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
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	09/08/2015	9128267	8081-1131-1	1892

466 7590 08/19/2015

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

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):

FUJIFILM CORPORATION, Tokyo, JAPAN;
Tatsuyuki OGINO, Saitama-ken, JAPAN;
Michio CHO, Saitama-ken, JAPAN;
Yoshiaki ISHII, Saitama-ken, JAPAN;

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

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)

466 7590 07/08/2015
YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

TITLE OF INVENTION: IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	10/08/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
JONES, JAMES	2872	359-714000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 YOUNG & THOMPSON
3 _____

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

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

(A) NAME OF ASSIGNEE: FUJIFILM CORPORATION
(B) RESIDENCE: (CITY and STATE OR COUNTRY): TOKYO, JAPAN

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

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 250120 (enclose an extra copy of this form).

(IF NECESSARY)

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
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.
☐ Applicant asserting small entity status. See 37 CFR 1.27
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.
☐ Applicant changing to regular undiscounted fee 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 /Eric Jensen/ Date August 4, 2015
Typed or printed name Eric Jensen Registration No. 37,855

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	14226172
Filing Date:	26-Mar-2014
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Filer:	Eric Jensen/Deidre Washington
Attorney Docket Number:	8081-1131-1

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:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Utility Appl Issue Fee	1501	1	960	960
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**960**

Electronic Acknowledgement Receipt	
EFS ID:	23106395
Application Number:	14226172
International Application Number:	
Confirmation Number:	1892
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Customer Number:	466
Filer:	Eric Jensen/Deidre Washington
Filer Authorized By:	Eric Jensen
Attorney Docket Number:	8081-1131-1
Receipt Date:	04-AUG-2015
Filing Date:	26-MAR-2014
Time Stamp:	11:45:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$960
RAM confirmation Number	9655
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IFEE.pdf	1022590 78f5521882120d85da4763860bb150bb695ec205	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32482 746d7c386a029814109077 2da36e28fdbddcf2d7	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1055072		

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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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

466 7590 07/08/2015

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

EXAMINER
JONES, JAMES

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 07/08/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

TITLE OF INVENTION: IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	10/08/2015

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

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

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)

466 7590 07/08/2015
YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

TITLE OF INVENTION: IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	10/08/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
JONES, JAMES	2872	359-714000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

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

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

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

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — 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.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — 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.
- ❑ Applicant changing to regular undiscounted fee 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. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

466 7590 07/08/2015

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

EXAMINER	
JONES, JAMES	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 07/08/2015

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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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. 14/226,172	Applicant(s) OGINO ET AL.	
	Examiner JAMES JONES	Art Unit 2872	AIA (First Inventor to File) 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 *amendments filed 6/24/2015*.
   ☐ 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 5-22*. 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 _____.

/JAMES JONES/
Primary Examiner, Art Unit 2872

REASONS FOR ALLOWANCE

1. Claims 1-3 and 5-22 are allowed.

2. The following is an examiner's statement of reasons for allowance: the prior art does not disclose the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103.

Regarding independent claim 1 (and its dependents), the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is satisfied: $1.4<f/f1<4$, where f is a focal length of a whole system, and f_1 is a focal length of the first lens, and wherein the following conditional expression is further satisfied: $0.78<f/f12<2.5$, where f12 is a composite focal length of the first lens and the second lens".

Regarding independent claim 21, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is satisfied: $1.4<f/f1<4$, where f is a focal length of a whole system, and f1 is a focal length of the first lens, and wherein the following conditional expression is further satisfied: $-2<f/f345<0$, where f345 is a composite focal length of the third to fifth lenses".

Regarding independent claim 22, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is satisfied:

1.4<f/f1<4, where f is a focal length of a whole system, and f1 is a focal length of the first lens, and wherein the following conditional expression is further satisfied: -0.4 <f1/f3 < 0.3, where f3 is a focal length of the third lens".

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."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES JONES whose telephone number is (571)270-1278. The examiner can normally be reached on Monday thru Friday, 9 a.m. to 6:00 p.m. est. time.

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 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.

/JAMES JONES/
Primary Examiner, Art Unit 2872
6/26/2015

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

CPC- SEARCHED		
Symbol	Date	Examiner
G02B13/0045	6/26/2015	JCJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
359	714	6/26/2015	JCJ

SEARCH NOTES		
Search Notes	Date	Examiner
359/714 and G02B13/0045	6/26/2015	JCJ
inventor name search	6/26/2015	JCJ
Text search	6/26/2015	JCJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	Interference search see search history	6/26/2015	JCJ

	/JAMES JONES/ Primary Examiner.Art Unit 2872

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	**Art Unit**
	JAMES JONES	2872

CPC						
Symbol					**Type**	**Version**
G02B		13	/	0045	F	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 21	
/JAMES JONES/ Primary Examiner.Art Unit 2872 (Primary Examiner)	06/26/2015 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No. 20150626

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	**Art Unit**
	JAMES JONES	2872

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
359	714	G 0 2 B 3 / 02 (2006.01.01)	

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/JAMES JONES/ Primary Examiner.Art Unit 2872	06/26/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20150626

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	**Art Unit**
	JAMES JONES	2872

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	16	17												
2	2	17	18												
3	3	18	19												
	4	19	20												
4	5	20	21												
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7	8														
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11	12														
12	13														
13	14														
14	15														
15	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 21	
/JAMES JONES/ Primary Examiner.Art Unit 2872 (Primary Examiner)	06/26/2015 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

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www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 1892

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/226,172	03/26/2014	359	2872	8081-1131-1

APPLICANTS
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INVENTORS
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Michio CHO, Saitama-ken, JAPAN;
Yoshiaki ISHII, Saitama-ken, JAPAN;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************
JAPAN 2013-072282 03/29/2013

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
04/17/2014

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged / James Jones / Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		JAPAN	14	21 ~~20~~	3 ~~1~~

ADDRESS
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209 Madison Street
Suite 500
Alexandria, VA 22314
UNITED STATES

TITLE
IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

FILING FEE RECEIVED		
1680	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	55888	first near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L2	210	biconcave near3 shape.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L3	52046	second near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L4	4010	fifth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L5	26797	focal near3 length.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L6	4716	inflection near3 point.clm.	US-PGPUB; USPAT	OR	ON	2015/06/26 12:39
L7	11	1 and 2 and 3 and 4 and 5 and 6	US-PGPUB; USPAT	OR	ON	2015/06/26 12:40
S113	1749	S111 and S112	US-PGPUB; USPAT	OR	ON	2014/11/03 11:23
S250	7019	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S251	1772	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S254	454	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S295	7992	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S296	3967	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S297	1723	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S298	1380	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S299	731	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S300	26	S295 and S296 and S297 and S298 and S299	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S301	5952	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S302	3649	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S303	1925	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47

S304	1324	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S305	341	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S307	37929	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S310	818	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S315	9767	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S316	9158	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S317	3299	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S318	3282	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S319	1376	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S320	370	S315 and S316 and S317 and S318 and S319	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S325	11890	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S326	7087	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S327	4779	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S328	3282	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S329	3749	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S330	511	S325 and S326 and S327 and S328 and S329	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S331	36	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S334	7530	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S335	6761	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S336	2018	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S337	903	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S338	388	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S339	4351	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S340	366	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S342	337	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S343	424	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S344	230	(third near5 lens) near7 concave	US-PGPUB;	OR	ON	2014/12/01

		near5 plastic	USPAT			11:47
S345	27787	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S346	17229	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S347	965	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S351	109	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S352	1726	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S353	939	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S354	1832	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S356	1811	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S357	1410	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S358	1045	S250 and S251 and S356 and S357	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S359	1027	S358 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S361	598	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S399	460	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S402	697	S401 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S413	183	S406 and S407 and S408 and S409 and S411 and S412	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S416	527	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S424	375	S419 and S420 and S421 and S422 and S423	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S435	375	S430 and S431 and S432 and S433 and S434	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S437	27193	lens near3 housing	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S446	5984	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S447	3676	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S448	1953	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S449	1340	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S450	350	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S452	38243	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S475	523	S470 and S471 and S472 and S473 and S474	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S476	38	((fifth near3 lens) near7 negative)	US-PGPUB;	OR	ON	2014/12/29

		near10 inflection	USPAT			09:22
S479	7577	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S480	6810	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S481	2044	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S482	929	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S483	403	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S484	4390	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S485	378	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S487	340	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S488	428	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S489	233	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S490	27922	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S491	17327	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S492	983	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S504	1042	S503 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S506	601	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S523	460	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S526	697	S525 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S537	183	S530 and S531 and S532 and S533 and S535 and S536	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S540	527	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S548	375	S543 and S544 and S545 and S546 and S547	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S559	375	S554 and S555 and S556 and S557 and S558	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S561	27193	lens near3 housing	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S653	1207	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 12:46
S655	6851	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/01/25 13:03
S657	2819	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:03
S659	2558	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15

S660	6934	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15
S661	2558	S659 with S660	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15
S663	281	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 17:49
S664	12058	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:50
S665	9885	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:50
S666	11697	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:51
S667	5799	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:51
S668	4645	S664 and S665 and S666 and S667	US-PGPUB; USPAT	OR	ON	2015/01/25 17:53
S669	2558	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S670	6934	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S671	2558	S669 and S670	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S673	15	S671 and S663	US-PGPUB; USPAT	OR	ON	2015/01/25 17:55
S674	266	S663 not S673	US-PGPUB; USPAT	OR	ON	2015/01/25 18:10
S675	3142	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/01/25 18:11
S676	8	S674 and S675	US-PGPUB; USPAT	OR	ON	2015/01/25 18:11
S677	258	S674 not S676	US-PGPUB; USPAT	OR	ON	2015/01/25 18:17
S678	163	f1/ft	US-PGPUB; USPAT	OR	ON	2015/01/25 18:26
S679	530	f1/f	US-PGPUB; USPAT	OR	ON	2015/01/25 18:26
S684	539	f/f1	US-PGPUB; USPAT	OR	ON	2015/01/25 18:44
S686	1207	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 18:45
S949	578	S945 and S946 and S947 and S948	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S950	2652353	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S951	559	S949 and S950	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S953	1638	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S954	4858	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S955	5275	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S956	1992	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38

S957	1927	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S958	578	S954 and S955 and S956 and S957	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S959	2652353	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S960	559	S958 and S959	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S961	185	S960 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S963	850	HFOV	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S967	9474	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S968	8475	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S969	7414	third near3 lens near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S970	197	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S971	3820	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S972	6754	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S975	2700	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S976	2661	second near3 lens near3 unit near5 negative	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S977	9482	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S978	3873	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S981	2002	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S982	1833	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S983	3344	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S984	1326	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S1049	300	fixing near3 diaphragm.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1050	15694	optical near3 set.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1051	54097	first near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1052	50432	second near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1053	15816	third near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1054	8456	fourth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1055	49310	convex near3 surface.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57

S1119	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1120	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1164	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1165	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1166	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1167	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1168	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1188	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1189	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1190	1096	S1119 and S1120 and S1188 and S1189	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1193	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1194	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1195	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1196	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1197	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1198	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1201	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1202	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1205	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1206	720	S1205 and S1202	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1208	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1209	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1210	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1211	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1212	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1213	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1217	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1218	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1219	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1220	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1221	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1224	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1225	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1226	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1227	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1228	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1231	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1232	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1233	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1234	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1235	581	S1231 and S1232 and S1233 and S1234	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1236	2666338	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1238	1652	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1239	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1240	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1241	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1242	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1243	581	S1239 and S1240 and S1241 and S1242	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1244	2666338	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1245	562	S1243 and S1244	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1246	187	S1245 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1266	2579	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1267	7008	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1269	283	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1270	12177	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1271	9987	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1272	11809	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1273	5872	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1275	2579	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1276	7008	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1277	2579	S1275 and S1276	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1279	268	S1269 not S1278	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1280	3166	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1288	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1289	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1295	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1296	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1297	1096	S1288 and S1289 and S1295 and S1296	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1300	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1301	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1302	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1303	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1304	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1305	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1308	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1309	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1312	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1313	720	S1312 and S1309	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1315	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1316	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1317	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1318	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1319	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1320	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1324	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1325	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1326	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1327	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1328	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1331	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1332	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1333	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1334	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1335	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1338	8361	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1339	4246	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1340	1831	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1341	1501	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1342	802	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1351	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1352	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1353	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1354	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1355	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1357	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1358	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1359	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1360	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1361	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1381	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1382	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1383	1096	S1308 and S1309 and S1381 and S1382	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1390	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1391	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1392	1837	S1390 and S1391	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1395	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1396	720	S1395 and S1391	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1400	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1401	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1402	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1403	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1405	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1406	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1410	887	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1411	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1412	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1413	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1414	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1415	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1416	392	S1411 and S1412 and S1413 and S1414 and S1415	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1420	26186	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1421	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1422	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1423	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1424	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1425	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1426	392	S1421 and S1422 and S1423 and S1424 and S1425	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1430	8361	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1431	4246	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1432	1831	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1433	1501	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1434	802	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1435	29	S1430 and S1431 and S1432 and S1433 and S1434	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1443	850	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1448	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1449	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1450	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1451	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1452	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1453	392	S1448 and S1449 and S1450 and S1451 and S1452	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1457	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1458	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1459	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1460	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1461	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1471	349	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1472	441	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1473	240	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1475	17566	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1476	1015	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1479	126	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1480	1761	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1481	957	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1482	1921	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1484	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1485	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1486	1096	S1390 and S1391 and S1484 and S1485	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1489	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1490	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1491	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1492	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1493	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1494	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1495	542	S1489 and S1490 and S1491 and S1492 and S1493 and S1494	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1496	1420	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1499	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1500	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1501	1837	S1499 and S1500	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1504	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1505	720	S1504 and S1500	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1509	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1510	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1511	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1512	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1514	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1515	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1519	887	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1520	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1521	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1522	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1523	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1524	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1525	392	S1520 and S1521 and S1522 and S1523 and S1524	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1529	26186	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1530	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1531	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1532	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1533	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1534	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1535	392	S1530 and S1531 and S1532 and S1533 and S1534	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1539	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1540	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1541	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1542	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1543	1	("20130057967").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 11:09
S1544	11329	((first near3 lens) near7 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 11:35
S1545	6129	(((second near3 lens) near7 positive) same convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 11:38
S1546	4997	(third near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 11:38
S1547	4965	(fourth near3 lens) near10 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 11:39
S1548	2172	(fifth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 11:41
S1549	736	S1544 and S1545 and S1546 and	US-PGPUB;	OR	ON	2015/04/23

		S1547 and S1548	USPAT			11:42
S1550	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 11:42
S1551	1098	359/659,746,753,764-766.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 11:44
S1552	150	S1549 and S1550	US-PGPUB; USPAT	OR	ON	2015/04/23 11:44
S1553	150	S1544 and S1552	US-PGPUB; USPAT	OR	ON	2015/04/23 12:32
S1554	1	"14175290"	US-PGPUB; USPAT	OR	ON	2015/04/23 13:08
S1555	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1556	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1557	1885	S1555 and S1556	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1558	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1559	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1560	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1561	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1562	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1563	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1564	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1565	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1566	29	S1561 and S1562 and S1563 and S1564 and S1565	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1567	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1568	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1569	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1570	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1571	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1572	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1573	871	(axial near3 distance) same (first near3 lens) same (second near3	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

		lens)				
S1574	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1575	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1576	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1577	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1578	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1579	404	S1574 and S1575 and S1576 and S1577 and S1578	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1580	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1581	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1582	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1583	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1584	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1585	575	S1580 and S1581 and S1582 and S1583 and S1584	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1586	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1587	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1588	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1589	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1590	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1591	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1592	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1593	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1594	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1595	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1596	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1597	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1598	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1599	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1600	130	(first near3 lens) near10 positive	US-PGPUB;	OR	ON	2015/04/23

		near10 paraxial.clm.	USPAT			13:43
S1601	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1602	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1603	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1604	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1605	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1606	1132	S1558 and S1559 and S1604 and S1605	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1607	1114	S1606 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1608	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1609	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1610	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1611	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1612	0	"S400" and S1610	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1613	0	S1612 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1614	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1615	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1616	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1617	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1618	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1619	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1620	201	S1614 and S1615 and S1616 and S1617 and S1618 and S1619	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1621	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1622	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1623	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1624	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1625	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1626	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1627	404	S1622 and S1623 and S1624 and	US-PGPUB;	OR	ON	2015/04/23

		S1625 and S1626	USPAT			13:43
S1628	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1629	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1630	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1631	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1632	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1633	404	S1628 and S1629 and S1630 and S1631 and S1632	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1634	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1635	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1636	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1637	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1638	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1639	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1640	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1641	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1642	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1643	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1644	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1645	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1646	575	S1641 and S1642 and S1643 and S1644 and S1645	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1647	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1648	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1649	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1650	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1651	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1652	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1653	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1654	419	(sixth near3 lens) near10	US-PGPUB;	OR	ON	2015/04/23

		concave.clm.	USPAT			13:43
S1655	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1656	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1657	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1658	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1659	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1660	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1661	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1662	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1663	1132	S1609 and S1610 and S1661 and S1662	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1664	1114	S1663 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1665	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1666	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1667	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1668	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1669	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1670	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1671	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1672	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1673	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1674	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1675	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1676	738	S1675 and S1673	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1677	728	S1676 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1678	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1679	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1680	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1681	2874	(fifth near3 lens) near9 convex	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1682	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1683	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1684	201	S1678 and S1679 and S1680 and S1681 and S1682 and S1683	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1685	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1686	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1687	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1688	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1689	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1690	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1691	404	S1686 and S1687 and S1688 and S1689 and S1690	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1692	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1693	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1694	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1695	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1696	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1697	404	S1692 and S1693 and S1694 and S1695 and S1696	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1698	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1699	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1700	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1701	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1702	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1703	599	S1699 and S1700 and S1701 and S1702	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1704	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1705	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1706	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1707	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1708	2056	(third near3 lens) near5 negative	US-PGPUB;	OR	ON	2015/04/23

		near15 (concave)	USPAT			13:43
S1709	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1710	599	S1706 and S1707 and S1708 and S1709	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1711	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1712	580	S1710 and S1711	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1713	191	S1712 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1714	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1715	6972	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1716	2863	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1717	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1718	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1719	2619	S1717 with S1718	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1720	288	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1721	12354	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1722	10143	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1723	11978	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1724	5982	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1725	4793	S1721 and S1722 and S1723 and S1724	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1726	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1727	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1728	2619	S1726 and S1727	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1730	273	S1720 not S1729	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1731	3207	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1734	170	f1/ft	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1735	556	f1/f	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1736	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1737	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

S1738	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1739	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1740	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1741	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1742	1132	S1738 and S1739 and S1740 and S1741	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1743	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1744	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1745	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1746	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1747	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1748	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1749	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1750	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1751	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1752	738	S1751 and S1750	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1753	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1754	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1755	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1756	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1757	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1758	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1759	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1760	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1761	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1762	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1763	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1764	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

S1765	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1766	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1767	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1768	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1769	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1770	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1771	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1772	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1773	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1774	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1775	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1776	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1777	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1778	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1779	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1780	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1781	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1782	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1783	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1784	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1785	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1786	1132	S1749 and S1750 and S1784 and S1785	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1787	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1788	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1789	1885	S1787 and S1788	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

S1790	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1791	738	S1790 and S1788	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1792	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1793	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1794	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1795	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1796	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1797	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1798	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1799	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1800	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1801	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1802	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1803	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1804	404	S1799 and S1800 and S1801 and S1802 and S1803	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1805	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1806	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1807	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1808	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1809	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1810	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1811	404	S1806 and S1807 and S1808 and S1809 and S1810	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1812	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1813	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1814	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1815	1527	(fourth near3 lens) near5 convex	FPRS; EPO;	OR	ON	2015/04/23

			JPO; DERWENT			13:43
S1816	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1817	29	S1812 and S1813 and S1814 and S1815 and S1816	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1818	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1819	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1820	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1821	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1822	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1823	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1824	404	S1819 and S1820 and S1821 and S1822 and S1823	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1825	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1826	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1827	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1828	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1829	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1830	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1831	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1832	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1833	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1834	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1835	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1836	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1837	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1838	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1839	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1840	1511	(fourth near4 lens) same negative	US-PGPUB;	OR	ON	2015/04/23

		same convex same aspheric	USPAT			13:44
S1841	1132	S1787 and S1788 and S1839 and S1840	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1842	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1843	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1844	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1845	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1846	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1847	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1848	555	S1842 and S1843 and S1844 and S1845 and S1846 and S1847	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1849	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1850	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1851	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1852	1885	S1850 and S1851	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1853	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1854	738	S1853 and S1851	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1855	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1856	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1857	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1858	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1859	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1860	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1861	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1862	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1863	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1864	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1865	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1866	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1867	404	S1862 and S1863 and S1864 and	US-PGPUB;	OR	ON	2015/04/23

		S1865 and S1866	USPAT			13:44
S1868	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1869	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1870	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1871	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1872	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1873	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1874	404	S1869 and S1870 and S1871 and S1872 and S1873	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1875	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1876	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1877	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1878	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1879	599	S1875 and S1876 and S1877 and S1878	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1880	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1881	580	S1879 and S1880	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1882	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1883	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1884	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1885	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1886	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1887	599	S1883 and S1884 and S1885 and S1886	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1888	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1889	580	S1887 and S1888	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1890	191	S1889 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1891	909	HFOV	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1892	9689	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1893	8642	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1894	7584	third near3 lens near10	US-PGPUB;	OR	ON	2015/04/23

		positive.clm.	USPAT			13:44
S1895	220	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1896	3919	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1897	6884	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1898	2746	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1899	2703	second near3 lens near3 unit near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1900	9637	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1901	3920	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1902	2040	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1903	1865	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1904	3397	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1905	1346	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1906	306	fixing near3 diaphragm.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1907	15865	optical near3 set.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1908	55050	first near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1909	51278	second near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1910	16152	third near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1911	8685	fourth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1912	50102	convex near3 surface.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1913	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1914	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1915	1885	S1913 and S1914	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1916	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1917	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1918	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1919	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1920	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO;	OR	ON	2015/04/23 13:44

			DERWENT			
S1921	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1922	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1923	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1924	29	S1919 and S1920 and S1921 and S1922 and S1923	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1925	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1926	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1927	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1928	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1929	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1930	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1931	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1932	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1933	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1934	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1935	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1936	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1937	404	S1932 and S1933 and S1934 and S1935 and S1936	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1938	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1939	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1940	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1941	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1942	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1943	575	S1938 and S1939 and S1940 and S1941 and S1942	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1944	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S1945	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1946	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1947	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1948	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1949	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1950	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1951	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1952	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1953	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1954	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1955	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1956	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1957	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1958	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1959	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1960	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1961	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1962	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1963	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1964	1132	S1916 and S1917 and S1962 and S1963	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1965	1114	S1964 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1966	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1967	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1968	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1969	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1970	0	"S400" and S1968	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1971	0	S1970 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S1972	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1973	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1974	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1975	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1976	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1977	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1978	201	S1972 and S1973 and S1974 and S1975 and S1976 and S1977	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1979	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1980	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1981	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1982	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1983	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1984	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1985	404	S1980 and S1981 and S1982 and S1983 and S1984	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1986	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1987	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1988	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1989	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1990	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1991	404	S1986 and S1987 and S1988 and S1989 and S1990	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1992	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1993	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1994	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1995	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1996	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44

S1997	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1998	29	S1993 and S1994 and S1995 and S1996 and S1997	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1999	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2000	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2001	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2002	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2003	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2004	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2005	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2006	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2007	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2008	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2009	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2010	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2011	404	S2006 and S2007 and S2008 and S2009 and S2010	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2012	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2013	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2014	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2015	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2016	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2017	575	S2012 and S2013 and S2014 and S2015 and S2016	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2018	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2019	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2020	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2021	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2022	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S2023	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2024	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2025	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2026	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2027	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2028	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2029	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2030	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2031	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2032	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2033	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2034	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2035	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2036	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2037	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2038	1132	S1967 and S1968 and S2036 and S2037	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2039	1114	S2038 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2040	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2041	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2042	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2043	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2044	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2045	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2046	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2047	555	S2041 and S2042 and S2043 and S2044 and S2045 and S2046	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2048	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2049	7328	(second near4 lens) same positive	US-PGPUB;	OR	ON	2015/04/23

		same concave	USPAT			13:44
S2050	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2051	1885	S2049 and S2050	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2052	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2053	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2054	738	S2053 and S2050	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2055	728	S2054 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2056	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2057	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2058	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2059	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2060	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2061	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2062	201	S2056 and S2057 and S2058 and S2059 and S2060 and S2061	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2063	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2064	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2065	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2066	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2067	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2068	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2069	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2070	404	S2065 and S2066 and S2067 and S2068 and S2069	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2071	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2072	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2073	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2074	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2075	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2076	1523	(fifth near3 lens) near5 concave	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S2077	404	S2072 and S2073 and S2074 and S2075 and S2076	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2078	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2079	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2080	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2081	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2082	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2083	599	S2079 and S2080 and S2081 and S2082	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2084	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2085	580	S2083 and S2084	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2086	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2087	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2088	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2089	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2090	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2091	599	S2087 and S2088 and S2089 and S2090	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2092	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2093	580	S2091 and S2092	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2094	191	S2093 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2095	909	HFOV	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2096	9689	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2097	8642	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2098	7584	third near3 lens near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2099	220	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2100	3919	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2101	6884	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2102	2746	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2103	2703	second near3 lens near3 unit near5	US-PGPUB;	OR	ON	2015/04/23

		negative	USPAT			13:44
S2104	9637	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2105	3920	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2106	2040	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2107	1865	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2108	3397	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2109	1346	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2110	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2111	6972	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2112	2863	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2113	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2114	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2115	2619	S2113 with S2114	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2116	288	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2117	12354	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2118	10143	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2119	11978	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2120	5982	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2121	4793	S2117 and S2118 and S2119 and S2120	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2122	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2123	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2124	2619	S2122 and S2123	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2125	15	S2124 and S2116	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2126	273	S2116 not S2125	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2127	3207	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2128	170	f1/ft	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2129	556	f1/f	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2130	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2131	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2132	111	359/715.ccls. and @pd>="20140311"	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2133	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2134	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2135	1885	S2133 and S2134	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2136	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2137	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2138	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2139	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2140	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2141	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2142	1132	S2133 and S2134 and S2140 and S2141	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2143	1114	S2142 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2144	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2145	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2146	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2147	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2148	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2149	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2150	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2151	555	S2145 and S2146 and S2147 and S2148 and S2149 and S2150	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2152	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2153	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2154	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2155	1885	S2153 and S2154	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2156	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2157	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2158	738	S2157 and S2154	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2159	728	S2158 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2160	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2161	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2162	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2163	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2164	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2165	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2166	201	S2160 and S2161 and S2162 and S2163 and S2164 and S2165	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2167	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2168	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2169	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2170	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2171	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2172	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2173	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2174	404	S2169 and S2170 and S2171 and S2172 and S2173	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2175	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2176	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2177	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2178	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2179	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2180	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2181	404	S2176 and S2177 and S2178 and S2179 and S2180	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2182	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2183	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO;	OR	ON	2015/04/23 13:44

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S2184	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2185	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2186	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2187	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2188	29	S2183 and S2184 and S2185 and S2186 and S2187	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2189	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2232	1	("20120087020").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 19:22
S2233	0	("(firstnear3lens)withpositive").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 20:13
S2234	15016	(first near3 lens) with positive	US-PGPUB; USPAT	OR	ON	2015/04/23 20:13
S2235	13134	(first near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 20:13
S2236	6107	(third near3 lens) near7 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 20:14
S2237	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2238	1907	S2235 and S2236 and S2237	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2239	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2240	86	S2238 and S2239	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2241	3	("20130033765" | "8310768" | "20120087020").PN.	US-PGPUB; USPAT	OR	ON	2015/04/23 20:58
S2242	25	("20100253829" | "20110310494" | "7365920" | "7643225").PN. OR ("8310768").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/04/24 07:41
S2243	1	"14226172"	US-PGPUB; USPAT; USOCR	OR	ON	2015/04/26 09:00
S2244	13169	(first near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/05/04 12:19
S2245	11208	(second near lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/05/04 12:20
S2246	10482	(third near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/05/04 12:20
S2247	8392	(fourth near3 lens) near7 (positive negative)	US-PGPUB; USPAT	OR	ON	2015/05/04 12:20
S2248	3310	(fourth near3 lens near3 group)	US-PGPUB;	OR	ON	2015/05/04

		near7 (positive negative)	USPAT			12:20
S2249	5885	(first near3 lens near3 group) near7 positive	US-PGPUB; USPAT	OR	ON	2015/05/04 12:20
S2250	2759	S2245 and S2246 and S2248 and S2249	US-PGPUB; USPAT	OR	ON	2015/05/04 12:21
S2251	1226	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:21
S2252	470	359/773,774.ccls.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:22
S2253	601	S2250 and S2251	US-PGPUB; USPAT	OR	ON	2015/05/04 12:22
S2254	83	S2250 and S2252	US-PGPUB; USPAT	OR	ON	2015/05/04 12:22
S2255	7660	camera near3 (shake vibrate)	US-PGPUB; USPAT	OR	ON	2015/05/04 12:34
S2256	80	S2254 and "14"	US-PGPUB; USPAT	OR	ON	2015/05/04 12:34
S2257	15	S2254 and S2255	US-PGPUB; USPAT	OR	ON	2015/05/04 12:34
S2258	2673	correct$3 near4 image near5 shake	US-PGPUB; USPAT	OR	ON	2015/05/04 12:39
S2259	2002	(third near3 lens near3 group) near7 fixed	US-PGPUB; USPAT	OR	ON	2015/05/04 12:44
S2260	3906	lens same moving same perpendicular same (optical adj axis)	US-PGPUB; USPAT	OR	ON	2015/05/04 12:45
S2261	91	S2258 and S2259 and S2260	US-PGPUB; USPAT	OR	ON	2015/05/04 12:45
S2262	76	S2255 and S2261	US-PGPUB; USPAT	OR	ON	2015/05/04 12:45
S2263	45	S2250 and S2262	US-PGPUB; USPAT	OR	ON	2015/05/04 12:46
S2264	3164	first near3 lens near group near3 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:47
S2265	2869	third near3 lens near group near3 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:47
S2266	1795	fourth near3 lens near group near3 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:47
S2267	828	camera near3 shake.clm.	US-PGPUB; USPAT	OR	ON	2015/05/04 12:47
S2268	21	S2264 and S2265 and S2266 and S2267	US-PGPUB; USPAT	OR	ON	2015/05/04 12:47
S2269	1	("6650475").PN.	US-PGPUB; USPAT	OR	ON	2015/05/04 13:08
S2270	3537	(G02B15/173 OR G02B9/34).CPC.	US-PGPUB; USPAT	OR	ON	2015/05/04 13:16
S2271	0	Daki near3 Kawamura.inv.	US-PGPUB; USPAT	OR	ON	2015/05/04 13:19
S2277	24041	(first near3 lens) near5 positive	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:09
S2278	20786	(third near3 lens) near5 positive	US-PGPUB;	OR	ON	2015/05/04

			USPAT; FPRS; EPO; JPO; DERWENT			14:10
S2279	24346	(second near3 lens) near5 negative	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:10
S2280	0	(fourth near3 lens) near5 menicsuc	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:10
S2281	2248	(fourth near3 lens) near7 aspheric	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:11
S2282	482	(fourth near3 lens) near7 aspheric near7 convex	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:11
S2283	309	(fifth near3 lens) near7 aspheric near7 concave	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:11
S2284	141	S2282 and S2283	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:11
S2285	3	("20120019706").PN.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:12
S2286	88	S2284 and S2277 and S2278 and S2279	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:16
S2287	1	"14242967"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:22
S2288	899	359/714.ccls.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:47
S2289	2741	(G02B13/0045 OR G02B9/60).CPC.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:47
S2290	354	masaya near3 hashimoto.inv.	US-PGPUB;	OR	ON	2015/05/04

			USPAT; FPRS; EPO; JPO; DERWENT			14:51
S2291	8558	(first near3 lens) near5 positive.clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:51
S2292	7046	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:51
S2293	8082	(second near3 lens) near5 negative.clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:51
S2294	77	(fourth near3 lens) near7 aspheric near7 convex.clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:51
S2295	51	(fifth near3 lens) near7 aspheric near7 concave.clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:51
S2296	8	S2291 and S2292 and S2293 and S2294 and S2295	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/04 14:52
S2297	1	("20130044381").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/05/05 11:31
S2298	6	359/717.ccls. and @pd>="20150109"	US-PGPUB; USPAT	OR	ON	2015/05/06 18:02
S2299	3279	((first near3 lens) near5 positive near7 convex)	US-PGPUB; USPAT	OR	ON	2015/05/06 18:12
S2300	3217	((second near3 lens) near5 positive near7 convex)	US-PGPUB; USPAT	OR	ON	2015/05/06 18:12
S2301	1944	((third near3 lens) near5 negative near7 convex)	US-PGPUB; USPAT	OR	ON	2015/05/06 18:13
S2303	3440	((second near3 lens) near5 positive same (convex and concave))	US-PGPUB; USPAT	OR	ON	2015/05/06 18:14
S2304	2758	((fourth near3 lens) near5 positive same concave)	US-PGPUB; USPAT	OR	ON	2015/05/06 18:15
S2305	1447	S2303 and S2304	US-PGPUB; USPAT	OR	ON	2015/05/06 18:15
S2306	467	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/05/06 18:15
S2307	25	S2305 and S2306	US-PGPUB; USPAT	OR	ON	2015/05/06 18:15
S2308	1792	((first near3 lens) near5 positive near7 convex).clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:27

S2309	1175	((second near3 lens) near5 positive near7 convex).clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:27
S2310	1084	((fourth near3 lens) near5 positive same concave).clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:28
S2311	58334	diaphragm.clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:28
S2312	9658	maximum near3 angle.clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:29
S2313	26506	focal near3 length.clm.	US-PGPUB; USPAT	OR	ON	2015/05/07 09:29
S2314	1	S2308 and S2309 and S2310 and S2311 and S2312 and S2313	US-PGPUB; USPAT	OR	ON	2015/05/07 09:30
S2315	303821	th	US-PGPUB; USPAT	OR	ON	2015/05/07 09:31
S2316	41426	thi	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	ON	2015/05/07 09:31
S2317	3	(("8014080") or ("20120044403") or ("20130070347")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/05/07 09:54
S2327	601	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/05/18 10:58
S2328	3292	(first near3 lens) near5 positive near7 convex	US-PGPUB; USPAT	OR	ON	2015/05/18 10:59
S2329	3034	(second near3 lens) near5 negative near7 convex	US-PGPUB; USPAT	OR	ON	2015/05/18 11:00
S2330	4638	(third near5 lens) near7 concave	US-PGPUB; USPAT	OR	ON	2015/05/18 11:05
S2331	7954	(fourth near5 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/05/18 11:05
S2332	4233	(fifth near5 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/05/18 11:05
S2333	503	S2328 and S2329 and S2330 and S2331 and S2332	US-PGPUB; USPAT	OR	ON	2015/05/18 11:06
S2334	197	S2327 and S2333	US-PGPUB; USPAT	OR	ON	2015/05/18 11:06
S2335	1098	(fifth near5 lens) near7 aspheric	US-PGPUB; USPAT	OR	ON	2015/05/18 11:07
S2336	224	S2333 and S2335	US-PGPUB; USPAT	OR	ON	2015/05/18 11:07
S2337	125	S2327 and S2336	US-PGPUB; USPAT	OR	ON	2015/05/18 11:08
S2338	0	"14306229"	US-PGPUB; USPAT	OR	ON	2015/05/18 11:33
S2339	983	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/05/18 12:57
S2340	643	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:54
S2341	725	(G02B13/004).CPC.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:55
S2342	9122	(first near3 lens) near7 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:58

