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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190
26161	7590	11/07/2023		
FISH & RICHARDSON P.C. (BO)			EXAMINER	
P.O. BOX 1022			CONNELLY, MICHELLE R	
MINNEAPOLIS, MN 55440-1022				
			ART UNIT	PAPER NUMBER
			2874	
			NOTIFICATION DATE	DELIVERY MODE
			11/07/2023	ELECTRONIC

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

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

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

PATDOCTC@fr.com



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APPLICATION NO.	ISSUE DATE	PATENT NO.
17/552,455	07-Nov-2023	11806804

FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at <https://patentcenter.uspto.gov>

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit <https://www.uspto.gov/electronicgrants>

TO: PATDOCTC@fr.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - eGrant Notification for Customer Number 26161

Tue Nov 07 06:15:07 EST 2023

Dear Patent Center Customer:

Correspondence Address:

FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MINNESOTA, 55440-1022
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 26161, that have new eGrant(s). The eGrant is now available for viewing in Patent Center.

The official date of the eGrant notification will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:

The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Patent	Document	Mailroom Date	Attorney Docket No.
17552455	11806804	EGRANT.NTF	11/07/2023	15540-0370005

To examine your eGrant online, please access [Patent Center](#) then search using the listed application or patent number. To download, click on the eGrant link on the left-hand menu or select the "Download eGrant" link on the Application data page.

If you have any questions, please contact the [Patent Electronic Business Center](#) (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

TO: PATDOCTC@fr.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 26161

Thu Oct 19 05:51:08 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MINNESOTA, 55440-1022
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 26161, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	ISSUE.NTF	10/18/2023	15540-0370005

To view your correspondence online, please sign in to [Patent Center](#) and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the [Patent Electronic Business Center](#) (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

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Sincerely,

The Patent Center Team



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	11/07/2023	11806804	15540-0370005	3190
26161	7590	10/18/2023		
FISH & RICHARDSON P.C. (BO) P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022				

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at <https://patentcenter.uspto.gov/>. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at <https://certifiedcopycenter.uspto.gov/index.html>. The Certified Copy Center may be reached at (800)972-6382.

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 Center (<https://patentcenter.uspto.gov>).

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

INVENTOR(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional inventors):

Rudolph Huber, Aldingen-Aixheim, GERMANY;
Wolfgang Andreasch, Weinstadt, GERMANY;
Martin Huonker, Dietingen, GERMANY;

APPLICANT(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

TRUMPF Laser- und Systemtechnik GmbH, Ditzingen, GERMANY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](https://selectusa.gov).



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ELECTRONIC PAYMENT RECEIPT

APPLICATION #
17/552,455

RECEIPT DATE / TIME
10/05/2023 10:05:19 AM ET

ATTORNEY DOCKET #
15540-0370005

Title of Invention

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 3190

FILED BY Cheryl Forrest

PATENT CENTER # 62932996

AUTHORIZED BY Yunbo Guo

CUSTOMER # 26161

FILING DATE 12/16/2021

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Rudolph Huber

Payment Information

PAYMENT METHOD
DA / 061050

PAYMENT TRANSACTION ID
E202305A05549611

PAYMENT AUTHORIZED BY
Cheryl Forrest

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1501	UTILITY ISSUE FEE	1200.00	1	1200.00
TOTAL AMOUNT:				\$1,200.00

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

New Applications Under 35 U.S.C. 111

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

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

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C.

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

New International Application Filed with the USPTO as a Receiving Office

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



UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/552,455

RECEIPT DATE / TIME
10/05/2023 10:05:19 AM ET

ATTORNEY DOCKET #
15540-0370005

Title of Invention

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

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CONFIRMATION # 3190

FILED BY Cheryl Forrest

PATENT CENTER # 62932996

FILING DATE 12/16/2021

CUSTOMER # 26161

FIRST NAMED INVENTOR
Rudolph Huber

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Yunbo Guo

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
ReplytoNOA.pdf	3	Issue Fee Payment (PTO-85B)	188 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
ReplytoNOA.pdf	F19AD43396A6E2599E6594081A6EE99B123063FECCE1D657D 985D843B94AA7615E1D6E27210D903B677C2C80842AE2BCE3 2C1DF33F6C3EF9CA90A03E6249AB73

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

New International Application Filed with the USPTO as a Receiving Office

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.

First Named Inventor :	Rudolph Huber	Art Unit :	2874
Application No. :	17/552,455	Examiner :	Michelle R. Connelly
Filed :	December 16, 2021	Confirmation No. :	3190
Notice of Allowance Date: July 11, 2023			
Title :	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

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

In response to the Notice of Allowance dated July 11, 2023, enclosed is a completed Part B - Fee(s) Transmittal.

The issue fee is being paid with this reply on the Electronic Filing System. Apply that fee and any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

It is recognized that, in accordance with M.P.E.P. § 1302.14, the Examiner's reasons for allowance need not set forth all of the details as to why the claims are allowed. In the above-referenced application, it is not conceded that the Examiner's stated reasons for allowance are the only reasons for which the claims are allowable. The Examiner's reasons for allowance indicate that particular claim elements are not disclosed or suggested by the prior art of record, yet the claims may be patentable for other reasons as well, including the inventive combination of all of the recited claim elements. It is not conceded that the specific limitations identified by the Examiner are necessary to distinguish the art of record or to satisfy the requirements of 35 U.S.C. § 112. Moreover, the Examiner does not assert, and it would not be conceded, that the Examiner's reasons have any bearing on the patentability of claims in any other applications directed to the disclosed subject matter.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 2 of 2

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

In addition, each dependent claim stands on its own and may be allowable on its own merits. In particular, each dependent claim may be allowable on the basis of a combination of some of the features recited in the dependent claim and its base claim(s), which combination of features may not include all of the limitations identified in the Examiner's reasons for allowance.

Respectfully submitted,

Date: 10/05/2023

/Yunbo Guo/
Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

24341999.doc

PART B - FEE(S) TRANSMITTAL

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

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22314-1450

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

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

26161 7590 07/11/2023

FISH & RICHARDSON P.C.
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190

TITLE OF INVENTION: METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	LARGE	\$1200	\$0	\$0	\$1200	10/11/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
CONNELLY, MICHELLE R.	2874	385-016000

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 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

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

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

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

(A) NAME OF ASSIGNEE
TRUMPF Laser- und Systemtechnik GmbH

(B) RESIDENCE: (CITY and STATE OR COUNTRY)
Ditzingen, Germany

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

4a. Fees Submitted: ☒ Issue Fee ☐ Publication Fee (if required)

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

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account No. 06-1050

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

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

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

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

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

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

Authorized Signature /Yunbo Guo/

Date 10/05/2023

Typed or printed name Yunbo Guo

Registration No. 70,538



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

26161 7590 07/11/2023
FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

CONNELLY, MICHELLE R

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 07/11/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190

TITLE OF INVENTION: METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	10/11/2023

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

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17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190

TITLE OF INVENTION: METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	10/11/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
CONNELLY, MICHELLE R	2874	385-016000

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(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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

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

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required)

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

☐ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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

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

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

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190
26161	7590	07/11/2023	EXAMINER	
FISH & RICHARDSON P.C. (BO)			CONNELLY, MICHELLE R	
P.O. BOX 1022			ART UNIT	
MINNEAPOLIS, MN 55440-1022			PAPER NUMBER	
			2874	
DATE MAILED: 07/11/2023				

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 17/552,455	Applicant(s) Huber et al.	
	Examiner MICHELLE R CONNELLY	Art Unit 2874	AIA (FITF) Status No

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

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

1. ☒ This communication is responsive to Applicant's Amendment filed June 20, 2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 9-15, 17 and 19-28. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 13/639,401.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

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

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

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

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

Attachment(s)

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

/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	
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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Terminal Disclaimer

The terminal disclaimer filed on June 20, 2023 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 9,482,821 or U.S. Patent No. 8,781,269 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Amendment

Applicant's Amendment filed June 20, 2023 has been fully considered and entered.

Allowable Subject Matter

Claims 9-15, 17, and 19-28 are allowed.

The following is an examiner's statement of reasons for allowance: Claims 9-15, 17, and 19-28 remain allowable over the prior art of record, which is the most relevant prior art known, for the reasons stated in the Office action mailed January 20, 2023.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE R CONNELLY whose telephone number is (571)272-2345. The examiner can normally be reached Monday-Friday, 9 AM to 5 PM.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/MICHELLE R CONNELLY/
Primary Examiner, Art Unit 2874

<i>Index of Claims</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	09/20/2022	01/14/2023	06/26/2023						
-	1	✓	✓	-						
-	2	✓	-	-						
-	3	✓	-	-						
-	4	-	-	-						
-	5	-	-	-						
-	6	-	-	-						
-	7	-	-	-						
-	8	-	-	-						
1	9	✓	✓	=						
2	10	✓	✓	=						
3	11	✓	✓	=						
4	12	✓	✓	=						
5	13	✓	✓	=						
6	14	✓	✓	=						
7	15	✓	✓	=						
-	16	-	-	-						
8	17	✓	✓	=						
-	18	-	-	-						
9	19	✓	✓	=						
10	20	✓	✓	=						
11	21	✓	✓	=						
12	22	✓	✓	=						
13	23	✓	✓	=						
14	24	✓	✓	=						
15	25	✓	✓	=						
16	26	✓	✓	=						
17	27	✓	✓	=						
18	28		✓	=						

<i>Search Notes</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296	06/26/2023	/MC/

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296) limited with text (see attached text search strategy)	09/20/2022	/MC/
Inventor & Assignee search	09/20/2022	/MC/
PE2E SEARCH (see attached text search strategy)	09/20/2022	/MC/
(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296) limited with text (see attached text search strategy)	06/26/2023	/MC/
Inventor & Assignee search	06/26/2023	/MC/
PE2E SEARCH (see attached text search strategy)	06/26/2023	/MC/

/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	
--	--

<i>Search Notes</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
PE2E SEARCH	see attached text search strategy	09/20/2022	/MC/
PE2E SEARCH	see attached text search strategy	06/26/2023	/MC/

/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	
--	--

Issue Classification 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

CPC						
Symbol					Type	Version
B23K	/	26	/	064	F	2013-01-01
B23K	/	26	/	073	I	2013-01-01
G02B	/	6	/	03644	I	2013-01-01
G02B	/	6	/	262	I	2013-01-01
G02B	/	6	/	4206	I	2013-01-01
G02B	/	6	/	4296	I	2013-01-01
G02B	/	6	/	02042	I	2013-01-01
G02B	/	6	/	35	I	2013-01-01
G02B	/	6	/	3508	I	2013-01-01
B23K	/	26	/	067	I	2013-01-01
B23K	/	2103	/	06	A	2018-08-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/	/			

NONE	Total Claims Allowed:	
(Assistant Examiner)	(Date)	18
/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	26 June 2023	O.G. Print Claim(s) 1
(Primary Examiner)	(Date)	O.G. Print Figure 1, 3

Issue Classification 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

INTERNATIONAL CLASSIFICATION			
CLAIMED			
B23K	/	26	/ 064
B23K	/	26	/ 067
B23K	/	26	/ 073
G02B	/	6	/ 26
G02B	/	6	/ 35
G02B	/	6	/ 42
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	18	
/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	26 June 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1, 3

Issue Classification 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47																
CLAIMS																
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Original
-	1	2	10	9	19	18	28									
-	2	3	11	10	20											
-	3	4	12	11	21											
-	4	5	13	12	22											
-	5	6	14	13	23											
-	6	7	15	14	24											
-	7	-	16	15	25											
-	8	8	17	16	26											
1	9	-	18	17	27											

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 18	
/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874 (Primary Examiner) _____ (Date) 26 June 2023		O.G. Print Claim(s) 1	O.G. Print Figure 1, 3

Bibliographic Data

Application No: 17/552,455

Foreign Priority claimed: ☒ Yes ☐ No

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

Verified and Acknowledged:

/MICHELLE R CONNELLY/

Examiner's Signature

Initials

Title:

METHOD AND ARRANGEMENT FOR GENERATING A LASER
BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/16/2021	385	2874	
RULE			

APPLICANTS

TRUMPF Laser- und Systemtechnik GmbH, Ditzingen, GERMANY

INVENTORS

Rudolph Huber, Aldingen-Aixheim, GERMANY

Wolfgang Andreasch, Weinstadt, GERMANY

Martin Huonker, Dietingen, GERMANY

CONTINUING DATA

This application is a DIV of 16398362 04/30/2019 PAT 11215761

16398362 is a CON of 15279781 09/29/2016 PAT 10281656

15279781 is a CON of 14300138 06/09/2014 PAT 9482821

14300138 is a CON of 13639401 12/20/2012 PAT 8781269

13639401 is a 371 of PCT/EP2011/055484 04/08/2011

FOREIGN APPLICATIONS

GERMANY DE102010003750.8 04/08/2010

IF REQUIRED, FOREIGN LICENSE GRANTED**

12/28/2021

STATE OR COUNTRY

GERMANY

ADDRESS

FILING FEE RECEIVED

\$1,980

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	16/398,362	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 03:40 PM
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L4	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L5	0	("2017/0031105").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L6	24	("2015/0293306").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L7	46	("2013/0223792").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
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L12	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:20 PM

L13	186	G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:20 PM
L14	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:22 PM
L15	1	L12 not L2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:22 PM
L16	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:24 PM

L17	4	near2 core) and (subbeam or sub-beam) and divid\$3).clm. ((laser adj beam) and coupl\$3 and fiber and (multiclad or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:27 PM
L18	59	"8781269"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/19 10:58 AM
L19	1	("8781269").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/04/19 10:59 AM
L20	79	((("HUBER") near3 ("Rudolph")) OR ((("ANDREASCH") near3 ("Wolfgang")) OR ((("HUONKER") near3 ("Martin")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2021/04/19 11:01 AM
L21	54	((("TRUMPF") near3 ("LASER-") near3 ("UND") near3 ("SYSTEMTECHNIK") near3 ("GMBH"))).AS,AANM.	(USPAT)	OR	ON	ON	2021/04/19 11:01 AM
L22	7	(L20 or L21) and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclad or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/19 11:01 AM
L23	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:58 PM
L24	1	16/398,362	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:58 PM
L25	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:58 PM

		B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and laser and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)					
L26	0	("2020/0310055").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:58 PM
L27	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L28	0	("2017/0031105").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L29	24	("2015/0293306").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L30	47	("2013/0223792").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L31	37	("20020071647" "20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20110305249" "20130064706" "20150217402" "20150378184" "3941670" "3975082" "4475788" "4575181" "5461692" "5475704" "5684642" "6819815" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269" "9482821").PN. OR ("10281656").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L32	43	("20020071647"	(US-PGPUB; USPAT;	OR	ON	ON	2021/08/28

		"20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20130064706" "3941670" "3975082" "4475788" "4575181" "5461682" "5461692" "5684642" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269").PN. OR ("9482821").URPN.	USOCR)				07:59 PM
L33	55	("20020071647" "20020168139" "20020172485" "20060251367" "20060263024" "3941670" "4475788" "4575181" "5684642" "7372877" "7379237" "7379648" "7720340" "7738166" "7809225" "7839902" "7933479" "8076632" "8094370" "8456523").PN. OR ("8781269").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L34	93	(L26 or L23 or L28 or L29 or L30 or L31 or L32 or L33)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L35	10	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre- optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi- core or (multiple adj core) or (plural\$3 near2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM

L36	199	core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam) (G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L37	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L38	1	L35 not L25	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L39	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L40	4	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM

L41	62	"8781269"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L42	1	("8781269").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/08/28 07:59 PM
L43	80	((("HUBER") near3 ("Rudolph")) OR ((("ANDREASCH") near3 ("Wolfgang")) OR ((("HUONKER") near3 ("Martin")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2021/08/28 07:59 PM
L44	58	((("TRUMPF") near3 ("LASER-") near3 ("UND") near3 ("SYSTEMTECHNIK") near3 ("GMBH"))).AS,AANM.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L45	7	(L43 or L44) and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L46	18	(L23 or L24 or L25 or L26 or L27 or L28 or L29 or L30 or L31 or L32 or L33 or L34 or L35 or L36 or L37 or L38 or L39 or L40 or L41 or L42 or L43 or L44 or L45) and @pd>"20210419"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 08:05 PM
L54	7	((("10795090") or ("10197741") or ("9778422") or ("9354402") or ("8992095") or ("8845205") or ("8382382"))).PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/08/29 09:36 PM
L55	1	((US-20190258009-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/09/19 11:41 AM

			MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L56	3	("2019/0258009").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:42 AM
L57	30	(michelle near2 connelly).xp. AND (beam near2 profile)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:43 AM
L58	21	("5012069" "5449881" "5684642" "8399803" "9620925" "10310201" "10807190" "20020198622" "20060219673" "20070170157" "20090211700" "20110127697" "20110240617" "20130073071" "20130148925" "20130223792" "20140010508" "20150372444" "20180147661" "20190118299").pn. OR ("11022747").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:44 AM
L59	67	("2013/0148925").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:46 AM
L60	3	("2019/0258009").urpn. AND (PGPB USPT USOC).dbnm.L56	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:58 AM
L61	45	("10281656" OR "11215761" OR "20020071647" OR "20020168139" OR "20020172485" OR "20050031261" OR "20060219673" OR "20060251367" OR "20060263024" OR "20110305249" OR "20130064706" OR "20130223792" OR "20150217402" OR "20150293306" OR "20150378184" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/19 12:07 PM

L62	45	"20170031105" OR "20190025502" OR "20190118299" OR "20190258009" OR "3941670" OR "3975082" OR "4475788" OR "4575181" OR "5461692" OR "5475704" OR "5684642" OR "6819815" OR "7372877" OR "7379237" OR "7379648" OR "7592568" OR "7720340" OR "7738166" OR "7809225" OR "7839902" OR "7933479" OR "8008600" OR "8076632" OR "8094370" OR "8326099" OR "8456523" OR "8781269" OR "8861910" OR "9482821" OR "9755739").pn. ("10281656" OR "11215761" OR "20020071647" OR "20020168139" OR "20020172485" OR "20050031261" OR "20060219673" OR "20060251367" OR "20060263024" OR "20110305249" OR "20130064706" OR "20130223792" OR "20150217402" OR "20150293306" OR "20150378184" OR "20170031105" OR "20190025502" OR "20190118299" OR "20190258009" OR "3941670" OR "3975082" OR "4475788" OR "4575181" OR "5461692" OR "5475704" OR "5684642" OR "6819815" OR "7372877" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/19 03:32 PM
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L63	23	"7379237" OR "7379648" OR "7592568" OR "7720340" OR "7738166" OR "7809225" OR "7839902" OR "7933479" OR "8008600" OR "8076632" OR "8094370" OR "8326099" OR "8456523" OR "8781269" OR "8861910" OR "9482821" OR "9755739").pn. ((US-20190258009-A1 OR US-20190118299- A1 OR US- 20180147661-A1 OR US-20150372444-A1 OR US-20130223792- A1 OR US- 20130148925-A1 OR US-20060219673-A1 OR US-20190025502- A1 OR US- 20170031105-A1 OR US-20150293306-A1 OR US-20150217402- A1).did. AND PGPB.dbnm.) OR ((US- 10916911-B2 OR US- 11215761-B2 OR US- 11022747-B2 OR US- 10807190-B2 OR US- 9620925-B2 OR US- 11435538-B2 OR US- 10281656-B2 OR US- 9755739-B1 OR US- 9482821-B2 OR US- 8781269-B2 OR US- 7592568-B2 OR US- 5461692-A).did. AND USPT.dbnm.) ("20060219673").pn. (L23 OR L24 OR L25 OR L26 OR L27 OR L28 OR L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR L38 OR L39 OR L40 OR L41 OR L42 OR L43 OR L44 OR L45)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/19 08:36 PM
L65	1	(US-PGPUB)	(US-PGPUB)	OR	ON	ON	2022/09/19 09:36 PM
L66	109	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/20 11:52 AM

