

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court District of Delaware on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED 11/3/2021	U.S. DISTRICT COURT District of Delaware
PLAINTIFF ImmerVision, Inc.		DEPENDANT Apple, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 US 10,795,120 B2	10/6/2020	ImmerVision, Inc.
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/432,180	10/06/2020	10795120	688266-26U3	4827

570 7590 09/16/2020
PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Jocelyn PARENT, Montreal, CANADA;
6115187 Canada, Inc. d/b/a ImmerVision, Inc., Montreal, CANADA;
Simon THIBAUT, Quebec City, CANADA;
Patrice ROULET, Montreal, CANADA;
Hu ZHANG, Montreal, CANADA;
Pascale NINI, Montreal, CANADA;
Pierre KONEN, Saint-Bruno, CANADA;

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.

PART B - FEE(S) TRANSMITTAL

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

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

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

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

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

570 7590 06/04/2020

PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

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.
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3	4827

TITLE OF INVENTION: MINIATURE WIDE-ANGLE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	09/04/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARRINGTON, ALICIA M	2872	359-740000

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 Panitch Schwarze Belisario & Nadel LLP

(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

ImmerVision, Inc.

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

Montreal, Quebec, Canada

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) ☐ Advance Order - # of Copies _____

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

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

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 50-1017

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 /Stephen E. Murray/ Date September 2, 2020

Typed or printed name Stephen E. Murray Registration No. 63,206

Electronic Patent Application Fee Transmittal				
Application Number:		16432180		
Filing Date:		05-Jun-2019		
Title of Invention:		MINIATURE WIDE-ANGLE IMAGING LENS		
First Named Inventor/Applicant Name:		Jocelyn PARENT		
Filer:		Stephen Murray/Amber Hyppolite		
Attorney Docket Number:		688266-26U3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1000

Electronic Acknowledgement Receipt	
EFS ID:	40458170
Application Number:	16432180
International Application Number:	
Confirmation Number:	4827
Title of Invention:	MINIATURE WIDE-ANGLE IMAGING LENS
First Named Inventor/Applicant Name:	Jocelyn PARENT
Customer Number:	570
Filer:	Stephen Murray/Amber Hyppolite
Filer Authorized By:	Stephen Murray
Attorney Docket Number:	688266-26U3
Receipt Date:	02-SEP-2020
Filing Date:	05-JUN-2019
Time Stamp:	17:25:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1000
RAM confirmation Number	E202092H26033655
Deposit Account	501017
Authorized User	Amber Hyppolite
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal_688266_26U3.pdf	92139	no	1
			5e5dcfc6d84870f5afb929d5ecf7c097c2589ae1		

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30412	no	2
			1ffc2f689df278984f3ddba4f4b4f09e6b9deb3e		

Warnings:

Information:

Total Files Size (in bytes): 122551

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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



UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

570 7590 06/04/2020
PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

EXAMINER

HARRINGTON, ALICIA M

ART UNIT PAPER NUMBER

2872

DATE MAILED: 06/04/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3	4827

TITLE OF INVENTION: MINIATURE WIDE-ANGLE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	09/04/2020

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

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

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

570 7590 06/04/2020

PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

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.
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3	4827

TITLE OF INVENTION: MINIATURE WIDE-ANGLE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	09/04/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARRINGTON, ALICIA M	2872	359-740000

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 _____

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

2 _____

3 _____

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

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

(A) NAME OF ASSIGNEE

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

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

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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

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

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

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. **NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

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

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3	4827
570 7590 06/04/2020 PANITCH SCHWARZE BELISARIO & NADEL LLP TWO COMMERCE SQUARE 2001 MARKET STREET, SUITE 2800 PHILADELPHIA, PA 19103			EXAMINER HARRINGTON, ALICIA M	
			ART UNIT 2872	PAPER NUMBER

DATE MAILED: 06/04/2020

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. 16/432,180	Applicant(s) PARENT et al.	
	Examiner ALICIA M HARRINGTON	Art Unit 2872	AIA (FITF) Status Yes

-- 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 amendment filed on 3/10/2020.
☐ 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 1-3 and 5-8. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

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

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

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

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

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

* Certified copies not received: _____.

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

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

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

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

Attachment(s)

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

/ALICIA M HARRINGTON/
Primary Examiner, Art Unit 2872

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

Claims 1-3 and 5-8 are allowed.

The following is an examiner's statement of reasons for allowance:
applicant's remarks filed on 3/10/2020, at page 6, were found persuasive.

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 ALICIA M HARRINGTON whose telephone number is (571)272-2330. The examiner can normally be reached on Monday-Friday 9:30 am -6 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule

Application/Control Number: 16/432,180
Art Unit: 2872

Page 3

an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Pham can be reached on (571)272-3689. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

**/ALICIA M HARRINGTON/
Primary Examiner, Art Unit
2872**

AMH

Issue Classification 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.	
	Examiner ALICIA M HARRINGTON	Art Unit 2872	

CPC						
Symbol				Type	Version	
G02B	/	13	/	001	F	2013-01-01
G02B	/	13	/	0045	I	2013-01-01
G02B	/	13	/	06	I	2013-01-01
G02B	/	9	/	62	I	2013-01-01
G02B	/	5	/	005	I	2013-01-01
G02B	/	5	/	208	I	2013-01-01
G02B	/	9	/	64	I	2013-01-01

CPC Combination Sets						
Symbol			Type	Set	Ranking	Version
	/		/			

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	7	
/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872	29 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.
	Examiner ALICIA M HARRINGTON	Art Unit 2872

INTERNATIONAL CLASSIFICATION			
CLAIMED			
G02B		9	00
G02B		9	08
NON-CLAIMED			

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
359	740

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	7	
/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872	29 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.
	Examiner ALICIA M HARRINGTON	Art Unit 2872

☐ 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
1	1														
2	2														
3	3														
	4														
4	5														
5	6														
6	7														
7	8														

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 7	
/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872 (Primary Examiner) _____ (Date) 29 May 2020		O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Search Notes</i> 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.
	Examiner ALICIA M HARRINGTON	Art Unit 2872

CPC - Searched*		
Symbol	Date	Examiner
(G02B13/001 or G02B5/005 or G02B5/208 or G02B9/64).cpc.	12/06/2019	AMH
updated search	05/29/2020	AMH

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
CPC Text Search	12/06/2019	AMH
Reviewed 15/384,900	12/06/2019	AMH
Reviewed Global Dossier	12/06/2019	AMH
CPC Text search	05/29/2020	AMH
Reviewed Global Dossier	05/29/2020	AMH

/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872	
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<i>Search Notes</i> 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.
	Examiner ALICIA M HARRINGTON	Art Unit 2872

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
G02B	13/001	05/29/2020	AMH
	USPGPUB text search-see interference search	05/29/2020	AMH

/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	28,847	(G02B13/001 or G02B5/005 or G02B5/208 or G02B9/64).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/05/29 16:16
L2	61	I1 and (wide near angle) and (relative near2 illumination) and resolution and (imager or CCD or CMOS)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/05/29 16:16
L3	2	(wide and miniaturization and MTF and ratio).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/05/29 16:24
L6	2	(wide and miniaturization and MTF).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/05/29 16:32

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	2	(wide and miniaturization and MTF and ratio).clm.	US-PGPUB; USPAT	OR	ON	2020/05/29 16:26
L5	2	(wide and miniaturization and MTF).clm.	US-PGPUB; USPAT	OR	ON	2020/05/29 16:27

5/29/2020 5:07:59 PM

C:\Users\aharrington\Documents\EAST\Workspaces\16432180.wsp

Electronic Acknowledgement Receipt	
EFS ID:	38816004
Application Number:	16432180
International Application Number:	
Confirmation Number:	4827
Title of Invention:	MINIATURE WIDE-ANGLE IMAGING LENS
First Named Inventor/Applicant Name:	Jocelyn PARENT
Customer Number:	570
Filer:	Stephen Murray/Andrea Bennett
Filer Authorized By:	Stephen Murray
Attorney Docket Number:	688266-26U3
Receipt Date:	10-MAR-2020
Filing Date:	05-JUN-2019
Time Stamp:	10:49:31
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	Amendment/Req. Reconsideration-After Non-Final Reject	Amendment.PDF	275243	no	7
			457fa815fa349b74611753af4b122fd6e8bd760d		

Warnings:

Information:	
Total Files Size (in bytes):	275243
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Jocelyn PARENT et al.

Application No.: 16/432,180

Confirmation No.: 4827

Filed: June 5, 2019

Art Unit: 2872

For: MINIATURE WIDE-ANGLE IMAGING LENS

Examiner: A. M. Harrington

AMENDMENT UNDER 37 C.F.R. § 1.111

The following Amendment and Remarks are being submitted in response to the Office Action dated December 11, 2019 and are being filed within the three month period set for reply, namely by March 11, 2020. No fee is believed to be due with this response, but if any fee in connection with this response is due, please charge such fee to Deposit Account No. 50-1017.

Kindly amend the above-identified U.S. patent application, without prejudice, as follows:

Amendments to and Listing of the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

AMENDMENTS TO AND LISTING OF THE CLAIMS

The following listing of the claims replaces all prior versions, and listings, of claims in this application. Please cancel claim 4, without prejudice, and amend claim 1, wherein strikethroughs and double brackets indicate deletions and underlining indicates additions, as follows:

1. (Currently Amended) A miniature wide-angle optical apparatus comprising:
a light-receiving first surface;
a focal plane;
a total track length measured from a center of the first surface to the focal plane;
a miniaturization ratio with a value less than 3.0, the miniaturization ratio being a ratio of the total track length divided by an image circle diameter; and
a non-linear targeted resolution to intentionally create a zone in an image captured by the miniature wide-angle optical apparatus with a lower or higher object to image magnification compared to linear targeted resolution, the lower or higher object to image magnification being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image,
an opening angle of light entering the optical apparatus being over 100°.
2. (Original) The miniature wide-angle optical apparatus of claim 1, wherein the optical apparatus is configured to create a resulting image with a constant image quality across a whole field of view.
3. (Original) The miniature wide-angle optical apparatus of claim 1, wherein a targeted resolution curve has a change of direction near an edge of a field of view.
4. (Cancelled).

5. (Original) The miniature wide-angle optical apparatus of claim 1, wherein an angle of chief-rays reaching the focal plane is over 20° from an optical axis of the optical apparatus.

6. (Original) The miniature wide-angle optical apparatus of claim 1, further comprising a plurality of optical elements, at least one of the plurality of optical elements defining the first surface.

7. (Original) The miniature wide-angle optical apparatus of claim 6, wherein at least one of the optical elements is made of glass.

8. (Original) The miniature wide-angle optical apparatus of claim 1, wherein the miniaturization ratio value is less than 2.0.

REMARKS

Claims 1-3 and 5-8 are currently pending in this application, as amended. Claim 4 has been cancelled and the subject matter thereof has been moved into claim 1. Claim 1 has been further amended to clarify the invention. Support for the further amendments to claim 1 can be found, for example, at least in original Figs. 6 and 7; and in the original specification at paragraphs [0040]-[0041]. Accordingly, no new matter has been added by the amendments to the claims and entry thereof is respectfully requested.

Claims Rejections Under 35 U.S.C. § 102

Claims 1-3 and 5-8 were rejected under 35 U.S.C. § 102(a)(1) as being anticipated by U.S. Patent Application Publication No. 2012/0314296 (Shabtay). Applicant traverses the rejection for at least the following reasons.

Claim 1 has been amended to include the subject matter of claim 4, which recites that the opening angle of light entering the optical apparatus is over 100°. The Examiner acknowledges that Shabtay fails to teach or disclose this feature, since claim 4 was not rejected as being anticipated. In order to anticipate a claim, a reference must disclose each and every element of the claim as arranged therein. M.P.E.P. § 2131. Accordingly, claim 1, as amended to include the subject matter of claim 4, is not anticipated by Shabtay because the reference fails to teach or disclose at least the above-described feature. Applicant therefore respectfully requests reconsideration and withdrawal of the anticipation rejection of claim 1.

Claims 2-3 and 5-8 are dependent on claim 1. Applicant respectfully requests reconsideration and withdrawal of the anticipation rejection of claims 2-3 and 5-8 due at least to their dependence on claim 1.

Claims Rejections Under 35 U.S.C. § 103

Claim 4 was rejected under 35 U.S.C. § 103 as being obvious over Shabtay. The Examiner contends that while Shabtay does not teach an opening angle of light entering the optical apparatus of over 100°, Shabtay “teaches using a wide angle lens,” and therefore it would have been obvious to include this angle range since “discovering an optimum workable range

involves only routine skill in the art.” Claim 4 has been cancelled and the subject matter thereof has been moved into claim 1. Applicant traverses the obviousness rejection, as applied to the remaining claims, for at least the following reasons.

