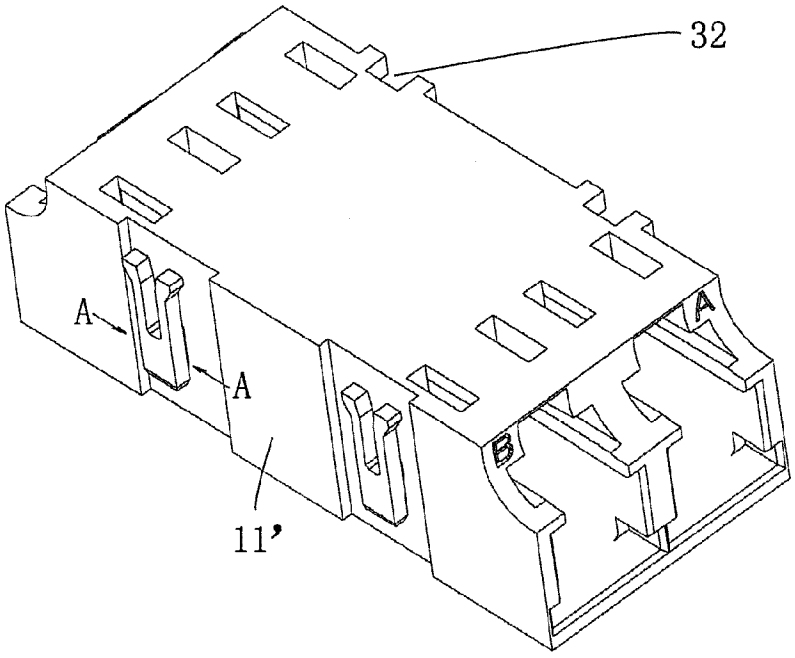

Fig. 10

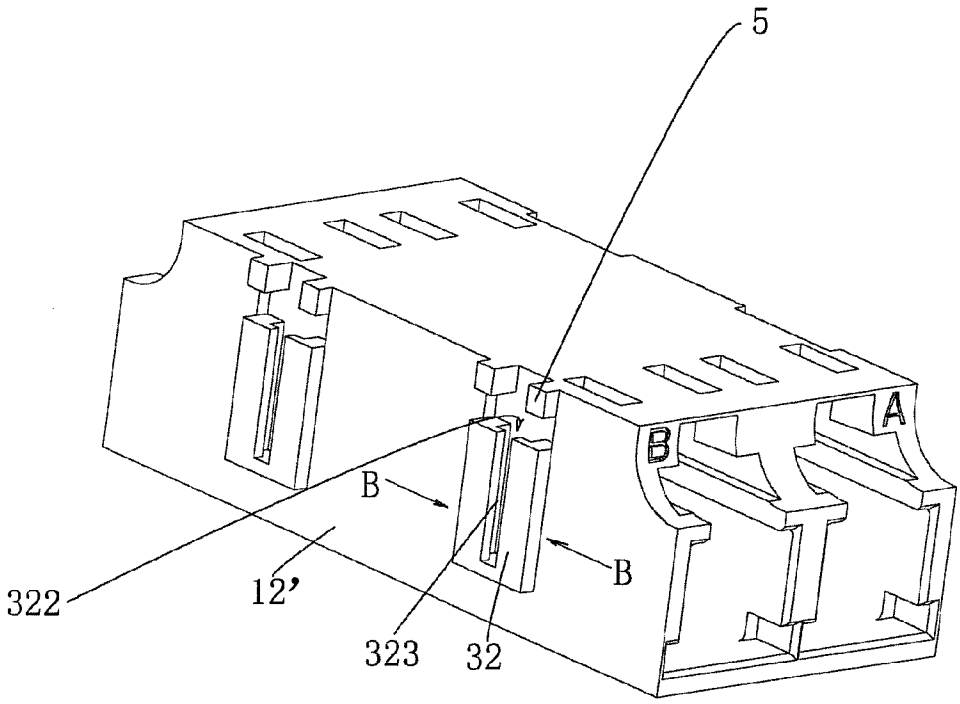

Fig. 11

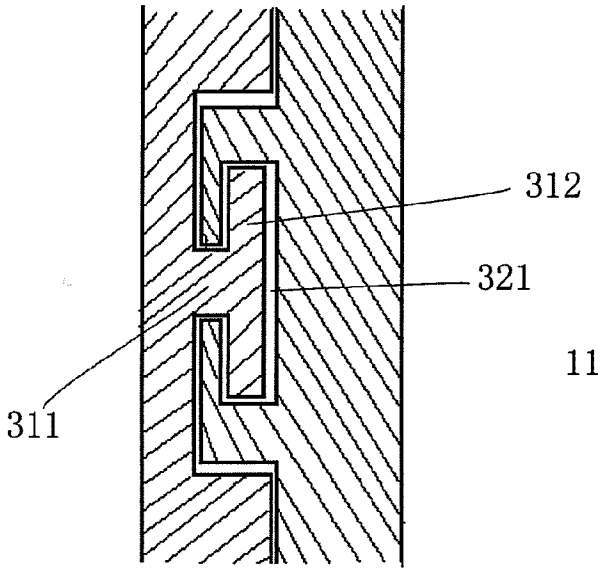

Fig. 12

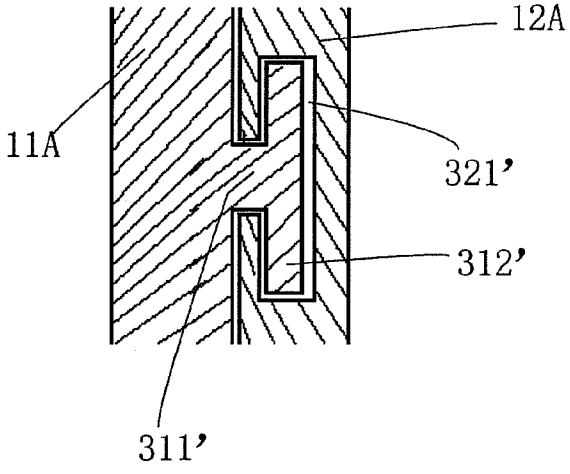

Fig. 13

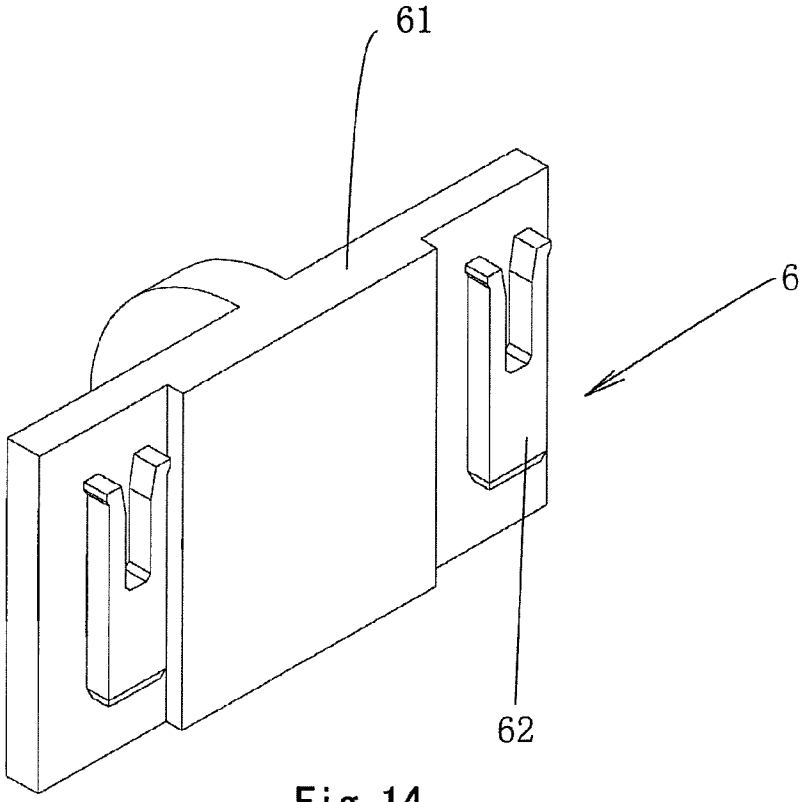

Fig. 14

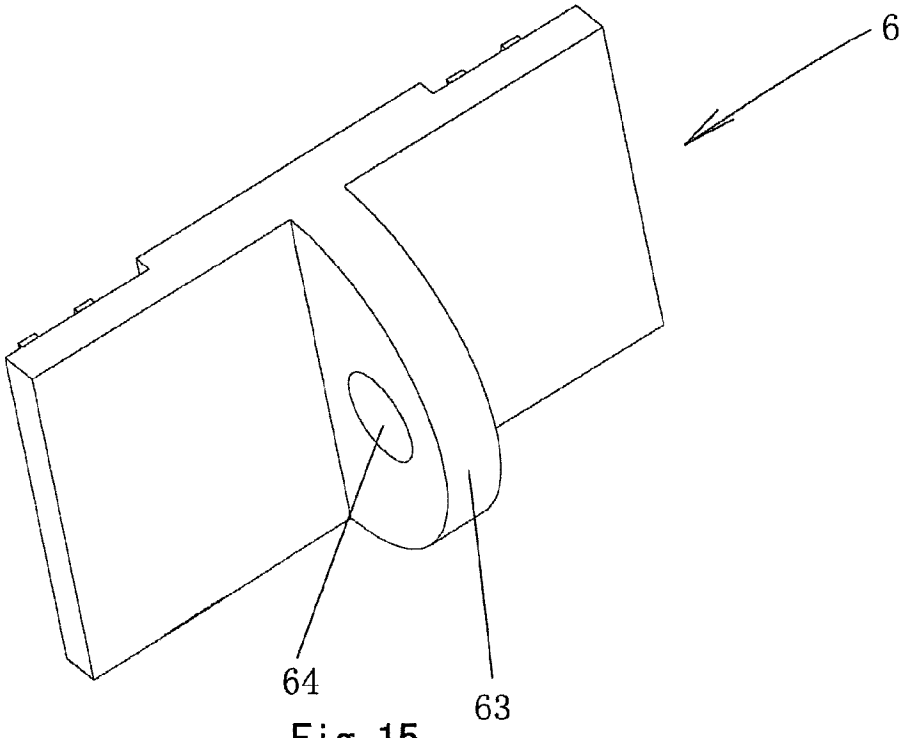

Fig. 15

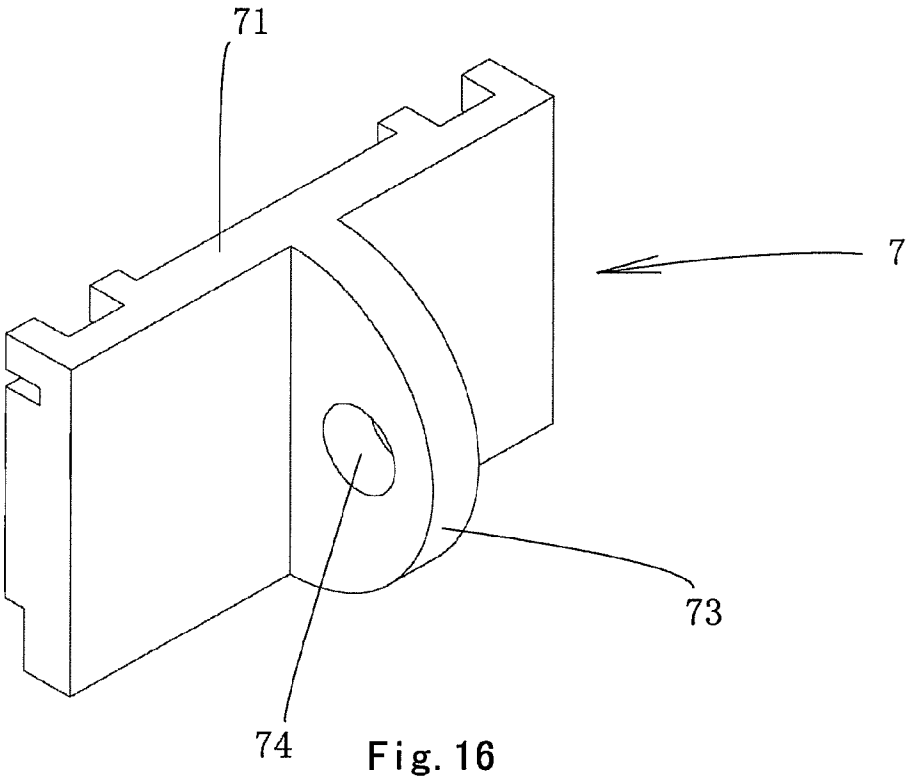

Fig. 16

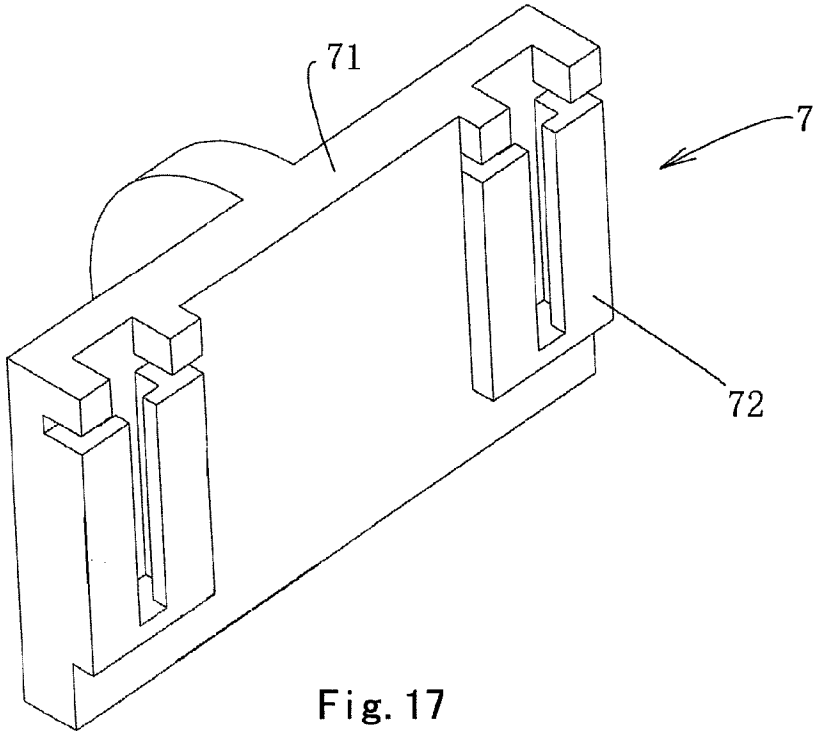

Fig. 17

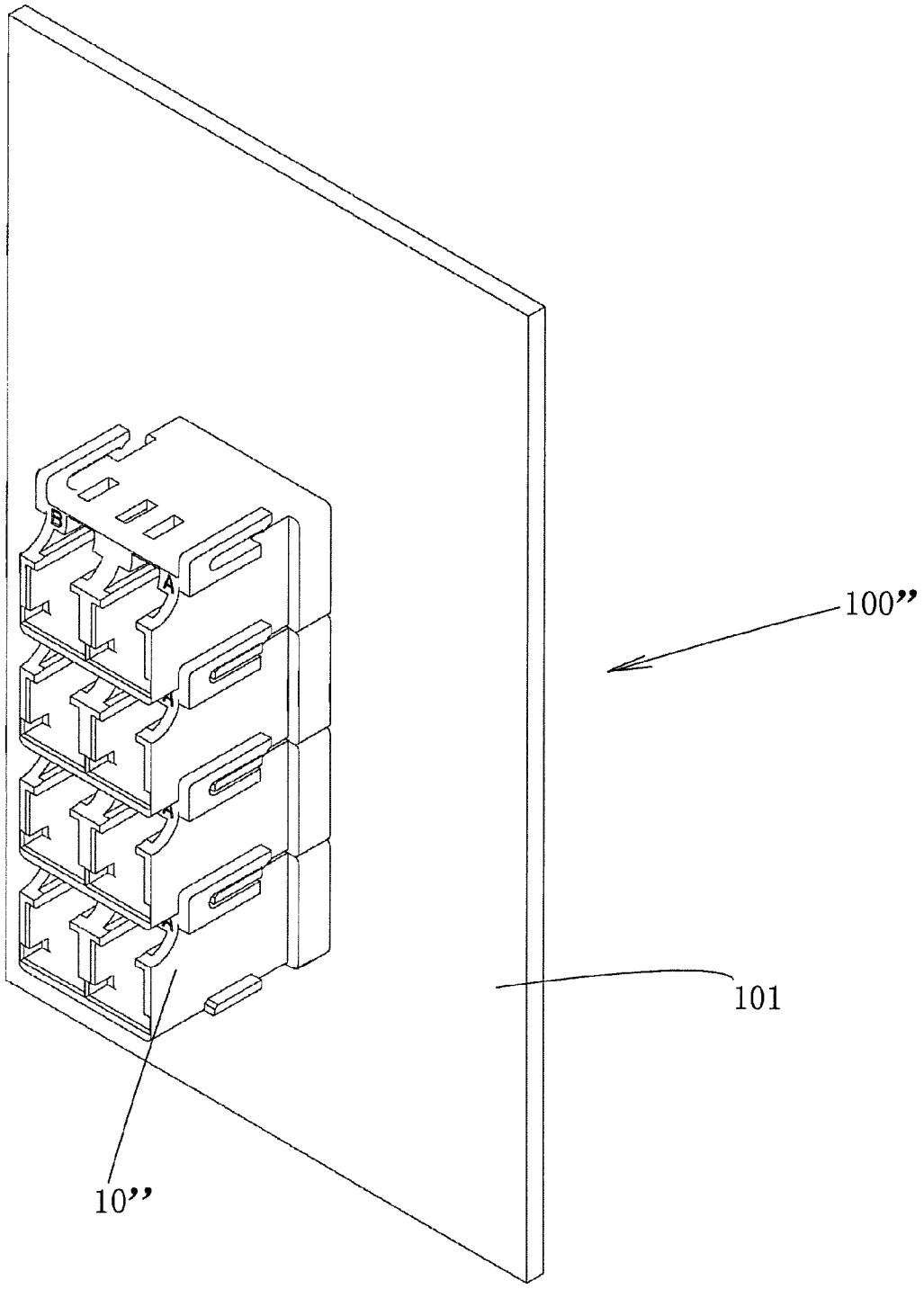

Fig. 18

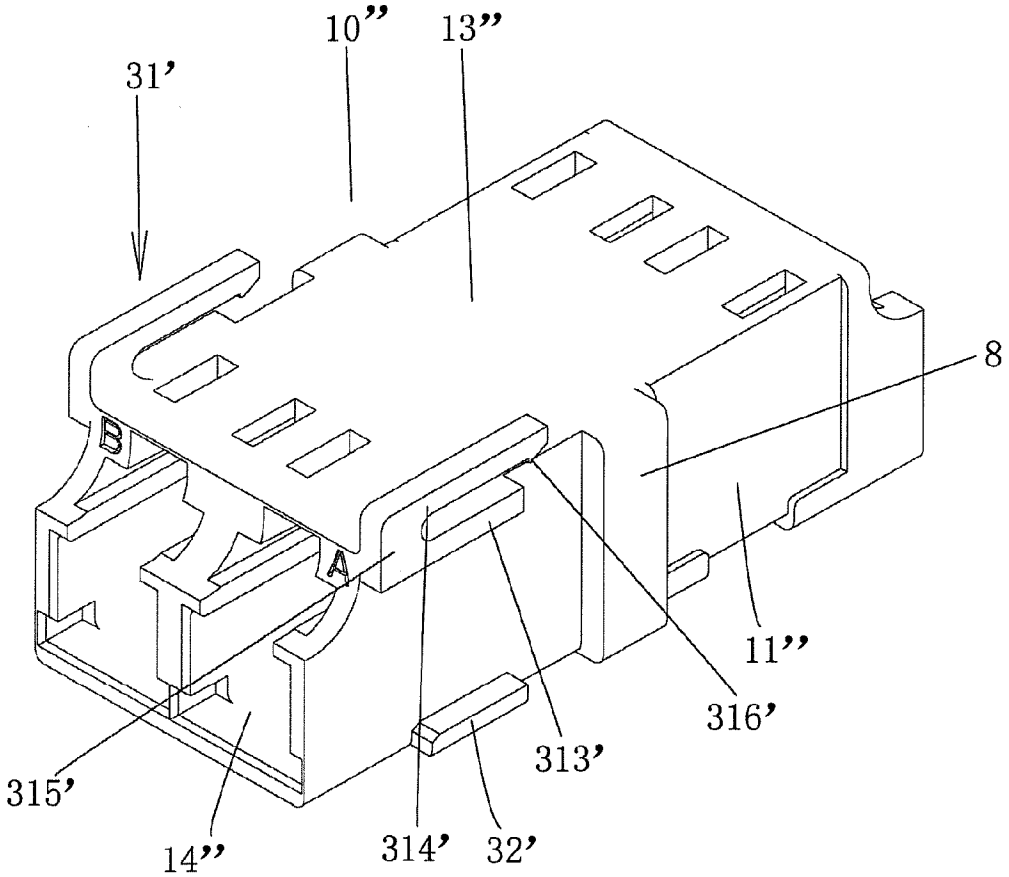

Fig. 19

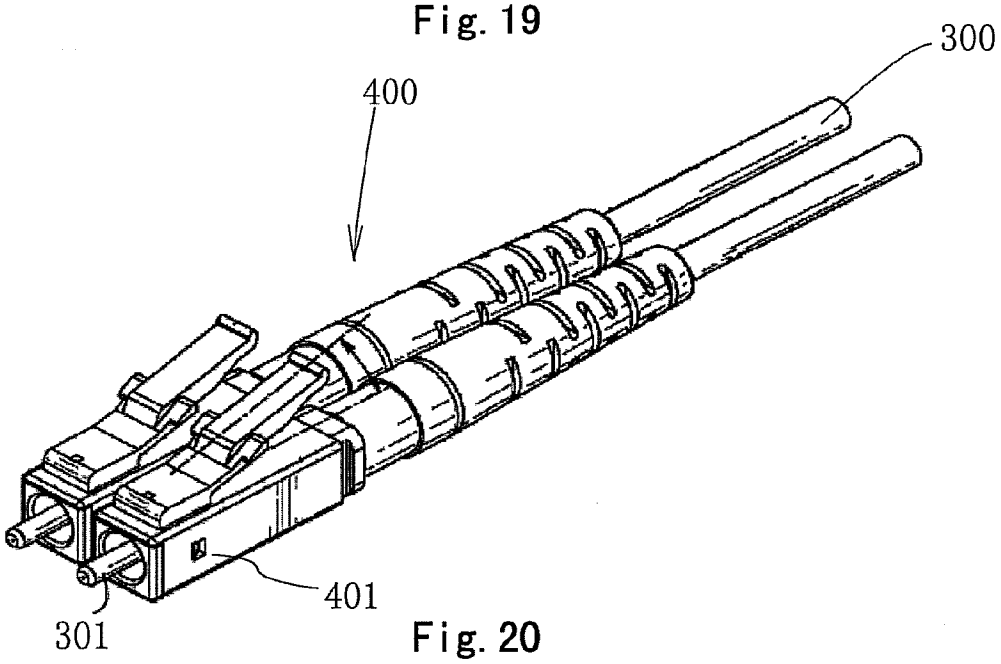

Fig. 20

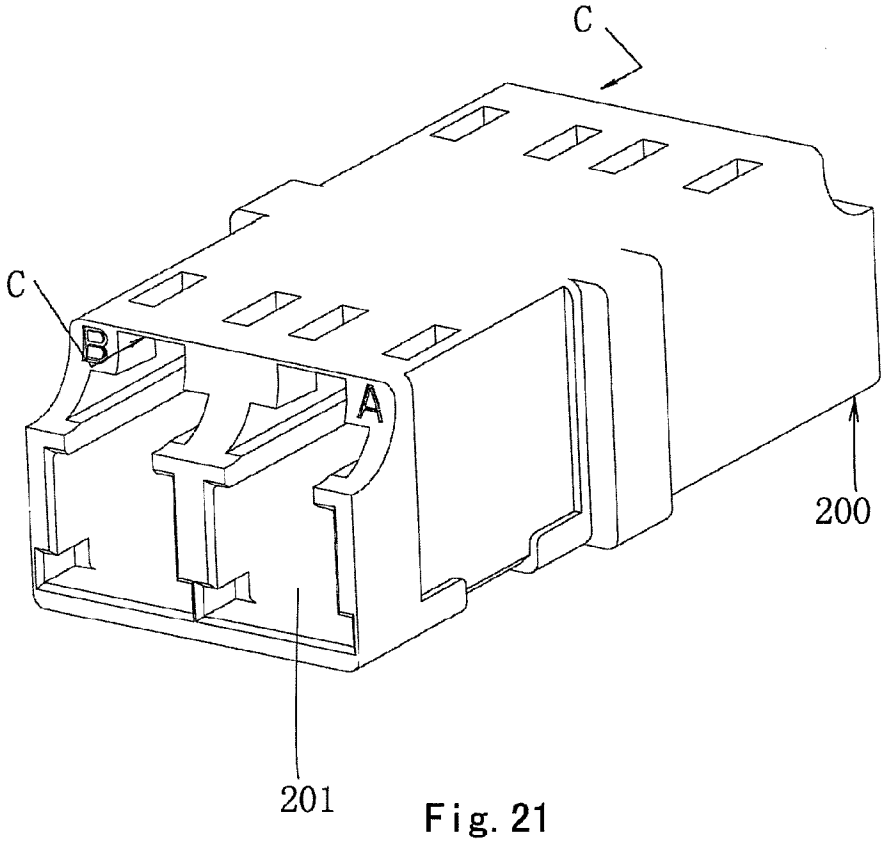

Fig. 21

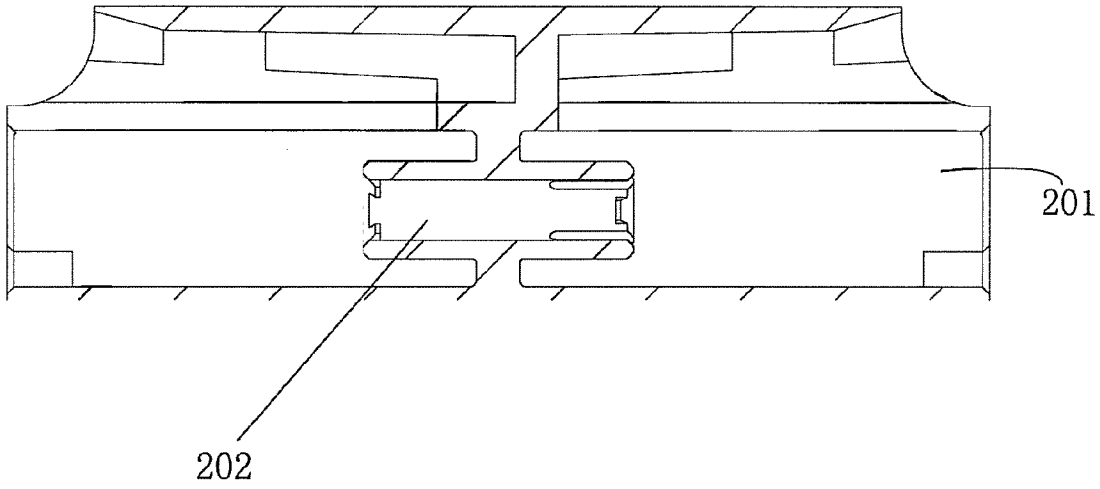

Fig. 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/054312

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R9/24 G02B6/00 H01R13/506 H01R13/508 H01R13/514
H01R31/06
ADD. H01R13/518 H01R13/74
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/311781 A1 (WOJCIK ALAN F [US] ET AL) 18 December 2008 (2008-12-18)	1-6,25
Y	claims 1, 15 , 29 , 30 , 32 , 33 paragraph [0054] - paragraph [0056] figures 18-23	26

X	US 2001/049223 A1 (FUKATSU YUKIHIRO [JP]) 6 December 2001 (2001-12-06)	1,2, 9-16,25
Y	claims 1, 10	26
A	paragraph [0033] - paragraph [0035] paragraph [0038] figures 1, 2 , 7 -10	17

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* 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	Date of mailing of the international search report
4 October 2013	16/10/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Stichauer, Libor

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C(Continuation). 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	column 4, line 24 - line 52 column 5, line 65 - column 6, line 8 column 6, line 50 - column 7, line 6 column 8, line 1 - line 10 figures 3,6, 9, 10, 13, 16	26

X	US 6 361 355 B1 (MATSUOKA YUTAKA [JP] ET AL) 26 March 2002 (2002-03-26)	1,2,9, 16, 20-22, 24,25
Y	column 5, line 19 - column 6, line 46 figures 1, 10	26

X	US 2006/228932 A1 (KOMIYAMA RYUICHI [JP]) 12 October 2006 (2006-10-12)	1,2,9, 16,25
Y	paragraph [0036] - paragraph [0039] paragraph [0041] figures 1, 2 , 3B, 4, 7, 8, 10, 11	26

X	US 2002/026710 A1 (MURAKAMI TAKAO [JP] ET AL) 7 March 2002 (2002-03-07)	1,2, 23-25
Y	claims 1 , 6 paragraph [0025] paragraph [0033] - paragraph [0037] figures	26

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

A	US 2009/258536 A1 (LEE KUO-CHI [TW] ET AL) 15 October 2009 (2009-10-15) paragraph [0025] figures 1-3	1-3,7-9, 16-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/054312

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/214,317	12/10/2018	Hiep V. Nguyen	USCO-053-03

CONFIRMATION NO. 7700

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

PUBLICATION NOTICE

OC000000107338599

Title: Alignment Adapter and Alignment Design for a Connector Therefor

Publication No.US-2019-0107679-A1
Publication Date:04/11/2019

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/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/214,317	12/10/2018	Hiep V. Nguyen	USCO-053-03

CONFIRMATION NO. 7700

POA ACCEPTANCE LETTER

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

OC000000105319989

Date Mailed: 01/25/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/18/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ltaba/

Senko Advanced Components v. US Conec Ltd.
Senko EX1023-B
Page 253

Electronic Acknowledgement Receipt

EFS ID:	34903766
Application Number:	16214317
International Application Number:	