L67	3	AND @pd>"20210415" "20060219673"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/01/14 11:38 AM
L68	287	(mov\$3 near3 laser) SAME (mov\$3 near3 fib\$3) SAME ((rotat\$3 OR mov\$3) near3 (lens OR mirror OR microlens OR micromirror OR micro-lens OR micro- mirror OR optics))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/01/14 11:59 AM
L69	10	(mov\$3 near3 laser) SAME (mov\$3 near3 fib\$3) SAME ((rotat\$3 OR mov\$3) near3 (lens OR mirror OR microlens OR micromirror OR micro-lens OR micro- mirror OR optics)) SAME (angl\$3 near3 inciden\$4)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/01/14 12:00 PM
L70	38	(L2 OR L11) AND @pd>"20210415"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/06/26 07:55 AM

L71	196	(L12 OR L13 OR L14 OR L16 OR L17 OR L22) AND @pd>"20210415"	MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 07:58 AM
L72	1114	((("HUBER") near3 ("Rudolph")) OR ("ANDREASCH") near3 ("Wolfgang")) OR ("HUONKER") near3 ("Martin"))).INV.) OR (((("TRUMPF") near3 ("LASER-") near3 ("UND") near3 ("SYSTEMTECHNIK") near3 ("GMBH"))).AS,AANM.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 08:01 AM
L73	14	L25 AND @pd>"20210828"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 08:01 AM
L74	92613	(G02B6/3508 OR	(US-PGPUB; USPAT;	OR	ON	ON	2023/06/26

		B23K26/067 OR B23K26/064 OR G02B6/02042 OR G02B6/35 OR B23K26/073 OR G02B6/03644 OR G02B6/262 OR G02B6/4206 OR G02B6/4296).cpc.	USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				08:02 AM
L75	11	L72 AND (((laser OR light OR optic\$3 OR photonic) near3 ((beam OR spot) near2 profile))) AND (((optic\$3 near2 fib\$3) OR opticalfib\$3 OR optical- fib\$3 OR opticfib\$3 OR optic-fib\$3 OR fibreoptic\$3 OR fibre- optic\$3 OR fiberoptic\$3 OR fiber-optic\$3) SAME (multi-clad OR multiclاد OR multicore OR multi- core OR (multiple ADJ core) OR (plural\$3 near2 core))) AND (divid\$3 WITH (light OR beam OR input)) AND (subbeam OR sub- beam))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 08:04 AM
L76	32	L74 AND (((laser OR light OR optic\$3 OR photonic) near3 ((beam OR spot) near2 profile))) AND (((optic\$3 near2 fib\$3) OR opticalfib\$3 OR optical- fib\$3 OR opticfib\$3 OR optic-fib\$3 OR fibreoptic\$3 OR fibre- optic\$3 OR fiberoptic\$3 OR fiber-optic\$3) SAME (multi-clad OR multiclاد OR multicore OR multi- core OR (multiple ADJ core) OR (plural\$3 near2 core))) AND (divid\$3 WITH (light OR beam OR input)) AND (subbeam OR sub- beam))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 08:05 AM

L77	396	L46 AND @pd>"20210828"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/26 08:07 AM
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PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N47	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and laser and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical- fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre- optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi- core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub- beam)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM
N48	10	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM

N49	194	(((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam) (G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM
N50	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM
N51	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM
N52	4	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM

		and (inner near2 core) and ((outer or ring near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.					
N53	194	(N48 or N48 or N49 or N50 or N51 or N52)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:08 PM
N54	29	(N48 OR N48 OR N49 OR N50 OR N51 OR N52) AND @pd>"20210415"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/20 11:50 AM
N55	11	((G02B6/3508 OR B23K26/067 OR B23K26/064 OR G02B6/02042 OR G02B6/35 OR B23K26/073 OR G02B6/03644 OR G02B6/262 OR G02B6/4206 OR G02B6/4296).cpc.) AND (((laser OR light OR optic\$3 OR photonic) near3 ((beam OR spot) near2 profile))) AND (((optic\$3 near2 fib\$3) OR opticalfib\$3 OR optical-fib\$3 OR opticfib\$3 OR optic-fib\$3 OR fibreoptic\$3 OR fibre-optic\$3 OR fiberoptic\$3 OR fiber-optic\$3) SAME (multi-clad OR multiclاد OR multicore OR multi-core OR (multiple ADJ core) OR (plural\$3 near2 core))) AND (divid\$3 WITH (light OR beam OR input)) AND (subbeam OR sub-beam))	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/26 08:05 AM
N56	14	(((((laser OR light OR optic\$3 OR photonic) near3 ((beam OR spot) near2 profile))) AND (((optic\$3 near2 fib\$3) OR opticalfib\$3 OR optical-fib\$3 OR opticfib\$3 OR optic-fib\$3 OR fibreoptic\$3 OR fibre-optic\$3 OR fiberoptic\$3 OR fiber-optic\$3) SAME (multi-clad OR multiclاد OR multicore OR multi-core	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/26 08:06 AM

N57	13	OR (multiple ADJ core) OR (plural\$3 near2 core))) AND (divid\$3 WITH (light OR beam OR input)) AND (subbeam OR sub- beam)) (N47 OR N48 OR N49 OR N50 OR N51 OR N52) AND @pd>"20220920"	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/26 08:36 AM
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TO: PATDOCTC@fr.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 26161

Tue Jul 11 05:23:44 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MINNESOTA, 55440-1022
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 26161, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	NOA	07/11/2023	15540-0370005

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Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Rudolph Huber	Art Unit :	2874
Application No. :	17/552,455	Examiner :	Michelle R. Connelly
Filed :	December 16, 2021	Conf. No. :	3190
Title :	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

MAIL STOP AF

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

REPLY TO ACTION OF JANUARY 20, 2023

Please consider the following reply.

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions and listings of claims in the application:

1. **(Canceled)**
2. **(Cancelled)**
3. **(Cancelled)**
4. – 8. **(Cancelled)**
9. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:
 - a multi-clad fiber having one inner fiber core and at least one outer ring core; and
 - a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
 - the input laser beam into the inner fiber core of the multi-clad fiber, and
 - the input laser beam into the at least one outer ring core of the multi-clad fiber.
10. (Original) The system of claim 9, wherein the switchable device comprises adjustable optical deflector configured to, in the at least two switch positions, deflect the input laser beam in a direction transverse to an axis of a coupling-side face of the multi-clad fiber to varying extents.
11. (Original) The system of claim 10, wherein the optical deflector comprises an optical device that is positionable in the at least two switch positions transverse to an optical axis of the input laser beam.

12. (Original) The system of claim 11, wherein the optical device is arrangeable in one of the switch positions outside a beam path of the input laser beam and in at least one other of the switch positions at least partially in the beam path of the laser beam.

13. (Original) The system of claim 11, wherein the optical device comprises an optical wedge plate.

14. (Original) The system of claim 9, wherein the switchable device comprises a controller configured to, in the at least two switch positions, move a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam to varying extents.

15. (Previously Presented) The system of claim 9, wherein the switchable device comprises an adjustable optical device configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber, and

wherein the adjustable optical device is configured to be moved back and forth along an optical axis of an input laser beam axis between the at least two switch positions.

16. (Cancelled)

17. (Original) The system of claim 9, wherein the switchable device comprises an adjustable aperture configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber.

18. (Cancelled)

19. (Original) The system of claim 9, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

20. (Original) The system of claim 9, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

21. (Previously Presented) The system of claim 9, wherein the switchable device comprises two optical fibers on an input side, via which first and second sub-beams are supplied, whereby the switchable device electively couples the first sub-beam at least into the inner fiber core of the multi-clad fiber and the second sub-beam at least into at least the one outer ring core of the multi-clad fiber.

22. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:

- a multi-clad fiber having one inner fiber core and at least one outer ring core; and
- a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
 - a first input laser beam at least into the inner fiber core of the multi-clad fiber, and
 - a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber.

23. (Original) The system of claim 22, wherein the switchable device comprises a beam divider configured to be moved into the input laser beam to divide the input laser beam into at least two sub-beams, each of the at least two sub-beam being coupled into a respective one of the cores of the multi-clad fiber.

24. (Original) The system of claim 22, wherein a diameter of the inner fiber core of the multi-clad fiber is no more than 200 μm .

25. (Original) The system of claim 22, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

26. (Original) The system of claim 22, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

27. (Previously Presented) The system of claim 22, wherein the switchable device comprises two optical fibers on an input side, via which the first and second input laser beams are supplied, whereby the switchable device electively couples the first input laser beam at least into the inner fiber core of the multi-clad fiber and the second input laser beam at least into at least one outer ring core of the multi-clad fiber.

28. (Previously Presented) A method of generating a laser beam with different beam profile characteristics, comprising:

coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of

coupling the input laser beam at least into an inner fiber core of the multi-clad fiber, and

coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber; and

emitting an output laser beam from a second fiber end of the multi-clad fiber,

wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:

projecting the input laser beam with respectively different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 6 of 7

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

REMARKS

This Application has been reviewed in light of the Office Action mailed on January 20, 2023 (hereinafter “*Action*”). Claims 1, 9-15, 17 and 19-28 were pending. Applicant has cancelled claim 1. No new subject matter has been added. Applicant presents the pending claims for examination in view of the amendments and the following remarks.

Double Patenting Rejection

Claims 1, 9-15, 17, and 19-28 stand rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 8,781,269 B2. Claims 1 and 28 stand rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 9,482,821 B2.

Without conceding the propriety of the obviousness-type double patenting rejections, Applicant is concurrently submitting terminal disclaimers over U.S. Patent No. 8,781,269 and U.S. Patent No. 9,482,821 to obviate the rejections. Applicant respectfully requests that the rejection be withdrawn.

Claim Rejections – 35 USC § 103

Claim 1 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. Pub. No. 2006/0219673 A1 (“*Varnham*”). The rejection is respectfully traversed.

Without conceding propriety of the rejection, and in a continued effort to advance prosecution of the instant application, Applicant has cancelled claim 1. Thus, Applicant respectfully requests withdrawal of the rejection.

Allowable Subject Matter

Applicant thanks the Examiner for identifying allowable subject matter in claims 9-15, 17, and 19-28. Applicant is filing the terminal disclaimers to overcome the non-statutory double patenting rejection, and respectfully requests a notice of allowance.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 7 of 7

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

Request for Interview

If the present Application is not allowed and/or if one or more of the rejections is maintained, Applicant hereby requests a telephone conference with the Examiner and further request that the Examiner contact the undersigned representative to schedule the telephone conference.

CONCLUSION

By responding in the foregoing remarks only to particular positions taken in the action, Applicant does not acquiesce in other positions that have not been explicitly addressed. In addition, Applicant's selecting some particular arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist. Finally, Applicant's decision to amend or cancel any claim should not be understood as implying that Applicant agrees with any positions taken in the action with respect to that claim or other claims, or that Applicant adopts any position except as specifically stated in this paper. In particular, by amending or cancelling a claim, Applicant does not necessarily concede that the claim prior to amendment or cancellation was unpatentable.

Applicant respectfully requests consideration of all filed IDSs not previously considered, by initialing and returning each Form PTO-1449.

The fees for two-month extension of time are being paid with this reply on the Electronic Filing System. Please apply those fees and any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 06/20/2023

/Yunbo Guo/

Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/552,455

RECEIPT DATE / TIME
06/20/2023 09:59:43 AM ET

ATTORNEY DOCKET #
15540-0370005

Title of Invention

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 3190

FILED BY Cheryl Forrest

PATENT CENTER # 62297704

FILING DATE 12/16/2021

CUSTOMER # 26161

FIRST NAMED INVENTOR Rudolph Huber

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Yunbo Guo

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
ReplytoFinal.pdf		7	-	120 KB
ReplytoFinal-A.NE.pdf	(1-1)	1	Response After Final Action	58 KB
ReplytoFinal-CLM.pdf	(2-5)	4	Claims	81 KB
ReplytoFinal-REM.pdf	(6-7)	2	Applicant Arguments/Remarks Made in an Amendment	92 KB

Digest

DOCUMENT MESSAGE DIGEST(SHA-512)

ReplytoFinal.pdf	4AC355C5ADBB9ED60E86D62E9AD2487D0C512C78810FCE34 C9C374EC0D382F0A3F16814FF5E927387FF32413C3C7FA2D3 B985396B7306F4C60BAB73289487822
ReplytoFinal-A.NE.pdf	FAA882B147A989419759A92178D103E183384AF4160023B94D0 B73ED914350751D03B54E286EC706036EFF670F79F40B9F6B1 A3C7F276F84AB11165057305AE6
ReplytoFinal-CLM.pdf	9F43234C2AF39B7322B1A54593BE4843E7AF48150B82CF7B50 6F4846C98DCA2DF20FEEB6273E953D9AAA2FB32E3A3052244 5F67F883E51564C48857081B65532
ReplytoFinal-REM.pdf	AB3CB87CCE3716DDCA7EE336B4C7D3623282FB003608CAE4 CEB6DC23E5DE9C69CDE8B218EDE2C4621E6E32D51BA23249 02B7C2B4D2977323467EF6D4CBC7DCFE

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

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

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New International Application Filed with the USPTO as a Receiving Office

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APPLICATION #
17/552,455

RECEIPT DATE / TIME
06/20/2023 09:59:43 AM ET

ATTORNEY DOCKET #
15540-0370005

Title of Invention

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 3190

FILED BY Cheryl Forrest

PATENT CENTER # 62297704

AUTHORIZED BY Yunbo Guo

CUSTOMER # 26161

FILING DATE 12/16/2021

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Rudolph Huber

Payment Information

PAYMENT METHOD
DA / 061050

PAYMENT TRANSACTION ID
E 20236J A00448366

PAYMENT AUTHORIZED BY
Cheryl Forrest

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1252	EXTENSION FOR RESPONSE WITHIN SECOND MONTH	640.00	1	640.00
TOTAL AMOUNT:				\$640.00

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New International Application Filed with the USPTO as a Receiving Office

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

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	
Application Number	17552455	
Filing Date	16-Dec-2021	
First Named Inventor	Rudolph Huber	
Attorney Docket Number	15540-0370005	
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER	
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Owner	Percent Interest	
TRUMPF Laser- und Systemtechnik GmbH	100%	
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Applicant claims the following fee status: ☐ Small Entity ☐ Micro Entity ☒ Regular Undiscounted	
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ☒ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number <u>70538</u> ☐ A sole inventor ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ☐ A joint inventor; all of whom are signing this request	
Signature	/Yunbo Guo/
Name	Yunbo Guo

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

Electronic Patent Application Fee Transmittal				
Application Number:		17552455		
Filing Date:		16-Dec-2021		
Title of Invention:		METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
First Named Inventor/Applicant Name:		Rudolph Huber		
Filer:		Yunbo Guo/Cheryl Forrest		
Attorney Docket Number:		15540-0370005		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				170

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 17552455

Filing Date: 16-Dec-2021

Applicant/Patent under Reexamination: Huber

Electronic Terminal Disclaimer filed on June 20, 2023

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

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

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	48174624
Application Number:	17552455
International Application Number:	
Confirmation Number:	3190
Title of Invention:	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER
First Named Inventor/Applicant Name:	Rudolph Huber
Customer Number:	26161
Filer:	Yunbo Guo/Cheryl Forrest
Filer Authorized By:	Yunbo Guo
Attorney Docket Number:	15540-0370005
Receipt Date:	20-JUN-2023
Filing Date:	16-DEC-2021
Time Stamp:	09:54:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$170
RAM confirmation Number	E20236J054108323
Deposit Account	
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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	41243	no	2
			b28c57886db5a4c3558dcd7a38f175f987efb2d		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38039	no	2
			c76219aec92ff11553a654b52ef6f6373f22ce6f		
Warnings:					
Information:					
Total Files Size (in bytes):			79282		
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 17/552,455		Filing Date 12/16/2021		☐ To be Mailed	
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO									
APPLICATION AS FILED - PART I									
	(Column 1)	(Column 2)							
FOR	NUMBER FILED	NUMBER EXTRA			RATE (\$)			FEE (\$)	
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*			x \$100 =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*			x \$480 =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.					TOTAL				
APPLICATION AS AMENDED - PART II									
	(Column 1)	(Column 2)	(Column 3)						
AMENDMENT	06/20/2023	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 18	Minus ** 20	= 0		x \$100 =		0	
	Independent (37 CFR 1.16(h))	* 3	Minus *** 3	= 0		x \$480 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		0	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	*	Minus **	=		x \$0 =			
	Independent (37 CFR 1.16(h))	*	Minus ***	=		x \$0 =			
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE			
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/JAMES T WASHINGTON/			
*** 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.									

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Jan 20, 2023 03:39:10 AM

Dear PAIR Customer:

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	CTFR	01/20/2023	15540-0370005

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190

26161	7590	01/20/2023
FISH & RICHARDSON P.C. (BO)		
P.O. BOX 1022		
MINNEAPOLIS, MN 55440-1022		

EXAMINER	
CONNELLY, MICHELLE R	

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
01/20/2023	ELECTRONIC

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

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

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

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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Response to Amendment

Applicant's Amendment filed December 21, 2022 has been fully considered and entered.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be

commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

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

Claims 1, 9-15, 17, and 19-28 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 8,781,269 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-15 of U.S. Patent No. 8,781,269 B2 at least disclose or suggest all of the limitations of claims 1, 9-15, 17, and 19-28 of the present application.

Regarding claim 1; U.S. Patent No. 8,781,269 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1-2 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 4-5 of claim 1),
- wherein the coupling comprises (see lines 8-17 of claim 1) electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 9-11 of claim 1), and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 9-12 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 6-7 or claim 1);
- wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement (see claim 2 of U.S. Patent No. 8,781,269 B2).

Regarding claim 9; U.S. Patent No. 8,781,269 B2 claims a system (arrangement; see lines 1-3 of claim 5) for generating a laser beam with different beam profile characteristics, comprising:

- a multi-clad fiber having one inner fiber core and at least one outer ring core (see lines 4-6 of claim 5); and
- a switchable device (see lines 7-11 of claim 5) with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of the input laser beam into the inner fiber core of the multi-clad fiber, and the input laser beam into the at least one outer ring core of the multi-clad fiber.

Regarding claim 10; see lines 1-6 of claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 11; see claim 7 of U.S. Patent No. 8,781,269 B2.

Regarding claim 12; see claim 10 of U.S. Patent No. 8,781,269 B2.

Regarding claim 13; see claim 11 of U.S. Patent No. 8,781,269 B2.

Regarding claim 14; see lines 6-9 of claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 15; see claims 8 and 9 of U.S. Patent No. 8,781,269 B2.

Regarding claim 17; see claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 19; see claims 10 and 3 of U.S. Patent No. 8,781,269 B2. The examiner notes that it's within the level of ordinary skill in the art to combine limitations from different claims in the same patent.

Regarding claim 20; see claim 14 of U.S. Patent No. 8,781,269 B2.

Regarding claim 21; see claim 15 of U.S. Patent No. 8,781,269 B2.