Contrary to the Examiner’s contention, Shabtay does not teach the use of a wide angle lens. First, the term “wide angle” appears nowhere in Shabtay’s description. The only particular field of view called out by Shabtay for its inventive lenses is the range of 30°-45° (preferably 35°-40°). *See* Shabtay at paras. [0023], [0044]. Shabtay also mentions that its preferred maximal distortion value of 8.5% should occur at a half-angle of about 27°, meaning Shabtay’s lens could have a field of view as large as 54°. Shabtay at paras. [0025], [0032], [0076]. None of these ranges would qualify as a “wide angle” lens as one of ordinary skill in the art would understand the term, let alone come anywhere close to the 100° or greater field of view provided in claim 1. It is further noted that although Fig. 1 in Shabtay is a relative illumination plot for a lens having an apparent field of view in the range of about 66°-70° (showing a field angle of 34.6°), this is background information on the phenomenon of relative illumination drop and is not a representation of any inventive embodiment. *See* Shabtay at para. [0037]. Shabtay does not teach that its invention even works up to that ~34° field angle. It is therefore incorrect to assert that Shabtay teaches the “general conditions” of the claim such that the feature of the opening angle of light being greater than 100° is mere optimization.

Moreover, an obviousness analysis requires that one of ordinary skill in the art recognize a “reasonable expectation of success.” *See e.g.*, M.P.E.P. § 2143.02 (“Reasonable Expectation of Success Is Required”). Shabtay itself provides no evidence that its inventive solution would extend to a 100° field of view or beyond. In particular, Shabtay introduces a small amount of distortion into a lens to increase depth of field, and consequently reduce relative illumination drop across the field of view:

The disclosed aspects provide a lens design with a relatively uniform illumination over the entire sensor area. This design is based on a small and deliberate deformation of the lens to obtain an increased DoF within a regular lens system. The lens is deformed in such a way that the relative light power projected by the lens design near the center of the sensor is lower than the relative power projected by a conventional lens in a similar

area of the sensor. Further, in accordance with the disclosed aspects, the relative power projected by the lens design in the peripheral area of the sensor is higher than the relative power projected by a conventional lens in the peripheral area. Thus, for the lens designs disclosed herein, the total light incident on the sensor is substantially equal to the total light projected by a regular (or conventional) lens onto the sensor.

Shabtay at para. [0040] (emphasis added).

The reference cautions, however, that too much distortion can, itself, cause poor illumination. (Shabtay at para. [0005]). Shabtay therefore caps this distortion at a field angle of about 27.11°. (Shabtay at paras. [0075]-[0076]). Perhaps not coincidentally, Fig. 1 (reproduced annotated below) shows a precipitous decline in relative illumination starting at a field angle of 27.68° (highlighted in yellow). This implies that Shabtay's correction method can restore relative illumination up to a field angle of approximately 27°, but after that point the relative illumination drop becomes

too steep, necessitating a level of distortion Shabtay deems undesirable. To achieve the claimed invention, Shabtay's field of view for its most extreme embodiment (~54°) would need to be essentially doubled (~100°), and Shabtay contains no teaching that the illumination drop-off

would ease or even be salvageable using its method at a 50° or larger field angle. Accordingly, there is no evidence that one of ordinary skill in the art would have a reasonable expectation of success in adopting Shabtay's technique to fields of view exceeding 100°.

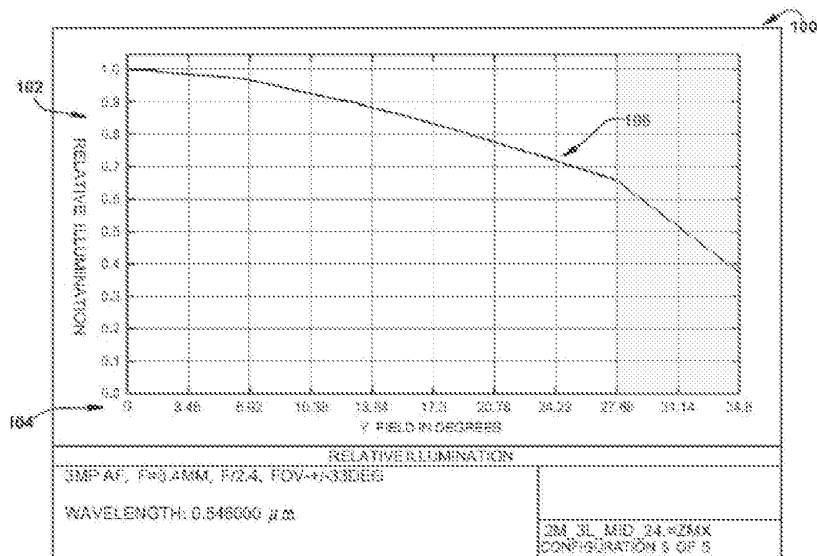


Figure 1

For at least the above-described reasons, Applicant respectfully requests reconsideration and withdrawal of the obviousness rejection as applied to claim 1, and the claims dependent therefrom.

CONCLUSION

In view of the foregoing Amendment and Remarks, Applicant respectfully submits that the pending application is in condition for allowance, and such action is respectfully requested.

Dated: March 10, 2020

Respectfully submitted,

By /Stephen E. Murray/
Stephen E. Murray
Registration No.: 63,206
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Philadelphia, Pennsylvania 19103
(215) 965-1307
(215) 965-1331 (Fax)
smurray@panitchlaw.com (E-Mail)

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 16/432,180		Filing Date 06/05/2019		☐ 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(i))		minus 20 =	*	x \$100 =						
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*	x \$460 =						
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL						
APPLICATION AS AMENDED - PART II										
AMENDMENT	03/10/2020	(Column 1) CLAIMS REMAINING AFTER AMENDMENT	(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	* 7	Minus ** 20	= 0	x \$100 =		0			
	Independent (37 CFR 1.16(h))	* 1	Minus *** 3	= 0	x \$460 =		0			
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE		0		
AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT	(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	*	Minus **	=	x \$0 =					
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x \$0 =					
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE				
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/TRACEY T BELL/				
*** 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3	4827

570	7590	12/11/2019
PANITCH SCHWARZE BELISARIO & NADEL LLP		
TWO COMMERCE SQUARE		
2001 MARKET STREET, SUITE 2800		
PHILADELPHIA, PA 19103		

EXAMINER	
HARRINGTON, ALICIA M	

ART UNIT	PAPER NUMBER
2872	

NOTIFICATION DATE	DELIVERY MODE
12/11/2019	ELECTRONIC

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

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

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

usptomail@panitchlaw.com

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

The information disclosure statement filed on 9/12/19 was considered by the Examiner.

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 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

(a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1-3 and 5-8 is/are rejected under 35 U.S.C. 102(a) (1)/ (a) (2) as being anticipated by Shabtray (US20120314296).

Regarding claim 1, Shabtray teaches a miniature wide-angle optical apparatus comprising:

- a light-receiving first surface (lens or image sensor);
- a focal plane (at the image sensor);
- a total track length (5.531414) measured from a center of the first surface to the focal plane (see table 1);
- a miniaturization ratio with a value less than 3.0 (value is approximately 1.97), the miniaturization ratio being a ratio of the total track length divided by an image circle diameter (see figures 1-3); and
- a non-linear targeted resolution to intentionally create a zone(center of image) in an image captured by the miniature wide-angle optical apparatus with a lower object to image magnification compared to linear targeted resolution, the lower object to image magnification being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image (see paragraphs 40-42xc)- the lens is designed to provide lower magnification image centrally so that relative illumination is substantially uniform.

Regarding claim 2, the miniature wide-angle optical apparatus of claim 1, wherein the optical apparatus is configured to create a resulting image with a constant image quality across a whole field of view (see paragraphs 40, 42 and 62).

Regarding claim 3, the miniature wide-angle optical apparatus of claim 1, wherein a targeted resolution curve has a change of direction near an edge of a field of view (see figures 11 ad 1).

Regarding claim 5, the miniature wide-angle optical apparatus of claim 1, wherein an angle of chief-rays reaching the focal plane is over 20° from an optical axis of the optical apparatus (see figure 3).

Regarding claim 6, the miniature wide-angle optical apparatus of claim 1, further comprising a plurality of optical elements, at least one of the plurality of optical elements defining the first surface (see figures 2-3).

Regarding claim 7, the miniature wide-angle optical apparatus of claim 6, wherein at least one of the optical elements is made of glass (see table 2).

Regarding claim 8, the miniature wide-angle optical apparatus of claim 1, wherein the miniaturization ratio value is less than 2.0- value is approximately 1.97.

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 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is/are rejected under 35 U.S.C. 103 as being unpatentable over Shabtray (US20120314296).

Regarding claim 4, Shabtray fails to specifically disclose an embodiment wherein the miniature wide-angle optical apparatus of claim 1, wherein an opening angle of light entering the optical apparatus is over 100°. However, Shabtray teaches using a wide angle lens. it would have been obvious to one of ordinary skill in the art at the effective filing date of the claimed invention, since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering an optimum workable range involves only routine skill in the art. In re Aller, 105 USPQ 233.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hua (US20100002154) teaches HMD with good MTF.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALICIA M HARRINGTON whose telephone number is (571)272-2330. The examiner can normally be reached on Monday-Friday 9:30 am -6 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, Thomas Pham can be reached on (571)272-3689. The fax

Application/Control Number: 16/432,180
Art Unit: 2872

Page 6

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

**/ALICIA M HARRINGTON/
Primary Examiner, Art Unit
2872**

AMH

<i>Notice of References Cited</i>	Application/Control No. 16/432,180		Applicant(s)/Patent Under Reexamination PARENT et al.	
	Examiner ALICIA M HARRINGTON		Art Unit 2872	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-20100002154-A1	01-2010	Hua; Hong	G02B13/00	349/11
	B					
	C					
	D					
	E					
	F					
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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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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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U.S. Patent and Trademark Office
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Notice of References Cited

Part of Paper No. 20191206

<i>Search Notes</i> 	Application/Control No. 16/432,180	Applicant(s)/Patent Under Reexamination PARENT et al.
	Examiner ALICIA M HARRINGTON	Art Unit 2872

CPC - Searched*		
Symbol	Date	Examiner
(G02B13/001 or G02B5/005 or G02B5/208 or G02B9/64).cpc.	12/06/2019	AMH

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
CPC Text Search	12/06/2019	AMH
Reviewed 15/384,900	12/06/2019	AMH
Reviewed Global Dossier	12/06/2019	AMH

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

/ALICIA M HARRINGTON/ Primary Examiner, Art Unit 2872	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	(wide near2 angle) and ((camera or image) near2 processor) and MTF and ((non adj linear)near2 resolution) and (zones or center or peripheral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/06 12:12
L2	0	(wide near2 angle) and ((camera or image) near2 processor) and MTF and ((non adj linear)near2 resolution)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/06 12:14
L3	74	(wide near2 angle) and ((camera or image) near2 processor) and MTF and (drop same resolution)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/06 12:14
L4	17	("20100142062" "20120212839" "20120314296" "20130114150" "20130308206" "20140029115" "20140118526" "20140204477" "20140218597" "20140226222" "20140285906" "20150116573" "20150253542" "20150268446" "20160004926" "7944620" "9696520").PN.	US-PGPUB; USPAT	OR	OFF	2019/12/06 12:56
L5	26805	(G02B13/001 or G02B5/005 or G02B5/208 or G02B9/64).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/06 13:59
L6	57	L5 and (wide near angle) and (relative near2 illumination) and resolution and (imager or CCD or CMOS)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/06 14:01

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16432180
	Filing Date	2019-06-05
	First Named Inventor	Jocelyn PARENT
	Art Unit	2872
	Examiner Name	A. M. Harrington
	Attorney Docket Number	688266-26U3

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	2	9696520		2017-07-04	Liang et al.		
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	2	20140218597	A1	2014-08-07	Lee		
	3	20120314296	A1	2012-12-13	Shabtay et al.		
	4	20140029115	A1	2014-01-30	LIAO et al.	cited in specification	

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5	20130308206	A1	2013-11-21	Hsu et al.	cited in specification
6	20140226222	A1	2014-08-14	HSIEH et al.	cited in specification
7	20140285906	A1	2014-09-25	HUANG	cited in specification
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15	20160004926	A1	2016-01-07	KERNER et al.	

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	1	Int'l Search Report issued 04/10/217 in Int'l Application No. PCT/IB2016/001808	
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Examiner Name	A. M. Harrington
Attorney Docket Number	688266-26U3

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

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

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

Signature	/Stephen E. Murray/	Date (YYYY-MM-DD)	2019-09-12
Name/Print	Stephen E. Murray	Registration Number	63,206

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/432,180	06/05/2019	Jocelyn PARENT	688266-26U3

CONFIRMATION NO. 4827

PUBLICATION NOTICE



570

PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

Title:MINIATURE WIDE-ANGLE IMAGING LENS

Publication No.US-2019-0285847-A1

Publication Date:09/19/2019

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	Filing Date	2019-06-05
	First Named Inventor	Jocelyn PARENT
	Art Unit	2872
	Examiner Name	A. M. Harrington
	Attorney Docket Number	688266-26U3

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	2	9696520		2017-07-04	Liang et al.		
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	1	20100142062	A1	2010-06-10	ASAMI et al.		
	2	20140218597	A1	2014-08-07	Lee		
	3	20120314296	A1	2012-12-13	Shabtay et al.		
	4	20140029115	A1	2014-01-30	LIAO et al.	cited in specification	

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5	20130308206	A1	2013-11-21	Hsu et al.	cited in specification
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7	20140285906	A1	2014-09-25	HUANG	cited in specification
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10	20120212839	A1	2012-08-23	Hsu et al.	cited in specification
11	20140118526	A1	2014-05-01	Sutton et al.	
12	20130114150	A1	2013-05-09	Kwon	
13	20150116573	A1	2015-04-30	Liao	
14	20140204477	A1	2014-07-24	ASAMI et al.	
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CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Stephen E. Murray/	Date (YYYY-MM-DD)	2019-09-12
Name/Print	Stephen E. Murray	Registration Number	63,206

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

Docket No.: 688266-26U3
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Jocelyn PARENT et al.