S2343	8499	(second near3 lens) near7 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:58
S2344	7359	(third near3 lens) near7 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:59
S2345	3365	(fourth near3 lens) near7 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:59
S2346	3720	cemented near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:59
S2347	4576	aspherical near3 surface.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 13:59
S2348	199	S2342 and S2343 and S2344 and S2345 and S2346 and S2347	US-PGPUB; USPAT	OR	ON	2015/05/18 14:00
S2349	172	f1/ft	US-PGPUB; USPAT	OR	ON	2015/05/18 14:00
S2350	0	S2348 and S2349	US-PGPUB; USPAT	OR	ON	2015/05/18 14:00
S2351	1695	sixth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 14:46
S2352	3881	variation near3 system.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 14:47
S2353	3919	fifth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/05/18 14:47
S2354	2	S2351 and S2352 and S2353	US-PGPUB; USPAT	OR	ON	2015/05/18 14:47
S2355	38653	zoom near3 lens	US-PGPUB; USPAT	OR	ON	2015/06/01 13:11
S2356	10583	(third near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/01 13:11
S2357	12698	(second near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/06/01 13:12
S2358	6689	(fourth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/06/01 13:12
S2359	4545	(fifth near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/01 13:12
S2360	12736	telephoto near10 lens	US-PGPUB; USPAT	OR	ON	2015/06/01 13:14
S2361	3444	S2356 and S2357 and S2358 and S2359	US-PGPUB; USPAT	OR	ON	2015/06/01 13:14
S2362	13277	(first near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/01 13:14
S2363	3252	S2361 and S2362	US-PGPUB; USPAT	OR	ON	2015/06/01 13:15
S2364	2074	S2363 and S2355	US-PGPUB; USPAT	OR	ON	2015/06/01 13:15
S2365	1731	S2364 and S2360	US-PGPUB; USPAT	OR	ON	2015/06/01 13:15
S2366	3298	lateral near3 magnification	US-PGPUB; USPAT	OR	ON	2015/06/01 13:15
S2367	384	S2365 and S2366	US-PGPUB; USPAT	OR	ON	2015/06/01 13:15
S2368	1889	359/676,714.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:16
S2369	1006	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:16

S2370	92	S2367 and S2368	US-PGPUB; USPAT	OR	ON	2015/06/01 13:16
S2371	99	359/766.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:36
S2372	20	S2366 and S2371	US-PGPUB; USPAT	OR	ON	2015/06/01 13:37
S2373	4	("20110085248" | "20120087016" | "8228620" | "8493666").PN.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:43
S2374	7393	(third near3 lens) near7 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2375	8542	(second near3 lens) near7 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2376	3387	(fourth near3 lens) near7 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2377	2273	(fifth near3 lens) near7 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2378	3951	telephoto near10 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2379	9165	(first near3 lens) near7 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2380	1063	lateral near3 magnification.clm.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:47
S2381	108	S2374 and S2375 and S2376 and S2377 and S2378 and S2379 and S2380	US-PGPUB; USPAT	OR	ON	2015/06/01 13:48
S2382	2706	(G02B15/173).CPC.	US-PGPUB; USPAT	OR	ON	2015/06/01 13:50
S2392	1	("20070147219").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/03 22:15
S2393	287	359/713.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 08:49
S2394	7022	lens near3 module.clm.	US-PGPUB; USPAT	OR	ON	2015/06/18 08:51
S2395	15237	(first near3 lens) with positive	US-PGPUB; USPAT	OR	ON	2015/06/18 08:51
S2396	13340	(first near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/18 08:51
S2397	13507	(second near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/18 08:52
S2398	9522	(third near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/06/18 09:46
S2399	4578	(fifth near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/18 09:46
S2400	3685	S2396 and S2397 and S2398 and S2399	US-PGPUB; USPAT	OR	ON	2015/06/18 09:47
S2401	51	S2394 and S2400	US-PGPUB; USPAT	OR	ON	2015/06/18 09:47
S2402	138	S2400 and S2393	US-PGPUB; USPAT	OR	ON	2015/06/18 09:47
S2403	1236	sixth near3 lens near10 concave	US-PGPUB; USPAT	OR	ON	2015/06/18 09:48
S2404	705	S2396 and S2397 and S2398 and S2399 and S2403	US-PGPUB; USPAT	OR	ON	2015/06/18 09:48

S2405	92	S2404 and S2393	US-PGPUB; USPAT	OR	ON	2015/06/18 09:48
S2406	143	359/755.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 09:52
S2407	177	(G02B9/64).CPC.	US-PGPUB; USPAT	OR	ON	2015/06/18 09:53
S2408	21	S2404 and S2407	US-PGPUB; USPAT	OR	ON	2015/06/18 09:53
S2409	260	359/756,757.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 09:59
S2410	57	S2404 and S2409	US-PGPUB; USPAT	OR	ON	2015/06/18 09:59
S2411	56	S2410 not S2408	US-PGPUB; USPAT	OR	ON	2015/06/18 09:59
S2412	612	359/756-760,713.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 10:10
S2413	57	359/760.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 10:10
S2414	13507	(second near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/06/18 11:19
S2415	5804	(third near3 lens) near6 convex	US-PGPUB; USPAT	OR	ON	2015/06/18 11:20
S2416	738	359/763-769.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/18 11:23
S2417	1030	(fifth near3 lens) near10 (plastic resin)	US-PGPUB; USPAT	OR	ON	2015/06/18 11:24
S2418	559	S2414 and S2415 and S2417	US-PGPUB; USPAT	OR	ON	2015/06/18 11:24
S2419	127	S2416 and S2418	US-PGPUB; USPAT	OR	ON	2015/06/18 11:24
S2420	8	("20100254029" | "20110316969" | "20120162769" | "20120194922" | "20130057967" | "20130107376" | "7911712" | "8345323").PN.	US-PGPUB; USPAT	OR	ON	2015/06/18 12:04
S2421	10	("20100254029" | "20110316969" | "20120162769" | "20120194922" | "20130057967" | "20130107376" | "7911712" | "8345323").PN. "20140313594"	US-PGPUB; USPAT	OR	ON	2015/06/18 12:31
S2422	30	"20140313594" "20100254029" "20120162769" "20140285710"	US-PGPUB; USPAT	OR	ON	2015/06/18 12:32
S2423	4	(("20140313594") or ("20100254029") or ("20120162769") or ("20140285710")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/18 12:32
S2424	41	("20100254029" | "20110316969" | "20120162769" | "20120194922" | "20130057967" | "20130107376" | "7911712" | "8345323")	US-PGPUB; USPAT	OR	ON	2015/06/18 15:14
S2425	10419	(first near3 lens) with positive	EPO; JPO; DERWENT	OR	ON	2015/06/18 15:14
S2426	13266	(first near3 lens) near7 positive	FPRS; EPO; JPO; DERWENT	OR	ON	2015/06/18 15:14
S2427	14283	(second near3 lens) near7 positive	FPRS; EPO; JPO;	OR	ON	2015/06/18 15:14

			DERWENT			
S2428	9383	(third near3 lens) near7 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/06/18 15:14
S2429	3268	(fifth near3 lens) near7 positive	FPRS; EPO; JPO; DERWENT	OR	ON	2015/06/18 15:14
S2432	2	"20120162769"	US-PGPUB; USPAT	OR	ON	2015/06/24 09:47
S2433	2	(("20120162769") or ("20140313594")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/06/24 09:47
S2434	287	359/713.ccls.	US-PGPUB; USPAT	OR	ON	2015/06/24 11:58
S2435	1044	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/06/24 11:58

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L8	66596	first near3 lens	USPAT; UPAD	OR	ON	2015/06/26 12:40
L9	520	biconcave near3 shape	USPAT; UPAD	OR	ON	2015/06/26 12:40
L10	61368	second near3 lens	USPAT; UPAD	OR	ON	2015/06/26 12:40
L11	6836	fifth near3 lens	USPAT; UPAD	OR	ON	2015/06/26 12:40
L12	61660	focal near3 length	USPAT; UPAD	OR	ON	2015/06/26 12:40
L13	13476	inflection near3 point	USPAT; UPAD	OR	ON	2015/06/26 12:40
L14	14	8 and 9 and 10 and 11 and 12 and 13	USPAT; UPAD	OR	ON	2015/06/26 12:41
S375	5769	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2014/12/01 11:47
S376	5200	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S377	2708	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S378	1808	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S379	337	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2014/12/01 11:47
S380	82743	distance near10 image	USPAT; UPAD	OR	ON	2014/12/01 11:47
S382	7219	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47
S383	5675	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47
S384	2186	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47
S385	1424	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47

S386	396	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2014/12/01 11:47
S387	12773	(inflection near2 point)	USPAT; UPAD	OR	ON	2014/12/01 11:47
S647	1663	first near3 lens near3 unit near5 positive	USPAT; UPAD	OR	ON	2015/01/10 11:17
S648	1643	second near3 lens near3 unit near5 negative	USPAT; UPAD	OR	ON	2015/01/10 11:17
S649	4765	reflecting near3 unit	USPAT; UPAD	OR	ON	2015/01/10 11:17
S650	2549	rear near3 lens near3 group	USPAT; UPAD	OR	ON	2015/01/10 11:17
S1027	5833	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1028	5265	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1029	2760	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1030	1845	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1031	358	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1032	84112	distance near10 image	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1034	7304	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1035	5753	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1036	2226	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1037	1459	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1038	414	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1039	12971	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1042	7945	((first near3 lens) near10 positive)	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1043	7911	(second near3 lens) near10 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1044	6123	third near3 lens near10 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1045	505	paraxial near3 region	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1046	4102	fourth near3 lens near10 negative	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1047	12222	aspheric	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1057	679	fixing near3 diaphragm	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1058	39988	optical near3 set	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1059	64927	first near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00

S1060	59898	second near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1061	21737	third near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1062	12320	fourth near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1063	82891	convex near3 surface	USPAT; UPAD	OR	ON	2015/02/05 14:00
S2191	5927	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2192	5380	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2193	2816	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2194	1889	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2195	378	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2196	85927	distance near10 image	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2197	7423	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2198	5862	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2199	2286	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2200	1504	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2201	436	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2202	13231	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2203	1694	first near3 lens near3 unit near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2204	1672	second near3 lens near3 unit near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2205	4868	reflecting near3 unit	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2206	2575	rear near3 lens near3 group	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2207	5927	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2208	5380	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2209	2816	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2210	1889	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2211	378	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2212	85927	distance near10 image	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2213	7423	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44

S2214	5862	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2215	2286	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2216	1504	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2217	436	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2218	13231	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2219	8072	((first near3 lens) near10 positive)	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2220	8039	(second near3 lens) near10 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2221	6241	third near3 lens near10 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2222	531	paraxial near3 region	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2223	4201	fourth near3 lens near10 negative	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2224	12417	aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2225	689	fixing near3 diaphragm	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2226	40519	optical near3 set	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2227	65846	first near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2228	60721	second near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2229	22058	third near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2230	12529	fourth near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2231	84085	convex near3 surface	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2272	2795	first near3 lens near group near3 positive	USPAT; UPAD	OR	ON	2015/05/04 13:50
S2273	2327	third near3 lens near group near3 positive	USPAT; UPAD	OR	ON	2015/05/04 13:50
S2274	1505	fourth near3 lens near group near3 positive	USPAT; UPAD	OR	ON	2015/05/04 13:50
S2275	3488	camera near3 shake	USPAT; UPAD	OR	ON	2015/05/04 13:50
S2276	138	S2272 and S2273 and S2274 and S2275	USPAT; UPAD	OR	ON	2015/05/04 13:50
S2318	1878	((first near3 lens) near5 positive near7 convex)	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2319	1878	((first near3 lens) near5 positive near7 convex)	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2320	1878	((first near3 lens) near5 positive near7 convex)	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2321	1881	((second near3 lens) near5 positive near7 convex)	USPAT; UPAD	OR	ON	2015/05/07 09:31

S2322	1555	((fourth near3 lens) near5 positive same concave)	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2323	132575	diaphragm	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2324	38520	maximum near3 angle	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2325	61120	focal near3 length	USPAT; UPAD	OR	ON	2015/05/07 09:31
S2326	17	S2320 and S2321 and S2322 and S2323 and S2324 and S2325	USPAT; UPAD	OR	ON	2015/05/07 09:33
S2384	6105	(third near3 lens) near7 positive	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2385	7369	(second near3 lens) near7 negative	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2386	3744	(fourth near3 lens) near7 negative	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2387	2442	(fifth near3 lens) near7 positive	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2388	7417	telephoto near10 lens	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2389	7720	(first near3 lens) near7 positive	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2390	1978	lateral near3 magnification	USPAT; UPAD	OR	ON	2015/06/01 13:48
S2391	211	S2384 and S2385 and S2386 and S2387 and S2388 and S2389 and S2390	USPAT; UPAD	OR	ON	2015/06/01 13:55
S2430	881964	"28" and "29" and "30" and "31" and "32" and "33" and "34"	USPAT; UPAD	OR	ON	2015/06/18 15:14

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/29/2014	04/26/2015	06/26/2015						
1	1	✓	✓	=						
2	2	✓	✓	=						
3	3	✓	✓	=						
	4	✓	O	-						
4	5	✓	O	=						
5	6	✓	✓	=						
6	7	✓	O	=						
7	8	✓	O	=						
8	9	✓	✓	=						
9	10	✓	✓	=						
10	11	✓	✓	=						
11	12	✓	✓	=						
12	13	✓	✓	=						
13	14	✓	✓	=						
14	15	✓	O	=						
15	16	✓	O	=						
16	17	✓	O	=						
17	18	✓	✓	=						
18	19	✓	O	=						
19	20	✓	✓	=						
20	21			=						
21	22			=						

MAIL STOP AMENDMENT
PATENT
8081-1131-1

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of:

Tatsuyuki OGINO et al. Conf.: 1892

Application No.: 14/226,172 Art Unit: 2872

Filed: March 26, 2014 Examiner: JONES, James

IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

AMENDMENT

Assistant Commissioner for Patents June 24, 2015
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Official Action of April 30, 2015, please amend the above-identified application as follows.

Amendments to the Claims are reflected in the listing of claims that begins on page 2.

Remarks begin on page 9.

Amendments to the Claims

This listing of the claims replaces all prior versions and listing of the claims in the present application.

Listing of Claims

1. (Currently Amended) An imaging lens substantially consisting of, in order from an object side, five lenses of:

a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side;

a second lens that has a biconcave shape;

a third lens that has a meniscus shape which is convex toward the object side;

a fourth lens that has a meniscus shape which is convex toward an image side; and

a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface,

wherein the following conditional expression (1) is satisfied:

$1.4<f/f1<4$ (1), where

f is a focal length of a whole system, and

f1 is a focal length of the first lens, and

wherein the following conditional expression (3) is further satisfied:

$0.78<f/f12<2.5$ (3), where

f12 is a composite focal length of the first lens and the second lens.

2. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-3<f/f2<-0.85$ (2), where

f2 is a focal length of the second lens.

3. (Original) The imaging lens, as defined in Claim 1, wherein the fourth lens has a positive refractive power.

4. (Canceled)

5. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-2<f/f345<0$ (4), where

f345 is a composite focal length of the third to fifth lenses.

6. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.5<f1/f3<0.4$ (5), where

f3 is a focal length of the third lens.

7. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-1<(R3f-R3r)/(R3f+R3r)<1.2$ (6), where

R3f is a paraxial radius of curvature of an object side surface of the third lens, and

R3r is a paraxial radius of curvature of an image side surface of the third lens.

8. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-4<f/f5<-0.2$ (7), where

f5 is a focal length of the fifth lens.

9. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$0.5<f\cdot\tan\omega/R5r<10$ (8), where

ω is a half angle of view, and

R5r is a paraxial radius of curvature of the image side surface of the fifth lens.

10. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.9<f/f3<0.7$ (9), where

f3 is a focal length of the third lens.

11. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further

satisfied:

0.05<D7/f<0.2 (10), where

D7 is a spacing on an optical axis between the third lens and the fourth lens.

12. (Original) The imaging lens, as defined in Claim 1, further comprising an aperture stop that is disposed on the object side of an object side surface of the second lens.

13. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

1.5<f/f1<3.5 (1-1).

14. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

-2.5<f/f2<-0.9 (2-1), where

f2 is a focal length of the second lens.

15. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

0.8<f/f12<2 (3-1), where

f12 is a composite focal length of the first lens and the second lens.

16. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further

satisfied:

$-1.5<f/f345<-0.05$ (4-1), where

f345 is a composite focal length of the third to fifth lenses.

17. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.4<f1/f3<0.2$ (5-1), where

f3 is a focal length of the third lens.

18. (Original) The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.6<(R3f-R3r)/(R3f+R3r)<1$ (6-1), where

R3f is a paraxial radius of curvature of the object side surface of the third lens, and

R3r is a paraxial radius of curvature of the image side surface of the third lens.

19. (Original) The imaging lens, as defined in Claim 1, wherein when a composite refractive power of the first to third lenses is positive, the following conditional expression is further satisfied:

$-3<f/f5<-0.4$ (7—1), where

f5 is a focal length of the fifth lens.

20. (Original) An imaging apparatus comprising:

the imaging lens, as defined in Claim 1.

21. (New) An imaging lens substantially consisting of, in order from an object side, five lenses of:

a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side;

a second lens that has a biconcave shape;

a third lens that has a meniscus shape which is convex toward the object side;

a fourth lens that has a meniscus shape which is convex toward an image side; and

a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface,

wherein the following conditional expression (1) is satisfied:

$1.4<f/f1<4$ (1), where

f is a focal length of a whole system, and

f1 is a focal length of the first lens, and

wherein the following conditional expression (4) is further satisfied:

$-2<f/f345<0$ (4), where

f345 is a composite focal length of the third to fifth lenses.

22. (New) An imaging lens substantially consisting of, in order from an object side, five lenses of:

a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side;

a second lens that has a biconcave shape;

a third lens that has a meniscus shape which is convex toward the object side;

a fourth lens that has a meniscus shape which is convex toward an image side; and

a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface,

wherein the following conditional expression (1) is satisfied:

$1.4<f/f1<4$ (1), where

f is a focal length of a whole system, and

f1 is a focal length of the first lens, and

wherein the following conditional expression (5-1) is further satisfied:

$-0.4<f1/f3<0.2$ (5-1), where

f3 is a focal length of the third lens.

Remarks

The application as filed and claim 7 as included herein correctly show that the denominator of the formula in claim 7 is (R3f **+** R3r). However, the application as published in U.S. Patent Publication 2014/0293453 incorrectly shows the denominator of the formula in claim 7 as (R3f **−** R3r). The Examiner's kind assistance fixing this error in the published application and ensuring that the Patent Office's error is not repeated in the issued patent are respectfully requested.

Claims 1-3, 6, 9-14, 18, and 20 were rejected as anticipated by SHINOHARA 2010/0253829. Claim 1 has been amended to include subject matter from claim 4 that was not rejected on this basis. Reconsideration and withdrawal of the rejection are respectfully requested.

The indication that claims 4-5, 7-8, 15-17, and 19 include patentable subject matter is acknowledged with thanks. In reliance thereon, claim 1 has been amended to include the allowable subject matter of claim 4 and new claims 21-22 have been added that include the allowable subject matter of claim 5 and 17, respectively. Allowance of amended claim 1 and new claims 21 and 22 is respectfully requested. The dependent claims are allowable for at least the same reasons.

In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in

condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Thomas W. Perkins/

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TWP/clt

Electronic Patent Application Fee Transmittal

Application Number:	14226172
Filing Date:	26-Mar-2014
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Filer:	Eric Jensen/Cynthia Thompson
Attorney Docket Number:	8081-1131-1

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:				
Claims in Excess of 20	1202	1	80	80
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**80**

Electronic Acknowledgement Receipt	
EFS ID:	22727350
Application Number:	14226172
International Application Number:	
Confirmation Number:	1892
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Customer Number:	466
Filer:	Eric Jensen/Cynthia Thompson
Filer Authorized By:	Eric Jensen
Attorney Docket Number:	8081-1131-1
Receipt Date:	24-JUN-2015
Filing Date:	26-MAR-2014
Time Stamp:	14:57:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$80
RAM confirmation Number	12593
Deposit Account	250120
Authorized User	PATCH, ANDREW J
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		AMD.pdf	41100 48f957494ae34c20266708bbc2345101c9efcdf6	yes	10

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	8
Applicant Arguments/Remarks Made in an Amendment	9	10

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30463 9823dd3a8020b1424ac2fbd8789a7c345c96d97e	no	2

Warnings:

Information:

Total Files Size (in bytes):	71563

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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/226,172	Filing Date 03/26/2014	☐ 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), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
	06/24/2015	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 21	Minus	** 20	= 1	X $80 =	80
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**80**

		(Column 1)		(Column 2)	(Column 3)		
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ 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.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/LYNNELL JOHNSON/

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

466 7590 04/30/2015

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

EXAMINER
JONES, JAMES

ART UNIT	PAPER NUMBER
2872	

NOTIFICATION DATE	DELIVERY MODE
04/30/2015	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):

DocketingDept@young-thompson.com
yandtpair@firsttofile.com

Office Action Summary	Application No. 14/226,172	Applicant(s) OGINO ET AL.	
	Examiner JAMES JONES	Art Unit 2872	AIA (First Inventor to File) Status Yes

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *1/8/2015*.

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

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

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

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

Disposition of Claims*

5)☒ Claim(s) *1-20* is/are pending in the application.

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

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-3,6,9-14,18 and 20* is/are rejected.

8)☒ Claim(s) *4, 5, 7, 8, 15-17 and 19* is/are objected to.

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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

DETAILED ACTION

Claim Rejections - 35 USC § 102

2. 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.

3. Claims 1-3, 6, 9-14, 18 and 20 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Shinohara (20100253829) hereafter Shinohara.

Regarding claim 1, Shinohara discloses an imaging lens substantially consisting of, in order from an object side, five lenses of: a first lens (G1) that has a positive refractive power (par. [0074], line 1) and has a meniscus shape which is convex toward the object side (par. [0074]); a second lens (G2) that has a biconcave shape (shown in fig. 1) a third lens (G3) that has a meniscus shape which is convex toward the object side (fig. 1, par. [0076]); a fourth lens (G4) that has a meniscus shape which is convex toward an image side(fig. 1); and a fifth lens (G5) that has a negative refractive power and has at least one inflection point on an image side surface (par. [0078], line 1-2, par. [0084]), wherein the following conditional expression (1) is satisfied: $1.4<f/f1<4$ (1), where f is a focal length of a whole system, and f1 is a focal length of the first lens (par. [0081]).

Regarding claim 2, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: -3<f/f2<-0.85 (2), where f2 is a focal length of the second lens (table 43).

Regarding claim 3, Shinohara discloses the imaging lens, as defined in claim 1, wherein the fourth lens has a positive refractive power (par. [0077], line 1).

Regarding claim 6, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: -0.5<f1/f3<0.4 (5), where f3 is a focal length of the third lens (see table 43).

Regarding claim 9, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: 0.5<ftan .omega./R5r<10 (8), where .omega. is a half angle of view, and R5r is a paraxial radius of curvature of the image side surface of the fifth lens (see table 1; tan(38.80)/1.3907=.5781).

Regarding claim 10 Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: -0.9<f/f3<0.7 (9), where f3 is a focal length of the third lens (see table 43).

Regarding claim 11, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: 0.05<D7/f<0.2 (10), where D7 is a spacing on an optical axis between the third lens and the fourth lens (see table 43; 1.49/7.95=.1874).

Regarding claim 12, Shinohora discloses the imaging lens, as defined in claim 1, further comprising an aperture stop (st) that is disposed on the object side of an object

side surface of the second lens (G2).

Regarding claim 13, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: 1.5<f/f1<3.5 (1-1) (par. [0011][0081] discloses 0.8<f/f1<1.5).

Regarding claim 14, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: -2.5<f/f2<-0.9 (2-1), where f2 is a focal length of the second lens (see table 43).

Regarding claim 18, Shinohara discloses the imaging lens, as defined in claim 1, wherein the following conditional expression is further satisfied: -0.6<(R3f-R3r)/(R3f+R3r)<1 (6-1), where R3f is a paraxial radius of curvature of the object side surface of the third lens, and R3r is a paraxial radius of curvature of the image side surface of the third lens (shown in table 1, (-1.9476)/(11.8424) = -.1645).

Regarding claim 20, Shinohara discloses an imaging apparatus comprising: the imaging lens, as defined in claim 1 (abstract).

Allowable Subject Matter

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

5. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not disclose the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103.

Regarding claim 4, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: 0.78<f/f12<2.5 (3), where f12 is a composite focal length of the first lens and the second lens".

Regarding claim 5, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: -2<f/f345<0 (4), where f345 is a composite focal length of the third to fifth lenses".

Regarding claim 7, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: -1<(R3f-R3r)/(R3f-R3r)<1.2 (6), where R3f is a paraxial radius of curvature of an object side surface of the third lens, and R3r is a paraxial radius of curvature of an image side surface of the third lens".

Regarding claim 8, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: -4<f/f5<-0.2 (7), where f5 is a focal length of the fifth lens".

Regarding claim 15, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied:

0.8<f/f12<2 (3-1), where f12 is a composite focal length of the first lens and the second lens".

Regarding claim 16, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: -1.5<f/f345<-0.05 (4-1), where f345 is a composite focal length of the third to fifth lenses".

Regarding claim 17, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein the following conditional expression is further satisfied: -0.4<f1/f3<0.2 (5-1), where f3 is a focal length of the third lens".

Regarding claim 19, the prior art does not disclose the claimed imaging lens specifically including as the distinguishing features in combination with the other limitations the claimed "wherein when a composite refractive power of the first to third lenses is positive, the following conditional expression is further satisfied: -3<f/f5<-0.4 (7-1), where f5 is a focal length of the fifth lens".

Response to Arguments

6. Applicant's arguments, filed 1/8/2015, with respect to the rejection(s) of claim(s) 1-20 under 35 USC 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Shinohara.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES JONES whose telephone number is (571)270-1278. The examiner can normally be reached on Monday thru Friday, 9 a.m. to 6:00 p.m. est. time.

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 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.

/JAMES JONES/
Primary Examiner, Art Unit 2872
4/26/2015

Notice of References Cited	Application/Control No. 14/226,172	Applicant(s)/Patent Under Reexamination OGINO ET AL.	
	Examiner JAMES JONES	Art Unit 2872	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2010/0253829	10-2010	Shinohara, Yoshikazu	348/340
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"14226172"	US-PGPUB; USPAT; USOCR	OR	ON	2015/04/26 09:00
S113	1749	S111 and S112	US-PGPUB; USPAT	OR	ON	2014/11/03 11:23
S250	7019	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S251	1772	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S254	454	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S295	7992	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S296	3967	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S297	1723	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S298	1380	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S299	731	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S300	26	S295 and S296 and S297 and S298 and S299	FPRS; EPO; JPO; DERWENT	OR	ON	2014/12/01 11:47
S301	5952	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S302	3649	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S303	1925	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S304	1324	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S305	341	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S307	37929	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S310	818	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S315	9767	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47

S316	9158	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S317	3299	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S318	3282	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S319	1376	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S320	370	S315 and S316 and S317 and S318 and S319	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S325	11890	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S326	7087	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S327	4779	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S328	3282	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S329	3749	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S330	511	S325 and S326 and S327 and S328 and S329	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S331	36	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S334	7530	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S335	6761	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S336	2018	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S337	903	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S338	388	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S339	4351	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S340	366	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S342	337	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S343	424	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S344	230	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S345	27787	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S346	17229	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S347	965	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S351	109	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S352	1726	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47

S353	939	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S354	1832	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S356	1811	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S357	1410	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S358	1045	S250 and S251 and S356 and S357	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S359	1027	S358 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S361	598	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/01 11:47
S399	460	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S402	697	S401 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S413	183	S406 and S407 and S408 and S409 and S411 and S412	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S416	527	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S424	375	S419 and S420 and S421 and S422 and S423	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S435	375	S430 and S431 and S432 and S433 and S434	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S437	27193	lens near3 housing	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S446	5984	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S447	3676	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S448	1953	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S449	1340	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S450	350	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S452	38243	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S475	523	S470 and S471 and S472 and S473 and S474	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S476	38	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S479	7577	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S480	6810	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S481	2044	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S482	929	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S483	403	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22

S484	4390	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S485	378	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S487	340	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S488	428	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S489	233	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S490	27922	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S491	17327	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S492	983	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S504	1042	S503 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S506	601	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S523	460	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S526	697	S525 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S537	183	S530 and S531 and S532 and S533 and S535 and S536	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S540	527	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S548	375	S543 and S544 and S545 and S546 and S547	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S559	375	S554 and S555 and S556 and S557 and S558	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S561	27193	lens near3 housing	US-PGPUB; USPAT	OR	ON	2014/12/29 09:22
S653	1207	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 12:46
S655	6851	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/01/25 13:03
S657	2819	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:03
S659	2558	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15
S660	6934	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15
S661	2558	S659 with S660	US-PGPUB; USPAT	OR	ON	2015/01/25 13:15
S663	281	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 17:49
S664	12058	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:50
S665	9885	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:50
S666	11697	(second near3 lens near5 negative)	US-PGPUB;	OR	ON	2015/01/25

			USPAT			17:51
S667	5799	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:51
S668	4645	S664 and S665 and S666 and S667	US-PGPUB; USPAT	OR	ON	2015/01/25 17:53
S669	2558	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S670	6934	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S671	2558	S669 and S670	US-PGPUB; USPAT	OR	ON	2015/01/25 17:54
S673	15	S671 and S663	US-PGPUB; USPAT	OR	ON	2015/01/25 17:55
S674	266	S663 not S673	US-PGPUB; USPAT	OR	ON	2015/01/25 18:10
S675	3142	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/01/25 18:11
S676	8	S674 and S675	US-PGPUB; USPAT	OR	ON	2015/01/25 18:11
S677	258	S674 not S676	US-PGPUB; USPAT	OR	ON	2015/01/25 18:17
S678	163	f1/ft	US-PGPUB; USPAT	OR	ON	2015/01/25 18:26
S679	530	f1/f	US-PGPUB; USPAT	OR	ON	2015/01/25 18:26
S684	539	f/f1	US-PGPUB; USPAT	OR	ON	2015/01/25 18:44
S686	1207	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/01/25 18:45
S949	578	S945 and S946 and S947 and S948	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S950	2652353	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S951	559	S949 and S950	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S953	1638	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S954	4858	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S955	5275	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S956	1992	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S957	1927	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S958	578	S954 and S955 and S956 and S957	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S959	2652353	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S960	559	S958 and S959	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S961	185	S960 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S963	850	HFOV	US-PGPUB;	OR	ON	2015/02/05

			USPAT			13:38
S967	9474	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S968	8475	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S969	7414	third near3 lens near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S970	197	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S971	3820	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S972	6754	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S975	2700	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S976	2661	second near3 lens near3 unit near5 negative	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S977	9482	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S978	3873	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S981	2002	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S982	1833	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S983	3344	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S984	1326	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:38
S1049	300	fixing near3 diaphragm.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1050	15694	optical near3 set.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1051	54097	first near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:56
S1052	50432	second near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1053	15816	third near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1054	8456	fourth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1055	49310	convex near3 surface.clm.	US-PGPUB; USPAT	OR	ON	2015/02/05 13:57
S1119	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1120	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1164	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1165	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1166	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1167	3393	(fourth near3 lens) near5 convex	US-PGPUB;	OR	ON	2015/03/09

			USPAT			08:17
S1168	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1188	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1189	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1190	1096	S1119 and S1120 and S1188 and S1189	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1193	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1194	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1195	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1196	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1197	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1198	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1201	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1202	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1205	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1206	720	S1205 and S1202	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1208	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1209	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1210	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1211	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1212	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1213	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1217	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1218	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1219	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1220	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1221	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1224	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1225	9361	(second near3 lens) near5 convex	US-PGPUB;	OR	ON	2015/03/09

			USPAT			08:17
S1226	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1227	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1228	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1231	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1232	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1233	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1234	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1235	581	S1231 and S1232 and S1233 and S1234	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1236	2666338	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1238	1652	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1239	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1240	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1241	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1242	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1243	581	S1239 and S1240 and S1241 and S1242	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1244	2666338	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1245	562	S1243 and S1244	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1246	187	S1245 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1266	2579	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1267	7008	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1269	283	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1270	12177	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1271	9987	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1272	11809	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1273	5872	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1275	2579	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1276	7008	(focal near3 length near3 first adj	US-PGPUB;	OR	ON	2015/03/09

		lens)	USPAT			08:17
S1277	2579	S1275 and S1276	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1279	268	S1269 not S1278	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1280	3166	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1288	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1289	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1295	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1296	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1297	1096	S1288 and S1289 and S1295 and S1296	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1300	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1301	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1302	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1303	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1304	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1305	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1308	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1309	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1312	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1313	720	S1312 and S1309	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1315	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1316	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1317	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1318	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1319	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1320	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1324	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1325	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1326	3419	(third near3 lens) near5 concave	US-PGPUB;	OR	ON	2015/03/09

			USPAT			08:17
S1327	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1328	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1331	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1332	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1333	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1334	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1335	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1338	8361	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1339	4246	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1340	1831	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1341	1501	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1342	802	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1351	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1352	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1353	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1354	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1355	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1357	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1358	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1359	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1360	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1361	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1381	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1382	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1383	1096	S1308 and S1309 and S1381 and S1382	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1390	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1391	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1392	1837	S1390 and S1391	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1395	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1396	720	S1395 and S1391	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1400	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1401	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1402	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1403	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1405	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1406	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1410	887	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1411	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1412	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1413	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1414	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1415	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1416	392	S1411 and S1412 and S1413 and S1414 and S1415	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1420	26186	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1421	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1422	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1423	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1424	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1425	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1426	392	S1421 and S1422 and S1423 and S1424 and S1425	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1430	8361	(first near3 lens) near5 negative	FPRS; EPO; JPO;	OR	ON	2015/03/09 08:17

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S1431	4246	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1432	1831	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1433	1501	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1434	802	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1435	29	S1430 and S1431 and S1432 and S1433 and S1434	FPRS; EPO; JPO; DERWENT	OR	ON	2015/03/09 08:17
S1443	850	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1448	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1449	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1450	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1451	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1452	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1453	392	S1448 and S1449 and S1450 and S1451 and S1452	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1457	12177	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1458	7263	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1459	4924	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1460	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1461	3899	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1471	349	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1472	441	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1473	240	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1475	17566	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1476	1015	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1479	126	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1480	1761	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1481	957	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1482	1921	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1484	1878	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1485	1467	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1486	1096	S1390 and S1391 and S1484 and S1485	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1489	5359	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1490	5180	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1491	4504	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1492	2294	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1493	1460	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1494	29453	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1495	542	S1489 and S1490 and S1491 and S1492 and S1493 and S1494	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1496	1420	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1499	7204	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1500	1837	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1501	1837	S1499 and S1500	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1504	720	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1505	720	S1504 and S1500	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1509	12519	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1510	9987	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1511	4162	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1512	2789	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1514	1164	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1515	1081	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1519	887	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1520	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1521	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17

