

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
5 July 2007 (05.07.2007)

PCT

(10) International Publication Number  
**WO 2007/075723 A3**

(51) International Patent Classification:  
**G02B 6/38** (2006.01)

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(21) International Application Number:  
PCT/US2006/048493

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

(22) International Filing Date:  
19 December 2006 (19.12.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
11/311,501 19 December 2005 (19.12.2005) US

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(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

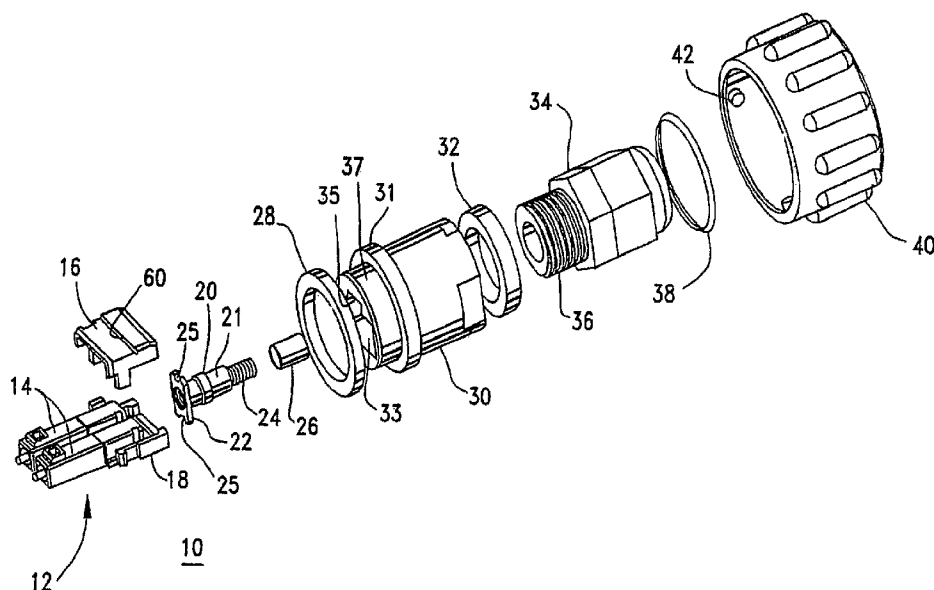
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**Published:**  
— with international search report

[Continued on next page]

(54) Title: INDUSTRIAL OPTICAL FIBER CONNECTOR ASSEMBLY



(57) Abstract: A sealed optical fiber connector assembly includes a connector housing (30) that is uniquely configured to cooperate with a cable crimp tail (20) and one or more terminal fiber optic connectors (14). The connector housing has a first opening for securely retaining the terminal fiber optic connectors. An interior passage connects the first opening to a second opening at the housing's other end. The interior passage allows the crimp tail to pass through the housing, the second opening forms a shoulder so that the crimp tail, after being pushed through the first opening and passage, can be rotated and seated against the shoulder. A cable seal (34) securely holds the crimp tail against the shoulder. This provides a sealed and substantially stronger cable attachment. The connector housing is part of a removable optical connector that provides environmental sealing when mated to a corresponding adapter.

WO 2007/075723 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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**(88) Date of publication of the international search report:**

16 August 2007

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/048493

## A. CLASSIFICATION OF SUBJECT MATTER

INV. G02B6/38

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)  
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 practical, 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	WO 92/19998 A (ITT [US]) 12 November 1992 (1992-11-12) page 4, line 8 - page 6, line 11; figures 2-4	1,2,6
Y		3-5,10, 13,23
A		11
X	WO 94/19716 A (PORTA SYSTEMS CORP [US]) 1 September 1994 (1994-09-01) page 6, line 18 - page 7, line 6 page 8, line 22 - page 9, line 10 page 9, line 16 - page 11, line 11; figures 1,6,11,15	8,12,21
Y		10, 16-18,20
A		11

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document 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