Confirmation Number:	7700
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-053-03
Receipt Date:	18-JAN-2019
Filing Date:	10-DEC-2018
Time Stamp:	16:28:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POAUSCO05303.pdf	353675 50f84da1429e6c768b74260b254eaffcb1dc93f3	no	4

Warnings:

Information:	
Total Files Size (in bytes):	353675

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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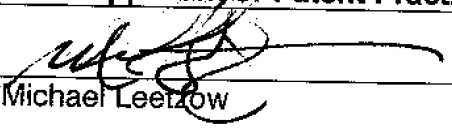
TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

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	16/214,317
Filing Date	2018-12-10
First Named Inventor	Hiep V. Nguyen
Title	Alignment Adapter and Alignment Design for a Connector Therefor
Art Unit	2883
Examiner Name	Omar R ROJAS
Attorney Docket Number	USCO-053-03

SIGNATURE of Applicant or Patent Practitioner

Signature		Date (Optional)	2019-01-18
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.**

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PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
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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.**

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: US Conec, Ltd.

Application No./Patent No.: 16/214,317 Filed/Issue Date: 12/10/2018

Titled: Alignment Adapter and Alignment Design for a Connector Therefor

US Conec, Ltd, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ 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 047977, Frame 0230, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

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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.

Signature

January 18, 2019
Date

Michael L. Leetzow
Printed or Typed Name

35,932
Title or Registration Number

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	16214317
Filing Date	2018-12-10
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-03

U.S.PATENTS

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	5129024		1992-07-01	Honma	
	2	6331079		2001-12-01	Grois	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

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	20110091158		2011-04-01	Iwaya	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16214317
	Filing Date	2018-12-10
	First Named Inventor	Hiep V. Nguyen
	Art Unit	
	Examiner Name	
	Attorney Docket Number	USCO-053-03

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16214317
Filing Date	2018-12-10
First Named Inventor	Hiep V. Nguyen
Art Unit	
Examiner Name	
Attorney Docket Number	USCO-053-03

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

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Shubhrangshu Sengupta/	Date (YYYY-MM-DD)	2018-12-31
Name/Print	Shubhrangshu Sengupta	Registration Number	67109

This collection of information is required by 37 CFR 1.97 and 1.98. 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 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: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	34728518
Application Number:	16214317
International Application Number:	
Confirmation Number:	7700
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Customer Number:	152017
Filer:	Shubhrangshu Sengupta
Filer Authorized By:	
Attorney Docket Number:	USCO-053-03
Receipt Date:	31-DEC-2018
Filing Date:	10-DEC-2018
Time Stamp:	15:26:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS_USCO053_03.pdf	73738 5f1bda**977822367b86ad**12a0f0ffaf509c1a6**80f**	no	4