Application No.: 16/432,180

Confirmation No.: 4827

Filed: June 5, 2019

Art Unit: 2872

For: MINIATURE WIDE-ANGLE IMAGING LENS

Examiner: A. M. Harrington

INFORMATION DISCLOSURE STATEMENT (IDS)

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

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, the attention of the United States Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of the above-identified application, and that the references be made of record therein and appear among the “References Cited” on any patent to issue therefrom.

In accordance with 37 C.F.R. § 1.98(d)(1) on the attached PTO/SB/08, certain foreign and non-patent literature references are not supplied because they were previously cited by or submitted to the Office in prior U.S. Patent Application No. 15/384,900 filed December 20, 2016 and relied on in the above-identified application for an earlier effective filing date under 35 U.S.C. § 120:

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed as a representation that a search has been made. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be

construed to be an admission that the information cited in this Information Disclosure Statement is, or is considered to be, material to patentability as defined in 37 C.F.R. § 1.56(b).

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98, and the Examiner is respectfully requested to consider the listed references.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 50-1017, under Order No. 688266.0065 from which the undersigned is authorized to draw.

Dated: September 12, 2019

Respectfully submitted,

By /Stephen E. Murray/
Stephen E. Murray
Registration No.: 63,206
PANITCH SCHWARZE BELISARIO & NADEL LLP
Two Commerce Square
2001 Market Street, Suite 2800
Philadelphia, Pennsylvania 19103
(215) 965-1307
(215) 965-1331 (Fax)
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Electronic Acknowledgement Receipt	
EFS ID:	37144079
Application Number:	16432180
International Application Number:	
Confirmation Number:	4827
Title of Invention:	MINIATURE WIDE-ANGLE IMAGING LENS
First Named Inventor/Applicant Name:	Jocelyn PARENT
Customer Number:	570
Filer:	Stephen Murray/Katie Carlson
Filer Authorized By:	Stephen Murray
Attorney Docket Number:	688266-26U3
Receipt Date:	12-SEP-2019
Filing Date:	05-JUN-2019
Time Stamp:	12:39:30
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	Non Patent Literature	IPRP_Ch.PDF	345772	no	9
			d7c7e40db0ad14b7390622d3714be55e1c13320e		

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	Information_Disclosure_Statement_Fillable_PDF.pdf	1034922	no	5
			d5f94d14d2083919c819ad8b8ea4ad643ace58d		
Warnings:					
Information:					
3	Transmittal Letter	IDS_Transmittal.PDF	97671	no	2
			0e9a2375106ab4ee1358bc2f239265c5ab907161		
Warnings:					
Information:					
Total Files Size (in bytes):			1478365		
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.					

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

SIMMONS, John, D.
Panitch Schwarze Belisario & Nadel LLP
One Commerce Square
2005 Market Street, Suite 2200
Philadelphia, PA 19103
ETATS-UNIS D'AMERIQUE

Date of mailing (<i>day/month/year</i>) 05 July 2018 (05.07.2018)			IMPORTANT NOTICE
Applicant's or agent's file reference 688266-26WO			
International application No. PCT/IB2016/001808	International filing date (<i>day/month/year</i>) 23 December 2016 (23.12.2016)	Priority date (<i>day/month/year</i>) 23 December 2015 (23.12.2015)	
Applicant 6115187 CANADA, D/B/A IMMERSION, INC.			

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Cécile Chatel e-mail: ro.ib@wipo.int
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 688266-26WO	FOR FURTHER ACTION	See item 4 below
International application No. PCT/IB2016/001808	International filing date (<i>day/month/year</i>) 23 December 2016 (23.12.2016)	Priority date (<i>day/month/year</i>) 23 December 2015 (23.12.2015)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant 6115187 CANADA, D/B/A IMMERSION, INC.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	This REPORT consists of a total of 8 sheets, including this cover sheet.																								
	In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																								
3.	This report contains indications relating to the following items: <table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: center;">☒</td> <td style="width: 30%;">Box No. I</td> <td style="width: 60%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	☒	Box No. I	Basis of the report	☐	Box No. II	Priority	☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	☒	Box No. IV	Lack of unity of invention	☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	☐	Box No. VI	Certain documents cited	☐	Box No. VII	Certain defects in the international application	☒	Box No. VIII	Certain observations on the international application
☒	Box No. I	Basis of the report																							
☐	Box No. II	Priority																							
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☐	Box No. VI	Certain documents cited																							
☐	Box No. VII	Certain defects in the international application																							
☒	Box No. VIII	Certain observations on the international application																							
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 26 June 2018 (26.06.2018) Authorized officer Cécile Chatel e-mail: ro.ib@wipo.int
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Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

To: SIMMONS, JOHN D. Panitch Schwarze Belisario & Nadel LLP One Commerce Square 2005 Market Street, Suite 2200 Philadelphia, Pennsylvania United States of America, 19103		Date of mailing (day/month/year) 10 April 2017 (10-04-2017) Applicant's or agent's file reference 688266-26WO FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/IB2016/001808	International filing date (day/month/year) 23 December 2016 (23-12-2016)	Priority date (day/month/year) 23 December 2015 (23-12-2015)	
International Patent Classification (IPC) or both national classification and IPC IPC: G02B 13/06 (2006.01), G02B 1/02 (2006.01), G02B 11/18 (2006.01)			
Applicant 6115187 CANADA, D/B/A IMMERSION, INC.			

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Date of completion of this opinion 06 April 2017 (06-04-2017)	Authorized officer Patrick Abou-Antoun (819) 639-1681
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No
PCT/IB2016/001808

Box No I

Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into _____ which is the language of a translation
furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

- ☐ in the form of an Annex C/ST.25 text file.
- ☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

- ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
- ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2016/001808

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☒ not complied with for the following reasons:

The claims are directed to a plurality of inventive concepts as follows:

Group I:

Claims 1-8 are directed to a miniature wide-angle optical apparatus comprising a first group of at least three optical elements, the first group having negative power in a paraxial region; a second group of optical elements including an aperture stop and an optical element located immediately in front of or behind the aperture stop, the first group being arranged on an object side of the second group; and a third group of at least two optical elements, the third group being arranged on an image side of the second group, the optical apparatus having a miniaturization ratio with a value less than 3.0, the miniaturization ratio being a ratio of a total track length measured from a center of a first surface of the optical apparatus to a focal plane divided by an image circle diameter.

Group II:

Claims 9-11 are directed to a method to design a wide-angle optical apparatus, the method comprising providing non-linear targeted resolution to intentionally create a zone in an image captured by the wide-angle optical apparatus with a higher number of pixels compared to linear targeted resolution, the higher number of pixels being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claim Nos.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2016/001808

Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																		
1. Statement	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Novelty (N)</td> <td style="width: 40%;">Claims 1-11</td> <td style="width: 30%; text-align: right;">YES</td> </tr> <tr> <td></td> <td>Claims NONE</td> <td style="text-align: right;">NO</td> </tr> <tr> <td> Inventive step (IS)</td> <td>Claims 9-11</td> <td style="text-align: right;">YES</td> </tr> <tr> <td></td> <td>Claims 1-8</td> <td style="text-align: right;">NO</td> </tr> <tr> <td> Industrial applicability (IA)</td> <td>Claims 1-11</td> <td style="text-align: right;">YES</td> </tr> <tr> <td></td> <td>Claims NONE</td> <td style="text-align: right;">NO</td> </tr> </table>	Novelty (N)	Claims 1-11	YES		Claims NONE	NO	 Inventive step (IS)	Claims 9-11	YES		Claims 1-8	NO	 Industrial applicability (IA)	Claims 1-11	YES		Claims NONE	NO
Novelty (N)	Claims 1-11	YES																	
	Claims NONE	NO																	
 Inventive step (IS)	Claims 9-11	YES																	
	Claims 1-8	NO																	
 Industrial applicability (IA)	Claims 1-11	YES																	
	Claims NONE	NO																	
2. Citations and explanations:	<u>GROUP I</u> Reference is made to the following documents: D1: US 2010/0142062 A1 (ASAMI et al.) 10 June 2010 (10-06-2010) D2: US 2014/0218597 A1 (LEE) 07 August 2014 (07-08-2014) D3: US 2012/0314296 A1 (SHABTAY et al.) 13 December 2012 (13-12-2012) D1 discloses a compact imaging lens comprising three groups of optical elements. D2 and D3 disclose an imaging lens having a miniaturization ratio with a value less than 3.0. The inventive concept of claims 1-8 is considered to be a miniature wide-angle imaging lens having a miniaturization ratio, of a total track length from the center of a first surface to a focal plane by an image circle diameter, with a value less than 3.0, wherein the imaging lens includes, a first group of at least three optical elements, a second group including an aperture stop and an optical element immediately in front of or behind the aperture stop, and a third group of at least two optical elements. Novelty Claims 1-8 are considered to be novel and comply with Article 33(2) of the PCT as the characteristic features of these claims are not specifically disclosed in the prior art documents D1-D3. Inventive Step Claims 1-8 do not comply with Article 33(3) of the PCT. The subject matter described and claimed in these claims cannot be considered to present an inventive step having regard to D1 in view of D2, D3 and common knowledge in the art. Regarding independent claim 1, D1 discloses a compact wide-angle optical apparatus comprising: a first group (L1, L2, L3 in figure 1) of at least three optical elements, the first group having negative power (paragraph [0014]); a second group (St, L4 in figure 1) of optical elements including an aperture stop and an optical element located immediately in front of or behind the aperture stop, the first group being arranged on an object side of the second group (see figure 1); and a third group (L5, L6 in figure 1) of at least two optical elements, the third group being arranged on an image side of the second group (see figure 1). The subject matter of claim 1 differs from D1 in that the optical apparatus has a miniaturization ratio with a value less than 3.0, the miniaturization ratio being a ratio of a total track length measured from a center of a first surface of the optical apparatus to a focal plane divided by an image circle diameter. (continued in Supplemental Box)																		

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/IB2016/001808

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

A statement in an application implying that protection may be expanded in some vague and not precisely defined way (ex: to cover the "spirit" of the invention), such as that found in paragraph [0044], does not comply with PCT Article 6.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box No. V

However, this feature cannot be considered inventive since an optical apparatus having a miniaturization ratio with a value less than 3.0 is known in the art. For example, D2 discloses a compact lens system having a total track length of 3.90mm and an image circle diameter of 4.536mm (paragraph [0056]); this corresponds to a miniaturization ratio of 0.86. Similarly, D3 discloses a compact lens system having a ratio of total track length to an image circle diameter being less than about 1.172 (paragraph [0022]).

Regarding dependent claim 2, see D1: paragraph [0065].

Regarding dependent claim 4, see D1: paragraph [0163].

Regarding dependent claim 5, see D2: paragraph [0056]; D3: paragraph [0022].

Dependent claims 3 and 6-8 do not contain any additional features or characteristics which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step (Article 33(3) PCT). The elements recited in these claims represent either features that are already known from the prior art, or common design and implementation details which are well known to a person skilled in the art.

Industrial Applicability

Claims 1-8 are directed to a miniature wide-angle optical apparatus. As such, the subject matter of claims 1-8 is considered to be industrially applicable, and thus the claims comply with the requirements of Article 33(4) of the PCT.

GROUP II

Reference is made to the following document:

D3: US 2012/0314296 A1 (SHABTAY et al.) 13 December 2012 (13-12-2012)

D3 discloses a method for designing an optical apparatus in order to provide a uniform illumination over an entire sensor area.

The inventive concept of claims 9-11 is considered to be a method to design a wide-angle optical apparatus, the method comprising providing non-linear targeted resolution to intentionally create a zone in an image captured by the wide-angle optical apparatus with a higher number of pixels compared to linear targeted resolution.

Novelty and Inventive Step

Claims 9-11 are considered to be novel and inventive as the characteristic features of these claims are not specifically disclosed in the prior art document D3.

Regarding independent claim 9, D3 discloses a lens design having a relatively uniform illumination over an entire sensor area, the design being based on a small and deliberate deformation of the lens to obtain an increased depth of field within a regular lens system. The lens is deformed in such a way that the relative light power projected by the lens design near the center of the sensor is lower than the relative power projected by a conventional lens in a similar area of the sensor. Furthermore, the relative power projected by the lens design in the peripheral area of the sensor is higher than the relative power projected by a conventional lens in the peripheral area (paragraph [0040]).

However, D3 fails to teach or fairly suggest a method for designing a wide-angle optical apparatus, wherein the method comprises providing non-linear targeted resolution to intentionally create a zone in an image captured by the wide-angle optical apparatus with a higher number of pixels compared to linear targeted resolution, the higher number of pixels being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image.