S1522	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1523	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1524	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1525	392	S1520 and S1521 and S1522 and S1523 and S1524	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1529	26186	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1530	9964	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1531	9361	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1532	3419	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1533	3393	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1534	1468	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1535	392	S1530 and S1531 and S1532 and S1533 and S1534	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1539	4894	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1540	5301	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1541	2011	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1542	1943	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/03/09 08:17
S1543	1	("20130057967").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 11:09
S1544	11329	((first near3 lens) near7 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 11:35
S1545	6129	(((second near3 lens) near7 positive) same convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 11:38
S1546	4997	(third near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 11:38
S1547	4965	(fourth near3 lens) near10 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 11:39
S1548	2172	(fifth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 11:41
S1549	736	S1544 and S1545 and S1546 and S1547 and S1548	US-PGPUB; USPAT	OR	ON	2015/04/23 11:42
S1550	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 11:42
S1551	1098	359/659,746,753,764-766.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 11:44
S1552	150	S1549 and S1550	US-PGPUB; USPAT	OR	ON	2015/04/23 11:44
S1553	150	S1544 and S1552	US-PGPUB; USPAT	OR	ON	2015/04/23 12:32
S1554	1	"14175290"	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:08
S1555	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1556	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1557	1885	S1555 and S1556	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1558	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1559	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1560	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1561	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1562	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1563	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1564	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1565	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1566	29	S1561 and S1562 and S1563 and S1564 and S1565	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1567	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1568	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1569	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1570	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1571	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1572	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1573	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1574	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1575	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1576	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1577	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1578	1523	(fifth near3 lens) near5 concave	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1579	404	S1574 and S1575 and S1576 and S1577 and S1578	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1580	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1581	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1582	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1583	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1584	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1585	575	S1580 and S1581 and S1582 and S1583 and S1584	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1586	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1587	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1588	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1589	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1590	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1591	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1592	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1593	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1594	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1595	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1596	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1597	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1598	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1599	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1600	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1601	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1602	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1603	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1604	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1605	1511	(fourth near4 lens) same negative	US-PGPUB;	OR	ON	2015/04/23

		same convex same aspheric	USPAT			13:43
S1606	1132	S1558 and S1559 and S1604 and S1605	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1607	1114	S1606 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1608	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1609	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1610	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1611	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1612	0	"S400" and S1610	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1613	0	S1612 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1614	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1615	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1616	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1617	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1618	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1619	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1620	201	S1614 and S1615 and S1616 and S1617 and S1618 and S1619	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1621	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1622	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1623	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1624	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1625	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1626	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1627	404	S1622 and S1623 and S1624 and S1625 and S1626	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1628	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1629	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1630	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1631	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1632	1523	(fifth near3 lens) near5 concave	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1633	404	S1628 and S1629 and S1630 and S1631 and S1632	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1634	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1635	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1636	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1637	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1638	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1639	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1640	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1641	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1642	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1643	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1644	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1645	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1646	575	S1641 and S1642 and S1643 and S1644 and S1645	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1647	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1648	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1649	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1650	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1651	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1652	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1653	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1654	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1655	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1656	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1657	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1658	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1659	17736	(fourth lens near5 lens) near10	US-PGPUB;	OR	ON	2015/04/23

		plastic	USPAT			13:43
S1660	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1661	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1662	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1663	1132	S1609 and S1610 and S1661 and S1662	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1664	1114	S1663 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1665	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1666	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1667	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1668	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1669	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1670	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1671	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1672	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1673	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1674	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1675	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1676	738	S1675 and S1673	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1677	728	S1676 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1678	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1679	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1680	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1681	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1682	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1683	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1684	201	S1678 and S1679 and S1680 and S1681 and S1682 and S1683	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1685	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1686	10098	(first near3 lens) near5 negative	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1687	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1688	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1689	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1690	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1691	404	S1686 and S1687 and S1688 and S1689 and S1690	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1692	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1693	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1694	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1695	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1696	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1697	404	S1692 and S1693 and S1694 and S1695 and S1696	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1698	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1699	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1700	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1701	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1702	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1703	599	S1699 and S1700 and S1701 and S1702	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1704	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1705	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1706	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1707	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1708	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1709	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1710	599	S1706 and S1707 and S1708 and S1709	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1711	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1712	580	S1710 and S1711	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1713	191	S1712 and (inflection near3 point)	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1714	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1715	6972	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1716	2863	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1717	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1718	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1719	2619	S1717 with S1718	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1720	288	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1721	12354	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1722	10143	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1723	11978	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1724	5982	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1725	4793	S1721 and S1722 and S1723 and S1724	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1726	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1727	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1728	2619	S1726 and S1727	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1730	273	S1720 not S1729	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1731	3207	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1734	170	f1/ft	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1735	556	f1/f	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1736	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1737	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1738	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1739	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1740	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1741	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1742	1132	S1738 and S1739 and S1740 and S1741	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

S1743	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1744	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1745	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1746	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1747	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1748	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1749	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1750	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1751	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1752	738	S1751 and S1750	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1753	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1754	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1755	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1756	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1757	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1758	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1759	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1760	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1761	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1762	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1763	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1764	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1765	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1766	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1767	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1768	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1769	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO;	OR	ON	2015/04/23 13:43

			DERWENT			
S1770	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1771	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1772	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1773	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1774	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1775	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1776	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1777	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1778	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1779	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1780	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1781	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1782	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1783	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1784	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1785	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1786	1132	S1749 and S1750 and S1784 and S1785	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1787	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1788	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1789	1885	S1787 and S1788	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1790	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1791	738	S1790 and S1788	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1792	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1793	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1794	4245	(fifth near3 lens) near5 positive	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:43
S1795	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1796	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1797	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1798	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1799	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1800	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1801	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1802	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1803	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1804	404	S1799 and S1800 and S1801 and S1802 and S1803	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1805	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1806	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1807	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1808	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1809	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1810	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1811	404	S1806 and S1807 and S1808 and S1809 and S1810	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1812	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1813	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1814	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1815	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1816	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1817	29	S1812 and S1813 and S1814 and S1815 and S1816	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:43
S1818	871	(axial near3 distance) same (first near3 lens) same (second near3	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43

		lens)				
S1819	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:43
S1820	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1821	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1822	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1823	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1824	404	S1819 and S1820 and S1821 and S1822 and S1823	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1825	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1826	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1827	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1828	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1829	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1830	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1831	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1832	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1833	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1834	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1835	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1836	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1837	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1838	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1839	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1840	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1841	1132	S1787 and S1788 and S1839 and S1840	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1842	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1843	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1844	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1845	2323	(fourth near3 lens near3 group)	US-PGPUB;	OR	ON	2015/04/23

		near5 negative	USPAT			13:44
S1846	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1847	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1848	555	S1842 and S1843 and S1844 and S1845 and S1846 and S1847	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1849	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1850	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1851	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1852	1885	S1850 and S1851	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1853	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1854	738	S1853 and S1851	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1855	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1856	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1857	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1858	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1859	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1860	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1861	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1862	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1863	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1864	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1865	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1866	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1867	404	S1862 and S1863 and S1864 and S1865 and S1866	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1868	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1869	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1870	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1871	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1872	3470	(fourth near3 lens) near5 convex	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S1873	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1874	404	S1869 and S1870 and S1871 and S1872 and S1873	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1875	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1876	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1877	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1878	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1879	599	S1875 and S1876 and S1877 and S1878	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1880	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1881	580	S1879 and S1880	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1882	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1883	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1884	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1885	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1886	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1887	599	S1883 and S1884 and S1885 and S1886	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1888	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1889	580	S1887 and S1888	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1890	191	S1889 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1891	909	HFOV	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1892	9689	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1893	8642	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1894	7584	third near3 lens near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1895	220	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1896	3919	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1897	6884	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1898	2746	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1899	2703	second near3 lens near3 unit near5	US-PGPUB;	OR	ON	2015/04/23

		negative	USPAT			13:44
S1900	9637	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1901	3920	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1902	2040	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1903	1865	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1904	3397	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1905	1346	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1906	306	fixing near3 diaphragm.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1907	15865	optical near3 set.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1908	55050	first near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1909	51278	second near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1910	16152	third near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1911	8685	fourth near3 lens.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1912	50102	convex near3 surface.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1913	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1914	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1915	1885	S1913 and S1914	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1916	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1917	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1918	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1919	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1920	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1921	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1922	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1923	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44

S1924	29	S1919 and S1920 and S1921 and S1922 and S1923	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1925	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1926	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1927	2040	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1928	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1929	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1930	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1931	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1932	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1933	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1934	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1935	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1936	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1937	404	S1932 and S1933 and S1934 and S1935 and S1936	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1938	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1939	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1940	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1941	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1942	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1943	575	S1938 and S1939 and S1940 and S1941 and S1942	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1944	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1945	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1946	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1947	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1948	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1949	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S1950	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1951	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1952	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1953	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1954	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1955	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1956	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1957	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1958	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1959	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1960	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1961	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1962	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1963	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1964	1132	S1916 and S1917 and S1962 and S1963	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1965	1114	S1964 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1966	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1967	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1968	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1969	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1970	0	"S400" and S1968	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1971	0	S1970 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1972	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1973	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1974	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1975	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1976	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S1977	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1978	201	S1972 and S1973 and S1974 and S1975 and S1976 and S1977	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1979	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1980	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1981	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1982	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1983	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1984	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1985	404	S1980 and S1981 and S1982 and S1983 and S1984	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1986	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1987	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1988	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1989	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1990	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1991	404	S1986 and S1987 and S1988 and S1989 and S1990	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1992	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S1993	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1994	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1995	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1996	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1997	819	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1998	29	S1993 and S1994 and S1995 and S1996 and S1997	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S1999	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2000	3821	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2001	2040	(third near3 lens) near5 convex.clm.	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S2002	1419	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2003	383	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2004	39643	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2005	871	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2006	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2007	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2008	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2009	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2010	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2011	404	S2006 and S2007 and S2008 and S2009 and S2010	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2012	12354	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2013	7377	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2014	5017	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2015	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2016	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2017	575	S2012 and S2013 and S2014 and S2015 and S2016	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2018	45	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2019	7786	(second near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2020	7030	(third near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2021	2128	(fifth near3 lens) near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2022	1015	(fifth near3 lens) near9 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2023	453	(fifth near3 lens) near5 aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2024	4600	(inflection near2 point).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2025	419	(sixth near3 lens) near10 concave.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2026	354	(first near5 lens) near7 convex near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2027	451	(second near5 lens) near7 aspheric near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2028	245	(third near5 lens) near7 concave near5 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2029	28691	(fourth lens near5 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2030	17736	(fourth lens near5 lens) near10 plastic	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2031	1040	(fourth lens near5 lens) near10 inflection	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2032	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2033	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2034	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2035	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2036	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2037	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2038	1132	S1967 and S1968 and S2036 and S2037	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2039	1114	S2038 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2040	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2041	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2042	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2043	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2044	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2045	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2046	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2047	555	S2041 and S2042 and S2043 and S2044 and S2045 and S2046	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2048	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2049	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2050	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2051	1885	S2049 and S2050	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2052	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2053	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2054	738	S2053 and S2050	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2055	728	S2054 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2056	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2057	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2058	4245	(fifth near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2059	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2060	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2061	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2062	201	S2056 and S2057 and S2058 and S2059 and S2060 and S2061	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2063	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2064	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2065	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2066	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2067	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2068	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2069	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2070	404	S2065 and S2066 and S2067 and S2068 and S2069	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2071	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2072	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2073	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2074	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2075	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2076	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2077	404	S2072 and S2073 and S2074 and S2075 and S2076	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2078	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2079	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2080	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2081	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2082	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2083	599	S2079 and S2080 and S2081 and S2082	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2084	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2085	580	S2083 and S2084	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2086	1686	maximum near3 angle near3 view	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2087	4982	((first near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2088	5384	((second near3 lens) near10 (positive) near15 (convex))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2089	2056	(third near3 lens) near5 negative near15 (concave)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2090	1986	(fourth near3 lens) near10 positive near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2091	599	S2087 and S2088 and S2089 and S2090	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2092	2690860	(diaphragm stop aperture)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2093	580	S2091 and S2092	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2094	191	S2093 and (inflection near3 point)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2095	909	HFOV	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2096	9689	((first near3 lens) near10 positive).clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2097	8642	(second near3 lens) near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2098	7584	third near3 lens near10 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2099	220	paraxial near3 region.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2100	3919	fourth near3 lens near10 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2101	6884	aspheric.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2102	2746	first near3 lens near3 unit near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2103	2703	second near3 lens near3 unit near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2104	9637	reflecting near3 unit	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2105	3920	rear near3 lens near3 group	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2106	2040	first near3 lens near3 unit near5 positive.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2107	1865	second near3 lens near3 unit near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2108	3397	reflecting near3 unit.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44

S2109	1346	rear near3 lens near3 group.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2110	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2111	6972	(wide-angle "wide angle" wideangle) same condition	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2112	2863	(wide-angle "wide angle" wideangle) same condition same (focal near3 length)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2113	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2114	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2115	2619	S2113 with S2114	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2116	288	359/773.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2117	12354	(first near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2118	10143	(third near3 lens near5 positive)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2119	11978	(second near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2120	5982	(fourth near3 lens near5 negative)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2121	4793	S2117 and S2118 and S2119 and S2120	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2122	2619	(focal near3 length near3 first adj lens adj4 group)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2123	7129	(focal near3 length near3 first adj lens)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2124	2619	S2122 and S2123	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2125	15	S2124 and S2116	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2126	273	S2116 not S2125	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2127	3207	(focal near3 length near10 zoom near10 (telephoto tele-photo))	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2128	170	f1/ft	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2129	556	f1/f	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2130	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2131	1224	359/687.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2132	111	359/715.ccls. and @pd>="20140311"	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2133	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2134	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2135	1885	S2133 and S2134	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S2136	130	(first near3 lens) near10 positive near10 paraxial.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2137	1786	(second near3 lens) near10 positive near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2138	967	(third near3 lens) near10 negative near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2139	1978	(fourth near3 lens) near10 convex.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2140	1925	(third near4 lens) same positive same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2141	1511	(fourth near4 lens) same negative same convex same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2142	1132	S2133 and S2134 and S2140 and S2141	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2143	1114	S2142 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2144	637	359/715.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2145	5423	(first near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2146	5244	(second near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2147	4562	(third near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2148	2323	(fourth near3 lens near3 group) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2149	1481	(fifth near3 lens near3 group) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2150	29778	aperture near3 stop	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2151	555	S2145 and S2146 and S2147 and S2148 and S2149 and S2150	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2152	1427	359/649-652.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2153	7328	(second near4 lens) same positive same concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2154	1885	(second near4 lens) same positive same concave same aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2155	1885	S2153 and S2154	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2156	466	359/717.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2157	738	((second near4 lens) near20 positive near20 concave near20 aspheric)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2158	738	S2157 and S2154	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2159	728	S2158 and (diaphragm aperture stop)	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2160	12704	(second near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2161	10143	(third near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2162	4245	(fifth near3 lens) near5 positive	US-PGPUB;	OR	ON	2015/04/23

			USPAT			13:44
S2163	2874	(fifth near3 lens) near9 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2164	1193	(sixth near3 lens) near10 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2165	1126	(fifth near3 lens) near10 aspheric	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2166	201	S2160 and S2161 and S2162 and S2163 and S2164 and S2165	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2167	590	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2168	956	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2169	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2170	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2171	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2172	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2173	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2174	404	S2169 and S2170 and S2171 and S2172 and S2173	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2175	26472	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2176	10098	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2177	9511	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2178	3484	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2179	3470	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2180	1523	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2181	404	S2176 and S2177 and S2178 and S2179 and S2180	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2182	27926	lens near3 housing	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2183	8448	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2184	4321	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2185	1863	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2186	1527	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2187	819	(fifth near3 lens) near5 concave	FPRS; EPO;	OR	ON	2015/04/23

			JPO; DERWENT			13:44
S2188	29	S2183 and S2184 and S2185 and S2186 and S2187	FPRS; EPO; JPO; DERWENT	OR	ON	2015/04/23 13:44
S2189	6143	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2015/04/23 13:44
S2232	1	("20120087020").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 19:22
S2233	0	("(firstnear3lens)withpositive").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2015/04/23 20:13
S2234	15016	(first near3 lens) with positive	US-PGPUB; USPAT	OR	ON	2015/04/23 20:13
S2235	13134	(first near3 lens) near7 positive	US-PGPUB; USPAT	OR	ON	2015/04/23 20:13
S2236	6107	(third near3 lens) near7 convex	US-PGPUB; USPAT	OR	ON	2015/04/23 20:14
S2237	3996	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2238	1907	S2235 and S2236 and S2237	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2239	557	f/f1	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2240	86	S2238 and S2239	US-PGPUB; USPAT	OR	ON	2015/04/23 20:19
S2241	3	("20130033765" | "8310768" | "20120087020").PN.	US-PGPUB; USPAT	OR	ON	2015/04/23 20:58
S2242	25	("20100253829" | "20110310494" | "7365920" | "7643225").PN. OR ("8310768").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/04/24 07:41

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S375	5769	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2014/12/01 11:47
S376	5200	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S377	2708	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S378	1808	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S379	337	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2014/12/01 11:47
S380	82743	distance near10 image	USPAT; UPAD	OR	ON	2014/12/01 11:47
S382	7219	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47
S383	5675	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47
S384	2186	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2014/12/01 11:47

S385	1424	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2014/12/01 11:47
S386	396	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2014/12/01 11:47
S387	12773	(inflection near2 point)	USPAT; UPAD	OR	ON	2014/12/01 11:47
S647	1663	first near3 lens near3 unit near5 positive	USPAT; UPAD	OR	ON	2015/01/10 11:17
S648	1643	second near3 lens near3 unit near5 negative	USPAT; UPAD	OR	ON	2015/01/10 11:17
S649	4765	reflecting near3 unit	USPAT; UPAD	OR	ON	2015/01/10 11:17
S650	2549	rear near3 lens near3 group	USPAT; UPAD	OR	ON	2015/01/10 11:17
S1027	5833	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1028	5265	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1029	2760	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1030	1845	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1031	358	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1032	84112	distance near10 image	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1034	7304	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1035	5753	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1036	2226	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1037	1459	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1038	414	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1039	12971	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1042	7945	((first near3 lens) near10 positive)	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1043	7911	(second near3 lens) near10 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1044	6123	third near3 lens near10 positive	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1045	505	paraxial near3 region	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1046	4102	fourth near3 lens near10 negative	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1047	12222	aspheric	USPAT; UPAD	OR	ON	2015/02/05 13:38
S1057	679	fixing near3 diaphragm	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1058	39988	optical near3 set	USPAT; UPAD	OR	ON	2015/02/05 14:00

S1059	64927	first near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1060	59898	second near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1061	21737	third near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1062	12320	fourth near3 lens	USPAT; UPAD	OR	ON	2015/02/05 14:00
S1063	82891	convex near3 surface	USPAT; UPAD	OR	ON	2015/02/05 14:00
S2191	5927	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2192	5380	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2193	2816	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2194	1889	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2195	378	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2196	85927	distance near10 image	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2197	7423	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2198	5862	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2199	2286	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2200	1504	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2201	436	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2202	13231	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2203	1694	first near3 lens near3 unit near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2204	1672	second near3 lens near3 unit near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2205	4868	reflecting near3 unit	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2206	2575	rear near3 lens near3 group	USPAT; UPAD	OR	ON	2015/04/23 13:43
S2207	5927	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2208	5380	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2209	2816	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2210	1889	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2211	378	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2212	85927	distance near10 image	USPAT; UPAD	OR	ON	2015/04/23 13:44

S2213	7423	(second near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2214	5862	(third near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2215	2286	(fifth near3 lens) near5 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2216	1504	(fifth near3 lens) near9 convex	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2217	436	(fifth near3 lens) near5 aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2218	13231	(inflection near2 point)	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2219	8072	((first near3 lens) near10 positive)	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2220	8039	(second near3 lens) near10 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2221	6241	third near3 lens near10 positive	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2222	531	paraxial near3 region	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2223	4201	fourth near3 lens near10 negative	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2224	12417	aspheric	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2225	689	fixing near3 diaphragm	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2226	40519	optical near3 set	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2227	65846	first near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2228	60721	second near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2229	22058	third near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2230	12529	fourth near3 lens	USPAT; UPAD	OR	ON	2015/04/23 13:44
S2231	84085	convex near3 surface	USPAT; UPAD	OR	ON	2015/04/23 13:44

4/ 26/ 2015 9:53:01 AM
C:\ Users\ jjones4\ Documents\ EAST\ Workspaces\ 14175290.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

CPC- SEARCHED		
Symbol	Date	Examiner
G02B13/0045	4/26/2015	JCJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
359	714	4/26/2015	JCJ

SEARCH NOTES		
Search Notes	Date	Examiner
359/714 and G02B13/0045	4/26/2015	JCJ
inventor name search	4/26/2015	JCJ
Text search	4/26/2015	JCJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/JAMES JONES/ Primary Examiner.Art Unit 2872

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/29/2014	04/26/2015							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	O							
	5	✓	O							
	6	✓	✓							
	7	✓	O							
	8	✓	O							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	O							
	16	✓	O							
	17	✓	O							
	18	✓	✓							
	19	✓	O							
	20	✓	✓							

MAIL STOP AMENDMENT
PATENT
8081-1131-1

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Tatsuyuki OGINO et al. Conf. 1892

Application No. 14/226,172 Art Unit 2872

Filed March 26, 2014 Examiner JONES, James

Title: IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

REQUEST FOR RECONSIDERATION

Assistant Commissioner for Patents January 8, 2015
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Official Action of October 9, 2014, reconsideration of the rejection of the claims is respectfully requested for the reasons set forth in the **Remarks** that begin on page 2.

Remarks

Claims 1-20 were rejected as anticipated by TANG et al. Reconsideration and withdrawal of the rejection are respectfully requested.

TANG et al. disclose 7 embodiments, which are summarized below, where + indicates a positive refractive power.

Embodiment	1st lens	2nd lens	3rd lens	4th lens	5th lens
1	+	−	+	+	−
2	+	−	+	+	−
3	+	−	+	+	−
4	+	−	+	−	+
5	+	−	+	+	−
6	+	−	+	−	−
7	+	−	+	−	+

The fifth lenses of embodiments 4 and 7 have positive refractive powers, which is different from the fifth lens of claim 1 which has a negative refractive power. Therefore, these embodiments do not anticipate claim 1.

The first lenses of embodiments 1, 2 and 5 are of biconvex shapes, which is different from the first lens of claim 1 which has a meniscus shape and is convex toward the object side.

Therefore, these embodiments do not anticipate claim 1.

The third lenses of not only embodiments 3 and 6 but also all of the embodiments have a biconvex shape, which is different from the third lens of claim 1 which has a meniscus shape and is convex toward the object side. Therefore, these embodiments do not anticipate claim 1.

In particular, please note that the third lens of TANG et al. is biconvex, not meniscus and convex toward the object side as in claim 1. The Official Action cites paragraph 0012 of TANG et al. However, according to paragraph 0012, the third lens element has a convex object side surface and a convex image side surface. Hence, the third lens of TANG et al. has a biconvex shape. The advantages of the third lens of claim 1, which has a meniscus shape and is convex toward the object side, are described at page 11, line 33, through page 12, line 2 of the present application.

Accordingly, none of the embodiments include all claim limitations. Thus, claim 1 avoids the rejection under §102.

In view of the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment

to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Thomas W. Perkins/

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TWP/lrs

Electronic Acknowledgement Receipt

EFS ID:	21158221
Application Number:	14226172
International Application Number:	
Confirmation Number:	1892
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Customer Number:	466
Filer:	Eric Jensen/Linda Sayyad
Filer Authorized By:	Eric Jensen
Attorney Docket Number:	8081-1131-1
Receipt Date:	08-JAN-2015
Filing Date:	26-MAR-2014
Time Stamp:	15:42:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		RESP.pdf	21464 054a110d98cf53eee7f865711d242d80e1574d29	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Applicant Arguments/Remarks Made in an Amendment	2	4
Warnings:			
Information:			
	Total Files Size (in bytes):	21464	

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New Applications Under 35 U.S.C. 111
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【書類名】明細書
【発明の名称】撮像レンズおよび撮像レンズを備えた撮像装置
【技術分野】
【０００１】
本発明は、ＣＣＤ（Charge Coupled Device）やＣＭＯＳ（Complementary Metal Oxide Semiconductor）等の撮像素子上に被写体の光学像を結像させる固定焦点の撮像レンズ、およびその撮像レンズを搭載して撮影を行うデジタルスチルカメラやカメラ付き携帯電話機および情報携帯端末（ＰＤＡ：Personal Digital Assistance）、スマートフォン、タブレット型端末および携帯型ゲーム機等の撮像装置に関する。
【背景技術】
【０００２】
パーソナルコンピュータの一般家庭等への普及に伴い、撮影した風景や人物像等の画像情報をパーソナルコンピュータに入力することができるデジタルスチルカメラが急速に普及している。また、携帯電話、スマートフォン、またはタブレット型端末に画像入力用のカメラモジュールが搭載されることも多くなっている。このような撮像機能を有する機器には、ＣＣＤやＣＭＯＳなどの撮像素子が用いられている。近年、これらの撮像素子のコンパクト化が進み、撮像機器全体ならびにそれに搭載される撮像レンズにも、コンパクト性が要求されている。また同時に、撮像素子の高画素化も進んでおり、撮像レンズの高解像、高性能化が要求されている。例えば５メガピクセル以上、よりさらに好適には８メガピクセル以上の高画素に対応した性能が要求されている。
【０００３】
このような要求を満たすために、撮像レンズをレンズ枚数が比較的多い５枚または６枚構成とすることが考えられる。例えば、特許文献１および２には、物体側から順に正の屈折力を有する第１レンズ、負の屈折力を有する第２レンズ、正の屈折力を有する第３レンズ、正の屈折力を有する第４レンズ、負の屈折力を有する第５レンズからなる５枚構成の撮像レンズを提案している。
【先行技術文献】
【特許文献】
【０００４】
【特許文献１】米国特許第８３１０７６８号明細書
【特許文献２】米国特許出願公開第２０１３／０３３７６５号明細書
【発明の概要】
【発明が解決しようとする課題】
【０００５】
一方、特に携帯端末、スマートフォンまたはタブレット端末のような薄型化が進む装置に用いられる撮像レンズには、レンズ全長の短縮化の要求が益々高まっている。このために、上記特許文献１および２に記載の撮像レンズは全長をさらに短縮化することが求められる。
【０００６】
本発明は上述の点に鑑みてなされたもので、その目的は、全長の短縮化を図りつつ、中心画角から周辺画角まで高い結像性能を実現することができる撮像レンズ、およびその撮像レンズを搭載して高解像の撮像画像を得ることができる撮像装置を提供することにある。
【課題を解決するための手段】
【０００７】
本発明の撮像レンズは、物体側から順に、正の屈折力を有し、物体側に凸面を向けたメニスカス形状である第１レンズと、
両凹形状である第２レンズと、
物体側に凸面を向けたメニスカス形状である第３レンズと、
像側に凸面を向けたメニスカス形状である第４レンズと、

負の屈折力を有し、像側の面に少なくとも１つの変曲点を有する第５レンズと、
から構成される実質的に５個のレンズからなり、下記条件式（１）を満足することを特徴とするものである。

【０００８】

１．４＜ｆ／ｆ１＜４　　（１）

ただし、

ｆ：全系の焦点距離

ｆ１：第１レンズの焦点距離

とする。

【０００９】

本発明の撮像レンズによれば、全体として５枚というレンズ構成において、第１レンズから第５レンズの各レンズ要素の構成を最適化したので、全長を短縮化しながらも、高解像性能を有するレンズ系を実現することができる。

【００１０】

なお、本発明の撮像レンズにおいて、「実質的に５個のレンズからなり」とは、本発明の撮像レンズが、５個のレンズ以外に、実質的にパワーを有さないレンズ、絞りやカバーガラス等レンズ以外の光学要素、レンズフランジ、レンズバレル、撮像素子、手振れ補正機構等の機構部分、等を持つものも含むことを意味する。また、上記のレンズの面形状や屈折力の符号は、非球面が含まれているものについては近軸領域で考えるものとする。

【００１１】

本発明の撮像レンズにおいて、さらに、次の好ましい構成を採用して満足することで、光学性能をより良好なものとすることができる。

【００１２】

本発明の撮像レンズにおいて、第４レンズは正の屈折力を有することが好ましい。

【００１３】

本発明の撮像レンズにおいて、第２レンズの物体側の面より物体側に配置された開口絞りをさらに備えていることが好ましい。

【００１４】

本発明の撮像レンズは、以下の条件式（１－１）から（１０）のいずれかを満足することが好ましい。なお、好ましい態様としては、条件式（１）から（１０）のいずれか１つを満足するものでもよく、あるいは任意の組合せを満足するものでもよい。ただし、条件（７－１）については、第１レンズから第３レンズの合成屈折力が正である場合において、条件式（７－１）を満足することが好ましい。

【００１５】

１．５＜ｆ／ｆ１＜３．５　　（１－１）
－３＜ｆ／ｆ２＜－０．８５　　（２）
－２．５＜ｆ／ｆ２＜－０．９　　（２－１）
０．７８＜ｆ／ｆ１２＜２．５　　（３）
０．８＜ｆ／ｆ１２＜２　　（３－１）
－２＜ｆ／ｆ３４５＜０　　（４）
－１．５＜ｆ／ｆ３４５＜－０．０５　　（４－１）
－０．５＜ｆ１／ｆ３＜０．４　　（５）
－０．４＜ｆ１／ｆ３＜０．２　　（５－１）
－１＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１．２　　（６）
－０．６＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１　　（６－１）
－４＜ｆ／ｆ５＜－０．２　　（７）
－３＜ｆ／ｆ５＜－０．４　　（７－１）
０．５＜ｆ・ｔａｎω／Ｒ５ｒ＜１０　　（８）
０．７＜ｆ・ｔａｎω／Ｒ５ｒ＜３　　（８－１）
－０．９＜ｆ／ｆ３＜０．７　　（９）

０．０５＜Ｄ７／ｆ＜０．２　　（１０）
ただし、
ｆ：全系の焦点距離
ｆ１：第１レンズの焦点距離
ｆ２：第２レンズの焦点距離
ｆ３：第３レンズの焦点距離
ｆ５：第５レンズの焦点距離
ｆ１２：第１レンズと第２レンズとの合成焦点距離
ｆ３４５：第３レンズから第５レンズの合成焦点距離
Ｒ３ｆ：第３レンズの物体側の面の近軸曲率半径
Ｒ３ｒ：第３レンズの像側の面の近軸曲率半径
Ｒ５ｒ：第５レンズの像側の面の近軸曲率半径
Ｄ７：第３レンズと第４レンズとの間の光軸上の間隔
ω：半画角
本発明による撮像装置は、本発明の撮像レンズを備えたものである。
【００１６】
本発明による撮像装置では、本発明の撮像レンズによって得られた高解像の光学像に基づいて高解像の撮像信号を得ることができる。
【発明の効果】
【００１７】
本発明の撮像レンズによれば、全体として５枚というレンズ構成において、各レンズ要素の構成を最適化し、特に第１レンズおよび第５レンズの形状を好適に構成したので、全長を短縮化しつつ、中心画角から周辺画角まで高い結像性能を有するレンズ系を実現できる。
【００１８】
また、本発明の撮像装置によれば、本発明の高い結像性能を有する撮像レンズによって形成された光学像に応じた撮像信号を出力するようにしたので、高解像の撮影画像を得ることができる。
【図面の簡単な説明】
【００１９】
【図１】本発明の一実施形態に係る撮像レンズの第１の構成例を示すものであり、実施例１に対応するレンズ断面図である。
【図２】本発明の一実施形態に係る撮像レンズの第２の構成例を示すものであり、実施例２に対応するレンズ断面図である。
【図３】本発明の一実施形態に係る撮像レンズの第３の構成例を示すものであり、実施例３に対応するレンズ断面図である。
【図４】本発明の一実施形態に係る撮像レンズの第４の構成例を示すものであり、実施例４に対応するレンズ断面図である。
【図５】本発明の一実施形態に係る撮像レンズの第５の構成例を示すものであり、実施例５に対応するレンズ断面図である。
【図６】本発明の一実施形態に係る撮像レンズの第６の構成例を示すものであり、実施例６に対応するレンズ断面図である。
【図７】図１に示す撮像レンズの光線図である。
【図８】本発明の実施例１に係る撮像レンズの諸収差を示す収差図であり、（Ａ）は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図９】本発明の実施例２に係る撮像レンズの諸収差を示す収差図であり、（Ａ）は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図１０】本発明の実施例３に係る撮像レンズの諸収差を示す収差図であり、（Ａ）

は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図１１】本発明の実施例４に係る撮像レンズの諸収差を示す収差図であり、（Ａ）は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図１２】本発明の実施例５に係る撮像レンズの諸収差を示す収差図であり、（Ａ）は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図１３】本発明の実施例６に係る撮像レンズの諸収差を示す収差図であり、（Ａ）は球面収差、（Ｂ）は非点収差（像面湾曲）、（Ｃ）は歪曲収差、（Ｄ）は倍率色収差を示す。
【図１４】本発明に係る撮像レンズを備えた携帯電話端末である撮像装置を示す図。
【図１５】本発明に係る撮像レンズを備えたスマートフォンである撮像装置を示す図。

【発明を実施するための形態】

【００２０】

以下、本発明の実施形態について図面を参照して詳細に説明する。

【００２１】

図１は、本発明の第１の実施形態に係る撮像レンズの第１の構成例を示している。この構成例は、後述の第１の数値実施例（表１、表２）のレンズ構成に対応している。同様にして、後述の第２から第６の実施形態に係る数値実施例（表３～表１２）のレンズ構成に対応する第２から第６の構成例の断面構成を図２～図６に示す。図１～図６において、符号Ｒｉは、最も物体側のレンズ要素の面を１番目として、像側（結像側）に向かうに従い順次増加するようにして符号を付したｉ番目の面の曲率半径を示す。符号Ｄｉは、ｉ番目の面とｉ＋１番目の面との光軸Ｚ１上の面間隔を示す。なお、各構成例共に基本的な構成は同じであるため、以下では、図１に示した撮像レンズの構成例を基本にして説明し、必要に応じて図２～図６の構成例についても説明する。また、図７は図１に示す撮像レンズＬにおける光路図であり、無限遠の距離にある物点からの軸上光束２および最大画角の光束３の各光路を示す。

【００２２】

本発明の実施形態に係る撮像レンズＬは、ＣＣＤやＣＭＯＳ等の撮像素子を用いた各種撮像機器、特に比較的小型の携帯端末機器、例えばデジタルスチルカメラ、カメラ付き携帯電話機、スマートフォン、タブレット型端末およびＰＤＡ等に用いて好適なものである。この撮像レンズＬは、光軸Ｚ１に沿って、物体側から順に、第１レンズＬ１と、第２レンズＬ２と、第３レンズＬ３と、第４レンズＬ４と、第５レンズＬ５とを備えている。

【００２３】

図１４に、本発明の実施形態に係る撮像装置１である携帯電話端末の概観図を示す。本発明の実施形態に係る撮像装置１は、本実施形態に係る撮像レンズＬと、この撮像レンズＬによって形成された光学像に応じた撮像信号を出力するＣＣＤなどの撮像素子１００（図１参照）とを備えて構成される。撮像素子１００は、この撮像レンズＬの結像面（像面Ｒ１４）に配置される。

【００２４】

図１５に、本発明の実施形態に係る撮像装置５０１であるスマートフォンの概観図を示す。本発明の実施形態に係る撮像装置５０１は、本実施形態に係る撮像レンズＬと、この撮像レンズＬによって形成された光学像に応じた撮像信号を出力するＣＣＤなどの撮像素子１００（図１参照）とを有するカメラ部５４１を備えて構成される。撮像素子１００は、この撮像レンズＬの結像面（撮像面）に配置される。

【００２５】

第５レンズＬ５と撮像素子１００との間には、レンズを装着するカメラ側の構成に応じて、種々の光学部材ＣＧが配置されていてもよい。例えば撮像面保護用のカバーガラスや

赤外線カットフィルタなどの平板状の光学部材が配置されていてもよい。この場合、光学部材ＣＧとして例えば平板状のカバーガラスに、赤外線カットフィルタやＮＤフィルタ等のフィルタ効果のあるコートが施されたもの、あるいは同様の効果を有する材料を使用してもよい。

【００２６】

また、光学部材ＣＧを用いずに、第５レンズＬ５にコートを施す等して光学部材ＣＧと同等の効果を持たせるようにしてもよい。これにより、部品点数の削減と全長の短縮を図ることができる。

【００２７】

この撮像レンズＬはまた、第２レンズＬ２の物体側の面より物体側に配置された開口絞りＳｔを備えることが好ましい。このように、開口絞りＳｔを第２レンズＬ２の物体側の面よりも物体側に配置したことにより、特に結像領域の周辺部において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを抑制することができる。この効果をさらに高めるために、開口絞りＳｔを、第１レンズＬ１の物体側の面より物体側に配置することが好ましい。なお、「第２レンズの物体側の面より物体側に配置」とは、光軸方向における開口絞りの位置が、軸上マージナル光線と第２レンズＬ２の物体側の面との交点と同じ位置かそれより物体側にあることを意味する。同様に、「第１レンズの物体側の面より物体側に配置」とは、光軸方向における開口絞りの位置が、軸上マージナル光線と第１レンズＬ１の物体側の面との交点と同じ位置かそれより物体側にあることを意味する。