Regarding claim 22; U.S. Patent No. 8,781,269 B2 claims a system (arrangement; see lines 1-3 of claim 5) for generating a laser beam with different beam profile characteristics, comprising:

- a multi-clad fiber having one inner fiber core and at least one outer ring core (see lines 4-6 of claim 5); and
- a switchable device (see lines 7-16 of claim 5) with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of a first input laser beam at least into the inner fiber core of the multi-clad fiber, and a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber (see lines 12-16 of claim 5).

Regarding claim 23; see claim 11 of U.S. Patent No. 8,781,269 B2.

Regarding claim 24; see claim 12 of U.S. Patent No. 8,781,269 B2.

Regarding claim 25; see claim 13 of U.S. Patent No. 8,781,269 B2.

Regarding claim 26; see claim 14 of U.S. Patent No. 8,781,269 B2.

Regarding claim 27; see claim 15 of U.S. Patent No. 8,781,269 B2.

Regarding claim 28; U.S. Patent No. 8,781,269 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1-2 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 4-5 of claim 1),
- wherein the coupling comprises (see lines 8-17 of claim 1) electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 9-11 of claim 1), and

- coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 9-12 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 6-7 or claim 1);
- wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - projecting the input laser beam with respective different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters (see claim 3 of U.S. Patent No. 8,781,269 B2).

Claims 1 and 28 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 9,482,821 B2.

Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-11 of U.S. Patent No. 9,482,821 B2 at least disclose or suggest all of the limitations of claims 1 and 28 of the present application.

Regarding claims 1 and 28; U.S. Patent No. 9,482,821 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1 and 8-11 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 2-4 of claim 1, and lines 1-2 of claim 6),
- wherein the coupling comprises (see lines 4-7 of claim 1) electively one of

- coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 5-6 of claim 1), and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 5-7 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 6-7 or claim 1);
- wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement (see claim 2 of U.S. Patent No. 9,482,821 B2);
- wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - projecting the input laser beam with respective different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters (see claim 3 of U.S. Patent No. 9,482,821 B2).

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any

correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claim 1 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Varnham et al. (US 2006/0219673 A1).

Regarding claim 1; Varnham et al. discloses a method of generating a laser beam (optical radiation 10; see Figures 1) with different beam profile characteristics (see Figures 1 and 3-7), comprising:

- coupling an input laser beam (see paragraphs 51) into a first fiber end of a multi-clad fiber (optical fiber 1; see paragraphs 46 and 49; see Figures 1 and 2),
- wherein the coupling comprises electively one of (the examiner notes that the election may be made by selection of the fiber, and that a light beam coupled into both inner and outer cores of a fiber is electively coupled into the outer core)
 - coupling the input laser beam at least into an inner fiber core (7 in Figure 1, 21 in Figure 2) of the multi-clad fiber (1), and
 - coupling the input laser beam at least into at least one outer ring core (7, 22 in Figure 2) of the multi-clad fiber (1); and
- emitting an output laser beam from a second fiber end (12) of the multi-clad fiber (1).

Varnham et al. does not specifically disclose that coupling the input laser beam into the first fiber end of the multi-clad fiber comprises relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement.

However, Varnham et al. further teaches that coupling an input laser beam (143; see Figures 14 and 15) into a first end (144) of an optical fiber (145) may comprise adjusting the input angle (148) of the beam (143) to obtain a desired output beam profile (see paragraph 79). Given the teachings of Varnham et al., one of ordinary skill in the art would have recognized that adjusting the input angle (148) of the beam (143) coupled into the fiber (145) inherently comprises relatively moving the input laser beam

(143) with respect to a coupling-side face (144) of the fiber (145) in a direction transverse to the input laser beam (see Figure 15 and paragraph 79), which may be achieved by parallel displacement, i.e. the light source and/or the optical fiber end face may be moved in a straight line that is transverse to the direction that the optical beam propagates. Additionally, one of ordinary skill in the art would have recognized that there are a limited number of possible ways to provide relative movement of the input laser beam (143) with respect to a coupling side face of a fiber (145), including: moving the position of the laser source to adjust the angle of incidence of the beam onto the fiber, moving a coupling element (mirror or lens) located between the laser beam and the laser source to adjust an angle of incidence of the beam onto the fiber, and/or moving the end face of the optical fiber with respect to the laser beam.

Therefore, one of ordinary skill in the art would have found it obvious to couple the input laser beam into the first end of the multi-clad optical fiber (1) by relatively moving the input laser beam and a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement to adjust the input angle for the purpose of obtaining a desired beam output from the optical waveguide, since it's known that the position of the laser source and the position of the fiber end face will inherently determine the incidence angle of light into an optical fiber, and one of ordinary skill in the art would have found it obvious to apply known beam alignment techniques of adjusting the positions of laser light sources and the input end face of the optical fiber to yield predictable results, including providing an optimal incidence angle of the light beam into the fiber end face to achieve desired optical coupling into the optical fiber, since there are a finite number of predictable solutions for

adjusting an angle of incidence and one of ordinary skill could have used any of the solutions with a reasonable expectation of success. *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007).

Allowable Subject Matter

Claims 9-15, 17, and 19-28 would be allowable if the non-statutory double patenting rejection set forth above was overcome.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, which is the most relevant known prior art, does not disclose or render obvious:

- A system for generating a laser beam with different beam profile characteristics, as defined by claim 9, comprising:
 - a multi-clad fiber having one inner fiber core and at least one outer ring core; and
 - ***a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of the input laser beam into the inner fiber core of the multi-clad fiber, and the input laser beam into the at least one outer ring core of the multi-clad fiber; or***
- A system for generating a laser beam with different beam profile characteristics, as defined by claim 22, comprising:
 - a multi-clad fiber having one inner fiber core and at least one outer ring core; and

- ***a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of a first input laser beam at least into the inner fiber core of the multi-clad fiber, and a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber; or***
- A method of generating a laser beam, as defined by claim 28, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises ***projecting the input laser beam with respectively different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters.***

Claims 10-15, 17, and 19-21 depend from claim 9, and claims 23-27 depend from claim 22.

Response to Arguments

Applicant's arguments filed December 21, 2022 have been fully considered but they are not persuasive.

Applicant states that without conceding the propriety of the obviousness-type double patenting rejections, Applicant is concurrently submitting terminal disclaimers over U.S. Patent No. 8,781,269, U.S. Patent No. 9,482,821, U.S. Patent No. 10,281,656, and U.S. Patent No. 11,215,761 to obviate the rejections.

- No terminal disclaimers have been received.
- The examiner notes that the obviousness-type double patenting rejections over U.S. Patent No. 8,781,269 B2 and U.S. Patent No. 9,482,821 B2 have been maintained as set for the above, while the obviousness-type double patenting rejections over U.S. 10,281,656 B2 and U.S. 11,215,761 B2 have been withdrawn in view of Applicant's Amendment.

Applicant states that without conceding propriety of the rejection, and in a continued effort to advance prosecution of the instant application, Applicant has amended independent claim 1 to incorporate features corresponding to those of claim 2, and that the cited prior art has not been shown to disclose or suggest the combination of the features of amended claim 1.

Applicant explains that, for example, the portions of Varnham, which the action (at p. 11) relies on, recite:

The laser radiation 143 is refocused by a lens 142 onto the multimode core 146 of a first end 144 of an optical fibre 145 at an angle θ 148 and offset 149. The angle θ 148 and offset 149 are selected such that groups of modes are excited in the optical fibre 145. (Varnham, [0048]).

Changing the input angle θ 148 changes only the diameter 154 of the output ring 152... At the other extreme, for a fibre that is fully mode mixed the output distribution is independent of launching conditions and consists of a circular patch of light, regardless of the input angle θ 148 provided that the angle 148 is within the numerical aperture of the fibre. (Id., [0049]).

Applicant further explains that Varnham, at best, discloses changing (or selecting) the input angle θ 148 and offset 149 onto the multimode core 146 of a first end 144 of an optical fibre 145 to excite the groups of modes in the optical fibre 145 and thereby change the output of the optical fibre 145, which fails to disclose or suggest at least "wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises: relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement" as recited in amended claim 1.

- The examiner disagrees. One of ordinary skill in the art would have recognized that the position of the laser and the relative position of the fiber end face will determine the angle of incidence of the light beam transmitted from the laser to the fiber, and that moving the laser and/or the fiber end face in a direction transverse to the direction that the beam propagates to a position that is parallel to and displaced from a prior position will easily adjust an angle of incidence.
- Since Varnham teaches that changing the input angle, i.e. the incidence angle, of the light beam into the optical fiber will adjust the output beam, one of ordinary skill would have used any known method for adjusting the angle of incidence, including a method of moving the position of the laser source and/or the optical fiber end face, since these positions are elementary in determining an angle of incidence of the light beam.

Conclusion

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

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

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE R CONNELLY whose telephone number is (571)272-2345. The examiner can normally be reached Monday-Friday, 9 AM to 5 PM.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/MICHELLE R CONNELLY/
Primary Examiner, Art Unit 2874

<i>Index of Claims</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/20/2022	01/14/2023						
	1	✓	✓						
	2	✓	-						
	3	✓	-						
	4	-	-						
	5	-	-						
	6	-	-						
	7	-	-						
	8	-	-						
	9	✓	✓						
	10	✓	✓						
	11	✓	✓						
	12	✓	✓						
	13	✓	✓						
	14	✓	✓						
	15	✓	✓						
	16	-	-						
	17	✓	✓						
	18	-	-						
	19	✓	✓						
	20	✓	✓						
	21	✓	✓						
	22	✓	✓						
	23	✓	✓						
	24	✓	✓						
	25	✓	✓						
	26	✓	✓						
	27	✓	✓						
	28		✓						

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Rudolph Huber	Art Unit :	2874
Application No. :	17/552,455	Examiner :	Michelle R. Connelly
Filed :	December 16, 2021	Conf. No. :	3190
Title :	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

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

REPLY TO ACTION OF SEPTEMBER 23, 2022

Please consider the following reply.

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions and listings of claims in the application:

1. **(Currently Amended)** A method of generating a laser beam with different beam profile characteristics, comprising:

coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of

coupling the input laser beam at least into an inner fiber core of the multi-clad fiber, and

coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber; and

emitting an output laser beam from a second fiber end of the multi-clad fiber,

wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:

relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber in a direction transverse to the input laser beam with parallel displacement.

2. **(Cancelled)**

3. **(Cancelled)**

4. – 8. (Cancelled)

9. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:
- a multi-clad fiber having one inner fiber core and at least one outer ring core; and
 - a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
 - the input laser beam into the inner fiber core of the multi-clad fiber, and
 - the input laser beam into the at least one outer ring core of the multi-clad fiber.
10. (Original) The system of claim 9, wherein the switchable device comprises adjustable optical deflector configured to, in the at least two switch positions, deflect the input laser beam in a direction transverse to an axis of a coupling-side face of the multi-clad fiber to varying extents.
11. (Original) The system of claim 10, wherein the optical deflector comprises an optical device that is positionable in the at least two switch positions transverse to an optical axis of the input laser beam.
12. (Original) The system of claim 11, wherein the optical device is arrangeable in one of the switch positions outside a beam path of the input laser beam and in at least one other of the switch positions at least partially in the beam path of the laser beam.
13. (Original) The system of claim 11, wherein the optical device comprises an optical wedge plate.
14. (Original) The system of claim 9, wherein the switchable device comprises a controller configured to, in the at least two switch positions, move a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam to varying extents.
15. (Previously Presented) The system of claim 9, wherein the switchable device comprises an adjustable optical device configured to, in the at least two switch positions, project the input

laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber,
and

wherein the adjustable optical device is configured to be moved back and forth along an optical axis of an input laser beam axis between the at least two switch positions.

16. (Cancelled)

17. (Original) The system of claim 9, wherein the switchable device comprises an adjustable aperture configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber.

18. (Cancelled)

19. (Original) The system of claim 9, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

20. (Original) The system of claim 9, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

21. (Previously Presented) The system of claim 9, wherein the switchable device comprises two optical fibers on an input side, via which first and second sub-beams are supplied, whereby the switchable device electively couples the first sub-beam at least into the inner fiber core of the multi-clad fiber and the second sub-beam at least into at least the one outer ring core of the multi-clad fiber.

22. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:

a multi-clad fiber having one inner fiber core and at least one outer ring core; and
a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
a first input laser beam at least into the inner fiber core of the multi-clad fiber, and
a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber.

23. (Original) The system of claim 22, wherein the switchable device comprises a beam divider configured to be moved into the input laser beam to divide the input laser beam into at least two sub-beams, each of the at least two sub-beam being coupled into a respective one of the cores of the multi-clad fiber.

24. (Original) The system of claim 22, wherein a diameter of the inner fiber core of the multi-clad fiber is no more than 200 μm .

25. (Original) The system of claim 22, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

26. (Original) The system of claim 22, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

27. (Previously Presented) The system of claim 22, wherein the switchable device comprises two optical fibers on an input side, via which the first and second input laser beams are supplied, whereby the switchable device electively couples the first input laser beam at least into the inner fiber core of the multi-clad fiber and the second input laser beam at least into at least one outer ring core of the multi-clad fiber.

28. **(New)** A method of generating a laser beam with different beam profile characteristics, comprising:

coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of

coupling the input laser beam at least into an inner fiber core of the multi-clad fiber, and

coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber; and

emitting an output laser beam from a second fiber end of the multi-clad fiber, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:

projecting the input laser beam with respectively different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 7 of 10

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

REMARKS

This Application has been reviewed in light of the Office Action mailed on September 23, 2022 (hereinafter “*Action*”). Claims 1-3, 9-15, 17 and 19-27 were pending and currently stand rejected. Applicant has amended claim 1, cancelled claims 2 and 3, and added new claim 28. Support for the claim amendments and new claims can be found, for example, in Applicant's specification at [0012] and FIG. 1. No new subject matter has been added. Applicant presents the pending claims for examination in view of the amendments and the following remarks.

Double-Patenting Rejection

Claims 1-3, 9-15, 17, and 19-27 stand rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 8,781,269 B2. Claims 1-3 stand rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 9,482,821 B2. Claim 1 stands rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 10,281,656 B2. Claim 1 stands rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 11,215,761 B2.

Without conceding the propriety of the obviousness-type double patenting rejections, Applicant is concurrently submitting terminal disclaimers over U.S. Patent No. 8,781,269, U.S. Patent No. 9,482,821, U.S. Patent No. 10,281,656, and U.S. Patent No. 11,215,761 to obviate the rejections. Applicant respectfully requests that the rejection be withdrawn.

Claim Rejections – 35 USC § 102 & 103

Claim 1 stands rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by U.S. Pat. Pub. No. 2006/0219673 A1 (“*Varnham*”). Claim 2 stands rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over *Varnham*. The rejection is respectfully traversed.

Without conceding propriety of the rejection, and in a continued effort to advance prosecution of the instant application, Applicant has amended independent claim 1 to incorporate features corresponding to those of claim 2. Applicant respectfully submits the cited prior art has not been shown to disclose or suggest the combination of the features of amended claim 1.

For example, the portions of *Varnham*, which the *Action* (at p. 11) relies on, recite:

The laser radiation 143 is refocused by a lens 142 onto the multimode core 146 of a first end 144 of an optical fibre 145 at an angle θ 148 and offset 149. **The angle θ 148 and offset 149 are selected** such that groups of modes are excited in the optical fibre 145. (Varnham, [0048]).

Changing the input angle θ 148 changes only the diameter 154 of the output ring 152... At the other extreme, for a fibre that is fully mode mixed the output distribution is independent of launching conditions and consists of a circular patch of light, **regardless of the input angle θ 148 provided that the angle 148 is within the numerical aperture of the fibre.** (Id., [0049]).

For ease of reference, FIGS. 14 and 15 of *Varnham* have been reproduced as below:

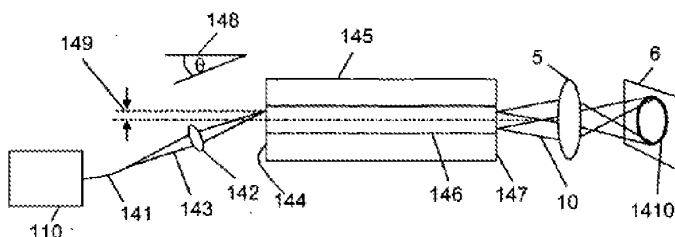


Fig 14

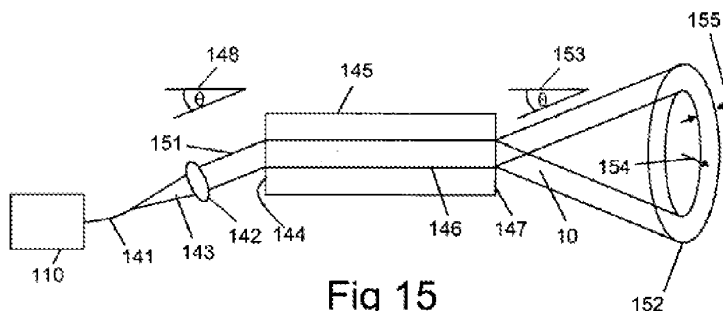


Fig 15

Thus, *Varnham*, at best, discloses changing (or selecting) the input angle θ 148 and offset 149 onto the multimode core 146 of a first end 144 of an optical fibre 145 to excite the groups of modes in the optical fibre 145 and thereby change the output of the optical fibre 145, which fails to disclose or suggest at least “wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises: relatively moving the input laser beam and a coupling-side face of the first fiber end of the multi-clad fiber **in a direction transverse to the input laser beam with parallel displacement**” as recited in amended claim 1.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 9 of 10

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

For at least the foregoing reasons, Applicant respectfully submits that the rejections of claim 1 should be withdrawn. Claim 2 has been cancelled. Applicant respectfully requests reconsideration and allowance of claim 1.

Allowable Subject Matter

Applicant thanks the Examiner for identifying that claims 3, 9-15, 17, and 19-27 are allowable.

New Claim 28

Claim 28 recites features of original claim 1 and allowable claim 3. Thus, Applicant respectfully submits that claim 28 is allowable for at least the same reason as claim 3.

Request for Interview

If the present Application is not allowed and/or if one or more of the rejections is maintained, Applicant hereby requests a telephone conference with the Examiner and further request that the Examiner contact the undersigned representative to schedule the telephone conference.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 10 of 10

Attorney Docket No.: 15540-0370005 / 18.01127;
DS10502

CONCLUSION

By responding in the foregoing remarks only to particular positions taken in the action, Applicant does not acquiesce in other positions that have not been explicitly addressed. In addition, Applicant's selecting some particular arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist. Finally, Applicant's decision to amend or cancel any claim should not be understood as implying that Applicant agrees with any positions taken in the action with respect to that claim or other claims, or that Applicant adopts any position except as specifically stated in this paper. In particular, by amending or cancelling a claim, Applicant does not necessarily concede that the claim prior to amendment or cancellation was unpatentable.

Applicant respectfully requests consideration of all filed IDSs not previously considered, by initialing and returning each Form PTO-1449.