Warnings:

Information:	
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Total Files Size (in bytes):	73738

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/214,317	12/10/2018		1720	USCO-053-03	17	2

CONFIRMATION NO. 7700

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

FILING RECEIPT

OC000000104730752

Date Mailed: 12/31/2018

Receipt is acknowledged of this non-provisional 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 APPLICANT, 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 Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections 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**

Inventor(s)

Hiep V. Nguyen, Fort Mill, SC;
Darrell R. Childers, Hickory, NC;
Michael E. Hughes, Hickory, NC;
Jillcha Fekadu Wakjira, Hickory, NC;
Joseph P. Howard, Hickory, NC;

Applicant(s)

US Conec, Ltd., Hickory, NC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 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

Senko Advanced Components v. US Conec Ltd.
Senko EX1023-B
Page 266

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: 12/27/2018
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/214,317**
Projected Publication Date: 04/11/2019
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).

Senko Advanced Components v. US Conec Ltd.
Senko EX1023-B
Page 267

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/214,317

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	660
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	17 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 460 =	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	1720

APPLICATION AS AMENDED - PART II

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

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

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

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 16214317 Document Date: 12/10/2018

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.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

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Form Revision Date: August 26, 2013

PTO/AIA/15 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	USCO-053-03
First Named Inventor	Hiep V. Nguyen
Title	Alignment Adapter and Alignment Design for a Connector Therefor
Express Mail Label No.	EFS Web

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✔] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✔] **Specification** [*Total Pages* 13] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✔] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 10]
6. **Inventor's Oath or Declaration** [*Total Pages* 5] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [✔] A copy from a prior application (37 CFR 1.63(d))
7. [✔] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

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P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [ ] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [✔] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:** _____

Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[✔] The address associated with Customer Number: 152017 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Michael L. Leetzow/	Date	2018-12-10
Name (Print/Type)	Michael L. Leetzow	Registration No. (Attorney/Agent)	35932

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. 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.