【００２８】

本実施形態において、第３および第６の構成例のレンズ（図３，６）が、開口絞りＳｔが第１レンズＬ１の物体側の面より物体側に配置された構成例であり、第１、第２、第４および第５の構成例のレンズが（図１，２，４，５）、開口絞りＳｔが第２レンズＬ２の物体側より物体側に配置された構成例である。なお、ここに示す開口絞りＳｔは必ずしも大きさや形状を表すものではなく、光軸Ｚ１上の位置を示すものである。

【００２９】

なお、開口絞りＳｔを第２レンズＬ２の物体側の面よりも物体側に配置した場合において、第１レンズＬ１の物体側の面より物体側に、フレア成分やゴースト成分を抑制するためのフレア絞りをさらに備えるものとしてもよい。本実施形態において、第１および第２の構成例のレンズ（図１，２）が、フレア絞りを備えた構成例である。なお、図１および図２において、フレア絞りに参照符号Ｓｔ１を、開口絞りに参照符号Ｓｔ２を付与している。この場合、開口絞りＳｔ２はＦｎｏ．を制限する絞りであり、フレア絞りＳｔ１は周辺画角の光束を制限する絞りとなる。

【００３０】

さらに、開口絞りＳｔを光軸方向において第１レンズＬ１の物体側の面よりも物体側に配置した場合において、開口絞りＳｔを第１レンズＬ１の面頂点よりも像側に配置することが好ましい。このように、開口絞りＳｔを第１レンズＬ１の面頂点よりも像側に配置した場合には、開口絞りＳｔを含めた撮像レンズの全長を短縮化することができる。また、本実施形態において、開口絞りＳｔは第１レンズＬ１の面頂点よりも像側に配置されているが、これに限定されず、開口絞りＳｔを第１レンズＬ１の面頂点よりも物体側に配置されていてもよい。開口絞りＳｔが第１レンズＬ１の面頂点よりも物体側に配置されている場合には、開口絞りＳｔが第１レンズＬ１の面頂点よりも像側に配置されている場合より周辺光量の確保の観点からはやや不利であるが、結像領域の周辺部において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのをさらに好適に抑制することができる。

【００３１】

また、図１，２，４，５に示す第１、第２、第４および第５の実施形態に係る撮像レンズのように、開口絞りＳｔ（Ｓｔ２）を光軸方向において第１レンズＬ１と第２レンズＬ２との間に配置してもよい。この場合には、像面湾曲を良好に補正することができる。な

お、開口絞りＳｔを光軸方向において第１レンズＬ１と第２レンズＬ２との間に配置した場合には、開口絞りＳｔを光軸方向において第１レンズＬ１の物体側の面より物体側に配置した場合よりもテレセントリック性を確保する、すなわち、主光線を光軸にできるだけ平行な状態にする（撮像面における入射角度がゼロに近くなるようにする）ためには不利であるものの、撮像素子技術の発展に伴い近年実現された、入射角度の増大に起因する受光効率の低下や混色の発生が従来よりも低減された撮像素子を適用することにより、好適な光学性能を実現することができる。

【００３２】

この撮像レンズＬにおいて、第１レンズＬ１は、光軸近傍において正の屈折力を有し、光軸近傍において物体側に凸面を向けたメニスカス形状である。各実施形態にも示されるように、最も物体側のレンズである第１レンズＬ１を、正の屈折力を有し、光軸近傍で物体側に凸面を向けたメニスカス形状とすることにより、第１レンズＬ１の後側主点位置を物体側に寄せやすくなり、全長を好適に短縮化できる。

【００３３】

第２レンズＬ２は、光軸近傍において両凹形状である。このことにより、色収差を良好に補正しつつ、高次の球面収差の発生を好適に抑制することができ、かつ好適に全長の短縮化を実現することができる。

【００３４】

第３レンズＬ３は、光軸近傍において物体側に凸面を向けたメニスカス形状である。このことにより、第３レンズＬ３の後側主点位置をより好適に物体側に寄せることができるため、好適に全長の短縮化を実現することができる。第３レンズＬ３は、光軸近傍において物体側に凸面を向けたメニスカス形状とされているものであれば、光軸近傍において正の屈折力を有するように構成することができ、光軸近傍において負の屈折力を有するように構成することもできる。図１～図３に示す第１から第３の実施形態に係る撮像レンズのように、第３レンズＬ３を光軸近傍において正の屈折力を有するように構成した場合には、より好適に全長の短縮化を実現することができる。また、図４～図６にそれぞれ示す第４から第６の実施形態に係る撮像レンズのように、第３レンズＬ３を光軸近傍において負の屈折力を有するように構成した場合には、色収差をより良好に補正することができる。

【００３５】

第４レンズＬ４は、光軸近傍において像側に凸面を向けたメニスカス形状である。このことにより、非点収差を好適に補正することができる。第４レンズＬ４は、光軸近傍において正の屈折力を有することが好ましい。このことにより、特に中間画角において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを好適に抑制することができ、かつ全長を好適に短縮化しつつ、倍率色収差を良好に補正できる。

【００３６】

第５レンズＬ５は、光軸近傍において負の屈折力を有する。撮像レンズの最も像側に光軸近傍において負の屈折力を有するレンズを配置することで、より好適に撮像レンズを全体としてテレフォト型の構成とすることができ、全長を好適に短縮化することができる。また、第５レンズＬ５が光軸近傍で負の屈折力を有することにより、像面湾曲を好適に補正することができる。また、第５レンズＬ５は光軸近傍において像側に凹面を向けている場合には、より好適に全長の短縮化を実現しつつ、像面湾曲を良好に補正することができる。この効果をさらに高めるために、第１、第２および第６の実施形態に示すように、第５レンズＬ５を光軸近傍において像側に凹面を向けたメニスカス形状とすることが好ましい。

【００３７】

また、第５レンズＬ５は、像側の面の有効径内に少なくとも１つの変曲点を有する。第５レンズＬ５の像側の面における「変曲点」とは、第５レンズＬ５の像側の面形状が像側に対して凸形状から凹形状（または凹形状から凸形状）に切り替わる点を意味する。変曲点の位置は、第５レンズＬ５の像側の面の有効径内であれば光軸から半径方向外側の任意の位置に配置することができる。各実施形態に示すように、第５レンズＬ５の像側の面を

少なくとも１つの変曲点を有する形状とすることにより、特に結像領域の周辺部において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを抑制することができる。

【００３８】

上記撮像レンズＬによれば、全体として５枚というレンズ構成において、第１から第５レンズＬ１～Ｌ５の各レンズ要素の構成を最適化したので、全長を短縮化しつつ、高解像性能を有するレンズ系を実現できる。

【００３９】

この撮像レンズＬは、高性能化のために、第１レンズＬ１から第５レンズＬ５のそれぞれのレンズの少なくとも一方の面に、非球面を用いることが好適である。

【００４０】

また、撮像レンズＬを構成する各レンズＬ１～Ｌ５は接合レンズでなく単レンズとすることが好ましい。各レンズＬ１～Ｌ５のいずれかを接合レンズとした場合よりも、非球面数が多いため、各レンズの設計自由度が高くなり、好適に全長の短縮化を図ることができるからである。

【００４１】

次に、以上のように構成された撮像レンズＬの条件式に関する作用および効果をより詳細に説明する。

【００４２】

まず、第１レンズＬ１の焦点距離ｆ１および全系の焦点距離ｆは、以下の条件式（１）を満足することが好ましい。

【００４３】

１．４＜ｆ／ｆ１＜４　　（１）

条件式（１）は、第１レンズＬ１の焦点距離ｆ１に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。条件式（１）の下限以下とならないように、第１レンズＬ１の屈折力を確保することにより、全系の屈折力に対して第１レンズＬ１の正の屈折力が弱くなりすぎず、好適に全長を短縮化することできる。条件式（１）の上限以上とならないように、第１レンズＬ１の屈折力を維持することにより、全系の屈折力に対して第１レンズＬ１の正の屈折力が強くなりすぎず、特に球面収差が良好に補正できる。この効果をより高めるために、条件式（１－１）を満足することがより好ましく、条件式（１－２）を満足することがさらに好ましい。

【００４４】

１．５＜ｆ／ｆ１＜３．５　　（１－１）

１．６＜ｆ／ｆ１＜３　　（１－２）

また、第２レンズＬ２の焦点距離ｆ２および全系の焦点距離ｆは、以下の条件式（２）を満足することが好ましい。

【００４５】

－３＜ｆ／ｆ２＜－０．８５　　（２）

条件式（２）は、第２レンズＬ２の焦点距離ｆ２に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。条件式（２）の下限以下とならないように、第２レンズＬ２の屈折力を維持することにより、全系の屈折力に対して第２レンズＬ２の屈折力が強くなりすぎず、好適に全長を短縮化することできる。条件式（２）の上限以上とならないように、第２レンズＬ２の屈折力を確保することにより、全系の屈折力に対して第２レンズＬ２の屈折力が弱くなりすぎず、特に軸上色収差を良好に補正することができる。この効果をより高めるために、条件式（２－１）を満足することがより好ましく、条件式（２－２）を満足することがさらに好ましい。

【００４６】

－２．５＜ｆ／ｆ２＜－０．９　　（２－１）

－２＜ｆ／ｆ２＜－０．９５　　（２－２）

また、第１レンズＬ１と第２レンズＬ２との合成焦点距離ｆ１２および全系の焦点距離

ｆは、以下の条件式（３）を満足することが好ましい。
【００４７】
０．７８＜ｆ／ｆ１２＜２．５　　（３）
条件式（３）は、第１レンズＬ１と第２レンズＬ２との合成焦点距離ｆ１２に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。条件式（３）の下限以下とならないように、第１レンズＬ１と第２レンズＬ２との合成屈折力を確保することにより、全系の屈折力に対して第１レンズＬ１と第２レンズＬ２との合成屈折力が弱くなりすぎず、好適に全長を短縮化することできる。条件式（３）の上限以上とならないように、第１レンズＬ１と第２レンズＬ２との合成屈折力を維持することにより、全系の屈折力に対して第１レンズＬ１と第２レンズＬ２との合成屈折力が強くなりすぎず、特に球面収差および軸上色収差を良好に補正することができる。この効果をより高めるために、条件式（３－１）を満足することがより好ましく、条件式（３－２）を満足することがさらに好ましい。
【００４８】
０．８＜ｆ／ｆ１２＜２　　（３－１）
０．９＜ｆ／ｆ１２＜１．８　　（３－２）
また、第３レンズＬ３から第５レンズＬ５の合成焦点距離ｆ３４５および全系の焦点距離ｆは、以下の条件式（４）を満足することが好ましい。
【００４９】
－２＜ｆ／ｆ３４５＜０　　（４）
条件式（４）は、第３レンズＬ３から第５レンズＬ５の合成焦点距離ｆ３４５に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。条件式（４）の下限以下とならないように、第３レンズＬ３から第５レンズＬ５の合成屈折力を維持することにより、全系の屈折力に対して第３レンズＬ３から第５レンズＬ５の合成屈折力が強くなりすぎず、特に中間画角において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを抑制することができる。条件式（４）の上限以上とならないように、第３レンズＬ３から第５レンズＬ５の合成屈折力を確保することにより、全系の屈折力に対して第３レンズＬ３から第５レンズＬ５の合成屈折力が弱くなりすぎず、好適に全長を短縮化することできる。この効果をより高めるために、条件式（４－１）を満足することがより好ましく、条件式（４－２）を満足することがさらに好ましい。
【００５０】
－１．５＜ｆ／ｆ３４５＜－０．０５　　（４－１）
－１．２＜ｆ／ｆ３４５＜－０．０５　　（４－２）
また、第１レンズＬ１の焦点距離ｆ１および第３レンズの焦点距離ｆ３は、以下の条件式（１）を満足することが好ましい。
【００５１】
－０．５＜ｆ１／ｆ３＜０．４　　（５）
条件式（５）は、第３レンズＬ３の焦点距離ｆ３に対する第１レンズの焦点距離ｆ１の比の好ましい数値範囲を規定するものである。第３レンズＬ３を負の屈折力を有するようにした場合に、条件式（５）の下限以下とならないように、第１レンズＬ１の屈折力に対して第３レンズＬ３の屈折力を確保することで、第３レンズＬ３の負の屈折力が第１レンズＬ１の屈折力に対して強くなりすぎず、好適に全長の短縮化を実現できる。第３レンズＬ３を正の屈折力を有するようにした場合に、条件式（５）の上限以上とならないように、第１レンズＬ１の屈折力に対して第３レンズＬ３の屈折力を確保することで、第３レンズＬ３の正の屈折力が第１レンズＬ１の屈折力に対して強くなりすぎず、球面収差を良好に補正することができる。この効果をより高めるために、条件式（５－１）を満足することがより好ましい。
【００５２】
－０．４＜ｆ１／ｆ３＜０．２　　（５－１）
第３レンズＬ３の物体側の面の近軸曲率半径Ｒ３ｆおよび第３レンズＬ３の像側の面の

近軸曲率半径Ｒ３ｒは、以下の条件式（３）を満足することが好ましい。
【００５３】
－１＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１．２　　（６）
条件式（６）は、第３レンズＬ３の物体側の面の近軸曲率半径Ｒ３ｆおよび第３レンズＬ３の像側の面の近軸曲率半径Ｒ３ｒの好ましい数値範囲を規定するものである。条件式（６）の下限以下とならないように、第３レンズＬ３の物体側の面の近軸曲率半径Ｒ３ｆおよび第３レンズＬ３の像側の面の近軸曲率半径Ｒ３ｒを設定することにより、好適に全長を短縮化することできる。条件式（６）の上限以上とならないように、第３レンズＬ３の物体側の面の近軸曲率半径Ｒ３ｆおよび第３レンズＬ３の像側の面の近軸曲率半径Ｒ３ｒを設定することにより、球面収差を良好に補正することができる。この効果をより高めるために、条件式（６－１）を満足することがより好ましい。
【００５４】
－０．６＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１　　（６－１）
また、第５レンズＬ５の焦点距離ｆ５および全系の焦点距離ｆは、以下の条件式（７）を満足することが好ましい。
【００５５】
－４＜ｆ／ｆ５＜－０．２　　（７）
条件式（７）は、第５レンズＬ５の焦点距離ｆ５に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。条件式（７）の下限以下とならないように、第５レンズＬ５の屈折力を維持することにより、全系の正の屈折力に対して第５レンズＬ５の屈折力が強くなりすぎず、特に中間画角において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを抑制することができる。条件式（７）の上限以上とならないように、第５レンズＬ５の屈折力を確保することにより、全系の屈折力に対して第５レンズＬ５の屈折力が弱くなりすぎず、像面湾曲を良好に補正しつつ、好適に全長の短縮化を実現することができる。この効果をより高めるために、第１レンズＬ１から第３レンズＬ３の合成屈折力が正である場合において、条件式（７－１）を満足することがより好ましい。
【００５６】
－３＜ｆ／ｆ５＜－０．４　　（７－１）
また、全系の焦点距離ｆ、半画角ω、第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒは、以下の条件式（８）を満足することが好ましい。
【００５７】
０．５＜ｆ・ｔａｎω／Ｒ５ｒ＜１０　　（８）
条件式（８）は、第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒに対する近軸像高（ｆ・ｔａｎω）の比の好ましい数値範囲を規定するものである。条件式（８）の下限以下とならないように、第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒに対する近軸像高（ｆ・ｔａｎω）を設定することで、近軸像高（ｆ・ｔａｎω）に対して撮像レンズの最も像側の面である第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒの絶対値が大きくなりすぎず、全長の短縮化を実現しつつ、像面湾曲を十分に補正することができる。また、条件式（８）の上限以上とならないように、第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒに対する近軸像高（ｆ・ｔａｎω）を設定することで、近軸像高（ｆ・ｔａｎω）に対して撮像レンズの最も像側の面である第５レンズＬ５の像側の面の近軸曲率半径Ｒ５ｒの絶対値が小さくなりすぎず、特に中間画角において、光学系を通過する光線の結像面（撮像素子）への入射角が大きくなるのを抑制することができる。この効果をより高めるために、条件式（８－１）を満足することが好ましい。
【００５８】
０．７＜ｆ・ｔａｎω／Ｒ５ｒ＜３　　（８－１）
また、第３レンズＬ３の焦点距離ｆ３および全系の焦点距離ｆは、以下の条件式（９）を満足することが好ましい。
【００５９】

－０．９＜ｆ／ｆ３＜０．７　　（９）

条件式（９）は、第３レンズＬ３の焦点距離ｆ３に対する全系の焦点距離ｆの比の好ましい数値範囲を規定するものである。第３レンズＬ３を負の屈折力を有するものとした場合に、条件式（９）の下限以下とならないように、第３レンズＬ３の屈折力を維持することにより、全系の屈折力に対して第３レンズＬ３の負の屈折力が強くなりすぎず、好適に全長を短縮化することができる。第３レンズＬ３を正の屈折力を有するものとした場合に、条件式（９）の上限以上とならないように、第３レンズＬ３の屈折力を確保することにより、全系の屈折力に対して第３レンズＬ３の正の屈折力が強くなりすぎず、球面収差を良好に補正することができる。この効果をより高めるために、条件式（９－１）を満足することがより好ましい。

【００６０】

－０．４＜ｆ／ｆ３＜０．５　　（９－１）

また、第３レンズＬ３と第４レンズＬ４との光軸上の間隔Ｄ７と全系の焦点距離ｆは、以下の条件式（１０）を満足することが好ましい。

【００６１】

０．０５＜Ｄ７／ｆ＜０．２　　（１０）

条件式（１０）は、全系の焦点距離ｆに対する第３レンズＬ３と第４レンズＬ４との光軸上の間隔Ｄ７の比の好ましい数値範囲を規定するものである。条件式（１０）の下限以下とならないように、全系の焦点距離ｆに対して第３レンズＬ３と第４レンズＬ４との光軸上の間隔Ｄ７を確保することにより、全長を短縮化した場合に発生しやすい歪曲収差を好適に抑制することができる。条件式（１０）の上限以上とならないように、全系の焦点距離ｆに対して第３レンズＬ３と第４レンズＬ４との光軸上の間隔Ｄ７を維持することにより、非点収差を良好に補正することができる。この効果をより高めるために、条件式（１０－１）を満足することが好ましい。

【００６２】

０．０７＜Ｄ７／ｆ＜０．１７　　（１０－１）

次に、図２～図６を参照しながら、本発明の第２から第６の実施形態に係る撮像レンズについて詳細に説明する。図１～図６に示す第１から第６の実施形態に係る撮像レンズは、第１レンズＬ１から第５レンズＬ５のすべての面が非球面形状とされている。また、本発明の第２から第６の実施形態に係る撮像レンズは、第１の実施形態と同様に、物体側から順に、正の屈折力を有し、物体側に凸面を向けたメニスカス形状である第１レンズＬ１と、両凹形状である第２レンズＬ２と、物体側に凸面を向けたメニスカス形状である第３レンズＬ３と、像側に凸面を向けたメニスカス形状である第４レンズＬ４と、負の屈折力を有し、像側の面に少なくとも１つの変曲点を有する第５レンズＬ５とから構成される実質的に５個のレンズから構成される。このため、以下の第２から第６の実施形態においては、各レンズ群を構成する各レンズの他の詳細な構成についてのみ説明する。また、第１から第６の実施形態の間で互いに共通する構成の作用効果はそれぞれ同じ作用効果を有するため、実施形態の順番が早いものについて構成およびその作用効果を説明し、その他の実施形態の共通する構成およびその作用効果の重複説明を省略する。

【００６３】

図２に示す第２の実施形態に係る撮像レンズＬは、第１の実施形態と第１レンズＬ１から第５レンズＬ５のレンズの構成を共通としており、これらのレンズの各構成によれば第１の実施形態のそれぞれ対応する構成と同じ作用効果が得られる。

【００６４】

また、図３に示す第３の実施形態のように、第５レンズＬ５が両凹形状を有するように構成し、第５レンズＬ５が両凹形状を有することを除いて、第１の実施形態と第１レンズＬ１から第５レンズＬ５の構成を共通としてもよい。第５レンズを両凹形状とすることで、強い負の屈折力を与えることが可能となり、全長を好適に短縮化できる。また、第３の実施形態において、第１の実施形態と共通する第１レンズＬ１から第５レンズＬ５の各構成によって第１の実施形態のそれぞれ対応する構成と同じ作用効果が得られる。

【００６５】
また、図４に示す第４の実施形態のように、第３レンズＬ３を光軸近傍で負の屈折力を有するように構成し、第３レンズＬ３が光軸近傍で負の屈折力を有することを除いて、第３の実施形態と第１レンズＬ１から第５レンズＬ５の構成を共通としてもよい。第３レンズＬ３を光軸近傍で負の屈折力を有するものとすることにより、色収差を良好に補正することができる。また、第４の実施形態において、第３の実施形態と共通する第１レンズＬ１から第５レンズＬ５の各構成によって第３の実施形態のそれぞれ対応する構成と同じ作用効果が得られる。
【００６６】
図５に示す第５の実施形態に係る撮像レンズＬは、第４の実施形態と第１レンズＬ１から第５レンズＬ５のレンズの構成を共通としており、これらのレンズの各構成によれば第４の実施形態のそれぞれ対応する構成と同じ作用効果が得られる。
【００６７】
また、図６に示す第６の実施形態のように、第５レンズＬ５を像側に凹面を向けたメニスカス形状を有するように構成し、第５レンズＬ５が像側に凹面を向けたメニスカス形状を有することを除いて、第４の実施形態と第１レンズＬ１から第５レンズＬ５の構成を共通としてもよい。第５レンズＬ５を像側に凹面を向けたメニスカス形状を有するものとすることにより、全長を好適に短縮化できる。また、第６の実施形態において、第４の実施形態と共通する第１レンズＬ１から第５レンズＬ５の各構成によって第４の実施形態のそれぞれ対応する構成と同じ作用効果が得られる。
【００６８】
以上説明したように、本発明の実施形態に係る撮像レンズによれば、全体として５枚というレンズ構成において、各レンズ要素の構成を最適化したので、全長を短縮化しつつ、高解像性能を有するレンズ系を実現できる。
【００６９】
また、適宜好ましい条件を満足することで、より高い結像性能を実現できる。また、本実施形態に係る撮像装置によれば、本実施形態に係る高性能の撮像レンズによって形成された光学像に応じた撮像信号を出力するようにしたので、中心画角から周辺画角まで高解像の撮影画像を得ることができる。
【００７０】
次に、本発明の実施形態に係る撮像レンズの具体的な数値実施例について説明する。以下では、複数の数値実施例をまとめて説明する。
【００７１】
後掲の表１および表２は、図１に示した撮像レンズの構成に対応する具体的なレンズデータを示している。特に表１にはその基本的なレンズデータを示し、表２には非球面に関するデータを示す。表１に示したレンズデータにおける面番号Ｓｉの欄には、実施例１に係る撮像レンズについて、最も物体側のレンズ要素の面を１番目（開口絞りＳｔを１番目）として、像側に向かうに従い順次増加するようにして符号を付したｉ番目の面の番号を示している。曲率半径Ｒｉの欄には、図１において付した符号Ｒｉに対応させて、物体側からｉ番目の面の曲率半径の値（ｍｍ）を示す。面間隔Ｄｉの欄についても、同様に物体側からｉ番目の面Ｓｉとｉ＋１番目の面Ｓｉ＋１との光軸上の間隔（ｍｍ）を示す。Ｎｄｊの欄には、物体側からｊ番目の光学要素のｄ線（５８７．５６ｎｍ）に対する屈折率の値を示す。νｄｊの欄には、物体側からｊ番目の光学要素のｄ線に対するアッベ数の値を示す。なお、各レンズデータには、諸データとして、全系の焦点距離ｆ（ｍｍ）とバックフォーカスＢｆ（ｍｍ）とレンズ全長ＴＬ（ｍｍ）の値をそれぞれ示す。なお、このバックフォーカスＢｆは空気換算した値を表しており、レンズ全長ＴＬにおいてバックフォーカス分は同様に空気換算した値を用いている。
【００７２】
この実施例１に係る撮像レンズは、第１レンズＬ１から第５レンズＬ５の両面がすべて非球面形状となっている。表１の基本レンズデータには、これらの非球面の曲率半径とし

て、光軸近傍の曲率半径（近軸曲率半径）の数値を示している。

【００７３】

表２には実施例１の撮像レンズにおける非球面データを示す。非球面データとして示した数値において、記号“Ｅ”は、その次に続く数値が１０を底とした“べき指数”であることを示し、その１０を底とした指数関数で表される数値が“Ｅ”の前の数値に乗算されることを示す。例えば、「１．０Ｅ－０２」であれば、「１．０×１０$^{-2}$」であることを示す。

【００７４】

非球面データとしては、以下の式（Ａ）によって表される非球面形状の式における各係数Ａｉ，ＫＡの値を記す。Ｚは、より詳しくは、光軸から高さｈの位置にある非球面上の点から、非球面の頂点の接平面（光軸に垂直な平面）に下ろした垂線の長さ（ｍｍ）を示す。

【００７５】

$$Z=C\cdot h^2/\{1+(1-KA\cdot C^2\cdot h^2)^{1/2}\}+\Sigma Ai\cdot h^i \quad \cdots\cdots (A)$$

ただし、

Ｚ：非球面の深さ（ｍｍ）

ｈ：光軸からレンズ面までの距離（高さ）（ｍｍ）

Ｃ：近軸曲率＝１／Ｒ

（Ｒ：近軸曲率半径）

Ａｉ：第ｉ次（ｉは３以上の整数）の非球面係数

ＫＡ：非球面係数

とする。

【００７６】

以上の実施例１の撮像レンズと同様にして、図２～図６に示した撮像レンズの構成に対応する具体的なレンズデータを実施例２から実施例６として、表３～表１２に示す。これらの実施例１～６に係る撮像レンズでは、第１レンズＬ１から第５レンズＬ５の両面がすべて非球面形状となっている。

【００７７】

なお、実施例1においては、第１レンズＬ１の面頂点から像側へ０．１０１ｍｍの位置に直径が１．６７５ｍｍの、実施例２においては０．１０１ｍｍの位置に直径が１．６７０ｍｍのフレア絞りが配置されているが、表１，３においては省略している。図８（Ａ）～（Ｄ）はそれぞれ、実施例１の撮像レンズにおける球面収差、非点収差、ディストーション（歪曲収差）、倍率色収差（倍率の色収差）図を示している。球面収差、非点収差（像面湾曲）、ディストーション（歪曲収差）を表す各収差図には、ｄ線（波長５８７．５６ｎｍ）を基準波長とした収差を示す。球面収差図、倍率色収差図には、ｇ線(波長４３５．８３ｎｍ)、Ｆ線(波長４８６．１ｎｍ)、およびＣ線（波長６５６．２７ｎｍ）についての収差も示す。非点収差図において、実線はサジタル方向（Ｓ）、破線はタンジェンシャル方向（Ｔ）の収差を示す。また、Ｆｎｏ．はＦナンバーを、ωは半画角をそれぞれ示す。

【００７８】

同様に、実施例２から実施例６の撮像レンズについての諸収差を図９（Ａ）～（Ｄ）から図１３（Ａ）～（Ｄ）に示す。

【００７９】

また、表１３には、本発明に係る各条件式（１）～（１０）に関する値を、各実施例１～６についてそれぞれまとめたものを示す。

【００８０】

以上の各数値データおよび各収差図から分かるように、各実施例について、全長を短縮化しながらも高い結像性能が実現されている。

【００８１】

なお、本発明の撮像レンズには、実施形態および各実施例に限定されず種々の変形実施

が可能である。例えば、各レンズ成分の曲率半径、面間隔、屈折率、アッベ数、非球面係数の値などは、各数値実施例で示した値に限定されず、他の値をとり得る。

【００８２】

また、各実施例では、すべて固定焦点で使用する前提での記載とされているが、フォーカス調整可能な構成とすることも可能である。例えばレンズ系全体を繰り出したり、一部のレンズを光軸上で動かしてオートフォーカス可能な構成とすることも可能である。

【表１】

実施例1

f=4.126, Bf=1.111、TL=4.137

Si	Ri	Di	ndj	νdj
*1	1.23831	0.557	1.54488	54.87
*2	93.70148	0.015		
3(開口絞り)	∞	0.085		
*4	−12.66265	0.334	1.63351	23.63
*5	2.60879	0.243		
*6	3.15915	0.253	1.63351	23.63
*7	4.55163	0.506		
*8	−3.56285	0.379	1.63351	23.63
*9	−3.58353	0.258		
*10	1.98236	0.396	1.54488	54.87
*11	1.23910	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.413		
14	∞			

*:非球面

【表２】

実施例1・非球面データ				
面番号	KA	A4	A6	A8
1	9.7589122E-01	-2.6729118E-02	4.7204449E-02	-2.6218167E-01
2	1.0000090E+00	-7.9154953E-02	8.3384460E-02	-6.1197888E-03
3	-1.6800000E+00	-3.8300234E-02	3.7458150E-01	-2.7551593E-01
4	3.1182039E+00	-7.3707562E-02	1.2126243E+00	-4.9458531E+00
5	6.9999076E-01	-2.6329653E-01	2.4873169E-01	6.8422800E-02
6	1.0000249E+00	-1.9056021E-01	1.2088188E-01	7.8189995E-02
7	-2.1000000E+01	-7.2840681E-02	-3.3284653E-01	5.2042516E-01
8	-2.8556198E+00	-1.2163394E-01	1.7522262E-02	-1.0676210E-02
9	-1.4000005E+01	-4.3055564E-01	2.7976405E-01	-9.4994461E-02
10	-5.9077860E+00	-2.7520458E-01	2.0923136E-01	-1.1952221E-01
	A10	A12	A14	A16
1	4.0997871E-01	-4.5226437E-01	1.0665075E-01	-8.1871346E-02
2	-2.0357974E-01	-9.6694982E-01	2.1915571E+00	-1.2401354E+00
3	-3.8447870E-01	-3.1121039E-01	2.3020800E+00	-1.6056084E+00
4	1.7803254E+01	-3.9765240E+01	4.8323265E+01	-2.3566996E+01
5	4.9267886E-01	-2.4199414E+00	3.4571789E+00	-1.8021267E+00
6	1.4186946E-01	-2.2779898E-01	-1.5644448E-02	4.4672840E-02
7	-4.7544883E-01	2.5326186E-01	-1.5953212E-02	-2.5450777E-02
8	3.2819033E-02	-8.8256572E-03	-7.6808797E-03	3.0337699E-03
9	1.2737276E-02	1.7450700E-03	-6.1232629E-04	3.3350877E-05
10	4.5143417E-02	-1.0711328E-02	1.3898779E-03	-7.1397774E-05

【表３】

実施例2

f=4.119, Bf=1.069, TL=4.120

Si	Ri	Di	ndj	νdj
*1	1.23597	0.557	1.54488	54.87
*2	15.97054	0.020		
3(開口絞り)	∞	0.081		
*4	-19.29047	0.334	1.63351	23.63
*5	3.10552	0.243		
*6	2.53139	0.265	1.54488	54.87
*7	2.70709	0.506		
*8	-3.97938	0.417	1.63351	23.63
*9	-2.24497	0.258		
*10	5.09366	0.370	1.63351	23.63
*11	1.57691	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.372		
14	∞			

*:非球面

【表４】

実施例2・非球面データ				
面番号	KA	A4	A6	A8
1	-6.9000900E-01	7.8401227E-02	4.8724169E-02	-3.1032450E-01
2	1.0000000E+00	-1.4179856E-01	1.2622836E-01	-3.1360196E-02
3	1.0000000E+01	-7.7610199E-02	4.1593603E-01	-1.7738968E-01
4	3.1182039E+00	-3.5937525E-02	9.8686897E-01	-3.2805080E+00
5	3.1872442E-01	-2.7915128E-01	2.8423559E-01	-2.1820589E-01
6	-5.0999884E-01	-1.9620120E-01	1.1264694E-01	-3.2207096E-01
7	-8.8745315E-01	-7.2840681E-02	-6.8446726E-01	2.6980741E+00
8	-2.3946942E+00	-2.3349899E-01	8.5626683E-02	-8.4780380E-02
9	-1.0079967E+01	-7.6948035E-01	7.1798466E-01	-2.9903150E-01
10	-1.3546000E+01	-3.4848072E-01	2.9750460E-01	-1.5469280E-01
	A10	A12	A14	A16
1	7.3975458E-01	-1.2853745E+00	1.0201759E+00	-4.1573183E-01
2	-3.1147565E-01	-2.5924164E-01	1.1354658E+00	-7.4361120E-01
3	-7.7126641E-01	9.2770917E-01	5.6561007E-01	-8.0673585E-01
4	1.1724933E+01	-2.7522413E+01	3.6438963E+01	-1.9556633E+01
5	6.4639121E-01	-1.6044352E+00	2.2177373E+00	-1.1204967E+00
6	8.7809423E-01	-1.2333009E+00	8.1561032E-01	-1.8182400E-01
7	-8.5699151E+00	1.3930093E+01	-1.1707336E+01	3.6414691E+00
8	1.8481830E-02	-7.3019643E-02	6.5021917E-02	-6.0493130E-03
9	5.3075607E-02	1.4586291E-03	-1.9559157E-03	2.1244648E-04
10	5.0295407E-02	-9.7601077E-03	1.0070371E-03	-4.1856063E-05

【表５】

実施例3

f=4.117, Bf=1.123, TL=4.117

Si	Ri	Di	ndj	νdj
1(開口絞り)	∞	-0.252		
*2	1.21258	0.482	1.54488	54.87
*3	11.57312	0.141		
*4	-7.67379	0.202	1.63351	23.63
*5	3.45544	0.338		
*6	5.09875	0.287	1.63351	23.63
*7	14.62892	0.582		
*8	-2.51969	0.364	1.54488	54.87
*9	-1.10708	0.345		
*10	-2.07885	0.253	1.54488	54.87
*11	2.90776	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.425		
14	∞			

*:非球面

【表６】

実施例3・非球面データ				
面番号	KA	A4	A6	A8
1	-5.9868050E+00	4.8641128E-01	-7.9546902E-01	2.1017252E+00
2	1.9240955E+00	-5.3853512E-02	2.1154063E-01	-4.4017448E-01
3	1.0921760E+01	-9.5725484E-02	7.5943447E-01	-1.9145869E+00
4	4.2702877E+00	-7.3659102E-02	7.7800384E-01	-1.3378460E+00
5	-3.0446805E-01	-2.3909795E-01	3.8056203E-02	-5.1291279E-02
6	-4.1652815E+00	-2.0189182E-01	1.5477070E-01	-8.7156700E-01
7	1.5660356E-01	5.7683409E-02	-3.0103142E-01	4.8387321E-01
8	-2.5416033E+00	1.0901372E-01	-2.8841662E-01	4.5116212E-01
9	-2.8886199E+01	-2.1705115E-01	1.5308753E-01	-3.9562058E-02
10	-9.1851222E+00	-2.2493967E-01	1.6877855E-01	-9.7203848E-02
	A10	A12	A14	A16
1	-4.6930095E+00	7.3788098E+00	-6.6387072E+00	2.5968201E+00
2	7.2411728E-01	-5.0309707E-01	-2.0972869E-01	4.1332784E-01
3	3.6385814E+00	-4.9896476E+00	4.2590990E+00	-1.6942132E+00
4	4.0930579E-01	5.4769361E+00	-1.1317295E+01	7.5185167E+00
5	5.3246530E-01	-1.2087019E+00	2.1064446E+00	-1.3514237E+00
6	2.7793661E+00	-4.6106123E+00	4.3246333E+00	-1.6422211E+00
7	-5.4851430E-01	3.6013932E-01	-9.6281745E-02	3.4936818E-03
8	-3.2780850E-01	1.2031213E-01	-2.1115167E-02	1.2566134E-03
9	-6.4447571E-05	2.4915794E-03	-5.5626637E-04	4.0995922E-05
10	3.7535798E-02	-9.2150833E-03	1.2851713E-03	-7.5129992E-05

