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Optics Co., Ltd
EXHIBIT 1002
IPR Petition for
U.S. Patent No. 7,198,416

TFW



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/044,475	01/27/2005	Curtis A. Ray	9455-1

Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA 94104



CONFIRMATION NO. 8763
POWER OF ATTORNEY NOTICE



Date Mailed: 04/21/2014

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/14/2014.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record (37 CFR 1.33).

/tnnguyen/

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



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United States Patent and Trademark Office
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11/044,475	01/27/2005	Curtis A. Ray	9455-1

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/044,475	01/27/2005	Curtis A. Ray	9455-1

117548
Murphy, Bilak & Homiller/Omron
8000 Regency Parkway, Suite 415
Cary, NC 27518

CONFIRMATION NO. 8763
POA ACCEPTANCE LETTER



Date Mailed: 04/21/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/14/2014.

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.

/tnnguyen/

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

LIMITED POWER OF ATTORNEY

I hereby appoint the Practitioners associated with the following Customer Number:

117548

as attorneys or agents to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with the patents listed below, and assigned to the undersigned according to USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Patent Number	Grant Date	Title
6,201,908	13 Mar 2001	Optical Wavelength Division Multiplexer/Demultiplexer having Preformed Passively Aligned Optics
6,396,978	28 May 2002	Optical Wavelength Division Multiplexer/Demultiplexer having Patterned Opaque Regions to Reduce Optical Noise
6,456,757	24 Sep 2002	Optical Wavelength Division Multiplexer/Demultiplexer having Adhesive Overflow Channels with Dams to Achieve Tight Adhesive Bond
6,558,046	6 May 2003	Optical Wavelength Division Multiplexer and/or Demultiplexer with Mechanical Strain Relief
6,563,976	13 May 2003	Cost-Effective Wavelength Division Multiplexer and Demultiplexer
6,572,278	3 Jun 2003	Opto-Electronic Device having Staked Connection between Parts to Prevent Differential Thermal Expansion
6,652,161	25 Nov 2003	Optical Wavelength Division Multiplexer and/or Demultiplexer Mounted in a Pluggable Module
6,735,397	11 May 2004	Skew Discovery and Compensation for WDM Fiber Communications Systems using 8b10b Encoding
7,272,323	18 Sep 2007	Bi-Directional Electrical to Optical Converter Module
7,198,416	3 Apr 2007	Optical Combiner Device

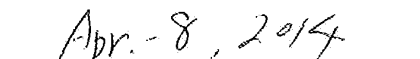
Assignee Name and Address:

Omron Corporation
Horikawa-Higashi
Shiokoji-Dori Shimogyo-Ku
Kyoto, Japan 600-8530

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the Assignee:


Name: Atsushi Noda
Title: Manager


Date:

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Omron Corporation
Application No./Patent No.: 7,198,416 Filed/Issue Date: April 3, 2007
Titled: Optical Combiner Device
Omron Corporation, 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 50 %. 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 _____, Frame _____, 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: Grann, Ray and Peters To: Aduro, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 016930, Frame 0230, or for which a copy thereof is attached.

2. From: Aduro, Inc. To: Omron Network Products, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 017444, Frame 0154, or for which a copy thereof is attached.

[Page 1 of 2]

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

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

STATEMENT UNDER 37 CFR 3.73(c)3. From: Omron Network Products, LLC To: Omron Corporation

The document was recorded in the United States Patent and Trademark Office at
Reel 020599, Frame 0564, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael D. Murphy/

Signature

Michael D. Murphy

Printed or Typed Name

April 14, 2014

Date

44,958

Title or Registration Number

Privacy Act Statement

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

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

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

LIMITED POWER OF ATTORNEY

I hereby appoint the Practitioners associated with the following Customer Number:

117548

as attorneys or agents to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with the patents and patent applications listed below, and assigned to the undersigned according to USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b) or 37 CFR 3.73(e), as appropriate.

Patent Number	Grant Date	Title
6,201,908	13 Mar 2001	Optical Wavelength Division Multiplexer/Demultiplexer having Preformed Passively Aligned Optics
6,396,978	28 May 2002	Optical Wavelength Division Multiplexer/Demultiplexer having Patterned Opaque Regions to Reduce Optical Noise
6,456,757	24 Sep 2002	Optical Wavelength Division Multiplexer/Demultiplexer having Adhesive Overflow Channels with Dams to Achieve Tight Adhesive Bond
6,558,046	6 May 2003	Optical Wavelength Division Multiplexer and/or Demultiplexer with Mechanical Strain Relief
6,563,976	13 May 2003	Cost-Effective Wavelength Division Multiplexer and Demultiplexer
6,572,278	3 Jun 2003	Opto-Electronic Device having Staked Connection between Parts to Prevent Differential Thermal Expansion
6,652,161	25 Nov 2003	Optical Wavelength Division Multiplexer and/or Demultiplexer Mounted in a Pluggable Module
6,735,397	11 May 2004	Skew Discovery and Compensation for WDM Fiber Communications Systems using 8b10b Encoding
7,272,323	18 Sep 2007	Bi-Directional Electrical to Optical Converter Module
7,198,416	3 Apr 2007	Optical Combiner Device

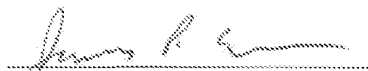
Appl. Number	Filing Date	Title
13/385,879	12 Mar 2012	Method and Apparatus for Transporting Two or More Asynchronous Data Streams over a Single Data Link
13/933,679	2 Jul 2013	A Method and Apparatus for USB Signaling via Intermediate Transports
14/046,250	4 Oct 2013	Method and Apparatus for a Floating Current Source

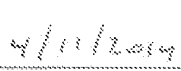
Assignee Name and Address:

Ontron Management Center of America, Inc.
55 Commerce Drive
Schaumburg, Illinois 60173
United States

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the Assignee:


Name: James P. Eberhart
Title: Vice President and Treasurer


Date:

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Omron Management Center of America, Inc.

Application No./Patent No.: 7,198,416 Filed/Issue Date: April 3, 2007

Titled: Optical Combiner Device

Omron Management Center of America, Inc., 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 50 %. 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:

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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 _____, Frame _____, 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:

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[Page 1 of 2]

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

STATEMENT UNDER 37 CFR 3.73(c)3. From: Omron Network Products, LLC To: Omron Management Center of America, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 032280, Frame 0912, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

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Reel _____, Frame _____, or for which a copy thereof is attached.☐ Additional documents in the chain of title are listed on a supplemental sheet(s).☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael D. Murphy/

Signature

Michael D. Murphy

Printed or Typed Name

April 14, 2014

Date

44,958

Title or Registration Number

Privacy Act Statement

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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.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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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:	18757040
Application Number:	11044475
International Application Number:	
Confirmation Number:	8763
Title of Invention:	OPTICAL COMBINER DEVICE
First Named Inventor/Applicant Name:	Curtis A. Ray
Correspondence Address:	Bruce H. Johnsonbaugh Eckhoff & Hoppe 101 Montgomery Street Suite 2800 San Francisco CA 94104 US 4153917160 -
Filer:	Michael Murphy/Laura Wade
Filer Authorized By:	Michael Murphy
Attorney Docket Number:	9455-1
Receipt Date:	14-APR-2014
Filing Date:	27-JAN-2005
Time Stamp:	16:36:21
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	OC_POA.pdf	2163749	no	1
			36d8b44b0e96c27b8c4ac466b2c50965b4bd5d52		
Warnings:					
Information:					
2	Assignee showing of ownership per 37 CFR 3.73.	OC_SB96.pdf	123651	no	3
			89ed4d64e6b2f243bd507cef0e38d04c30e77eec		
Warnings:					
Information:					
3	Power of Attorney	OMCA_POA.pdf	343816	no	1
			59152e7fbd0581d3d0f7dab1218129ef6b669aae		
Warnings:					
Information:					
4	Assignee showing of ownership per 37 CFR 3.73.	OMCA_SB96.pdf	123981	no	3
			6a8f761d45d6b3cc0c703a49eac4cf3b3674121		
Warnings:					
Information:					
Total Files Size (in bytes):			2755197		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	04/03/2007	7198416	9455-1	8763

7590

03/14/2007

Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA 94104

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Curtis A. Ray, Alamo, CA;
Eric B. Grann, San Ramon, CA;
Brian C. Peters, Alamo, CA;



UNITED STATES PATENT AND TRADEMARK OFFICE

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BIBDATASHEET

CONFIRMATION NO. 8763

Bib Data Sheet

SERIAL NUMBER 11/044,475	FILING OR 371(c) DATE 01/27/2005 RULE	CLASS 385	GROUP ART UNIT 2874	ATTORNEY DOCKET NO. 9455-1
APPLICANTS Curtis A. Ray, Alamo, CA; Eric B. Grann, San Ramon, CA; Brian C. Peters, Alamo, CA;				
** CONTINUING DATA ***** This appln claims benefit of 60/541,573 02/04/2004				
** FOREIGN APPLICATIONS *****				
IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 03/30/2005				
Foreign Priority claimed ☐ yes ☐ no 35 USC 119 (a-d) conditions ☐ yes ☐ no ☐ Met after met Allowance Verified and Acknowledged		STATE OR COUNTRY CA	SHEETS DRAWING 11	TOTAL CLAIMS 9
Examiner's Signature _____ Initials _____		INDEPENDENT CLAIMS 2		
ADDRESS Bruce H. Johnsonbaugh Eckhoff & Hoppe 101 Montgomery Street Suite 2800 San Francisco, CA94104				
TITLE OPTICAL COMBINER DEVICE				
FILING FEE RECEIVED 800	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

JAN 16 2007

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

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7590

01/08/2007

Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800

San Francisco, CA 94104

01/17/2007 RMEBRAH1 00000010 050420 11044475

01 FC:1501 1400.00 OP
02 FC:1504 300.00 OP

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

Certificate of Mailing or Transmission

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

Bruce H. Johnsonbaugh (Depositor's name)
Bruce H. Johnsonbaugh (Signature)
January 11, 2007 (Date)

03 FILING NO. 30	00 DAFILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763

TITLE OF INVENTION: OPTICAL COMBINER DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	~~YES~~ NO	~~\$700~~ \$1,400.00	~~\$300~~ \$300	\$0	~~\$1000~~ \$1,700.00	04/09/2007
EXAMINER	ART UNIT	CLASS-SUBCLASS				
WOOD, KEVIN S	2874	385-093000				

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

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

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

2. For printing on the patent front page, list

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

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

Bruce H. Johnsonbaugh

2

3

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

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

(A) NAME OF ASSIGNEE

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

Omron Network Products, LLC

Schaumburg, IL 60173 Pleasanton, CA 94588

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee☐ Publication Fee (No small entity discount permitted)☒ Advance Order - # of Copies 10

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

☒ A check is enclosed.☐ Payment by credit card. Form PTO-2038 is attached.☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 05-0420 (enclose an extra copy of this form).

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

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.☒ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Date January 11, 2007

Typed or printed name Bruce H. Johnsonbaugh

Registration No. 24,982

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 01/08/2007
Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA 94104

EXAMINER	
WOOD, KEVIN S	
ART UNIT	PAPER NUMBER
2874	
DATE MAILED: 01/08/2007	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763
TITLE OF INVENTION: OPTICAL COMBINER DEVICE				

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	04/09/2007

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

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

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
- B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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

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

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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

7590 01/08/2007

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 Eckhoff & Hoppe
 101 Montgomery Street
 Suite 2800
 San Francisco, CA 94104

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

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763

TITLE OF INVENTION: OPTICAL COMBINER DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	04/09/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
WOOD, KEVIN S	2874	385-093000

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

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1	_____
2	_____
3	_____

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

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

(A) NAME OF ASSIGNEE

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

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
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- ☐ Advance Order - # of Copies _____

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- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763

7590 01/08/2007

Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA 94104

EXAMINER

WOOD, KEVIN S

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 01/08/2007

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

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

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

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

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

Notice of Allowability

Application No.

11/044,475

Applicant(s)

RAY ET AL.

Examiner

Kevin S. Wood

Art Unit

2874

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

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

1. ☒ This communication is responsive to 5 December 2006.
2. ☒ The allowed claim(s) is/are 1-9.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☐ Notice of Informal Patent Application |
| 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. ☐ Examiner's Amendment/Comment |
| 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. ☒ Examiner's Statement of Reasons for Allowance |
| | 9. ☐ Other _____ |

Kevin S. Wood
Kevin S. Wood
Primary Examiner

ALLOWANCE

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5 December 2006 has been entered.

Response to Amendment

2. The Declarations filed on 5 December 2006 under 37 CFR 1.131 is sufficient to overcome the Bhandarkar et al reference (U.S. Patent Application Publication 2005/0069013).

Response to Arguments

3. Applicant's arguments, filed 5 December 2006, with respect to claims 1-9 have been fully considered and are persuasive. The rejections/objections of claims 1-9 have been withdrawn.

Allowable Subject Matter

4. Claims 1-9 are allowed.

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

Referring to claims 1-6, the primary reason for the allowability of the claims is the inclusion of a focusing means for focusing the n collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having n separate radial sectors on its surface, and each of the n collimated beams passes through a separate one of the n sectors of the focusing means whereby the n output beams having n different wavelengths are coupled into the single fiber. The prior art does not disclose or make obvious the claimed limitation.

Referring to claims 7-9, the primary reason for the allowability of the claims is the inclusion focusing means for focusing the collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having four separate quadrants on its surface, and each of the four collimated beams passes through a separate one of the quadrants of the focusing means whereby the output beam of the four lasers are coupled into the single fiber. The prior art does not disclose or make obvious the claimed limitation.

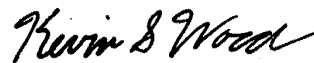
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S. Wood whose telephone number is (571) 272-2364. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. 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.



Kevin S. Wood
Primary Examiner



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



Bib Data Sheet

CONFIRMATION NO. 8763

SERIAL NUMBER 11/044,475	FILING OR 371(c) DATE 01/27/2005 RULE	CLASS 385	GROUP ART UNIT 2874	ATTORNEY DOCKET NO. 9455-1
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APPLICANTS

Curtis A. Ray, Alamo, CA;
Eric B. Grann, San Ramon, CA;
Brian C. Peters, Alamo, CA;

**** CONTINUING DATA ******* *Yes K34*
This appln claims benefit of 60/541,573 02/04/2004

**** FOREIGN APPLICATIONS ******* *None K34*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED **
03/30/2005

**** SMALL ENTITY ****

Foreign Priority claimed ☐ yes ☒ no	STATE OR COUNTRY CA	SHEETS DRAWING 11	TOTAL CLAIMS 9	INDEPENDENT CLAIMS 2
35 USC 119 (a-d) conditions met ☐ yes ☒ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature <i>Heun & J. J. J. J.</i> Initials <i>K34</i>				

ADDRESS

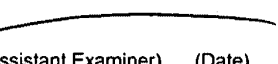
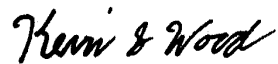
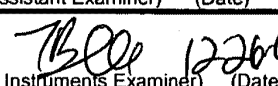
Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA94104

TITLE

Optical combiner device

FILING FEE RECEIVED 500	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit
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Issue Classification 	Application/Control No.	Applicant(s)/Patent under Reexamination	
	11/044,475	RAY ET AL.	
	Examiner	Art Unit	
	Kevin S. Wood	2874	

ISSUE CLASSIFICATION										
ORIGINAL				CROSS REFERENCE(S)						
CLASS	SUBCLASS			CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					
385	93			385	88	89	92	33	36	
INTERNATIONAL CLASSIFICATION										
G	0	2	B	6/32						
G	0	2	B	6/34						
G	0	2	B	6/36						
				/						
				/						
(Assistant Examiner) (Date) 				 Kevin S. Wood 12/21/06 (Primary Examiner) (Date)				Total Claims Allowed: 9 O.G. Print Claim(s) 1 O.G. Print Fig. 1		
(Legal Instruments Examiner) (Date) 										

☒ Claims renumbered in the same order as presented by applicant		☐ CPA		☐ T.D.		☐ R.1.47	
Final	Original	Final	Original	Final	Original	Final	Original
1	1		31		61		121
2	2		32		62		122
3	3		33		63		123
4	4		34		64		124
5	5		35		65		125
6	6		36		66		126
7	7		37		67		127
8	8		38		68		128
9	9		39		69		129
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Index of Claims



Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under Reexamination

RAY ET AL.

Art Unit

2874

√	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date											
Final	Original	12/5/06											
1	1	=											
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Search Notes

Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under
Reexamination

RAY ET AL.

Art Unit

2874

SEARCHED

Class	Subclass	Date	Examiner
385	31-36	12/21/2006	KSW
385	88-94	12/21/2006	KSW

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner
Searched Interference (See Search History Printout)		12/21/2006	KSW

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

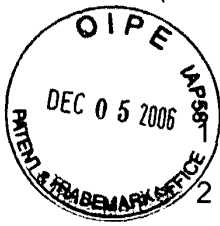
	DATE	EXMR
Searched EAST (See Search History Printout)	12/21/2006	KSW

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1995	(multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and ((multiple or plural\$4 or multi) near5 (facet or face or section or segment or sector or portion or region or quadrant)) and (optic\$4 near2 (fiber or cable))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 15:02
L2	75632	"385"/\$6.ccls. or "398"/\$6.ccls.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 12:20
L3	420	L2 and L1	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 12:20
L4	1842	L2 and (multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and (facet or face or section or segment or sector or portion or region or quadrant) and (optic\$4 near2 (fiber or cable))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 15:01
L5	634	385/31-36,88-94.ccls. and (multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and (fiber or cable)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 15:02
L6	7	((multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and ((multiple or plural\$4 or multi) near5 (facet or face or section or segment or sector or portion or region or quadrant)) and (optic\$4 near2 (fiber or cable))). clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 15:13
L7	107	((multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and (facet or face or section or segment or sector or portion or region or quadrant) and (optic\$4 near2 (fiber or cable))). clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/21 15:14
S1	1	10/952226	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/20 19:22

EAST Search History

S2	16160	(multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/20 19:24
S3	4182	(multiplex\$4 or combin\$4) and wavelength and (lens or prism or block) and collimat\$4 and focus\$4 and laser and ((lens or prism or block) near10 (facet or face or section or segment or sector or portion or region or quadrant)) and (optic\$4 near2 (fiber or cable))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/12/20 19:27



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re application of)
Applicant: CURTIS A. RAY, ET AL)
Serial No. 11/044,475)
Filed: January 27, 2005)
For: OPTICAL COMBINER DEVICE)

Art Unit : 2874
Examiner : Wood, Kevin S.
December 5, 2006

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Sir:

In response to the Office action mailed July 5, 2006, please amend the above-identified application as follows:

Amendments to the Claims begin at page 2

Remarks/Arguments begin at page 5

1 **Amendments to the Claims**

2 Claim 1 (currently amended): An optical combiner usable in data communication
3 systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs
4 has a different output wavelength, for transmission into and through a stopped single optical
5 fiber, comprising:

6 a plurality of n collimating lenses, said lenses being spaced apart and positioned
7 to receive and collimate the output of said n laser output beams, said n laser output beams
8 have n different output wavelengths, and

9 focusing means for focusing said n collimated output beams onto a single spot
10 at said stopped single optical fiber, said focusing means having n separate radial sectors on
11 its surface, and each of said n collimated beams passes through a separate one of said n
12 sectors of said focusing means whereby said n output beams having n different wavelengths
13 are coupled into said single fiber ~~and each of said n collimated beams is refracted through the~~
14 ~~same angle as it passes through said focusing means.~~

15 Claim 2 (original): The optical combiner of claim 1 wherein n=4 and wherein said four
16 lasers and four collimating lenses are each formed in a two-dimensional, two by two array,
17 wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-
18 shaped quadrant.

19 Claim 3 (original): The optical combiner of claim 2 wherein a prism is positioned
20 between each of said collimating lenses and said focusing lens, and wherein said collimating
21 lenses, said prism and said focusing lens are formed as a single, monolithic molded block.

22 Claim 4 (original): The optical combiner of claim 3 wherein said single monolithic block
23 has a top surface, a bottom surface, and four side surfaces, said top surface forming said
24 focusing lens, each of said four side surfaces forming one of said collimating lenses, and said
25 bottom surface being formed to include four separate prisms, each of said prisms reflecting
26 a laser output beam passing through one of said collimating lenses onto one of said quadrants

1 of said focusing lens.

2 Claim 5 (original): The optical combiner of claim 4 wherein said four lasers are
3 positioned in a circular array with their output beams directed toward the center of said array,
4 all of said output beams lying in a common plane, and said single monolithic block is
5 positioned at the center of said circular array.

6 Claim 6 (original): The optical combiner of claim 1 wherein said optical combiner does
7 not require the use of dielectric filters or waveguides.

8 Claim 7 (currently amended): An optical combiner usable in data communication
9 systems for multiplexing the outputs of a plurality of lasers wherein each of said outputs has
10 a different wavelength, for transmission into and through a stopped single optical fiber,
11 comprising:

12 an array of four lasers, formed in a two-dimensional, two by two array, each of
13 said lasers having an output beam with a different wavelength,

14 an array of four collimating lenses, said lenses being formed in a two-
15 dimensional, two by two array and positioned to receive and collimate the output of said laser
16 output beams, and

17 focusing means for focusing said collimated output beams onto a single spot at
18 said stopped single optical fiber, said focusing means having four separate ~~radial sectors~~
19 quadrants on its surface, and each of said four collimated beams passes through a separate
20 one of said ~~sectors~~ quadrants of said focusing means whereby said output beams of said four
21 lasers are coupled into said single fiber and each of said collimated beams is refracted through
22 the same angle as it passes through said focusing means.

23 Claim 8 (original): The optical combiner of claim 7 wherein a prism is positioned
24 between each of said collimating lenses and said focusing lens, and wherein said collimating
25 lenses, said prism and said focusing lens are formed as a single, monolithic molded block.

26

1 Claim 9 (original): The optical combiner of claim 7 wherein said optical combiner does
2 not require the use of dielectric filters or waveguides.

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1 **Remarks/Arguments**

2 This Request for Continued Examination is submitted in response to the Final Rejection
3 dated July 5, 2006. The undersigned submits herewith the required fee for filing the Request
4 for Continued Examination in the amount of \$790.00 for a large entity. The undersigned also
5 submits a Request for Extension of time to and including December 5, 2006 to respond, along
6 with the extension fee in the amount of \$450.00.

7 Claims 1-9 remain in the application. Independent claims 1 and 7 are currently
8 amended. The undersigned notes the indication of allowable subject matter in claims 3-5 and
9 claim 8.

10 In support of this Request for Continued Examination, the applicants rely on the
11 enclosed Declaration of Brian C. Peters and the Supplemental Declarations of Curtis A. Ray
12 and Eric B. Grann. Applicants also rely on the earlier filed declarations of Curtis A. Ray dated
13 February 21, 2006 and of Eric B. Grann dated March 30, 2006.