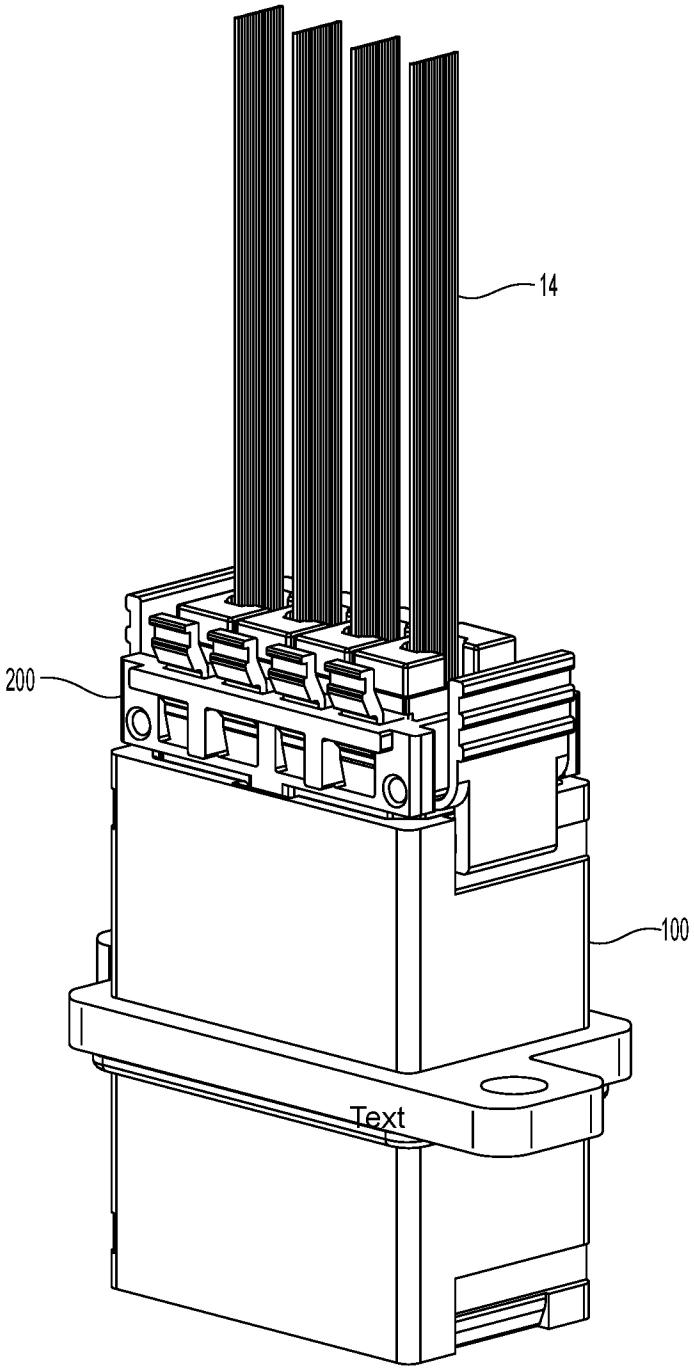

Fig. 1

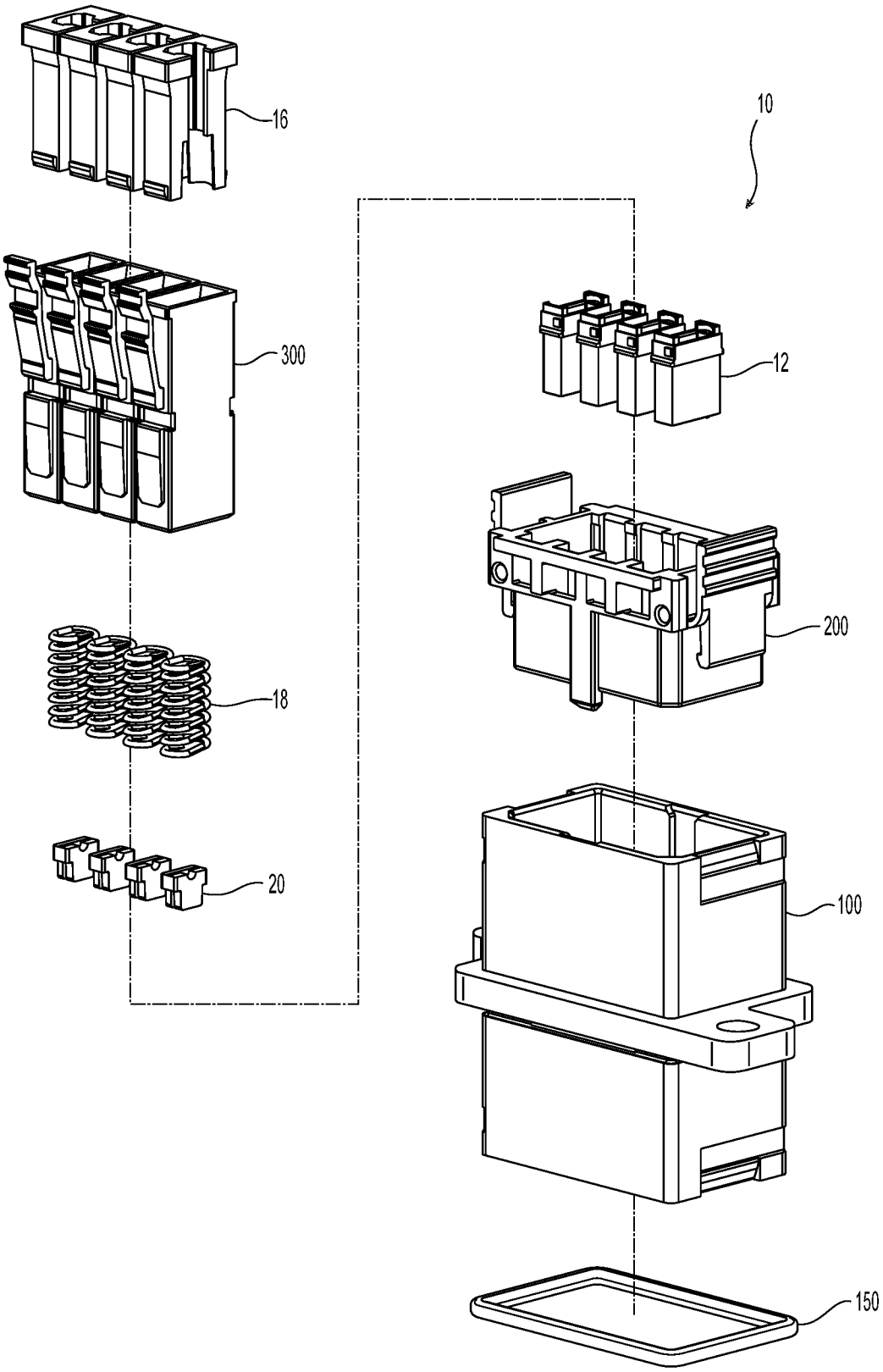

Fig. 2

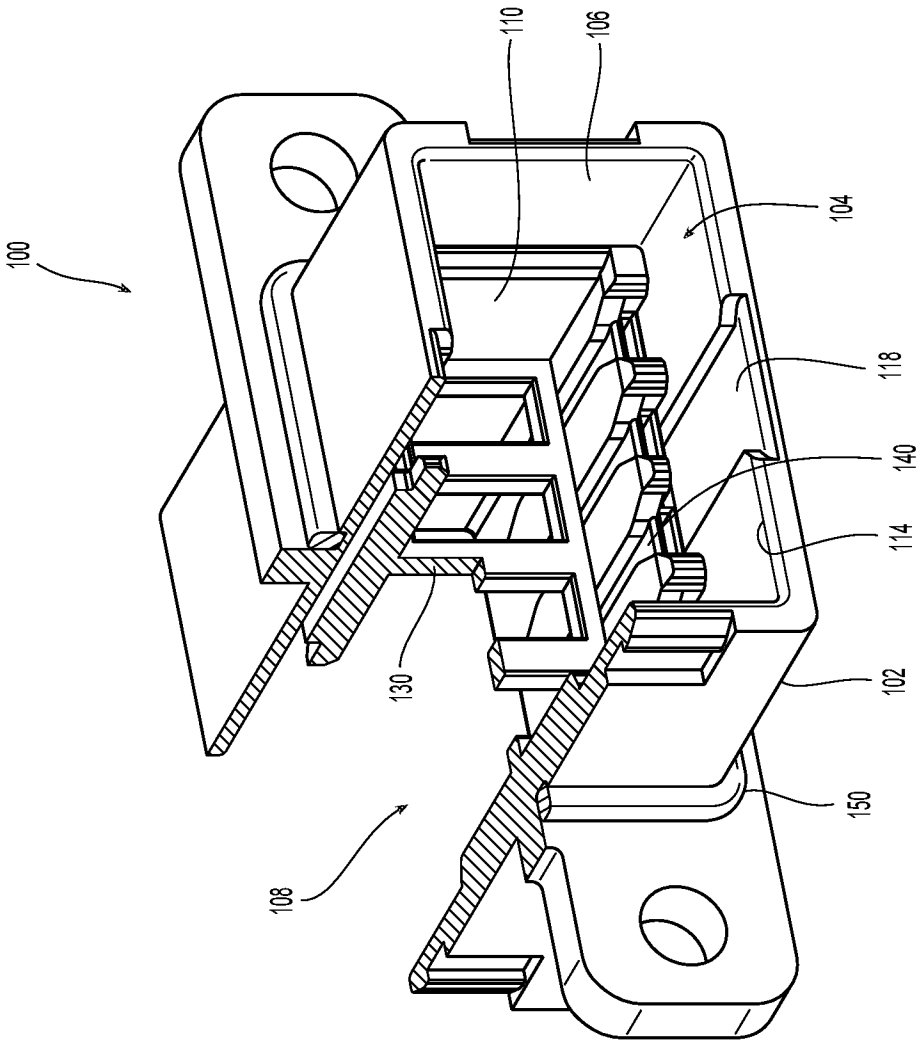

Fig. 3

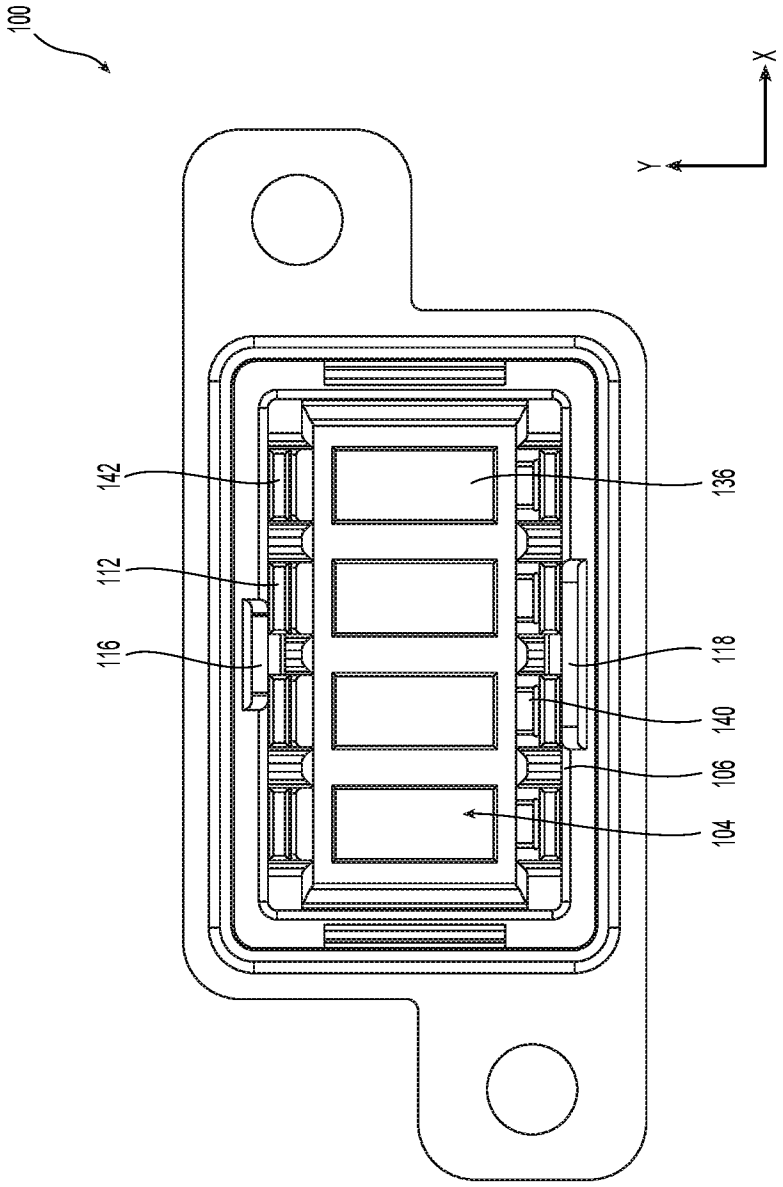

Fig. 4

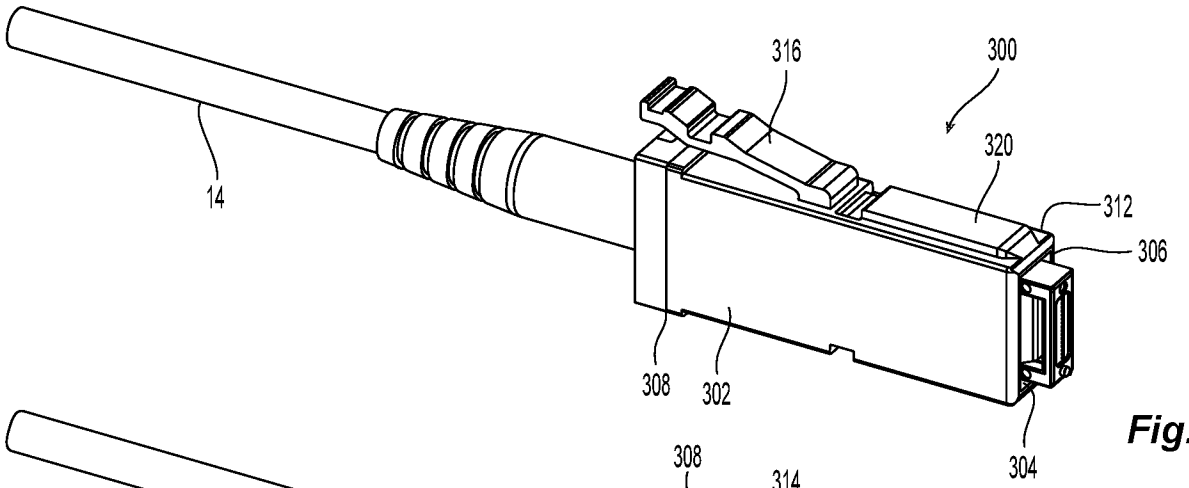

Fig. 5A

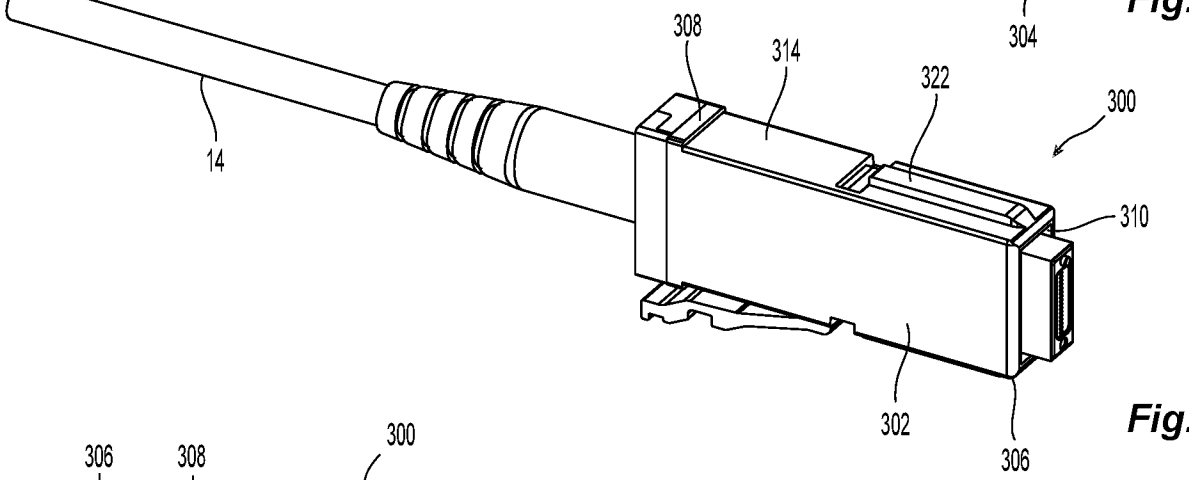

Fig. 5B

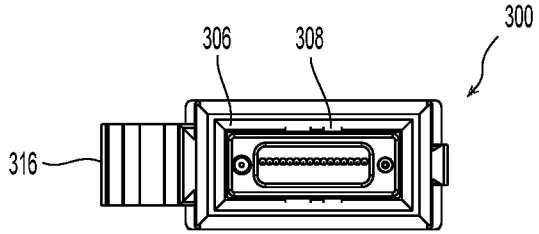

Fig. 5C

Replacement Sheet Cont of 15/855,750