【表７】

実施例4

f=4.555, Bf=1.538, TL=4.260

Si	Ri	Di	ndj	νdj
*1	0.99476	0.506	1.54488	54.87
*2	253.01381	0.046		
3(開口絞り)	∞	0.056		
*4	-22.24707	0.152	1.63351	23.63
*5	1.69768	0.243		
*6	253.00000	0.253	1.63351	23.63
*7	39.05374	0.506		
*8	-1.90297	0.354	1.63351	23.63
*9	-1.16022	0.151		
*10	-3.16206	0.455	1.54488	54.87
*11	3.61431	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.840		
14	∞			

*:非球面

【表８】

実施例4・非球面データ				
面番号	KA	A4	A6	A8
1	1.1921937E+00	-2.8552244E-02	1.9464672E-02	-1.7622814E-01
2	-7.2205120E+00	1.0009125E-01	5.6965587E-02	-1.2128920E-04
3	-1.6800098E+00	4.3862266E-01	-2.5955621E-01	-3.0871421E-01
4	3.1182039E+00	4.9953409E-01	7.4979015E-01	-4.0780165E+00
5	-1.6495744E+01	-7.5670799E-04	4.6703185E-01	6.5512652E-03
6	9.9999036E-01	2.7502524E-02	2.3242844E-01	-7.5662102E-02
7	-6.1085232E+00	-7.2840681E-02	-6.1939901E-02	4.0213149E-01
8	-1.9317843E+00	2.9226488E-03	1.6279485E-02	-1.1936707E-02
9	-1.4000001E+01	-1.4394163E-01	1.2958519E-01	-6.9903475E-02
10	-1.3546000E+01	-2.3244698E-01	1.8331804E-01	-1.1223612E-01
	A10	A12	A14	A16
1	4.3011057E-01	-4.4272734E-01	9.7079058E-02	-6.1193103E-02
2	-1.7377307E-01	-9.7305688E-01	2.2005578E+00	-1.2311427E+00
3	-4.2662287E-01	-2.3413149E-01	2.5428004E+00	-1.9963875E+00
4	1.8205811E+01	-3.8842459E+01	6.3021364E+01	-5.0226037E+01
5	8.6310550E-01	-8.0002749E-01	3.6125413E+00	-1.5876512E+01
6	5.4526971E-02	-6.2891755E-02	2.2916270E-01	-1.9122565E-01
7	-4.7056467E-01	2.4130912E-01	-2.7435913E-02	-2.7992163E-02
8	2.7648276E-02	-8.7177546E-03	-7.5782951E-03	1.4110223E-03
9	1.3115167E-02	1.8723448E-03	-5.6945481E-04	-2.7551420E-06
10	4.4224273E-02	-1.0817291E-02	1.3978168E-03	-7.0081151E-05

【表９】

実施例5

f=5.956, Bf=2.438, TL=5.171

Si	Ri	Di	ndj	νdj
*1	1.12444	0.546	1.54488	54.87
*2	252.97534	0.030		
3(開口絞り)	∞	0.069		
*4	-18.78836	0.227	1.63351	23.63
*5	2.25616	0.243		
*6	506.45581	0.253	1.63351	23.63
*7	4.36560	0.506		
*8	-99.83715	0.506	1.63351	23.63
*9	-1.70702	0.100		
*10	-2.17464	0.253	1.54488	54.87
*11	3.61429	0.500		
12	∞	0.300	1.51633	64.14
13	∞	1.740		
14	∞			

*:非球面

【表１０】

実施例5・非球面データ				
面番号	KA	A4	A6	A8
1	6.9377302E-01	-8.6315370E-03	-2.9322827E-03	-2.8236519E-01
2	1.0000090E+00	1.0299728E-02	-3.3338883E-02	-3.5854402E-01
3	9.8073731E+00	4.1860316E-01	2.4161475E-01	-7.6083670E-01
4	3.1182039E+00	4.6995645E-01	1.5149631E+00	-2.7101440E+00
5	6.1881621E-01	-1.9777356E-01	1.5104859E+00	-1.5044509E+00
6	9.9999979E-01	-1.3815608E-01	8.2457564E-01	-4.9516542E-01
7	3.2258104E-01	-7.2840681E-02	1.5663313E-01	9.8367802E-02
8	-2.6292010E+00	1.1379689E-01	-1.7291781E-02	2.9845655E-02
9	-1.4000002E+01	-4.4092972E-02	9.9278653E-02	-7.7922450E-02
10	1.3000586E-01	-1.8315230E-01	1.3758774E-01	-9.0542240E-02
	A10	A12	A14	A16
1	3.6582042E-01	-4.2487703E-01	-2.2631039E-01	-2.0344291E-02
2	-2.1599412E-01	-4.4977846E-01	2.5600140E+00	-1.9687116E+00
3	-7.7068397E-01	2.7743135E-01	2.0383002E+00	7.4259109E-01
4	1.3698992E+01	-3.8132984E+01	5.1107685E+01	-2.7851932E+01
5	1.4799995E+00	1.8815842E+01	-1.1654772E+02	1.7961509E+02
6	2.3119410E+00	-1.5309306E+01	2.6135941E+01	-1.0762516E+01
7	-2.7569022E-01	1.7783105E-01	-4.9261478E-02	3.9419268E-03
8	1.7970251E-04	-2.1611961E-02	4.0098433E-03	1.4790761E-03
9	2.0967820E-02	4.6775947E-03	-9.1757326E-04	-4.2752923E-04
10	4.2054637E-02	-1.3115957E-02	2.7031329E-03	-1.9876871E-04

【表１１】

実施例6

f=4.428, Bf=1.424, TL=4.387

Si	Ri	Di	ndj	νdj
1(開口絞り)	∞	-0.278		
*2	1.17174	0.557	1.54488	54.87
*3	101.21828	0.101		
*4	-8.52605	0.334	1.63351	23.63
*5	3.10246	0.243		
*6	253.12530	0.354	1.54488	54.87
*7	7.08468	0.350		
*8	-4.62732	0.427	1.63351	23.63
*9	-2.28837	0.246		
*10	2.81503	0.351	1.63351	23.63
*11	1.45940	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.726		
14	∞			

*:非球面

【表１２】

実施例6・非球面データ				
面番号	KA	A4	A6	A8
1	3.6898607E-02	4.1325089E-02	7.7959667E-02	-3.1320039E-01
2	-2.3337736E+01	-7.0438383E-02	1.2689897E-01	-1.6510709E-02
3	1.4512180E+00	1.0524624E-01	2.7959740E-01	-1.2882128E-01
4	3.1182039E+00	2.0460167E-01	9.3788710E-01	-3.1083520E+00
5	7.0000900E-01	-1.7148265E-01	2.9051562E-01	-5.2650666E-02
6	3.5470814E-01	-1.9176138E-01	1.7502659E-01	-3.4890662E-01
7	-2.3602970E+00	-7.2840681E-02	-8.4242604E-01	2.9509268E+00
8	-1.8311731E+00	-2.6699460E-01	9.1126040E-02	-1.0539776E-01
9	1.0044588E-01	-7.9144306E-01	7.1344844E-01	-2.9852745E-01
10	-1.0909351E+01	-3.3970419E-01	2.9895759E-01	-1.5487925E-01
	A10	A12	A14	A16
1	7.3615786E-01	-1.2805754E+00	1.0422927E+00	-4.0402215E-01
2	-3.3618937E-01	-3.1710410E-01	1.2488311E+00	-7.8867528E-01
3	-6.9518976E-01	8.8551140E-01	3.3513814E-01	-5.9764108E-01
4	1.1989263E+01	-2.7274104E+01	4.1138655E+01	-2.6221811E+01
5	1.2799215E+00	-6.0805643E-01	-6.5701417E+00	1.0955959E+01
6	8.6734211E-01	-1.2626762E+00	8.7271985E-01	-1.2234385E-01
7	-8.6810396E+00	1.3687948E+01	-1.1500705E+01	3.7304276E+00
8	1.2739701E-02	-7.4356044E-02	6.4549028E-02	-1.2957543E-02
9	5.3475537E-02	1.5902396E-03	-1.9540075E-03	1.7122320E-04
10	5.0278107E-02	-9.7894164E-03	1.0056192E-03	-4.1181094E-05

【表１３】

条件式に関する値							
式番号	条件式	実施例1	実施例2	実施例3	実施例4	実施例5	実施例6
(1)	f/f1	1.8	1.7	1.68	2.49	2.88	2.04
(2)	f/f2	-1.22	-0.98	-1.1	-1.83	-1.88	-1.25
(3)	f/f12	0.91	0.98	0.84	1.17	1.52	1.14
(4)	f/f345	-0.2	-0.37	-0.08	-0.42	-1.04	-0.48
(5)	f1/f3	0.15	0.05	0.2	-0.03	-0.3	-0.16
(6)	(R3f-R3r)/(R3f+R3r)	-0.18	-0.03	-0.48	0.73	0.98	0.95
(7)	f/f5	-0.55	-1.1	-1.88	-1.51	-2.43	-0.83
(8)	f·tanω／R5r	1.7	0.86	1.5	1.66	1.44	1.64
(9)	f/f3	0.27	0.09	0.34	-0.06	-0.86	-0.33
(10)	D7/f	0.12	0.12	0.14	0.11	0.08	0.08

【符号の説明】

【００８３】

Ｌ１　　第１レンズ
Ｌ２　　第２レンズ
Ｌ３　　第３レンズ
Ｌ４　　第４レンズ
Ｌ５　　第５レンズ
Ｓｔ　　開口絞り
Ｒｉ　　物体側から第ｉ番目のレンズ面の曲率半径
Ｄｉ　　物体側から第ｉ番目と第ｉ＋１番目のレンズ面との面間隔
Ｚ１　　光軸
１００　　撮像素子（像面）

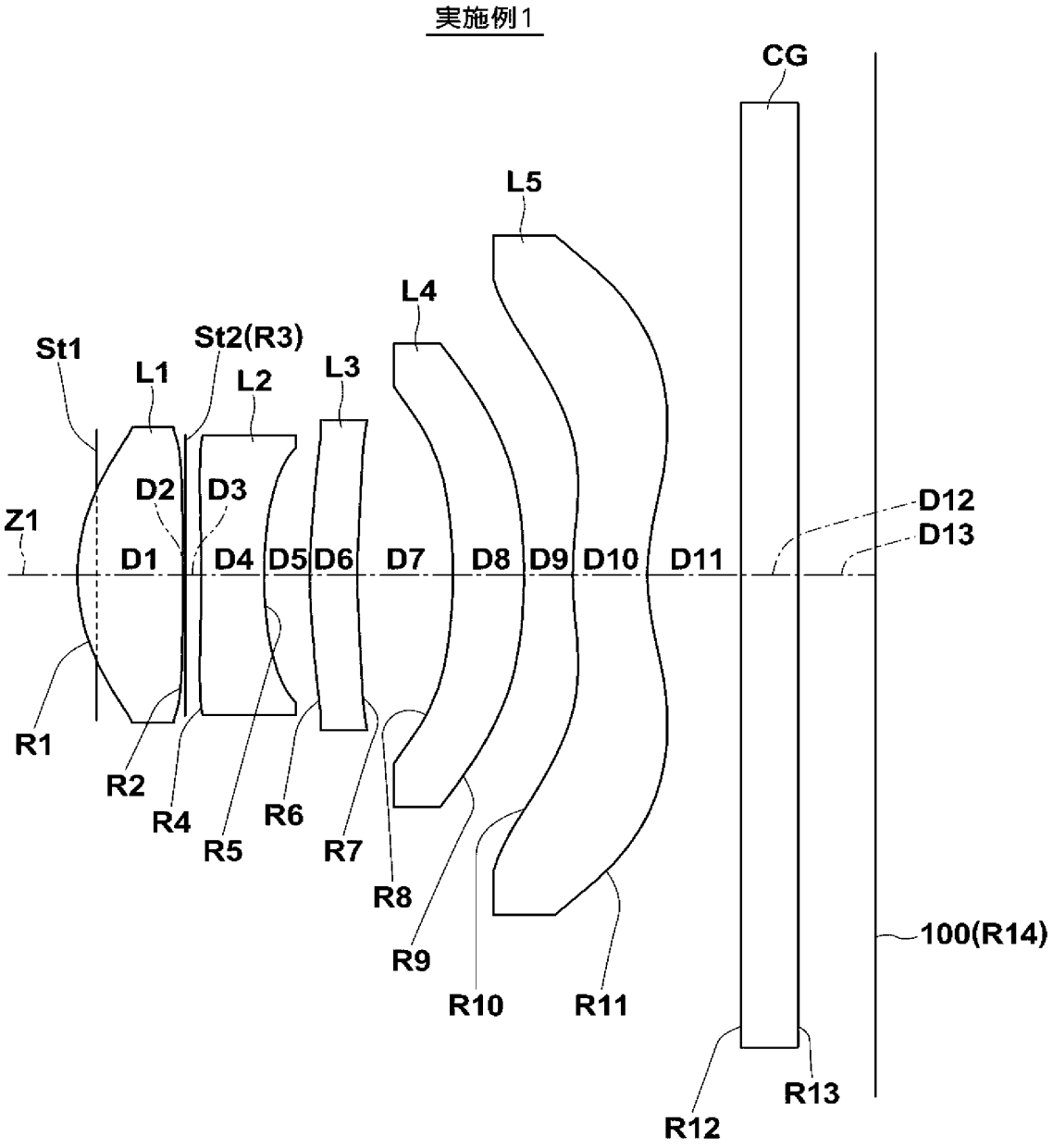
【書類名】特許請求の範囲
【請求項１】
物体側から順に、
正の屈折力を有し、物体側に凸面を向けたメニスカス形状である第１レンズと、
両凹形状である第２レンズと、
物体側に凸面を向けたメニスカス形状である第３レンズと、
像側に凸面を向けたメニスカス形状である第４レンズと、
負の屈折力を有し、像側の面に少なくとも１つの変曲点を有する第５レンズと、
から構成される実質的に５個のレンズからなり、下記条件式（１）を満足することを特徴とする撮像レンズ。
１．４＜ｆ／ｆ１＜４　　（１）
ただし、
ｆ：全系の焦点距離
ｆ１：前記第１レンズの焦点距離
とする。
【請求項２】
さらに以下の条件式を満足する請求項１記載の撮像レンズ。
－３＜ｆ／ｆ２＜－０．８５　　（２）
ただし、
ｆ２：前記第２レンズの焦点距離
とする。
【請求項３】
前記第４レンズは正の屈折力を有する請求項１または２記載の撮像レンズ。
【請求項４】
さらに以下の条件式を満足する請求項１から３のいずれか１項記載の撮像レンズ。
０．７８＜ｆ／ｆ１２＜２．５　　（３）
ただし、
ｆ１２：前記第１レンズと前記第２レンズとの合成焦点距離
とする。
【請求項５】
さらに以下の条件式を満足する請求項１から４のいずれか１項記載の撮像レンズ。
－２＜ｆ／ｆ３４５＜０　　（４）
ただし、
ｆ３４５：前記第３レンズから前記第５レンズの合成焦点距離
とする。
【請求項６】
さらに以下の条件式を満足する請求項１から５のいずれか１項記載の撮像レンズ。
－０．５＜ｆ１／ｆ３＜０．４　　（５）
ただし、
ｆ３：前記第３レンズの焦点距離
とする。
【請求項７】
さらに以下の条件式を満足する請求項１から６のいずれか１項記載の撮像レンズ。
－１＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１．２　　（６）
ただし、
Ｒ３ｆ：前記第３レンズの物体側の面の近軸曲率半径
Ｒ３ｒ：前記第３レンズの像側の面の近軸曲率半径
とする。
【請求項８】
さらに以下の条件式を満足する請求項１から７のいずれか１項記載の撮像レンズ。

－４＜ｆ／ｆ５＜－０．２　　（７）
ただし、
ｆ５：前記第５レンズの焦点距離
とする。
【請求項９】
さらに以下の条件式を満足する請求項１から８のいずれか１項記載の撮像レンズ。
０．５＜ｆ・ｔａｎω／Ｒ５ｒ＜１０　　（８）
ただし、
ω：半画角
Ｒ５ｒ：前記第５レンズの像側の面の曲率半径
とする。
【請求項１０】
さらに以下の条件式を満足する請求項１から９のいずれか１項記載の撮像レンズ。
－０．９＜ｆ／ｆ３＜０．７　　（９）
ただし、
ｆ３：前記第３レンズの焦点距離
とする。
【請求項１１】
さらに以下の条件式を満足する請求項１から１０のいずれか１項記載の撮像レンズ。
０．０５＜Ｄ７／ｆ＜０．２　　（１０）
ただし、
Ｄ７：前記第３レンズと前記第４レンズとの間の光軸上の間隔
とする。
【請求項１２】
前記第２レンズの物体側の面より物体側に配置された開口絞りをさらに備えた請求項１から１１のいずれか１項記載の撮像レンズ。
【請求項１３】
さらに以下の条件式を満足する請求項１から１２のいずれか１項記載の撮像レンズ。
１．５＜ｆ／ｆ１＜３．５　　（１－１）
【請求項１４】
さらに以下の条件式を満足する請求項１から１３のいずれか１項記載の撮像レンズ。
－２．５＜ｆ／ｆ２＜－０．９　　（２－１）
ただし、
ｆ２：前記第２レンズの焦点距離
とする。
【請求項１５】
さらに以下の条件式を満足する請求項１から１４のいずれか１項記載の撮像レンズ。
０．８＜ｆ／ｆ１２＜２　　（３－１）
ただし、
ｆ１２：前記第１レンズと前記第２レンズとの合成焦点距離
とする。
【請求項１６】
さらに以下の条件式を満足する請求項１から１５のいずれか１項記載の撮像レンズ。
－１．５＜ｆ／ｆ３４５＜－０．０５　　（４－１）
ただし、
ｆ３４５：前記第３レンズから前記第５レンズの合成焦点距離
とする。
【請求項１７】
さらに以下の条件式を満足する請求項１から１６のいずれか１項記載の撮像レンズ。
－０．４＜ｆ１／ｆ３＜０．２　　（５－１）

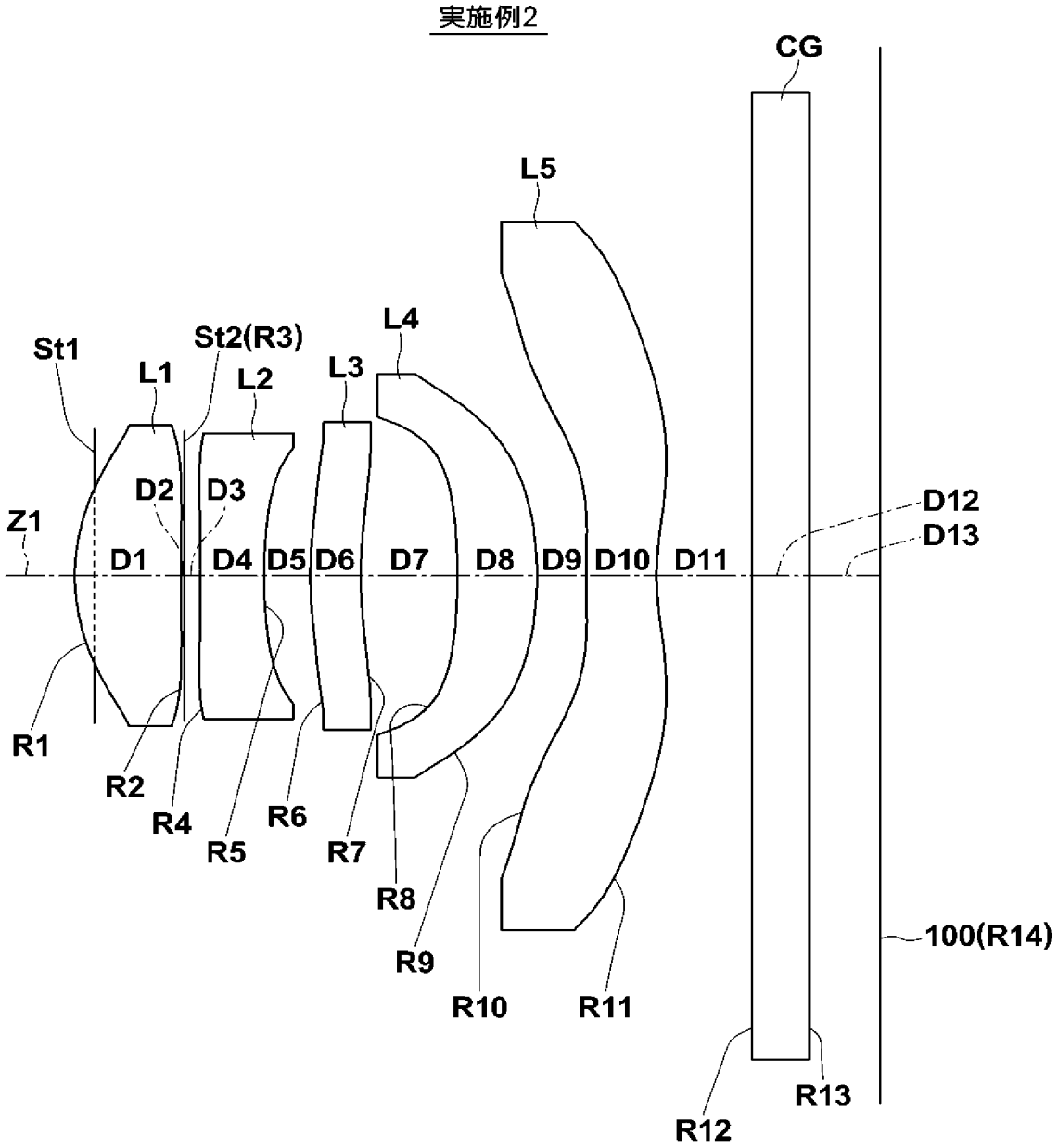
ただし、
　ｆ３：前記第３レンズの焦点距離
とする。
【請求項１８】
　さらに以下の条件式を満足する請求項１から１７のいずれか１項記載の撮像レンズ。
　－０．６＜（Ｒ３ｆ－Ｒ３ｒ）／（Ｒ３ｆ＋Ｒ３ｒ）＜１　　（６－１）
ただし、
　Ｒ３ｆ：前記第３レンズの物体側の面の近軸曲率半径
　Ｒ３ｒ：前記第３レンズの像側の面の近軸曲率半径
とする。
【請求項１９】
　前記第１レンズから前記第３レンズの合成屈折力が正である場合において、さらに以下の条件式を満足する請求項１から１８のいずれか１項記載の撮像レンズ。
　－３＜ｆ／ｆ５＜－０．４　　（７－１）
ただし、
　ｆ５：前記第５レンズの焦点距離
とする。
【請求項２０】
　請求項１記載の撮像レンズを有する撮像装置。

【書類名】要約書
【要約】
【課題】全長の短縮化および高解像化を実現した撮像レンズおよびこの撮像レンズを備えた撮像装置を実現する。
【解決手段】撮像レンズが、物体側から順に、正の屈折力を有し、物体側に凸面を向けたメニスカス形状である第１レンズＬ１と、両凹形状である第２レンズＬ２と、物体側に凸面を向けたメニスカス形状である第３レンズＬ３と、像側に凸面を向けたメニスカス形状である第４レンズＬ４と、負の屈折力を有し、像側の面に少なくとも１つの変曲点を有する第５レンズＬ５とから構成される実質的に５個のレンズからなり、所定の条件式を満足する。
【選択図】図１

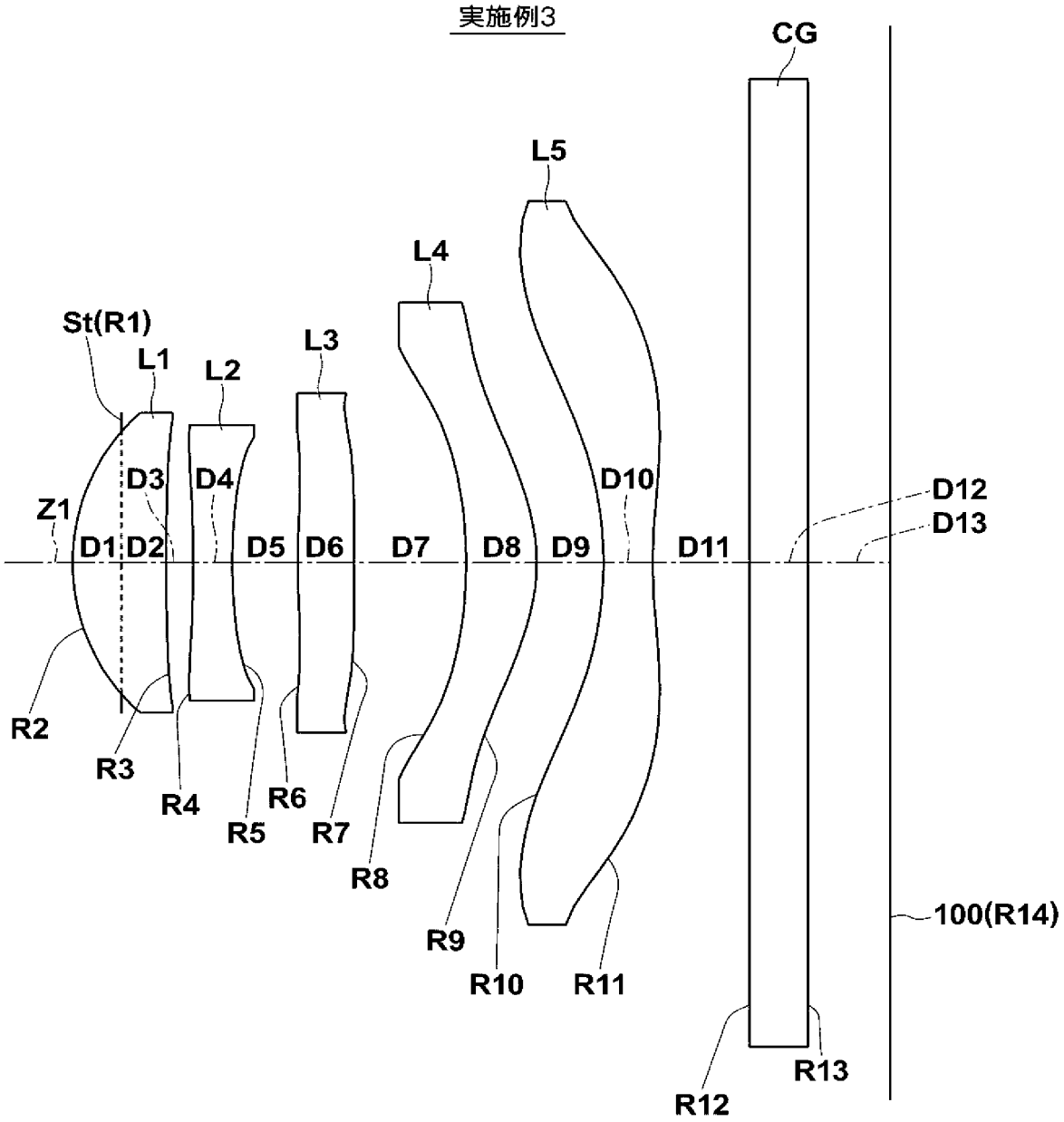
【書類名】図面
【図１】


実施例1
CG
L5
L4
St1
St2(R3)
L1
L2
L3
D2
D3
Z1
D1
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
R1
R2
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
100(R14)

【図２】

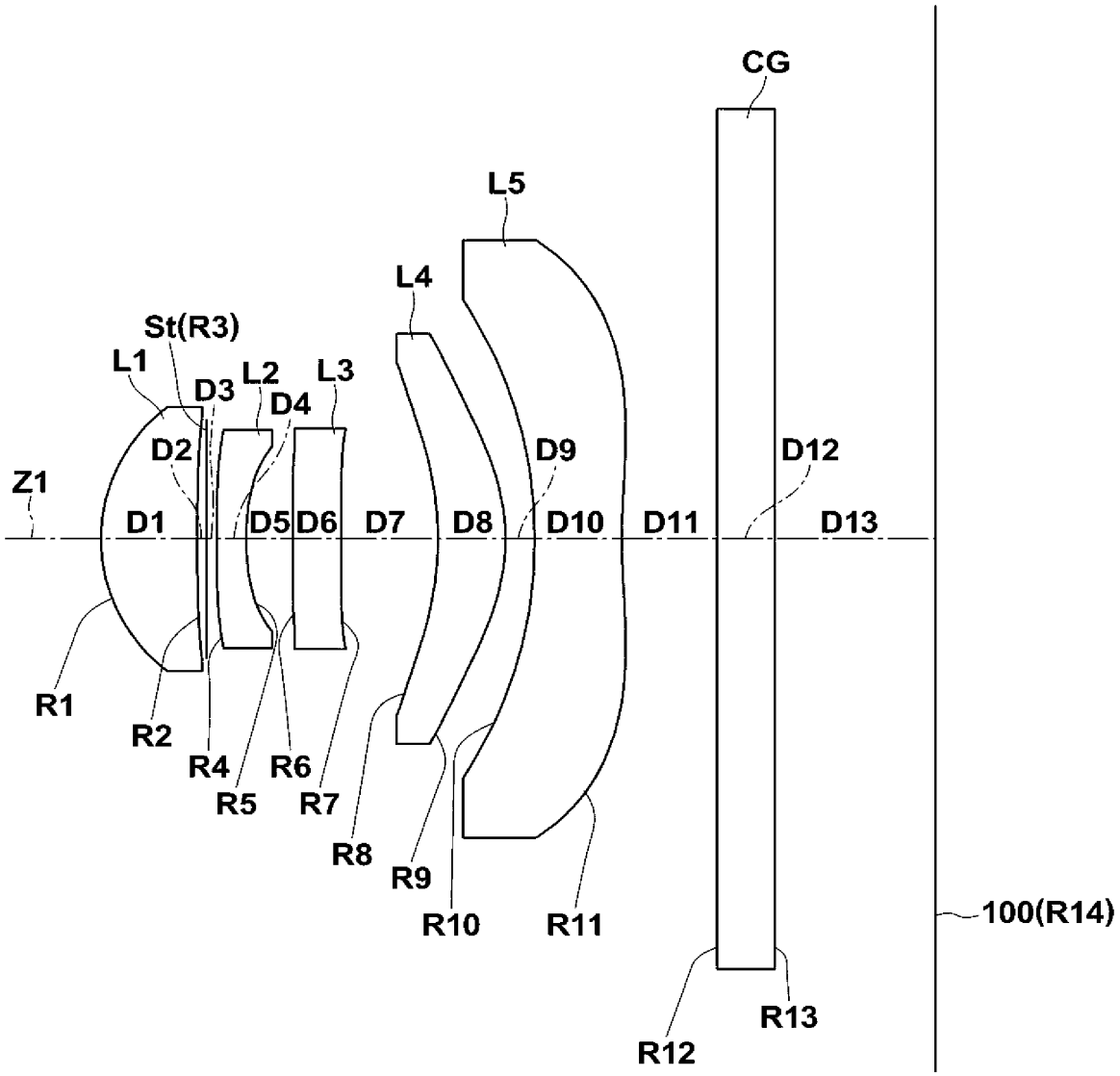

実施例2
CG
L5
L4
St1
St2(R3)
L1
L2
L3
D2
D3
Z1
D1
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
R1
R2
R4
R5
R6
R7
R8
R9
R10
R11
100(R14)
R12
R13

【図３】

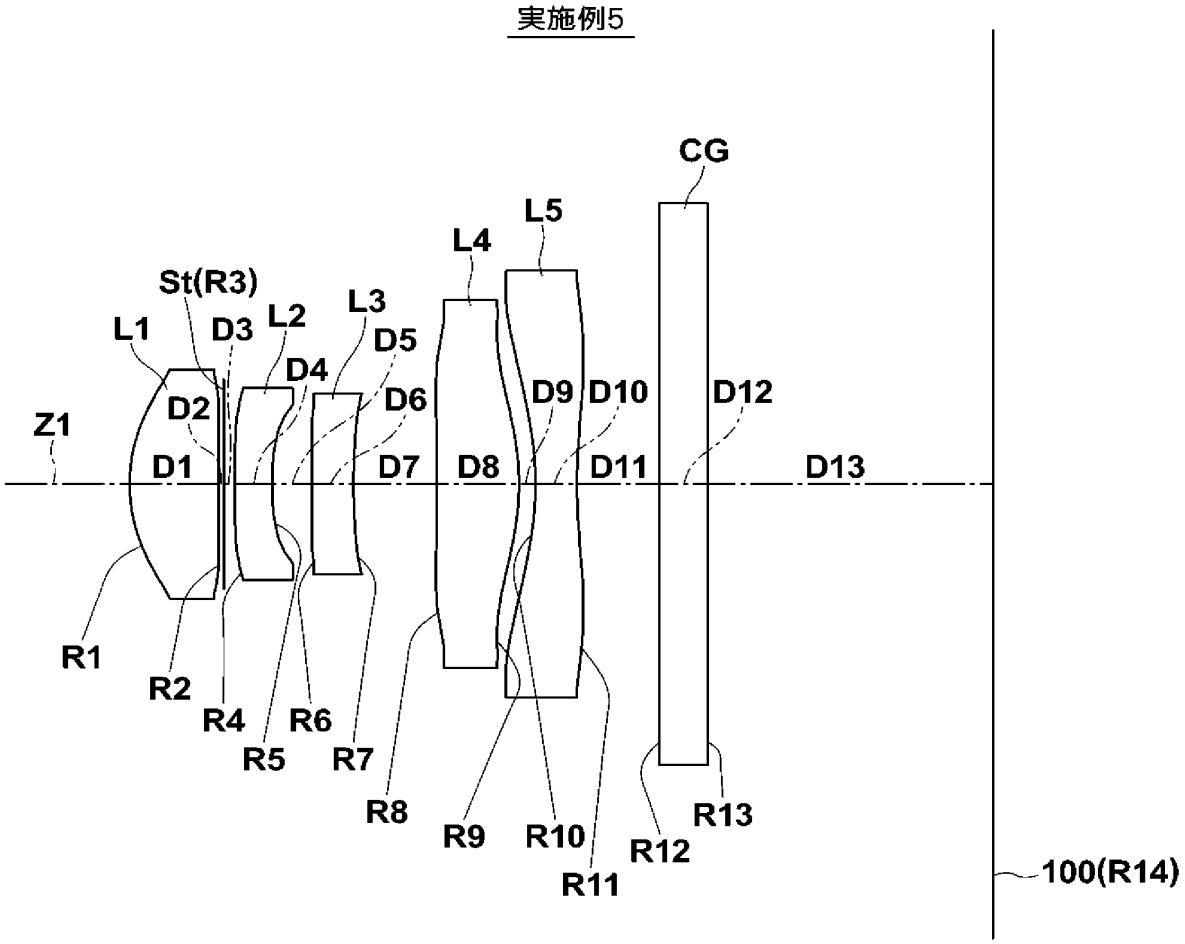

実施例3
CG
L5
L4
L3
L2
L1
St(R1)
Z1
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
100(R14)