The fees for extra claim are being paid with this reply on the Electronic Filing System. Please apply those fees and any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 12/21/2022

/Yunbo Guo/

Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

24248468.doc

Electronic Patent Application Fee Transmittal				
Application Number:		17552455		
Filing Date:		16-Dec-2021		
Title of Invention:		METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
First Named Inventor/Applicant Name:		Rudolph Huber		
Filer:		Yunbo Guo/Cheryl Forrest		
Attorney Docket Number:		15540-0370005		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	480	480
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				480

Electronic Acknowledgement Receipt	
EFS ID:	47249577
Application Number:	17552455
International Application Number:	
Confirmation Number:	3190
Title of Invention:	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER
First Named Inventor/Applicant Name:	Rudolph Huber
Customer Number:	26161
Filer:	Yunbo Guo/Cheryl Forrest
Filer Authorized By:	Yunbo Guo
Attorney Docket Number:	15540-0370005
Receipt Date:	21-DEC-2022
Filing Date:	16-DEC-2021
Time Stamp:	09:54:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$480
RAM confirmation Number	E2022BK054313967
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ReplytoOA.pdf	161142	yes	10
			355312b8f6a7c77fab2f257bdd5d7129b9b63eaa		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment/Request for Reconsideration-After Non-Final Rejection		1	1	
	Claims		2	6	
	Applicant Arguments/Remarks Made in an Amendment		7	10	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38275	no	2
			f5d3fccff04f6517b0247397e692bcd7b58ee2e0		
Warnings:					
Information:					
Total Files Size (in bytes):			199417		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 17/552,455		Filing Date 12/16/2021		☐ To be Mailed	
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO									
APPLICATION AS FILED - PART I									
	(Column 1)	(Column 2)							
FOR	NUMBER FILED	NUMBER EXTRA			RATE (\$)			FEE (\$)	
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*			x \$100 =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*			x \$480 =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.							TOTAL		
APPLICATION AS AMENDED - PART II									
	(Column 1)	(Column 2)	(Column 3)						
AMENDMENT	12/21/2022	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 19	Minus	** 20	= 0		x \$100 =	0	
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 3	= 1		x \$480 =	480	
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE	480		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	*	Minus	**	=		x \$0 =		
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x \$0 =		
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE			
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/DEBORAH D SCOTT/			
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									

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

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

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UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	CTNF	09/23/2022	15540-0370005
	892	09/23/2022	15540-0370005
	1449	09/23/2022	15540-0370005

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/552,455	12/16/2021	Rudolph Huber	15540-0370005	3190
26161 7590 09/23/2022 FISH & RICHARDSON P.C. (BO) P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			EXAMINER CONNELLY, MICHELLE R	
			ART UNIT 2874	PAPER NUMBER
			NOTIFICATION DATE 09/23/2022	DELIVERY MODE ELECTRONIC

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

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

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

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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on June 14, 2022 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Five (5) sheets of drawings were filed on December 16, 2021 and have been accepted by the examiner.

Specification

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Double Patenting

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

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

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

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

www.uspto.gov/patents/process/file/efs/guidance/eTD-info-l.jsp.

Claims 1-3, 9-15, 17, and 19-27 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No.

8,781,269 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-15 of U.S. Patent No. 8,781,269 B2 at least disclose or suggest all of the limitations of claims 1-3, 9-15, 17, and 19-27 of the present application.

Regarding claim 1; U.S. Patent No. 8,781,269 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1-2 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 4-5 of claim 1),
- wherein the coupling comprises (see lines 8-17 of claim 1) electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 9-11 of claim 1), and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 9-12 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 6-7 or claim 1).

Regarding claim 2; see claim 2 of U.S. Patent No. 8,781,269 B2.

Regarding claim 3; see claim 3 of U.S. Patent No. 8,781,269 B2.

Regarding claim 9; U.S. Patent No. 8,781,269 B2 claims a system (arrangement; see lines 1-3 of claim 5) for generating a laser beam with different beam profile characteristics, comprising:

- a multi-clad fiber having one inner fiber core and at least one outer ring core (see lines 4-6 of claim 5); and
- a switchable device (see lines 7-11 of claim 5) with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of the input laser beam into the inner fiber core of the multi-clad fiber, and the input laser beam into the at least one outer ring core of the multi-clad fiber.

Regarding claim 10; see lines 1-6 of claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 11; see claim 7 of U.S. Patent No. 8,781,269 B2.

Regarding claim 12; see claim 10 of U.S. Patent No. 8,781,269 B2.

Regarding claim 13; see claim 11 of U.S. Patent No. 8,781,269 B2.

Regarding claim 14; see lines 6-9 of claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 15; see claims 8 and 9 of U.S. Patent No. 8,781,269 B2.

Regarding claim 17; see claim 6 of U.S. Patent No. 8,781,269 B2.

Regarding claim 19; see claims 10 and 3 of U.S. Patent No. 8,781,269 B2. The examiner notes that it's within the level of ordinary skill in the art to combine limitations from different claims in the same patent.

Regarding claim 20; see claim 14 of U.S. Patent No. 8,781,269 B2.

Regarding claim 21; see claim 15 of U.S. Patent No. 8,781,269 B2.

Regarding claim 22; U.S. Patent No. 8,781,269 B2 claims a system (arrangement; see lines 1-3 of claim 5) for generating a laser beam with different beam profile characteristics, comprising:

- a multi-clad fiber having one inner fiber core and at least one outer ring core (see lines 4-6 of claim 5); and
- a switchable device (see lines 7-16 of claim 5) with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of a first input laser beam at least into the inner fiber core of the multi-clad fiber, and a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber (see lines 12-16 of claim 5).

Regarding claim 23; see claim 11 of U.S. Patent No. 8,781,269 B2.

Regarding claim 24; see claim 12 of U.S. Patent No. 8,781,269 B2.

Regarding claim 25; see claim 13 of U.S. Patent No. 8,781,269 B2.

Regarding claim 26; see claim 14 of U.S. Patent No. 8,781,269 B2.

Regarding claim 27; see claim 15 of U.S. Patent No. 8,781,269 B2.

Claims 1-3 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 9,482,821 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-11 of U.S. Patent No. 9,482,821 B2 at least disclose or suggest all of the limitations of claims 1-3 of the present application.

Regarding claim 1; U.S. Patent No. 9,482,821 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1 and 8-11 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 2-4 of claim 1, and lines 1-2 of claim 6),
- wherein the coupling comprises (see lines 4-7 of claim 1) electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 5-6 of claim 1), and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 5-7 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 6-7 or claim 1).

Regarding claim 2; see claim 2 of U.S. Patent No. 9,482,821 B2.

Regarding claim 3; see claim 3 of U.S. Patent No. 9,482,821 B2.

Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 10,281,656 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-15 of U.S. Patent No. 10,281,656 B2 at least disclose or suggest all of the limitations of claim 1 of the present application.

Regarding claim 1; U.S. Patent No. 10,281,656 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1 and 15-16 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 2-5 of claim 1, and lines 1-2 of claim 6),
- wherein the coupling comprises (see lines 2-12 of claim 1) electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 6-7 and 10-12 of claim 1), and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 8-12 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 13-15 or claim 1).

Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 11,215,761 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-5 of U.S. Patent No. 11,215,761 B2 at least disclose or suggest all of the limitations of claim 1 of the present application.

Regarding claim 1; U.S. Patent No. 11,215,761 B2 claims a method of generating a laser beam with different beam profile characteristics (see lines 1-2 of claim 1), comprising:

- coupling an input laser beam into a first fiber end of a multi-clad fiber (see lines 3-5 of claim 1 of claim 6),
- wherein the coupling comprises (see lines 3-5 of claim 1) electively one of

- coupling the input laser beam at least into an inner fiber core of the multi-clad fiber (see lines 6-7 of claim 1), and
- coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber (see lines 8-10 or claim 1); and
- emitting an output laser beam from a second fiber end of the multi-clad fiber (see lines 11-12 or claim 1).

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

Claim 1 is rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Varnham et al. (US 2006/0219673 A1).

Regarding claim 1; Varnham et al. discloses a method of generating a laser beam (optical radiation 10; see Figures 1) with different beam profile characteristics (see Figures 1 and 3-7), comprising:

- coupling an input laser beam (see paragraphs 51) into a first fiber end of a multi-clad fiber (optical fiber 1; see paragraphs 46 and 49; see Figures 1 and 2),
- wherein the coupling comprises electively one of (the examiner notes that the election may be made by selection of the fiber, and that a light beam coupled into both inner and outer cores of a fiber is electively coupled into the outer core)
 - coupling the input laser beam at least into an inner fiber core (7 in Figure 1, 21 in Figure 2) of the multi-clad fiber (1), and
 - coupling the input laser beam at least into at least one outer ring core (7, 22 in Figure 2) of the multi-clad fiber (1); and
- emitting an output laser beam from a second fiber end (12) of the multi-clad fiber (1).

Claim Rejections - 35 USC § 103

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

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

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Varnham et al. (US 2006/0219673 A1).

Regarding claim 2; Varnham et al. teaches that coupling an input laser beam (143; see Figures 14 and 15) into a first end (144) of an optical fiber (145) may comprise adjusting the input angle (148) of the beam (143) to obtain a desired output beam profile (see paragraph 79). One of ordinary skill in the art would have recognized that adjusting the input angle (148) of the beam (143) coupled into the fiber (145) comprises relatively moving the input laser beam (143) with respect to a coupling-side face (144) of the fiber (145) in a direction transverse to the input laser beam (see Figure 15 and paragraph 79). Thus, one of ordinary skill in the art would have found it obvious to couple the input laser beam into the first end of the multi-clad optical fiber (1) by relatively moving the input laser beam and a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam to adjust the input angle for the purpose of obtaining a desired beam output from the optical waveguide.

Allowable Subject Matter

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if the non-statutory double patenting rejection set forth above

was overcome and if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 9-15, 17, and 19-27 would be allowable if the non-statutory double patenting rejection set forth above was overcome.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, which is the most relevant known prior art, does not disclose or render obvious:

- The method defined by claim 3, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises ***projecting the input laser beam with respectively different beam cross-sections onto a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters;***
- a system for generating a laser beam with different beam profile characteristics, as defined by claim 9, comprising:
 - a multi-clad fiber having one inner fiber core and at least one outer ring core; and
 - ***a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of the input laser beam into the inner fiber core of the multi-clad fiber, and the input laser beam into the at least one outer ring core of the multi-clad fiber; or***

- a system for generating a laser beam with different beam profile characteristics, as defined by claim 22, comprising:
 - a multi-clad fiber having one inner fiber core and at least one outer ring core; and
 - ***a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of a first input laser beam at least into the inner fiber core of the multi-clad fiber, and a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber.***

Claims 10-15, 17, and 19-21 depend from claim 9, and claims 23-27 depend from claim 22.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE R CONNELLY whose telephone number is (571)272-2345. The examiner can normally be reached Monday-Friday, 9 AM to 5 PM.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/MICHELLE R CONNELLY/
Primary Examiner, Art Unit 2874

Notice of References Cited	Application/Control No. 17/552,455		Applicant(s)/Patent Under Reexamination Huber et al.	
	Examiner MICHELLE R CONNELLY		Art Unit 2874	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-8781269-B2	07-2014	Huber; Rudolf	B23K26/064	385/18
*	B	US-9482821-B2	11-2016	Huber; Rudolf	B23K26/067	1/1
*	C	US-10281656-B2	05-2019	Huber; Rudolph	G02B6/03644	1/1
*	D	US-11215761-B2	01-2022	Huber; Rudolph	B23K26/073	1/1
*	E	US-20060219673-A1	10-2006	Varnham; Malcolm Paul	B23K26/0734	219/121.85
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
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NON-PATENT DOCUMENTS

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

<i>Search Notes</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296) limited with text (see attached text search strategy)	09/20/2022	/MC/
Inventor & Assignee search	09/20/2022	/MC/
PE2E SEARCH (see attached text search strategy)	09/20/2022	/MC/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
PE2E SEARCH	see attached text search strategy	09/20/2022	/MC/

/MICHELLE R CONNELLY/ Primary Examiner, Art Unit 2874	
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<i>Index of Claims</i> 	Application/Control No. 17/552,455	Applicant(s)/Patent Under Reexamination Huber et al.
	Examiner MICHELLE R CONNELLY	Art Unit 2874

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/20/2022							
	1	✓							
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	3	✓							
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	27	✓							

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	16/398,362	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 03:40 PM
L2	8	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and laser and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:17 PM
L3	0	("2020/0310055").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L4	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L5	0	("2017/0031105").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L6	24	("2015/0293306").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L7	46	("2013/0223792").URP N.	(USPAT)	OR	ON	ON	2021/04/15 05:18 PM
L8	37	("20020071647" "20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20110305249" "20130064706" "20150217402" "20150378184" "3941670" "3975082"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/04/15 05:19 PM

L9	43	"4475788" "4575181" "5461692" "5475704" "5684642" "6819815" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269" "9482821").PN. OR ("10281656").URPN. ("20020071647" "20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20130064706" "3941670" "3975082" "4475788" "4575181" "5461682" "5461692" "5684642" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269").PN. OR ("9482821").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/04/15 05:19 PM
L10	55	("20020071647" "20020168139" "20020172485" "20060251367" "20060263024" "3941670" "4475788" "4575181" "5684642" "7372877" "7379237" "7379648" "7720340" "7738166" "7809225" "7839902" "7933479" "8076632" "8094370" "8456523").PN. OR ("8781269").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/04/15 05:19 PM
L11	92	(L3 or L4 or L5 or L6 or L7 or L8 or L9 or L10)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/04/15 05:19 PM
L12	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:20 PM

L13	186	G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:20 PM
L14	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:22 PM
L15	1	L12 not L2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:22 PM
L16	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:24 PM

L17	4	near2 core) and (subbeam or sub-beam) and divid\$3).clm. ((laser adj beam) and coupl\$3 and fiber and (multiclad or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/15 05:27 PM
L18	59	"8781269"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/19 10:58 AM
L19	1	("8781269").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/04/19 10:59 AM
L20	79	((("HUBER") near3 ("Rudolph")) OR ((("ANDREASCH") near3 ("Wolfgang")) OR ((("HUONKER") near3 ("Martin")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2021/04/19 11:01 AM
L21	54	((("TRUMPF") near3 ("LASER-") near3 ("UND") near3 ("SYSTEMTECHNIK") near3 ("GMBH"))).AS,AANM.	(USPAT)	OR	ON	ON	2021/04/19 11:01 AM
L22	7	(L20 or L21) and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclad or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/04/19 11:01 AM
L23	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:58 PM
L24	1	16/398,362	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:58 PM
L25	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:58 PM

		B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and laser and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical- fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre- optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi- core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub- beam)					
L26	0	("2020/0310055").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:58 PM
L27	3	("2019/0258009").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L28	0	("2017/0031105").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L29	24	("2015/0293306").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L30	47	("2013/0223792").URP N.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L31	37	("20020071647" "20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20110305249" "20130064706" "20150217402" "20150378184" "3941670" "3975082" "4475788" "4575181" "5461692" "5475704" "5684642" "6819815" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269" "9482821").PN. OR ("10281656").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L32	43	("20020071647"	(US-PGPUB; USPAT;	OR	ON	ON	2021/08/28

		"20020168139" "20020172485" "20050031261" "20060251367" "20060263024" "20130064706" "3941670" "3975082" "4475788" "4575181" "5461682" "5461692" "5684642" "7372877" "7379237" "7379648" "7592568" "7720340" "7738166" "7809225" "7839902" "7933479" "8008600" "8076632" "8094370" "8326099" "8456523" "8781269").PN. OR ("9482821").URPN.	USOCR)				07:59 PM
L33	55	("20020071647" "20020168139" "20020172485" "20060251367" "20060263024" "3941670" "4475788" "4575181" "5684642" "7372877" "7379237" "7379648" "7720340" "7738166" "7809225" "7839902" "7933479" "8076632" "8094370" "8456523").PN. OR ("8781269").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L34	93	(L26 or L23 or L28 or L29 or L30 or L31 or L32 or L33)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2021/08/28 07:59 PM
L35	10	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre- optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi- core or (multiple adj core) or (plural\$3 near2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM

L36	199	core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam) (G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L37	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L38	1	L35 not L25	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L39	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L40	4	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM

L41	62	"8781269"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L42	1	("8781269").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/08/28 07:59 PM
L43	80	((("HUBER") near3 ("Rudolph")) OR ((("ANDREASCH") near3 ("Wolfgang")) OR ((("HUONKER") near3 ("Martin")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2021/08/28 07:59 PM
L44	58	((("TRUMPF") near3 ("LASER-") near3 ("UND") near3 ("SYSTEMTECHNIK") near3 ("GMBH"))).AS,AANM.	(USPAT)	OR	ON	ON	2021/08/28 07:59 PM
L45	7	(L43 or L44) and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 07:59 PM
L46	18	(L23 or L24 or L25 or L26 or L27 or L28 or L29 or L30 or L31 or L32 or L33 or L34 or L35 or L36 or L37 or L38 or L39 or L40 or L41 or L42 or L43 or L44 or L45) and @pd>"20210419"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/08/28 08:05 PM
L54	7	((("10795090") or ("10197741") or ("9778422") or ("9354402") or ("8992095") or ("8845205") or ("8382382"))).PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/08/29 09:36 PM
L55	1	((US-20190258009-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/09/19 11:41 AM

			MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L56	3	("2019/0258009").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:42 AM
L57	30	(michelle near2 connelly).xp. AND (beam near2 profile)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:43 AM
L58	21	("5012069" "5449881" "5684642" "8399803" "9620925" "10310201" "10807190" "20020198622" "20060219673" "20070170157" "20090211700" "20110127697" "20110240617" "20130073071" "20130148925" "20130223792" "20140010508" "20150372444" "20180147661" "20190118299").pn. OR ("11022747").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:44 AM
L59	67	("2013/0148925").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:46 AM
L60	3	("2019/0258009").urpn. AND (PGPB USPT USOC).dbnm.L56	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/19 11:58 AM
L61	45	("10281656" OR "11215761" OR "20020071647" OR "20020168139" OR "20020172485" OR "20050031261" OR "20060219673" OR "20060251367" OR "20060263024" OR "20110305249" OR "20130064706" OR "20130223792" OR "20150217402" OR "20150293306" OR "20150378184" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/19 12:07 PM

L62	45	"20170031105" OR "20190025502" OR "20190118299" OR "20190258009" OR "3941670" OR "3975082" OR "4475788" OR "4575181" OR "5461692" OR "5475704" OR "5684642" OR "6819815" OR "7372877" OR "7379237" OR "7379648" OR "7592568" OR "7720340" OR "7738166" OR "7809225" OR "7839902" OR "7933479" OR "8008600" OR "8076632" OR "8094370" OR "8326099" OR "8456523" OR "8781269" OR "8861910" OR "9482821" OR "9755739").pn. ("10281656" OR "11215761" OR "20020071647" OR "20020168139" OR "20020172485" OR "20050031261" OR "20060219673" OR "20060251367" OR "20060263024" OR "20110305249" OR "20130064706" OR "20130223792" OR "20150217402" OR "20150293306" OR "20150378184" OR "20170031105" OR "20190025502" OR "20190118299" OR "20190258009" OR "3941670" OR "3975082" OR "4475788" OR "4575181" OR "5461692" OR "5475704" OR "5684642" OR "6819815" OR "7372877" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/19 03:32 PM
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L63	23	"7379237" OR "7379648" OR "7592568" OR "7720340" OR "7738166" OR "7809225" OR "7839902" OR "7933479" OR "8008600" OR "8076632" OR "8094370" OR "8326099" OR "8456523" OR "8781269" OR "8861910" OR "9482821" OR "9755739").pn. ((US-20190258009-A1 OR US-20190118299- A1 OR US- 20180147661-A1 OR US-20150372444-A1 OR US-20130223792- A1 OR US- 20130148925-A1 OR US-20060219673-A1 OR US-20190025502- A1 OR US- 20170031105-A1 OR US-20150293306-A1 OR US-20150217402- A1).did. AND PGPB.dbnm.) OR ((US- 10916911-B2 OR US- 11215761-B2 OR US- 11022747-B2 OR US- 10807190-B2 OR US- 9620925-B2 OR US- 11435538-B2 OR US- 10281656-B2 OR US- 9755739-B1 OR US- 9482821-B2 OR US- 8781269-B2 OR US- 7592568-B2 OR US- 5461692-A).did. AND USPT.dbnm.) ("20060219673").pn. (L23 OR L24 OR L25 OR L26 OR L27 OR L28 OR L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR L38 OR L39 OR L40 OR L41 OR L42 OR L43 OR L44 OR L45)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/19 08:36 PM
L65	1	(US-PGPUB)	(US-PGPUB)	OR	ON	ON	2022/09/19 09:36 PM
L66	109	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/20 11:52 AM

		AND @pd>"20210415"					
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PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N47	9	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and laser and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM
N48	10	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input)) and (subbeam or sub-beam)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM

N49	194	(G02B6/3508 or B23K26/067 or B23K26/064 or G02B6/02042 or G02B6/35 or B23K26/073 or G02B6/03644 or G02B6/262 or G02B6/4206 or G02B6/4296).cpc. and (((optic\$3 near2 fib\$3) or opticalfib\$3 or optical-fib\$3 or opticfib\$3 or optic-fib\$3 or fibreoptic\$3 or fibre-optic\$3 or fiberoptic\$3 or fiber-optic\$3) same (multi-clad or multiclاد or multicore or multi-core or (multiple adj core) or (plural\$3 near2 core))) and (divid\$3 with (light or beam or input))	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:05 PM
N50	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM
N51	5	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM
N52	4	((laser adj beam) and coupl\$3 and fiber and (multiclاد or multi-clad) and (inner near2 core) and ((outer or ring) near2 core) and (subbeam or sub-beam) and divid\$3 and different).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:06 PM
N53	194	(N48 or N48 or N49 or N50 or N51 or N52)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/28 08:08 PM
N54	29	(N48 OR N48 OR N49 OR N50 OR N51 OR N52) AND @pd>"20210415"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/20 11:50 AM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Rudolph Huber Art Unit : Unknown
Application No. : 17/552,455 Examiner : Unknown
Filed : December 16, 2021 Conf. No. : 3190
Title : METHOD AND ARRANGEMENT FOR GENERATING A LASER
BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

MAIL STOP AMENDMENT

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

INFORMATION DISCLOSURE STATEMENT

Please consider the documents listed on the disclosure form submitted with this statement. Copies of the documents are being submitted with this statement to the extent required under 37 C.F.R. § 1.98(a)(2).