As such, claims 9-11 are considered novel and inventive as required by PCT Articles 33(2) and 33(3).

(continued in Supplemental Box)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2016/001808

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box No. V

Industrial Applicability

Claims 9-11 are directed to a method for designing a wide-angle optical apparatus. As such, the subject matter of claims 9-11 is considered to be industrially applicable and thus complies with the requirements of Article 33(4) of the PCT.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT5596456

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	SECURITY INTEREST	
CONVEYING PARTY DATA		
Name		Execution Date
IMMERVISION INC.		06/26/2019
RECEIVING PARTY DATA		
Name:	BRIDGING FINANCE INC.	
Street Address:	77 KING STREET WEST	
Internal Address:	SUITE 2925	
City:	TORONTO, ONTARIO	
State/Country:	CANADA	
Postal Code:	M5K 1K7	
PROPERTY NUMBERS Total: 18		
Property Type	Number	
Application Number:	16432180	
Application Number:	16243492	
Application Number:	15384900	
Application Number:	15656647	
Application Number:	15656707	
Application Number:	15903872	
Application Number:	62859861	
Patent Number:	9930326	
Patent Number:	10204398	
PCT Number:	IB1950169	
Patent Number:	6895180	
Patent Number:	6885817	
Patent Number:	6844990	
Patent Number:	6865028	
Patent Number:	8016426	
Application Number:	14668314	
Patent Number:	9299127	
Application Number:	14370268	

CORRESPONDENCE DATA**Fax Number:**

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 2159651330
Email: abennett@panitchlaw.com
Correspondent Name: JOHN D. SIMMONS
Address Line 1: 2001 MARKET STREET STE 2800
Address Line 4: PHILADELPHIA, PENNSYLVANIA 19103

ATTORNEY DOCKET NUMBER:	688266.5002
NAME OF SUBMITTER:	JOHN D. SIMMONS
SIGNATURE:	/John D. Simmons/
DATE SIGNED:	06/28/2019
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 7

source=Contract Confirmatory Security Agreement#page1.tif
source=Contract Confirmatory Security Agreement#page2.tif
source=Contract Confirmatory Security Agreement#page3.tif
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source=Contract Confirmatory Security Agreement#page7.tif

CONFIRMATORY SECURITY AGREEMENT

WHEREAS IMMERSION INC (the "Grantor"), having its registered office at 2320-2020 boul. Robert-Bourassa, Montréal, Quebec H3A 2A5 (i) is the registered owner of the US trademarks and trademark applications listed in Schedule "A" hereto and may, in the future, become the registered owner of additional US trademarks and trademark applications (collectively, the "US Trademarks"), and (ii) is the registered owner of the US patents and patent applications listed in Schedule "B" hereto and may, in the future, become the registered owner of additional US patents and patent applications (collectively, the "US Patents", and together with the US Trademarks, the "Intellectual Property");

WHEREAS Bridging Finance Inc. (the "Creditor"), having a place of business at 77 King Street West, Suite 2925, Toronto, Ontario M5K 1K7 and the Grantor entered into a deed of hypothec dated as of June 26, 2019 (the "Deed of Hypothec"), pursuant to which the Grantor granted to the Creditor a security in and to, among other things, the Intellectual Property;

WHEREAS the Grantor and the Creditor have perfected and rendered opposable to third parties the Deed of Hypothec in the Intellectual Property in accordance with the laws of the Provinces of Québec, Canada;

WHEREAS the Grantor and the Creditor are desirous of recording the Deed of Hypothec and the additional security created hereunder in the Intellectual Property with the United States Patent and Trademark Office;

NOW THEREFORE, the Grantor and the Creditor hereby confirm that the Grantor and the Creditor entered into the Deed of Hypothec, pursuant to which the Grantor granted to the Creditor a security in and to, among other things, the Intellectual Property.

AND, for good and valuable consideration, receipt of which is hereby acknowledged, the Grantor does hereby further grant to the Creditor a security interest in, and mortgage on, the Intellectual Property.

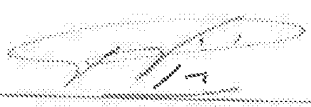
AND each party hereto does hereby further acknowledge and affirm that the rights and remedies of the Creditor with respect to the security interest in and mortgage on the Intellectual Property made and granted hereby are more fully set forth in the Deed of Hypothec, the terms and provisions of which are hereby incorporated herein by reference as if fully set forth herein.

THE PARTIES FURTHER AGREE that the Grantor shall record this Confirmatory Security Agreement with the United States Patent and Trademark Office, with respect to the US Trademarks and the US Patents.

CONFIRMATORY SECURITY AGREEMENT (USPTO) - SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed as a sealed instrument on June 26, 2019.

IMMERVISION INC.

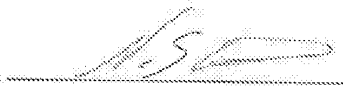
Per: 

Name: Pascale Nini

Title: President and CEO

CONFIRMATORY SECURITY AGREEMENT (USPTO) - SIGNATURE PAGE

BRIDGING FINANCE INC.

Per: 

Name: Natasha Sharpe
Title: Chief Investment Officer

SCHEDULE A
TRADEMARKS

TRADEMARK	OWNER	TERRITORY	REGISTRATION NUMBER	CLASS	EXPIRY DATE
Immervision (word mark)	Immervision Inc.	United States of America	3542321	9	December 11, 2028
Immervision Enables (word mark)	Immervision Inc.	United States of America	3578319	9	February 26, 2029
Enabling Panoramic Technology (word mark)	Immervision Inc.	United States of America	3604788	9	October 15, 2019

SCHEDULE B
UNITED STATES PATENTS AND PATENT APPLICATIONS

	Description	Filing Date or 371 (c) Date	Patent number or Publication number (application number)
1.	Camera support device	August 13, 2003	6,895,180
2.	Method and device for orienting a digital panoramic image	August 14, 2003	6,885,817
3.	Method for capturing and displaying a variable resolution digital panoramic image	November 12, 2003	6,844,990
4.	Method for capturing a panoramic image by means of an image sensor rectangular in shape	January 20, 2004	6,865,028
5.	Method and device for projecting a panoramic image with a variable resolution	February 27, 2008	8,016,426
6.	Automated definition of system behaviour or user experience by recording, sharing, and processing information associated with wide-angle image	March 25, 2015	2015/0281307 (14/668,314)
7.	Splitting of elliptical images	July 25, 2013	9,299,127

	Description	Filing Date or 371 (c) Date	Patent number or Publication number (application number)
8.	Panoramic camera	July 2, 2014	2014/0340473 A1 (14/370,268)
9.	Method for designing an optimization apparatus for a camera having a lens with non-uniform parameters to be imaged as a lens with uniform parameters	September 9, 2015	9,930,326
10.	Miniature Wide-Angle Imaging Lens	December 20, 2016	unpublished provisional (62/216,105) US <i>non-provisional</i> application US2017/0184813
11.	Image distortion transformation method and apparatus	February 16, 2017	US continuation 16/432,180 10,204,398
Families with ungranted patents applications			
12.	Method to Capture, Store, Distribute, Share, Stream and Display Panoramic Image or Video	July 21, 2017	US <i>non-provisional</i> application 15/656,647
13.	Wide angle Stereoscopic Vision With Cameras Having Different Parameters	July 21, 2017 February 23, 2018	US <i>non-provisional</i> application 15/656,707 US <i>non-provisional</i> application 15/903,872

	Description	Filing Date or 371 (c) Date	Patent number or Publication number (application number)
14.	Constant resolution continuous hybrid zoom system	January 9, 2019	US non-provisional application 16/243,492 PCT/IB2019/050169
15.	Method for Adaptive Dewarping Based on Context Segmentation Layers	June 11, 2019	US provisional application 62/859,861

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/432,180	
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	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	660
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	8	minus 20 = *				x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
			TOTAL			TOTAL	1720
* 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(\$)		RATE(\$)
	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
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	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	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/432,180	06/05/2019	2872	1720	688266-26U3	8	1

CONFIRMATION NO. 4827

FILING RECEIPT



0000000106866134

570

PANITCH SCHWARZE BELISARIO & NADEL LLP
TWO COMMERCE SQUARE
2001 MARKET STREET, SUITE 2800
PHILADELPHIA, PA 19103

Date Mailed: 06/13/2019

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)

Jocelyn PARENT, Montreal, CANADA;
Simon THIBAUT, Quebec City, CANADA;
Patrice ROULET, Montreal, CANADA;
Hu ZHANG, Montreal, CANADA;
Pascale NINI, Montreal, CANADA;
Pierre KONEN, Saint-Bruno, CANADA;

Applicant(s)

6115187 Canada, Inc. d/b/a ImmerVision, Inc., Montreal, CANADA;

Power of Attorney: The patent practitioners associated with Customer Number 000570

Domestic Priority data as claimed by applicant

This application is a CON of 15/384,900 12/20/2016
which claims benefit of 62/298,795 02/23/2016
and claims benefit of 62/387,409 12/23/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 06/12/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/432,180**

Projected Publication Date: 09/19/2019

Non-Publication Request: No

Early Publication Request: No

Title

MINIATURE WIDE-ANGLE IMAGING LENS

Preliminary Class

359

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

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

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

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT5561093

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
JOCELYN PARENT	01/11/2017
SIMON THIBAUT	01/10/2017
PATRICE ROULET	01/11/2017
HU ZHANG	01/10/2017
PASCALE NINI	01/11/2017
PIERRE KONEN	01/11/2017
RECEIVING PARTY DATA	
Name:	6115187 CANADA, INC. D/B/A IMMERSION, INC.
Street Address:	2020 UNIVERSITY STREET
Internal Address:	SUITE 2320
City:	MONTREAL
State/Country:	CANADA
Postal Code:	H3A 2A5
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	16432180
CORRESPONDENCE DATA	
Fax Number:	(215)965-1331
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	(215) 965-1330
Email:	abennett@panitchlaw.com
Correspondent Name:	PANITCH SCHWARZE BELISARIO & NADEL LLP
Address Line 1:	TWO COMMERCE SQUARE
Address Line 2:	2001 MARKET STREET, SUITE 2800
Address Line 4:	PHILADELPHIA, PENNSYLVANIA 19103
ATTORNEY DOCKET NUMBER:	688266-26U3
NAME OF SUBMITTER:	STEPHEN E. MURRAY
SIGNATURE:	/Stephen E. Murray/
DATE SIGNED:	06/07/2019

	This document serves as an Oath/Declaration (37 CFR 1.63).
Total Attachments: 3 source=Declaration#page1.tif source=Declaration#page2.tif source=Declaration#page3.tif	

COPY

Attorney Docket No: 688266-26U2

**INVENTOR'S COMBINED
DECLARATION (37 CFR 1.63) AND ASSIGNMENT
(Utility Patent Application)**

As a below-named inventor/assignor of a certain new and useful invention for which I have executed an application for Letters Patent entitled:

Miniature Wide-Angle Imaging Lens

DECLARATION

I hereby declare that:

This Declaration is directed to United States application number 15/384,900 filed on December 20, 2016.

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

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

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

Note to Inventor: 37 C.F.R. § 1.63(e) states: "A person may not execute an oath or declaration for an application unless that person has reviewed and understands the contents of the application, including the claims, and is aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in § 1.56."

ASSIGNMENT

WHEREAS, I ("ASSIGNOR") desire/am obligated to assign to the below-named ASSIGNEE the invention identified above;

WHEREAS, ("ASSIGNEE");

**6115187 Canada, Inc. d/b/a ImmerVision, Inc.
(a Canadian Corporation)
2020 University Street, Suite 2320
Montreal, Quebec
Canada H3A 2A5**

is desirous of acquiring the entire right, title and interest in and to the invention throughout the United States and the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all countries throughout the world;

FOR GOOD and VALUABLE CONSIDERATION, the full receipt and sufficiency of which are hereby acknowledged, ASSIGNOR(S), intending to be legally bound, do hereby:

AUTHORIZE said ASSIGNEE, or its representatives to insert above the filing date and application number of the application when these are known;

SELL, ASSIGN, TRANSFER and CONVEY to ASSIGNEE the whole and entire right, title and interest for the United States and its possessions and territories and all foreign countries in and to the invention which is disclosed in the above-identified patent application, and, in and to any and all patent applications related thereto including, but not limited to, all provisionals, non-provisionals, divisionals, continuations, continuations-in-part, substitutes, reexaminations, reissues and all other applications for patent which have been or shall be filed in the United States and all foreign countries on the invention; all original, reissued and reexamined patents and extensions thereof which have been or shall be issued in the United States and all foreign countries on the invention to the full end of the term or terms for which the patent(s) may be granted, as fully and entirely as the same would have been held by the undersigned ASSIGNOR(S) had this Assignment not been made; and specifically including all rights of priority created by the above patent application under any treaty, convention or law relating thereto;

AUTHORIZE and REQUEST the issuing authority to issue any and all United States and foreign patents granted on the invention to ASSIGNEE;

WARRANT and REPRESENT that no assignment, grant, mortgage, license or other agreement affecting the rights and property herein conveyed has been or will be made to others by ASSIGNOR(S), and that the full right to convey the same as herein expressed is possessed by ASSIGNOR(S);

AGREE and UNDERTAKE, when requested and at the expense of ASSIGNEE, to carry out in good faith the intent and purpose of this Assignment. ASSIGNOR(S) will execute all non-provisionals, divisionals, continuations, continuations-in-part, substitutes, reexaminations, reissues, and all other patent applications on the invention; execute all lawful oaths, declarations, assignments, powers of attorney and other papers; communicate to ASSIGNEE all facts known to ASSIGNOR(S) relating to the invention and the history thereof; and generally do everything possible which ASSIGNEE shall consider desirable for vesting title to the invention in ASSIGNEE, and for securing, maintaining and enforcing proper patent protection for the invention; all without further compensation to ASSIGNOR(S);

TO BE BINDING on the heirs, assigns, representatives and successors of ASSIGNOR(S) and extending to the successors, assigns, and nominees of ASSIGNEE.