【図４】

実施例4

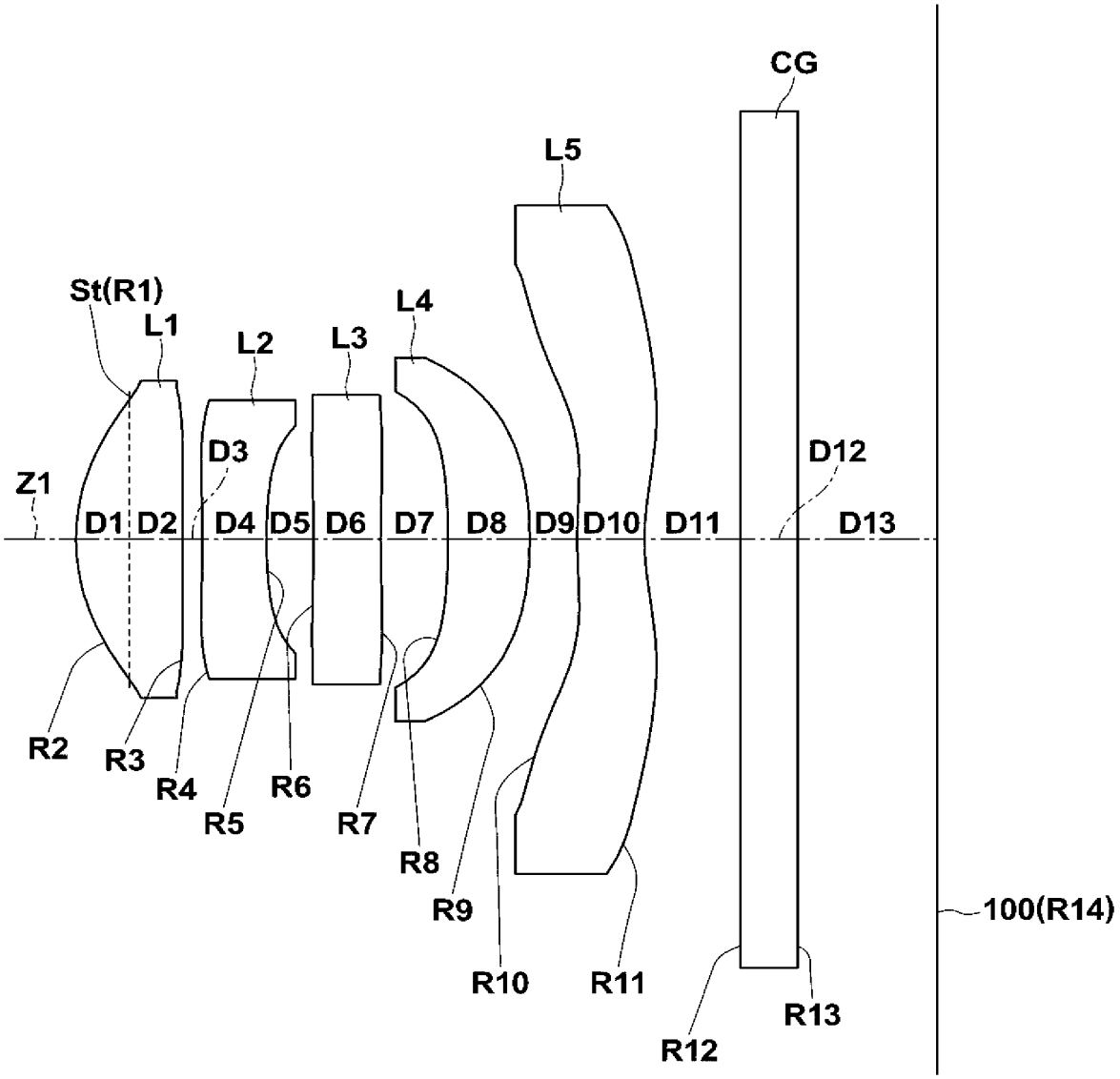

CG
L5
L4
St(R3)
L1
D3
L2
L3
D4
D2
D9
D12
Z1
D1
D5
D6
D7
D8
D10
D11
D13
R1
R2
R4
R6
R5
R7
R8
R9
R10
R11
100(R14)
R12
R13

【図５】

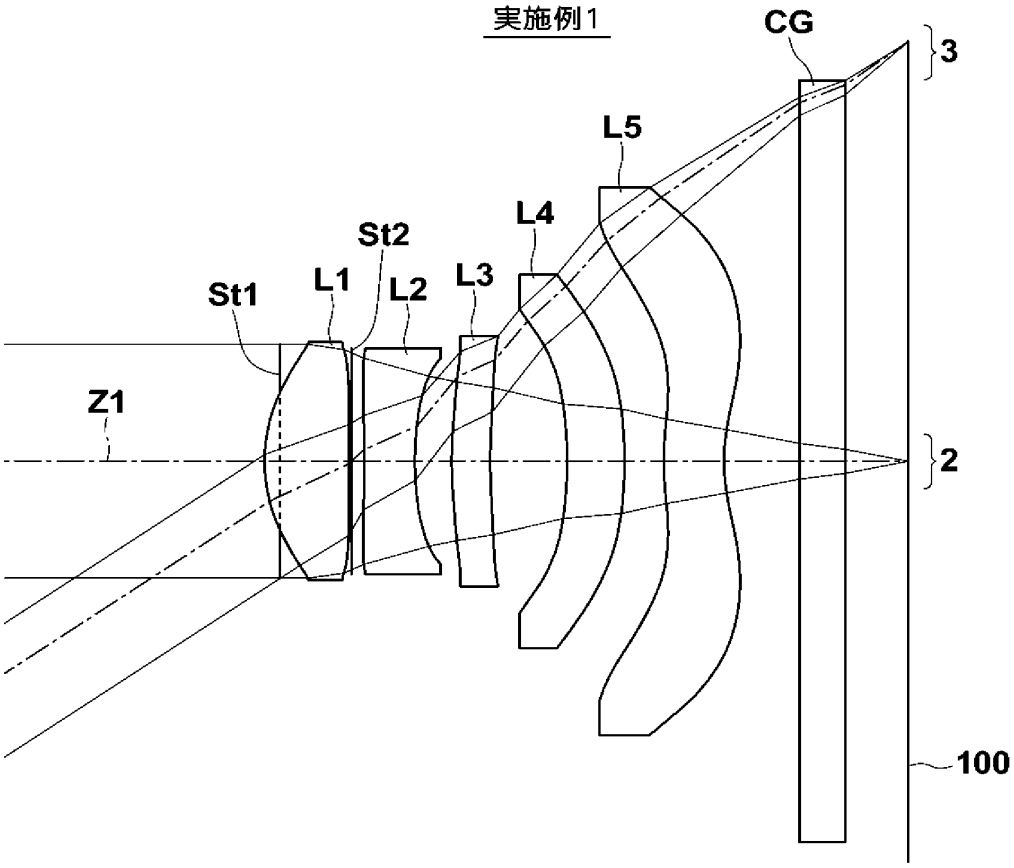

実施例5
CG
L5
L4
St(R3)
L3
L1
D3
L2
D5
D4
D6
D9
D10
D12
Z1
D2
D1
D7
D8
D11
D13
R1
R2
R4
R6
R5
R7
R8
R9
R10
R12
R13
R11
100(R14)

【図６】

実施例6


CG
L5
St(R1)
L1
L2
L3
L4
D3
D12
Z1
D1
D2
D4
D5
D6
D7
D8
D9
D10
D11
D13
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
100(R14)

【図７】



【図８】

実施例1
Fno. = 2.47
ω = 35.2°
d線
C線
F線
g線
-100μm
0
100μm
球面収差
(A)
ω = 35.2°
d線(S)
d線(T)
-100μm
0
100μm
非点収差
(B)
ω = 35.2°
d線
-10%
0
10%
歪曲収差
(C)
ω = 35.2°
C線
F線
g線
-10μm
0
10μm
倍率色収差
(D)

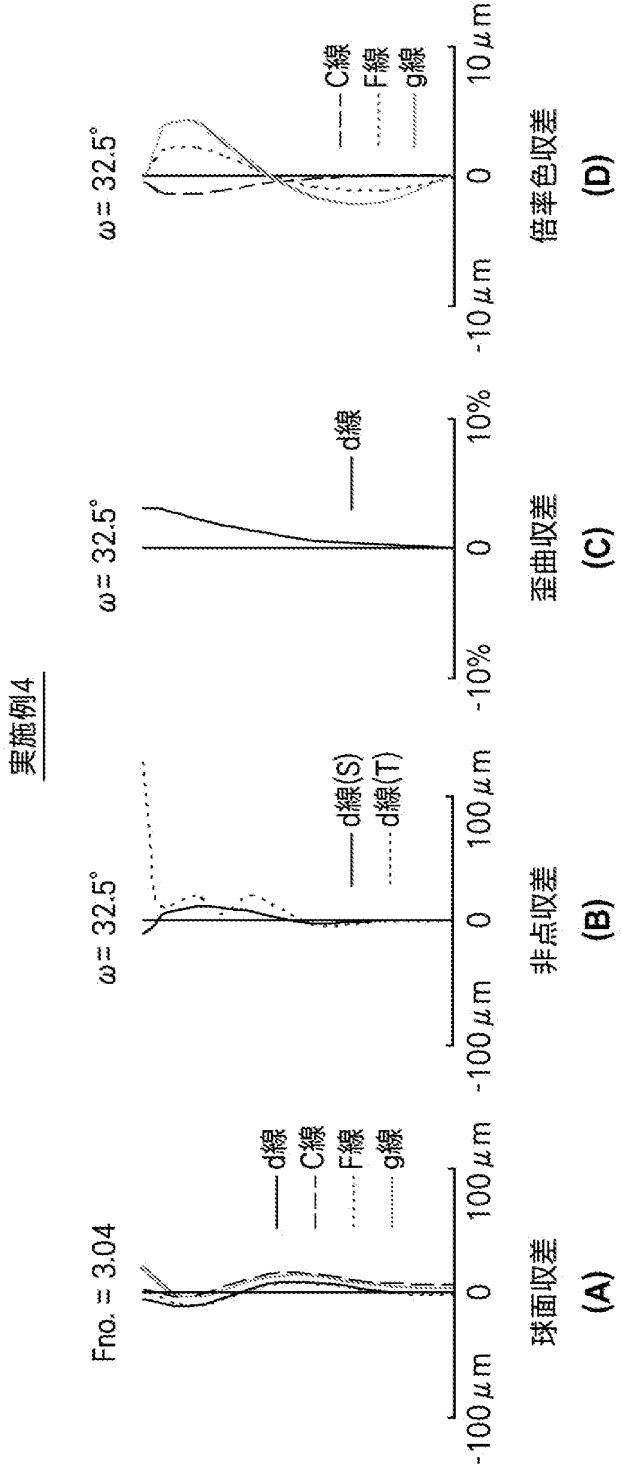
【図９】

実施例2
Fno. = 2.46
ω = 35.1°
d線
C線
F線
g線
-100μm
0
100μm
球面収差
(A)
d線(S)
d線(T)
非点収差
(B)
-10%
0
10%
歪曲収差
(C)
倍率色収差
(D)
-10μm
10μm

【図１０】

実施例3
Fno. = 2.45
d線
C線
F線
g線
-100μm
0
100μm
球面収差
(A)
ω = 35.2°
d線(S)
d線(T)
-100μm
0
100μm
非点収差
(B)
ω = 35.2°
d線
-10%
0
10%
歪曲収差
(C)
ω = 35.2°
C線
F線
g線
-10μm
0
10μm
倍率色収差
(D)

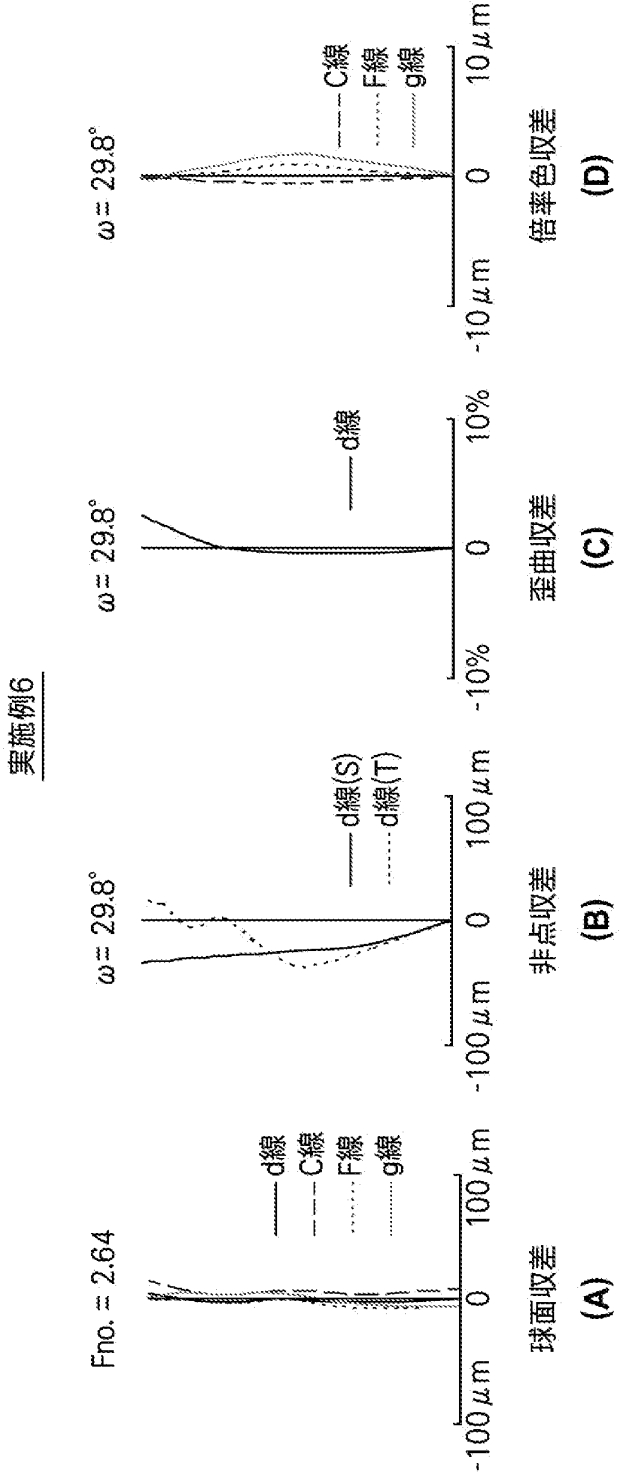
【図１１】


実施例4
Fno. = 3.04
ω = 32.5°
ω = 32.5°
ω = 32.5°
d線
C線
F線
g線
d線(S)
d線(T)
-100μm
0
100μm
-10%
0
10%
-10μm
0
10μm
球面収差
(A)
非点収差
(B)
歪曲収差
(C)
倍率色収差
(D)

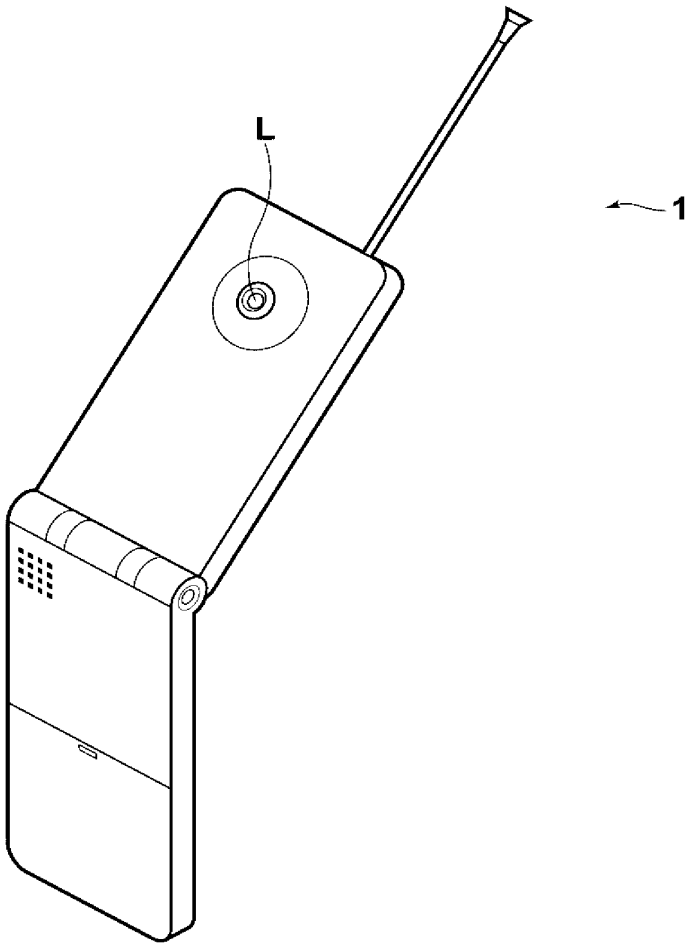
【図１２】

実施例5
Fno. = 3.94
d線
C線
F線
g線
-100μm
0
100μm
球面収差
(A)
ω = 25.9°
d線(S)
d線(T)
-100μm
0
100μm
非点収差
(B)
ω = 25.9°
d線
-10%
0
10%
歪曲収差
(C)
ω = 25.9°
C線
F線
g線
-10μm
0
10μm
倍率色収差
(D)

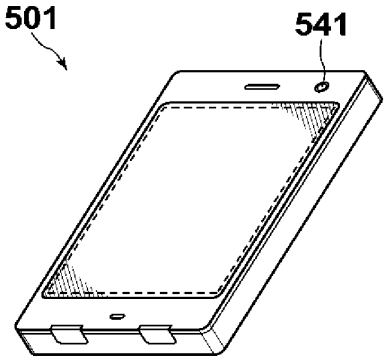
【図１３】


実施例6
Fno. = 2.64
d線
C線
F線
g線
-100μm
0
100μm
球面収差
(A)
ω = 29.8°
d線(S)
d線(T)
-100μm
0
100μm
非点収差
(B)
ω = 29.8°
d線
-10%
0
10%
歪曲収差
(C)
ω = 29.8°
C線
F線
g線
-10μm
0
10μm
倍率色収差
(D)

【図１４】



【図１５】



出願人履歴

３０６０３７３１１

20061002

新規登録

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富士フイルム株式会社

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1	1892

466 7590 10/09/2014

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

EXAMINER	
JONES, JAMES	
ART UNIT	PAPER NUMBER
2872	

NOTIFICATION DATE	DELIVERY MODE
10/09/2014	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):

DocketingDept@young-thompson.com
yandtpair@firsttofile.com

Office Action Summary	Application No. 14/226,172	Applicant(s) OGINO ET AL.	
	Examiner JAMES JONES	Art Unit 2872	AIA (First Inventor to File) Status Yes

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

Period for Reply

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

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

Status

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

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

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

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

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

Disposition of Claims*

5)☒ Claim(s) *1-20* is/are pending in the application.

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

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-20* is/are rejected.

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

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

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

Application Papers

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

11)☒ The drawing(s) filed on *3/26/2014* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☒ None of the:

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

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

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

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

Attachment(s)

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

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *3/26/2014*.

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

4) ☐ Other: _____.

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

DETAILED ACTION

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 3/29/2013. It is noted, however, that applicant has not filed a certified copy of the 2013-072282 application as required by 37 CFR 1.55.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 3/26/2014 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

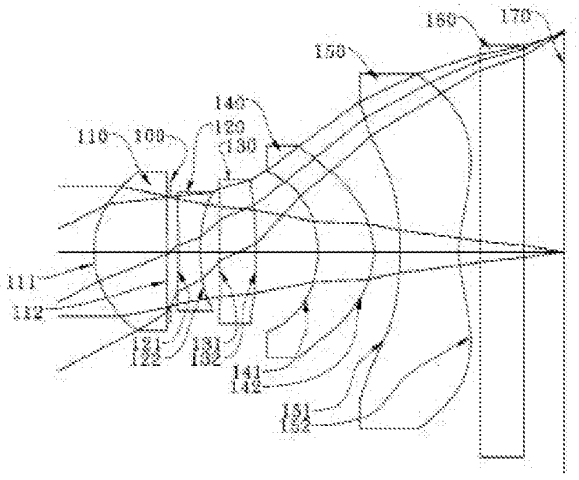
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> 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.

5. Claims 1-20 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Tang (20120087020) hereafter Tang.

Regarding claim 1, Tang discloses an imaging lens substantially consisting of, in order from an object side, five lenses of: a first lens (110) that has a positive refractive power (par. [0058], lines 2-4) and has a meniscus shape which is convex toward the object side (par. [0058], lines 2-4); a second lens (120) that has a biconcave shape (par. [0012]); a third lens (130) that has a meniscus shape which is convex toward the object side (par. [0012]); a fourth lens (140) that has a meniscus shape which is convex toward an image side (shown in the figure below); and a fifth lens (150) that has a negative refractive power and has at least one inflection point on an image side surface (par. [0074]), wherein the following conditional expression (i) is satisfied:

1.4 < f/f1 < 4, where f is a focal length of a whole system, and f1 is a focal length of the first lens (see table 1, 1.4 < 5.97/3.25 < 4 = 1.4 < 1.84 < 4).



Regarding claim 2, Tang discloses The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: -3<f/f2<-.085, where f2 is a focal length of the second lens (see table 1… -3 < 5.97/-4.42 < -.085).

Regarding claim 3, Tang discloses the imaging lens, as defined in Claim 1, wherein the fourth lens has a positive refractive power (par. [0074], line 16).

Regarding claim 4, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: .078<f/f12<2.5, where f12 is a composite focal length of the first lens and the second lens (fig. 22).

Regarding claim 5, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: -2<f/f345<0, where f345 is a composite focal length of the third to fifth lenses (table 1 and 3).

Regarding claim 6, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: -0.5<f/f3<0.4, where f3 is a composite focal length of the third lens (fig. 22).

Regarding claim 7, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: -1<(R3f-R3r)/(R3f+R3r)<1.2, Where R3f is a praraxial radius of curvature of an image side surface of the third lens (table 1, 3, 5 and fig. 22).

Regarding claim 8, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: -4<f/f5<-0.2, where f5 is a composite focal length of the fifth lens (fig. 8, table 1).

Regarding claim 9, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: $0.5<f*\tan\omega/R5r<10$, where ω is a half angle of view, and R5r is a paraxial radius of curvature of the image side surface of the fifth lens (fig. 8, 10 and 22).

Regarding claim 10, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: $-0.9<f/f3<0.7$, where f3 is a composite focal length of the third lens (table 1).

Regarding claim 11, Tang discloses the imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied: $0.05<D7/f<0.2$, where D7 is spacing on an optical axis between the third lens and the fourth lens (table 1).

Regarding claim 12, Tang discloses the imaging lens, as defined in Claim l, further comprising an aperture stop (100) that is disposed on the object side of an object side surface of the second lens (120).

Regarding claims 13-19, Tang discloses in Figures 8-22 the values that satisfy the equations of claims 13-19.

Regarding claim 20, Tang discloses an imaging apparatus comprising: the imaging lens, as defined in Claim 1 (fig. 1 abstract).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES JONES whose telephone number is (571)270-

1278. The examiner can normally be reached on Monday thru Friday, 9 a.m. to 6:00 p.m. est. time.

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.

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/JAMES JONES/
Primary Examiner, Art Unit 2872
9/29/2014

Notice of References Cited	Application/Control No. 14/226,172	Applicant(s)/Patent Under Reexamination OGINO ET AL.	
	Examiner JAMES JONES	Art Unit 2872	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2012/0087020	04-2012	Tang et al.	359/714
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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BIB DATA SHEET

CONFIRMATION NO. 1892

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/226,172	03/26/2014	359	2872	8081-1131-1

APPLICANTS

FUJIFILM CORPORATION, Tokyo, JAPAN, Assignee (with 37 CFR 1.172 Interest);

INVENTORS

Tatsuyuki OGINO, Saitama-ken, JAPAN;
Michio CHO, Saitama-ken, JAPAN;
Yoshiaki ISHII, Saitama-ken, JAPAN;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************

JAPAN 2013-072282 03/29/2013

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

04/17/2014

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JAMES JONES/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		JAPAN	14	20	1

ADDRESS

YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314
UNITED STATES

TITLE

IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

FILING FEE RECEIVED		
1600	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	Tatsuyuki near3 Ogino.inv.	US-PGPUB; USPAT	OR	ON	2014/09/29 10:01
L2	75	Michio near3 cho.inv.	US-PGPUB; USPAT	OR	ON	2014/09/29 10:01
L3	2	("20130033765" | "8310768").PN.	US-PGPUB; USPAT	OR	ON	2014/09/29 10:02
L5	11674	(first near3 lens) near5 positive	US-PGPUB; USPAT	OR	ON	2014/09/29 10:05
L6	6965	(second near3 lens) near5 (concave biconcave bi-concave)	US-PGPUB; USPAT	OR	ON	2014/09/29 10:06
L7	4691	(third near3 lens) near5 (convex)	US-PGPUB; USPAT	OR	ON	2014/09/29 10:06
L8	3193	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/29 10:07
L9	3649	(fifth near3 lens) near7 negative	US-PGPUB; USPAT	OR	ON	2014/09/29 10:07
L10	487	5 and 6 and 7 and 8 and 9	US-PGPUB; USPAT	OR	ON	2014/09/29 10:07
L11	31	((fifth near3 lens) near7 negative) near10 inflection	US-PGPUB; USPAT	OR	ON	2014/09/29 10:08
L12	13	10 and 11	US-PGPUB; USPAT	OR	ON	2014/09/29 10:08
S1	472	359/714.ccls.	US-PGPUB; USPAT	OR	ON	2014/09/28 13:02
S2	717	(G02B13/0045).CPC.	US-PGPUB; USPAT	OR	ON	2014/09/28 13:25
S3	8	("20100254029" | "20110316969" | "20130057967" | "20130107376" | "7538958" | "7746572" | "8345323" | "7911712").PN.	US-PGPUB; USPAT	OR	ON	2014/09/28 13:26
S4	9612	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/09/28 13:26
S5	9024	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 13:27
S6	3229	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 13:28
S7	3193	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 13:29
S8	1314	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 13:29
S10	360	S4 and S5 and S6 and S7 and S8	US-PGPUB; USPAT	OR	ON	2014/09/28 13:30
S11	73	S1 and S10	US-PGPUB; USPAT	OR	ON	2014/09/28 13:30
S12	112	S2 and S10	US-PGPUB;	OR	ON	2014/09/28

			USPAT			13:30
S13	3564	(first near3 lens) near5 thickness	US-PGPUB; USPAT	OR	ON	2014/09/28 20:34
S14	1335	(third near3 lens) near5 thickness	US-PGPUB; USPAT	OR	ON	2014/09/28 20:34
S15	25312	lens near3 barrel	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S16	9612	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S17	9024	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S18	3229	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S19	3193	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S20	1314	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S21	360	S16 and S17 and S18 and S19 and S20	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S22	192	S21 and S15	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S23	26653	lens near3 housing	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S24	17	S21 and S23	US-PGPUB; USPAT	OR	ON	2014/09/28 20:35
S25	5858990	third n	US-PGPUB; USPAT	OR	ON	2014/09/28 20:37
S26	7829	(first near3 lens) near5 negative	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:39
S27	3798	(second near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:39
S28	1668	(third near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:39
S29	1325	(fourth near3 lens) near5 convex	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:40
S30	685	(fifth near3 lens) near5 concave	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:40
S31	25	S26 and S27 and S28 and S29 and S30	FPRS; EPO; JPO; DERWENT	OR	ON	2014/09/28 20:40
S32	5867	(first near3 lens) near5 negative.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:35
S33	3598	(second near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:35
S34	1881	(third near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:36
S35	1281	(fourth near3 lens) near5 convex.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:36
S36	332	(fifth near3 lens) near10 plastic.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:36

S37	18	S32 and S33 and S34 and S35 and S36	US-PGPUB; USPAT	OR	ON	2014/09/28 21:37
S38	37196	distance near10 image.clm.	US-PGPUB; USPAT	OR	ON	2014/09/28 21:38
S39	10	S32 and S33 and S34 and S35 and S36 and S38	US-PGPUB; USPAT	OR	ON	2014/09/28 21:38
S40	52816	axial near3 distance	US-PGPUB; USPAT	OR	ON	2014/09/28 21:40
S41	799	(axial near3 distance) same (first near3 lens) same (second near3 lens)	US-PGPUB; USPAT	OR	ON	2014/09/28 21:40
S42	0	S31 and S41	US-PGPUB; USPAT	OR	ON	2014/09/28 21:41
S43	0	S26 and S27	US-PGPUB; USPAT	OR	ON	2014/09/28 21:41
S44	9612	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/09/28 21:41
S45	9024	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 21:41
S46	9612	(first near3 lens) near5 negative	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S47	9024	(second near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S48	3229	(third near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S49	3193	(fourth near3 lens) near5 convex	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S50	1314	(fifth near3 lens) near5 concave	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S51	360	S46 and S47 and S48 and S49 and S50	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42
S52	49	S51 and S41	US-PGPUB; USPAT	OR	ON	2014/09/28 21:42

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S53	5690	(first near3 lens) near5 negative	USPAT; UPAD	OR	ON	2014/09/28 21:43
S54	5146	(second near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/09/28 21:43
S55	2671	(third near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/09/28 21:43
S56	1766	(fourth near3 lens) near5 convex	USPAT; UPAD	OR	ON	2014/09/28 21:43
S57	323	(fifth near3 lens) near10 plastic	USPAT; UPAD	OR	ON	2014/09/28 21:43
S58	81253	distance near10 image	USPAT; UPAD	OR	ON	2014/09/28 21:43
S59	41	S53 and S54 and S55 and S56 and S57 and S58	USPAT; UPAD	OR	ON	2014/09/28 21:44

9/29/2014 11:58:40 AM
C:\Users\jjones4\Documents\EAST\Workspaces\14175290.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/29/2014								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
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	7	✓								
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	9	✓								
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	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14226172	OGINO ET AL.
	Examiner	Art Unit
	JAMES JONES	2872

CPC- SEARCHED		
Symbol	Date	Examiner
G02B13/0045	9/29/2014	JCJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
359	714	9/29/2014	JCJ

SEARCH NOTES		
Search Notes	Date	Examiner
359/714 and G02B13/0045	9/29/2014	JCJ
inventor name search	9/29/2014	JCJ
Text search	9/29/2014	JCJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/JAMES JONES/ Primary Examiner.Art Unit 2872

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	2014-03-26
	First Named Inventor	Tatsuyuki OGINO
	Art Unit	
	Examiner Name	
	Attorney Docket Number	8081-1131-1

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8310768		2012-11-13	LIN et al.	Cited in the specification
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20130033765		2013-02-07	TSAI et al.	Cited in the specification
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Receipt date: 03/26/2014	Application Number	14226172 - GAU: 2872
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Filing Date	2014-03-26
	First Named Inventor	Tatsuyuki OGINO
	Art Unit	
	Examiner Name	
	Attorney Docket Number	8081-1131-1

	1		☐

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Examiner Signature	/James Jones/	Date Considered	09/29/2014

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Receipt date: 03/26/2014	Application Number	14226172 - GAU: 2872
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2014-03-26
	First Named Inventor	Tatsuyuki OGINO
	Art Unit	
	Examiner Name	
	Attorney Docket Number	8081-1131-1

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

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OR

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☐ 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.

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Signature	/Eric Jensen/	Date (YYYY-MM-DD)	2014-03-26
Name/Print	Eric Jensen	Registration Number	37855

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/226,172	03/26/2014	Tatsuyuki OGINO	8081-1131-1

CONFIRMATION NO. 1892

466
YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

PUBLICATION NOTICE

Title:IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

Publication No.US-2014-0293453-A1
Publication Date:10/02/2014

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

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/226,172	03/26/2014	2872	1600	8081-1131-1	20	1

CONFIRMATION NO. 1892

466
YOUNG & THOMPSON
209 Madison Street
Suite 500
Alexandria, VA 22314

FILING RECEIPT

OC000000067859525

Date Mailed: 04/18/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Tatsuyuki OGINO, Saitama-ken, JAPAN;
Michio CHO, Saitama-ken, JAPAN;
Yoshiaki ISHII, Saitama-ken, JAPAN;

Applicant(s)

FUJIFILM CORPORATION, Tokyo, JAPAN

Assignment For Published Patent Application

FUJIFILM CORPORATION, Tokyo, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 00466

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
JAPAN 2013-072282 03/29/2013

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to**

Retrieve Electronic Priority Application(s) (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 04/17/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/226,172**

Projected Publication Date: 10/02/2014

Non-Publication Request: No

Early Publication Request: No

Title

IMAGING LENS AND IMAGING APPARATUS INCLUDING THE 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.

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NOT GRANTED

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/226,172

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

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

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UTILITY PATENT APPLICATION TRANSMITTAL

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

Attorney Docket No. **8081-1131-1**

To the Commissioner of Patents

Transmitted herewith for filing is the patent application of:

Inventors: **Tatsuyuki OGINO, Michio CHO and Yoshiaki ISHII**

Corresponding to **Japanese** Patent Application No. **2013-072282** filed on **March 29, 2013,** the entirety of which application is hereby expressly incorporated by reference in the accompanying application.

Title: **IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS**

Enclosed are:

- ☐ Applicant claims small entity status under 37 C.F.R. § 1.33(b)
- ☒ Specification – Total Pages **55**
- ☒ Drawings – Total Sheets **14**
- ☒ Newly executed Oath or Declaration
- ☐ Copy of Oath or Declaration/Power of Attorney from a prior application (continuation/divisional)
  - ☐ The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied as indicated in the preceding box, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
  - ☐ Deletion of inventor(s). A signed statement attached deleting inventor(s) named in the prior application (see 37 CFR 1.63 (d)(2) and 1.33(b)
- ☒ Application Data Sheet under 37 C.F.R. § 1.76
- ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
  - a. ☐ Computer Readable Form (CRF)
  - b. Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ paper
  - c. ☐ Statement verifying identity of above copies
- ☒ Assignment Papers filed via EFS.
- ☐ 37 C.F.R. §3.73(c) Statement (when there is an assignee – PTO/AIA/96) ☒ Power of Attorney
- ☐ Confirmation of English translation of prior provisional application under 37 CFR 1.78(a)(5)
- ☒ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☒ Copies of IDS citations attached
- ☐ Preliminary Amendment
- ☐ Other items or information: ____
- ☒ The required filing fees are being paid online simultaneously herewith by credit card.
- ☒ The Director is hereby authorized in this, concurrent, and future submissions, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fee required under 37 C.F.R. §§ 1.16 or 1.17.

SEND ALL CORRESPONDENCE TO THE ADDRESS ASSOCIATED WITH CUSTOMER NO. **00466**

YOUNG & THOMPSON
209 Madison Street, Suite 500
Alexandria, VA 22314
Telephone: (703) 521-2297
Facsimile: (703) 685-0573

/Eric Jensen /
Signature

Eric Jensen, Reg. No. 37,855
Name, Registration Number

EJ/**yr**

26 March 2014

ABSTRACT OF THE DISCLOSURE

An imaging lens substantially consists of, in order from an object side, five lenses of a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side, a second lens that has a biconcave shape, a third lens that has a meniscus shape which is convex toward the object side, a fourth lens that has a meniscus shape which is convex toward the image side; and a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface. Further, the following conditional expression (1) is satisfied.

$$1.4<f/f1<4 \quad (1)$$

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Filer:	Eric Jensen/Yolanda Reynolds
Attorney Docket Number:	8081-1131-1

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1600**

Electronic Acknowledgement Receipt	
EFS ID:	18585635
Application Number:	14226172
International Application Number:	
Confirmation Number:	1892
Title of Invention:	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS
First Named Inventor/Applicant Name:	Tatsuyuki OGINO
Customer Number:	466
Filer:	Eric Jensen/Yolanda Reynolds
Filer Authorized By:	Eric Jensen
Attorney Docket Number:	8081-1131-1
Receipt Date:	26-MAR-2014
Filing Date:	
Time Stamp:	15:59:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1600
RAM confirmation Number	2600
Deposit Account	250120
Authorized User	REYNOLDS, YOLANDA
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 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	ADS-AIA.pdf	1561282 47d665c6a638e53da9b01da5f40974b6c403be2e	no	7
Warnings:					
Information:					
2	Claims	CLMS.pdf	84225 aecbc6480ad43ca3f11c43cdaa251e0944295d37	no	3
Warnings:					
Information:					
3	Oath or Declaration filed	DEC.pdf	436461 ac6824eb632e753fa3a542f8375e8b3f6c5e9ee9	no	2
Warnings:					
Information:					
4	Drawings-only black and white line drawings	DWGS.pdf	1322789 e21494bf71bfb760cb380ecb873bf67e840d3582	no	14
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	612297 d330ceb079279b174b0f730accfc7f5029eb3aaa	no	4
Warnings:					
Information:					
6	Power of Attorney	POA.pdf	78758 97266d7bb153ef0b8a2cfa012ab72a6d525fc408	no	1
Warnings:					
Information:					
7	Specification	SPEC.pdf	1117966 d04ab4379580d1d7d3e36cf1ca2f420f315102c9	no	37
Warnings:					
Information:					
8	Transmittal of New Application	TR-APP.pdf	43577 97c449986fc309eefa4257f80c38bf5abde3f182	no	1
Warnings:					
Information:					

9	Abstract	ABSTRACT.pdf	19193 810305779484e640a00dbd6ef9d4f91b5997ec8b	no	1
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32893 1bc68078bd9ce6b73fb7caffec55359ed88e1aa0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5309441		

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.