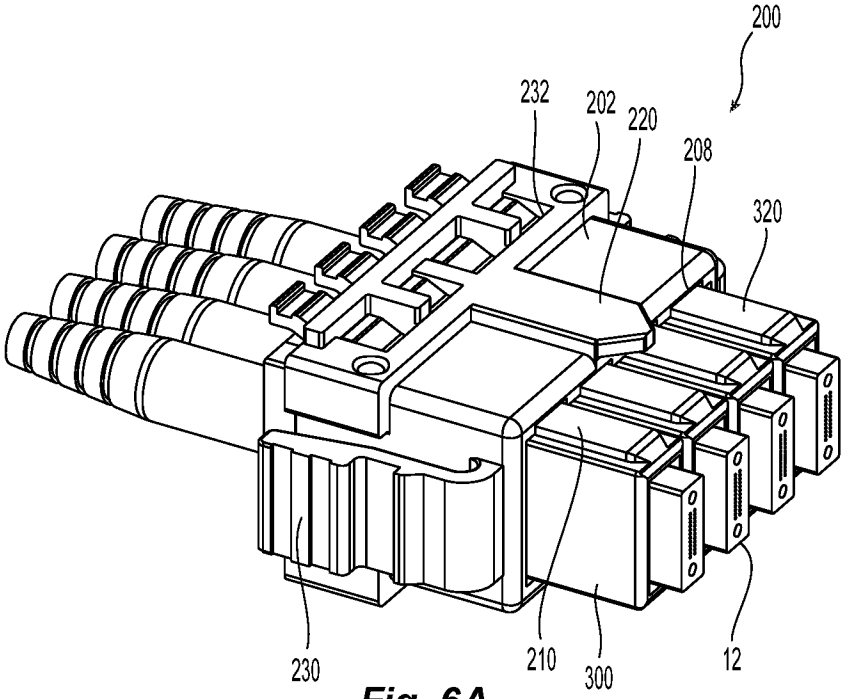
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Fig. 6A

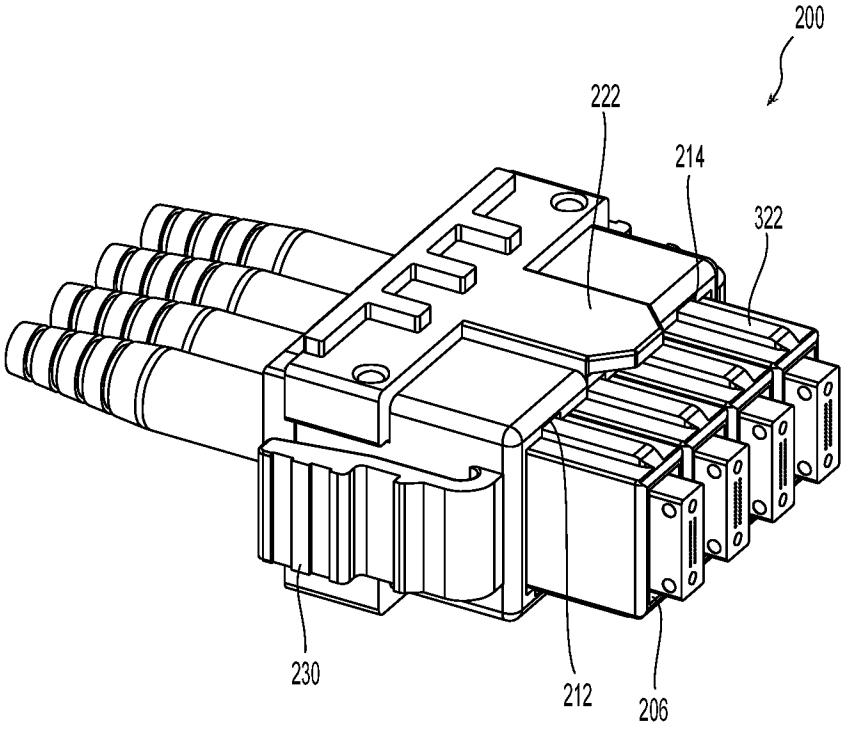
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Fig. 6B

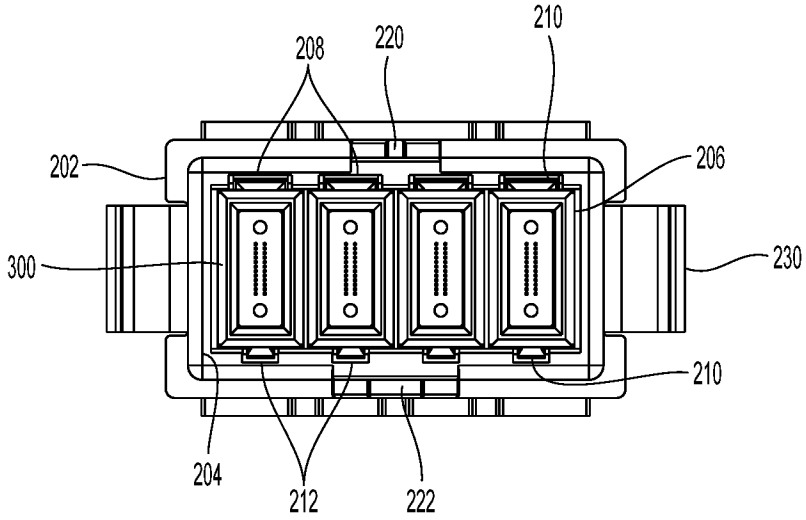

Fig. 6C

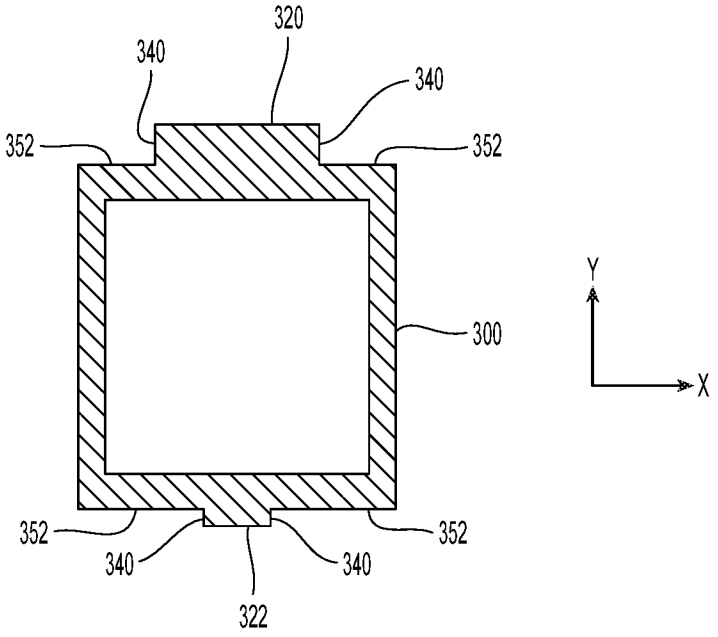
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Fig. 7A