First Joint Inventor/Assignor:

Date: 2017-01-11 Signature: Jocelyn Parent
Typed Legal Name: Jocelyn Parent

Second Joint Inventor/Assignor:

Date: 2017-01-10 Signature: Simon Thibault
Typed Legal Name: Simon Thibault

Third Inventor/Assignor:

Date: 2017-01-11 Signature: Patrice Roulet
Typed Legal Name: Patrice Roulet

Fourth Joint Inventor/Assignor:

Date: Jan 10, 2017 Signature: Hu Zhang
Typed Legal Name: Hu Zhang

Fifth Joint Inventor/Assignor:

Date: Jan 11, 2017 Signature: Pascale Nini
Typed Legal Name: Pascale Nini

Sixth Joint Inventor/Assignor:

Date: 2017-01-11 Signature: Pierre Konen
Typed Legal Name: Pierre Konen

Applicant: 6115187 Canada, Inc. d/b/a ImmerVision, Inc.

GENERAL POWER OF ATTORNEY BY PATENT APPLICANT (USPTO)

I hereby revoke all previous powers of attorney given in the patent application identified in the attached Transmittal Letter.

I hereby appoint the Practitioners associated with Customer No. 000570 as my/our attorneys/agents to transact all business in the U.S. Patent and Trademark Office in connection therewith.

I am the Applicant:

- ☐ Inventor or Joint Inventor
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign
- ☐ 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 currently being filed in this document)

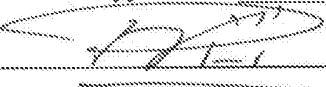
The undersigned Representative of Applicant states that he/she is authorized and empowered to sign this document on behalf of Applicant.

Please address all correspondence to Customer No. 000570, namely, **PANITCH SCHWARZE BELISARIO & NADEL LLP**, One Commerce Square, 2005 Market Street, Suite 2200, Philadelphia, PA 19103, e-mail address: usptomail@panitchlaw.com. Please direct all communications and telephone calls to the attorney/agent identified in the attached Transmittal Letter.

Applicant: 6115187 Canada, Inc. d/b/a ImmerVision, Inc.

Name of Representative of Applicant: Pascale Nini

Title of Representative of Applicant: President and Chief Executive Officer

Signature:  Date: 27/05/2014

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		MINIATURE WIDE-ANGLE IMAGING LENS		
First Named Inventor/Applicant Name:		Jocelyn PARENT		
Filer:		Stephen Murray/Andrea Bennett		
Attorney Docket Number:		688266-26U3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1720

Electronic Acknowledgement Receipt	
EFS ID:	36209546
Application Number:	16432180
International Application Number:	
Confirmation Number:	4827
Title of Invention:	MINIATURE WIDE-ANGLE IMAGING LENS
First Named Inventor/Applicant Name:	Jocelyn PARENT
Customer Number:	00570
Filer:	Stephen Murray/Andrea Bennett
Filer Authorized By:	Stephen Murray
Attorney Docket Number:	688266-26U3
Receipt Date:	05-JUN-2019
Filing Date:	
Time Stamp:	14:29:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1720
RAM confirmation Number	060619INTEFSW14302900
Deposit Account	501017
Authorized User	Andrea Bennett
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	Application_Data_Sheet_Fillable_PDF.pdf	1256148	no	10
			14448c1f5518131c6a727aac4deb721c68117a98		
Warnings:					
Information:					
2	Specification	Application.PDF	154079	no	13
			e2f073c270605c050249f2afae00958b2e50ce3a		
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Drawings.PDF	161030	no	5
			56dd9f18c816df5a27be3f70d10228291a10e9bc		
Warnings:					
Information:					
4	Oath or Declaration filed	Declaration.PDF	183268	no	3
			56fe3a4f11ed3cd01a70e03cd2e4849607650ca1		
Warnings:					
Information:					
5	Transmittal Letter	Transmittal_for_Power_of_Attorney.PDF	68896	no	1
			de07f3981fd586921d66114f1c8a46e32c574d98		
Warnings:					
Information:					
6	Power of Attorney	General_Power_of_Attorney.PDF	633740	no	1
			8fd1bd131453c8bb908d6ab06798bf421993ce9b		
Warnings:					
Information:					

7	Fee Worksheet (SB06)	fee-info.pdf	34964	no	2				
			e998b666e598b24b8f3db88375a153f43a88a0dd						
Warnings:									
Information:									
Total Files Size (in bytes):			2492125						
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.									

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		
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
Mr. ▾	Jocelyn		PARENT
Residence Information (Select One) US Residency • Non US Residency Active US Military Service			
City	Montreal	Country of Residence ⁱ	CA
Mailing Address of Inventor:			
Address 1		300 rue Gordon	
Address 2		Apartment No. 303	
City	Montreal	State/Province	QC
Postal Code	H4G 2R9	Country ⁱ	CA
Inventor 2		Remove	
Legal Name			
Prefix	Given Name	Middle Name	Family Name
Mr. ▾	Simon		THIBAUT
Residence Information (Select One) US Residency • Non US Residency Active US Military Service			
City	Quebec City	Country of Residence ⁱ	CA
Mailing Address of Inventor:			
Address 1		1281 av de Gaudarville	
Address 2			
City	Quebec City	State/Province	QC
Postal Code	G2G 2V7	Country ⁱ	CA
Inventor 3		Remove	
Legal Name			

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr. ▾	Patrice		ROULET	▾
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Montreal	Country of Residence ⁱ	CA	

Mailing Address of Inventor:

Address 1	2020 University Street			
Address 2	Suite 2320			
City	Montreal	State/Province	QC	
Postal Code	H3A 2A5	Country ⁱ	CA	
Inventor	4	Remove		

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr. ▾	Hu		ZHANG	▾
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Montreal	Country of Residence ⁱ	CA	

Mailing Address of Inventor:

Address 1	3645 rue Sherbrook East			
Address 2	Apartment 203			
City	Montreal	State/Province	QC	
Postal Code	H1W 1E5	Country ⁱ	CA	
Inventor	5	Remove		

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Ms. ▾	Pascale		NINI	▾
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Montreal	Country of Residence ⁱ	CA	

Mailing Address of Inventor:

Address 1	1070 Bleury Street			
Address 2	#901			
City	Montreal	State/Province	QC	
Postal Code	H2Z 1N3	Country ⁱ	CA	

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Inventor	6				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
Mr. ▾	Pierre		KONEN	▾		
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service						
City	Saint-Bruno		Country of Residence ⁱ	CA		
Mailing Address of Inventor:						
Address 1	2025 rue de la regence					
Address 2						
City	Saint-Bruno		State/Province	QC		
Postal Code	J3V 4B7		Country ⁱ	CA		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						

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	00570		
Email Address	usptomail@panitchlaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	MINIATURE WIDE-ANGLE IMAGING LENS		
Attorney Docket Number	688266-26U3	Small Entity Status Claimed	☐
Application Type	Nonprovisional ▾		
Subject Matter	Utility ▾		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	00570		

Domestic Benefit/National Stage Information:

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

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

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15/384900	2016-12-20

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15/384900	Claims benefit of provisional	62/298795	2016-02-23
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15/384900	Claims benefit of provisional	62/387409	2015-12-23
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 ⁱ (if applicable)	Remove
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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Authorization or Opt-Out of Authorization to Permit Access:

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

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

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

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

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

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

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

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

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.		
Clear		
☐ Assignee	☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		

Name of the Deceased or Legally Incapacitated Inventor:			
☒ If the Applicant is an Organization check here.			
Organization Name	6115187 Canada, Inc. d/b/a ImmerVision, Inc.		
Mailing Address Information For Applicant:			
Address 1	2020 University Street		
Address 2	Suite 2320		
City	Montreal	State/Province	QC
Country	CA	Postal Code	H3A 2A5
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				Add

Signature:

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

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

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

Signature	/Stephen Murray/		Date (YYYY-MM-DD)	2019-06-05
First Name	Stephen	Last Name	Murray	Registration Number
				63,206
Additional Signature may be generated within this form by selecting the Add button.				Add

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	688266-26U3
		Application Number	
Title of Invention	MINIATURE WIDE-ANGLE IMAGING LENS		