Under 35 U.S.C. § 120, this application relies on the earlier filing date of application number 16/398,362, filed on April 30, 2019. All listed documents were submitted to and/or cited by the Office in the prior application, and so copies of those documents are not provided in this application.

This statement is being filed before the receipt of a first action on the merits.

Apply any necessary charges or credits applicable under 37 C.F.R. § 1.17(p) to deposit account 06-1050, referencing the above attorney docket number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: 06/14/2022

/Yunbo Guo/

Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

Sheet 1 of 3

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 15540-0370005	Application No. 17/552,455
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant TRUMPF Laser- und Systemtechnik GmbH	
		Filing Date December 16, 2021	Group Art Unit Unknown

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Filing Date If Appropriate	Class	Subclass
/M.R.C/	1.	3,941,670	3/2/1976	Pratt			
	2.	3,975,082	8/17/1976	Winzer			
	3.	4,475,788	10/9/1984	Tomassini et al			
	4.	4,575,181	3/11/1986	Ishikawa			
	5.	5,461,692	10/24/1995	Nagel			
	6.	5,475,704	12/12/1995	Lomashevich			
	7.	5,684,642	11/4/1997	Zumoto et al			
	8.	6,819,815	11/16/2004	Corbalis et al.			
	9.	7,372,877	5/13/2008	Shirakawa et al			
	10.	7,379,237	5/27/2008	Di Teodoro et al			
	11.	7,379,648	5/27/2008	Brooks et al			
	12.	7,592,568	9/22/2009	Vamham et al			
	13.	7,720,340	5/18/2010	Lewis et al			
	14.	7,738,166	6/15/2010	Murison et al			
	15.	7,809,225	10/5/2010	Bouma et al			
	16.	7,839,902	11/23/2010	Li et al.			
	17.	7,933,479	4/26/2011	Gonthier et al			
	18.	8,008,600	8/30/2011	Nakamae et al			
	19.	8,076,632	12/13/2011	Kreysing et al			
	20.	8,094,370	1/10/2012	Lewis			
	21.	8,326,099	12/4/2012	Singer et al			
	22.	8,456,523	6/4/2013	Stork Gennant Wersborg			
	23.	8,781,269	7/15/2014	Huber et al			
	24.	8,861,910	10/14/2014	Yun			
	25.	9,482,821	11/1/2016	Huber et al.			
/M.R.C/	26.	9,755,739	9/5/2017	Wang et al.			

Examiner Signature /MICHELLE R CONNELLY/	Date Considered 09/19/2022
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

Sheet 2 of 3

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 15540-0370005	Application No. 17/552,455
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant TRUMPF Laser- und Systemtechnik GmbH	
		Filing Date December 16, 2021	Group Art Unit Unknown

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Filing Date If Appropriate	Class	Subclass
/M.R.C/	27.	10,281,656	5/7/2019	Huber et al.			
	28.	11,215,761	1/4/2022	Huber et al.			
	29.	2002/0071647	6/13/2002	Manzur			
	30.	2002/0168139	11/14/2002	Clarkson et al.			
	31.	2002/0172485	11/21/2002	Keaton et al.			
	32.	2005/0031261	2/10/2005	Tanaka			
	33.	2006/0219673	10/5/2006	Varnham et al.			
	34.	2006/0251367	11/9/2006	Seifert et al.			
	35.	2006/0263024	11/23/2006	Dong et al.			
	36.	2011/0305249	12/15/2011	Gapontsev et al.			
	37.	2013/0064706	3/14/2013	Schwarze et al.			
	38.	2013/0223792	8/29/2013	Huber et al.			
	39.	2015/0217402	8/6/2015	Hesse et al.			
	40.	2015/0293306	10/15/2015	Huber et al.			
	41.	2015/0378184	12/31/2015	Tayebati et al.			
	42.	2017/0031105	2/2/2017	Huber et al.			
	43.	2019/0025502	1/24/2019	Zediker et al.			
	44.	2019/0118299	4/25/2019	Kangastupa et al.			
/M.R.C/	45.	2019/0258009	8/22/2019	Huber et al.			

Foreign Patent Documents or Published Foreign Patent Applications							
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Translation	Class	Subclass
/M.R.C/	46.	CN 1580865	2/16/2005	CN			
/M.R.C/	47.	DE 3833992	4/12/1990	DE			
/M.R.C/	48.	DE 3833993	4/12/1990	DE			
/M.R.C/	49.	DE 4200587	4/1/1993	DE			
/M.R.C/	50.	FR 0362466	9/26/1990	EP			

Examiner Signature /MICHELLE R CONNELLY/	Date Considered 09/19/2022
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Sheet 3 of 3

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 15540-0370005	Application No. 17/552,455
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		Filing Date December 16, 2021	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications							
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Translation	Class	Subclass
/M.R.C/	51.	FR 2284892	4/9/1976	FR			
/M.R.C/	52.	GB 2449689	12/3/2008	GB			
/M.R.C/	53.	KR 100750511	8/13/2007	KR			
/M.R.C/	54.	WO 2009/155536	12/23/2009	WO			
	55.	WO 2010009101	1/21/2010	WO			

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/M.R.C/	56.	DE German Office Action dated November 22, 2010
/M.R.C/	57.	EP Extended European Search Report dated July 1, 2013
/M.R.C/	58.	IN Office Action for Indian Application No. 8560/CHENP/2012 by Controller Ambigaapathy A, dated November 20, 2017, 6 pages (with English translation)
/M.R.C/	59.	PCT International Search Report dated May 6, 2011

Examiner Signature /MICHELLE R CONNELLY/	Date Considered 09/19/2022
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Rudolph Huber Art Unit : Unknown
Application No. : 17/552,455 Examiner : Unknown
Filed : December 16, 2021 Conf. No. : 3190
Title : METHOD AND ARRANGEMENT FOR GENERATING A LASER
BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

MAIL STOP AMENDMENT

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

INFORMATION DISCLOSURE STATEMENT

Please consider the documents listed on the disclosure form submitted with this statement. Copies of the documents are being submitted with this statement to the extent required under 37 C.F.R. § 1.98(a)(2).

Under 35 U.S.C. § 120, this application relies on the earlier filing date of application number 16/398,362, filed on April 30, 2019. All listed documents were submitted to and/or cited by the Office in the prior application, and so copies of those documents are not provided in this application.

This statement is being filed before the receipt of a first action on the merits.

Apply any necessary charges or credits applicable under 37 C.F.R. § 1.17(p) to deposit account 06-1050, referencing the above attorney docket number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: 06/14/2022 /Yunbo Guo/
Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

62854611.doc

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 15540-0370005	Application No. 17/552,455
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant TRUMPF Laser- und Systemtechnik GmbH	
		Filing Date December 16, 2021	Group Art Unit Unknown

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Filing Date If Appropriate	Class	Subclass
	1.	3,941,670	3/2/1976	Pratt			
	2.	3,975,082	8/17/1976	Winzer			
	3.	4,475,788	10/9/1984	Tomassini et al			
	4.	4,575,181	3/11/1986	Ishikawa			
	5.	5,461,692	10/24/1995	Nagel			
	6.	5,475,704	12/12/1995	Lomashevich			
	7.	5,684,642	11/4/1997	Zumoto et al			
	8.	6,819,815	11/16/2004	Corbalis et al.			
	9.	7,372,877	5/13/2008	Shirakawa et al			
	10.	7,379,237	5/27/2008	Di Teodoro et al			
	11.	7,379,648	5/27/2008	Brooks et al			
	12.	7,592,568	9/22/2009	Vamham et al			
	13.	7,720,340	5/18/2010	Lewis et al			
	14.	7,738,166	6/15/2010	Murison et al			
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	17.	7,933,479	4/26/2011	Gonthier et al			
	18.	8,008,600	8/30/2011	Nakamae et al			
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	23.	8,781,269	7/15/2014	Huber et al			
	24.	8,861,910	10/14/2014	Yun			
	25.	9,482,821	11/1/2016	Huber et al.			
	26.	9,755,739	9/5/2017	Wang et al.			

Examiner Signature	Date Considered
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(37 CFR §1.98(b))			

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	31.	2002/0172485	11/21/2002	Keaton et al			
	32.	2005/0031261	2/10/2005	Tanaka			
	33.	2006/0219673	10/5/2006	Varnham et al.			
	34.	2006/0251367	11/9/2006	Seifert et al			
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	39.	2015/0217402	8/6/2015	Hesse et al.			
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	41.	2015/0378184	12/31/2015	Tayebati et al.			
	42.	2017/0031105	2/2/2017	Huber et al.			
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	47.	DE 3833992	4/12/1990	DE			
	48.	DE 3833993	4/12/1990	DE			
	49.	DE 4200587	4/1/1993	DE			
	50.	FR 0362466	9/26/1990	EP			

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Substitute Disclosure Form

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 15540-0370005	Application No. 17/552,455
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant TRUMPF Laser- und Systemtechnik GmbH	
		Filing Date December 16, 2021	Group Art Unit Unknown

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	52.	GB 2449689	12/3/2008	GB			
	53.	KR 100750511	8/13/2007	KR			
	54.	WO 2009/155536	12/23/2009	WO			
	55.	WO 2010009101	1/21/2010	WO			

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	57.	EP Extended European Search Report dated July 1, 2013
	58.	IN Office Action for Indian Application No. 8560/CHENP/2012 by Controller Ambigaapathy A, dated November 20, 2017, 6 pages (with English translation)
	59.	PCT International Search Report dated May 6, 2011

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

Electronic Acknowledgement Receipt	
EFS ID:	45947394
Application Number:	17552455
International Application Number:	
Confirmation Number:	3190
Title of Invention:	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER
First Named Inventor/Applicant Name:	Rudolph Huber
Customer Number:	26161
Filer:	Yunbo Guo/Matthew O'Brien
Filer Authorized By:	Yunbo Guo
Attorney Docket Number:	15540-0370005
Receipt Date:	14-JUN-2022
Filing Date:	16-DEC-2021
Time Stamp:	10:21:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	146904	no	4
			9118a3be7cab09d6f9127bb14cf56431c94ed1fd		

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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.	

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	NTC.PUB	06/09/2022	15540-0370005

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/552,455	12/16/2021	Rudolph Huber	15540-0370005

CONFIRMATION NO. 3190

26161

FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

PUBLICATION NOTICE



OC000000134414905

Title:METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Publication No.US-2022-0179153-A1

Publication Date:06/09/2022

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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To: PATDOCTC@fr.com,,
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Feb 28, 2022 03:42:54 AM

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Application	Document	Mailroom Date	Attorney Docket No.
17552455	APP.FILE.REC	02/28/2022	15540-0370005

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Monday - Friday 6:00 a.m. to 12:00 a.m.

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UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/552,455	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)	OR	RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	700
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800
TOTAL CLAIMS (37 CFR 1.16(i))	20	minus 20 = *			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 480 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
			TOTAL			TOTAL	1820
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	OTHER THAN SMALL ENTITY	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	RATE(\$)
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	ADDITIONAL FEE(\$)
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	OTHER THAN SMALL ENTITY	
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	RATE(\$)
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	ADDITIONAL FEE(\$)
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/552,455	12/16/2021		0.00	15540-0370005	20	3

CONFIRMATION NO. 3190

UPDATED FILING RECEIPT

26161
FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022



0000000132089358

Date Mailed: 02/28/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Rudolph Huber, Aldingen-Aixheim, GERMANY;
Wolfgang Andreasch, Weinstadt, GERMANY;
Martin Huonker, Dietingen, GERMANY;

Applicant(s)

TRUMPF Laser- und Systemtechnik GmbH, Ditzingen, GERMANY;

Power of Attorney: The patent practitioners associated with Customer Number 26161

Domestic Priority data as claimed by applicant

This application is a DIV of 16/398,362 04/30/2019 PAT 11215761
which is a CON of 15/279,781 09/29/2016 PAT 10281656
which is a CON of 14/300,138 06/09/2014 PAT 9482821
which is a CON of 13/639,401 12/20/2012 PAT 8781269
which is a 371 of PCT/EP2011/055484 04/08/2011

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)
GERMANY 102010003750.8 04/08/2010 No Access Code Provided

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If Required, Foreign Filing License Granted: 12/28/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/552,455**

Projected Publication Date: 06/09/2022

Non-Publication Request: No

Early Publication Request: No
Title

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING
BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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page 2 of 4

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Rudolph Huber	Art Unit :	Unknown
Application No. :	17/552,455	Examiner :	Unknown
Filed :	December 16, 2021	Conf. No. :	3190
Title :	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

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

PRELIMINARY AMENDMENT

Prior to examination, please amend the application as indicated on the following pages.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 2 of 6

Attorney Docket: 15540-0370005 / 18.01127;
DS10502

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Original) A method of generating a laser beam with different beam profile characteristics, comprising:
 - coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber, and
 - coupling the input laser beam at least into at least one outer ring core of the multi-clad fiber; and
 - emitting an output laser beam from a second fiber end of the multi-clad fiber.
2. (Original) The method of claim 1, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - relatively moving the input laser beam and a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam.
3. (Currently Amended) The method of claim 1, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - projecting the input laser beam with respectively different beam cross-sections onto [[the]] a coupling-side face of the multi-clad fiber, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters.
4. (Cancelled)
5. (Cancelled)

6. – 8. (Cancelled)

9. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:

a multi-clad fiber having one inner fiber core and at least one outer ring core; and
a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of

the input laser beam into the inner fiber core of the multi-clad fiber, and
the input laser beam into the at least one outer ring core of the multi-clad fiber.

10. (Original) The system of claim 9, wherein the switchable device comprises adjustable optical deflector configured to, in the at least two switch positions, deflect the input laser beam in a direction transverse to an axis of a coupling-side face of the multi-clad fiber to varying extents.

11. (Original) The system of claim 10, wherein the optical deflector comprises an optical device that is positionable in the at least two switch positions transverse to an optical axis of the input laser beam.

12. (Original) The system of claim 11, wherein the optical device is arrangeable in one of the switch positions outside a beam path of the input laser beam and in at least one other of the switch positions at least partially in the beam path of the laser beam.

13. (Original) The system of claim 11, wherein the optical device comprises an optical wedge plate.

14. (Original) The system of claim 9, wherein the switchable device comprises a controller configured to, in the at least two switch positions, move a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam to varying extents.

15. (Currently Amended) The system of claim 9, wherein the switchable device comprises an adjustable optical device configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber, and wherein the adjustable optical device is configured to be moved back and forth along an optical axis of an input laser beam axis between the at least two switch positions.
16. (Cancelled)
17. (Original) The system of claim 9, wherein the switchable device comprises an adjustable aperture configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber.
18. (Cancelled)
19. (Original) The system of claim 9, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.
20. (Original) The system of claim 9, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.
21. (Currently Amended) The system of claim 9, wherein the switchable device comprises two optical fibers on an input side, via which [[the]] first and second sub-beams are supplied, whereby the switchable device electively couples the first sub-beam at least into the inner fiber core of the multi-clad fiber and the second sub-beam at least into at least the one outer ring core of the multi-clad fiber.

22. (Original) A system for generating a laser beam with different beam profile characteristics, comprising:

a multi-clad fiber having one inner fiber core and at least one outer ring core; and
a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
a first input laser beam at least into the inner fiber core of the multi-clad fiber, and
a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber.

23. (Original) The system of claim 22, wherein the switchable device comprises a beam divider configured to be moved into the input laser beam to divide the input laser beam into at least two sub-beams, each of the at least two sub-beam being coupled into a respective one of the cores of the multi-clad fiber.

24. (Original) The system of claim 22, wherein a diameter of the inner fiber core of the multi-clad fiber is no more than 200 μm .

25. (Original) The system of claim 22, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

26. (Original) The system of claim 22, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

27. (Currently Amended) The system of claim 22, wherein the switchable device comprises two optical fibers on an input side, via which the first and second input laser beams are supplied, whereby the switchable device electively couples the first input laser beam at least into the inner fiber core of the multi-clad fiber and the second ~~sub-beam~~ input laser beam at least into at least one outer ring core of the multi-clad fiber.

First Named Inventor : Rudolph Huber
Application No. : 17/552,455
Filed : December 16, 2021
Page : 6 of 6

Attorney Docket: 15540-0370005 / 18.01127;
DS10502

REMARKS

Applicant asks that all claims be examined in view of the amendment to the claims.