PTO/AIA/14 (12-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE 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	Suffix
	Tatsuyuki		OGINO	

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

City	Saitama-ken	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o FUJIFILM Corporation		
Address 2	1-324, Uetake-cho, Kita-ku, Saitama-shi		
City	Saitama-ken	**State/Province**	
Postal Code	331-9624	**Country** i	JP

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Michio		CHO	

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

City	Saitama-ken	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o FUJIFILM Corporation		
Address 2	1-324, Uetake-cho, Kita-ku, Saitama-shi		
City	Saitama-ken	**State/Province**	
Postal Code	331-9624	**Country** i	JP

Inventor 3 Remove

Legal Name

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Yoshiaki		ISHII	

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

City	Saitama-ken	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o FUJIFILM Corporation		
Address 2	1-324, Uetake-cho, Kita-ku, Saitama-shi		
City	Saitama-ken	**State/Province**	
Postal Code	331-9624	**Country** i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	00466		
Email Address	embon@young-thompson.com	Add Email	Remove Email

Application Information:

Title of the Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS		
Attorney Docket Number	8081-1131-1	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	14	**Suggested Figure for Publication (if any)**	

Filing By Reference :

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

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

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

PTO/AIA/14 (12-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS	

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	00466		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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 blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

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(d). 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(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
2013-072282	JP	2013-03-29	

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS	

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.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

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.

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS	

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. [X]

Organization Name	FUJIFILM Corporation		
Mailing Address Information:			
Address 1	26-30, Nishiazabu 2-chome		
Address 2	Minato-ku		
City	Tokyo	**State/Province**	
Country [i]	JP	Postal Code	106-8620
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 subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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. [ ]

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	8081-1131-1
	Application Number	
Title of Invention	IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS	

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

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

Signature	/Eric Jensen/			Date (YYYY-MM-DD)	2014-03-26
First Name	Eric	Last Name	Jensen	Registration Number	37855

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

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.

What is claimed is:

1. An imaging lens substantially consisting of, in order from an object side, five lenses of:

a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side;

a second lens that has a biconcave shape;

a third lens that has a meniscus shape which is convex toward the object side;

a fourth lens that has a meniscus shape which is convex toward an image side; and

a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface,

wherein the following conditional expression (1) is satisfied:

$1.4<f/f1<4$ (1), where

f is a focal length of a whole system, and

f1 is a focal length of the first lens.

2. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-3<f/f2<-0.85$ (2), where

f2 is a focal length of the second lens.

3. The imaging lens, as defined in Claim 1, wherein the fourth lens has a positive refractive power.

4. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$0.78<f/f12<2.5$ (3), where

f12 is a composite focal length of the first lens and the second lens.

5. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-2<f/f345<0$ (4), where

f345 is a composite focal length of the third to fifth lenses.

6. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.5<f1/f3<0.4$ (5), where

f3 is a focal length of the third lens.

7. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-1<(R3f-R3r)/(R3f+R3r)<1.2$ (6), where

R3f is a paraxial radius of curvature of an object side surface of the third lens, and

R3r is a paraxial radius of curvature of an image side surface of the third lens.

8. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-4<f/f5<-0.2$ (7), where

f5 is a focal length of the fifth lens.

9. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$0.5<f\cdot\tan\omega/R5r<10$ (8), where

ω is a half angle of view, and

R5r is a paraxial radius of curvature of the image side surface of the fifth lens.

10. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.9<f/f3<0.7$ (9), where

f3 is a focal length of the third lens.

11. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$0.05<D7/f<0.2$ (10), where

D7 is a spacing on an optical axis between the third lens and the fourth lens.

12. The imaging lens, as defined in Claim 1, further comprising an aperture stop that is disposed on the object side of an object side surface of the second lens.

13. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$1.5<f/f1<3.5$ (1-1).

14. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-2.5<f/f2<-0.9$ (2-1), where

f2 is a focal length of the second lens.

15. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$0.8<f/f12<2$ (3-1), where

f12 is a composite focal length of the first lens and the second lens.

16. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-1.5<f/f345<-0.05$ (4-1), where

f345 is a composite focal length of the third to fifth lenses.

17. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.4<f1/f3<0.2$ (5-1), where

f3 is a focal length of the third lens.

18. The imaging lens, as defined in Claim 1, wherein the following conditional expression is further satisfied:

$-0.6<(R3f-R3r)/(R3f+R3r)<1$ (6-1), where

R3f is a paraxial radius of curvature of the object side surface of the third lens, and

R3r is a paraxial radius of curvature of the image side surface of the third lens.

19. The imaging lens, as defined in Claim 1, wherein when a composite refractive power of the first to third lenses is positive, the following conditional expression is further satisfied:

$-3<f/f5<-0.4$ (7-1), where

f5 is a focal length of the fifth lens.

20. An imaging apparatus comprising:

the imaging lens, as defined in Claim 1.

Docket No.:
Only After Sept 16, 2012

ASSIGNMENT WITH DECLARATION FOR PATENT APPLICATION (37 CFR 1.63)

特許出願宣誓書及び譲渡書 (37 CFR 1.63)

Japanese Language Assignment with Declaration

下記に署名した発明者（以下“譲渡人”）である私／我々は、下記で特定される出願書類の中に記載されたいくつかの改良について発明を行い、また、

Whereas, I/We, the undersigned inventor(s) hereinafter called assignor(s), have invented certain improvements described in the application identified below; and

富士フイルム株式会社（譲受人）は本出願および本発明に対する全ての権利、権原、および利益、ならびに当該出願および発明に対して得られる米国特許の取得を希望しているため、

Whereas, FUJIFILM Corporation (assignee), desires to acquire the entire right, title, and interest in the application and invention, and to any United States patents to be obtained therefor;

ここに、譲渡人は、上記譲受人への譲渡に関し、相当の対価を受けることを確認し、

Now therefore, for valuable consideration, receipt whereof is hereby acknowledged,

上記譲渡人である私／我々は、本宣誓書により、

i 上記指定された譲受人、その後継者および継承人に対して、以下の全てを売却、譲渡および移転します。
- すべての分割出願および継続出願を含めて、アメリカ合衆国で開示された本出願および本発明に対する全ての権利、権原および利益、

ならびに、
- 同出願書および発明に対して交付された米国特許証およびその全ての再発行（米国特許法第 119 条に基づく優先権主張の権利を含む）に対する全ての権利、権原および利益。

ii また、米国特許商標局長官に対して、本出願で記述された発明に対して交付された特許証を譲受人、その後継者および継承人に対し発行するよう要請し、また、追加の対価を受けることなく、譲受人の要求に応じて、米国出願に関連して譲受人が必要とみなすすべての書類の完成実施・署名を行います。

I/We, the above named assignor(s), hereby sell, assign and transfer to the above named assignee, its successors and assigns, the entire right, title and interest in the application and the invention disclosed therein for the United States of America, including all divisions, and continuations thereof, and all Letters Patent of the United States that may be granted thereon, and all reissues thereof, including the right to claim priority under 35 USC §119, and I/we request the Director of the U.S. Patent and Trademark Office to issue any Letters Patent granted upon the invention set forth in the application to the assignee, its successors and assigns; and I/we will execute without further consideration all papers deemed necessary by the assignee in connection with the United States application when called upon to do so by the assignee.

私は下記に記載の発明者として以下の通り宣言します。

As the below named inventor, I hereby declare that:

本「宣誓書付き譲渡書」は以下に関するものです。

☐ 添付の出願書、または

This assignment with declaration is directed to:

☒ The attached application, or

☐ _____年__月__日に出願された米国出願あるいは PCT 国際出願番号 _____（確認番号_____）

☐ United States Application or PCT International Application Number _____filed on (Confirmation No. _____).

本出願書の名称は以下の通りです。

The application is entitled:
“IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS”

_____

Japanese Language Assignment with Declaration

上記に特定された出願は私が作成した、または作成を許可したものです。

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

私は私が本宣言書内で請求されている発明を自らなした発明者、または共同発明者であると信じます。

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

私は本宣言付き譲渡書において故意になされた一切の虚偽の陳述が 18 USC 1001 に基づき罰金あるいは 5 年未満の拘禁または両方による処罰にあたることを理解しています。

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

STATEMENT OF ACCURATE TRANSLATION IN ACCORDANCE WITH 37 CFR §1.69(b):

The assignment with declaration is an accurate translation of the corresponding English language assignment with declaration.

Signature / Atsushi Nakamura /
Atsushi Nakamura

Date September 16, 2012

NAME OF SOLE OR FIRST INVENTOR: 唯一あるいは第一の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム） Tatsuyuki		Family Name or Surname 姓 OGINO	
Inventor's signature 発明者の署名 Tatsuyuki Ogino		Date 日付 Jan. 07, 2014	
NAME OF SECOND INVENTOR: 第二の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム） Michio		Family Name or Surname 姓 CHO	
Inventor's signature 発明者の署名 Michio Cho		Date 日付 Jan. 07, 2014	
NAME OF THIRD INVENTOR: 第三の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム） Yoshiaki		Family Name or Surname 姓 ISHII	
Inventor's signature 発明者の署名 Yoshiaki Ishii		Date 日付 Jan. 07, 2014	
NAME OF FOURTH INVENTOR: 第四の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム）		Family Name or Surname 姓	
Inventor's signature 発明者の署名		Date 日付	
NAME OF FIFTH INVENTOR: 第五の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム）		Family Name or Surname 姓	
Inventor's signature 発明者の署名		Date 日付	
NAME OF SIXTH INVENTOR: 第六の発明者名			
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム）		Family Name or Surname 姓	
Inventor's signature 発明者の署名		Date 日付	

FIG.1

EXAMPLE 1

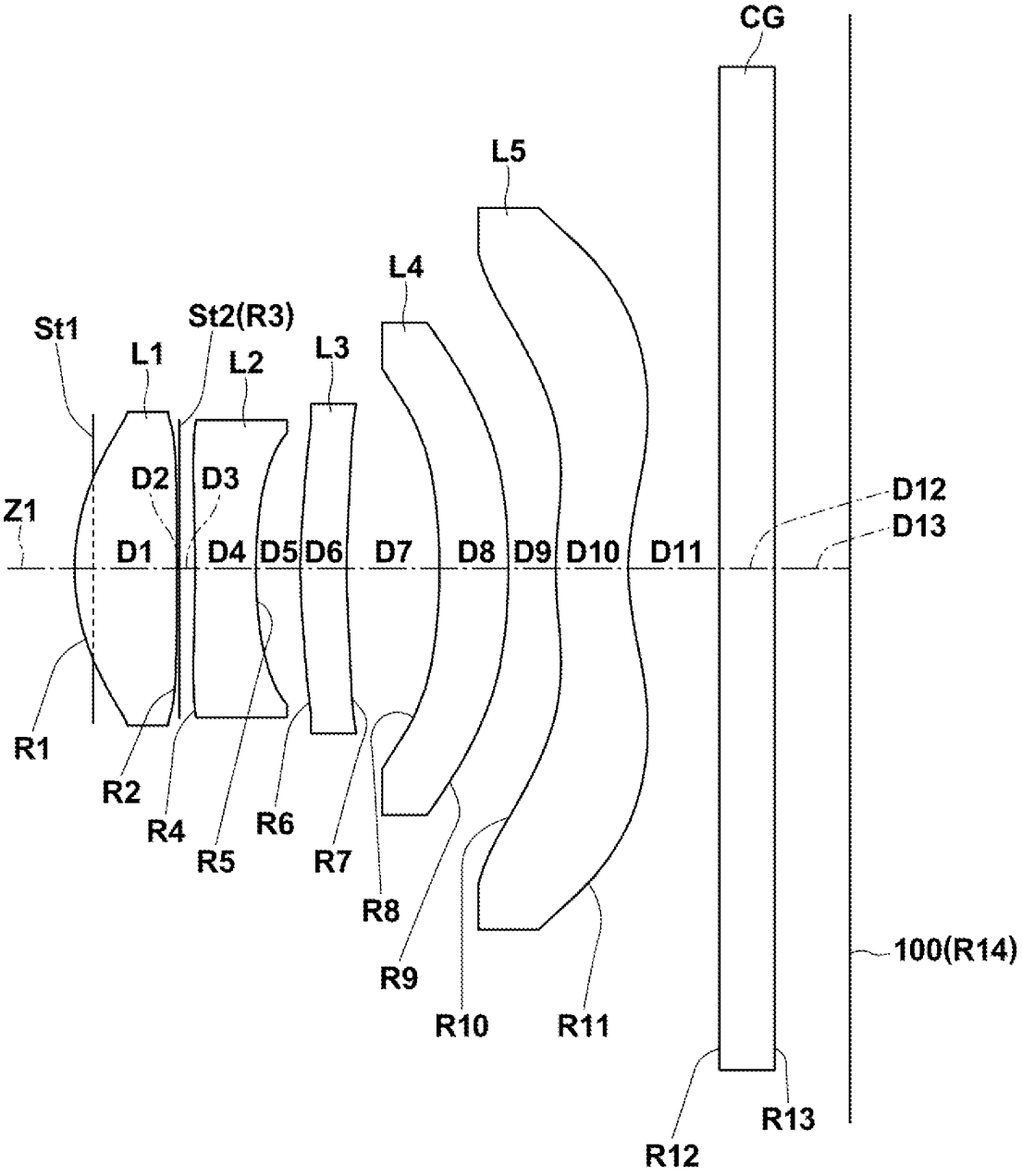


FIG.2

EXAMPLE 2

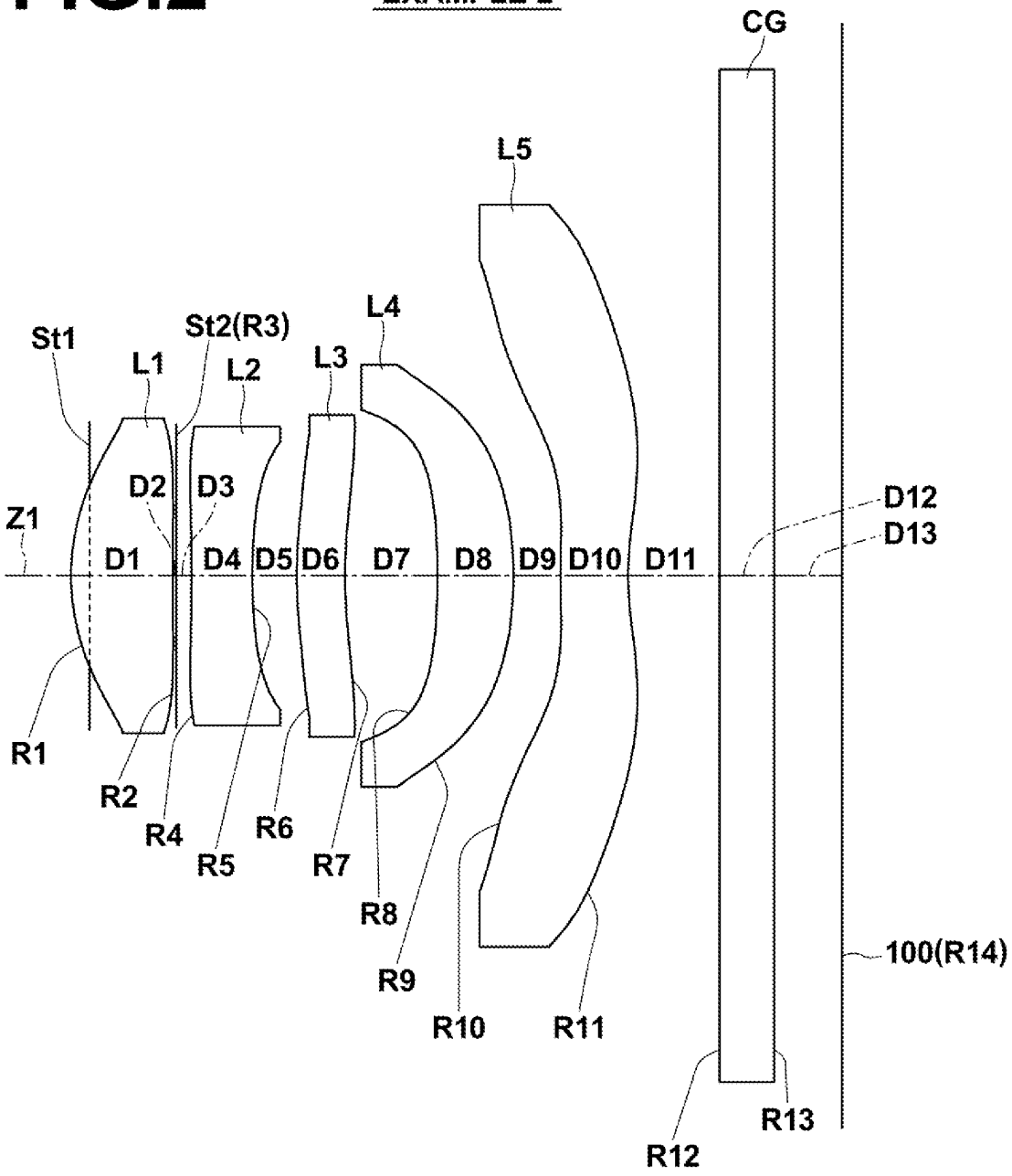


FIG.3

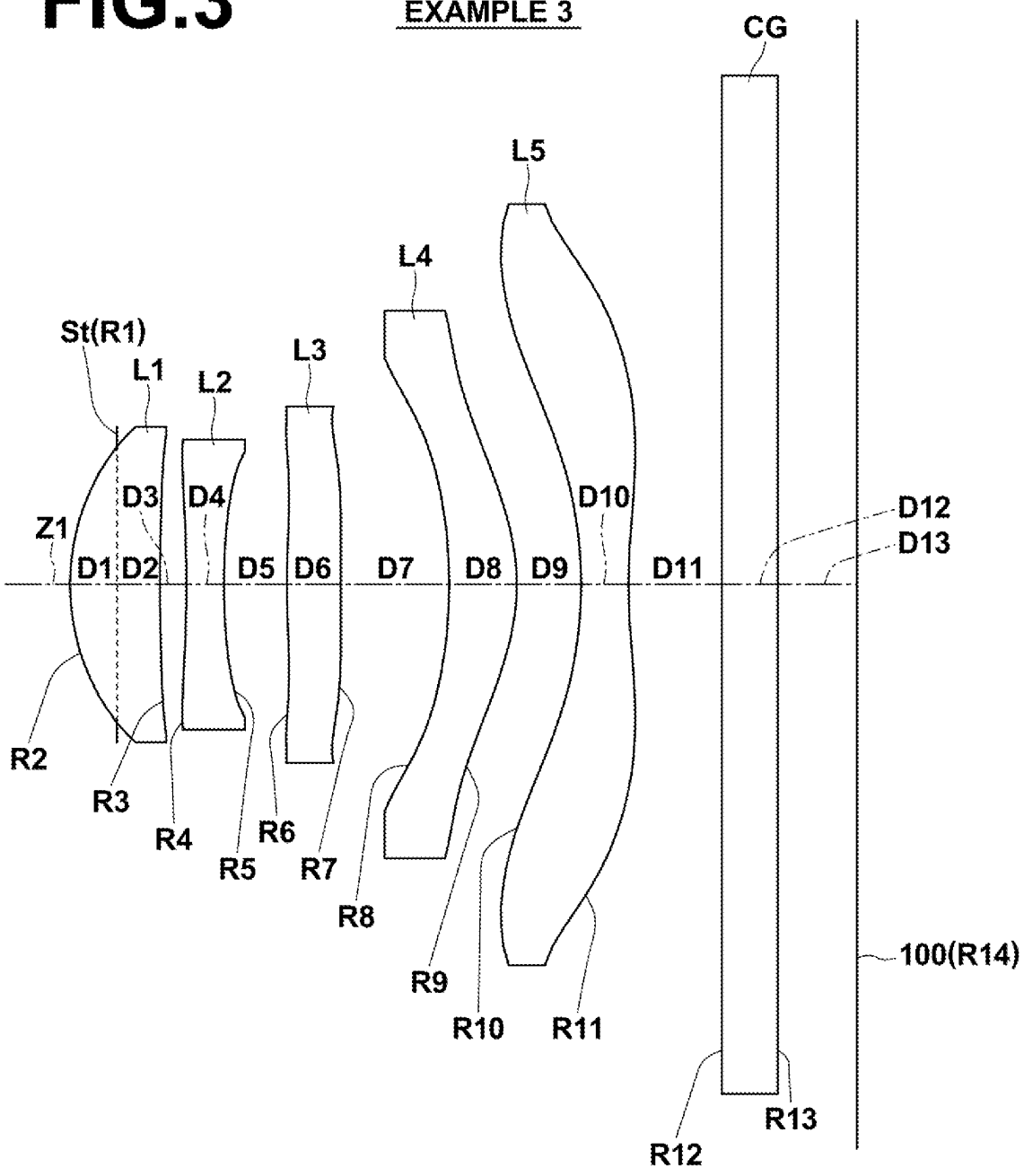

EXAMPLE 3
CG
L5
L4
L3
L2
L1
St(R1)
Z1
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
100(R14)

FIG.4

EXAMPLE 4

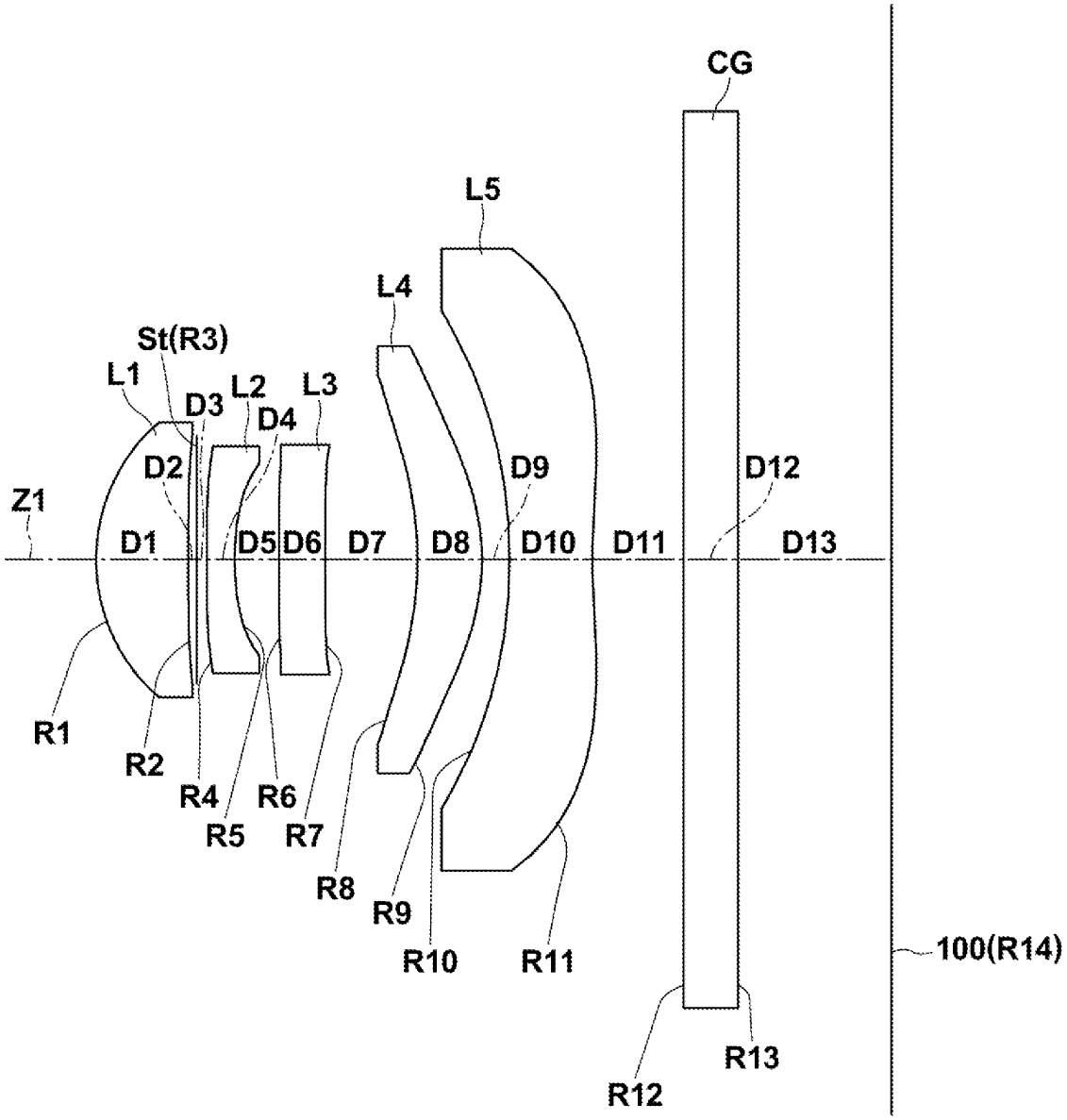


FIG.5

EXAMPLE 5

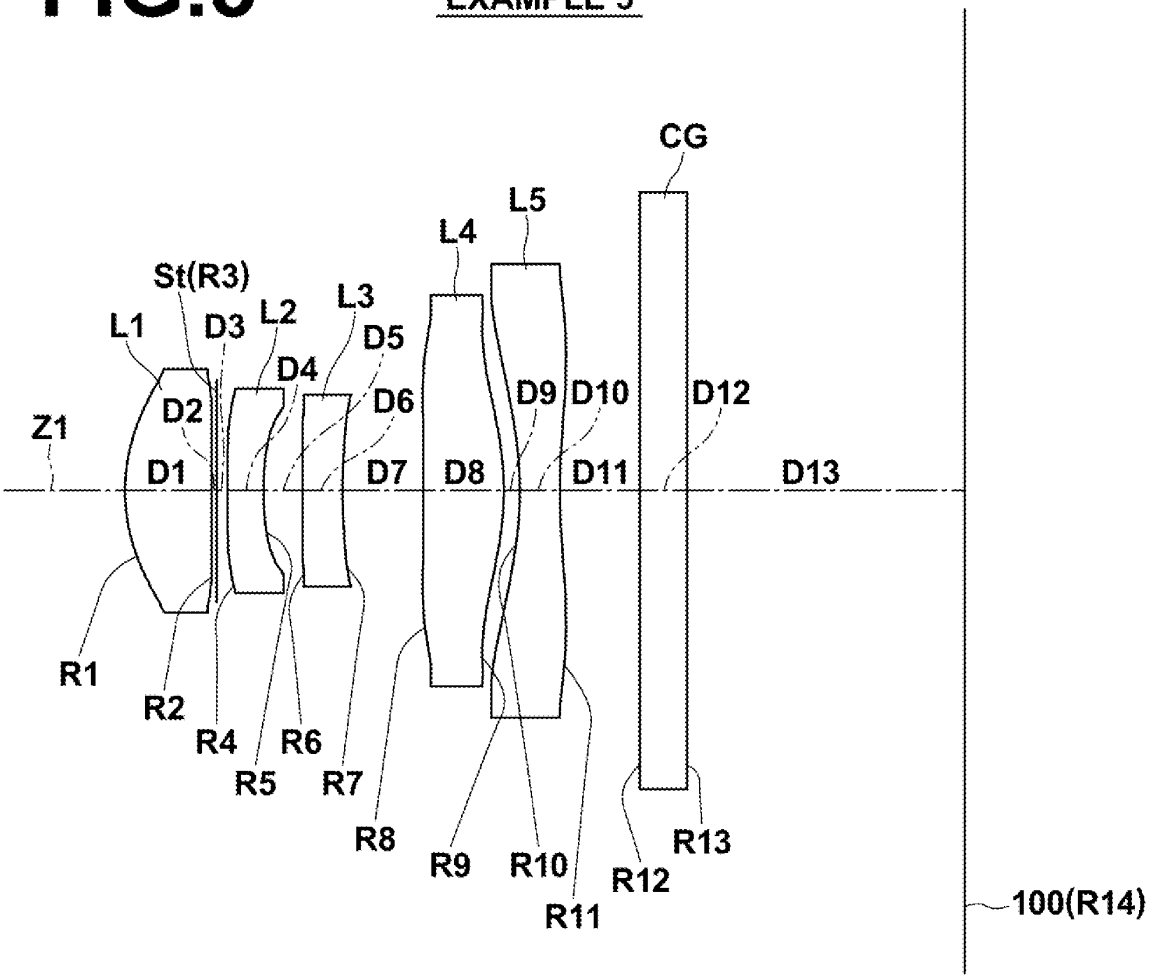


FIG.6

EXAMPLE 6

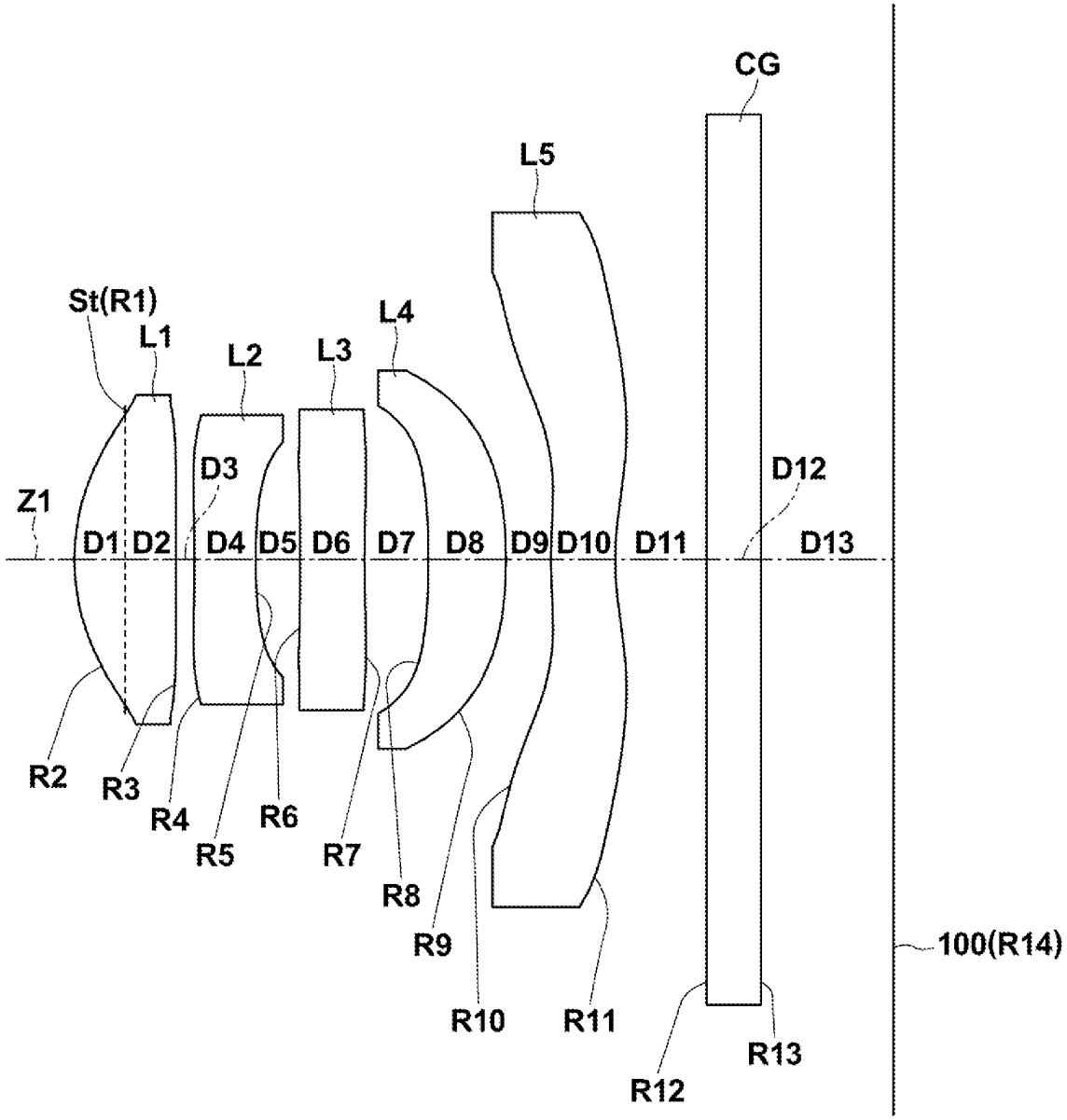


FIG.7

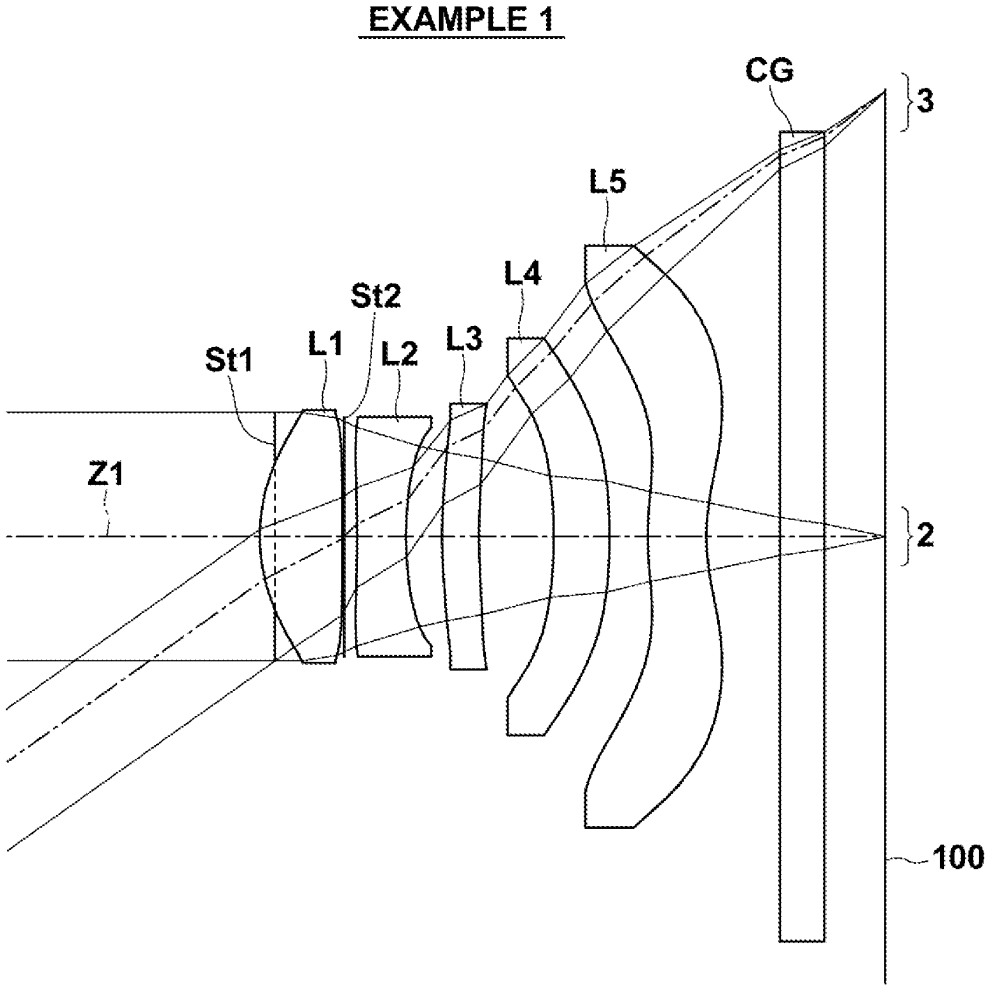


FIG.8

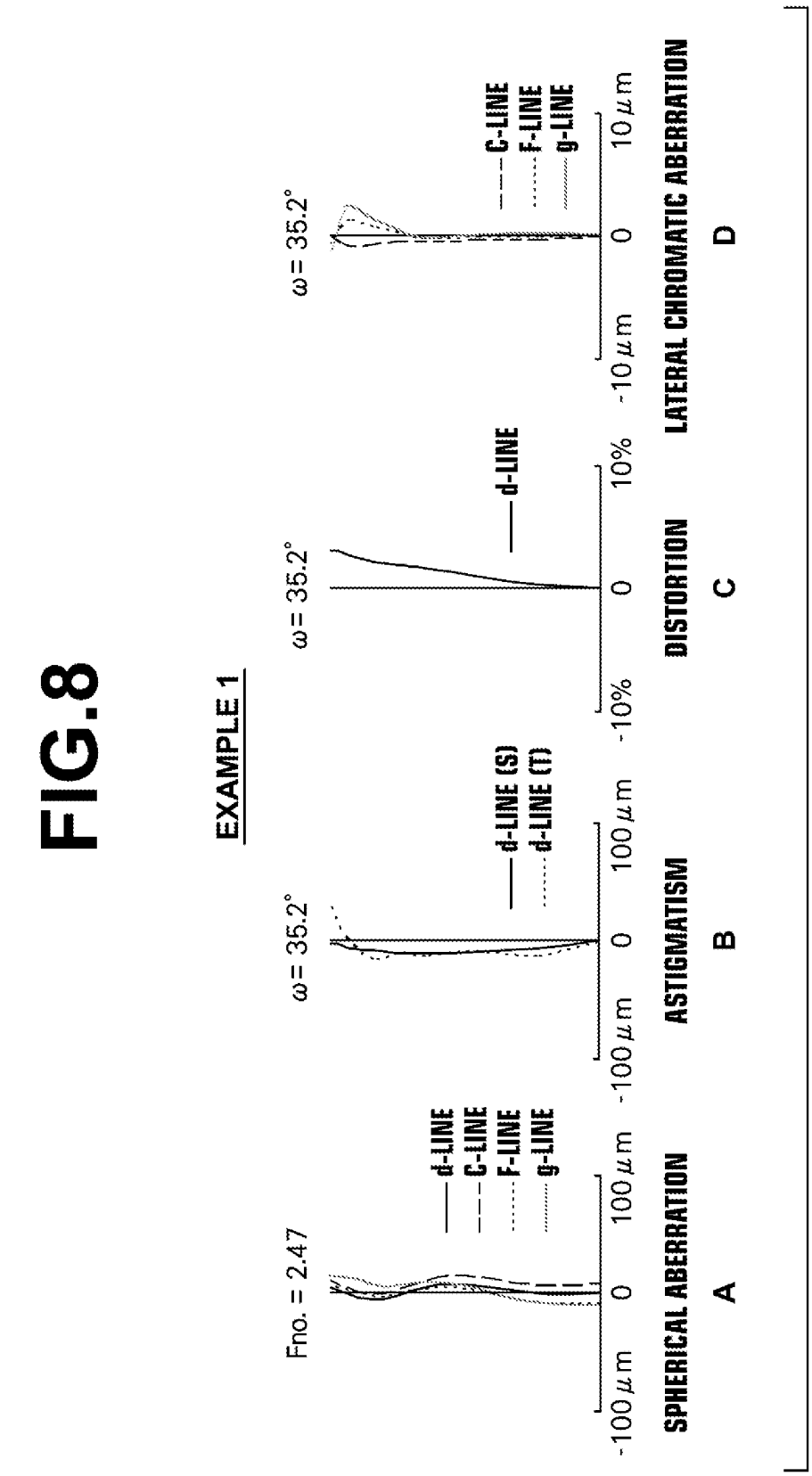

EXAMPLE 1
Fno. = 2.47
ω= 35.2°
d-LINE
C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
SPHERICAL ABERRATION
A
ω= 35.2°
d-LINE (S)
d-LINE (T)
-100 μm
0
100 μm
ASTIGMATISM
B
ω= 35.2°
d-LINE
-10%
0
10%
DISTORTION
C
ω= 35.2°
C-LINE
F-LINE
g-LINE
-10 μm
0
10 μm
LATERAL CHROMATIC ABERRATION
D