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

Privacy Act Statement

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

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

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

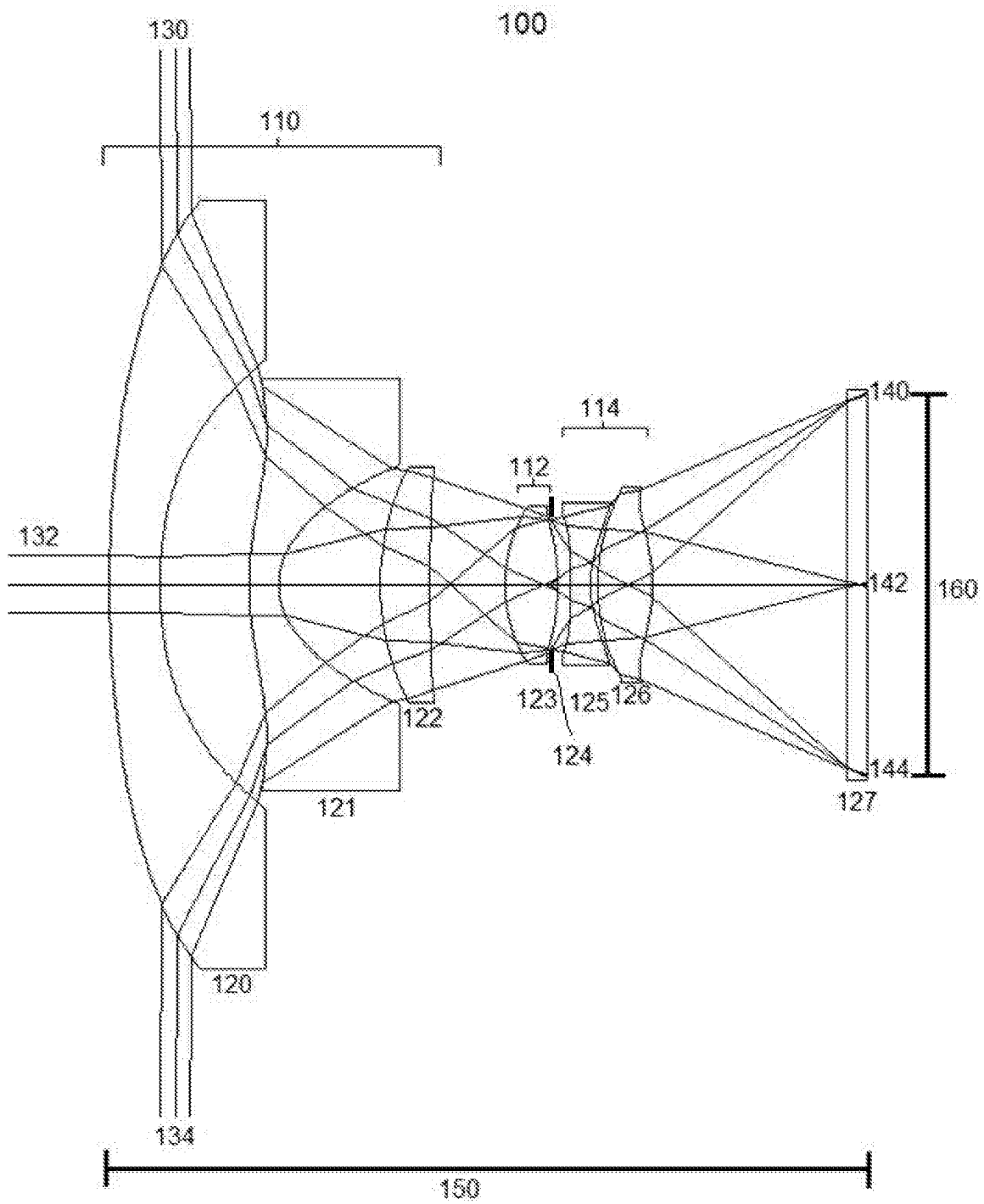


Figure 1

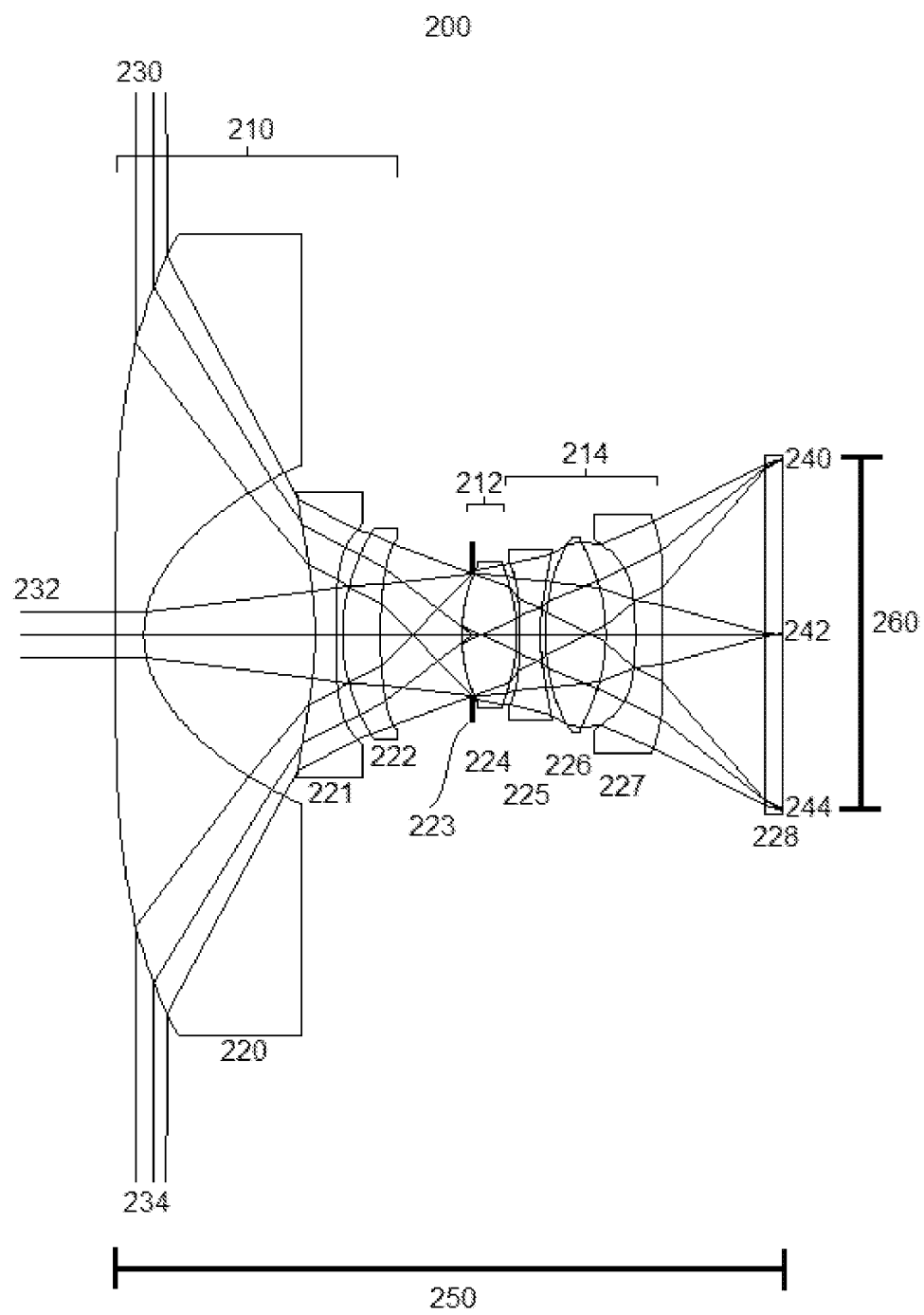


Figure 2

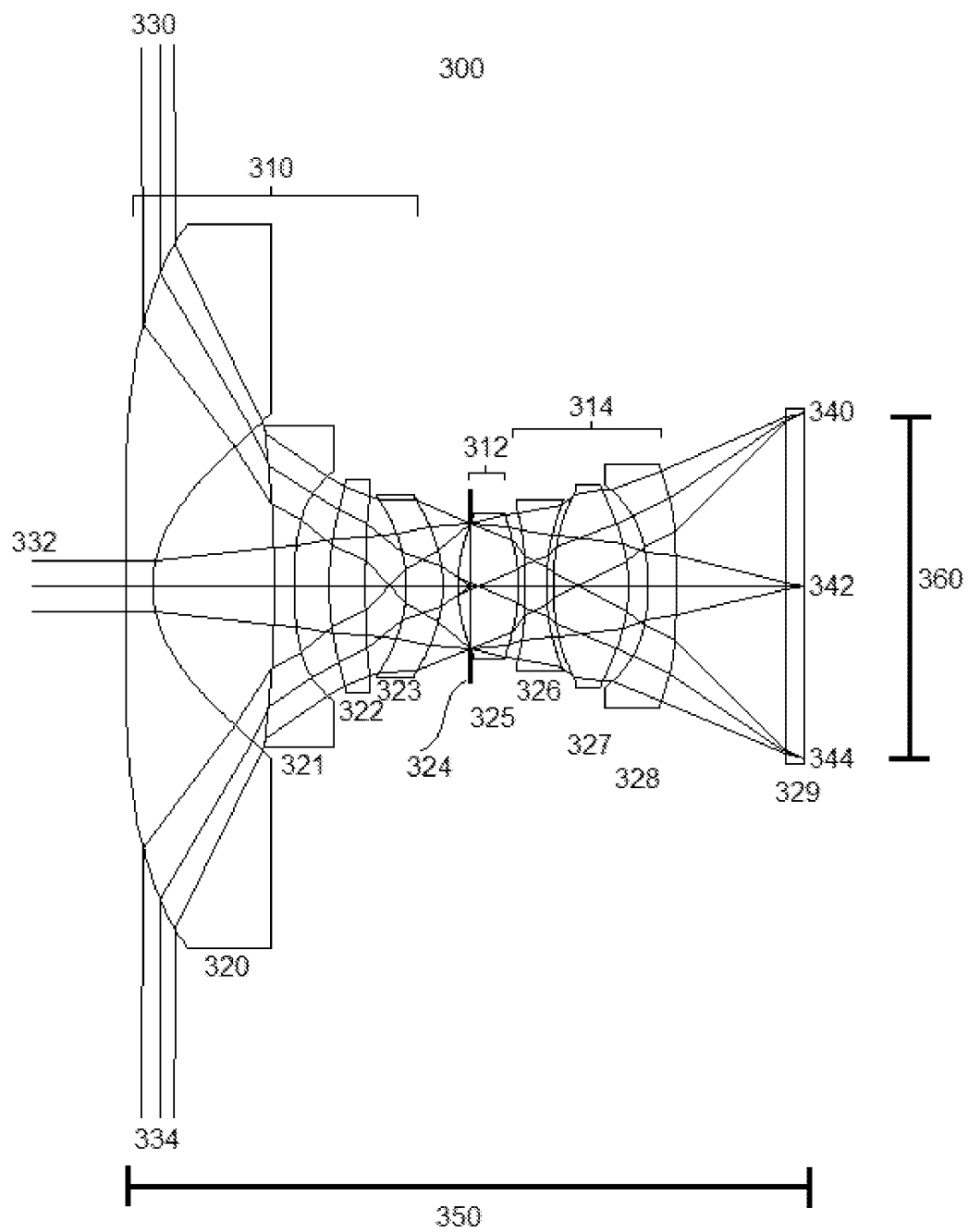


Figure 3

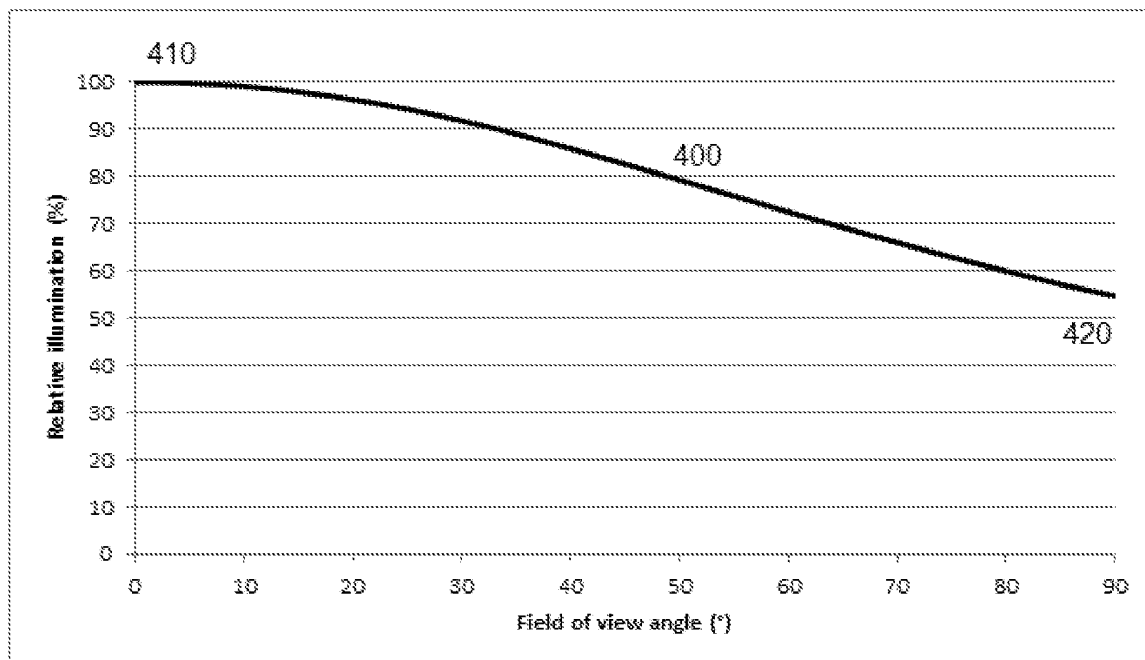


Figure 4

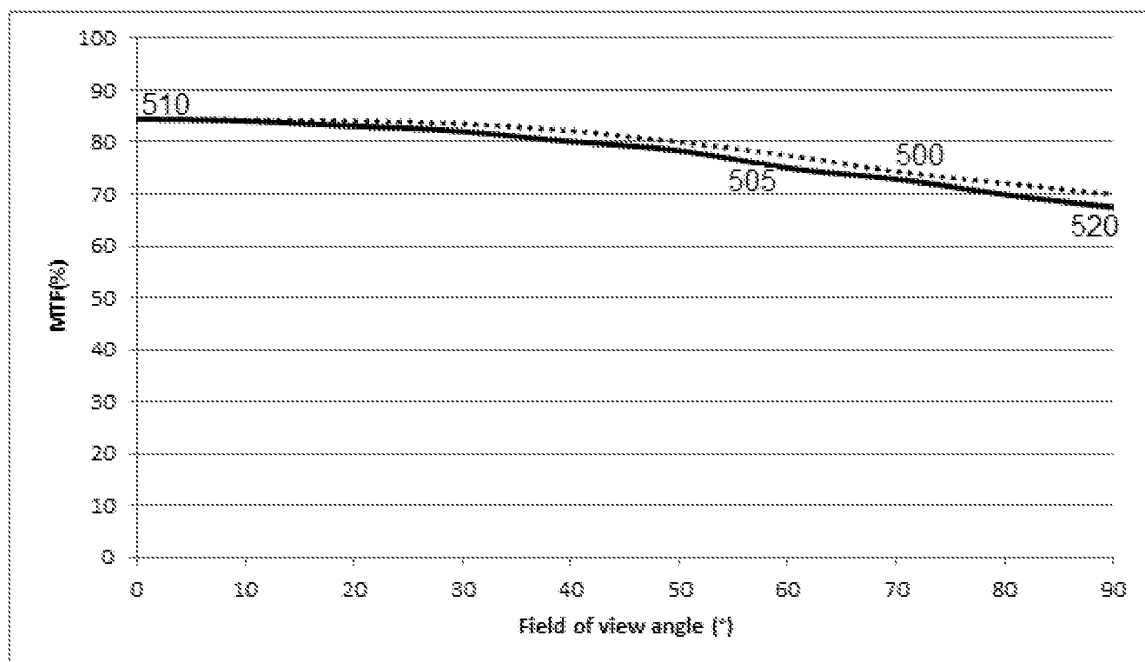


Figure 5

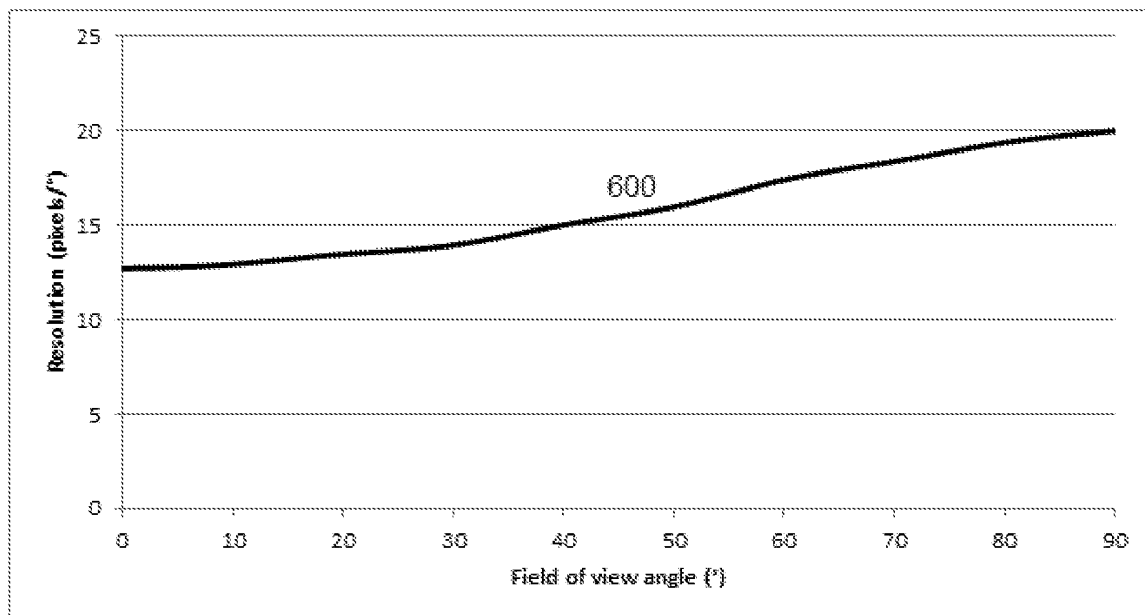


Figure 6

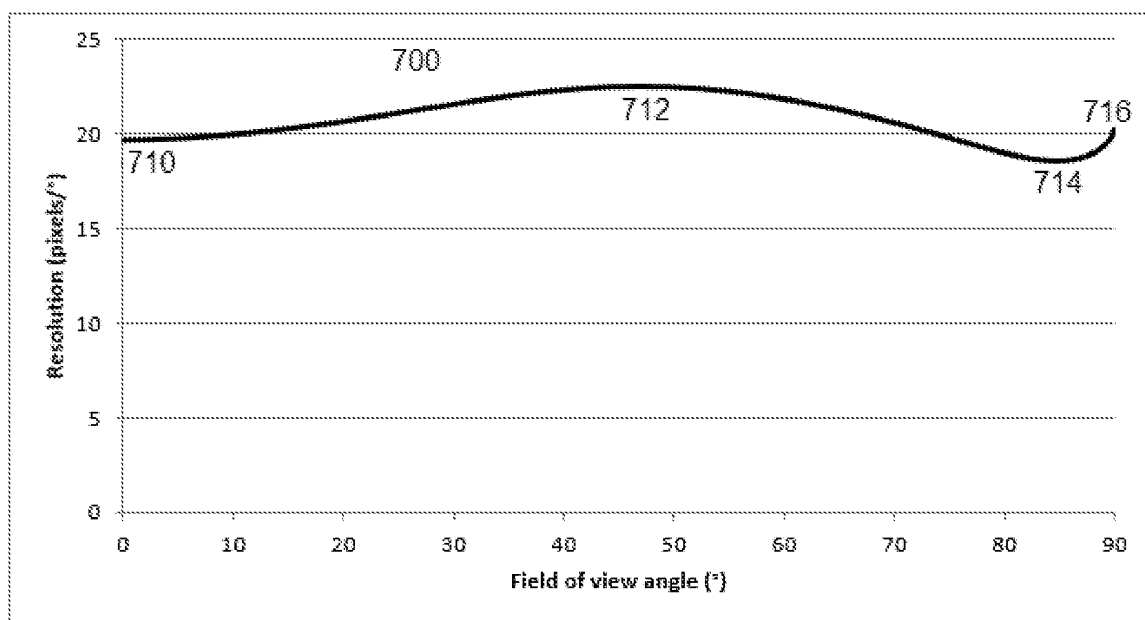


Figure 7

COPY

Attorney Docket No: 688266-26U2

**INVENTOR'S COMBINED
DECLARATION (37 CFR 1.63) AND ASSIGNMENT
(Utility Patent Application)**

As a below-named inventor/assignor of a certain new and useful invention for which I have executed an application for Letters Patent entitled:

Miniature Wide-Angle Imaging Lens

DECLARATION

I hereby declare that:

This Declaration is directed to United States application number 15/384,900 filed on December 20, 2016.

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

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

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

Note to Inventor: 37 C.F.R. § 1.63(c) states: "A person may not execute an oath or declaration for an application unless that person has reviewed and understands the contents of the application, including the claims, and is aware of the duty to disclose to the Office all information known to the person to be material to patentability as defined in § 1.56."

ASSIGNMENT

WHEREAS, I ("ASSIGNOR") desire/am obligated to assign to the below-named ASSIGNEE the invention identified above;

WHEREAS, ("ASSIGNEE"):

**6115187 Canada, Inc. d/b/a ImmerVision, Inc.
(a Canadian Corporation)
2020 University Street, Suite 2320
Montreal, Quebec
Canada H3A 2A5**

is desirous of acquiring the entire right, title and interest in and to the invention throughout the United States and the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all countries throughout the world;

FOR GOOD and VALUABLE CONSIDERATION, the full receipt and sufficiency of which are hereby acknowledged, ASSIGNOR(S), intending to be legally bound, do hereby:

AUTHORIZE said ASSIGNEE, or its representatives to insert above the filing date and application number of the application when these are known;

SELL, ASSIGN, TRANSFER and CONVEY to ASSIGNEE the whole and entire right, title and interest for the United States and its possessions and territories and all foreign countries in and to the invention which is disclosed in the above-identified patent application, and, in and to any and all patent applications related thereto including, but not limited to, all provisionals, non-provisionals, divisionals, continuations, continuations-in-part, substitutes, reexaminations, reissues and all other applications for patent which have been or shall be filed in the United States and all foreign countries on the invention; all original, reissued and reexamined patents and extensions thereof which have been or shall be issued in the United States and all foreign countries on the invention to the full end of the term or terms for which the patent(s) may be granted, as fully and entirely as the same would have been held by the undersigned ASSIGNOR(S) had this Assignment not been made; and specifically including all rights of priority created by the above patent application under any treaty, convention or law relating thereto;

AUTHORIZE and REQUEST the issuing authority to issue any and all United States and foreign patents granted on the invention to ASSIGNEE;

WARRANT and REPRESENT that no assignment, grant, mortgage, license or other agreement affecting the rights and property herein conveyed has been or will be made to others by ASSIGNOR(S), and that the full right to convey the same as herein expressed is possessed by ASSIGNOR(S);

AGREE and UNDERTAKE, when requested and at the expense of ASSIGNEE, to carry out in good faith the intent and purpose of this Assignment. ASSIGNOR(S) will execute all non-provisionals, divisionals, continuations, continuations-in-part, substitutes, reexaminations, reissues, and all other patent applications on the invention; execute all lawful oaths, declarations, assignments, powers of attorney and other papers; communicate to ASSIGNEE all facts known to ASSIGNOR(S) relating to the invention and the history thereof; and generally do everything possible which ASSIGNEE shall consider desirable for vesting title to the invention in ASSIGNEE, and for securing, maintaining and enforcing proper patent protection for the invention; all without further compensation to ASSIGNOR(S);

TO BE BINDING on the heirs, assigns, representatives and successors of ASSIGNOR(S) and extending to the successors, assigns, and nominees of ASSIGNEE.

First Joint Inventor/Assignor:

Date: 2017-01-11 Signature: Jocelyn Parent
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Date: 2017-01-11 Signature: Pierre Konen
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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Jocelyn PARENT
Title	MINIATURE WIDE-ANGLE IMAGING LENS
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	688266-26U3

SIGNATURE of Applicant or Patent Practitioner

Signature	/Stephen E. Murray/	Date (Optional)	June 5, 2019
Name	Stephen E. Murray	Registration Number	63,206
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 1 forms are submitted.

TITLE OF THE INVENTION

Miniature Wide-Angle Imaging Lens

CROSS-REFERENCE TO RELATED APPLICATIONS

5 **[0001]** This application is a continuation application of U.S. Patent Application No. 15/384,900, filed December 20, 2016, entitled “Miniature Wide-Angle Imaging Lens,” currently pending, which claims the benefit of U.S. Provisional Patent Application No. 62/387,409, filed December 23, 2015, entitled “Miniature wide-angle imaging lens,” now expired, and U.S. Provisional Patent Application No. 62/298,795, filed February 23, 2016, entitled “Miniature