No excess fees are believed to be due at this time. Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 02/24/2022

/Yunbo Guo/

Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

24181112.doc

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Rudolph Huber Art Unit : Unknown
Application No. : 17/552,455 Examiner : Unknown
Filed : December 16, 2021 Conf. No. : 3190

Title : METHOD AND ARRANGEMENT FOR GENERATING A LASER
BEAM HAVING A DIFFERING BEAM PROFILE
CHARACTERISTIC BY A MULTI-CLAD FIBER

MAIL STOP MISSING PARTS

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

REPLY TO NOTICE TO FILE MISSING PARTS OF APPLICATION

In response to the Notice to File Missing Parts of Application under 37 CFR §1.53(b) dated December 29, 2021, applicant as a large entity submits herewith the following:

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- ☒ Payment of the search fee of \$700;
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Respectfully submitted,

Date: 02/24/2022

/Yunbo Guo/

Yunbo Guo, Reg. No. 70,538

Customer Number 26161
Fish & Richardson P.C.
Telephone: +1 (512) 226-8108
Facsimile: (877) 769-7945

24192355.doc

Electronic Patent Application Fee Transmittal				
Application Number:		17552455		
Filing Date:		16-Dec-2021		
Title of Invention:		METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
First Named Inventor/Applicant Name:		Rudolph Huber		
Filer:		Yunbo Guo/Cheryl Forrest		
Attorney Docket Number:		15540-0370005		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	320	320
UTILITY SEARCH FEE	1111	1	700	700
UTILITY EXAMINATION FEE	1311	1	800	800
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	1051	1	160	160
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1980

Electronic Acknowledgement Receipt	
EFS ID:	45072888
Application Number:	17552455
International Application Number:	
Confirmation Number:	3190
Title of Invention:	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER
First Named Inventor/Applicant Name:	Rudolph Huber
Customer Number:	26161
Filer:	Yunbo Guo/Cheryl Forrest
Filer Authorized By:	Yunbo Guo
Attorney Docket Number:	15540-0370005
Receipt Date:	24-FEB-2022
Filing Date:	16-DEC-2021
Time Stamp:	10:39:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$1980
RAM confirmation Number	E20222NA39162561
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		PrelimAmend.pdf	77625	yes	6
			30991f81737c06a7b788c36189158b8ae647b91f		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Claims		2	5	
	Applicant Arguments/Remarks Made in an Amendment		6	6	
Warnings:					
Information:					
2	Applicant Response to Pre-Exam Formalities Notice	ReplytoNTFMP.pdf	57650	no	1
			01a8564b0f165004b221e412c022688b2d7eb725		
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3	Fee Worksheet (SB06)	fee-info.pdf	46776	no	2
			61f411649c5dc790a905ff0993d9e8b4dcc947f5		
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Application	Document	Mailroom Date	Attorney Docket No.
17552455	NTC.MISS.PRT	12/29/2021	15540-0370005
	APP.FILE.REC	12/29/2021	15540-0370005

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/552,455	12/16/2021		0.00	15540-0370005	27	4

CONFIRMATION NO. 3190

26161
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P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

FILING RECEIPT



0000000130740645

Date Mailed: 12/29/2021

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Inventor(s)

Rudolph Huber, Aldingen-Aixheim, GERMANY;
Wolfgang Andreasch, Weinstadt, GERMANY;
Martin Huonker, Dietingen, GERMANY;

Applicant(s)

TRUMPF Laser- und Systemtechnik GmbH, Ditzingen, GERMANY;

Power of Attorney: The patent practitioners associated with Customer Number 26161

Domestic Priority data as claimed by applicant

This application is a DIV of 16/398,362 04/30/2019 PAT 11215761
which is a CON of 15/279,781 09/29/2016 PAT 10281656
which is a CON of 14/300,138 06/09/2014 PAT 9482821
which is a CON of 13/639,401 12/20/2012 PAT 8781269
which is a 371 of PCT/EP2011/055484 04/08/2011

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Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No
Title

METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING
BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/552,455				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	700			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800			
TOTAL CLAIMS (37 CFR 1.16(i))	27	minus 20 = *	7			x 100 =	700			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4	minus 3 = *	1			x 480 =	480			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	3000			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
TOTAL ADD'L FEE								TOTAL ADD'L FEE		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
TOTAL ADD'L FEE								TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/552,455	12/16/2021	Rudolph Huber	15540-0370005

CONFIRMATION NO. 3190

FORMALITIES LETTER

26161
FISH & RICHARDSON P.C. (BO)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022



Date Mailed: 12/29/2021

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

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

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Additional claim fees of \$ **1180** as an undiscounted entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
The surcharge is due for any one of:
 - late submission of the basic filing fee, search fee, or examination fee,
 - late submission of inventor's oath or declaration,
 - filing an application that does not contain at least one claim on filing, or
 - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. No entity status discount is in effect. If applicant is qualified for small entity status, a written assertion of small entity status must be submitted to establish small entity status. (See 37 CFR 1.27). If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ **320** basic filing fee.
- \$ **160** surcharge.
- \$ **700** search fee.
- \$ **800** examination fee.
- \$ **480** for **1** independent claims over 3.
- \$ **700** for **7** total claims over 20.

- \$(0) previous unapplied payment amount.
- **\$ 3160** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

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

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

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

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

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

/nbekele/

SCORE Placeholder Sheet for IFW Content

Application Number: 17552455

Document Date: 12/16/2021

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

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

- Drawing

At the time of document entry (noted above):

- USPTO employees may access SCORE content via DAV or via the SCORE web page.
- External customers may access SCORE content via PAIR using the Supplemental Content tab.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

Application Number	Unknown		
Filing Date	Herewith		
First Named Inventor	Rudolph Huber		
Title	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
Art Unit			
Examiner Name			
Attorney Docket Number	15540-0370005		
SIGNATURE of Applicant or Patent Practitioner			
Signature	/Yunbo Guo/	Date (Optional)	
Name	Yunbo Guo	Registration Number	70,538
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.			
☒ *Total of <u>1</u> forms are submitted.			

24175534.doc

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on the Transmittal.)

- ☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter, which may be an application filed after the date of this power of attorney, or identified above:

26161

OR

- ☐ I hereby appoint Practitioner(s) named in the attached list as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter, which may be an application filed after the date of this power of attorney, or identified above.

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

- ☐ The address associated with the above-mentioned Customer Number

OR

- ☒ The address associated with Customer Number: **26161**

OR

Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

TRUMPF Laser- und Systemtechnik GmbH

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Date (Optional)
Name	
Title	

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

- ☐ *Total of _____ forms are submitted.



December 16, 2021

Attorney Docket No.: 15540-0370005 / 18.01127; DS10502

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

Street Address
Fish & Richardson P.C.
One Congress Plaza
Suite 810
111 Congress Avenue
Austin, TX 78701

Mail Address
P.O. Box 1022
Minneapolis, MN 55440-1022
512 472 5070 main
512 320 8935 fax

Presented for filing is a new divisional patent application of:

Inventor(s): RUDOLPH HUBER, WOLFGANG ANDREASCH AND MARTIN HUONKER

Title: METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM
HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-
CLAD FIBER

The requirement for a certified copy of the foreign priority document under 37 CFR 1.55 is satisfied in this application, as the certified copy is contained in the file of the related Application No. **13/639,401**, filed **December 20, 2012**.

Enclosed are the following papers, including those required to receive a filing date under 37 CFR 1.53(b):

	<u>Pages</u>
Specification	14
Claims	5
Abstract	1
Declaration	3
Drawing(s)	5

Enclosures:

- Application Data Sheet, 9 pages.
- Power of Attorney, 2 pages.

Basic Filing Fee		\$320
Search Fee		\$700
Examination Fee		\$800
Total Claims 27	over 20	7 x \$100
Independent Claims 4	over 3	1 x \$480
Fee for Multiple Dependent claims		\$0
Application size fee for each 50 pages over 100		

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Commissioner for Patents
December 16, 2021
Page 2

Total Sheets: $29 \times .75 - 100/50 = 0x$ \$0

Total Filing fee \$3000

No filing fee is being paid now.

I hereby authorize the USPTO to communicate in response to email communications from the undersigned and practitioners under Customer No. 26161 in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via email. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03).

If this application is considered to be incomplete, or if a telephone conference would otherwise be helpful, call the undersigned at +1 (512) 226-8108.

Send all correspondence to:

26161
Customer Number

Respectfully submitted,

/Yunbo Guo/

Yunbo Guo
Registration No. 70,538

Enclosures

YYG/czc
24175536.doc

Electronic Acknowledgement Receipt	
EFS ID:	44530521
Application Number:	17552455
International Application Number:	
Confirmation Number:	3190
Title of Invention:	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER
First Named Inventor/Applicant Name:	Rudolph Huber
Customer Number:	26161
Filer:	Yunbo Guo/Cheryl Forrest
Filer Authorized By:	Yunbo Guo
Attorney Docket Number:	15540-0370005
Receipt Date:	16-DEC-2021
Filing Date:	
Time Stamp:	10:27:41
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	Application Data Sheet	ADS.pdf	1823299	no	9
			9bb81c1b8b7986e74996af5ddfe287da75ae212c		
Warnings:					

Information:					
2		Application.pdf	156405	yes	20
			c338cc4743554b6f3fd86bc5e3a6faf0ada2807f		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	14	
	Claims		15	19	
	Abstract		20	20	
Warnings:					
Information:					
3	Drawings-other than black and white line drawings	Drawings.pdf	949379	no	5
			20e8533cb16a658654c9c59b11ddc90f994e5165		
Warnings:					
Information:					
4	Oath or Declaration filed	ExecutedDeclaration.pdf	778881	no	3
			d029e12c29c1695915a23d8c539e76c2f87a1294		
Warnings:					
Information:					
5	Power of Attorney	POA.pdf	1932099	no	2
			36110b9af8f20f2383acb07d045bb8b0b58a6449		
Warnings:					
Information:					
6	Transmittal of New Application	PAP.pdf	75297	no	2
			2f9124bc5e4e2f055d06c1bb4fd14823b1719a0		
Warnings:					
Information:					
Total Files Size (in bytes):			5715360		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005
		Application Number	
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Rudolph		Huber		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Aldingen-Aixheim		Country of Residenceⁱ	DE	
Mailing Address of Inventor:					
Address 1	Johann-Maus-Strasse 2				
Address 2					
City	Ditzingen		State/Province		
Postal Code	D-71254		Countryⁱ	DE	
Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Wolfgang		Andreasch		
Residence Information (Select One) US Residency • Non US Residency Active US Military Service					
City	Weinstadt		Country of Residenceⁱ	DE	
Mailing Address of Inventor:					
Address 1	Johann-Maus-Strasse 2				
Address 2					
City	Ditzingen		State/Province		
Postal Code	D-71254		Countryⁱ	DE	
Inventor	3				Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005
		Application Number	
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Martin		Huonker	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Dietingen		Country of Residence ⁱ	DE
Mailing Address of Inventor:				
Address 1	Johann-Maus-Strasse 2			
Address 2				
City	Ditzingen	State/Province		
Postal Code	D-71254	Country ⁱ	DE	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence Information of this application.	
Customer Number	26161
Email Address	apsi@fr.com Add Email Remove Email

Application Information:

Title of the Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		
Attorney Docket Number	15540-0370005	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

Filing By Reference:

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

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005
		Application Number	
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:			
☒	Customer Number	☐	Limited Recognition (37 CFR 11.9)
Customer Number	26161		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Division of	16398362	2019-04-30		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16398362	Continuation of	15279781	2016-09-29	10281656	2019-05-07
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15279781	Continuation of	14300138	2014-06-09	9482821	2016-11-01
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14300138	Continuation of	13639401	2012-12-20	8781269	2014-07-15

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005	
		Application Number		
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER			
Prior Application Status	Pending	Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
13639401	a 371 of international	PCT/EP2011/055484	2011-04-08	
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.				Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)	Remove
102010003750.8	DE	2010-04-08		
Additional Foreign Priority Data may be generated within this form by selecting the Add button.				Add

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005
		Application Number	
Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	15540-0370005
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Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY A MULTI-CLAD FIBER		

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Mailing Address Information For Applicant:			
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Address 2			
City	Ditzingen	State/Province	
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Method and Arrangement for Generating a Laser Beam Having a Differing Beam Profile Characteristic by a Multi-Clad Fiber

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is a divisional of and claims priority under 35 U.S.C. §120 to U.S. Serial No. 16/398,362, filed on April 30, 2019, which is a continuation of U.S. Serial No. 15/279,781, filed on September 29, 2016, now U.S. Patent No. 10,281,656, which is a continuation of U.S. Serial No. 14/300,138, filed on June 9, 2014, now U.S. Patent No. 9,482,821, which is a continuation of U.S. Serial No. 13/639,401, filed on December 20, 2012, now U.S. Patent No. 8,781,269, which is a 371 National Phase
10 Application of PCT Application No. PCT/EP2011/055484 filed on April 8, 2011, which claims priority to German Application No. DE 10 2010 003750.8, filed on April 8, 2010. The entire contents of these priority applications are incorporated herein by reference.

TECHNICAL FIELD

15 The invention concerns a method and arrangement for the generation of a laser beam with different beam profile characteristics.

BACKGROUND

In materials processing by means of laser beams, different processes and applications have different requirements for characteristic laser beam parameters such as
20 focal diameter, intensity distribution or beam profile quality at the processing point. Therefore, changing a process or application in a laser machining system usually involves the necessary resetting work, which may range from relatively simple replacement of individual optical components to transfer to a different system.

For example, DE 38 33 992 A1 describes a method for achieving specific laser
25 beam properties in which the laser beams of two laser beam sources are coupled into a conventional optical fiber at different coupling angles. A beam is thus created, depending on the coupling angles of the two laser beams, with various wavelengths which are selected to suit the biological or medical processing task at hand. In addition to the use of

two laser sources, this method may also employ just one laser source with a variable wavelength. The coupling conditions into the optical fiber depend greatly on the wavelength here. However, if, for example, the applications do not have different wavelengths or rather even require the use of a single wavelength, the method outlined
5 proves not to be optimum on account of its disproportionate complexity for such cases and its limiting specialization in applications of a different type. Moreover, the method proposed is limited to the beam formation dependent on the wavelength which, in turn, leads to limitations for its potential applications.

SUMMARY

10 Therefore, the object of the present invention is to indicate a method for generating a laser beam with different laser beam profile characteristics which, using several laser beam sources or just one laser beam source, in particular with a single wavelength, allows an application-specific change to the laser beam characteristics with relatively little effort, and to provide an arrangement for this method. A further aim is to
15 expand the range of adaptation potential of beam profile characteristics to miscellaneous applications as far as possible, while reducing the complexity of the arrangement and the method.

In accordance with the invention, this object is solved by a method in which a laser beam is coupled into one fiber end of a multi-clad fiber, in particular a double-clad
20 fiber, and coupled out of the other end of the multi-clad fiber and, to generate different beam profile characteristics of the output laser beam, the input laser beam is electively coupled either at least into the inner fiber core of the multi-clad fiber or at least into at least one outer ring core of the multi-clad fiber or, however, electively a first laser beam is coupled at least into the inner fiber core of the multi-clad fiber and a different, second
25 laser beam is coupled at least into at least one outer ring core of the multi-clad fiber.

In this invention, a multi-clad fiber means a fiber with one inner fiber core and at least one outer ring core, for example a double-clad fiber with a single outer ring core or also a triple-clad fiber with an additional outer ring core adjacent to the first outer ring core. To change the beam profile characteristics of the output laser beam, the input laser
30 beam is coupled variously into one or more of the cores of the multi-clad fiber.

For the sake of simplicity, the invention will be described in the following using a double-clad fiber. It will be clear to an expert that the principle of the invention can easily also be transferred to multi-clad fibers with additional outer ring cores adjacent to the first outer ring core.

5 A double-clad fiber with two cores has an inner fiber core and cladding surrounding this fiber core that is as thin and low-refractive as possible. This is followed by a single outer ring core which is also surrounded by low-refractive second cladding. This may be followed by an additional layer of glass which determines the external diameter of the fiber but has no influence on its function in terms of beam guidance. This
10 is completed by a coating of a synthetic material such as silicone and/or nylon which serves to protect the fiber.

By using a double-clad fiber, the present invention makes it possible to choose between different beam profile characteristics at the fiber output, depending on whether the beam is coupled into the inner fiber core, the outer ring core or into both the inner
15 fiber core and the outer ring core. In material processing using laser beams, in particular using high power in the kW range, the ability to switch between these coupling variants makes it possible, for example to choose between a comparatively good beam quality with a sharp focus as is required, for example, for a laser cutting process, and, in contrast, a 'reduced' beam quality with a 'blurred' focus with almost uniform intensity distribution
20 in the beam cross-section, which is particularly suitable for welding processes.

To achieve a high laser beam quality, the laser beam is coupled into the inner fiber core of the double-clad fiber, which, in this case, behaves like a conventional standard fiber, the fiber core of which is surrounded by low-refractive cladding. However, if a laser beam with a wider profile and, for example, with uniform intensity is
25 required, the laser beam is coupled into the outer ring core or into both the inner fiber core and the outer ring core. Depending on the application, therefore, at the output of the double-clad fiber, a laser beam can be achieved with a filled circular profile in accordance with the inner fiber core, with a ring profile in accordance with the outer ring core, with a filled circular profile in accordance with the two core areas together (with a
30 narrow missing ring through the first cladding) or with the corresponding intermediate stages of the stated profile characteristics.

In a preferred version of the method in accordance with the invention, for the elective coupling of the laser beam into the double-clad fiber, relative motion takes place between the input laser beam and the coupling-side face of the double-clad fiber in a direction transverse to the laser beam, in particular in the form of parallel displacement. If the coupling-side face of the double-clad fiber is moved transverse to the laser beam, no additional optical elements are required to switch between the various couplings. With sufficiently long free beam propagation of the laser beam before it strikes the double-clad fiber, angular deflection of the laser beam, which is also understood as deflection transverse to the axis of the coupling-side face, is also possible in order to couple the laser beam into the inner fiber core and/or into the outer ring core of the double-clad fiber. In this case, this involves rotation of the laser beam axis about a point instead of displacement, whereby the change in the angle of incidence should remain negligible for the coupling.

In another preferred version of the method in accordance with the invention, for electively coupling of the laser beam into the double-clad fiber, the input laser beam is projected with different beam cross-sections, in particular with different beam diameters, onto the coupling-side face of the double-clad fiber. These different beam diameters can be set, for example with optics that can travel along the laser beam axis such as a lens or aperture which, depending on its travel position, couples the laser beam either only into the inner fiber core or into the outer ring core or into both the inner fiber core and the outer ring core. Alternatively, a different beam cross-section or diameter can also be set by optics such as a lens or aperture being electively moved into or out of the beam path of the laser beam. In another alternative, the beam cross-section or diameter can be adapted to desired coupling conditions into the double-clad fiber using a laser source with alternative guidance options via optical fibers with different beam guidance characteristics, which can, for example, be set via the diameter of the beam guidance optical fiber core. This principle of choosing the coupling conditions into the double-clad fiber can also be applied to the use of the laser beam sources assigned to the upstream optical fibers, in particular to laser beam sources of different beam qualities.

In another preferred version of the method in accordance with the invention, for the coupling of the laser beam both into the inner fiber core and into the at least one outer

ring core, the input laser beam is divided into at least two sub-beams, each of which is coupled into one of the two cores of the double-clad fiber. This allows the division of the beam power between the inner fiber core and the outer ring core to be particularly well controlled if they are to be used simultaneously. With the two sub-beams, it is also possible, in a particularly easy fashion, to omit the area of the first cladding of the double-clad fiber in connection with coupling. Specifically for applications in the high-power area, it is important that no laser beam is coupled into the first or second cladding of the double-clad fiber. Any such beam coupled into the cladding is propagated with a large angle in relation to the fiber axis in the inner fiber core or outer ring core and emerges at the fiber end also with a large angle, as a result of which connecting optics can become heated. In addition, a beam in the second cladding can destroy the coating of the fiber. To safely prevent the propagation of the laser beam in the cladding, mode strippers can be used, for example. Accordingly, it is preferred also not to couple any laser beam into the double-clad fiber during the switching process in order to prevent any propagation in the cladding. This can be done, for example, by switching the laser off or deflecting the beam into an absorber by using beam shutters.