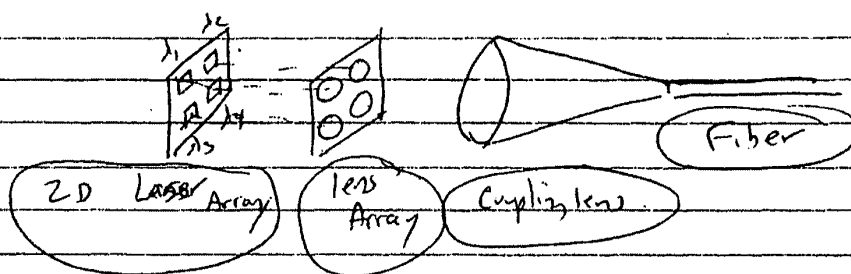
14 In the Final Rejection dated July 5, 2006, the patent Examiner took the position that the
15 applicants do not appear to have conceived the claimed invention prior to the effective date
16 of the Bhandarkar et al reference. The undersigned submits that, in view of the Declarations
17 submitted herewith (and the prior Declarations), along with the amendments to the claims, the
18 record now clearly shows that the applicants conceived the claimed invention on or about July
19 17, 2003, prior to the effective date (September 29, 2003) of the Bhandarkar et al reference.

20 The first of three grounds asserted by the Examiner is that "The lab notes relied upon
21 as evidence of conception do not appear to disclose that the plurality of lasers each had a
22 different wavelength." (see page 2, para. 3 of Office action) As shown by the Supplemental
23 Declaration of Eric B. Grann, the lab notes do clearly indicate the use of different wavelengths.
24 In particular, page 11 of Eric Grann's notebook (Ex. F to his first declaration dated March 30,
25 2006), clearly shows the use of λ_1 λ_2 λ_3 λ_4 , , conventional notations for four different wave-
26 lengths. For reference, page 11, noted above, is reproduced as page 5a:

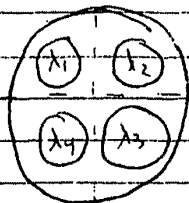
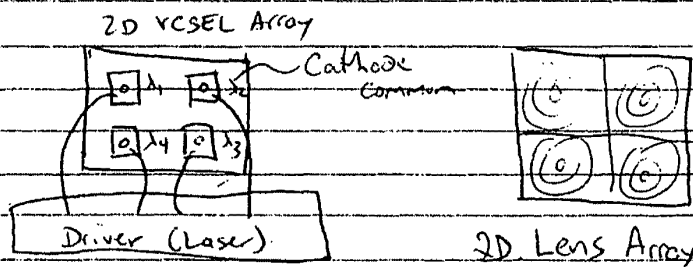
7/17/03

Concept: WDM coupler

Use different quadrants of a lens to
couple into an optical fiber.



For MMF coupling, one also has the added
benefit of creating a donut intensity pattern
in the lens which significantly reduces
the DMO within the Fiber, resulting in extended
distance performance.



Collimated image plane
before coupling lens

BEST AVAILABLE COPY

Group
Ex F
4 of 6

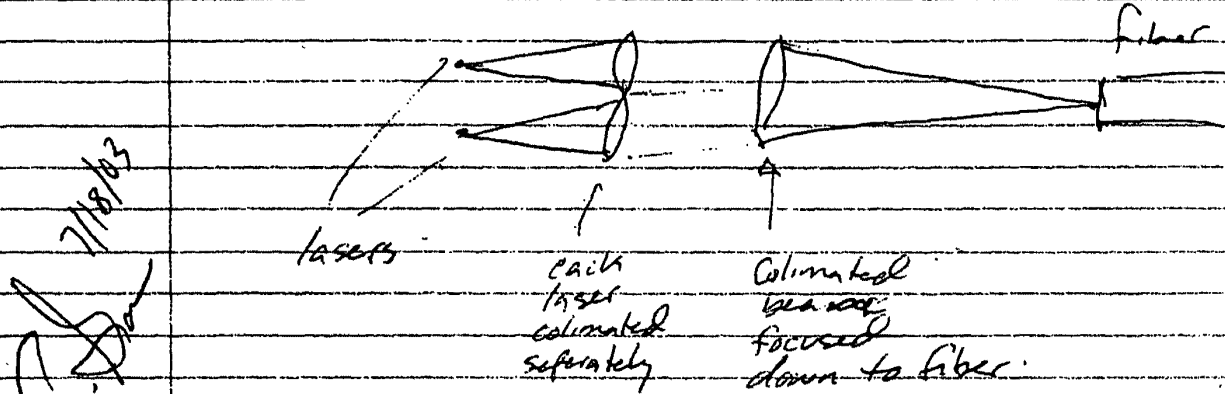
1 As noted in the Supplemental Declaration of Eric B. Grann, the above notations are customary
2 for indicating separate wavelengths. This notation for separate wavelengths is also used in
3 U.S. patent 6,201,908, in which Eric B. Grann is the named sole inventor.

4 The second ground relied upon by the Examiner is that "each of the collimated beams
5 is refracted at the same angle" (see page 2 of Office action, para. 3). In response to that
6 ground, claims 1 and 7 have been amended to delete the requirement that each of the
7 collimated beams is refracted at the same angle. The claims have been amended to delete
8 that language and to replace it with the phrase "whereby said n output beams having n
9 different wavelengths are coupled into said single fiber" (see amended claim 1). Claim 7 has
10 been amended in a very similar fashion. The amendments to claims 1 and 7 are clearly
11 supported by the lab notebooks and by the specification as filed in the following respects.
12 First, the notation at page 11 of Eric Grann's notebook (see page 4, Ex. F, of Grann
13 Declaration dated March 30, 2006) uses the phrase "use different quadrants of a lens to
14 couple into an optical fiber." The sketch immediately beneath that language shows that the
15 output of the laser array with four different wavelengths goes through a collimating lens array
16 and into separate sectors or quadrants of the coupling lens and are coupled into the single
17 optical fiber. That notation and sketch are shown in page 5 above for convenience.

18 Similarly, page 16 of the notebook of Curtis Ray (see page 3 of Ex. A of Mr. Ray's
19 Declaration dated February 21, 2006) includes a similar sketch and the notation "collimated
20 beams focused down to fiber." Excerpts of that page are reproduced on the following page
21 7 for reference:

1

Side view:



2600 3 UNCLASIFIED THIS IDEA/INVENTION

7-18-03

Ray
Ex A
3 of 6

14 The phrase "whereby said n output beams having n different wavelengths are coupled
15 into said single fiber" is also supported in the specification of the present application at page
16 2, lines 3-5, 19-20, 23-25; page 3, lines 15-16; page 4, lines 9-12; page 5, lines 6, 17-18; and
17 page 6, lines 11-14.

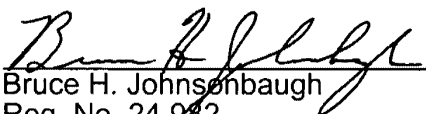
18 A third ground asserted by the Examiner in support of the rejection is that "None of the
19 Declarations included a statement declaring that the acts relied upon were carried out in the
20 United States of America or a NAFTA or WTO Member Country." The Supplemental
21 Declarations of Eric Grann and Curtis Ray, as well as the Declaration of Brian C. Peters,
22 submitted herewith, include statements declaring that the acts relied upon were carried out in
23 the United States of America. The undersigned submits that paragraphs 2 and 3 of the
24 declaration of Eric Grann dated March 30, 2006 was sufficient, but to avoid any doubt, the
25 Supplemental Declarations submitted herewith explicitly state all of the acts relied upon were
26 carried out in the United States of America.

1 The notebook entries made by Curtis Ray and Eric Grann and relied upon herein were
2 dated and witnessed on July 17 and 18, 2003, as described in detail in the Declarations. The
3 undersigned submits that the acts relied upon herein are fully corroborated by the Declarations
4 taken together with the notebook entries and signatures.

5 As shown above, applicants did conceive the invention in the time frame of July 17 and
6 18, 2003 (as corroborated by the Declarations), as claimed in amended claims 1 and 7
7 submitted herewith, prior to the effective date (September 29, 2003) of the Bhandarkar et al
8 reference. The undersigned submits that reference should be withdrawn and that claims 1-9
9 are allowable.

10 Favorable action is requested.

11
12 Respectfully submitted,

13
14 By  12/5/06
15 Bruce H. Johnsonbaugh
16 Reg. No. 24,982
17 Attorney for Applicants

18 ECKHOFF & HOPPE
19 101 Montgomery Street, Suite 2800
20 San Francisco, CA 94104
21 Telephone: 415-391-7160
22 9455.301
23
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12-06-06

RCE
1FW

PTO/SB/30 (04-05)

Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**Request
for
Continued Examination (RCE)
Transmittal**Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	11/044,475
Filing Date	1-27-2005
First Named Inventor	Curtis A. Ray
Art Unit	2874
Examiner Name	Wood, Kevin S.
Attorney Docket Number	9455-1

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).
- a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
- i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ii. ☐ Other _____
- b. ☒ Enclosed
- i. ☒ Amendment/Reply
- iii. ☐ Information Disclosure Statement (IDS)
- ii. ☒ Affidavit(s) Declaration(s)
- iv. ☐ Other _____
2. **Miscellaneous**
- a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)
- b. ☐ Other _____
3. **Fees** The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
- The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to
- a. ☒ Deposit Account No. 05-0420. I have enclosed a duplicate copy of this sheet.
- i. ☐ RCE fee required under 37 CFR 1.17(e)
- ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)
- iii. ☐ Other _____
- b. ☒ Check in the amount of \$ 790 enclosed
- c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

Signature	<i>Bruce H. Johnsonbaugh</i>	Date	12-5-2006
Name (Print/Type)	Bruce H. Johnsonbaugh	Registration No.	24,982

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature	<i>Bruce H. Johnsonbaugh</i>	Date	12-5-2006
Name (Print/Type)	Bruce H. Johnsonbaugh		

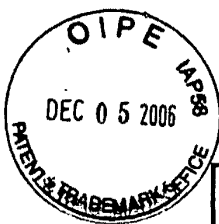
This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, 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.

12/07/2006 DEMHANU1 00000094 11044475

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790.00 DP



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Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 9455-1
In re Application of Curtis A. Ray et al		
Application Number 11/044,475		Filed 1-27-2005
For Optical Combiner Device		
Group Art Unit 2874	Examiner Wood, Kevin S.	

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

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

☐ One month (37 CFR 1.17(a)(1)) \$ _____

☒ Two months (37 CFR 1.17(a)(2)) \$ 450

☐ Three months (37 CFR 1.17(a)(3)) \$ _____

☐ Four months (37 CFR 1.17(a)(4)) \$ _____

☐ Five months (37 CFR 1.17 (a)(5)) \$ _____

☐ Applicant is a small entity under 37 CFR 1.9 and 1.27, therefore the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____

A small entity statement under 37 CFR 1.27:

☐ is enclosed.

☐ has already been filed in this application.

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

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

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 05-0420. I have enclosed a duplicate copy of this sheet.

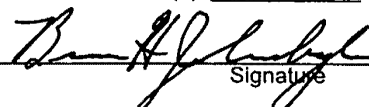
I am the ☐ assignee of record of the entire interest.

☐ applicant.

☒ attorney or agent of record.

☐ attorney or agent under 37 CFR 1.34(a).
Registration number if acting under 37 CFR 1.34(a). _____

12-5-2006
Date


Signature

Bruce H. Johnsonbaugh. #24,982
Typed or printed name

Burden Hour Statement: This form is estimated to take 0.1 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

12/07/2006 DENH001 00000094 11044475

450.00 OP

02 FC:1252



CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"Express Mail" Mailing Label No.: EQ 735173513 US

Date of Deposit: Tuesday, December 5, 2006

I hereby certify that this Request for Continued Examination (RCE) and required fee of \$790 to file same, relating to patent application Serial No. 11/044,475 filed January 27, 2005 entitled OPTICAL COMBINER DEVICE, together with a responsive amendment, Supplemental Declarations of Curtis A. Ray and Eric B. Grann and Declaration of Brian C. Peters due in the Patent and Trademark Office on October 5, 2006, a two-month Petition for Extension of Time to and including December 5, 2006, and extension fee of \$450, are being deposited with the United States Postal Service "Express Mail" under 37 C.F.R. § 1.10 on the date indicated above in an envelope addressed to:

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dated this 5th day of December, 2006.

Respectfully submitted,

By 
Bruce H. Johnsonbaugh
Reg. No. 24,982
Attorney for applicants

ECKHOFF & HOPPE
101 Montgomery Street, Suite 2800
San Francisco, CA 94104
Telephone [415] 391-7160
9455.express



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
CURTIS A. RAY ET AL	)	Art Unit : 2874
Serial No. 11/044,475	)	Examiner : Wood, Kevin S.
Filed: January 27, 2005	)	
For: OPTICAL COMBINER DEVICE	)	

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL
DECLARATION OF CURTIS A. RAY

I, CURTIS A. RAY, hereby declare under penalty of perjury:

1. I am the first named co-inventor in the above-identified '475 patent application.
2. All of the acts relied upon in my declaration dated February 21, 2006 and all acts described below in this declaration were carried out in the United States of America.
3. Claims 1 and 7 as amended include the added language "whereby said n output beams having n different wavelengths are coupled into said single fiber." That added language is fully supported by the notations at the top of page 11 of Eric B. Grann's notebook. In addition, the sketch at page 16 of my notebook (see Ex. A of my declaration dated February 21, 2006) shows the focusing lens focusing the separate collimated laser

CR
11-29-06

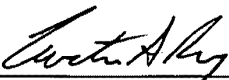
output beams into a fiber and contains the following legend beneath the sketch: "Collimated beams focused down to fiber." These notations clearly indicate that the multiple laser output beams are coupled into the single fiber.

4. Pages 16-18 of my notebook contain entries made by myself on July 17 and July 18, 2003. Each of these pages were read and witnessed in my presence by Eric B. Grann and Brian C. Peters on July 18, 2003 as evidenced by their signatures on each of those pages of my laboratory notebook. I signed and dated those entries on July 18, 2003 as evidenced by my signatures on pages 17 and 18 of my laboratory notebook.

5. I also witnessed the signatures made on page 11 of the laboratory notebook of Eric B. Grann. Those signatures were made by myself and Brian C. Peters and Eric B. Grann on July 17, 2003.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issuing therefrom, declares that all statements made of his own knowledge are true and that all statements made on information and belief are believed to be true.

Dated: 11-29-2006


Curtis A. Ray



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

in re application of

CURTIS A. RAY ET AL

Serial No. 11/044,475

Filed: January 27, 2005

For: OPTICAL COMBINER DEVICE

Art Unit : 2874

Examiner : Wood, Kevin S.

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL
DECLARATION OF ERIC B. GRANN, Ph. D

I, ERIC B. GRANN, hereby declare under penalty of perjury:

1. I am a named co-inventor in the above-identified '475 patent application. I attended graduate school at the University of Central Florida and received a Ph. D. degree in Electrical Engineering, specializing in optoelectronics. I have studied and/or worked full time in optical engineering and design for the past 14 years. I am familiar with conventional optical notations.

2. All of the acts relied upon in my declaration dated March 30, 2006 and all acts described below in this declaration were carried out in the United States of America.

3. As shown by the notes and sketches at page 11 of my notebook (a copy of which is attached hereto as Ex. A for convenience), each of the plurality of lasers has a different wavelength. The three sketches on page 11 each reference a laser array with four

different lasers. Each sketch includes the notations λ_1 λ_2 λ_3 λ_4 which notations mean 4 separate wavelengths and, in my opinion, those notations would indicate to any optical engineer that four different wavelengths are being described.

4. A further indicator that the symbols λ_1 λ_2 λ_3 λ_4 refer to different wavelengths is that U.S. patent 6,201,908, for which I was the sole inventor, uses the same symbols to indicate different wavelengths. The cover sheet of that patent is attached hereto as Ex. B.

5. Page 11 of my notebook also includes the notation "concept: WDM coupler." The legend "WDM" stands for wavelength division multiplexer, a concept that inherently includes the notion of separate and distinct wavelengths being multiplexed and transmitted simultaneously.

6. Claims 1 and 7 as amended include the added language "whereby said n output beams having n different wavelengths are coupled into said single fiber." That limitation in claims 1 and 7 is fully supported by the notations at the top of page 11 of my notebook. The notation reads "Use different quadrants of a lens to couple into an optical fiber." The sketch beneath that legend shows a laser array having four lasers with four different output wavelengths. The sketch also shows a collimating lens array of four spaced apart collimating lenses. The sketch also shows a coupling lens and a single fiber together with lines representing the focusing of the collimated laser output beams into the single fiber. In addition, page 16 of the notebook of Curtis Ray (see Ex. C hereto and Ex. A of Curtis Ray's declaration dated February 21, 2006) shows the focusing lens focusing the separate collimated laser output beams into a fiber and contains the following legend beneath the sketch: "Collimated beams focused down to fiber." These notations clearly

indicate that the multiple laser output beams of different wavelengths are coupled into the single fiber.

7. The language added to claims 1 and 7 which states "whereby said n output beams having n different wavelengths are coupled into said single fiber" is supported in the specification of the present application at page 2, lines 3-5, 19-20, 23-25; page 3, lines 15-16; page 4, lines 9-12; page 5, lines 6, 17-18; and page 6, lines 11-14 and by Fig. 1 and Figs. 7-11.

8. I wrote the entries at page 11 of my notebook on July 17, 2003 and signed the bottom of page 11 of my notebook on that date (see Ex. A attached hereto). In addition, my co-inventors, Curtis Ray and Brian Peters, read and understood the entries at page 11 of my laboratory notebook and they both signed that page on July 18, 2003, as evidenced by their signatures as shown on Ex. A attached hereto. Curtis Ray and Brian Peters signed my notebook in my presence on July 18, 2003.

9. With respect to pages 16, 17 and 18 of the laboratory notebook of Curtis Ray, copies of which are attached hereto as Ex. C, I read and understood those entries on July 18, 2003 and entered my signature on each of those pages on July 18, 2003. I also witnessed the fact that Brian Peters also reviewed those three pages and signed those three pages of Mr. Ray's notebook on July 18, 2003.

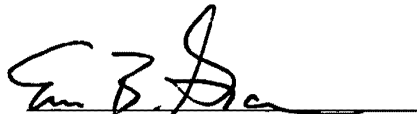
10. The drawings at page 17 of Mr. Ray's notebook (see Ex. A to Ray's Declaration of February 21, 2006) represent a computer modeled design of the combiner. Those sketches indicate the use of a stopped single fiber. The notation "focusing lens" refers to the focusing lens which focuses the four collimated beams into the stopped single fiber. The legend "opening for prism" refers to the opening used to receive and reflect the

four collimated beams. The sketch at the bottom left hand corner of page 17 includes the legend "for each lens" which refers to the four separate, spaced apart collimating lens. The output beams of those lens are reflected off the prism above the lenses through a 90° angle and into the focusing lens shown between the prism and the stop for the single fiber illustrated in phantom in the right hand portion of that sketch.

11. Page 18 of my notebook (for which the page number has been obliterated by the three dimensional computer generated drawings shown thereon) includes three dimensional drawings which correspond to the sketches shown at page 17 of Mr. Ray's notebook. Those three dimensional drawings include a top view shown at the top of page 18 and a bottom view of the device at the bottom of page 18. The bottom view shows the four separate spaced apart collimating lenses and the left hand portion of that three dimensional drawing shows the fiber stop. The drawing at the top of page 17 shows the reflected prism as seen from above which reflects the spaced apart collimated beams through the focusing lens and into the stopped fiber (not shown) which is placed into the fiber coupling shown in the left hand portion of that computerized drawing.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issuing therefrom, declares that all statements made of his own knowledge are true and that all statements made on information and belief are believed to be true.

Dated: 11/29/06


Eric B. Grann

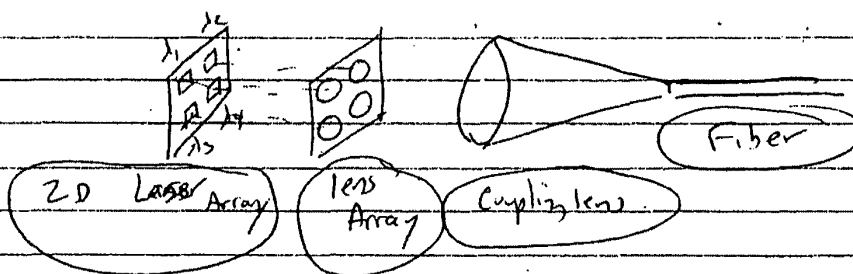


11

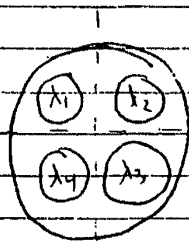
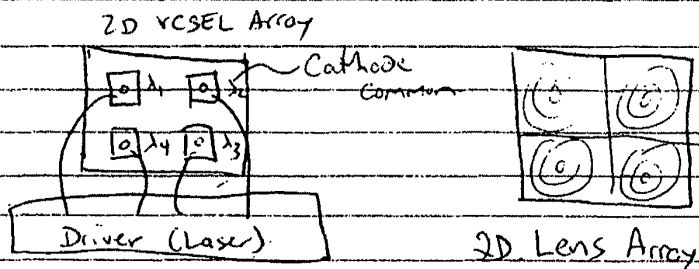
7/17/03

Concept: WDM coupler

use different quadrants of a lens to
couple into an optical fiber.



For MMF coupling, one also has the added
benefit of creating a spot intensity pattern
on the lens which significantly reduces
the DMD within the fiber, resulting in extended
distance performance.



Collimated image plane
before coupling lens

Grann
Supplemental
Declaration
Ex A

Grann
Ex F
4 of 6

[Signature]

BEST AVAILABLE COPY



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)
CURTIS A. RAY ET AL) Art Unit : 2874
Serial No. 11/044,475) Examiner : Wood, Kevin S.
Filed: January 27, 2005)
For: OPTICAL COMBINER DEVICE)

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF BRIAN C. PETERS

I, BRIAN C. PETERS, hereby declare under penalty of perjury:

1. I am a named co-inventor in the above-identified '475 patent application. I am presently the CEO of the assignee of the application and I was the CEO of the assignee of the application during all the periods of time here in question.
2. I have read the Declarations of Curtis A. Ray and Eric B. Grann and their Supplemental Declarations. All of the acts relied upon in those Declarations and all acts described below in this Declaration were carried out in the United States of America.
3. I read and understood the entries at pages 16, 17 and 18 of Curtis Ray's laboratory notebook on July 18, 2003 and placed my signature on those pages on that date.

4. I also read and understood the entries at page 11 of the laboratory notebook of Eric Grann on July 18, 2003. I signed his laboratory notebook on that date as shown by my signature on Grann Ex. F at page 4 of the exhibit.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issuing therefrom, declares that all statements made of his own knowledge are true and that all statements made on information and belief are believed to be true.

Dated: 11-29-06



Brian C. Peters

9455.20

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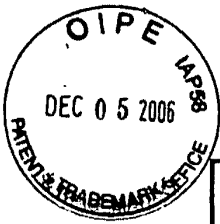
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 9455-1
In re Application of Curtis A. Ray et al		
Application Number 11/044,475		Filed 1-27-2005
For Optical Combiner Device		
Group Art Unit 2874	Examiner Wood, Kevin S.	