10 wide-angle imaging lens,” now expired, the entire contents of all of which are incorporated by reference herein.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to optical lenses and more particularly to miniature lenses having a wide-angle field of view.

15 **[0003]** For most applications requiring wide-angle imaging, larger lens constructions having a miniaturization ratio (i.e., a total track length over an image circle diameter) greater than 3.0 are often used. However, for consumer applications, especially with mobile devices, the trend is that the lens thicknesses are becoming thinner while the sensor sizes are becoming larger. Accordingly, a new kind of wide-angle lenses with a miniaturization ratio less than 3.0 are
20 required.

[0004] Previously suggested miniature wide-angle lenses, such as that described in “Consumer electronic optics: how small can a lens be: the case of panomorph lenses” published in “Proc. SPIE 9192, Current Developments in Lens Design and Optical Engineering XV, 91920H,” or as in U.S. Pat. No. 8,248,715 or U.S. Pat. App. Pub. Nos. 2014/0029115,
25 2013/0308206, 2014/0226222, 2014/0285906, 2015/0253542, 2015/0268446 or 2012/0212839 were designed for previous generations of sensors having smaller sizes and larger pixels. These lenses had lower performance requirements, especially regarding image quality and aperture size. For these existing lens constructions, a total of three to six optical elements were enough to meet the required performances for these sensors. For the existing wide-angle 6-element lenses,

a symmetric construction using 3 elements in front of the stop and 3 elements behind the stop has been used. However, with new larger sensors and smaller pixels, more complex wide-angle lens constructions using six elements with asymmetric constructions around the stop or using seven or more elements must be designed to achieve the required performances.

5 **[0005]** One of the challenges to achieve good imaging performance over the whole field of view of a miniature wide-angle lens is the change of relative illumination from the center to the edge of the field of view. In wide-angle lenses, the relative illumination is usually maximum in the center and drops continuously toward the edge of the field of view. The consequence of lower illumination toward the edge is a lower image quality at the edge due to increased
10 diffraction effects and additional sensor noise at the edges.

[0006] Another challenge to achieve good imaging performance over the whole field of view of a miniature wide-angle lens is a drop of the modulation transfer function (MTF) from the center to the edge of the field of view. In wide-angle lenses, the image MTF is usually maximum in the center and drops continuously toward the edge of the field of view. The consequence of
15 lower MTF toward the edge is a lower image quality at the edge.

BRIEF SUMMARY OF THE INVENTION

[0007] To overcome all the previously mentioned issues, embodiments of the current invention describe miniature wide-angle imaging lenses having a miniaturization ratio (i.e., total track length from the center of the first surface to the focal plane over the image circle diameter)
20 having a value less than 3.0 while maintaining a good balance between image quality parameters, including MTF, relative illumination, and resolution. The imaging lens construction, in order from the object space to the image space, preferably includes a first group of elements, a second group of elements, and a third group of elements.

[0008] The first group of elements, preferably including all the elements in front of the
25 second group, has a negative optical power in the paraxial region and preferably includes at least three optical lenses. Of these at least three optical lenses, the first lens on the object side is generally a negative meniscus lens with a surface on the object side and accepting light from an opening angle of at least 100° and generally between 120° to 280°.

[0009] The second group of elements preferably includes an aperture stop and a single optical lens immediately in front of or behind the aperture stop. The single optical lens of the second group is preferably a positive lens.

5 **[0010]** The third group of elements preferably includes at least two optical lenses after the second group. Of these at least two optical lenses, there is generally at least one positive element and at least one negative element. The last lens element on the image side has a surface on the image side transmitting light to an opening angle of at least 40°.

[0011] In an embodiment of the current invention, the miniature optical lens has six optical elements, split as three, one, and two elements respectively for the first, second, and third groups.

10 In another embodiment of the current invention, the miniature optical lens has seven optical elements in it, split as three, one, and three elements respectively for the first, second, third groups. In another embodiment of the current invention, the miniature optical lens has eight optical elements in it, split as four, one, and three elements respectively for the first, second and third groups.

15 **[0012]** In some embodiments of the current invention, the targeted resolution curve of the miniature wide-angle lens is configured to offset, at least in part, the drop of relative illumination from the miniature wide-angle lens by increasing the number of pixels imaged in the zone where the relative illumination is lower.

20 **[0013]** In some other embodiments of the current invention, the targeted resolution curve of the miniature wide-angle lens is configured to offset, at least in part, the drop of MTF from the miniature wide-angle lens by increasing the number of pixels imaged in the zone where the MTF is lower.