13 June 2007

Date of mailing of the international search report

22/06/2007

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/048493

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 638 828 A (AT & T CORP [US]) 15 February 1995 (1995-02-15) column 6, line 38 - line 56; figures 1,3 -----	10
Y	EP 1 258 758 A (CORNING CABLE SYS LLC [US]) 20 November 2002 (2002-11-20) the whole document -----	10
Y	EP 0 097 575 A1 (SOCAPEX [FR]) 4 January 1984 (1984-01-04) page 5, line 17 - line 33; figures 3-5 -----	10
A	US 2003/036340 A1 (MORIYA JIRO [JP] ET AL) 20 February 2003 (2003-02-20) the whole document -----	11
A	US 2003/044122 A1 (LEE HSIN [US]) 6 March 2003 (2003-03-06) the whole document -----	11
A	US 2003/091295 A1 (CHENG YUNG CHANG [TW]) 15 May 2003 (2003-05-15) the whole document -----	11
Y	US 5 915 056 A (BRADLEY KELVIN B [US] ET AL) 22 June 1999 (1999-06-22) the whole document -----	3
Y	US 2002/057870 A1 (DEAN DAVID L [US] ET AL DEAN JR DAVID L [US] ET AL) 16 May 2002 (2002-05-16) the whole document -----	3
X	US 5 224 187 A (DAVISDON GARY A [US]) 29 June 1993 (1993-06-29) column 4, line 31 - column 7, line 45; figures 1,2 -----	9
Y	-----	4,22,23
Y	US 5 943 462 A (SCHOFIELD PHILIP W [US] ET AL) 24 August 1999 (1999-08-24) the whole document -----	4,13,22, 23
A	-----	14,15
Y	WO 01/59499 A (HUBER & SUHNER AG [CH]; SCHMALZIGAUG THOMAS [CH]; KOCH BEAT [CH]) 16 August 2001 (2001-08-16) page 8, paragraph 3; figures 3,4 -----	5
A	WO 2005/101078 A (TYCO ELECTRONICS CORP [US]) 27 October 2005 (2005-10-27) the whole document -----	7,19
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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/048493

## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 566 674 A (REICHLE & DE MASSARI FA [CH]) 24 August 2005 (2005-08-24) the whole document -----	7,19
Y	EP 1 020 743 A2 (DELPHI TECH INC [US]) 19 July 2000 (2000-07-19) the whole document -----	16-18,20
A		7,19

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2006/048493

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1,2,8,10,11,12,21

Subject 1 relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to details of the crimp tail like a crimp tail tube with flange.

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2. claim: 3

Subject 2 also relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to the internal cross section of the connector housing.

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3. claims: 4,9,22,23

Subject 3 also relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to details of a cable seal attached to the connector housing.

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4. claim: 5

Subject 4 also relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to details of the shoulder.

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5. claims: 6,16,17,18,20

Subject 5 also relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to details for mounting the connector housing to an adapter.

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6. claims: 7,19

Subject 6 also relates to a connector housing and a connector with an internal latching arm and a shoulder for stopping a crimp tail, and to details of the connector terminals to be inserted into the connector housing.

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7. claims: 13,14,15

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Subject 7 also relates to a connector with an internal shoulder for stopping a crimp tail and a latching arm, and to details of a clip for insertion into the connector housing of the connector.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/048493

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9219998	A	12-11-1992	EP 0695429 A1 JP 6511565 T US 5230032 A	07-02-1996 22-12-1994 20-07-1993
WO 9419716	A	01-09-1994	EP 0731930 A1 US 5436994 A US 5559917 A	18-09-1996 25-07-1995 24-09-1996
EP 0638828	A	15-02-1995	CA 2126772 A1 JP 2928101 B2 JP 7077630 A US 5396572 A	11-02-1995 03-08-1999 20-03-1995 07-03-1995
EP 1258758	A	20-11-2002	CA 2385945 A1 JP 2002341185 A WO 2004044636 A1 US 2003063869 A1 US 2002164130 A1	08-11-2003 27-11-2002 27-05-2004 03-04-2003 07-11-2002
EP 0097575	A1	04-01-1984	CA 1239819 A1 DE 3373551 D1 FR 2528984 A1 US 4579418 A	02-08-1988 15-10-1987 23-12-1983 01-04-1986
US 2003036340	A1	20-02-2003	EP 1283090 A2 JP 2003048148 A	12-02-2003 18-02-2003
US 2003044122	A1	06-03-2003	NONE	
US 2003091295	A1	15-05-2003	TW 496534 Y	21-07-2002
US 5915056	A	22-06-1999	NONE	
US 2002057870	A1	16-05-2002	JP 2001183550 A US 6547449 B1	06-07-2001 15-04-2003
US 5224187	A	29-06-1993	CA 2094952 A1 CN 1082203 A EP 0568335 A2	30-10-1993 16-02-1994 03-11-1993
US 5943462	A	24-08-1999	NONE	
WO 0159499	A	16-08-2001	AU 2426900 A CA 2399120 A1 CN 1433524 A EP 1254387 A1 JP 2004502962 T TW 588802 Y US 6811321 B1	20-08-2001 16-08-2001 30-07-2003 06-11-2002 29-01-2004 21-05-2004 02-11-2004
WO 2005101078	A	27-10-2005	AU 2005233912 A1 CN 1938624 A DE 112005000697 T5	27-10-2005 28-03-2007 05-04-2007
EP 1566674	A	24-08-2005	CN 1667441 A JP 2005234567 A SG 114734 A1	14-09-2005 02-09-2005 28-09-2005

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/048493

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1020743	A2	19-07-2000 DE 19901473 A1	20-07-2000