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

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

☐ One month (37 CFR 1.17(a)(1)) \$ _____

☒ Two months (37 CFR 1.17(a)(2)) \$ 450

☐ Three months (37 CFR 1.17(a)(3)) \$ _____

☐ Four months (37 CFR 1.17(a)(4)) \$ _____

☐ Five months (37 CFR 1.17 (a)(5)) \$ _____

☐ Applicant is a small entity under 37 CFR 1.9 and 1.27, therefore the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____

A small entity statement under 37 CFR 1.27:

☐ is enclosed.

☐ has already been filed in this application.

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

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

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 05-0420. I have enclosed a duplicate copy of this sheet.

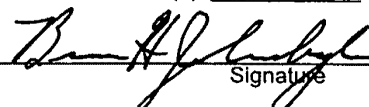
I am the ☐ assignee of record of the entire interest.

☐ applicant.

☒ attorney or agent of record.

☐ attorney or agent under 37 CFR 1.34(a).
Registration number if acting under 37 CFR 1.34(a) _____

12-5-2006
Date


Signature

Bruce H. Johnsonbaugh. #24,982
Typed or printed name

Burden Hour Statement: This form is estimated to take 0.1 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

12/07/2006 DENH001 00000094 11044475

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

PATENT APPLICATION FEE DETERMINATION RECORD						Application or Docket Number		
Substitute for Form PTO-875						111 044475		
APPLICATION AS FILED - PART I			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)			RATE (\$)	FEE (\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))							190.00	190.00
SEARCH FEE (37 CFR 1.16(k), (l), or (n))								
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))								
TOTAL CLAIMS (37 CFR 1.16(j))	9	20	X	=	OR		X	=
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	3	X	=	OR		X	=
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 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				TOTAL	790.00 pd
APPLICATION AS AMENDED - PART II								
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(j))	9	20	=	X	=	OR	X	=
Independent (37 CFR 1.16(h))	2	3	=	X	=	OR	X	=
Application Size Fee (37 CFR 1.16(s))								
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
Total (37 CFR 1.16(j))			=	X	=	OR	X	=
Independent (37 CFR 1.16(h))			=	X	=	OR	X	=
Application Size Fee (37 CFR 1.16(s))								
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
			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 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

APPROPRIATE		CLAIMS											
12/5/00		ALL FILED		AFTER 1st INTERVIEW		AFTER 2nd INTERVIEW							
NO.	DOA	NO.	DOA	NO.	DOA	NO.	DOA	NO.	DOA	NO.	DOA	NO.	DOA
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MAY BE USED FOR ADDITIONAL CLAIMS OR ADJUSTMENTS

U.S. DEPARTMENT OF COMMERCE
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FORM PTO-0022 (1-64)



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763

7590 07/05/2006
Bruce H. Johnsonbaugh
Eckhoff & Hoppe
101 Montgomery Street
Suite 2800
San Francisco, CA 94104

EXAMINER

WOOD, KEVIN S

ART UNIT PAPER NUMBER

2874

DATE MAILED: 07/05/2006

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

8

Office Action Summary	Application No.	Applicant(s)	
	11/044,475	RAY ET AL.	
	Examiner	Art Unit	
	Kevin S. Wood	2874	

-- 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 ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 04 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ 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

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7 and 9 is/are rejected.
- 7) ☒ Claim(s) 3-5,8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ 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).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ 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) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____. | 6) ☐ Other: ____. |

FINAL REJECTION

Response to Amendment

1. This action is responsive to the Amendment filed on 4 April 2006. Claims 1 and 7 have been amended. Claims 1-9 are pending in the application.

Response to Declaration

2. The Declarations filed on 4 April 2006 under 37 CFR 1.131 have been considered but is ineffective to overcome the Bhandarkar et al. reference.
3. The evidence submitted is insufficient to establish a conception of the invention prior to the effective date of the Bhandarkar et al. reference. While conception is the mental part of the inventive act, it must be capable of proof, such as by demonstrative evidence or by a complete disclosure to another. Conception is more than a vague idea of how to solve a problem. The requisite means themselves and their interaction must also be comprehended. See *Mergenthaler v. Scudder*, 1897 C.D. 724, 81 O.G. 1417 (D.C. Cir. 1897). The lab notes relied upon as evidence of conception do not appear to disclose that the plurality of lasers each had a different wavelength or that each of the collimated beams is refracted at the same angle. The applicant's do not appear to have conceived the claimed invention prior to the effective date of the Bhandarkar et al. reference.

4. The evidence submitted is insufficient to establish a reduction to practice of the invention in this country or a NAFTA or WTO member country prior to the effective date of the Bhandarkar et al. reference. None of the Declarations included a statement declaring that the acts relied upon were carried out in the United States of America or a NAFTA or WTO Member Country. Prior invention may not be established under this section in any country other than the United States, a NAFTA country, or a WTO member country.

Response to Arguments

5. Applicant's arguments filed 4 April 2006 have been fully considered but they are not persuasive. All of the applicant's arguments rely on the Declarations under 37 CFR 1.131, which the examiner has found ineffective. The applicant has failed to establish invention of the subject matter of the rejected claim prior to the effective date of the Bhandarkar et al. reference, therefore the rejections under 35 U.S.C. 102(e) as being anticipated by the Bhandarkar et al. reference are maintained. The examiner believes that the Bhandarkar et al. reference reasonably and fairly meets all the limitations of the claimed inventions within claims 1, 2, 6, 7 and 9.

Claim Rejections - 35 USC § 102

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

A person shall be entitled to a patent unless –

Art Unit: 2874

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

7. Claims 1, 2, 6, 7, and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0069013 to Bhandarkar et al.

Referring to claims 1, 2, and 6, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses an optical combiner (500) for multiplexing the outputs of a plurality of n lasers (520) wherein each of the n outputs has a different output wavelength, for transmission into and through a stopped single optical fiber, comprising: a plurality of n collimating lenses (540), the lenses being spaced apart and positioned to receive and collimate the output of the n laser output beams, and focusing means (560) for focusing the n collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having n separate radial sectors on its surface, and each of the n collimated beams passes through a separate one of the n sectors of the focusing beams and each of the n collimated beams is refracted through the same angle as it passes through the focusing means. Based on the drawings of the device, it is clear that each of the collimated light beams would pass through a different quadrant of the focusing lens (560) and the focusing lens would refract each of the collimated beams at the same angle. See Fig. 5 along with its respective portion of the specification.

Referring to claim 2, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses that the number of lasers and collimating lenses is 4, and that they are formed in two dimensional, tow by two arrays, wherein the focusing means is a single focusing lens. See Fig. 5 along with its respective portions of the specification.

Referring to claims 7 and 9, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses an optical combiner (500) for multiplexing the outputs of a plurality of lasers (520) wherein each of the outputs has a different output wavelength, for transmission into and through a stopped single optical fiber, comprising: an array of four lasers (520), formed in a two-dimensional, two by two array; an array of four collimating lenses (540), the lenses being formed in a two-dimensional, two by two array and positioned to receive and collimate the output of the laser output beams; and focusing means (560) for focusing the n collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having four separate radial sectors on its surface, and each of the four collimated beams passes through a separate one of the sectors of the focusing means and each of the collimated beams is refracted through the same angle as it passes through the focusing means. Based on the drawings of the device, it is clear that each of the collimated light beams would pass through a different quadrant of the focusing lens (560) and the focusing lens would refract each of the collimated beams at the same angle. See Fig. 5 along with its respective portion of the specification.

Allowable Subject Matter

8. Claims 3-5 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including 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:

Referring to claims 3-5 and 8, the primary reason for the allowability of these claims is the inclusion of the collimating lenses, the prism and the focusing lens are all a single, monolithic molded block. .

Conclusion

10. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S. Wood whose telephone number is (571) 272-2364. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. 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.



Kevin S. Wood
Patent Examiner

Index of Claims



Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under Reexamination

RAY ET AL.

Art Unit

2874

✓	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date					
Final	Original	6/26/06					
	1	✓					
	2	✓					
	3	O					
	4	O					
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	8	O					
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Search Notes (continued)

Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under
Reexamination

RAY ET AL.

Art Unit

2874

SEARCHED

Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Searched EAST (See Search History Printout)	6/26/2006	KSW

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	2718	(combiner or multiplexer) and (focus\$4) and (lens or prism or block) and ((plurality or multiple) near2 (region or portion or sections or sectors or faces or facet\$4))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/06/26 14:56
L6	820	(combiner or multiplexer) and (focus\$4) and (lens or prism or block) and ((plurality or multiple) near2 (region or portion or sections or sectors or faces or facet\$4)) and laser and fiber	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/06/26 14:56
S1	1	11/044475	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 11:41
S2	1096	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:54
S3	639	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets)) and (laser and fiber)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:11
S4	955	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets or region or portion)) and (laser and fiber)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:15
S5	3	("6201908" "6563976" "6760359"). PN.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:53
S6	1524	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (region or portion or sections or sectors or faces or facets))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 13:07
S7	215	385/33-37.ccls. and S6	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:55

EAST Search History

S8	1799	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) with (region or portion or sections or sectors or faces or facet\$4))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 13:08
S9	6	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) with (region or portion or sections or sectors or faces or facet\$4) with quadrant)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 14:09
S10	252	385/33-37.ccls. and (focus\$4) and (lens or prism or block) and ((plurality or multiple) near2 (region or portion or sections or sectors or faces or facet\$4))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2006/06/26 14:55
S11	23	("3827059" "4621890" "4652080" "4828357" "5048911" "5077750" "5081637" "5099358" "5148326" "5161064" "5185758" "5210643" "5333077" "5355249" "5408553" "5418880" "5559911").PN. OR ("6075912").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/10/02 14:22
S12	1	"6219476".pn. and wavelength	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 15:12



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Applicant: CURTIS A. RAY, ET AL

Serial No. 11/044,475

Filed: January 27, 2005

For: OPTICAL COMBINER DEVICE

Art Unit : 2874

Examiner : Wood, Kevin S.

April 4, 2006

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Sir:

In response to the Office action mailed October 5, 2005, please amend the above-identified application as follows:

Amendments to the Claims begin at page 2

Remarks/Arguments begins at page 4

1 **Amendments to the Claims**

2 Claim 1 (currently amended): An optical combiner usable in data communication
3 systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs
4 has a different output wavelength, for transmission into and through a stopped single optical
5 fiber, comprising:

6 a plurality of n collimating lenses, said lenses being spaced apart and positioned
7 to receive and collimate the output of said n laser output beams, said n laser output beams
8 have n different output wavelengths, and

9 focusing means for focusing said n collimated output beams onto a single spot
10 at said stopped single optical fiber, said focusing means having n separate radial sectors on
11 its surface, and each of said n collimated beams passes through a separate one of said n
12 sectors of said focusing means and each of said n collimated beams is refracted through the
13 same angle as it passes through said focusing means.

14 Claim 2 (original): The optical combiner of claim 1 wherein $n=4$ and wherein said four
15 lasers and four collimating lenses are each formed in a two-dimensional, two by two array,
16 wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-
17 shaped quadrant.

18 Claim 3 (original): The optical combiner of claim 2 wherein a prism is positioned
19 between each of said collimating lenses and said focusing lens, and wherein said collimating
20 lenses, said prism and said focusing lens are formed as a single, monolithic molded block.

21 Claim 4 (original): The optical combiner of claim 3 wherein said single monolithic block
22 has a top surface, a bottom surface, and four side surfaces, said top surface forming said
23 focusing lens, each of said four side surfaces forming one of said collimating lenses, and said
24 bottom surface being formed to include four separate prisms, each of said prisms reflecting
25 a laser output beam passing through one of said collimating lenses onto one of said quadrants
26 of said focusing lens.

1 Claim 5 (original): The optical combiner of claim 4 wherein said four lasers are
2 positioned in a circular array with their output beams directed toward the center of said array,
3 all of said output beams lying in a common plane, and said single monolithic block is
4 positioned at the center of said circular array.

5 Claim 6 (original): The optical combiner of claim 1 wherein said optical combiner does
6 not require the use of dielectric filters or waveguides.

7 Claim 7 (currently amended): An optical combiner usable in data communication
8 systems for multiplexing the outputs of a plurality of lasers wherein each of said outputs has
9 a different wavelength, for transmission into and through a stopped single optical fiber,
10 comprising:

11 an array of four lasers, formed in a two-dimensional, two by two array, each of
12 said lasers having an output beam with a different wavelength.

13 an array of four collimating lenses, said lenses being formed in a two-
14 dimensional, two by two array and positioned to receive and collimate the output of said laser
15 output beams, and

16 focusing means for focusing said collimated output beams onto a single spot at
17 said stopped single optical fiber, said focusing means having four separate radial sectors on
18 its surface, and each of said four collimated beams passes through a separate one of said
19 sectors of said focusing means and each of said collimated beams is refracted through the
20 same angle as it passes through said focusing means.

21 Claim 8 (original): The optical combiner of claim 7 wherein a prism is positioned
22 between each of said collimating lenses and said focusing lens, and wherein said collimating
23 lenses, said prism and said focusing lens are formed as a single, monolithic molded block.

24 Claim 9 (original): The optical combiner of claim 7 wherein said optical combiner does
25 not require the use of dielectric filters or waveguides.

1 **Remarks/Arguments**

2 This amendment is submitted in response to the Office action mailed October 5, 2005.
3 Applicants submit herewith a request for a three-month extension of time to and including April
4 5, 2006 by which to respond. Applicants also enclose the required three-month extension fee
5 for a small entity in the amount of \$510.

6 The undersigned notes that the subject matter of claims 3-5 and claim 8 was found to
7 be allowable.

8 Claims 1, 2, 6, 7 and 9 were rejected as being anticipated by the Bhandarkar et al
9 reference. The earliest effective date of the Bhandarkar reference is September 29, 2003, the
10 date on which a U.S. provisional application was filed. Applicants herein submit declarations
11 under 35 C.F.R. §1.131, establishing prior invention in the United States at least as early as
12 July 17, 2003, more than two months prior to September 29, 2003, the earliest effective date
13 of the Bhandarkar reference, together with due diligence between July 17, 2003 and February
14 4, 2004, the date the provisional application for the present invention was filed.

15 In addition to the declarations under 35 C.F.R. §1.131, independent claims 1 and 7 are
16 amended to clarify the distinctions over the prior art Kususawa et al reference, referred to, but
17 not relied upon, in the Office action.

18 The declarations include the declarations of Curtis A. Ray, Eric B. Grann, two of the co-
19 inventors, as well as the declaration of Bruce H. Johnsonbaugh, the undersigned attorney who
20 filed the present application.

21 The declarations filed herewith show that the invention herein was conceived on July
22 17, 2003. The concept was recorded in both Mr. Ray's and Dr. Grann's notebooks, and the
23 concept was duly witnessed by the co-inventors. The notebook drawing at the bottom of page
24 17 of Mr. Ray's notebook (Ray Ex. A, p. 4 of 6) corresponds to Fig. 1 of the present patent
25 application; and the computer generated models at page 18 of Mr. Ray's notebook (Ray Ex.
26 A, p. 5 of 6) correspond to Figs. 2 and 3 of the patent application. The sketches made at page

1 11 of Dr. Grann's notebook (Grann Ex. F, p. 4 of 6) clearly shows the concept of multiplexing
2 four separate wavelengths through different quadrants of a lens into an optical fiber. These
3 concepts are recorded and witnessed more than two months prior to the filing of the
4 Bhandarkar reference.

5 During the period from July 17, 2003 until the present application was filed on February
6 4, 2004, the co-inventors were diligently pursuing the invention. The co-inventors were
7 performing mechanical and optical modeling for the invention as shown by the declarations.
8 The co-inventors were also conducting searches of the prior art and also prepared three
9 separate drafts of an invention disclosure document to be submitted to their outside patent
10 attorney. The final disclosure was reviewed by the undersigned on Wednesday, January 28,
11 2004. The provisional application was prepared over the next few business days and filed on
12 Wednesday, February 4, 2004.

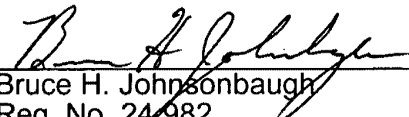
13 Based upon the showing contained herein, the undersigned submits that the enclosed
14 declarations establish conception of the invention prior to the effective date of the Bhandarkar
15 reference coupled with due diligence from the conception date of July 17, 2003 until the date
16 of the filing of the application on February 4, 2004. The undersigned therefore submits that
17 the rejection based upon the Bhandarkar reference should now be withdrawn.

18 The Kususawa et al U.S. patent 6,219,476 was referenced in the Office action but was
19 not relied upon by the Examiner. The Kususawa reference teaches a system for increasing
20 or condensing the power or intensity of a light beam for use in imaging microscopes. There
21 is no teaching or suggestion in Kususawa of multiplexing a plurality of laser output beams
22 having different wavelengths for use in data communications, as taught by the present
23 invention. In contrast to Kususawa et al, the present invention pertains to a data
24 communications multiplexer wherein multiple and different wavelength channels are combined
25 into a single fiber. Claim 1 as amended specifically requires that the n laser output beams
26 have n different output wavelengths and that the focusing means has n separate radial sectors

1 on its surface for refracting each of the separate laser output beams through the same angle
2 as it passes through the focusing means. Kususawa simply does not teach or suggest such
3 a combiner for multiplexing laser output beams for use in a data communication system.
4 Similarly, claim 7 of the present application has been amended to specifically require the
5 multiplexing of four different laser wavelengths through a focusing means where each laser
6 output beam passes through one of the four radial sectors of the focusing means. As stated
7 above, the undersigned submits that both independent claims 1 and 7 as amended are
8 patentable over Kususawa.

9 The undersigned submits that all claims are now allowable. Favorable action is
10 requested.

11
12 Respectfully submitted,

13
14 By 
15 Bruce H. Johnsonbaugh
16 Reg. No. 24,982
17 Attorney for Applicants
18

19 ECKHOFF & HOPPE
20 101 Montgomery Street, Suite 2800
21 San Francisco, CA 94104
22 Telephone: 415-391-7160
23 9455.203
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BEST AVAILABLE COPY

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
	)	
CURTIS A. RAY ET AL	)	Art Unit : 2874
	)	
Serial No. 11/044,475	)	Examiner : Wood, Kevin S.
	)	
Filed: January 27, 2005	)	February 21, 2006
	)	
For: OPTICAL COMBINER DEVICE	)	

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF CURTIS A. RAY

I, CURTIS A. RAY, hereby declare under penalty of perjury:

1. I am the first named co-inventor in the above-identified '475 patent application.
2. During the period of time from June 1, 2003 through January 31, 2004, I was employed full-time by Aduro, Inc., the owner of the above-identified '475 patent application (Aduro, Inc. has been acquired by Omron Network Products, Inc. effective January 1, 2006). During that time my job title was COO. My educational background includes BS Mechanical Engineering.
3. During all times herein in question, I maintained a laboratory notebook in which I recorded significant events on dates indicated in my notebook. Attached as Exhibit

A are true and accurate copies of pages 14-19 of my notebook.

4. As shown at page 16 of my notebook, on July 17, 2003, during a meeting with my co-inventors, Eric Grann and Brian Peters, the concept of providing an "off-set launch," as sketched on page 16 and ultimately shown in the '475 patent application, occurred to me. I promptly recorded the concept at page 16 of my notebook on July 17, 2003. The concept was read and understood by Eric Grann and Brian Peters; they both signed and dated page 16 in my presence on July 18, 2003.

5. As shown on pages 17 and 18 (the page number from page 18 being covered by the images placed on page 18), I performed initial computer modeling of the concept. The information on pages 17 and 18 was generated by me on July 17, 2003 and the subject matter of those pages were read and understood by Eric Grann and Brian Peters; they both signed and dated pages 17 and 18 in my presence on July 18, 2003. The computer generated three-dimensional models shown on page 18 were generated on July 17, 2003 and are essentially the same images that were carried forward into the '475 patent application which was filed in early 2004; those images all illustrate the optical combiner with off-set launch.

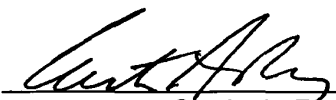
6. Between the date of concept, approximately July 17, 2003, until the final disclosure was generated on January 27, 2004, I worked together with Eric Grann and Brian Peters in updating the computer modeling of the mechanical and optical aspects of the design. Enclosed as Exhibit B is a printout highlighting the "ZEMAX Optical Design Files" for the "LX4" coupler, which is the acronym for the concept here in issue. Exhibit B indicates that revisions were being made until January 9, 2004. The intervening revisions between July 17, 2003 and January 9, 2004 were continually updated automatically by our

computerized design files and cannot be recovered at this time.

7. During the period of October 7, 2003 and October 16, 2003, I worked together with Eric Grann and Brian Peters in preparing the first draft of a "Report of Possible Subject Invention," a true and correct copy of which is attached as Exhibit C. The three of us elected to revise the invention disclosure and, during the period October 24, 2003 to November 10, 2003, we prepared a second draft, a true copy of which is attached as Exhibit D. The invention disclosure was revised a third time during January 2004 and the final invention disclosure, which was forwarded to our patent attorney, was finalized on January 27, 2004, a true copy of which is attached as Exhibit E.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issuing therefrom, declares that all statements made of his own knowledge are true and that all statements made on information and belief are believed to be true.

Dated: February 21, 2006


Curtis A. Ray

9455.20

Jack Matis

6/24/03

Violas being sold.

Of next buying Pine + doing L&Y

Enmore possibly

Moxes

2005 - \$600 target

150-200 K

Numbers

2006 \$400

300-400 K units

04 - he suggested shoulders - no solution.

Sentira - dispersion compensation

850 nm - 100 m

Fading Perot 300 m

on receive side.

Already sampling - shipping in a couple months.

Does it work with centered defect. DMD?

Triformix

Stefan

7/9/03

Customer not signed up -

Going through co-funding - done in one month.

Found 2 new customers.

or join Blaze, and get license

• 6/12/03 Walker had light heart attack / Arrhythmia

Deal closed - 30 pat. granted, 6 waiting, 4 to write.