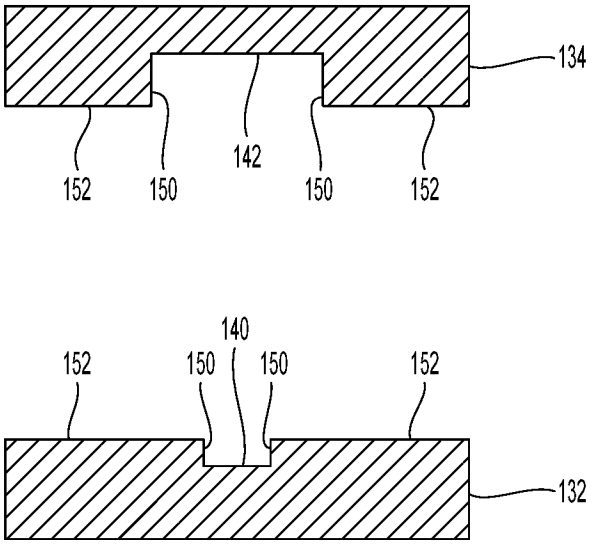
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Fig. 7B

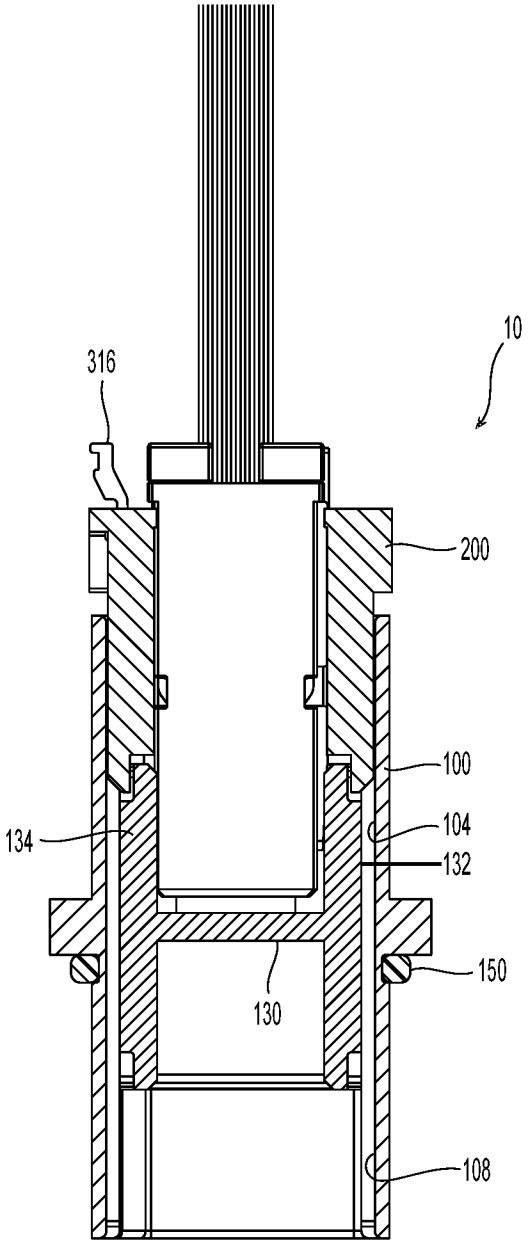

Fig. 8

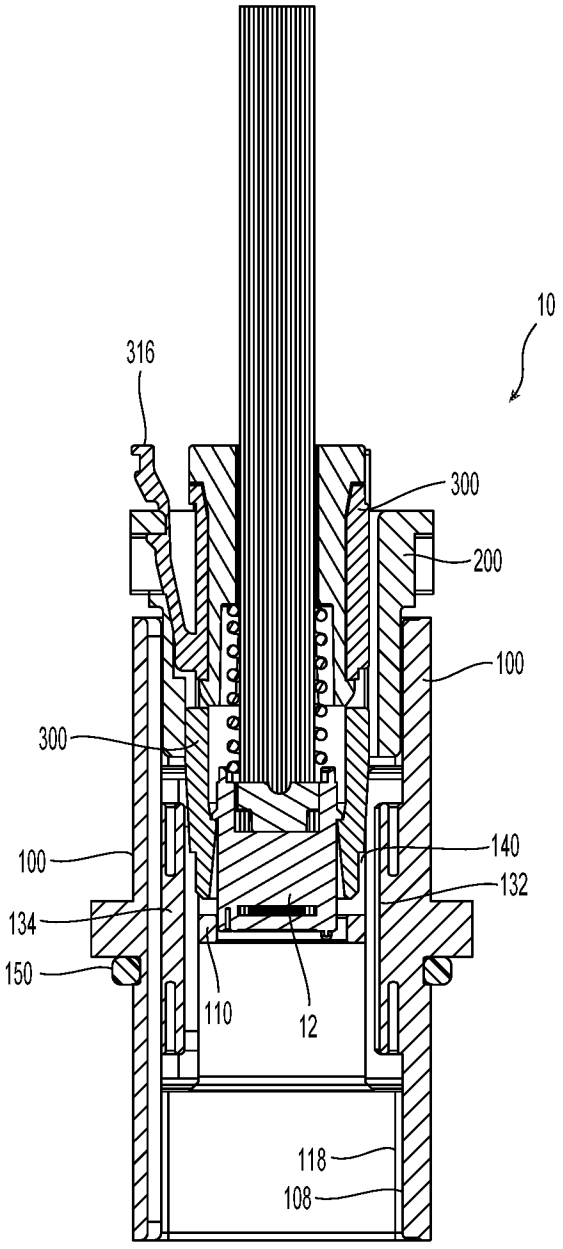

Fig. 9

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-053-03
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hiep	V.	Nguyen	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Fort Mill	SC	US

Mailing Address of Inventor:

Address 1	1102 Queen Anne's Cove
Address 2	
City	Fort Mill
State/Province	SC
Postal Code	29708
Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Darrell	R.	Childers	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hickory	NC	US

Mailing Address of Inventor:

Address 1	611 5th Ave NE
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-053-03
	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.**

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-03
	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-053-03	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	152017		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-03
	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	15855750	2017-12-27	

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

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-03
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

☐ 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-053-03
	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-053-03
	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			

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.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-03
	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:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Michael L. Leetzow/			Date (YYYY-MM-DD)	2018-12-10
First Name	Michael	Last Name	Leetzow	Registration Number	35932

Additional Signature may be generated within this form by selecting the Add button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	USCO-053-03
	Application Number	
Title of Invention	Alignment Adapter and Alignment Design for a Connector Therefor	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

x United States application or PCT international application number 14/214,931 filed on March 15, 2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understood the contents of the application, and

I am aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR
Inventor: Jillcha Wakiira Date (Optional): 7/28/2014
Signature: [signature]

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

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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: Darrell R. Childers Date (Optional): 7/28/2014

Signature: Darrell R. Childers

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

x United States application or PCT international application number 14/214,931

filed on March 15, 2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understood the contents of the application, and

I am aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: JOSEPH HOWARD Date (Optional): 7/25/2014

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

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filed on March 15, 2014..

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I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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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.

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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/01form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**ALIGNMENT ADAPTER AND ALIGNMENT DESIGN FOR A CONNECTOR THEREFOR**

As the below named inventor, I hereby declare that:

This declaration is directed to:

□ The attached application, or

x United States application or PCT international application number 14/214,931

filed on March 15, 2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understood the contents of the application, and

I am aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR § 1.56.

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LEGAL NAME OF INVENTOR

Inventor: Michael E Hughes Date (Optional): 8-26-2014

Signature: Michael E. Hughes

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01form for each additional inventor.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep V. Nguyen
Filer:	MICHAEL LEETZOW
Attorney Docket Number:	USCO-053-03

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1720**

Electronic Acknowledgement Receipt

EFS ID:	34530690
Application Number:	16214317
International Application Number:	
Confirmation Number:	7700
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-053-03
Receipt Date:	10-DEC-2018
Filing Date:	
Time Stamp:	11:47:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1720
RAM confirmation Number	121018INTEFSW11475900
Deposit Account	
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ApplicationUSCO05303ForFiling.pdf	1996739 36854**3110b3dfafed6fac3ff5**d512c**58**d25a6**381**	yes	23
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Drawings-other than black and white line drawings		14	23	
	Abstract		13	13	
	Claims		10	12	
	Specification		1	9	
Warnings:					
Information:					
2	Transmittal of New Application	aia001505303.pdf	276128 1235**ff93ece9b05d8c02321739eeba**a74f21**98e7**	no	2
Warnings:					
Information:					
3	Preliminary Amendment	PrelimAmendUSCO05303.pdf	79910 65054**f46cfdae5c54246e02f01e0c98**62b4a**e1dc**	no	7
Warnings:					
Information:					
4	Drawings-only black and white line drawings	RevisedDwgs05303.pdf	571171 96c12**595ff48ed1b0b9905ce34c6a87**70ad0**7b00**	no	10
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Information:					

5	Application Data Sheet	USCO-053-03_USPTO_AIA14_20181210_112342.pdf	1874435 449fb832e5184266b922d9ce29a8bd856b3e25b5	no	10
Warnings:					
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6	Oath or Declaration filed	SignedDeclarationUSC053.pdf	672007 0936228670739e9eb21b2ca719e0e7737d1b46301	no	5
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	34963 b31c3de4557f0e01bde151bc1af35ad3948a64cc	no	2
Warnings:					
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			Total Files Size (in bytes):	5505353	