In another aspect, the invention also concerns an arrangement suitable for implementing the method described above. The arrangement in accordance with the invention comprises a double-clad fiber with one inner fiber core and at least one outer ring core and a switchable device with at least two switch positions in which the input laser beam is electively coupled either at least into the inner fiber core of the double-clad fiber or at least into the at least one outer ring core of the double-clad fiber or, electively, a first laser beam is coupled at least into the inner fiber core of the multi-clad fiber and a different, second laser beam is coupled at least into one outer ring core of the multi-clad fiber.

In a preferred embodiment of the arrangement in accordance with the invention, the switchable device is formed by adjustable deflection optics which, in their at least two switch positions, deflect an input laser beam in a direction transverse to the axis of the coupling-side face of the double-clad fiber to varying extents or formed by a control device which, in its at least two switch positions, moves the coupling-side face in a direction transverse to the input laser beam to varying extents. Deflection optics in

accordance with the invention mean any adjustable optics that couples a laser beam, depending on the adjustment position, into at least partially different fiber areas of the double-clad fiber.

In another preferred embodiment of the arrangement in accordance with the invention, the switchable device is formed by mobile optics or a mobile aperture which, in their at least two switch positions, project the input laser beam with different beam cross-sections, in particular with different beam diameters, onto the coupling-side face of the double-clad fiber. The mobile optics can, for example, be prisms, plane-parallel (glass) plates, convex and concave lenses, mirrors, diffractive optical elements, etc. individually or in combinations.

It is particularly preferred for the optics to be formed by a beam divider, in particular by an optical wedge plate that can be moved into the laser beam, to divide the input laser beam into at least two sub-beams, each of which is coupled into one of the cores of the double-clad fiber. Advantageously, the division of the intensity between the inner fiber core and the outer ring core depends on how far the beam divider intervenes in the beam path. This makes it possible to adapt the intensity division and thus the beam profile of the output laser beam optimally to each application.

However, the wedge plate can also be used as a beam switch to couple the laser beam in its entirety either into the inner fiber core or into the outer ring core. Moving/displacing the coupling optics transverse to the optical axis of the laser beam causes a comparable effect. In this version, the coupling optics are located in the beam path in the switchable states, producing different beam deflections, depending on the position of the coupling optics. As the beam is not divided here and the intensities cannot be divided via sub-beams, it is preferred to deflect either into the inner fiber core or into the outer ring core and to switch between at least two states representing these positions.

Preferably, the diameter of the inner fiber core of the double-clad fiber is maximum approximately 200 μm , in particular maximum approximately 150 μm , preferably maximum approximately 120 μm . For example, with a diameter of the inner fiber core of approximately 100 μm , a good quality of the output laser beam can be achieved for demanding laser applications, such as laser cutting processes, in connection with the beam being coupled into the inner fiber core.

The ring thickness of the at least one outer ring core of the double-clad fiber is preferably greater than or equal to the diameter of the inner fiber core. The outer ring diameter corresponds to the wider laser beam profile required for specific applications, such as laser welding, and is approximately 600 μm or 400 μm , for example, depending on the application.

In an advantageous embodiment of the arrangement in accordance with the invention, the numerical aperture of the first cladding surrounding the inner fiber core is higher than the numerical aperture of the second cladding surrounding the at least one outer ring core in a double-clad fiber. As a result, a beam coupled inadvertently into the first cladding can penetrate the second cladding and be emitted and displayed there by a mode stripper. This facilitates the adjustment of the inner fiber core and fault monitoring. For example, the first cladding has a standard numerical aperture of 0.22 (tolerance ± 0.02), whereby the second cladding in this case preferably has a numerical aperture of 0.18 (tolerance ± 0.015) and should be thick enough to guide the laser beam well, for example 10 μm thick, preferably less, such as 3 to 5 μm , with a cladding core diameter ratio (CCDR) of 1.2. The first cladding forms a conventional transport fiber with the inner fiber core.

In another preferred embodiment, the switchable device has, on the input side, at least two optical fibers via which at least two different laser beams can be supplied, whereby the switchable device electively couples one laser beam at least into the inner fiber core of the multi-clad fiber and the other laser beam at least into at least one outer ring core of the multi-clad fiber.

The embodiments described with the use of one or more laser beam sources can also be used in combination, for example within a cascaded system.

Further advantages of the invention are provided in the following description and the drawing. The embodiments shown and described should not be considered to be an exhaustive list. They are instead examples for the purposes of describing the invention. Similarly, the above-mentioned characteristics and those described below can be used individually or in any combinations.

The invention is presented in a number of embodiments in the drawing and will be described in further detail in the following description. The presentation in the figures

in the drawing should only be considered to be an outline. It contains no restrictions in respect of details or dimensions and is not to scale.

DESCRIPTION OF DRAWINGS

5 Figs. 1, 2A, 2B, and 3 show three arrangements in accordance with the invention for generating a laser beam with different beam profile characteristics, in which a laser beam is coupled into the fiber end of a double-clad fiber and emitted from the other fiber end of the double-clad fiber.

Fig. 4 shows the radial course of the refractive index of the double-clad fiber shown in Figs. 1 to 3.

10 Figs. 5A, 5B and 5C show various possible beam profiles of the laser beam emitted from the double-clad fiber in Figs. 1 to 3.

Fig. 6 shows another arrangement in accordance with the invention for generating a laser beam with different beam profile characteristics, whereby, electively, a first laser beam is coupled into the inner fiber core of a double-clad fiber and a different, second
15 laser beam is coupled both into the inner fiber core and into the outer ring core of the double-clad fiber.

DETAILED DESCRIPTION

Figs. 1 to 3 show three different arrangements 10, 20, 30 for generating a laser beam with different beam profile characteristics, whereby the laser beam is coupled into
20 one fiber end 1a of a multi-clad fiber 1, which is a double-clad fiber 1 in the present case, and is emitted from the other fiber end 1b of the double-clad fiber 1. The input laser beam is labelled 2 and the emitted laser beam is labelled 3.

As shown in Fig. 1, the double-clad fiber 1 has an inner fiber core 4 (for example of undoped quartz glass) with a refractive index n_1 and thin first cladding 5 (for example
25 of doped quartz glass) surrounding the inner fiber core 4, the refractive index n_2 of which is lower than n_1 . This is followed by an outer ring core 6 (for example of undoped quartz glass) with refractive index n_3 which is also surrounded by low-refractive second cladding 7 (for example of doped quartz glass) with refractive index n_4 . The refractive indices n_1 and n_3 can be the same or different; the same applies to the refractive indices

n_2 and n_4 . This may be followed by an additional layer of glass (not shown) which determines the external diameter of the fiber but has no influence on its function in terms of beam guidance. This is typically completed by a coating (not shown) of a synthetic material such as silicone and/or nylon which serves to protect the fiber.

Fig. 4 shows an outline of the radial dependence of the refractive index n within the double-clad fiber 1, where $n_1 = n_3$ and $n_2 = n_4$. The figure shows an area with radius r_1 and high refractive index n_1 corresponding to the inner fiber core 4, a ring area between radii r_1 and r_2 with lower refractive index n_2 corresponding to the first cladding 5, a ring area with external radius r_3 and high refractive index n_1 corresponding to the outer ring core 6 and, finally, the second cladding 7 with low refractive index n_2 . On account of the lower refractive index of the cladding 5, 7, light is guided in the inner fiber core 4 and in the outer ring core 6 by means of total reflection.

To change the beam profile characteristics of the emitted laser beam 3, it is possible, as described below in detail, for the input laser beam 2 striking the coupling-side face 8 of the double-clad fiber 1 to be coupled, by means of a switchable device, electively either into the inner fiber core 4 or into the outer ring core 6 or both into the inner fiber core 4 and into the outer ring core 6 of the double-clad fiber 1.

In the arrangement 10 shown in Fig. 1, the switchable device for electively coupling the laser beam 2 into the double-clad fiber 1 is formed by adjustable deflection optics 11 with two switch positions, which are represented by continuous and dotted lines. In these two switch positions, the laser beam 2 focused on the coupling-side face 8 is deflected in a direction 12 transverse to the axis of the coupling-side face 8 to varying extents, in particular displaced in parallel to varying extents. In one switch position, the laser beam 2 is coupled centrally or eccentrically to the fiber axis only into the inner fiber core 4 and in the other switch position it is coupled eccentrically to the fiber axis only into the outer ring core 6. In the first case, the emitted laser beam 3 has the beam profile shown in Fig. 5A, i.e. a narrow filled circular profile 51 corresponding to the inner fiber core 4, and a comparatively high beam quality with a sharp focus, as is required for material processing, for example for a laser cutting process. In the second case, the emitted laser beam 3 has the wider beam profile shown in Fig. 5B, i.e. a ring profile 52 corresponding to the outer ring core 6, and a comparatively lower beam quality, as is

required for material processing, for example for a laser welding process. Under suitable coupling conditions into the outer ring core 6, the emitted laser beam 3 has a top hat ring beam profile, the quality of which is suitable for many applications.

The deflection optics 11, the components of which are not shown individually in Fig. 1, are based on beam deflection principles familiar to an expert. In particular, a deflection mirror can be used here. The location of the coupling into the coupling-side face of the double-clad fiber 1 can be determined by the angular position of the deflection mirror or the deflection mirror can deflect the beam, depending on position, to various outputs which, in turn, define various coupling areas. A semireflecting deflection mirror or a deflection mirror that is only partially in the beam path can also perform the described function of a beam divider. Preferably, the deflection optics 11 contain additional means for coupling the laser beam 2 into the coupling-side face 8 of the double-clad fiber 1, such as, for example, a focusing lens, which can alternatively also be arranged before or after the deflection optics 11.

A sufficiently long double-clad fiber 1 also allows for angularly homogeneous intensity distribution in the output laser beam 3 with eccentric coupling of the laser beam 2 to the fiber axis into the inner fiber core 4 or the outer ring core 6.

If, however, the beam is coupled both into the inner fiber core 4 and into the outer ring core 6 of the double-clad fiber 1, the output laser beam 3 has the uniformly filled wide beam profile 53 shown in Fig. 5C with an omitted ring corresponding to the first cladding 5.

Alternatively (or in addition) to the deflection optics 11, the switchable device for electively coupling the laser beam 2 into the double-clad fiber 1 can also be formed, for example, by a motor-driven control device 13 which displaces the coupling-side face 8 of the double-clad fiber 1 in a direction 12 transverse to the input laser beam 2 to varying extents, whereby the laser beam 2 focused on the coupling-side face 8 can be coupled either into the inner fiber core 4 or into the outer ring core 6.

In the arrangement 20 shown in Fig. 2A, the switchable device for electively coupling the laser beam 2 into the double-clad fiber 1 is formed by adjustable telescopic/expansion optics 21 which are shown here only in outline. In their switch positions, not shown here, the telescopic/expansion optics 21 expand the input laser beam

2 to different beam diameters. Depending on the beam diameter, the laser beam 2 is then projected by coupling optics (for example a lens) 22 with different beam diameters, in this case different focal diameters, onto the coupling-side face 8 of the double-clad fiber 1. As shown with continuous and dotted lines, the laser beam 2 is, for example, coupled

5 centrically only into the inner fiber core 4 in one switch position of the telescopic/expansion optics 21 and coupled centrically both into the inner fiber core 4 and into the outer ring core 6 in another switch position. In the first case, the output laser beam 3 has beam profile 51 and in the second case beam profile 53.

10 Via the diameter of the expanded laser beam 2, the proportion of the laser beam coupled into the outer ring core 6 can be set continuously and thus also the intensity distribution into the inner fiber core 4 and the outer ring core 6, allowing the beam profile of the output laser beam 3 to be adapted to each application optimally.

15 In the arrangement 20 shown in Fig. 2B, the switchable device for electively coupling the laser beam 2 into the double-clad fiber 1 is formed by focusing optics 23 shown here as a lens which can be displaced along the laser beam axis to various switch positions, which are represented by continuous, dotted, and dashed and dotted lines. In these switch positions, the input laser beam 2 is coupled by the focusing optics 23 with different beam diameters onto the coupling-side face 8 of the double-clad fiber 1. In one switch position, the focused laser beam 2 is coupled centrically only into the inner fiber

20 core 4. In the two other switch positions, the defocused laser beam 2 is coupled centrically both into the inner fiber core 4 and into the outer ring core 6. In the first case, the output laser beam 3 has beam profile 51 and in the second case beam profile 53.

25 In the arrangement 30 shown in Fig. 3, the switchable device for electively coupling the laser beam 2 into the double-clad fiber 1 is formed by a beam switch implemented here only by way of example as an optical wedge plate 31 which can be adjusted continuously between two end positions that are shown with continuous and dotted lines. In one of its end positions, the optical wedge plate 31 is arranged outside the beam path of the input laser beam 2 so that the entire input laser beam 2 is coupled via coupling optics (for example a lens) 32 only into the inner fiber core 4, whereby the

30 output laser beam 3 has beam profile 51. In its other end position, shown by the dotted line, the wedge plate 31 is arranged in the entire beam path of the laser beam 2 so that the

entire laser beam 2 is deflected by the wedge plate 31 and is coupled via the coupling optics 32 only into the outer ring core 6, whereby the output laser beam 3 has beam profile 52.

5 Moving/displacing the coupling optics 32 transverse to the optical axis of the laser beam 2 causes a comparable effect. In this version, the coupling optics 32 are located in the beam path in the switchable states, producing different beam deflections, depending on the position of the coupling optics 32. As the beam is not divided here and the intensities cannot be divided via sub-beams, it is preferred to deflect either into the inner fiber core 4 or into the outer ring core 6 and to switch between at least two states
10 representing these positions.

As indicated with a dotted line, partially introducing the wedge plate 31 into the input laser beam 2 creates two sub-beams 2a, 2b, so that here, for example, the optical wedge plate 31 acts as a beam divider. The first sub-beam 2a is not influenced by the wedge plate 31 and thus continues to be coupled via the coupling optics 32 into the inner
15 fiber core 4, while the second sub-beam 2b is deflected by the wedge plate 31 in relation to the first sub-beam 2a and coupled via the coupling optics 32 into the outer ring core 6. The output laser beam 3 has beam profile 53. Partially introducing the wedge plate 31 into the input laser beam 2 therefore creates two sub-beams 2a, 2b, with a division of intensity between the inner fiber core 4 and the outer ring core 6, depending on the
20 degree of introduction, whereby the beam profile of the output laser beam 3 can be optimally adapted to each application.

Moreover, the two sub-beams 2a, 2b offer the significant advantage that they omit the area of the first cladding 5 in connection with coupling. Specifically for applications in the high-power area, it is important that no laser beam is coupled into the inner or outer
25 cladding 5, 7. This beam is propagated with a large angle in the inner core or outer ring core and emerges at the fiber end also with a large angle, as a result of which connecting optics can become heated. In addition, the beam in the outer cladding 7 can destroy the coating of the fiber 1.

A diameter of the inner fiber core 4 of approximately 100 μm guarantees, for
30 typical applications with high power in the kW range, the production of good beam profile quality in connection with coupling the laser beam 2 into the inner fiber core 4.

The first cladding 5 is already sufficiently thick, at approximately 10 μm , preferably at approximately 5 μm , to guide the laser beam well. With a ring thickness of the outer ring core 6 of approximately 240 μm , the external diameter of the outer ring core 6 is approximately 600 μm . For certain applications, such as laser welding, this corresponds to the necessary widening of the laser beam profile.

Fig. 6 shows another arrangement 60 for generating a laser beam with different beam profile characteristics, whereby, electively, a first laser beam 61 is coupled into the inner fiber core 4 of the double-clad fiber 1 and a different, second laser beam 62 is coupled both into the inner fiber core 4 and into the outer ring core 6 of the double-clad fiber 1. The two laser beams 61, 62, which can, for example, have different beam qualities, are guided in optical fibers 63, 64 to switching optics 65 (for example an optical switch system), shown here only in outline, which can be switched between two switch positions. In one switch position, the first laser beam 61 with the higher beam quality is coupled into the inner fiber core 4 of the double-clad fiber 1 and, in the second switch position, the second laser beam 62 is coupled both into the inner fiber core 4 and into the outer ring core 6 of the double-clad fiber 1. In the first case, the output laser beam 3 has beam profile 51 and in the second case beam profile 53. The double-clad fiber 1 leads to a laser processing machine (not shown) so that the arrangement 60 is used to switch laser beams 61, 62 with different beam qualities for the laser processing machine. However, the laser beam 62 can also only be directed at the outer ring core 6 of the double-clad fiber 1 via the switching optics 65.

Up to now, laser processing machines that are to be supplied with several laser beams of different beam qualities needed several sockets for the various optical fibers and a corresponding optical switch system to allow the various laser beams to be coupled into the following beam path. For a desired laser beam, the appropriate optical fiber cable has to be manually replugged, which is undesirable on account of an increased risk of soiling, or beam guidance optics are required on the laser processing machines themselves. This is disadvantageous as several optical fiber cables have to be laid within the laser processing machine, the entire switching optics have to be mounted and moved on the axis system of the laser processing machine and the size of the switching optics, in

connection with the space available, limits the possibilities or the possible optical concepts.

5 In the arrangement 60, the switching optics 65 are supplied on the input side by two lasers with the two laser beams of different beam qualities, and the respective laser beams 61, 62 are coupled into the central double-clad fiber 1 via the switching optics 65. In this way, the switching between the two laser beams 61, 62 is separated from the axis system of the laser processing machine and takes place outside the laser processing machine itself. The laser beams are then supplied to the machine via the double-clad fiber 1. One or more additional light-guiding ring cores around the outer ring core 6 are also
10 conceivable so that additional laser beams with different beam qualities can be guided via the switching optics 65.

A number of embodiments of the invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope
15 of the following claims.

WHAT IS CLAIMED IS:

1. A method of generating a laser beam with different beam profile characteristics, comprising:
 - 5 coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of
 - coupling the input laser beam at least into an inner fiber core of the multi-clad fiber, and
 - coupling the input laser beam at least into at least one outer ring core of
 - 10 the multi-clad fiber; and
 - emitting an output laser beam from a second fiber end of the multi-clad fiber.
2. The method of claim 1, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - 15 relatively moving the input laser beam and a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam.
3. The method of claim 1, wherein coupling the input laser beam into the first fiber end of the multi-clad fiber comprises:
 - 20 projecting the input laser beam with respectively different beam cross-sections onto the coupling-side face of the multi-clad fiber.
4. The method of claim 3, wherein the different beam cross-sections of the input laser beam comprise respectively different beam diameters.
- 25 5. The method of claim 1, wherein the multi-clad fiber comprises a double-clad fiber.
6. A method of generating a laser beam with different beam profile characteristics, comprising:
 - 30

coupling an input laser beam into a first fiber end of a multi-clad fiber, wherein the coupling comprises electively one of

coupling a first input laser beam at least into the inner fiber core of the multi-clad fiber, and

5 coupling a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber; and

emitting an output laser beam from a second fiber end of the multi-clad fiber.