• 2 & 6 loss vs 7-9

Also reduces RIN

Ray
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Walter is semi-retired for 1 year -
 Charles + Stefan running -
 JV + partnering only way - no funding -

- Deals - PO. for 2.5M - to Teranetics
 Teranetics subs. ext.
 former Integraph - qualified in many areas -

FMC Slicing -
 ? - input sensitivity

IEEE - Nov. meeting - 98% - required for study group

CX4 - call for interest + par same week -
 Nov. call
 Nov. P45

meeting + working doc -
 In CX4 { Tx, cable, Rx - define ... Tx + Cable spec'd ...
 - Rx requires 10^{-12}

Cable may be too idealized

Bill Hamm -
 Pierre Dawes -

May require several stressed eyes to pass

Need objective of blind adaptable - data independent

300m is really challenging + probably impossible -
 or really expensive ? -

Ray
 Ex A
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1 kHz or 10 kHz. time variant?

low pass followed by Dual Polac? filter

Retimer questions -

XUAT interface w/ Broadcom - ie

MDIO interface

- 1) timing
- 2) register assignments
- 3) functionality

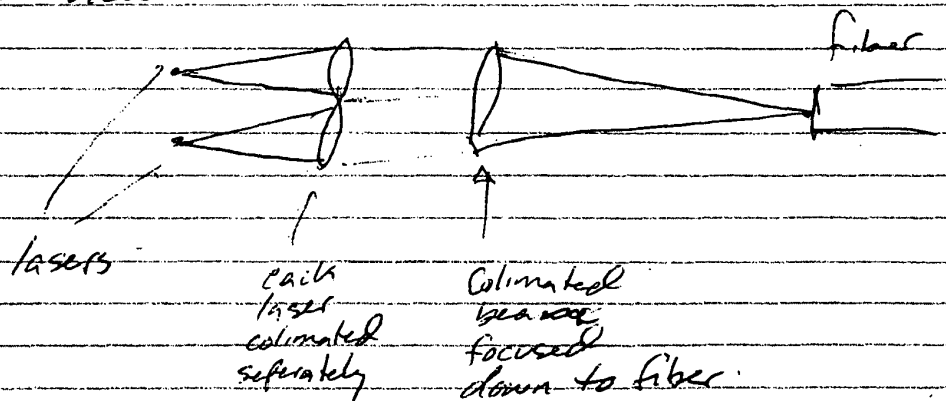
PMA/PMD

- 1) Return over T + F; pattern
- 2) Input sensitivity

7/17

Concept to make a new mux without requiring filters. May be useful to launch inner core and provide offset launch.

Side view:



7/18/03
W. J. S.

2003 SUNDAY THIS IDEA/INVENTION

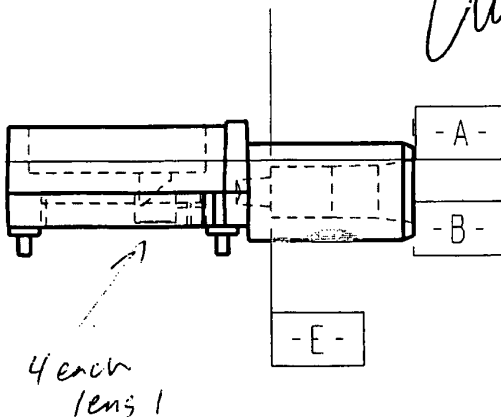
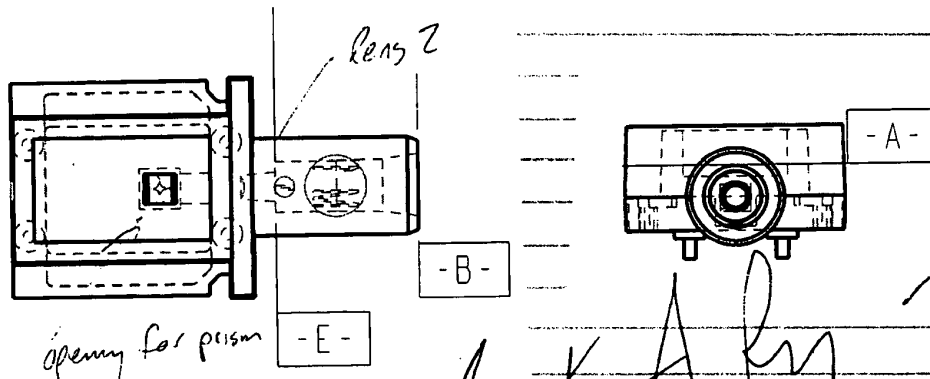
W. J. S.

7-18-03

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Ex A
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Any offset in lasers will be translated into offset on fiber and will have angular content as well. Both should help improve bandwidth of fiber.

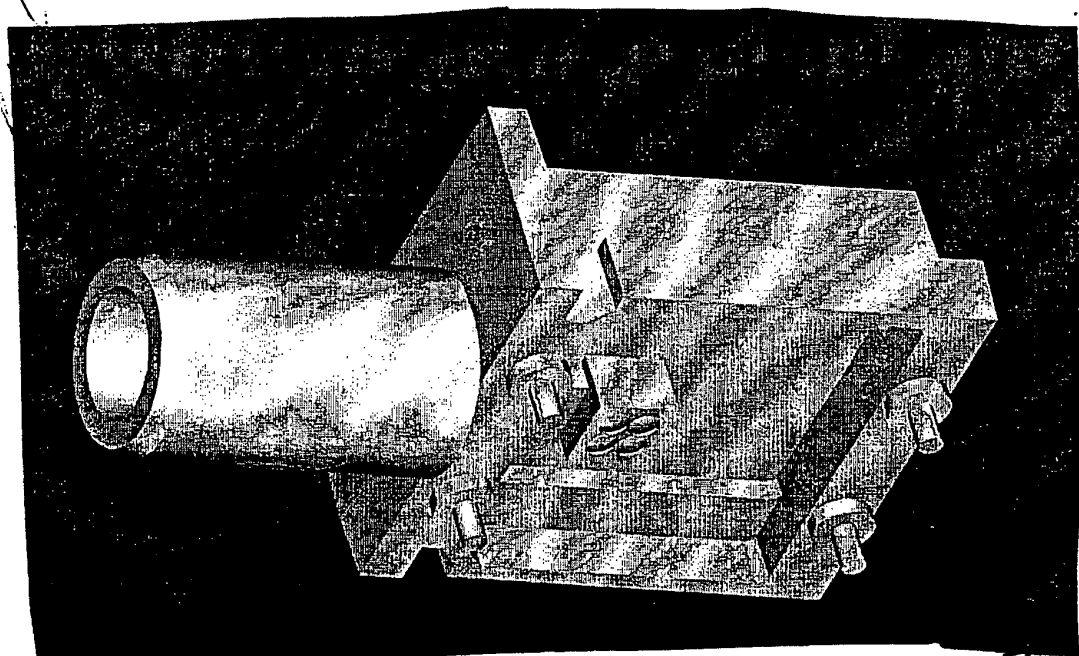
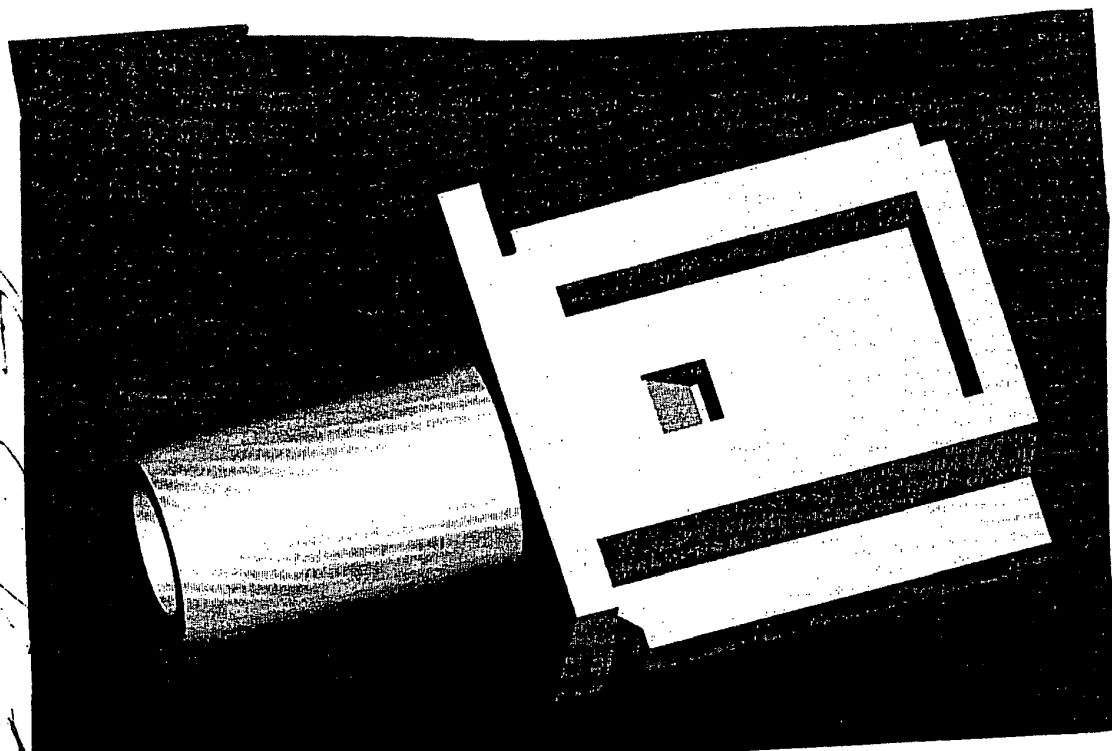
Could also be used for single mode fiber without offset
 7/17/03



7/18
 Eric F. [Signature]

7/18/03
 Eric F. [Signature]
 7-18-03

Ray
 Ex A
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Ex. 88-7/18/63

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*Ray
Ex A
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7/21 - Scintera - Abhijit Phance
Abhijit Shambhag

power

signal to noise - how overcome? -

DMD with zeros

Architecture segmentation

speed

size

Material + process - gate size

130 nm - process -

350 mW -

165 of μ sec Adaption cycle -

32 pin 5x5 mm - for XFP -

SCN 1058 - Alpha - FR4 at 10G - Beta -

3 Watts - extra - f1505, etc - - wait mark -

Aug - 1st sil - Beta - March -
pre-prod - now -

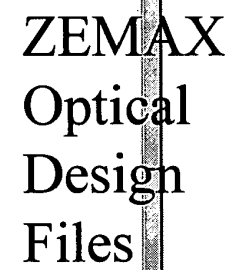
Launch conditions + receive optics -
capturing all light + eliminate modal noise

SCN 3142 - Sep 03 -

1310 Serial - ROSA TEST -- costs \$100 -

\$300 μ 40% GM -

Ray
ExA
6 of 6





2134A Rheem Drive
Pleasanton, CA 94588

REPORT OF POSSIBLE SUBJECT INVENTION

1. **SUBMITTER(s):**

Curtis A. Ray, Eric B. Grann, Brian C. Peters

2. **TITLE:**

Micro-Optical Wavelength Division Multiplexer Device with Integrated Fiber Optic Connector

3. **ABSTRACT:**

A micro-optical device for wavelength division multiplexing or optical combining is described wherein, an array of light sources are collimated, directed to propagate along a similar path, and coupled into an optical fiber. Multiple pairs of lenses for each light source spatially combine multiple-wavelengths. One lens of each pair is for each light source and one lens is for the fiber. The passively or actively aligned monolithic optical coupling module is constructed by plastic-mold injection, and contains all of the mechanical alignment features, an array of collimating lenses, and a fiber coupling lens housed within a fiber optic connector ferule.

4. **PROBLEM THE INVENTION OVERCOMES:**

Current wavelength division multiplexed (WDM) devices are designed using dielectric filters or expensive waveguides. The WDM device described herein utilizes plastic-mold injection to create a compact device capable of multiplexing multiple optical wavelengths.

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5. DETAILED DESCRIPTION OF THE INVENTION:

Background of the Invention

1. Field of the Invention

The present invention pertains to optical communications. More particularly, this invention relates to an optical multiplexing device which spatially combines multi-wavelength light from a plurality of lasers into an optical fiber. In certain preferred embodiments, the improved multiplexing device of the present invention is particularly suited for wavelength division multiplexing systems for the fiber-optic data-communications and telecommunications systems.

2. Description of the Related Art

In wavelength division multiplexed optical communication systems, many different optical wavelength carriers provide independent communication channels in a single optical fiber. Future computation and communication systems place ever-increasing demands upon communication link bandwidth. It is generally known that optical fibers offer much higher bandwidth than conventional coaxial communications; furthermore a single optical channel in a fiber waveguide uses a small fraction of the available bandwidth of the fiber (typically a few GHz out of several tens of THz). By transmitting several channels at different optical wavelengths into a fiber (i.e., wavelength division multiplexing, or WDM), this bandwidth may be more efficiently utilized.

An optical multiplexing device combines or separates multiple light signals with varying optical wavelengths. The optical multiplexing device has applications for both dense and course wavelength division multiplexing (DWDM & CWDM) for both multi-mode and signal-mode fiber optic data communications and telecommunications. Multiple wavelength light sources are combined into a single optical path for transmission.

Summary of the Invention

One of the key features of the present invention is to provide a compact and cost effective optical multiplexer for both single-mode or multimode fiber optic communication systems.

Another feature of the present invention is to minimize optical loss due to divergence of light between the source coupling optics and the fiber optic connector coupling optics.

Another feature of the present invention to integrate a fiber optic connector within the optical module, to passively align an optical fiber to the coupling optic.

The present invention is comprised of a plastic molded coupling module consisting of a plurality of lenses, one lens for focusing several geometrically placed collimated beams onto the fiber and one or more lenses for collimating light from lasers or fibers and a means for geometrically arranging the plurality of collimated beams for maximum coupling efficiency into the fiber.

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The plastic molded coupling module is formed by integrating an aspherical on-axis, offset collimating lens array, a redirectional mirror, a coupling lens, a fiber optic connector, and mechanical features for alignment of the optical part to either an array of light sources or an optical fiber array, all within a single part.

Brief Description of the Drawings

FIG. 1 shows a cross-section side view of the WDM optical multiplexer;

FIG. 2 shows an isometric top view of the WDM device;

FIG. 3 shows an isometric bottom view of the WDM device;

FIG. 4 shows a cross-sectional isometric side view of the WDM device;

FIG. 5 shows an isometric view of an alternative embodiment of the WDM device;

FIG. 6 shows an isometric cross-sectional view of an alternative embodiment of the WDM device;

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Fig. 1 shows a wavelength division multiplexer 1 that illustrates an embodiment of the present invention. The multiplexer 1 in this embodiment shows four input collimating lenses 2a, 2b, 2c, 2d and output focusing lens 3. Light sources are located at the focal points of the four input lenses and the light is collimated, reflected off a prism 4 and focused by the focusing lens 3 onto a spot at which a fiber is stopped 5. Pins 6 are located to aid in affixing the WDM device 1 to the light sources.

This multiplexing device has the ability to combine individual light signals into a single optical path that can be directed towards an optical fiber. Matching the NA of the larger lens 3 and the NA of the fiber inserted at the fiber stop 5, as well as the spot size of the focused beam being made smaller than the fiber core couples a maximum amount of the collimated light into the fiber. Similarly, by arranging four (in this embodiment) collimating lenses 2a, 2b, 2c, 2d of a size small enough to fit inside the diameter of the focusing beam, and matching their NA to the light sources, the maximum amount of light will couple into the collimated beam. Figure five and six show an alternative embodiment which does not include a prism and is shown able to mate to a standard "TO" style can for chip packaging.

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U. S. Patent 5,583,683 (Dec. 10, 1996)	Michael A. Scobey
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U. S. Patent 5,894,535 (Apr. 13, 1999)	Brian E. Lemoff
U. S. Patent x,xxx,xxx (XXX. XX, 19xx)	Eric Grann

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the references listed in Item number 6

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Replication procedures are extremely fast, thus reducing the overall cost of the manufactured device.

2) Passive Alignment.

All of the optical components within the multiplexer could utilize passive alignment mechanisms.

3) Monolithic Coupling Optics

Each optical coupling and redirection component is integrated within a single monolithic plastic-molded device.

4) Cost Reduction

Fewer parts are required such as filters and reflector blocks

5) Offset Launch

Spots may be focused on a section of the fiber which is offset from the center of the fiber, thus creating an offset launch condition, which is known by those skilled in the art to produce a better condition for resisting modal partition noise.

8. POSSIBLE ALTERNATIVE VERSIONS:

Potential applications:

1) Wavelength division multiplexing / demultiplexing (WDM)

2) Optical signal routing

3) Spectroscopy

4) Biological and chemical integrated optical sensors

5) Optical computing

9. PROBABLE VALUE:

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10. SUBMITTERS AND CONTRIBUTIONS: Provide the following for each contributor to the invention:

(If any submitter is not an employee of Blaze Network Products, Inc., indicate affiliation and supply a copy of the controlling contract)

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Home Address: 108 Warwick Court
Alamo, CA 94507
Citizenship: U.S.
Specific Contributions:

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Signature: Date:

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Home Address:
Citizenship:
Specific Contributions:

Notebook #: Page #: Date:
Signature: Date:

Name:
Home Address:
Citizenship:
Specific Contributions:

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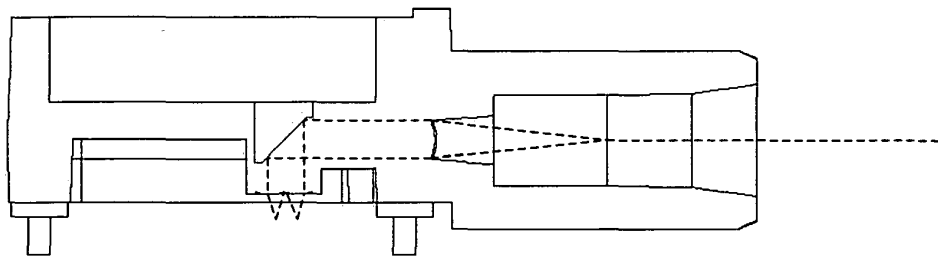


Figure 1

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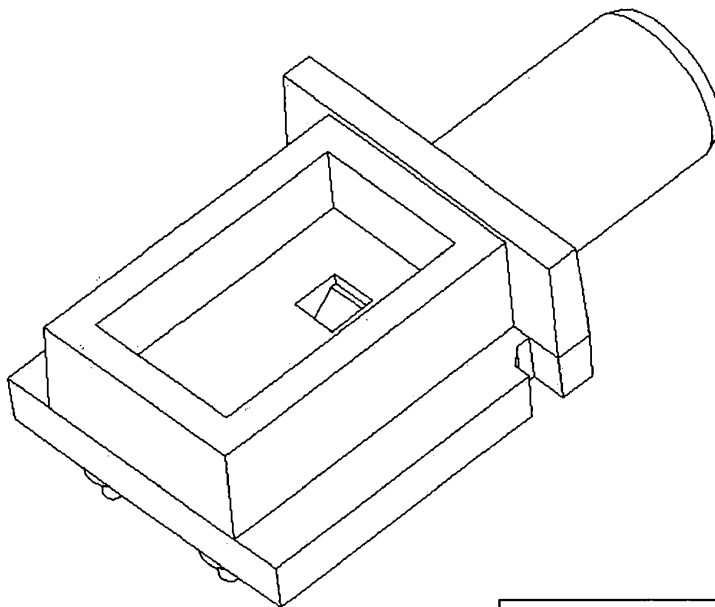


Figure 2

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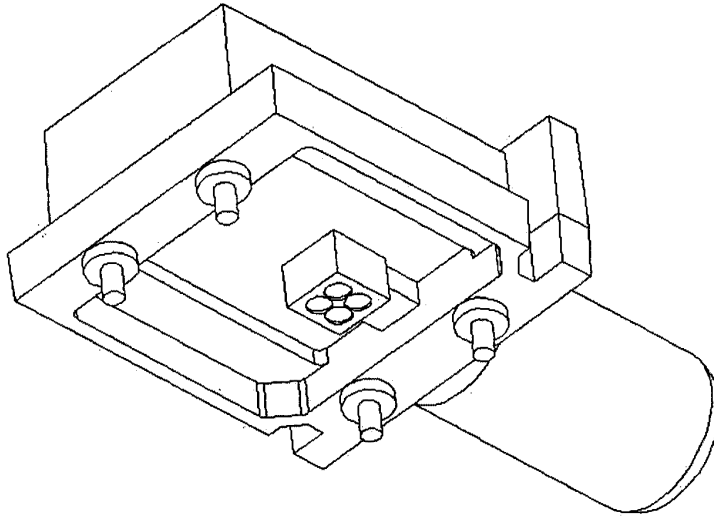


Figure 3

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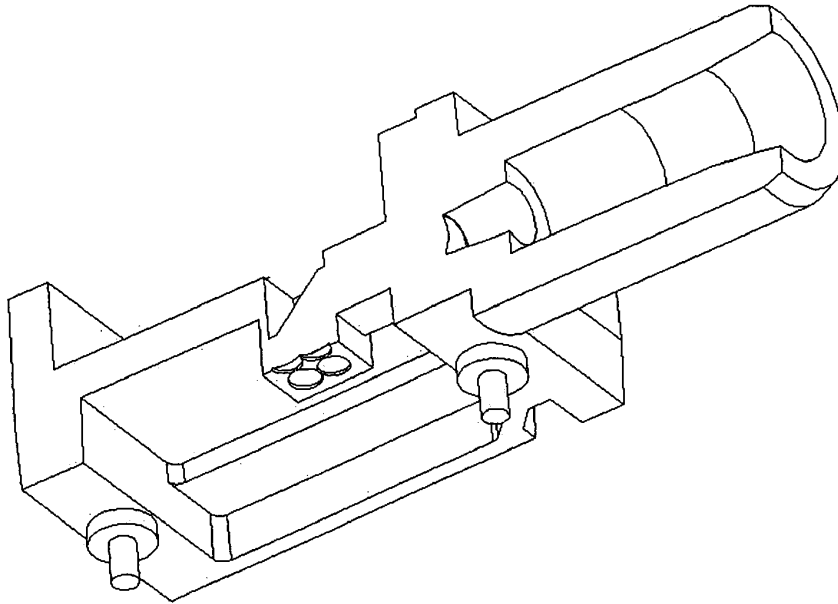


Figure 4

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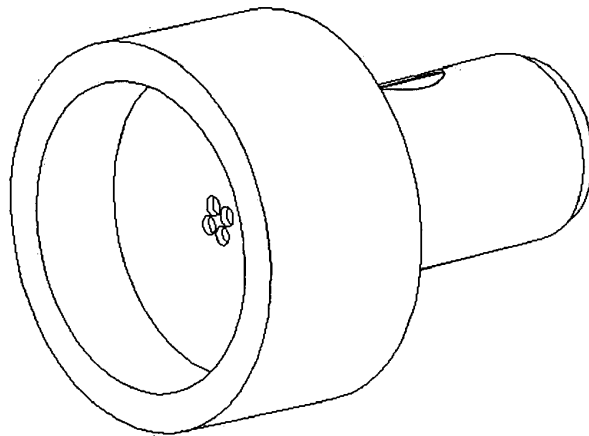
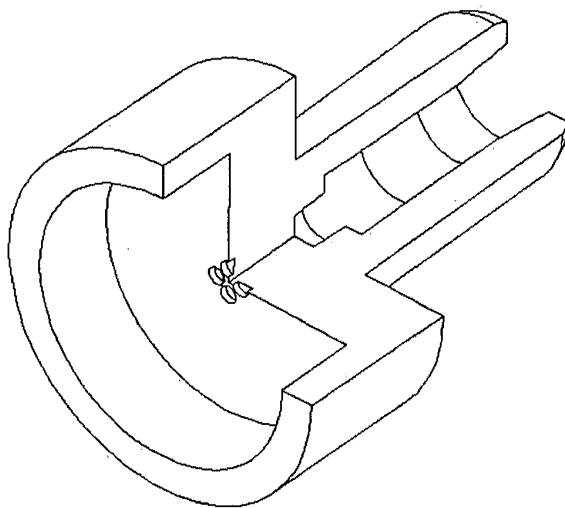


Figure 5

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2134A Rheem Drive
Pleasanton, CA 94588

REPORT OF POSSIBLE SUBJECT INVENTION

1. **SUBMITTER(s):**

Curtis A. Ray, Eric B. Grann, Brian C. Peters

2. **TITLE:**

Micro-Optical Wavelength Division Multiplexer Combiner Device with Integrated Fiber Optic Connector

3. **ABSTRACT:**

A micro-optical device for ~~wavelength division multiplexing or optical combining~~ optical signals of similar or different wavelengths is described wherein, an array of light sources are collimated, directed to propagate along a similar path, and coupled into an optical fiber through a single lens. ~~Multiple pairs of lenses for each light source spatially combine multiple wavelengths. One lens of each pair is for each light source and one lens is for the fiber. The passively or actively aligned monolithic~~ The optical coupling module is can be constructed in various ways to achieve the desired configuration. by One example is a single plastic-mold injection molded part, and containings all of the mechanical alignment features, an array of collimating lenses, and a fiber coupling lens housed within a fiber optic connector ferule.