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

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

New International Application Filed with the USPTO as a Receiving Office

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

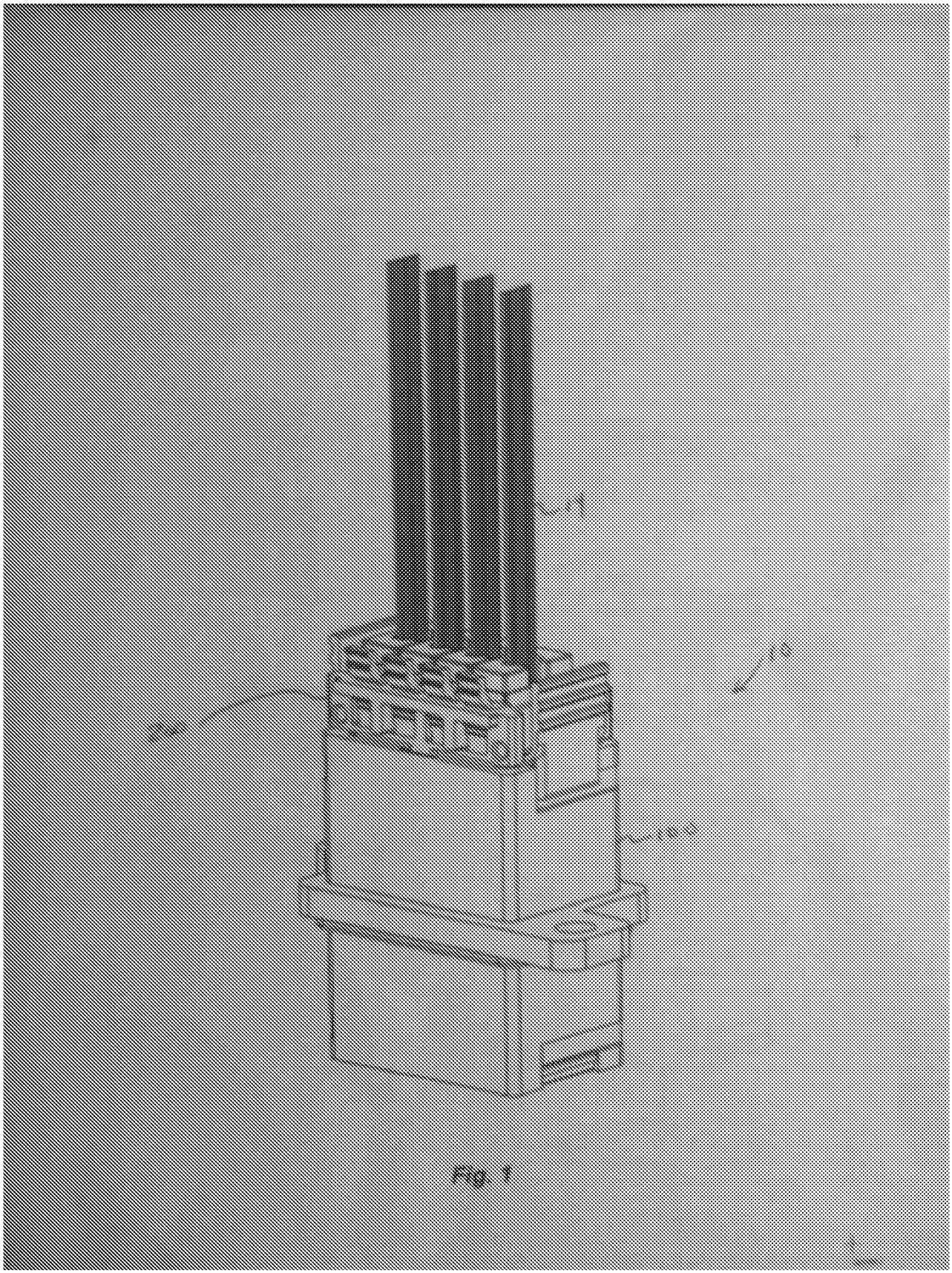

Fig. 1

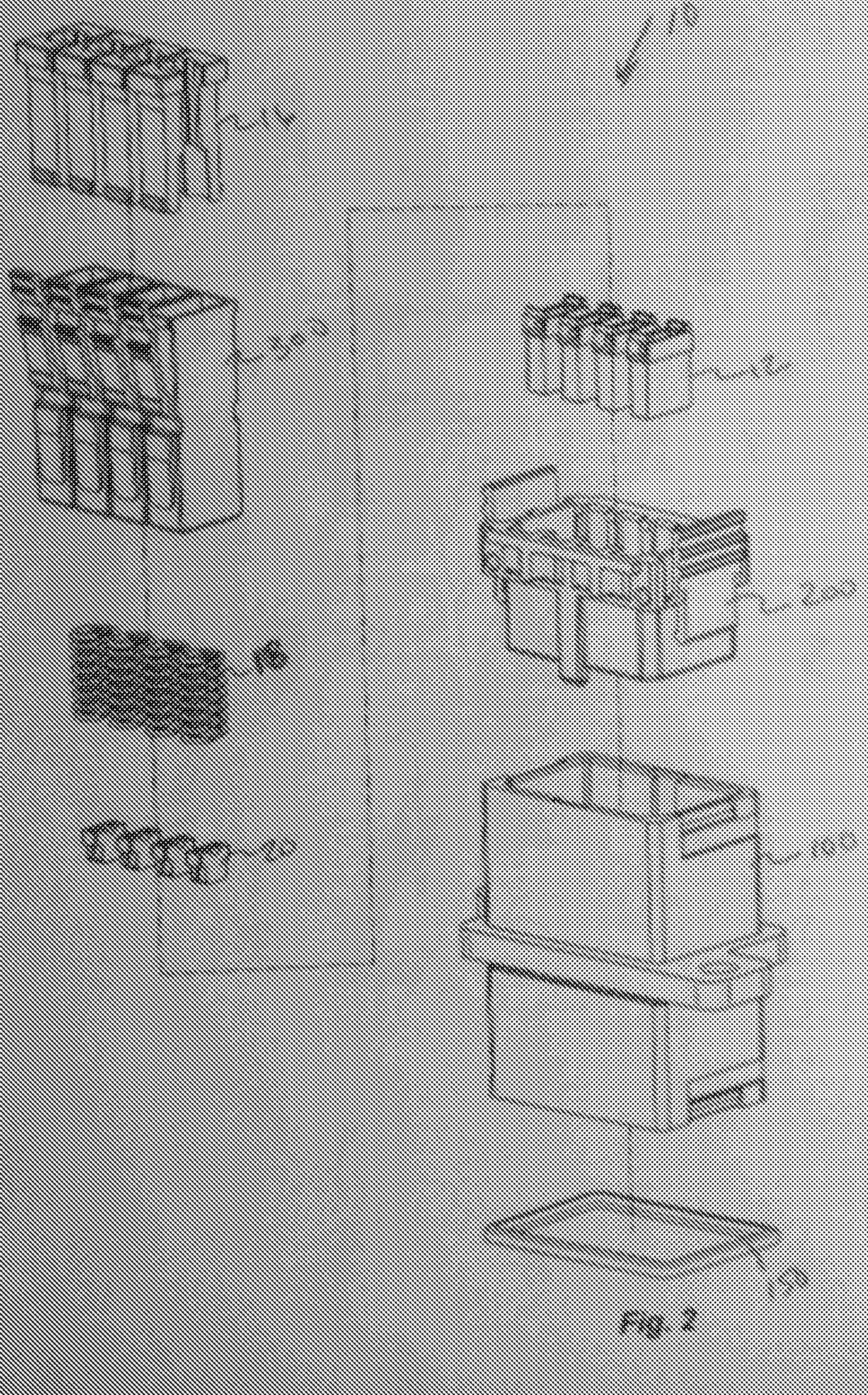

Fig. 2

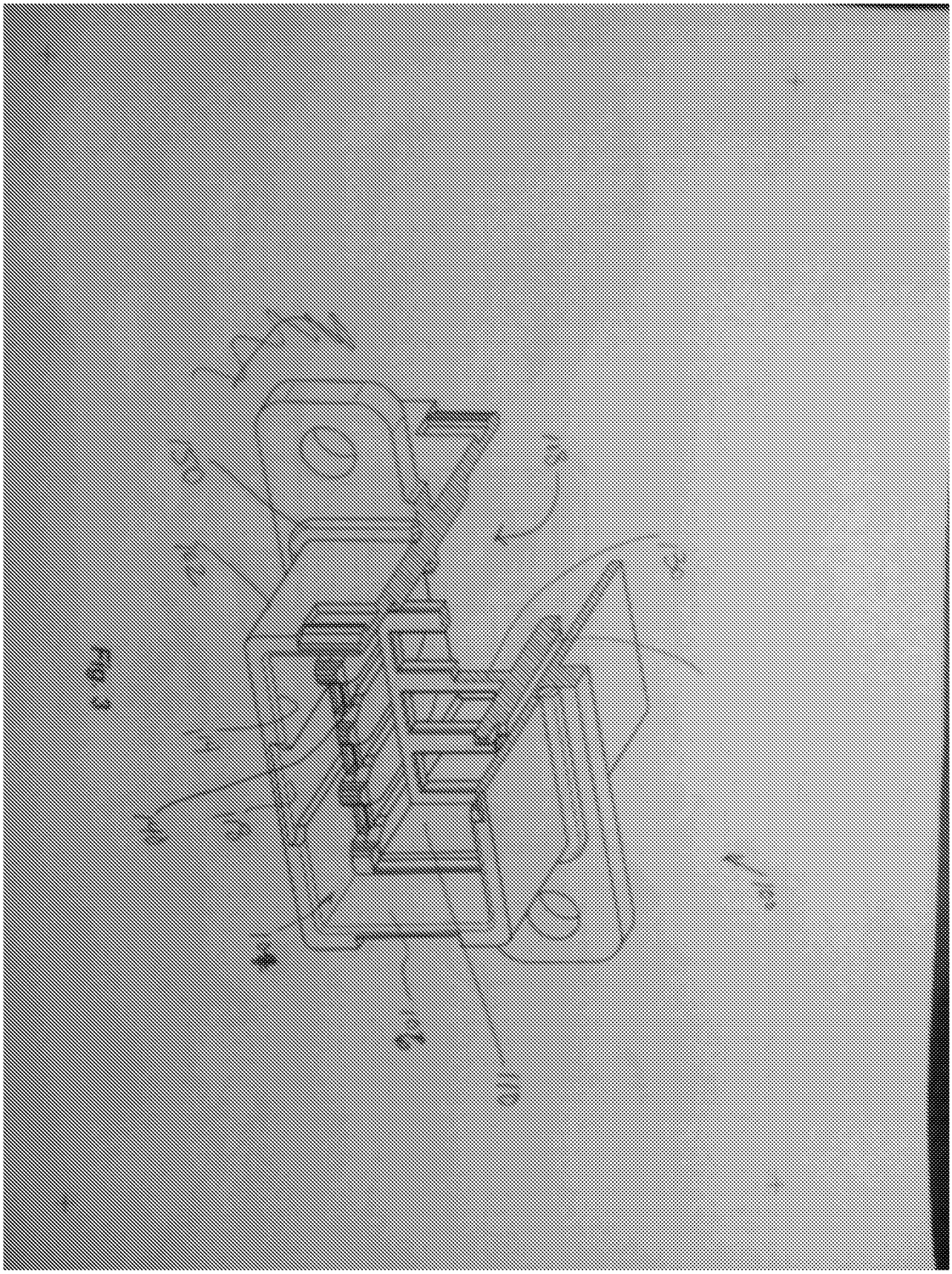

Fig. 3

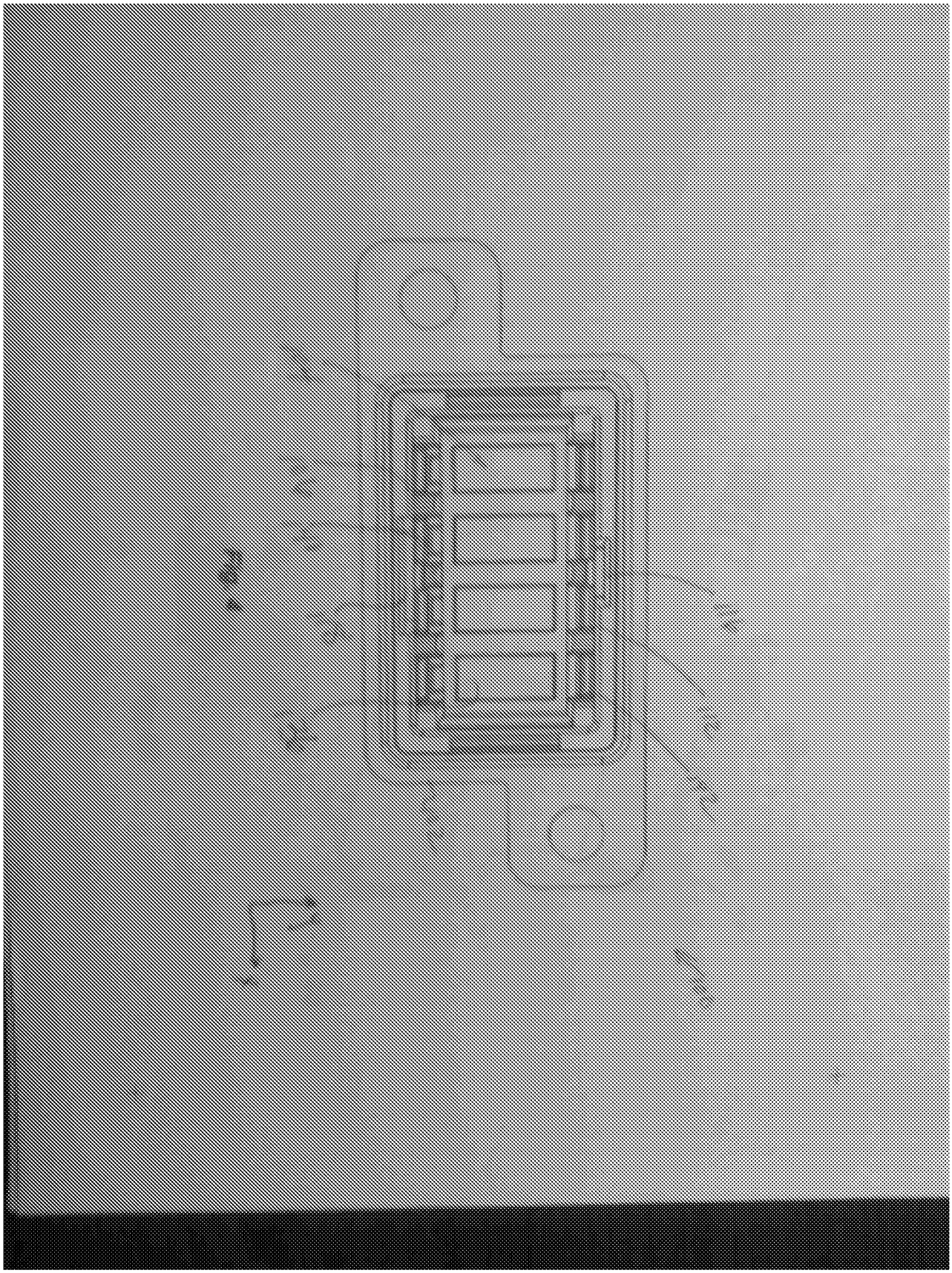

Fig 5A
Fig 5B
Fig 5C

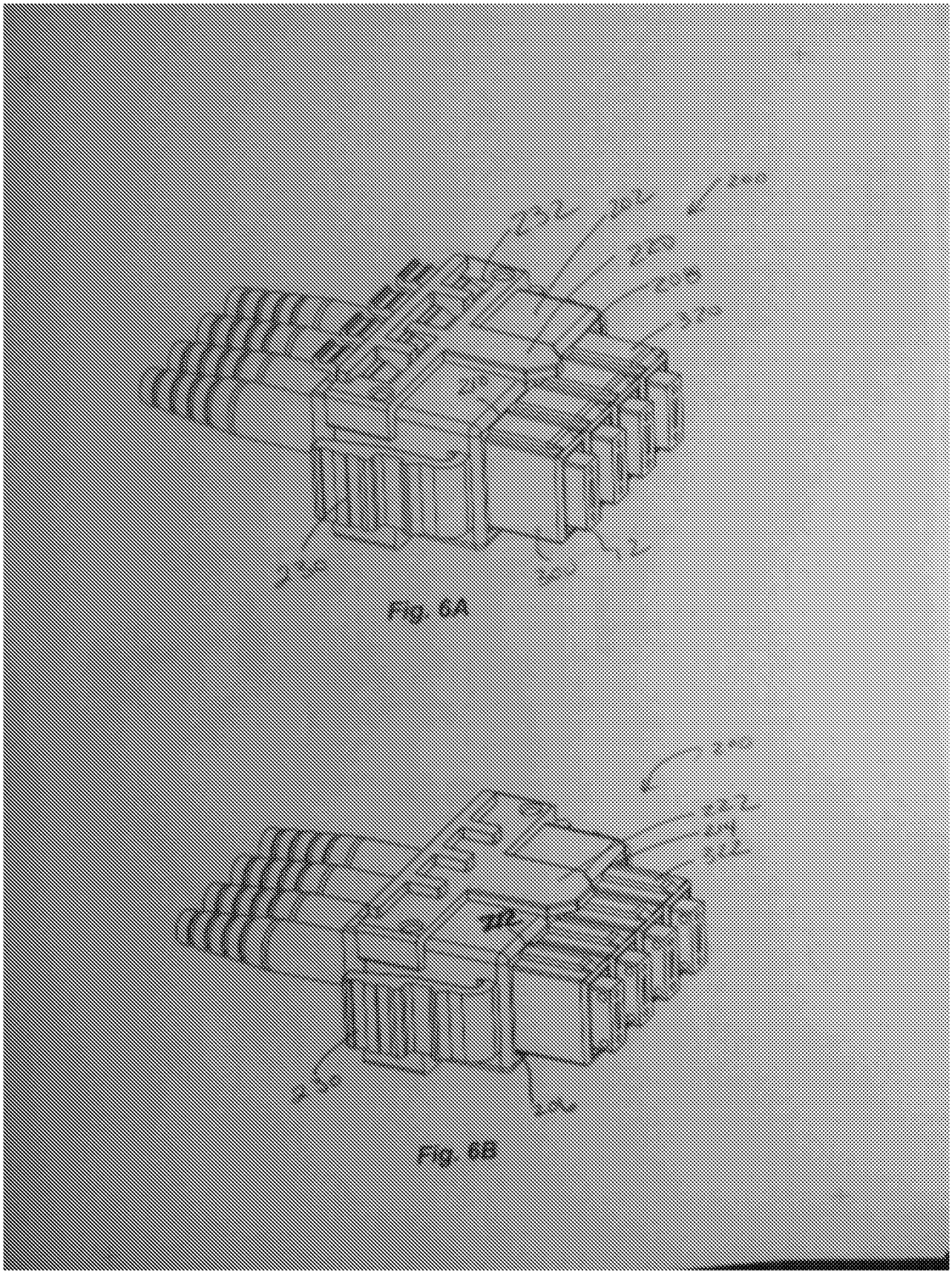

Fig. 6A

Fig. 6B

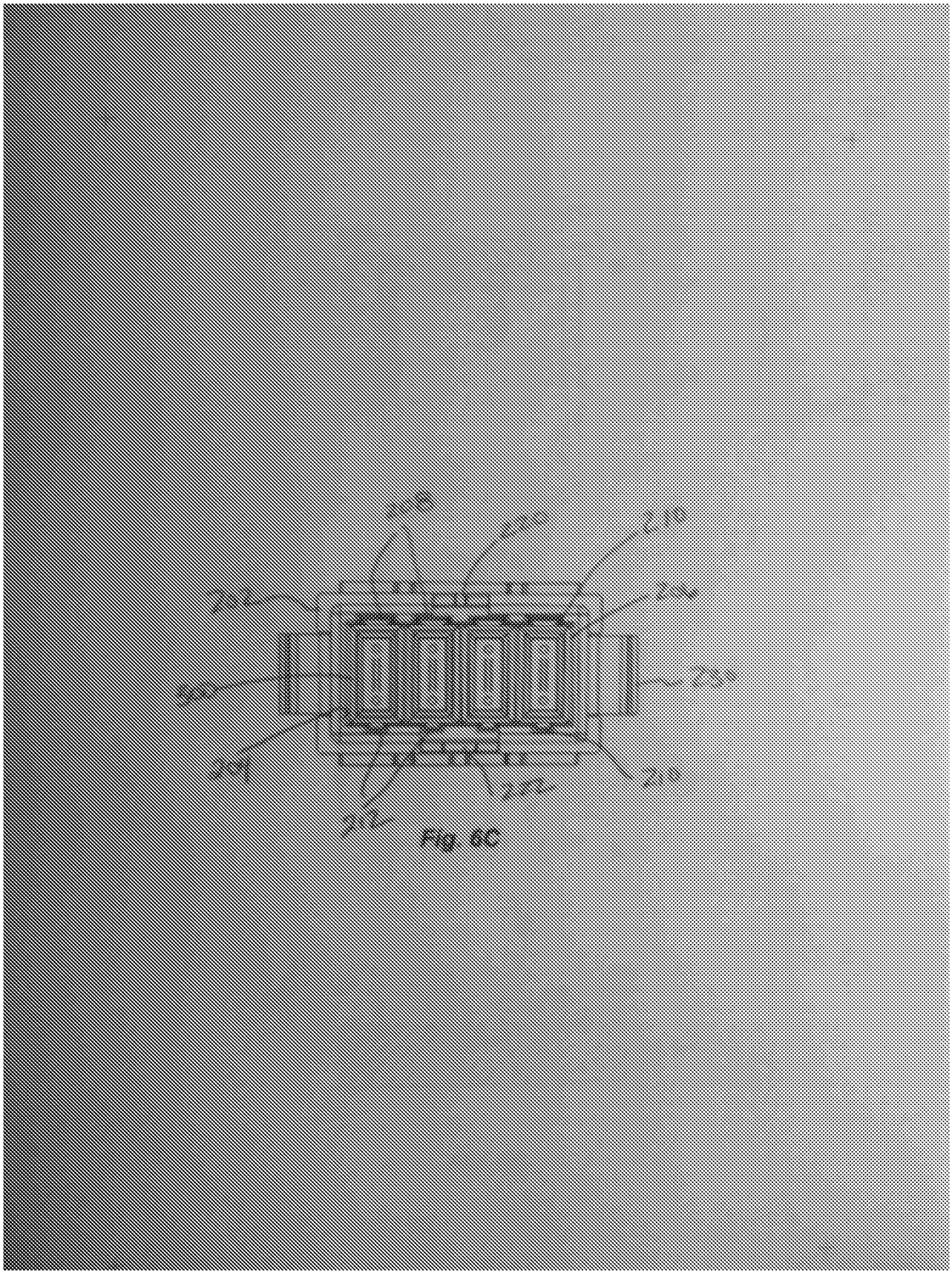

Fig. 6C

Fig. 7A

Fig. 7B

Fig. 6

Fig. 9

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.

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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.

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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.

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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.

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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 is 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

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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

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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

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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**.

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second end 308 allows for the optical fibers **14** (shown in Fig. 5A and 5B to have a boot and a covering) to exit the ferrule holder **300**. The ferrule holder **300** has a top surface **312** and a bottom surface **314**, with a cantilevered latch **316** to engage the plug **200**. The top surface **312** has a projection **320** and the bottom surface **314** has a projection **322**. The projections **320,322** are preferably elongated and have a chamfered front end. The projections **320,322** are used to engage grooves in the plug **200** and the adapter **100** to position the ferrule holders **300** with precision in the adapter **100**. The projection **320** has a width that is different that the width of projection **322** so as to act as a key in inserting the ferrule holder **300** in the plug 200. While the projection **320** is wider than projection **322**, it could be opposite in that projection **320** is more narrow than projection **322**. The projections **320,322** are preferably on the top and the bottom surfaces **312,314** of the ferrule holder **300** to allow, as illustrated below, more ferrule holders to be inserted into the adapter **100** and the plug **200**. The projections **320,322** are used to position the ferrules **12** in the adapter in the x and y directions, eliminating the need for side walls to position the ferrule holders **300** and the ferrules **12**.

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 that the width of projection **222** so as to act as a key in inserting the plug **200** into the adapter **100**. While the

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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.

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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**.