7. The method of claim 6, wherein coupling the input laser beam into the first fiber
10 end of the multi-clad fiber comprises:

dividing the input laser beam into at least two sub-beams including a first sub-beam and a second sub-beam; and

coupling the first sub-beam into the inner fiber core of the multi-clad fiber as the first input laser beam and the second sub-beam into the outer ring core of the multi-clad
15 fiber as the second input laser beam.

8. The method of claim 6, wherein the multi-clad fiber comprises a double-clad fiber.

20 9. A system for generating a laser beam with different beam profile characteristics, comprising:

a multi-clad fiber having one inner fiber core and at least one outer ring core; and

a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by
25 electively coupling one of

the input laser beam into the inner fiber core of the multi-clad fiber, and

the input laser beam into the at least one outer ring core of the multi-clad fiber.

30 10. The system of claim 9, wherein the switchable device comprises adjustable optical deflector configured to, in the at least two switch positions, deflect the input laser

beam in a direction transverse to an axis of a coupling-side face of the multi-clad fiber to varying extents.

11. The system of claim 10, wherein the optical deflector comprises an optical device
5 that is positionable in the at least two switch positions transverse to an optical axis of the input laser beam.

12. The system of claim 11, wherein the optical device is arrangeable in one of the
switch positions outside a beam path of the input laser beam and in at least one other of
10 the switch positions at least partially in the beam path of the laser beam.

13. The system of claim 11, wherein the optical device comprises an optical wedge
plate.

14. The system of claim 9, wherein the switchable device comprises a controller
15 configured to, in the at least two switch positions, move a coupling-side face of the multi-clad fiber in a direction transverse to the input laser beam to varying extents.

15. The system of claim 9, wherein the switchable device comprises an adjustable
20 optical device configured to, in the at least two switch positions, project the input laser beam with different beam cross-sections onto a coupling-side face of the multi-clad fiber.

16. The system of claim 15, wherein the adjustable optical device is configured to be
moved back and forth along an optical axis of the input laser beam axis between the at
25 least two switch positions.

17. The system of claim 9, wherein the switchable device comprises an adjustable
aperture configured to, in the at least two switch positions, project the input laser beam
with different beam cross-sections onto a coupling-side face of the multi-clad fiber.

30

18. The system of claim 9, wherein a diameter of the inner fiber core of the multi-clad fiber is no more than 200 μm .

19. The system of claim 9, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

20. The system of claim 9, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a second cladding surrounding the at least one outer ring core.

21. The system of claim 9, wherein the switchable device comprises two optical fibers on an input side, via which the first and second sub-beams are supplied, whereby the switchable device electively couples the first sub-beam at least into the inner fiber core of the multi-clad fiber and the second sub-beam at least into at least the one outer ring core of the multi-clad fiber.

22. A system for generating a laser beam with different beam profile characteristics, comprising:

a multi-clad fiber having one inner fiber core and at least one outer ring core; and
a switchable device with at least two switch positions, the switchable device configured to couple an input laser beam into a first fiber end of the multi-clad fiber by electively coupling one of
a first input laser beam at least into the inner fiber core of the multi-clad fiber, and
a second, different input laser beam at least into the at least one outer ring core of the multi-clad fiber.

23. The system of claim 22, wherein the switchable device comprises a beam divider configured to be moved into the input laser beam to divide the input laser beam into at least two sub-beams, each of the at least two sub-beam being coupled into a respective one of the cores of the multi-clad fiber.

24. The system of claim 22, wherein a diameter of the inner fiber core of the multi-clad fiber is no more than 200 μm .

5 25. The system of claim 22, wherein a ring thickness of the at least one outer ring core of the multi-clad fiber is no smaller than a diameter of the inner fiber core.

26. The system of claim 22, wherein, for the multi-clad fiber, a numerical aperture of a first cladding surrounding the inner fiber core is higher than a numerical aperture of a
10 second cladding surrounding the at least one outer ring core.

27. The system of claim 22, wherein the switchable device comprises two optical fibers on an input side, via which the first and second input laser beams are supplied, whereby the switchable device electively couples the first input laser beam at least into
15 the inner fiber core of the multi-clad fiber and the second sub-beam at least into at least one outer ring core of the multi-clad fiber.

ABSTRACT

Methods and systems for generating a laser beam with different beam profile characteristics are provided. In one aspect, a method includes coupling an input laser beam into one fiber end of a multi-clad fiber, in particular a double-clad fiber and
5 emitting an output laser beam from the other fiber end of the multi-clad fiber. To generate different beam profile characteristics of the output laser beam, the input laser beam is electively coupled either at least into the inner fiber core of the multi-clad fiber or at least into at least one outer ring core of the multi-clad fiber, or a first sub-beam of the input laser beam is coupled into at least into the inner fiber core of the multi-clad
10 fiber and a second, different sub-beam of the input laser beam is coupled at least into the at least one outer ring core of the multi-clad fiber.

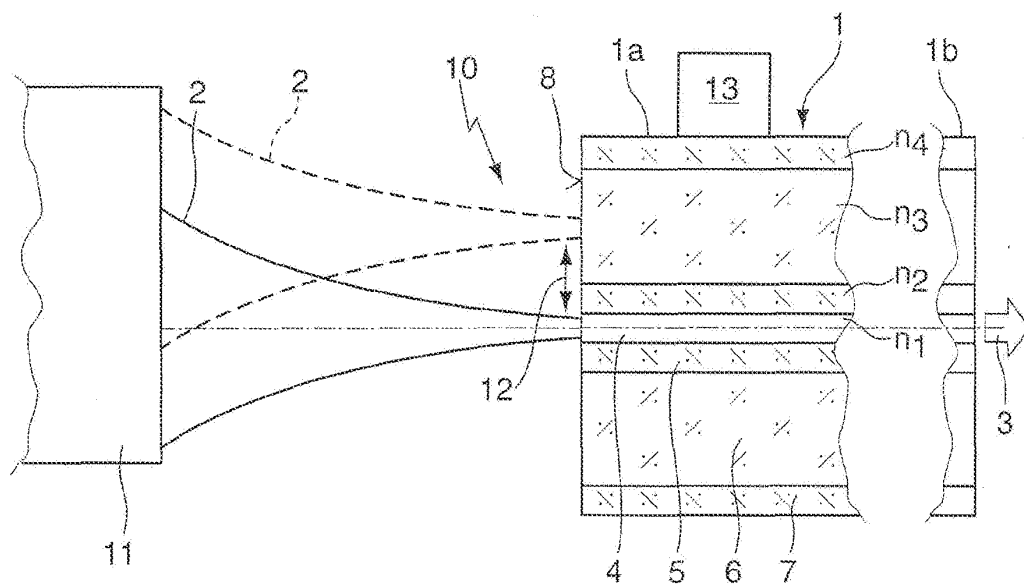


Fig. 1

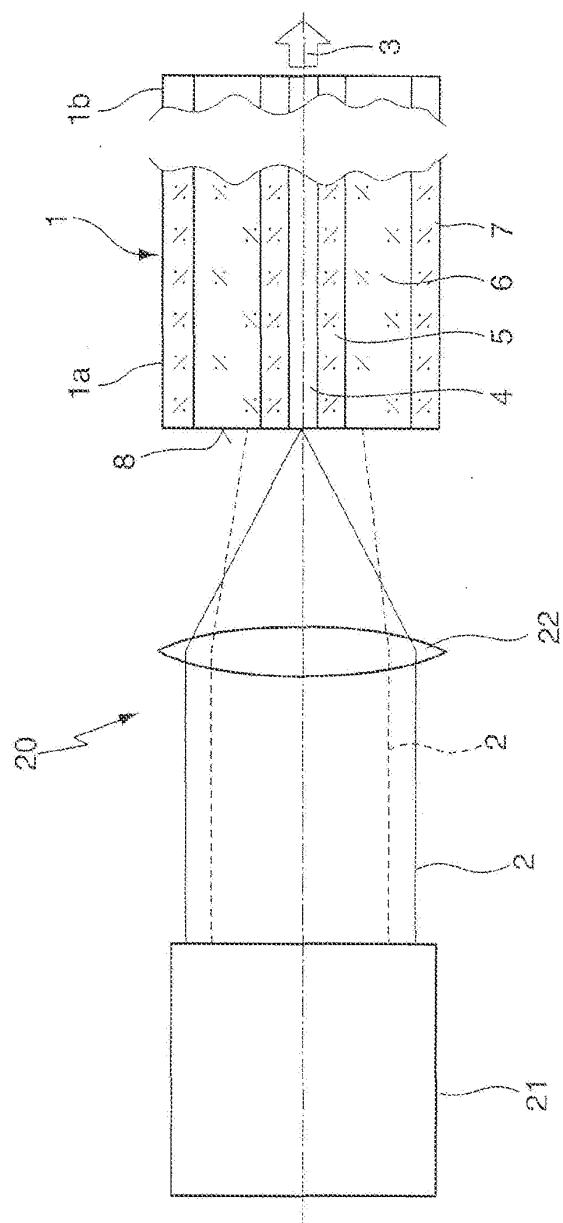
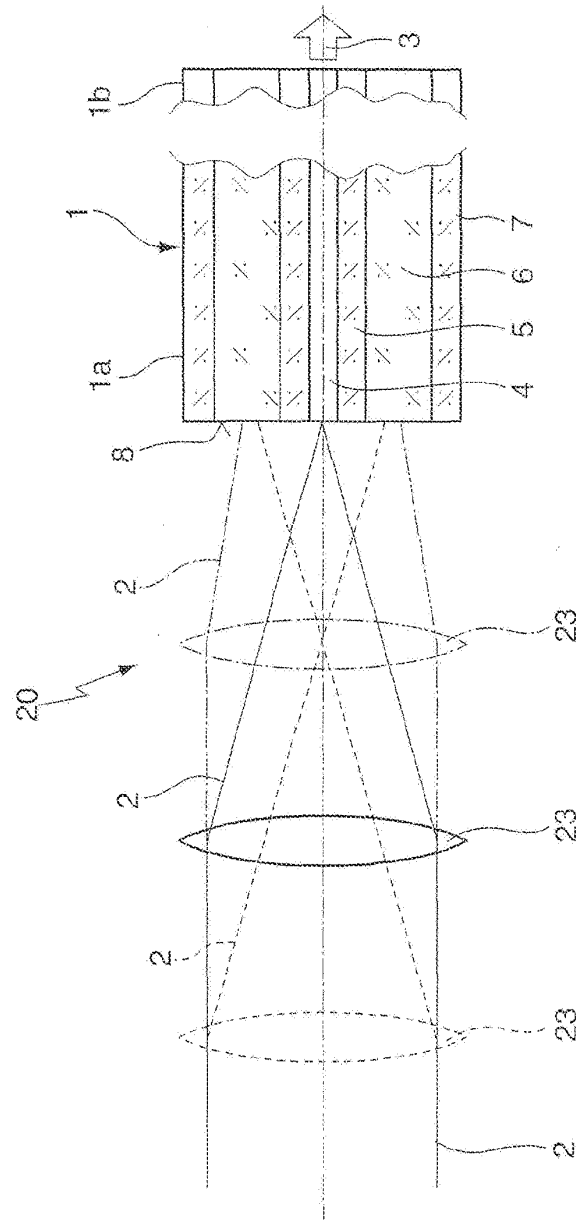


Fig. 2A



25

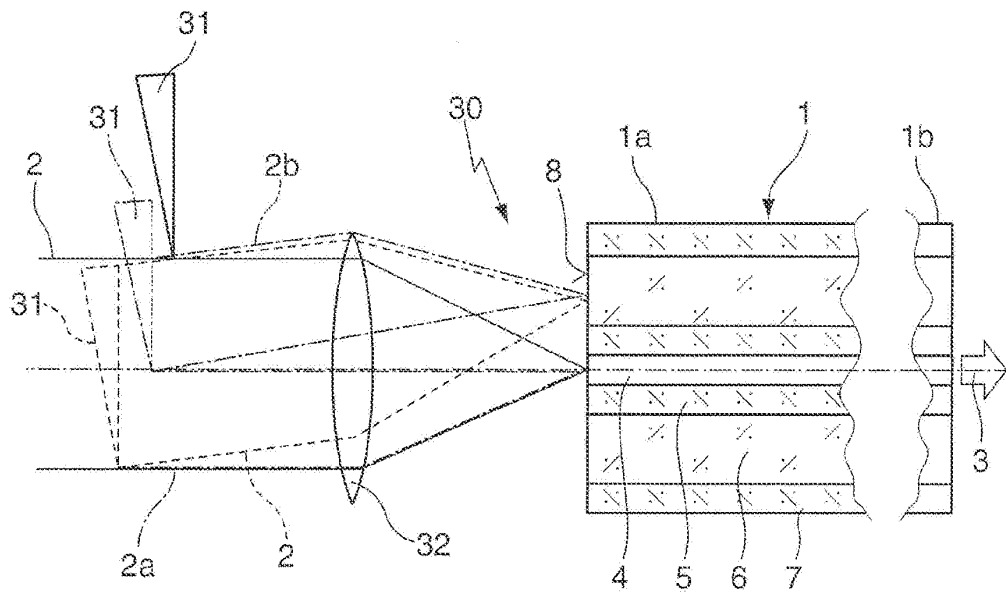


Fig. 3

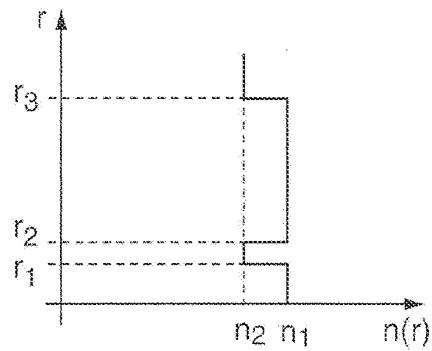


Fig. 4



Fig. 5A

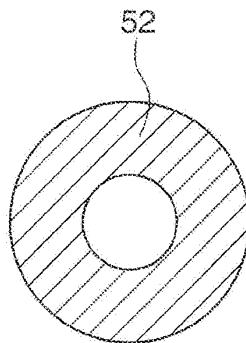


Fig. 5B

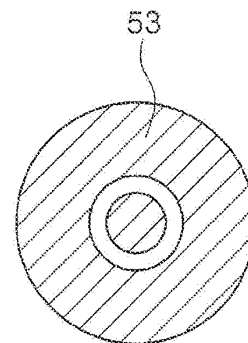


Fig. 5C

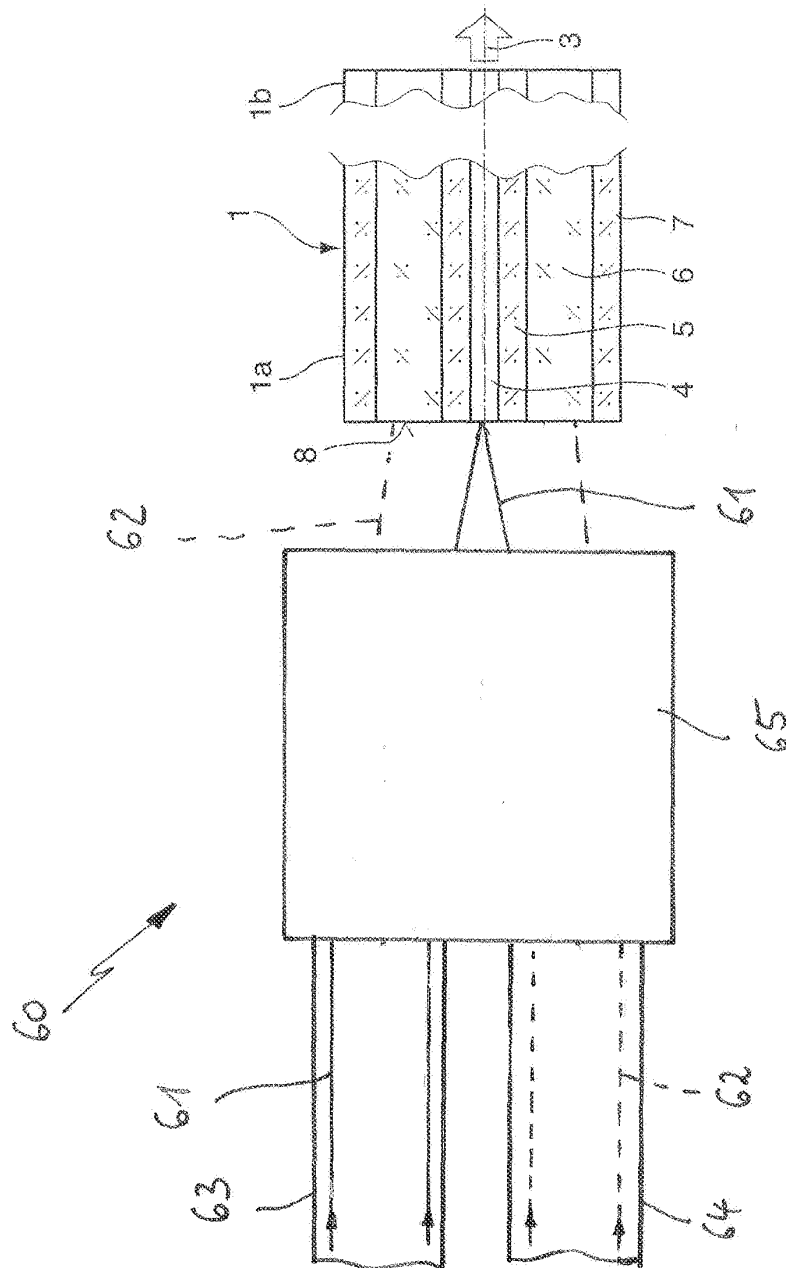


Fig. 6

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ERKLÄRUNG (37 CFR 1.63) FÜR UTILITY- ODER DESIGNANMELDUNG MITTELS EINES ANMELDEFORMULARS
DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET
(37 CFR 1.76)

Bezeichnung der Erfindung Title of Invention	METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM PROFILE CHARACTERISTIC BY MEANS OF A MULTI-CLAD FIBER
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Attorney Docket No. 15540-0370003

/ Client Ref. SP10129US(PCT)CON2: 18.01127; DS10502

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(37 CFR 1.76)

Bezeichnung der Erfindung **METHOD AND ARRANGEMENT FOR GENERATING A LASER BEAM HAVING A DIFFERING BEAM**
Title of invention **PROFILE CHARACTERISTIC BY MEANS OF A MULTI-CLAD FIBER**

Als unten benannter Erfindern erkläre ich hiermit:
As the below named inventor, I hereby declare that:

Diese Erklärung
bezieht sich auf:
This declaration
is directed to:

☐ Die beigefügte Anmeldung, oder
The attached application, or

☐ United States Anmeldung oder PCT internationale Anmeldung mit der Anmeldenummer 15/279.781
eingereicht am September 29, 2016.
United States application or PCT international application number 15/279.781
filed on September 29, 2016.

Die oben genannte Anmeldung wurde von mir getätigt oder autorisiert.
The above-identified application was made or authorized to be made by me.

Ich glaube, dass ich der ursprüngliche Erfinder oder ein ursprünglicher Mitfinder einer beanspruchten Erfindung in der Anmeldung bin.
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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RECHTSGÜLTIGER NAME DES ERFINDERS
LEGAL NAME OF INVENTOR

Erfinder: Martin Huonker

Datum (freiwillig): _____

Inventor: _____

Date (Optional): _____

Unterschrift: _____

Signature: _____

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