4. **PROBLEM THE INVENTION OVERCOMES:**

Most combiner devices are used as wavelength division multiplexers. Current wavelength division multiplexed (WDM) devices are designed using dielectric filters or expensive waveguides. The combiner / WDM device described herein utilizes plastic-mold injection to create a compact device capable of multiplexing combining multiple optical wavelengthssignals into a single optical fiber. While a single molded device can be constructed to create the present invention, two or more parts can be combined to accomplish the same function, and may be necessary to achieve certain environmental conditions.

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1 of 11

5. DETAILED DESCRIPTION OF THE INVENTION:

Background of the Invention

1. Field of the Invention

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Another feature of the present invention is to minimize optical loss due to divergence of light between the source coupling optics and the fiber optic connector coupling optics.

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Another feature of the present invention to integrate a fiber optic connector within the optical module, to passively align an optical fiber to the coupling optic.

The present invention is comprised of a plastic molded coupling module consisting of a plurality of lenses, one lens for focusing several geometrically placed collimated beams onto the fiber and one or more lenses for collimating light from lasers or fibers and a means for

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Ex D
2 of 11

geometrically arranging the plurality of collimated beams for maximum coupling efficiency into the fiber.

The plastic molded coupling module is formed by integrating an aspherical on-axis, offset collimating lens array, a redirectional mirror, a coupling lens, a fiber optic connector, and mechanical features for alignment of the optical part to either an array of light sources or an optical fiber array, all within a single part.

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Search for Patents on optical combiners

U. S. Patent 4,244,045 (Jan. 6, 1981)	Kiyoshi Nosu
U. S. Patent 5,583,683 (Dec. 10, 1996)	Michael A. Scobey
U. S. Patent 5,786,915 (Jul. 28, 1998)	Michael A. Scobey
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U. S. Patent 5,894,535 (Apr. 13, 1999)	Brian E. Lemoff
U. S. Patent x,xxx,xxx (XXX. XX, 19xx)	Eric Grann

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3 of 11

7. UNIQUE FEATURES:

Itemize the features or advantages you consider unique and compare those with the references listed in Item number 6

Key Features:

1) Manufacturing throughput.

Replication procedures are extremely fast, thus reducing the overall cost of the manufactured device.

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Spots may be focused on a section of the fiber which is offset from the center of the fiber, thus creating an offset launch condition, which is known by those skilled in the art to produce a better condition for resisting modal partition noise.

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Potential applications:

- 1) Wavelength division multiplexing / demultiplexing (WDM)
- 2) Optical signal routing
- 3) Spectroscopy
- 4) Biological and chemical integrated optical sensors
- 5) Optical computing

9. PROBABLE VALUE:

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4 of 11

10. SUBMITTERS AND CONTRIBUTIONS: Provide the following for each contributor to the invention:

(If any submitter is not an employee of Blaze Network Products, Inc., indicate affiliation and supply a copy of the controlling contract)

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Home Address: 108 Warwick Court
Alamo, CA 94507
Citizenship: U.S.
Specific Contributions:

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Signature: Date:

Name:
Home Address:
Citizenship:
Specific Contributions:

Notebook #: Page #: Date:
Signature: Date:

Name:
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Notebook #: Page #: Date:
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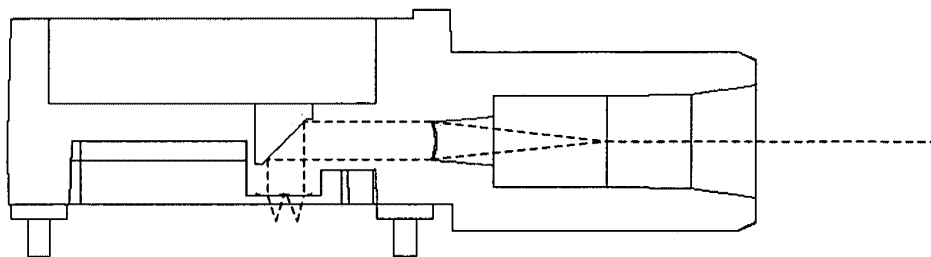


Figure 1

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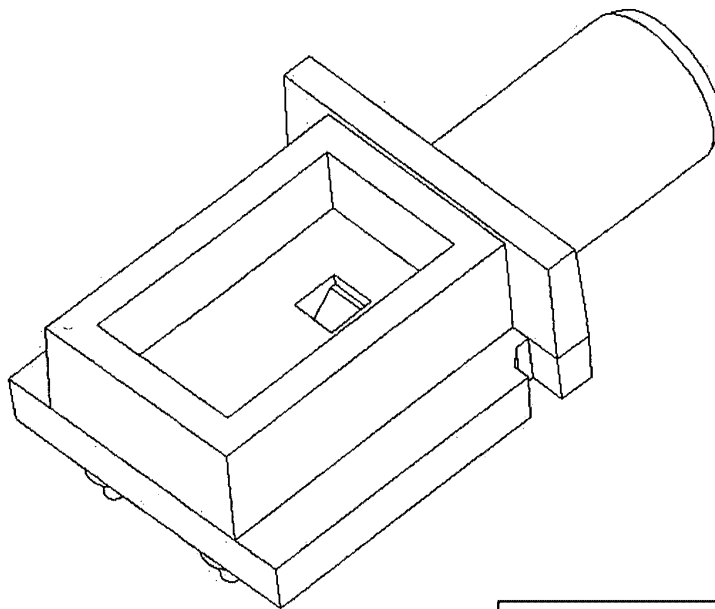


Figure 2

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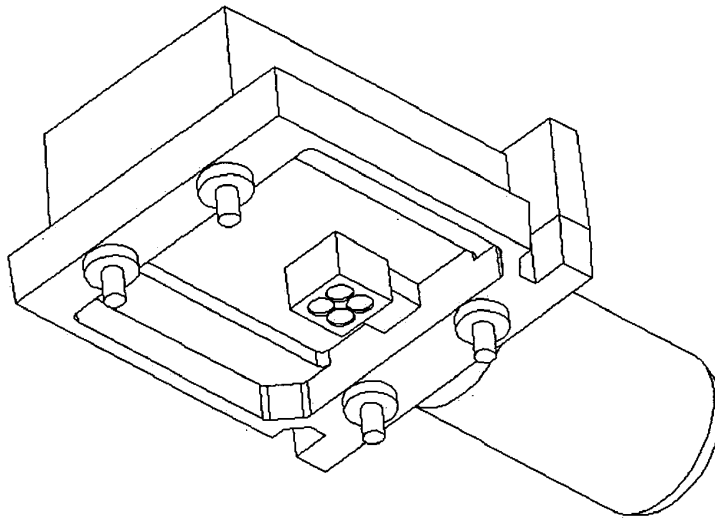


Figure 3

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8 of 11

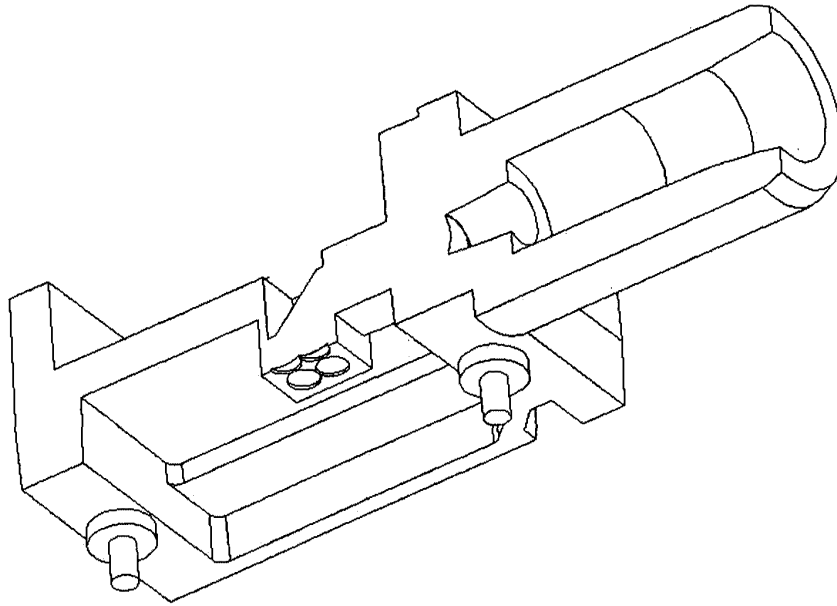


Figure 4

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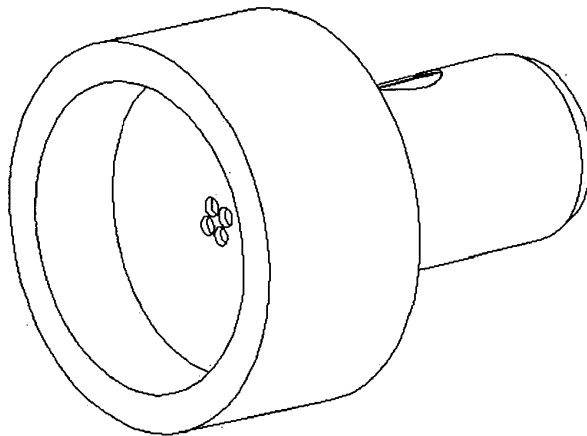
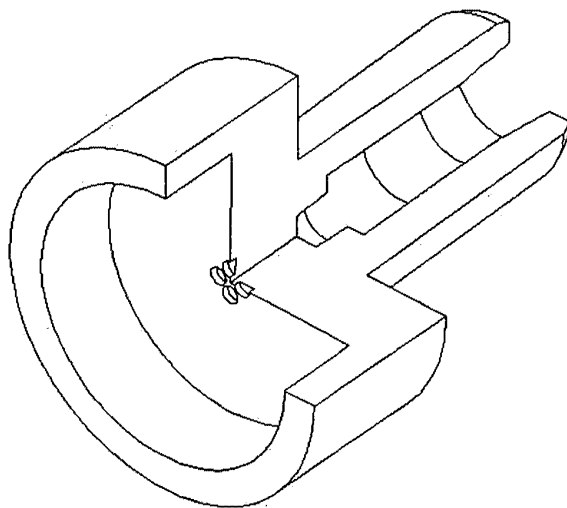


Figure 5

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2134A Rheem Drive
Pleasanton, CA 94588

REPORT OF POSSIBLE SUBJECT INVENTION

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Curtis A. Ray, Eric B. Grann, Brian C. Peters

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1 of 11

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Ex E
2 of 11

geometrically arranging the plurality of collimated beams for maximum coupling efficiency into the fiber.

The plastic molded coupling module is formed by integrating an aspherical on-axis, offset collimating lens array, a redirectional mirror, a coupling lens, a fiber optic connector, and mechanical features for alignment of the optical part to either an array of light sources or an optical fiber array, all within a single part.

Brief Description of the Drawings

FIG. 1 shows a cross-section side view of the WDM optical multiplexer;

FIG. 2 shows an isometric top view of the WDM device;

FIG. 3 shows an isometric bottom view of the WDM device;

FIG. 4 shows a cross-sectional isometric side view of the WDM device;

FIG. 5 shows an isometric view of an alternative embodiment of the WDM device;

FIG. 6 shows an isometric cross-sectional view of an alternative embodiment of the WDM device;

Detailed Description of the Invention

Figures 1 - 4 show an optical combiner **1** that illustrates an embodiment of the present invention. The combiner **1** in this embodiment shows four input collimating lenses **2a, 2b, 2c, 2d** and output focusing lens **3**. Light sources are located at the focal points of the four input lenses and the light is collimated, reflected off a prism **4** and focused by the focusing lens **3** onto a spot at which a fiber is stopped **5**. Pins **6** are located to aid in affixing the combiner device **1** to the light sources. The integrated ferrule **7** enables one to place a fiber optic cable into the pre-aligned connector.

This combiner device has the ability to combine individual light signals into a single optical path that can be directed towards an optical fiber. Matching the NA of the larger lens **3** and the NA of the fiber inserted at the fiber stop **5**, as well as the spot size of the focused beam being made smaller than the fiber core couples a maximum amount of the collimated light into the fiber. Similarly, by arranging four (in this embodiment) collimating lenses **2a, 2b, 2c, 2d** of a size small enough to fit inside the diameter of the focusing beam, and matching their NA to the light sources, the maximum amount of light will couple into the collimated beam.

Figure 5 and 6 show an alternative embodiment for combining multiple optical signals **8**, which does not include a prism for translating the optical beams from one axis to another. This particular embodiment is beneficial for mating to a standard "TO" style laser chip package. Similar to the embodiment described in figure 1-4, the embodiment shown here utilizes a two-dimensional array of lenses **9a, 9b, 9c, 9d** for collimating the input light signals, a single focusing lens **10**, and a fiber connector **11** that allows one to place a fiber optic cable into the pre-aligned connector.

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This document contains patentable subject matter and is disclosed in confidence by Aduro Inc.

Ray
E x E
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6. **RELATED ART:** List all prior art references known to you to be relevant to the novelty (newness) of the invention, and include a copy of each one

Search for Patents on optical combiners

U. S. Patent 6,369,925	(Apr. 9, 2002)	Il'ya Agurok
U. S. Patent 6,362,919	(Mar. 26, 2002)	Dale Flanders
U. S. Patent 6,219,480	(Apr. 17, 2001)	William Cassarly
U. S. Patent 6,201,908	(Mar. 13, 2001)	Eric Grann
U. S. Patent 5,852,699	(Dec. 22, 1998)	Vitaly Lissatschenko
U. S. Patent 5,751,869	(May 12, 1998)	Kenneth Li
U. S. Patent 5,377,287	(Dec. 27, 1994)	Jar Lee
U. S. Patent 4,516,832	(May 14, 1985)	Kantilal Jain
U. S. Patent 4,230,941	(Oct. 28, 1980)	Norman Stauffer

7. **UNIQUE FEATURES:** Itemize the features or advantages you consider unique and compare those with the references listed in Item number 6

Key Features:

- | | |
|--------------------------------------|--|
| 1) <u>Manufacturing throughput.</u> | Replication procedures are extremely fast, thus reducing the overall cost of the manufactured device. |
| 2) <u>Passive Alignment.</u> | All of the optical components within the multiplexer could utilize passive alignment mechanisms. |
| 3) <u>Monolithic Coupling Optics</u> | Each optical coupling and redirection component is integrated within a single monolithic plastic-molded device. |
| 4) <u>Cost Reduction</u> | Fewer parts are required such as filters and reflector blocks |
| 5) <u>Offset Launch</u> | Spots may be focused on a section of the fiber which is offset from the center of the fiber, thus creating an offset launch condition, which is known by those skilled in the art to produce a better condition for resisting modal partition noise. |

8. **POSSIBLE ALTERNATIVE VERSIONS:**

Potential applications:

- 1) Wavelength division multiplexing / demultiplexing (WDM)
- 2) Optical signal routing
- 3) Spectroscopy
- 4) Biological and chemical integrated optical sensors
- 5) Optical computing

9. **PROBABLE VALUE:**

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Ray
E x E
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10. SUBMITTERS AND CONTRIBUTIONS: Provide the following for each contributor to the invention:

(If any submitter is not an employee of Blaze Network Products, Inc., indicate affiliation and supply a copy of the controlling contract)

Name: Curtis Ray
Home Address: 108 Warwick Court
Alamo, CA 94507
Citizenship: U.S.
Specific Contributions:

Notebook #: Page #: Date:
Signature: Date:

Name: Eric Grann
Home Address: 410 Commodore Court
San Ramon, CA 94583
Citizenship: U.S.
Specific Contributions:

Notebook #: Page #: Date:
Signature: Date:

Name: Brian Peters
Home Address: 25 Via Alondra
Alamo, CA 94507
Citizenship: U.S.
Specific Contributions:

Notebook #: Page #: Date:
Signature: Date:

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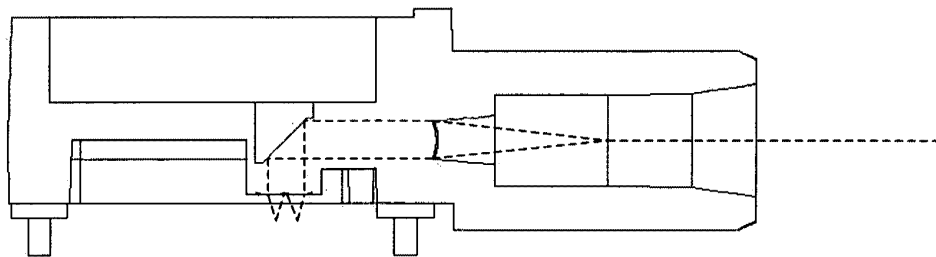


Figure 1

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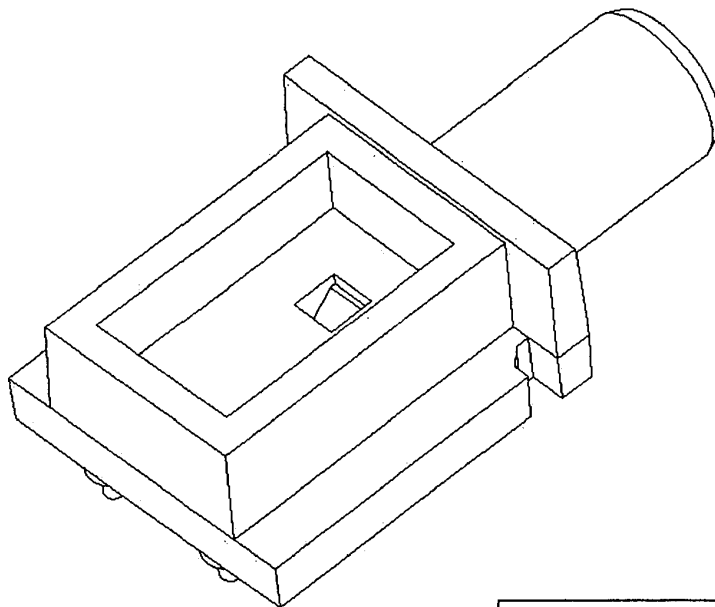


Figure 2

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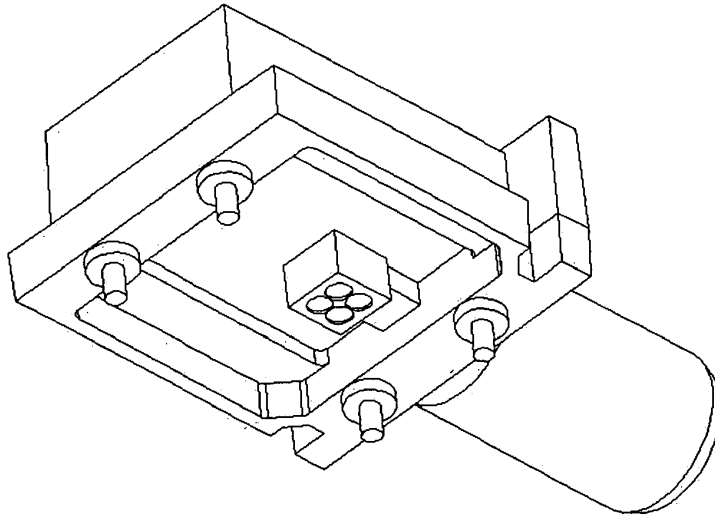


Figure 3

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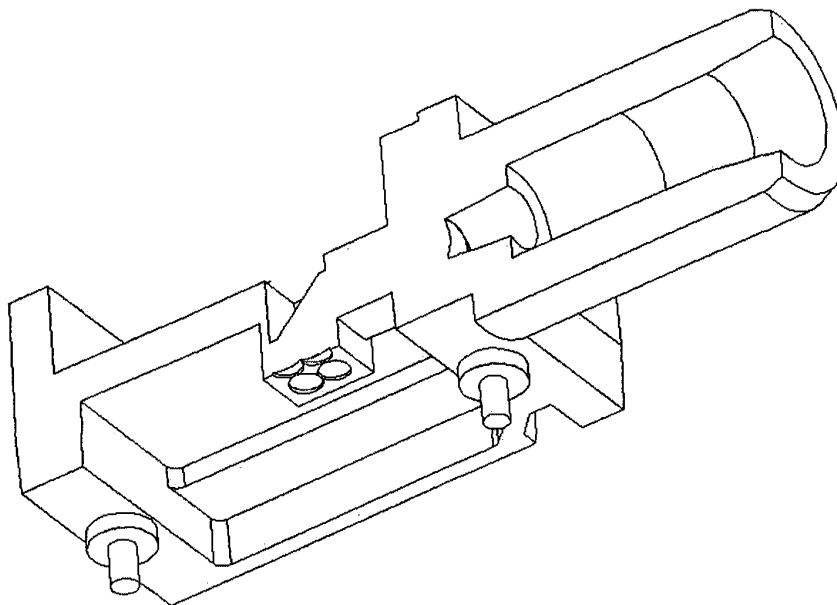


Figure 4

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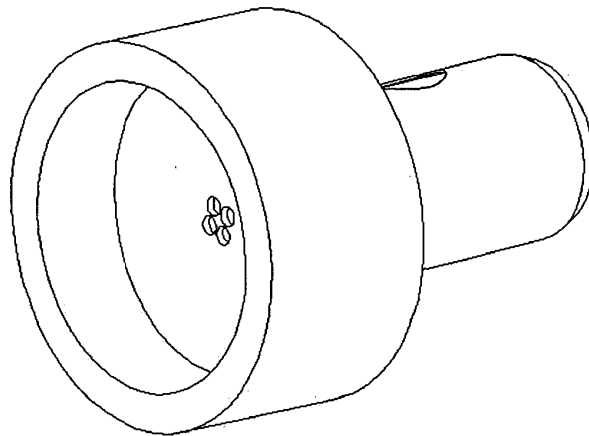
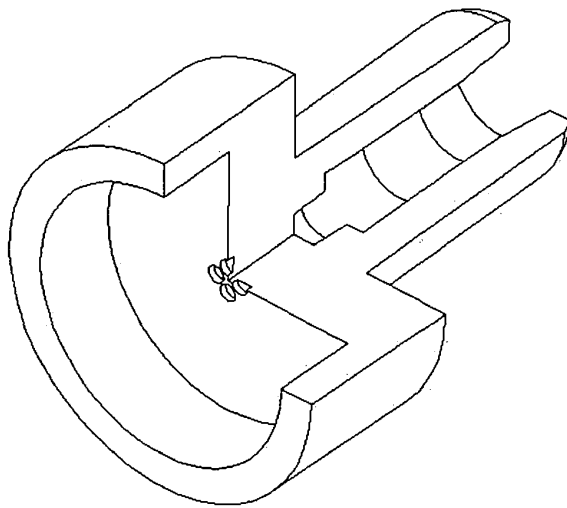


Figure 5

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)
CURTIS A. RAY ET AL) Art Unit : 2874
Serial No. 11/044,475) Examiner : Wood, Kevin S.
Filed: January 27, 2005)
For: OPTICAL COMBINER DEVICE)

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF ERIC B. GRANN

I, ERIC B. GRANN, hereby declare under penalty of perjury:

1. I am a named co-inventor in the above-identified '475 patent application.
2. During the period of time here in issue, from June 1, 2003 through January 31, 2004, I was employed full-time by Aduro, Inc., the owner of the above-identified '475 patent application (Aduro, Inc. has been acquired by Omron Network Products, Inc. effective January 1, 2006). During that time my job title was Chief Technology Officer. My educational background includes a B.S., M.S., and Ph.D. in Electrical Engineering.
3. During the period of time from June 1, 2003 through January 31, 2004, both Curtis Ray and myself worked full-time at our corporate offices in Pleasanton, California. We each maintained a laboratory notebook in which we each recorded significant events. I

have read the Declaration of Curtis A. Ray and the Exhibits to his Declaration and I am familiar with them and I know those documents are authentic, true and correct.