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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.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Hiep V. Nguyen	)	
		)	Group Art Unit: Unassigned
Serial No.:	Cont. of 15/855,750	)	
		)	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, under 35 U.S.C. § 120, and also claims priority to U.S. Patent Application No. 15/855,750, filed on December 27, 2017, 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 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 fiber optic ferrules inserted from opposing sides comprising:

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

a plurality of grooves disposed in a top surface and a bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side.

16. (New) The adapter according to claim 15, the opening having at least one groove therein and extending in a direction from the first side to the second side.

17. (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 and second sides to pass therethrough.

18. (New) The adapter according to claim 15, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

19. (New) The adapter according to claim 15, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

20. (New) The adapter according to claim 15, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

21. (New) The adapter according to claim 15, wherein the first and second sides are configured to receive a plurality of optical ferrules.

22. (New) The adapter according to claim 15, 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.

23. (New). The adapter according to claim 18, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

24. (New) 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 inside the main body, the main body having at least one groove in the opening and extending in a direction from the first side to the second side; and

a plurality of grooves disposed in a top surface and bottom surface of the central portion, each of the plurality of grooves extending into the central portion from each of the first side and the second side.

25. (New) The adapter according to claim 24, 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.

26. (New) The adapter according to claim 24, wherein the at least one passage comprises a plurality of passages, the plurality of passages corresponding to the number of fiber optic ferrules.

27. (New) The adapter according to claim 24, wherein the opening in the central portion of the main body is smaller than the opening in the first and second sides.

28. (New) The adapter according to claim 24, further comprising an conductive elastomeric gasket encircling an external surface of the adapter to provide EMI shielding to the adapter.

29. (New) The adapter according to claim 24, wherein the first and second sides are configured to receive a plurality of optical ferrules.

30. (New) The adapter according to claim 24, 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.

31. (New). The adapter according to claim 26, wherein the plurality of passages are sized to allow a ferrule holder to enter therein.

REMARKS

The present application has been filed to pursue additional claims directed to the adapter that was the subject of the divisional application. Applicant has also submitted all new drawings as were filed in the original case and corrected in the parent 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,

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