25 **[0014]** In some other embodiments of the current invention, the targeted resolution curve of the miniature wide-angle lens is configured as the optimal curve to produce the highest relative illumination and MTF values combination and hence produce the optimal image quality for the whole lens plus camera system.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0015] The foregoing summary, as well as the following detailed description of a preferred embodiment of the invention, will be better understood when read in conjunction with the
5 appended drawings. For the purpose of illustration, there is shown in the drawings an embodiment which is presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

[0016] In the drawings:

[0017] Fig. 1 is a first preferred embodiment of a miniature wide-angle lens with six total
10 lens elements;

[0018] Fig. 2 is a second preferred embodiment of a miniature wide-angle lens with seven total lens elements;

[0019] Fig. 3 is third preferred embodiment of a miniature wide-angle lens with eight total lens elements;

[0020] Fig. 4 is an example of a typical relative illumination curve of a miniature wide-angle
15 lens;

[0021] Fig. 5 is an example of a typical MTF curve of a miniature wide-angle lens;

[0022] Fig. 6 is an example of a targeted resolution curve used to at least partially
20 compensate the relative illumination or at least partially compensate the MTF according to certain embodiments of the present invention; and

[0023] Fig. 7 is an example of a targeted resolution curve chosen to produce the highest relative illumination in the whole field of view while keeping the highest MTF according to certain embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Certain terminology is used in the following description for convenience only and is
25 not limiting. The words “right”, “left”, “lower”, and “upper” designate directions in the

drawings to which reference is made. The words “inwardly” and “outwardly” refer to directions toward and away from, respectively, the geometric center of the device and designated parts thereof. The terminology includes the above-listed words, derivatives thereof, and words of similar import. Additionally, the words “a” and “an”, as used in the claims and in the
5 corresponding portions of the specification, mean “at least one.”

[0025] Fig. 1 shows a first embodiment of the present invention with an optical layout for a design having six optical elements in an asymmetric configuration around the stop, having four optical elements before the stop and two optical elements after the stop. The lens 100 is comprised of the three groups 110, 112 and 114. In this embodiment of the miniature wide-angle
10 lens 100, the first group 110 from the object space is made of lenses 120, 121 and 122. The first group has a negative total optical power. The second group 112 includes an aperture stop 124 and a single positive lens 123. The second group 112 has positive optical power. In this embodiment of the miniature wide-angle lens 100, the third group 114 has two optical elements 125, 126 and has a negative total optical power.

[0026] Light entering the miniature lens 100 hits a first surface of element 120 from all directions between an upper angle 130 and a lower angle 134. In this example embodiment of Fig. 1, a total field of view around the central field 132 of the lens 100 is 180°, but any total field of view over 100° can be considered as a wide-angle lens according to the present invention.

[0027] The light then passes through all the elements 120, 121, 122, of the first group 110, the single lens 123 and the aperture stop 124 of the second group 112, and the elements 125 and 126 of the third group 114 to reach an IR filter and image sensor 127. More specifically, the light beam from direction 130 reaches the sensor 127 at position 144, the light from direction 132 reaches the sensor 127 at position 142, and the light from direction 134 reaches the sensor 127 at position 140. For all beams of light 130, 132 and 134, the chief-ray is defined as the
25 middle ray of the three rays drawn because it passes through the center of the aperture stop 124. In this example embodiment, the angle of the cone of light formed by the chief-rays reaching the sensor plane at positions 140 and 144 is over 40° to minimize the dimensions of the lens 100. When measured with respect to the chief-ray reaching the sensor 127 at position 142, which

represents the optical axis of the lens 100, the chief-ray angle of the extreme rays reaching the sensor at position 140 or 144 are over 20° .

[0028] The lens 100 has a total track length 150, which is a measure from the first surface on the object side of lens 120 to the image sensor 127, and forms an image having a diameter 160, which is a distance on the sensor 127 between the position 140 and the position 144 where the light beams from the lower and the upper fields 130, 134 reach the sensor 127. The miniaturization ratio is calculated by dividing the total track length 150 over the footprint diameter 160 and is less than 3.0 for any miniature lens according to the present invention and could even be less than 2.0 for an extreme miniature lens.

[0029] Fig. 2 shows an embodiment of the present invention with an optical layout for a design having seven optical elements. The lens 200 is comprised of the three groups 210, 212 and 214. In this embodiment of the miniature wide-angle lens 200, the first group 210 from the object space is made of lenses 220, 221, and 222. The first group 210 has a negative total optical power. The second group 212 includes the aperture stop 223 and a single positive lens 224. The second group 212 has positive optical power. In this embodiment of the miniature wide-angle lens 200, the third group 214 has three optical elements 225, 226, 227 and has a negative total optical power.

[0030] Light entering the miniature lens 200 hits the first surface of element 220 from all directions between the upper angle 230 and the lower angle 234. In this example embodiment of Fig. 2, the total field of view around the central field 232 is 180° , but any total field of view over 100° can be considered as a wide-angle lens according to the present invention.

[0031] The light then passes through all the elements 220, 221, 222 of the first group 210, the aperture stop 223 and positive lens 224 of the second group 212, and the elements 225, 226 and 227 of the third group 214 to reach the IR filter and image sensor 228. More specifically, the light beam from direction 230 reaches the sensor at position 244, the light from direction 232 reaches the sensor at position 242, and the light from direction 234 reaches the sensor at position 240. In this example, an angle of the cone of light formed by the chief-rays reaching the sensor plane at positions 240 and 244 is over 40° to minimize the dimensions of the lens 200. When

measured with respect to the chief ray reaching the sensor 228 at position 242, which represents the optical axis of the lens 200, the chief-ray angle of the extreme rays is over 20°.

[0032] The lens 200 has a total track length 250, which is a measure from the first surface on the object side of lens 220 to the image sensor 228 and forms an image having a diameter 260, which is the distance on the sensor between the position 240 and the position 244 where the light beams from the upper and the lower fields 230, 234 reach the sensor. The miniaturization ratio is calculated by dividing the total track length 250 over the footprint diameter 260 and is less than 3.0 for any miniature lens according to the present invention, and could even be less than 2.0 for an extreme miniature lens.

[0033] Fig. 3 shows an embodiment of the present invention with an optical layout for a design having eight optical elements. The lens is comprised of the three groups 310, 312 and 314. In this embodiment of the miniature wide-angle lens, the first group 310 from the object space is made of lenses 320, 321, 322 and 323. The first group has a negative total optical power. The second group 312 includes the aperture stop 324 and a single positive lens 325. The second group 312 has positive optical power. In this embodiment of the miniature wide-angle lens 300, the third group 314 has three optical elements 326, 327, 328 and has a negative total optical power.

[0034] Light entering the miniature lens 300 hit the first surface of element 320 from all directions between the upper angle 330 and the lower angle 334. In this example embodiment of Fig. 3, the total field of view around the central field 332 is 180°, but any total field of view over 100° can be considered as a wide-angle lens according to the present invention.

[0035] The light then passes through all the elements 320, 321, 322, 323 of the first group 310, the aperture stop 324 and lens 325 of the second group 312, and the elements 326, 327 and 328 of the third group 314 to reach the IR filter and image sensor 329. More specifically, the light beam from direction 330 reaches the sensor 329 at position 344, the light from direction 332 reaches the sensor 329 at position 342, and the light from direction 334 reaches the sensor 329 at position 340. In this example, the angle of the cone of light formed by the chief-rays reaching the sensor plane at positions 340 and 344 is over 40° to minimize the dimensions of the

lens. When measured with respect to the chief ray reaching the sensor at position 342, which represents the optical axis of the lens, the chief-ray angle of the extreme rays is over 20°.

[0036] The lens has a total track length 350, which is a measure from the first surface on the object side of lens 320 to the image sensor 329, and forms an image having a diameter 360

5 which is a distance on the sensor 329 between the position 340 and the position 344 where the light beams from the upper and the lower fields 330, 334 reach the sensor. The miniaturization ratio is calculated by dividing the total track length 250 over the footprint diameter 260 and is less than 3.0 for any miniature lens according to the present invention and could even be less than 2.0 for an extreme miniature lens.

10 **[0037]** In some embodiments of the present invention, all of the elements inside the miniature wide-angle lenses are made of plastic materials in part to ease the mass-production or lower the costs. In some other embodiments of the present invention, the miniature wide-angle lens consist of at least one glass element to improve the optical performances of the miniature wide-angle lens or to increase the rigidity of when the glass element is the first element.

15 **[0038]** Fig. 4 shows a typical relative illumination curve 400 for a miniature wide-angle lens according to embodiments of the present invention. The exact values of the relative illumination with respect to the field of view vary between each embodiment of the present invention, but the overall shape having a value around 100% at 0° shown at center 410 and under 80% at the maximum field angle shown at position 420 is present in all families of miniature wide-angle
20 lenses according to the present invention.

[0039] Fig. 5 shows a typical sagittal MTF curve 500 and tangential MTF curve 505 for a miniature wide-angle lens according to embodiments of the present invention. The exact values of the MTF with respect to the field of view vary between each embodiment of the present invention and also vary according to the spatial frequency at which the MTF is calculated, but
25 the overall shape having a higher value at 0° shown at center 510 than at the edge shown at position 520 is present in all families of miniature wide-angle lenses according to the present invention.

[0040] Fig. 6 shows an example targeted resolution curve 600 for a miniature wide-angle lens according to embodiments of the present invention where the targeted resolution is non-linear and a higher number of pixels per degree is intentionally present in a part of the image. In some embodiments of the miniature wide-angle, the shape of the targeted resolution curve is intentionally designed to compensate for the drop of relative illumination seen in Fig. 4. In some other embodiments of the miniature wide-angle lens, the shape of the targeted resolution is intentionally designed to compensate for the drop of MTF seen in Fig. 5. In the zone where the resolution is higher, there are more pixels of the sensors used to image a given angle of the object space. By having more imaging pixels in this zone, this compensates for the lower image quality in this zone either due to the lower relative illumination or the lower MTF. The final resulting image can then be processed to create a resulting image with constant image quality across the whole field of view.

[0041] Fig. 7 shows another example embodiment of a non-linear targeted resolution curve 700 for a miniature wide-angle lens according to the present invention. The targeted resolution curve is chosen to have an upward curve between the center resolution value 710 and a maximum 712 (number of pixels/degree), followed by a downward curve between the maximum 712 and a region near the edge of the field of view around position 714. This downward curve between maximum value 712 and position 714 allows the lens system to have a higher relative illumination value toward the edge of the field of view by having a lower object to image magnification ratio in that region and hence redirecting the same quantity of light from an object to a smaller region in the image with more illumination.

[0042] In some embodiments of a miniature wide-angle lens according to the present invention, the resolution curve has a change of direction at the edge of the field of view 716. This change of direction is an upward trend if it is preceded by a downward trend and it is a downward trend if it is preceded by an upward trend. This change of direction allows for a closer value of resolution in pixels/degree in the center 710 and at the edge 716, creating the best balance of MTF between the center 710 and the edge 716.

[0043] Combined together, the downward curve between maximum value 712 and position 714 allowing higher relative illumination and the change of direction in the curve between

position 714 and edge provides 716 the best image quality on the lens and camera system. The more balanced relative illumination creates less sensor noise in the images due to illumination differences and less difference of diffraction effects on the image quality due to the variable $f/\#$ across the field of view. For the more balanced MTF, thanks to the change of direction between position 614 and edge 616, it is directly related to the image quality of the lens.

[0044] All of the above are figures and examples of miniatures wide-angle lenses. They are examples of families of constructions having three groups and at least six optical elements. Furthermore, the miniature wide-angle lenses can be optimized according to a function which at least includes the relative illumination, the resolution and the MTF. Similar constructions are possible and the three examples presented should not limit the scope and spirit of the present invention. It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

CLAIMS

What is claimed is:

1. A miniature wide-angle optical apparatus comprising:
a light-receiving first surface;
5 a focal plane;
a total track length measured from a center of the first surface to the focal plane;
a miniaturization ratio with a value less than 3.0, the miniaturization ratio being a ratio of
the total track length divided by an image circle diameter; and
a non-linear targeted resolution to intentionally create a zone in an image captured by the
10 miniature wide-angle optical apparatus with a lower object to image magnification compared to
linear targeted resolution, the lower object to image magnification being used to compensate, at
least in part, for a lower image quality due to at least one of a drop of relative illumination or a
drop of MTF in a zone of the image.
- 15 2. The miniature wide-angle optical apparatus of claim 1, wherein the optical
apparatus is configured to create a resulting image with a constant image quality across a whole
field of view.
- 20 3. The miniature wide-angle optical apparatus of claim 1, wherein a targeted
resolution curve has a change of direction near an edge of a field of view.
4. The miniature wide-angle optical apparatus of claim 1, wherein an opening angle
of light entering the optical apparatus is over 100°.
- 25 5. The miniature wide-angle optical apparatus of claim 1, wherein an angle of chief-
rays reaching the focal plane is over 20° from an optical axis of the optical apparatus.
6. The miniature wide-angle optical apparatus of claim 1, further comprising a
plurality of optical elements, at least one of the plurality of optical elements defining the first
30 surface.

7. The miniature wide-angle optical apparatus of claim 6, wherein at least one of the optical elements is made of glass.

8. The miniature wide-angle optical apparatus of claim 1, wherein the
5 miniaturization ratio value is less than 2.0.

ABSTRACT OF THE DISCLOSURE

A miniature wide-angle imaging lens has a miniaturization ratio, of a total track length from the center of a first surface to a focal plane by an image circle diameter, with a value less than 3.0. The imaging lens includes, starting from an object side of the lens, a first group of at
5 least three optical elements, a second group including an aperture stop and an optical element immediately in front of or behind the aperture stop, and a third group of at least two optical elements.