4. As shown at page 16 of Mr. Ray's notebook, on July 17, 2003, during a meeting with my co-inventors, Curtis Ray and Brian Peters, the concept of providing an "off-set launch," as sketched on page 16 and ultimately shown in the '475 patent application, was suggested. Mr. Ray promptly recorded the concept at page 16 of his notebook on July 17, 2003, as shown in Exhibit A attached to Mr. Ray's declaration. The concept was read and understood by myself and Brian Peters, as evidenced by our signatures that were placed on page 16 on July 18, 2003.

5. Attached to this declaration as Exhibit F are true and accurate copies of the cover and pages 9-13 of my notebook. As shown at page 11 of my notebook, on July 17, 2003, I recorded my thoughts about the "WDM coupler" that I had discussed with my co-inventors, Curtis Ray and Brian Peters, that same day. The concept shown at page 11 of my notebook is the same "off-set launch" concept, as described in Mr. Ray's notebook and carried into the patent application here involved. My notes at page 11 record the notion of using different quadrants of a lens to couple different wavelengths into an optical fiber. That concept is illustrated in each of the sketches shown at page 11. The sketch at the bottom of page 11 indicates the use of four separate wavelengths, each wavelength in a separate quadrant of a coupled lens. The top sketch shows the use of a two-dimensional laser array coupled to a lens array and then through a coupling lens to a fiber. The sketches and comments recorded at page 11 of my notebook were carried forward into the

patent application that is described above. On the lefthand side of page 11 from my notebook, the entries were read, understood and witnessed by Brian C. Peters and dated 7-17-03. Pages 10 and 12 (and all even numbered pages) of my notebook (Exhibit F) are blank as a matter of my personal preference. The notes on page 9 reference a meeting (not related to this invention) on July 9, 2003. The notes at page 13 were entered by me on July 23, 2003, and likewise do not pertain to this present invention.

6. As shown in Mr. Ray's lab notebook (Exhibit A to Mr. Ray's declaration) on pages 17 and 18 (the page number from page 18 being covered by the images placed on page 18), Mr. Ray performed initial computer modeling of the concept. The information on pages 17 and 18 was generated by Mr. Ray on July 17, 2003 and the subject matter of those pages was read and understood by myself and Brian Peters on July 18, 2003. The computer generated three-dimensional models shown on page 18 were generated on July 17, 2003 and are essentially the same images that were carried forward into the '475 patent application which was filed in early 2004; those images all illustrate the optical combiner with off-set launch.

7. Shortly after July 17, 2003, I began performing the optical modeling necessary to determine how well the concept would perform. Attached to my declaration as Exhibit G is a computer screen printout showing one iteration of the optical modeling. The software I used continuously updates the model and earlier variations of the modeling are not retrievable. I performed approximately 8 separate iterations in the optical modeling project.

8. I also personally performed a prior art search in August and September of 2003. I worked with Curtis Ray during the period from October 7, 2003 through October 16, 2003 to prepare the first draft "Report of Possible Subject Invention," attached to Mr. Ray's declaration as Exhibit C. I also interacted with Brian Peters, the CEO of Aduro, Inc., regarding possible end uses of the invention and potential variations of design. The three of us discussed the prior art located and what we felt were the unique and novel aspects of the invention.

9. Mr. Ray, Mr. Peters and I discussed the first draft "Report of Possible Subject Invention" (Ray Exhibit C) and Mr. Ray and I prepared a second draft (Ray Exhibit D) during the period from October 24, 2003 to November 10, 2003. During the preparation of the second draft, Mr. Ray and I realized that the invention would minimize reflections back to the same focal position from which they were emitted. This aspect of the invention was added to the second draft.

10. Prior to forwarding the "Report of Possible Subject Invention" to our patent attorney, Mr. Ray and I updated our prior art search during the period from November 10, 2003 through approximately January 15, 2004. We prepared a third and final draft "Report of Possible Subject Invention" (Ray Exhibit E), which included the additional prior art Mr. Ray and I had located and discussed.

11. The final draft (Ray Exhibit E) was forwarded to our patent attorney, Bruce H. Johnsonbaugh, on January 27, 2004. The provisional application was filed by Mr. Johnsonbaugh on February 4, 2004.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issuing therefrom, declares that all statements made of his own knowledge are true and that all statements made on information and belief are believed to be true.

Dated: 3/30/2006


Eric B. Grann

9455.202

Eric Grann

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7/9/03



Meeting w/ Teralux

- Network Elements - Transceiver Vendor (Oregon)
- Raj → Need more funding

- Adfran Huntsville, Alabama

- Teranetics → Contact Manufacturer in Huntsville

- ADC communications

- announcement w/ Verizon FTTP

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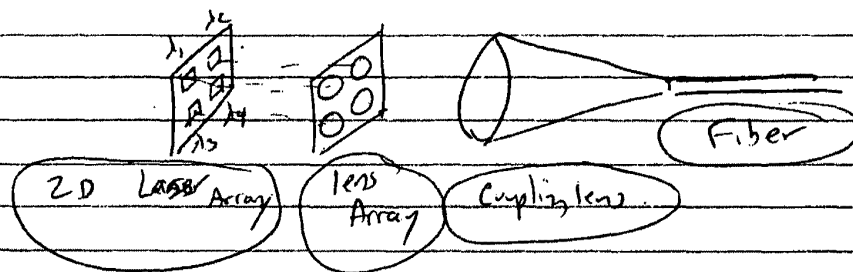
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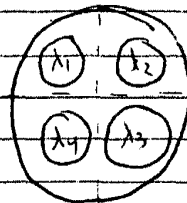
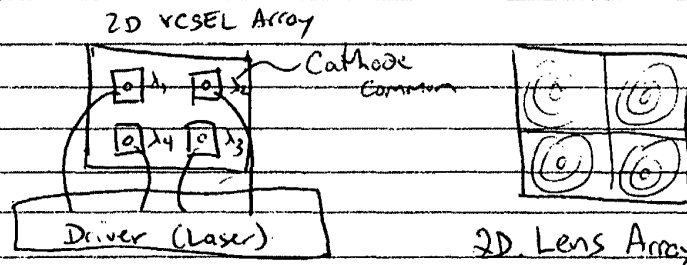
7/17/03

Concept: WDM coupler

Use different quadrants of a lens to
couple into an optical fiber.



For MMF coupling, one also has the added benefit of creating a donut intensity pattern in the launch which significantly reduces the DMO within the fiber, resulting in extended distance performance.



Collimated image plane
before coupling lens

Group
Ex F
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Sub D

12

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7/23/03

Sunters

350mw

3x distance

32 pin chip

→ Backplane chip
→ Octal

→ FP TOSA
Detector ROSA \$100

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Grann
Ex F
6 of 6



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

3 In re application of

4 CURTIS A. RAY ET AL

5 Serial No. 11/044,475

6 Filed: January 27, 2005

7 For: OPTICAL COMBINER DEVICE

Art Unit : 2874

Examiner : Wood, Kevin S.

8
9 Mail Stop Amendment (FEE)
10 Commissioner for Patents
11 P.O. Box 1450
Alexandria, VA 22313-1450

12 DECLARATION OF BRUCE H. JOHNSONBAUGH

13
14 I, BRUCE H. JOHNSONBAUGH, hereby declare under penalty of perjury:

15 1. I am a registered patent attorney and the attorney of record in the above-
16 identified U.S. patent application.

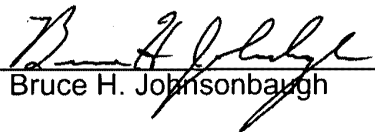
17 2. During the relevant times in issue, from June 1, 2003 through mid-February,
18 2004, I was and still am the outside patent attorney for Aduro, Inc. (Aduro, Inc. has been
19 acquired by Omron Network Products, Inc. effective January 1, 2006).

20 3. On January 28, 2004, I received a "Report of Possible Subject Invention" form
21 from Aduro, Inc. entitled "Micro-Optical Combiner Device." A true copy of that disclosure is
22 attached to the Declaration of Curtis Ray as Exhibit E. I reviewed the disclosure on January
23 28, 2004 and discussed it briefly with Eric Grann on the telephone. I attended to other
24 pressing legal matters on January 29 and 30, 2004. I was out of town for a preplanned three-
25 day weekend from Saturday, January 31, 2004 through Monday, February 2, 2004. I prepared
26 the provisional application that became Serial No. 60/541,573 on February 3, 2004,

1 transmitted it to the client for approval and filed the provisional application by Express Mail on
2 Wednesday, February 4, 2004.

3 The undersigned, being hereby warned that willful false statements and the like so
4 made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the
5 United States Code, and that such willful false statements and the like may jeopardize the
6 validity of the application or any patent issuing therefrom, declares that all statements made
7 of his own knowledge are true and that all statements made on information and belief are
8 believed to be true.

9
10 Dated: April 4, 2006


Bruce H. Johnsonbaugh

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04-06-06

Fwd 8

PTO/SB/22 (12-97)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 9455-1
In re Application of Curtis A. Ray, et al		
Application Number 11/044,475		Filed 1-27-2005
For Optical Combiner Device		
Group Art Unit 2874	Examiner Wood, Kevin S.	

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

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

☐	One month (37 CFR 1.17(a)(1))	\$ _____
☐	Two months (37 CFR 1.17(a)(2))	\$ _____
☒	Three months (37 CFR 1.17(a)(3))	\$ 1,020
☐	Four months (37 CFR 1.17(a)(4))	\$ _____
☐	Five months (37 CFR 1.17(a)(5))	\$ _____

☒ Applicant is a small entity under 37 CFR 1.9 and 1.27, therefore the fee amount shown above is reduced by one-half, and the resulting fee is: \$ 510.

A small entity statement under 37 CFR 1.27:

☐ is enclosed.

☒ has already been filed in this application.

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

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

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 05-0420. I have enclosed a duplicate copy of this sheet.

I am the ☐ assignee of record of the entire interest.

☐ applicant.

☒ attorney or agent of record.

☐ attorney or agent under 37 CFR 1.34(a).
Registration number if acting under 37 CFR 1.34(a) _____

April 4, 2006
Date

Signature

Bruce H. Johnsonbaugh #24,982
Typed or printed name

Burden Hour Statement: This form is estimated to take 0.1 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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CHANGE OF CORRESPONDENCE ADDRESS Application

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Assistant Commissioner for Patents
Washington, D.C. 20231

Application Number	11/044,475
Filing Date	1-27-2005
First Named Inventor	Curtis A. Ray
Group Art Unit	2874
Examiner Name	Wood, Kevin S.
Attorney Docket Number	9455-1

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☒ Firm or Individual Name	Bruce H. Johnsonbaugh				
Address	Eckhoff & Hoppe				
Address	101 Montgomery Street, Suite 2800				
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- ☐ Assignee of record of the entire interest.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).
- ☒ Attorney or Agent of record.
- ☐ Registered practitioner named in the application transmittal letter in an application without an executed oath or declaration. See 37 CFR 1.33(a)(1). Registration Number _____

Typed or Printed
Name

Bruce H. Johnsonbaugh

Signature

Bruce H. Johnsonbaugh

Date

April 4, 2006

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

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Date of Deposit: Tuesday, April 4, 2006

I hereby certify that this Responsive Amendment, relating to patent application Serial No. 11/044,475 filed January 27, 2005 entitled OPTICAL COMBINER DEVICE, due in the Patent and Trademark Office on January 5, 2006, together with a Declaration of Curtis A. Ray with Exhibits A through E, Declaration of Eric B. Grann with Exhibits F and G, and Declaration of Bruce H. Johnsonbaugh, a three-month Petition for Extension of Time to and including April 5, 2006, small entity extension fee of \$510 and Change of Correspondence Address, is being deposited with the United States Postal Service "Express Mail" under 37 C.F.R. § 1.10 on the date indicated above in an envelope addressed to:

Mail Stop Amendment (FEE)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dated this 4th day of April, 2006.

Respectfully submitted,

By Bruce H. Johnsonbaugh 4/4/06
Bruce H. Johnsonbaugh
Reg. No. 24,982
Attorney for applicants

ECKHOFF & HOPPE
101 Montgomery Street, Suite 2800
San Francisco, CA 94104
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Other, description:

AF/D

Doc Code: Artifact Artifact Type Code: Z

March 8, 2004

PATENT APPLICATION FEE DETERMINATION RECORD
Effective December 8, 2004

11/04/05

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	9	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	9 minus 20 =	*
INDEPENDENT CLAIMS	2 minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	* 2	Minus ** 20	=
Independent	* 2	Minus *** 3	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

SMALL ENTITY TYPE ☐

OR OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	150.00
X\$ 25=	/
X100=	/
+180=	/
TOTAL	150

RATE	FEE
BASIC FEE	300.00
X\$50=	
X200=	
+360=	
TOTAL	

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus **	=
Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus **	=
Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. 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 number found in the appropriate box in column 1.

4/4/00		CLAIMS		7/7/04 4475	
AS FILED		AFTER 1st INTERVIEW		AFTER 2nd INTERVIEW	
NO.	DOX	NO.	DOX	NO.	DOX
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TOTAL NO.	2				
TOTAL DOX	7				
TOTAL CLAIMS	9				

MAY BE USED FOR ADDITIONAL CLAIMS OR ADJUSTMENTS

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/044,475	01/27/2005	Curtis A. Ray	9455-1	8763
7590 10/05/2005			EXAMINER	
Bruce H. Johnsonbaugh Eckhoff & Hoppe 333 Sacramento Street San Francisco, CA 94111			WOOD, KEVIN S	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 10/05/2005

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

H.A

Office Action Summary	Application No. 11/044,475	Applicant(s) RAY ET AL.	
	Examiner Kevin S. Wood	Art Unit 2874	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ 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

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7 and 9 is/are rejected.
- 7) ☒ Claim(s) 3-5,8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 January 2005 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).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).
- a) ☐ All b) ☐ Some * c) ☐ None of:
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) | 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) ☐ Other: ____. |

NON-FINAL REJECTION

Claim Rejections - 35 USC § 102

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

A person shall be entitled to a patent unless –

(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.

2. Claims 1, 2, 6, 7, and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0069013 to Bhandarkar et al.

Referring to claims 1, 2, and 6, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses an optical combiner (500) for multiplexing the outputs of a plurality of n lasers (520) wherein each of the n outputs has a different output wavelength, for transmission into and through a stopped single optical fiber, comprising: a plurality of n collimating lenses (540), the lenses being spaced apart and positioned to receive and collimate the output of the n laser output beams, and focusing means (560) for focusing the n collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having n separate radial sectors on its surface, and each of the n collimated beams passes through a separate one of the n sectors of the focusing beams and each of the n collimated beams is refracted through the same angle as it passes through the focusing

means. Based on the drawings of the device, it is clear that each of the collimated light beams would pass through a different quadrant of the focusing lens (560) and the focusing lens would refract each of the collimated beams at the same angle. See Fig. 5 along with its respective portion of the specification.

Referring to claim 2, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses that the number of lasers and collimating lenses is 4, and that they are formed in two dimensional, tow by two arrays, wherein the focusing means is a single focusing lens. See Fig. 5 along with its respective portions of the specification.

Referring to claims 7 and 9, the Bhandarkar et al. reference discloses all the limitations of the claimed invention. The Bhandarkar et al. reference discloses an optical combiner (500) for multiplexing the outputs of a plurality of lasers (520) wherein each of the outputs has a different output wavelength, for transmission into and through a stopped single optical fiber, comprising: an array of four lasers (520), formed in a two-dimensional, two by two array; an array of four collimating lenses (540), the lenses being formed in a two-dimensional, two by two array and positioned to receive and collimate the output of the laser output beams; and focusing means (560) for focusing the n collimated output beams onto a single spot at the stopped single optical fiber, the focusing means having four separate radial sectors on its surface, and each of the four collimated beams passes through a separate one of the sectors of the focusing means and each of the collimated beams is refracted through the same angle as it passes through the focusing means. Based on the drawings of the device, it is clear that each

of the collimated light beams would pass through a different quadrant of the focusing lens (560) and the focusing lens would refract each of the collimated beams at the same angle. See Fig. 5 along with its respective portion of the specification.

Allowable Subject Matter

3. Claims 3-5 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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

Referring to claims 3-5 and 8, the primary reason for the allowability of these claims is the inclusion of the collimating lenses, the prism and the focusing lens are all a single, monolithic molded block.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,219,476 to Kususawa et al.

This reference discloses a combiner similar to that of the claimed invention, where prisms (10,11) are placed between the collimating lenses (8a,8b,8c,8d) and the single focusing lens (9).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S. Wood whose telephone number is (571) 272-2364. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. 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).



Kevin S. Wood
Patent Examiner

Notice of References Cited	Application/Control No. 11/044,475	Applicant(s)/Patent Under Reexamination RAY ET AL.	
	Examiner Kevin S. Wood	Art Unit 2874	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-2005/0069013	03-2005	Bhandarkar et al.	372/102
	B	US-6,219,476	04-2001	Kususawa et al.	385/33
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	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.

Index of Claims



Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under Reexamination

RAY ET AL.

Art Unit

2874

√	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim	Date
Final	Original
1	√
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4	O
5	O
6	√
7	√
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Search Notes

Application/Control No.

11/044,475

Examiner

Kevin S. Wood

Applicant(s)/Patent under
Reexamination

RAY ET AL.

Art Unit

2874

SEARCHED

Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED

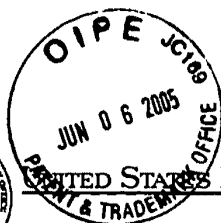
Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Searched EAST (USPAT,US-PGPUBS, JPO,EPO) See Search History Printout	10/2/2005	KSW
385/33-37 (Text search only) See Search History Printout	10/2/2005	KSW

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	11/044475	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 11:41
L2	1096	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:54
L3	639	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets)) and (laser and fiber)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:11
L5	955	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (sections or sectors or faces or facets or region or portion)) and (laser and fiber)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:15
L6	3	("6201908" "6563976" "6760359"). PN.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:53
L8	1524	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) near10 (region or portion or sections or sectors or faces or facets))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 13:07
L9	215	385/33-37.ccls. and L8	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 12:55
L10	1799	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) with (region or portion or sections or sectors or faces or facet\$4))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 13:08
L12	6	(combiner or multiplexer) and (collimat\$4 near8 lens) and (focus\$4) and ((lens or prism or block) with (region or portion or sections or sectors or faces or facet\$4) with quadrant)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 14:09
L13	252	385/33-37.ccls. and (focus\$4) and (lens or prism or block) and ((plurality or multiple) near2 (region or portion or sections or sectors or faces or facet\$4))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2005/10/02 14:11

L14	23	("3827059" "4621890" "4652080" "4828357" "5048911" "5077750" "5081637" "5099358" "5148326" "5161064" "5185758" "5210643" "5333077" "5355249" "5408553" "5418880" "5559911").PN. OR ("6075912").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/10/02 14:22
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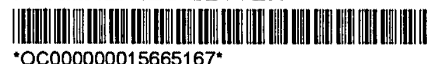
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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/044,475	01/27/2005	Curtis A. Ray	9455-1

CONFIRMATION NO. 8763

Bruce H. Johnsonbaugh
Eckhoff & Hoppe
333 Sacramento Street
San Francisco, CA 94111

FORMALITIES LETTER



OC000000015665167

Date Mailed: 04/07/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$105** for a Small Entity

- The application search fee has not been paid. Applicant must submit **\$250** to complete the search fee.

(A previous payment of **\$145** will be applied to the additional fees indicated above.)

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

06/07/2005 WABDELRI 00000013 11044475

01 FC:2111

250.00 OP

A copy of this notice **MUST** be returned with the reply.

Office of Initial Patent Examination (703) 308-1202

PART 2 - COPY TO BE RETURNED WITH RESPONSE

Adjustment date: 06/07/2005 WABDELRI
04/06/2005 AB01TON 00000019 11044475
-145.00 OP
02 FC:2622



THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

CURTIS A. RAY ET AL

Serial No. 11/044,475

Filed: January 27, 2005

For: OPTICAL COMBINER DEVICE

Art Unit : 2633

June 3, 2005

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

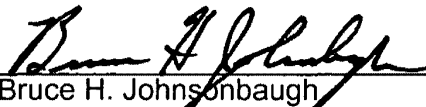
RESPONSE TO NOTICE TO FILE
MISSING PARTS OF NONPROVISIONAL APPLICATION

Sir:

Applicants hereby transmit the application search fee in the amount of \$105 for a small entity. A copy of the notice to file missing parts is also transmitted herewith.

Respectfully submitted,

By


Bruce H. Johnsonbaugh
Reg. No. 24,982
Attorney for Applicants

ECKHOFF & HOPPE
333 Sacramento Street
San Francisco, CA 94111
Telephone: 415-391-7160
9455.missing

**I hereby certify that this correspondence is
being deposited with the United States Postal
Service as first class mail in an envelope
addressed to: Mail Stop Missing Parts**

**Commissioner for Patents,
P.O. Box 1450, Alexandria, VA 22313-1450,
June 3, 2005**

Reg. No. 24,982 of Eckhoff & Hoppe


Signature
6/3/2005
Date



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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/044,475	01/27/2005	Curtis A. Ray	9455-1

CONFIRMATION NO. 8763

FORMALITIES LETTER



OC000000015665167

Bruce H. Johnsonbaugh
 Eckhoff & Hoppe
 333 Sacramento Street
 San Francisco, CA 94111

Date Mailed: 04/07/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

*Filing Date Granted***Items Required To Avoid Abandonment:**

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Replies should be mailed to: Mail Stop Missing Parts
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*A copy of this notice **MUST** be returned with the reply.*

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 Office of Initial Patent Examination (703) 308-1202

PART 3 - OFFICE COPY

04772 U.S. PTO
012705

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ECKHOFF & HOPPE
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SAN FRANCISCO, CALIFORNIA 94111
TELEPHONE (415) 391-7160
FACSIMILE (415) 391-7161
EMAIL eckhoffhoppe@hotmail.com

January 27, 2005

112975 U.S. PTO
11/044475
012705

File 9455-1

EXPRESS MAIL

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: Patent Application based on
Prov. Appln. Serial No. 60/541,573
Filed: February 4, 2004
Applicants: Curtis A. Ray et al
For: OPTICAL COMBINER DEVICE

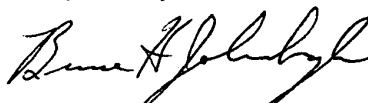
Sir:

Pursuant to 37 C.F.R. § 1.10, the undersigned hereby certifies that the following is being deposited as "Express Mail" with the United States Postal Service on January 27, 2005, as addressed above, and requests that the above-entitled patent application be accorded a filing date of January 27, 2005. The "Express Mail" mailing number is ER 822247365 US. The items transmitted herewith include:

1. Patent specification (7 pages) with 9 claims and abstract;
2. Executed Declaration for Utility or Design Patent Application;
3. Eleven sheets of drawings; and
4. Small entity filing fee of \$395.00 .

The undersigned represents that the applicants and the assignee are small entities and qualify for small entity fees. If additional fees are required, please charge our deposit account No. 05-0420.

Respectfully,



Bruce H. Johnsonbaugh

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1 OPTICAL COMBINER DEVICE

2 Cross-Reference to Related Application

3 This application claims the benefit of and priority from United States Provisional
4 Application Serial No. 60/541,573 filed February 4, 2004.

5 Background and Brief Summary of the Invention

6 The present invention pertains to optical communications. More particularly, this
7 invention relates to an optical multiplexing device which spatially combines multi-wavelength
8 light from a plurality of lasers into an optical fiber. In certain preferred embodiments, the
9 improved multiplexing device of the present invention is particularly suited for wavelength
10 division multiplexing systems for the fiber-optic data-communications and telecommunications
11 systems.

12 In prior art wavelength division multiplexed optical communication systems, many
13 different optical wavelength carriers provide independent communication channels in a single
14 optical fiber. Future computation and communication systems place ever-increasing demands
15 upon communication link bandwidth. It is generally known that optical fibers offer much higher
16 bandwidth than conventional coaxial communications; furthermore a single optical channel in
17 a fiber waveguide uses a small fraction of the available bandwidth of the fiber (typically a few
18 GHz out of several tens of THz). By transmitting several channels at different optical
19 wavelengths into a fiber (i.e., wavelength division multiplexing, or WDM), this bandwidth may
20 be more efficiently utilized.

21 Prior art optical multiplexing devices combine or separate multiple light signals with
22 varying optical wavelengths. Such optical multiplexing devices have applications for both
23 dense and course wavelength division multiplexing (DWDM & CWDM) for both multi-mode
24 and signal-mode fiber optic data communications and telecommunications. Multiple wave-
25 length light sources are combined into a single optical path for transmission.

1 The prior art includes inherent problems overcome by the present invention. Prior art
2 wavelength division multiplexed (WDM) devices are typically designed using dielectric filters
3 requiring alignment or expensive waveguides. The combiner/WDM device described herein
4 utilizes plastic-mold injection to create a compact device capable of combining multiple optical
5 signals into a single optical fiber, and which avoids the use of dielectric filters and the use of
6 expensive waveguides. While a single molded device can be constructed to create one
7 embodiment of the present invention, two or more parts can be combined to accomplish the
8 same function, and may be necessary to achieve certain environmental conditions.

9 The prior art also includes an optical power combiner which utilizes collimators and a
10 focusing lens to concentrate multiple output beams to increase power density; see Lee et al
11 U.S. patent 5,377,287. The Lee et al device combines the outputs of, for example, 19 passive
12 optical fibers arranged concentrically together with 19 collimating lenses and a Fresnel
13 focusing lens. The Lee et al design does not achieve isolation from unwanted reflections or
14 a uniform coupling efficiency between each fiber optic input and the single output. The
15 present invention, in contrast, uses a separate radial sector of the focusing lens to focus each
16 separate laser output. Each laser output beam of the present invention therefore has the
17 same degree of refraction as it passes through the focusing lens; this feature simultaneously
18 creates a uniform coupling efficiency (as shown below) and prevents unwanted reflections
19 back through the optical pathway to the input lasers. Furthermore, the Lee et al combiner
20 does not multiplex n different wavelength channels, as does the present invention. Therefore,
21 for the above reasons, the Lee et al combiner simply is not effective for communication
22 purposes, which is the primary purpose of the present invention.

23 The present invention provides, for the first time, an inexpensive, injection molded, one
24 piece optical combiner capable of combining, separately collimating and focusing the output
25 of multiple lasers into a single optical fiber with a uniform, high coupling efficiency. The
26 invention includes optional passive alignment pins molded into the combiner. An optional two

1 piece combiner is also provided for use in certain environments. For example, the invention
2 in one embodiment combines the output of four lasers arranged in a two dimensional, two by
3 two array into a single fiber.

4 One of the key objects of the present invention is to provide a compact and cost
5 effective optical combiner for both single-mode or multimode fiber optic communication
6 systems, all without requiring the use of dielectric filters and the alignment necessitated by
7 those filters or expensive waveguides.

8 Another object of the present invention is to minimize optical loss due to divergence of
9 light between the source coupling optics and the fiber optic connector coupling optics.

10 Another object of the present invention is to minimize reflections directly back to the
11 same focal position from which they were emitted.

12 A further object is to provide an optical combiner wherein a single focusing lens is
13 utilized to uniformly and efficiently combine n separate wavelength channels by passing each
14 channel through a separate radial sector of the focusing lens.

15 Another object of the present invention is to integrate a fiber optic connector within the
16 optical module, to passively align an optical fiber to the coupling optic.

17 Further objects and advantages will become apparent from the following description
18 and drawings.

19 Brief Description of the Drawings

20 Fig. 1 is a side elevational, sectional view of a combiner of the present invention;

21 Fig. 2 is an isometric top view of the combiner of Fig. 1;

22 Fig. 3 is an isometric bottom view of the combiner of Figs. 1 and 2;

23 Fig. 4 is a cross-sectional isometric side view of the combiner of Figs. 1-3;

24 Fig. 5 is an isometric view of a second embodiment of the invention;

25 Fig. 6 is an isometric cross-sectional view of the second embodiment of Fig. 5;

26 Fig. 7 is a perspective view of a third embodiment of the invention;

1 Fig. 8 is a sectional view of a portion of the third embodiment shown in Fig. 7;

2 Fig. 9 is a perspective view of the third embodiment shown in Figs. 7 and 8, wherein
3 a slice of the molded coupling optic is shown to illustrate the invention;

4 Fig. 10 is a side elevational view of a fourth embodiment of the invention; and

5 Fig. 11 is a top isometric view of the fourth embodiment shown in Fig. 10.

6 Detailed Description of the Invention

7 Figs. 1 - 4 show an optical combiner 10 that illustrates a first embodiment of the present
8 invention. The combiner 10 in this embodiment includes four spaced apart input collimating
9 lenses 21,22, 23,24 and output focusing lens 30. Lasers 11,12 are located at the focal points
10 of the input lenses and the light is collimated, reflected off a prism 40 and focused by the
11 focusing lens 30 onto a spot at which a single optical fiber (not shown) is stopped by fiber stop
12 or seat 60 formed in ferrule 80. Pins 71,72,73,74 are located to aid in affixing the combiner
13 device 10 to the support (not shown) for the lasers. The integrated ferrule 80 enables one to
14 place an output fiber optic cable into the pre-aligned connector.

15 This combiner device has the ability to combine individual light signals into an optical
16 path 90 that can be directed towards an optical fiber (not shown for clarity). Matching the NA
17 of the larger focusing lens 30 and the NA of the fiber (not shown) inserted into ferrule 80,
18 seated at the fiber stop 60, as well as the spot size 50 of the focused beam being made
19 smaller than the fiber core couples a maximum amount of the collimated light into the fiber.
20 Similarly, by arranging four (in this embodiment) collimating lenses 21,22,23,24 of a size small
21 enough to fit inside the diameter of the focusing lens 30, and matching their NA to the light
22 sources, the maximum amount of light will couple into the collimated output beam 95.

23 The first embodiment of the invention is a combiner 10 comprised of a single piece
24 plastic molded coupling module 16 consisting of four collimating lenses 21-24 and one lens
25 30 for focusing several geometrically placed collimated beams onto the output fiber (not
26 shown) and a prism 40 for reflecting the plurality of collimated beams for maximum coupling

1 efficiency into the output fiber.

2 The plastic molded coupling module 16 is formed by integrating an aspherical on-axis,
3 offset collimating lens array 21-24, a redirectional prism 40, a focusing lens 30, a fiber optic
4 ferrule 80, and mechanical pins 71-74 for alignment of the optical part 16 to an array of four
5 lasers, all within a single part 16.

6 The invention is usable with n lasers and n collimating lenses. The embodiment shown
7 in Figs. 1-4 illustrates the case of $n=4$. Furthermore, Figs. 1-4 utilize a two-dimensional, two
8 by two array of input lasers as well as collimating lenses.

9 Figs. 5 and 6 show a second embodiment of the invention 110 which does not include
10 a prism for translating the optical beams from one axis to another. This particular embodiment
11 is beneficial for mating to a standard "TO" style laser chip package. Similar to the embodiment
12 described in Figs. 1-4, the embodiment shown here utilizes a two-dimensional array of four
13 lenses 121,122,123,124 for collimating the input light signals from a two-dimensional, two by
14 two, array of lasers (not shown), a single focusing lens 130, and a fiber connector 180 that
15 allows one to place a fiber optic cable into the pre-aligned connector.

16 Figs. 7, 8 and 9 illustrate a third embodiment of the invention. The combiner is shown
17 generally as 210 and includes a circular array of four lasers 211,212,213 and 214. Each laser
18 211-214 has a different output wavelength. Each laser is mounted to a support 215. The
19 lasers 211-214 are co-planar and the output beam of each of the lasers 211-214 is directed
20 towards the center of the array. At the center of the array is a coupling optic 216 formed of
21 a single monolithic optical block. Four collimating lenses (only two of which 221 and 222 are
22 visible) are formed in the four side walls 231,232,233 and 234, respectively, of the module or
23 coupling block 216. The focusing lens 250 is formed on the top surface of the module 216.
24 The surface of focusing lens 250 is smooth and includes four pie-shaped radial quadrants
25 251-254. Each of the quadrants 251-254 transmits a separate output beam of the lasers 211-
26 214, respectively.

1 As shown best in Fig. 8, the bottom surface 240 of module 216 is recessed with four
2 separate inclined surfaces that form four separate prisms to reflect collimated light to the
3 output lens 250. In the view shown in Fig. 8, collimating lenses 222 and 224 receive the output
4 beams from lasers 212 and 214, respectively. Prisms 242 and 244 reflect the output beams
5 from collimating lenses 222 and 224 and direct those beams through separate pie-shaped
6 quadrants 252 and 254 of focusing lens 250.

7 It is significant to note that, as shown in Fig. 8, the output beams of lasers 212 and 214
8 are refracted through output lens 250 through equal angles. This is significant because the
9 beam passing through quadrant 252 will not be reflected by the stopped single fiber optic back
10 into laser 212. Rather, the laser output 212 passing through quadrant 252 will tend to be
11 reflected from the stopped fiber optic back towards quadrant 254. Since the output of laser
12 212 is of a different wavelength than the output of laser 214, that reflection that passes back
13 through quadrant 254 from laser 212 will not adversely affect the performance of laser 214,
14 since it operates at a different wavelength.

15 Fig. 9 shows a single slice of optic 216 to more clearly illustrate the interaction with the
16 module 216 with the circular array of lasers 211-214.

17 Figs. 10 and 11 illustrate a fourth embodiment of the invention. In this embodiment, the
18 combiner shown generally as 310 includes a two-piece molded module including a separately
19 molded output lens 350 and separately molded collimating lenses 321-324. The collimating
20 lenses 321-324 are preferably molded into a single but separate monolithic block of molded
21 material so that the combiner 310 includes two separate molded optics. The focusing lens
22 350 is supported in its position shown in Fig. 10 by means known to those skilled in the art
23 which are deleted in the interest of brevity. As shown in Fig. 10, an array of four lasers are
24 supported in housing 319. In the view shown in Fig. 10, only two lasers 311 and 312 are
25 visible. Their output beams are directed through collimating lenses 321 and 322 and in the
26 embodiment shown in Figs. 10 and 11 travel directly to and through focusing lens 350 without

1 being reflected by a prism. Collimating lenses 321-324 are supported by the top of housing
2 319.

3 Key Features:

4 Manufacturing throughput Replication procedures are extremely fast, thus reducing the
5 overall cost of the manufactured device.

6 Passive Alignment All of the optical components within the multiplexer could utilize
7 passive alignment mechanisms.

8 Monolithic Coupling Optics Each optical coupling and redirection component is
9 integrated within a single monolithic plastic-molded device in most embodiments.

10 Cost Reduction Fewer parts are required such as filters and reflector blocks

11 Offset Launch Spots may be focused on a section of the fiber which is offset from the
12 center of the fiber, thus creating an offset launch condition, which is known by those skilled
13 in the art to produce a better condition for resisting modal partition noise.

14 Potential Applications:

- 15 1) Wavelength division multiplexing/demultiplexing (WDM)
- 16 2) Optical signal routing
- 17 3) Spectroscopy
- 18 4) Biological and chemical integrated optical sensors
- 19 5) Optical computing

20 The foregoing description of the invention has been presented for purposes of
21 illustration and description and is not intended to be exhaustive or to limit the invention to the
22 precise form disclosed. Modifications and variations are possible in light of the above
23 teaching. The embodiments were chosen and described to best explain the principles of the
24 invention and its practical application to thereby enable others skilled in the art to best use the
25 invention in various embodiments and with various modifications suited to the particular use
26 contemplated. The scope of the invention is to be defined by the following claims.

1 WHAT IS CLAIMED IS:

2
3 1. An optical combiner for multiplexing the outputs of a plurality of n lasers wherein
4 each of said n outputs has a different output wavelength, for transmission into and through a
5 stopped single optical fiber, comprising:

6 a plurality of n collimating lenses, said lenses being spaced apart and positioned
7 to receive and collimate the output of said n laser output beams, and

8 focusing means for focusing said n collimated output beams onto a single spot
9 at said stopped single optical fiber, said focusing means having n separate radial sectors on
10 its surface, and each of said n collimated beams passes through a separate one of said n
11 sectors of said focusing means and each of said n collimated beams is refracted through the
12 same angle as it passes through said focusing means.

13
14 2. The optical combiner of claim 1 wherein $n=4$ and wherein said four lasers and
15 four collimating lenses are each formed in a two-dimensional, two by two array, wherein said
16 focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped
17 quadrant.

18
19 3. The optical combiner of claim 2 wherein a prism is positioned between each of
20 said collimating lenses and said focusing lens, and wherein said collimating lenses, said prism
21 and said focusing lens are formed as a single, monolithic molded block.

1 4. The optical combiner of claim 3 wherein said single monolithic block has a top
2 surface, a bottom surface, and four side surfaces, said top surface forming said focusing lens,
3 each of said four side surfaces forming one of said collimating lenses, and said bottom surface
4 being formed to include four separate prisms, each of said prisms reflecting a laser output
5 beam passing through one of said collimating lenses onto one of said quadrants of said
6 focusing lens.

7
8 5. The optical combiner of claim 4 wherein said four lasers are positioned in a
9 circular array with their output beams directed toward the center of said array, all of said output
10 beams lying in a common plane, and said single monolithic block is positioned at the center
11 of said circular array.

12
13 6. The optical combiner of claim 1 wherein said optical combiner does not require
14 the use of dielectric filters or waveguides.

1 7. An optical combiner for multiplexing the outputs of a plurality of lasers wherein
2 each of said outputs has a different wavelength, for transmission into and through a stopped
3 single optical fiber, comprising:

4 an array of four lasers, formed in a two-dimensional, two by two array,

5 an array of four collimating lenses, said lenses being formed in a two-
6 dimensional, two by two array and positioned to receive and collimate the output of said laser
7 output beams, and

8 focusing means for focusing said collimated output beams onto a single spot at
9 said stopped single optical fiber, said focusing means having four separate radial sectors on
10 its surface, and each of said four collimated beams passes through a separate one of said
11 sectors of said focusing means and each of said collimated beams is refracted through the
12 same angle as it passes through said focusing means.

13
14 8. The optical combiner of claim 7 wherein a prism is positioned between each of
15 said collimating lenses and said focusing lens, and wherein said collimating lenses, said prism
16 and said focusing lens are formed as a single, monolithic molded block.

17
18 9. The optical combiner of claim 7 wherein said optical combiner does not require
19 the use of dielectric filters or waveguides.

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Abstract

An optical device for combining optical signals of different wavelengths is described wherein an array of laser output beams are collimated, directed to propagate along a similar path, and coupled into an optical fiber through a single molded part. The single-part optical coupling module can be constructed in various ways to achieve the desired configuration. One example is a single plastic-injection molded part, containing mechanical alignment features, an array of collimating lenses, and a focusing lens housed within a fiber optic connector ferrule. The laser output beams are separately passed through separate radial sectors of the focusing lens.

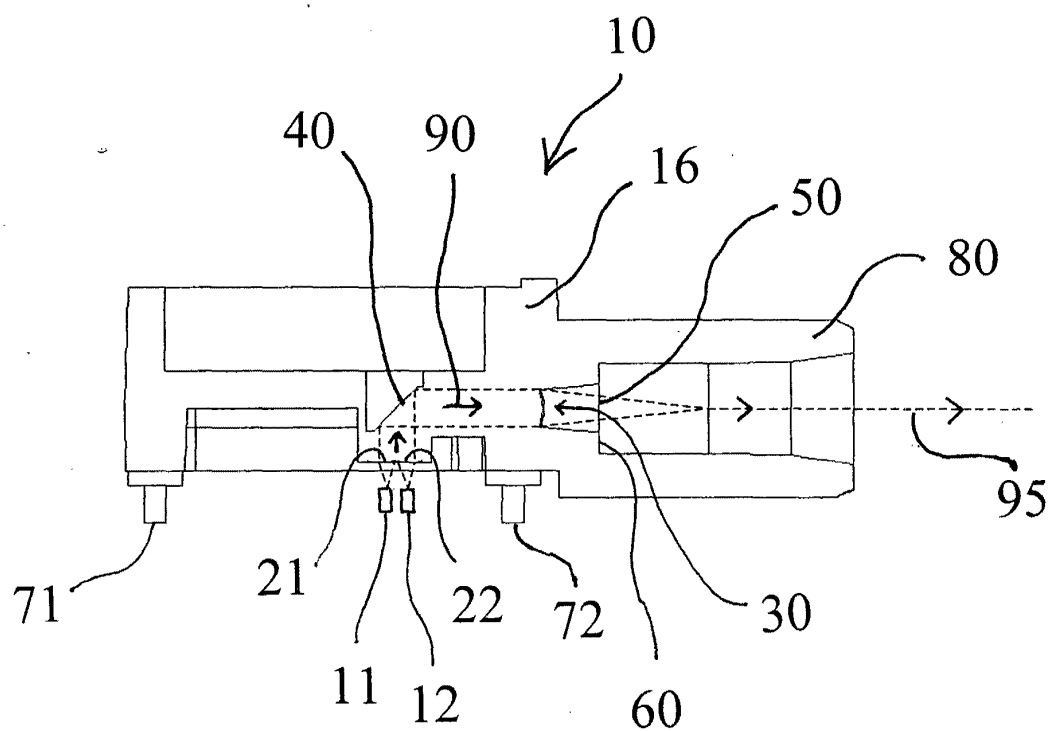


Fig. 1

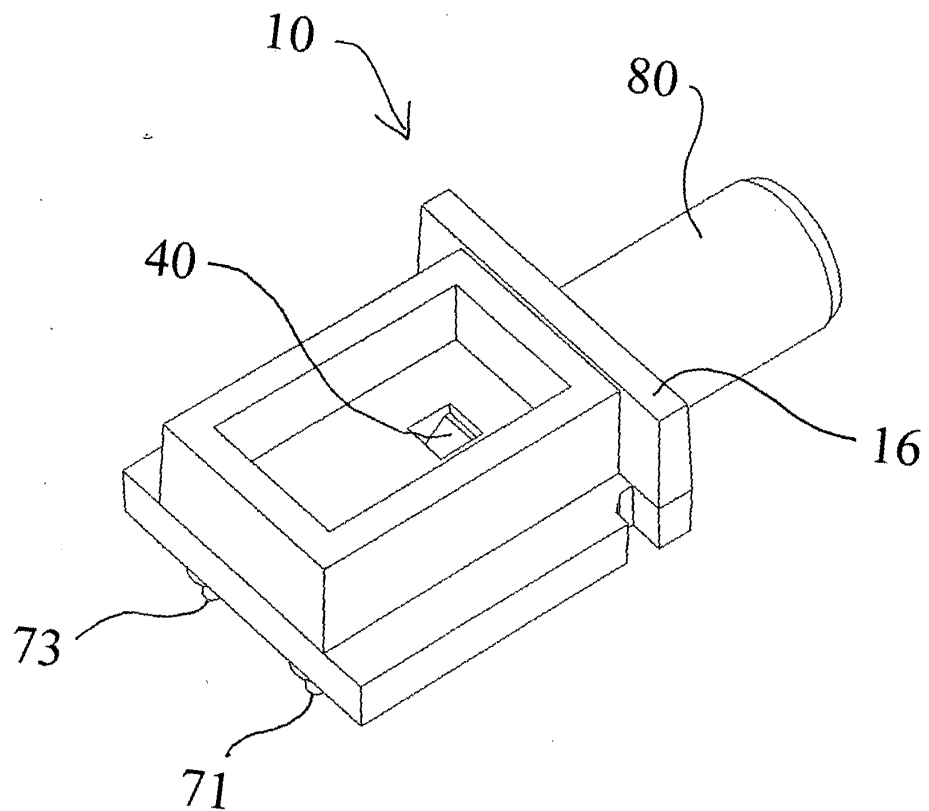


Fig. 2

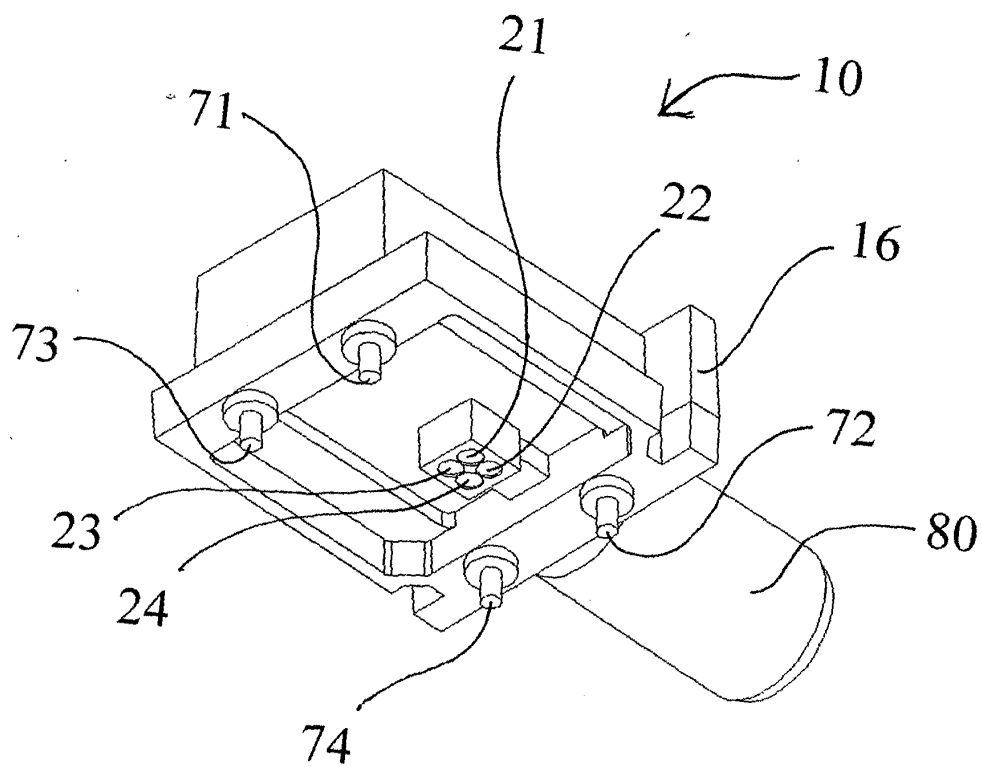


Fig. 3

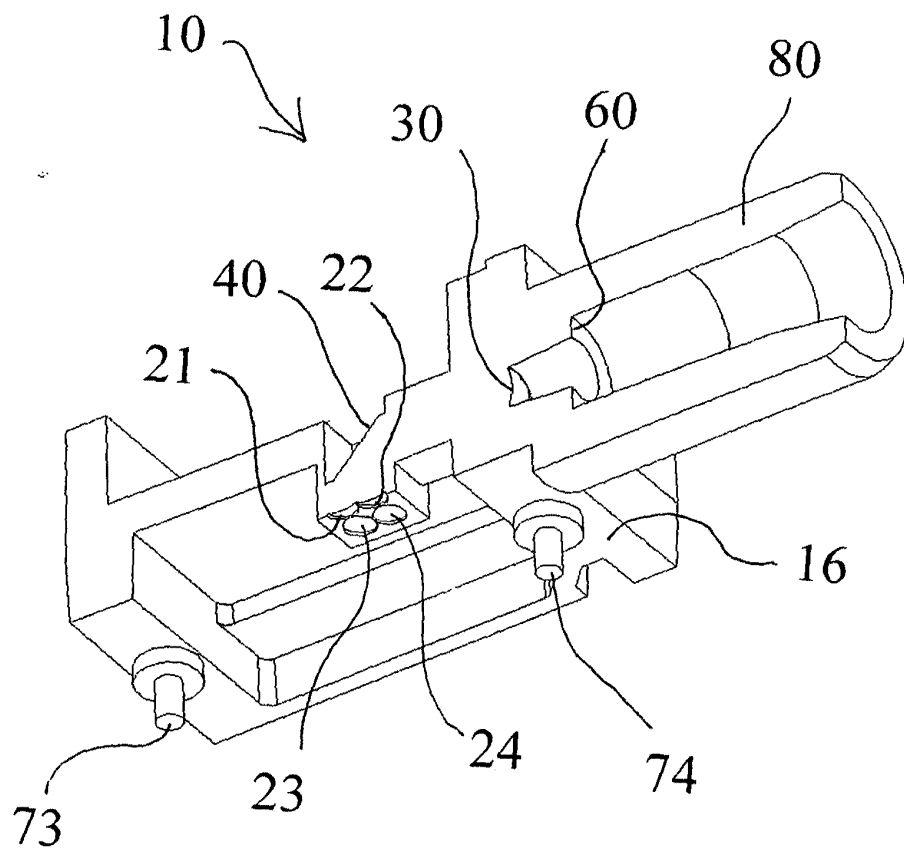


Fig. 4

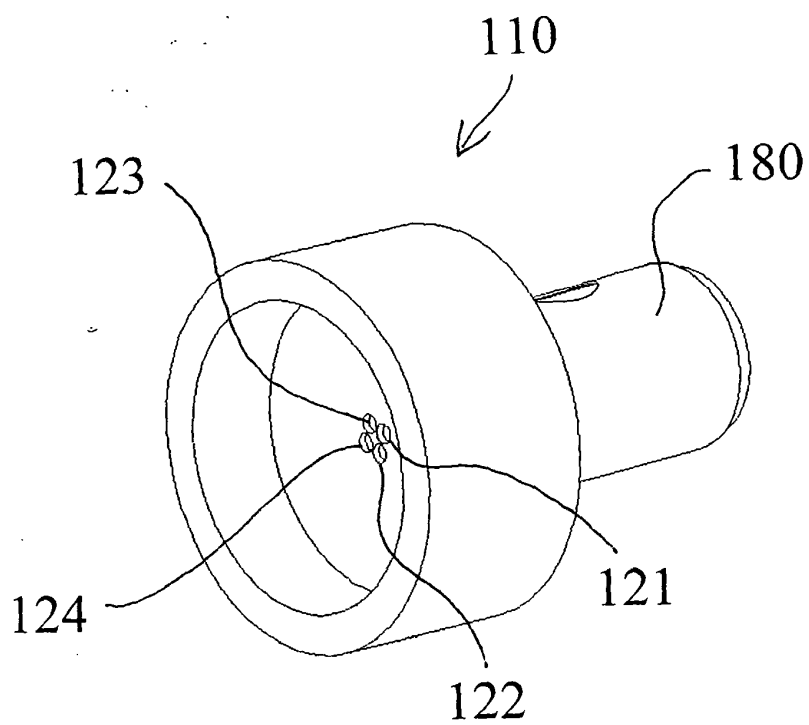


Fig. 5

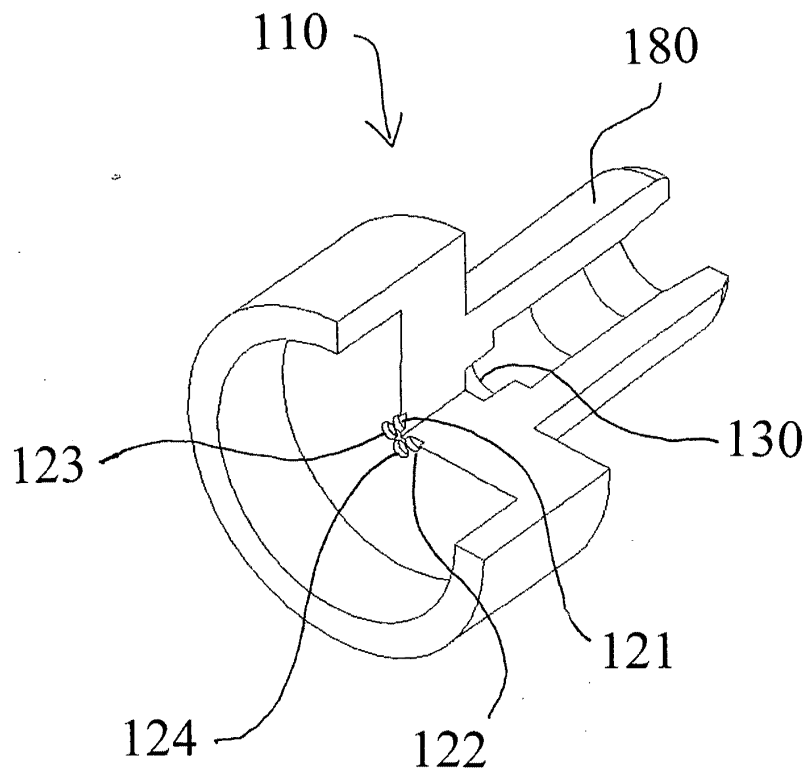
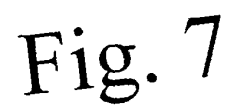


Fig. 6



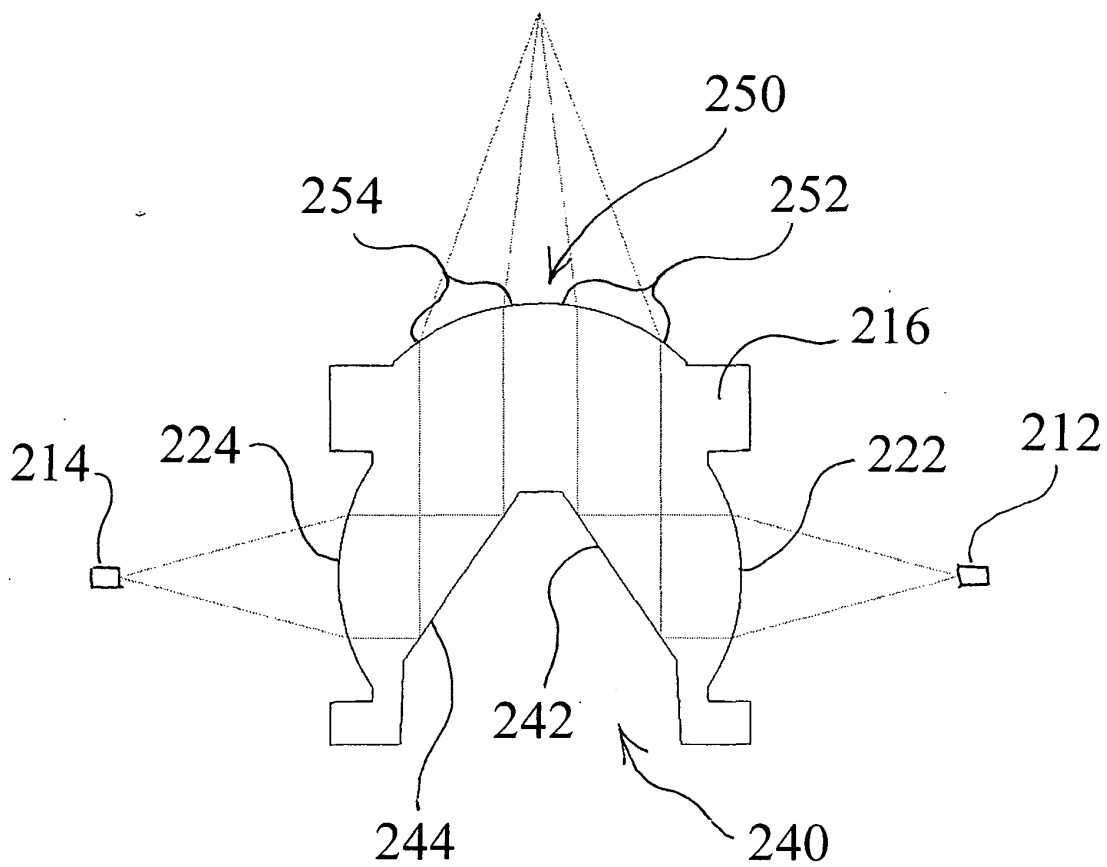


Fig. 8

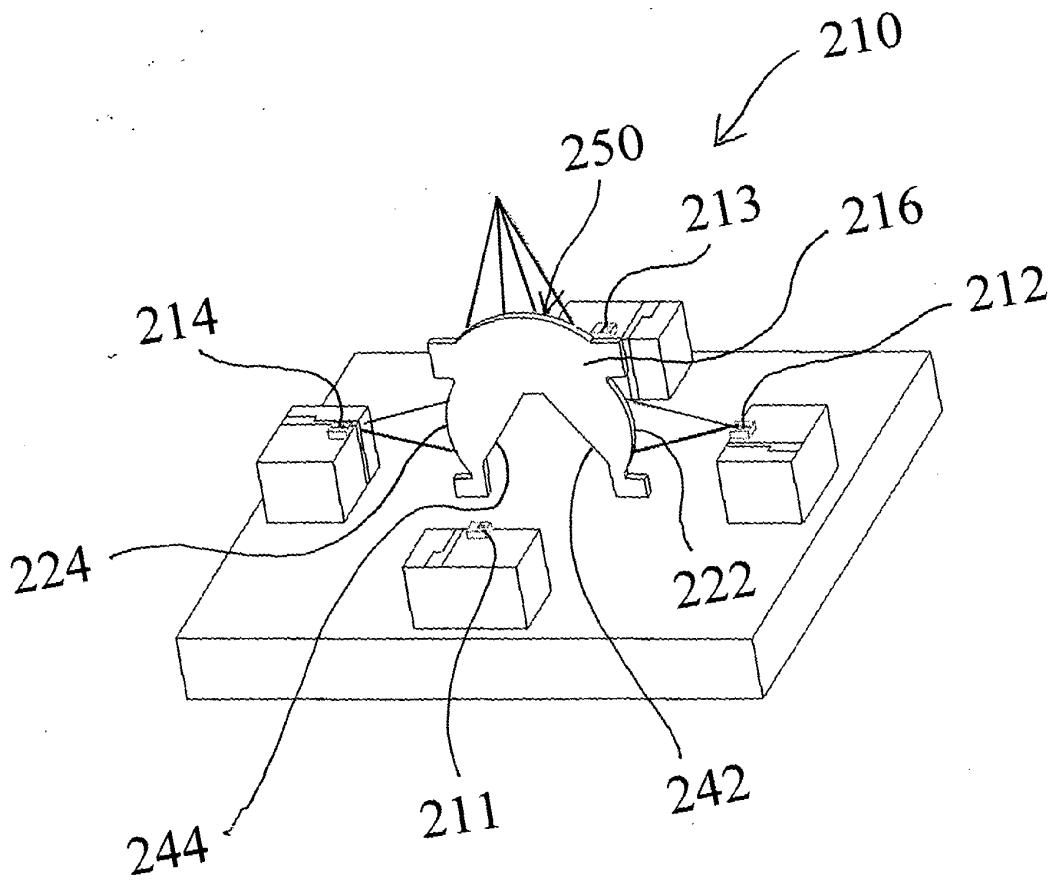


Fig. 9

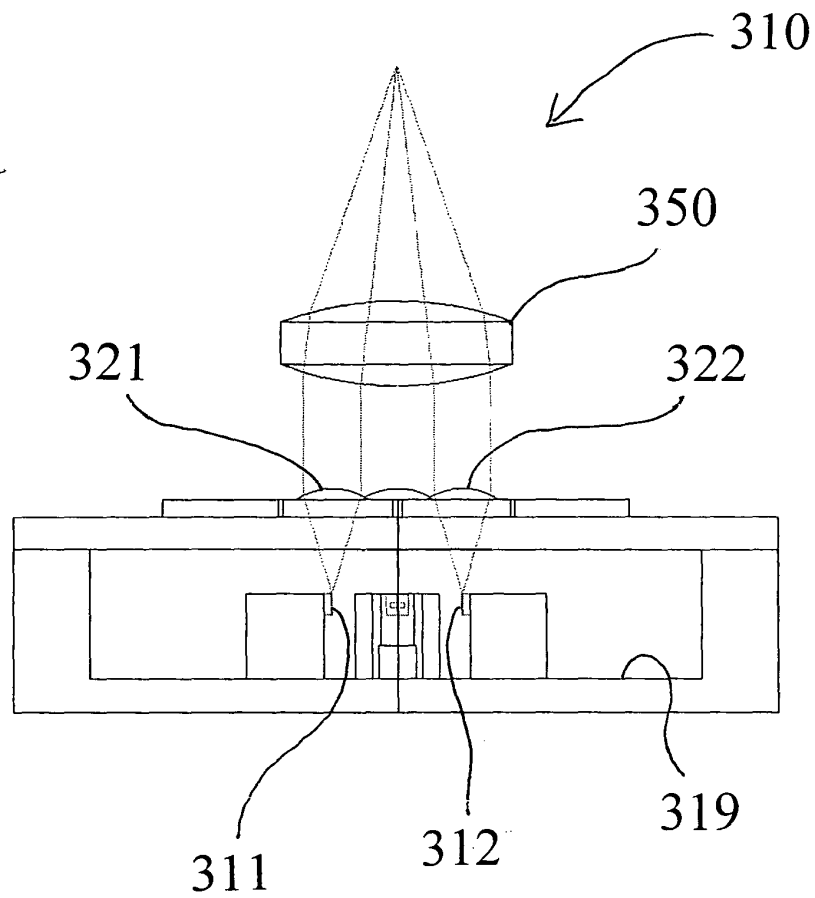


Fig. 10

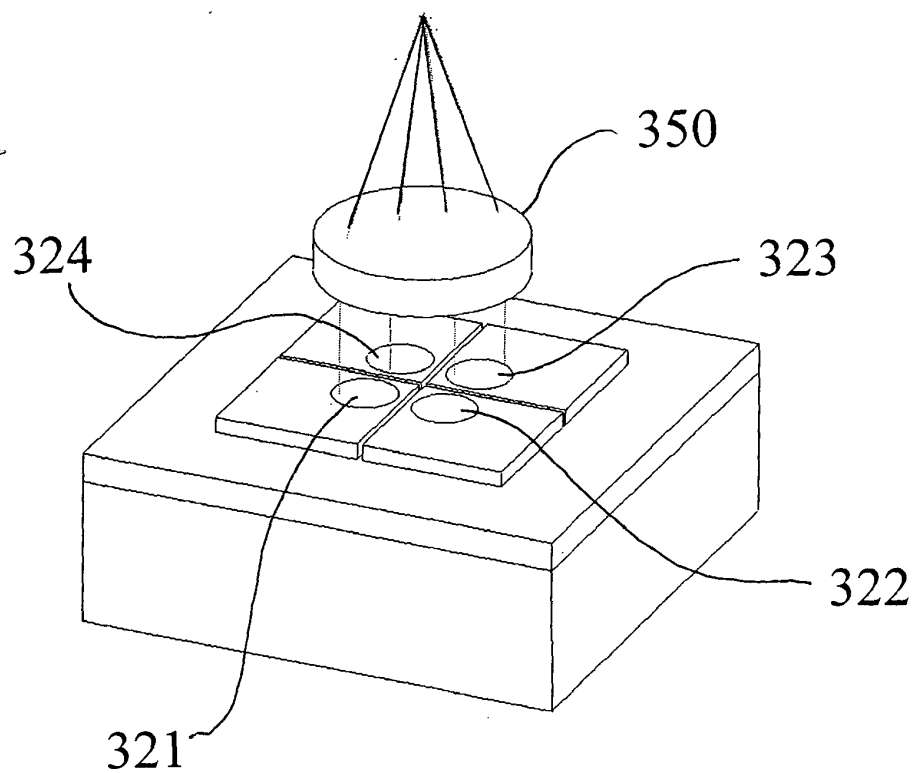


Fig. 11

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	First Named Inventor	Curtis A. Ray et al
	COMPLETE IF KNOWN	
	Application Number	
	Filing Date	
	Art Unit	
	Examiner Name	

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

OPTICAL COMBINER DEVICE

(Title of the Invention)

the specification of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

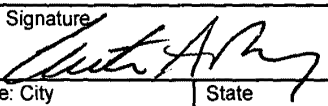
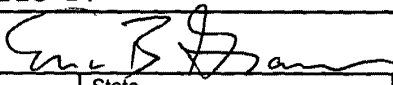
[Page 1 of 2]

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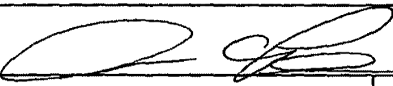
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Address 333 Sacramento Street			
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NAME OF SOLE OR FIRST INVENTOR:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) Curtis A.		Family Name or Surname Ray	
Inventor's Signature 		Date 1/21/05	
Residence: City Alamo	State California	Country US	Citizenship US
Mailing Address 108 Warwick Court			
City Alamo	State California	Zip 94507	Country US
NAME OF SECOND INVENTOR:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any)) Eric B.		Family Name or Surname Grann	
Inventor's Signature 		Date 1/21/05	
Residence: City San Ramon	State California	Country US	Citizenship US
Mailing Address 410 Commodore Court			
City San Ramon	State California	Zip 94583	Country US
☒ Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.			

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PTO/SB/02A (11-00)
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DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet Page <u>1</u> of <u>1</u>
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Name of Additional Joint Inventor, if any:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Brian C.		Peters	
Inventor's Signature 		Date <u>1-21-05</u>	
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Mailing Address 25 Via Alondra			
Mailing Address			
City Alamo	State CA	ZIP 94507	Country US
Name of Additional Joint Inventor, if any:		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature		Date	
Residence: City	State	Country	Citizenship
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Name of Additional Joint Inventor, if any:		☐ A petition has been filed for this unsigned inventor	
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APPLICATION NUMBER: 11/044475

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The suspended fee code: 1999/1506/pp 26 22 amount - \$ 245

Fee Due amount =\$ 105

If you have any questions, please contact Cynthia Streater at 703-306-5430 or Eleanor Kurtz at 703-308-3642.

Terminal Operator NGAN

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

02/03/2005 NNGUYEN1 00000028 11044475

01 FC:2011	150.00 OP
02 FC:2622	245.00 OP

PTO-1556
(5/87)

U.S. Government Printing Office: 2002 — 489-267/69033

PATENT APPLICATION FEE DETERMINATION RECORD
Effective December 8, 2004

11044475

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	9	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	9 minus 20= *	/
INDEPENDENT CLAIMS	2 minus 3= *	/
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ OR

OTHER THAN SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE	150.00	OR	BASIC FEE	300.00
X\$ 25=	/	OR	X\$50=	
X100=	/	OR	X200=	
+180=	/	OR	+360=	
TOTAL	150	OR	TOTAL	

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR
			PRESENT EXTRA
	Total *	Minus	**
	Independent *	Minus	***
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

SMALL ENTITY OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X\$ 25=		OR	X\$50=	
X100=		OR	X200=	
+180=		OR	+360=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR
			PRESENT EXTRA
	Total *	Minus	**
	Independent *	Minus	***
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR
			PRESENT EXTRA
	Total *	Minus	**
	Independent *	Minus	***
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐			

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. 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 number found in the appropriate box in column.1.

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

02/03/2005 NNGUYEN1 00000028 11044475

01 FC:2011	150.00 OP
02 FC:2622	245.00 OP

Adjustment date: 04/06/2005 AGDITOM
02/03/2005 NNGUYEN1 00000028 11044475
02 FC:2622 -245.00 OP

04/06/2005 AGDITOM 00000019 11044475

01 FC:2311	100.00 OP
02 FC:2622	145.00 OP

PTO-1556
(5/87)

U.S. Government Printing Office: 2002 — 489-267/60000