FIG.9

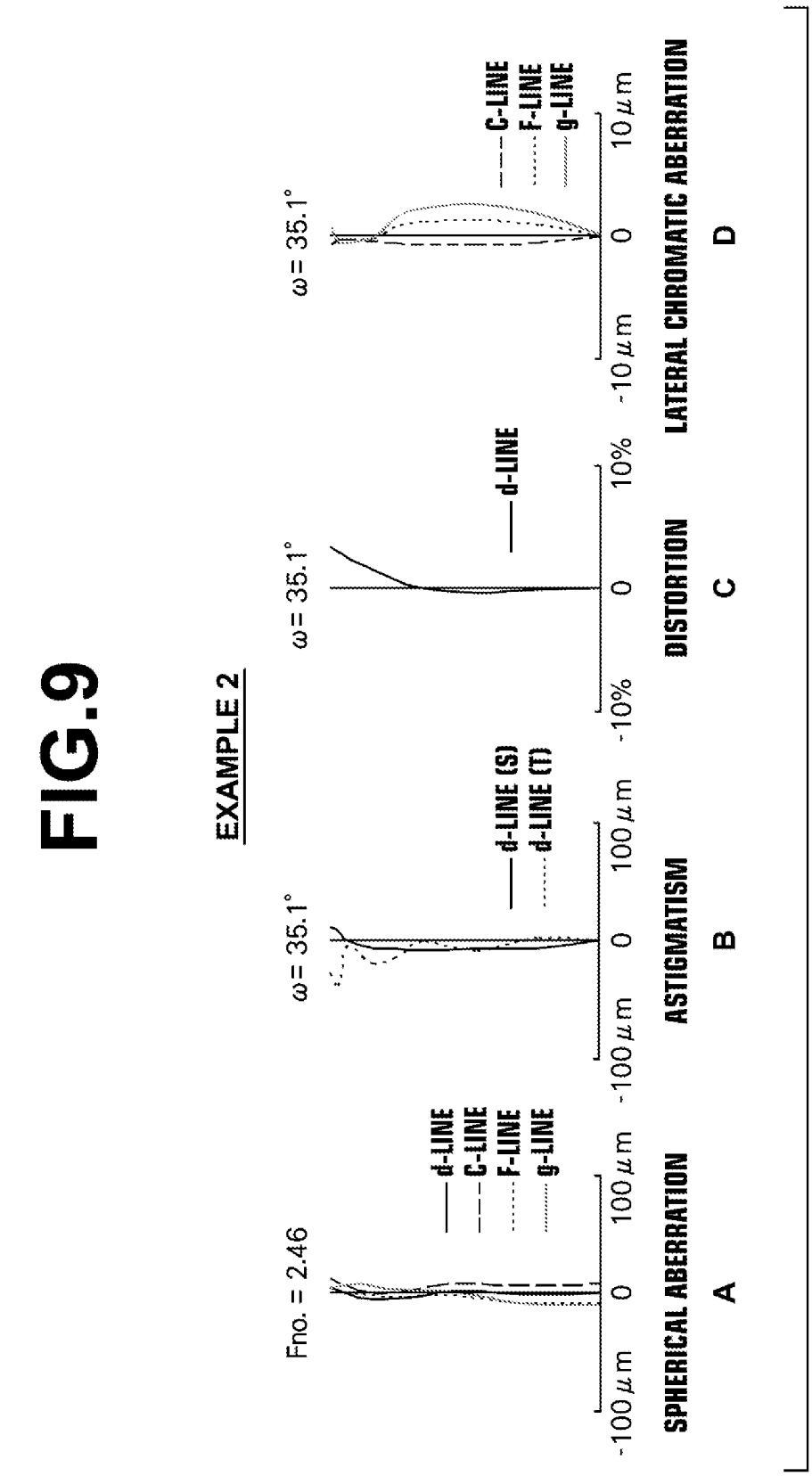

EXAMPLE 2
Fno. = 2.46
ω= 35.1°
d-LINE
C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
SPHERICAL ABERRATION
A
d-LINE (S)
d-LINE (T)
ASTIGMATISM
B
-10%
10%
d-LINE
DISTORTION
C
C-LINE
F-LINE
g-LINE
-10 μm
10 μm
LATERAL CHROMATIC ABERRATION
D

FIG.10

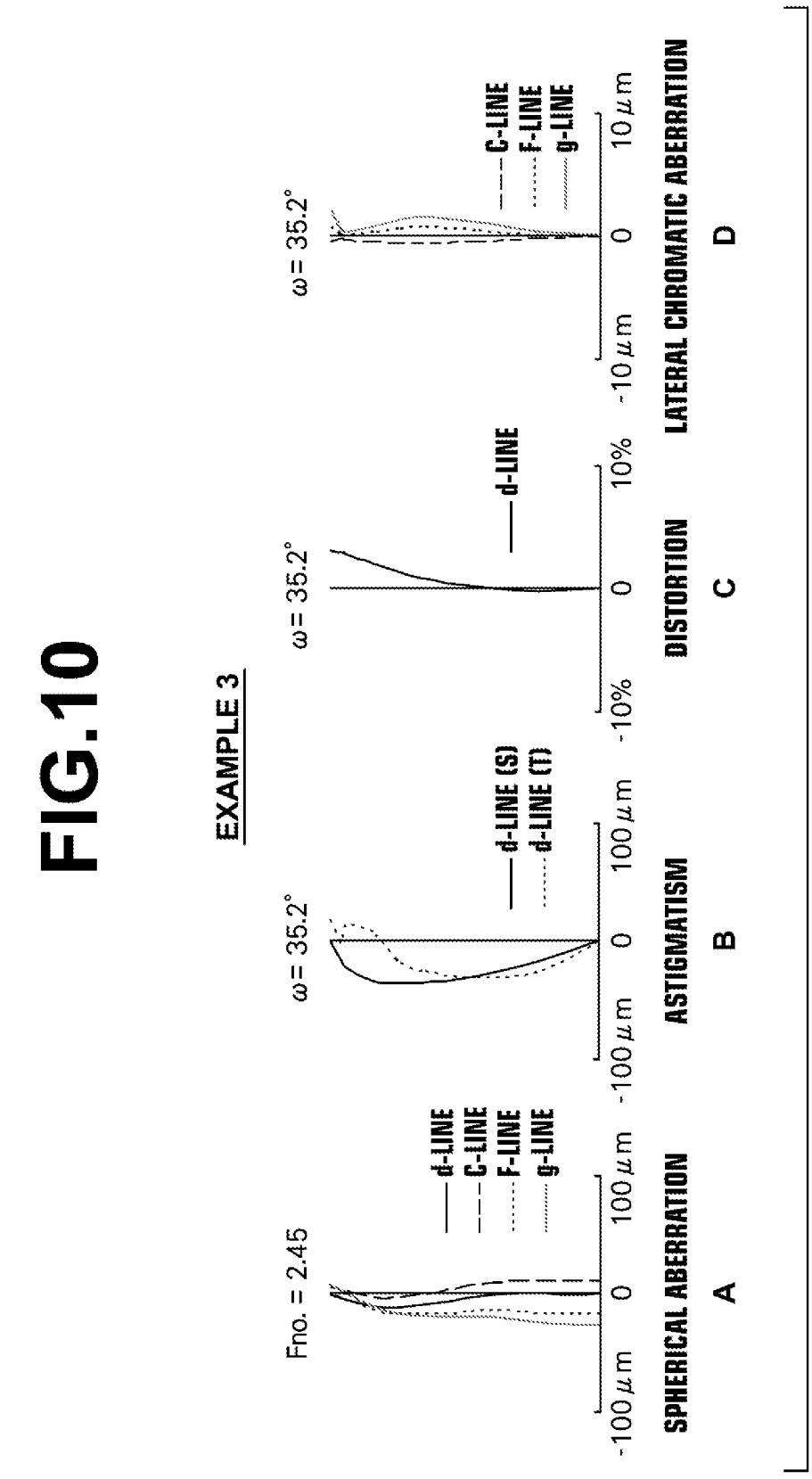
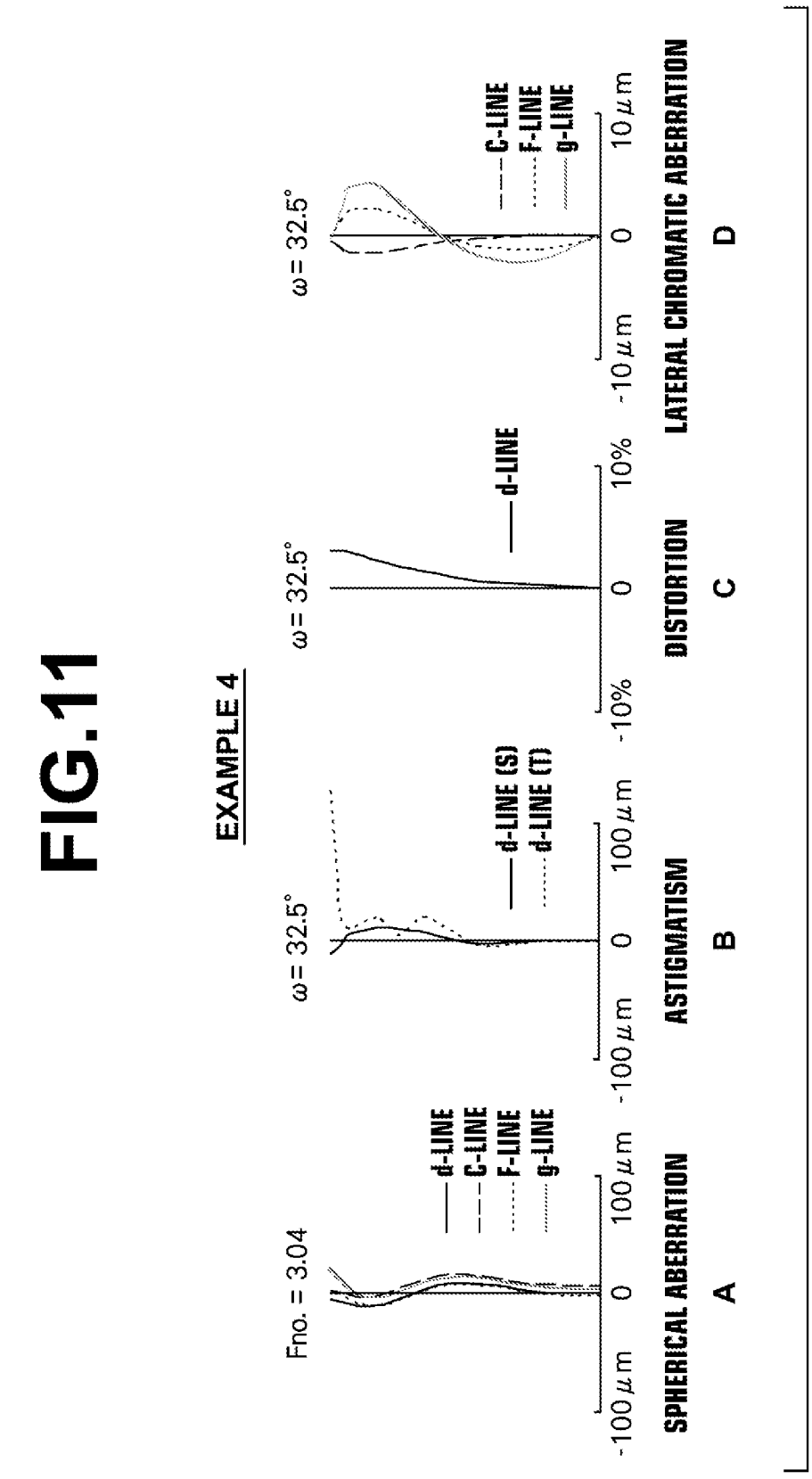

EXAMPLE 3
Fno. = 2.45
ω= 35.2°
d-LINE
C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
SPHERICAL ABERRATION
A
d-LINE (S)
d-LINE (T)
ASTIGMATISM
B
-10%
0
10%
d-LINE
DISTORTION
C
-10 μm
0
10 μm
LATERAL CHROMATIC ABERRATION
D

FIG.11


EXAMPLE 4
Fno. = 3.04
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C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
SPHERICAL ABERRATION
A
ω= 32.5°
d-LINE (S)
d-LINE (T)
-100 μm
0
100 μm
ASTIGMATISM
B
ω= 32.5°
d-LINE
-10%
0
10%
DISTORTION
C
ω= 32.5°
C-LINE
F-LINE
g-LINE
-10 μm
0
10 μm
LATERAL CHROMATIC ABERRATION
D

FIG.12

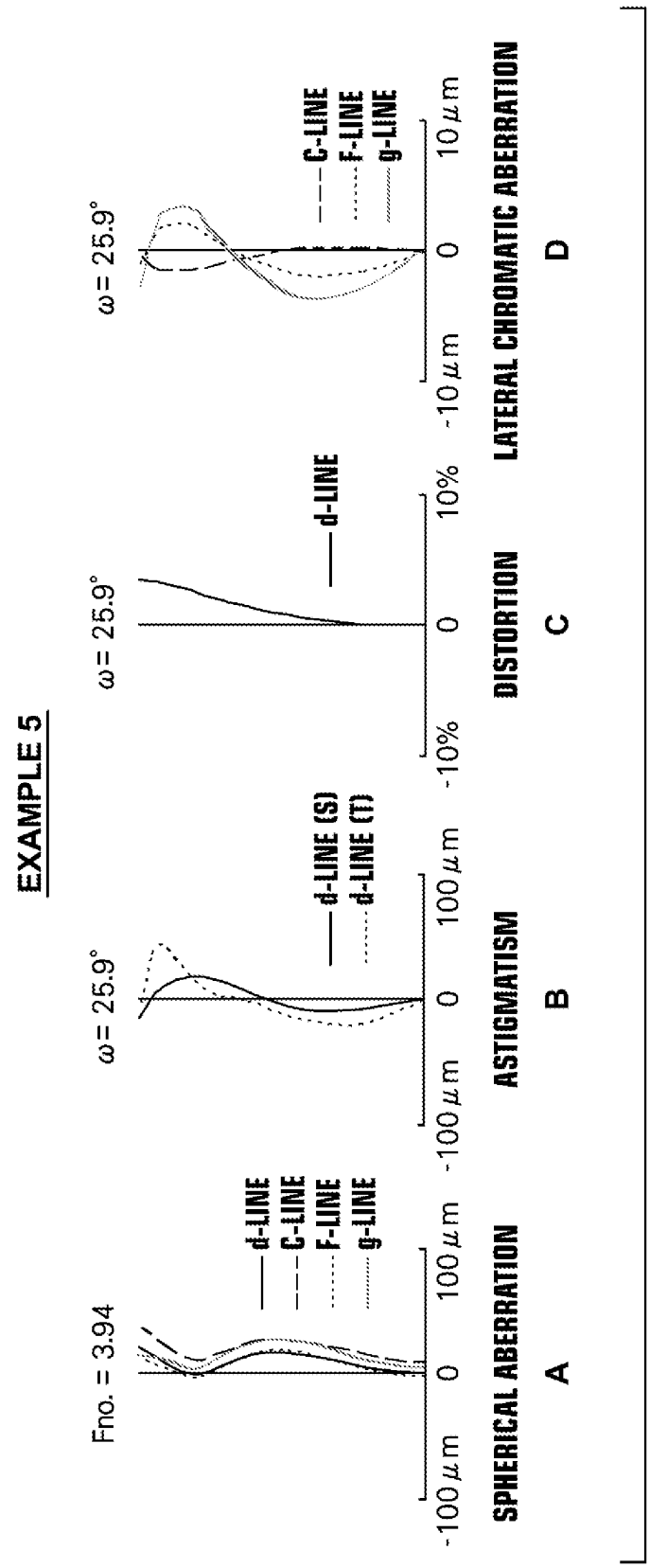
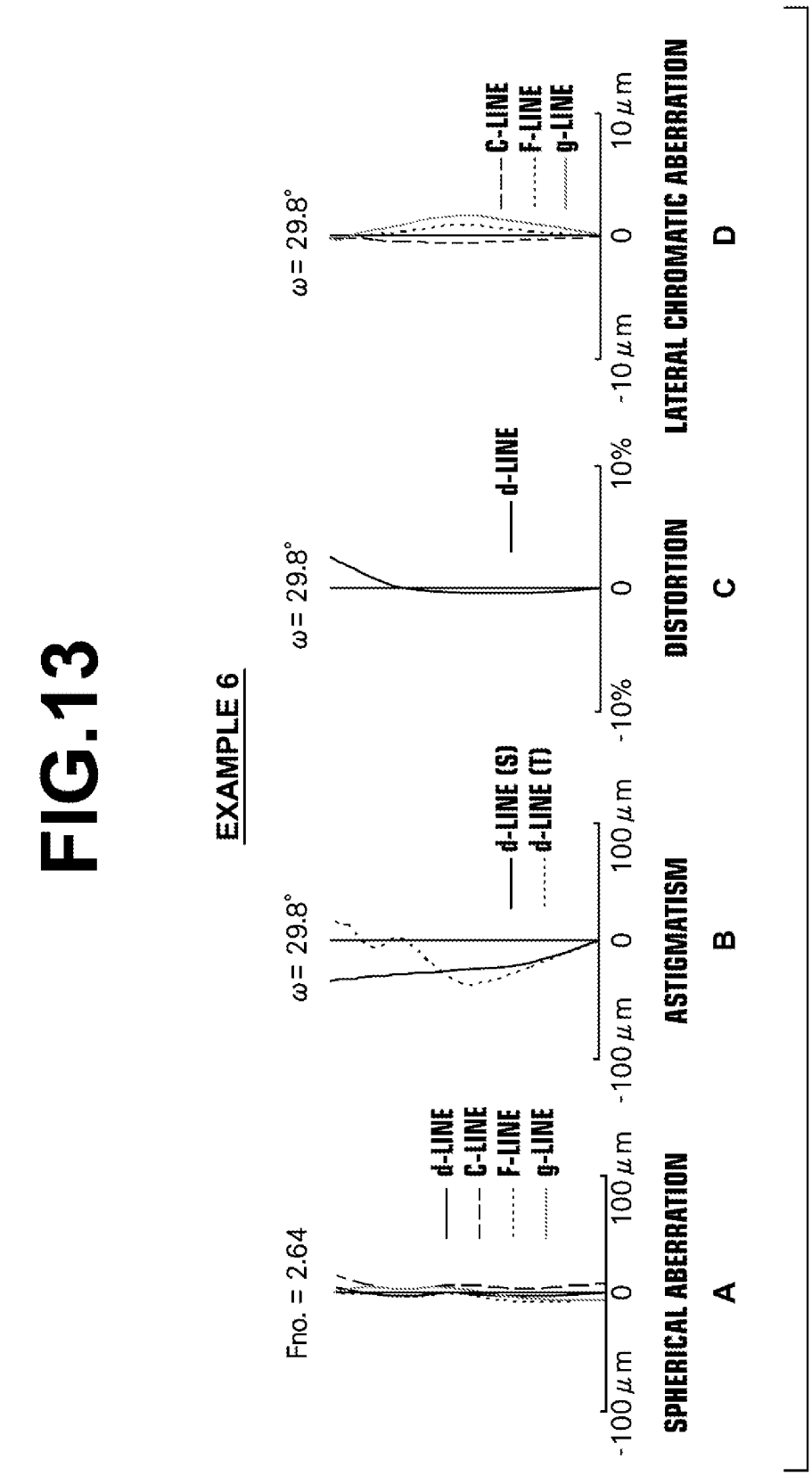

EXAMPLE 5
Fno. = 3.94
ω= 25.9°
ω= 25.9°
ω= 25.9°
d-LINE
C-LINE
F-LINE
g-LINE
d-LINE (S)
d-LINE (T)
d-LINE
C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
-100 μm
0
100 μm
-10%
0
10%
-10 μm
0
10 μm
SPHERICAL ABERRATION
ASTIGMATISM
DISTORTION
LATERAL CHROMATIC ABERRATION
A
B
C
D

FIG.13


EXAMPLE 6
Fno. = 2.64
d-LINE
C-LINE
F-LINE
g-LINE
-100 μm
0
100 μm
SPHERICAL ABERRATION
A
ω= 29.8°
d-LINE (S)
d-LINE (T)
-100 μm
0
100 μm
ASTIGMATISM
B
ω= 29.8°
d-LINE
-10%
0
10%
DISTORTION
C
ω= 29.8°
C-LINE
F-LINE
g-LINE
-10 μm
0
10 μm
LATERAL CHROMATIC ABERRATION
D

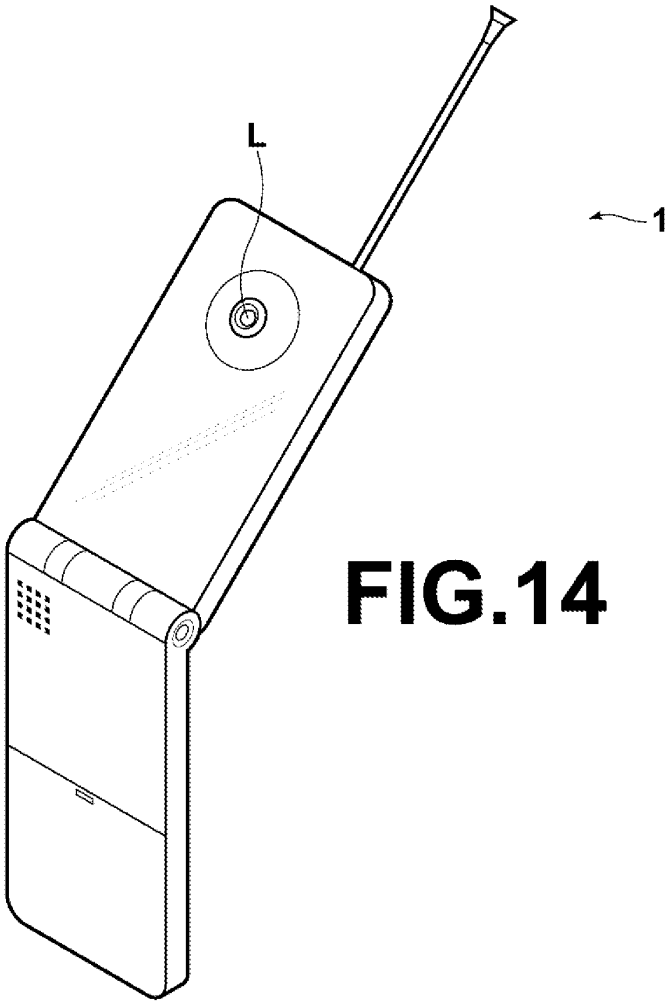


FIG.14

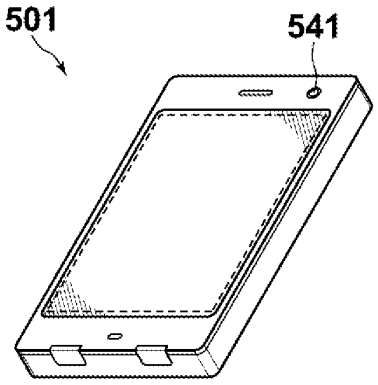


FIG.15

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	2014-03-26
	First Named Inventor	Tatsuyuki OGINO
	Art Unit	
	Examiner Name	
	Attorney Docket Number	8081-1131-1

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8310768		2012-11-13	LIN et al.	Cited in the specification
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	
	Examiner Name	
	Attorney Docket Number	8081-1131-1

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☐ See attached certification statement.

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

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Signature	/Eric Jensen/	Date (YYYY-MM-DD)	2014-03-26
Name/Print	Eric Jensen	Registration Number	37855

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SIGNATURE of Applicant for Patent

Signature	Kiyotaka Kaneko	Date	Sep. 13, 2012
Name	Kiyotaka KANEKO		
Title and Company	General Manager, Intellectual Property Technology Div., Intellectual ~~Property Div., R&D Management HQ, Fujifilm Corporation~~		

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IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a fixed-focus imaging lens that forms an optical image of a subject on an imaging device, such as a charge coupled device (CCD) and a complementary metal oxide semiconductor (CMOS), and to an imaging apparatus, such as a digital still camera, a cellular phone with a camera, a mobile information terminal (PDA: Personal Digital Assistance), a smartphone, a tablet terminal, and a mobile game machine, on which the imaging lens is mounted to perform photography.

Description of the Related Art

As personal computers have become popular in homes, digital still cameras which are capable of inputting image information about photographed scenes, persons, and the like into the personal computers have spread rapidly. Further, a cellular phone, a smartphone, or a tablet terminal in which a camera module for inputting images is installed has been increasing. Such apparatus having an imaging function uses an imaging device, such as a CCD and a CMOS. Recently, because the imaging device has been miniaturized, there has been also a demand to miniaturize the whole of the imaging apparatus and an imaging lens mounted thereon. Further, since the number of pixels included in the imaging device has also been increasing, there has been a demand to enhance the resolution and performance of the imaging lens. For example, there has been a demand for performance corresponding to high resolution of 5 megapixels or higher, and preferably performance corresponding to high resolution of 8 megapixels or higher.

To satisfy such demands, it can be considered that the imaging lens is composed of five or six lenses, which are a relatively large number of lenses. For example, U.S. Patent No. 8,310,768 (Patent Document 1) and U.S. Patent Application Publication No. 20130033765 (Patent Document 2) propose an imaging lens composed of five lenses. The imaging lens disclosed in Patent Documents 1 and 2 substantially

consists of, in order from an object side, five lenses of a first lens that has a positive refractive power, a second lens that has a negative refractive power, a third lens that has a positive refractive power, a fourth lens that has a positive refractive power, and a fifth lens that has a negative refractive power.

SUMMARY OF THE INVENTION

In particular, for the imaging lenses used in apparatuses, of which the thickness has been decreased, such as a cellular phone, a smartphone or a tablet terminal, a demand to decrease the total length of the lens has been increased more and more. Hence, it is necessary to further decrease the total lengths of the imaging lenses disclosed in Patent Documents 1 and 2.

The present invention has been made in view of the above-mentioned circumstances and an object thereof is to provide an imaging lens capable of achieving high imaging performance in the range from the central angle of view to the peripheral angle of view while achieving a decrease in the total length thereof. Another object of the present invention is to provide an imaging apparatus capable of obtaining a photographed image with high resolution through the imaging lens which is mounted thereon.

The imaging lens of the present invention is an imaging lens substantially consisting of, in order from an object side, five lenses of:

a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side;

a second lens that has a biconcave shape;

a third lens that has a meniscus shape which is convex toward the object side;

a fourth lens that has a meniscus shape which is convex toward an image side; and

a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface,

in which the following conditional expression (1) is satisfied:

$1.4<f/f1<4 \quad (1)$, where

f is a focal length of a whole system, and

f1 is a focal length of the first lens.

According to the imaging lens of the present invention, in the imaging lens which is composed of five lenses as a whole, a configuration of each lens element of the first to fifth lenses is optimized. Therefore, it is possible to achieve a lens system that has high resolution performance while decreasing the total length thereof.

In the imaging lens of the present invention, the expression "substantially consisting of five lenses" means that the imaging lens of the present invention may include not only the five lenses but also a lens which has substantially no refractive power, optical elements, such as a stop and a cover glass, which are not a lens, mechanism parts, such as a lens flange, a lens barrel, an imaging device and a hand shake blur correction mechanism, and the like. When the lens includes an aspheric surface, the reference sign of the surface shape and refractive power of the lens is considered in a paraxial region.

In the imaging lens of the present invention, by employing and satisfying the following desirable configuration, it is possible to make the optical performance thereof better.

In the imaging lens of the present invention, it is desirable that the fourth lens have a positive refractive power.

It is desirable that the imaging lens of the present invention further include an aperture stop that is disposed on the object side of an object side surface of the second lens.

It is desirable that the imaging lens of the present invention satisfy any of the following conditional expressions (1-1) to (10). It should be noted that, as a desirable mode, any one of the conditional expressions (1-1) to (10) may be satisfied, or an arbitrary combination thereof may be satisfied. However, regarding the conditional expression (7-1), when the composite refractive power of the first to third lenses is positive, it is desirable to satisfy the conditional expression (7-1).

$$1.5<f/f1<3.5 \quad (1-1),$$

$-3<f/f2<-0.85$ (2),

$-2.5<f/f2<-0.9$ (2-1),

$0.78<f/f12<2.5$ (3),

$0.8<f/f12<2$ (3-1),

$-2<f/f345<0$ (4),

$-1.5<f/f345<-0.05$ (4-1),

$-0.5<f1/f3<0.4$ (5),

$-0.4<f1/f3<0.2$ (5-1),

$-1<(R3f-R3r)/(R3f+R3r)<1.2$ (6),

$-0.6<(R3f-R3r)/(R3f+R3r)<1$ (6-1),

$-4<f/f5<-0.2$ (7),

$-3<f/f5<-0.4$ (7-1),

$0.5<f\cdot\tan\omega/R5r<10$ (8),

$0.7<f\cdot\tan\omega/R5r<3$ (8-1),

$-0.9<f/f3<0.7$ (9), and

$0.05<D7/f<0.2$ (10), where

f is a focal length of a whole system,

f1 is a focal length of the first lens,

f2 is a focal length of the second lens,

f3 is a focal length of the third lens,

f5 is a focal length of the fifth lens,

f12 is a composite focal length of the first lens and the second lens,

f345 is a composite focal length of the third to fifth lenses,

R3f is a paraxial radius of curvature of an object side surface of the third lens,

R3r is a paraxial radius of curvature of an image side surface of the third lens,

R5r is a paraxial radius of curvature of an image side surface of the fifth lens,

D7 is a spacing on an optical axis between the third lens and the fourth lens, and

ω is a half angle of view.

The imaging apparatus of the present invention includes the imaging lens of the present invention.

In the imaging apparatus of the present invention, imaging signals with high resolution can be obtained based on an optical image with high resolution obtained by the imaging lens of the present invention.

According to the imaging lens of the present invention, in the imaging lens which is composed of five lenses as a whole, a configuration of each lens element is optimized, and particularly the shapes of the first and fifth lenses are appropriately formed. Therefore, it is possible to achieve a lens system that has high resolution performance in the range from the central angle of view to the peripheral angle of view while decreasing the total length thereof.

Further, according to the imaging apparatus of the present invention, imaging signals based on an optical image formed by the imaging lens of the present invention, which has high imaging performance, are output. Therefore, it is possible to obtain a photographed image with high resolution.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a lens cross-sectional view illustrating a first configuration example of an imaging lens according to an embodiment of the present invention and corresponding to Example 1;

Figure 2 is a lens cross-sectional view illustrating a second configuration example of an imaging lens according to an embodiment of the present invention and corresponding to Example 2;

Figure 3 is a lens cross-sectional view illustrating a third configuration example of an imaging lens according to an embodiment of the present invention and corresponding to Example 3;

Figure 4 is a lens cross-sectional view illustrating a fourth configuration example of an imaging lens according to an embodiment of the present invention and corresponding to Example 4;

Figure 5 is a lens cross-sectional view illustrating a fifth configuration example of an imaging lens according to an embodiment of the present invention and corresponding to Example 5;

Figure 6 is a lens cross-sectional view illustrating a sixth configuration example of an imaging lens according to an embodiment

of the present invention and corresponding to Example 6;

Figure 7 is a ray diagram of the imaging lens shown in Figure 1;

Figure 8 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 1 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 9 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 2 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 10 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 3 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 11 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 4 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 12 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 5 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 13 is an aberration diagram illustrating various aberrations of an imaging lens according to Example 6 of the present invention, where Section A shows a spherical aberration, Section B shows astigmatism (curvature of field), Section C shows distortion, and Section D shows a lateral chromatic aberration;

Figure 14 is a diagram illustrating an imaging apparatus which is a cellular phone terminal including the imaging lens according

to the present invention; and

Figure 15 is a diagram illustrating an imaging apparatus which is a smartphone including the imaging lens according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings.

Figure 1 shows a first configuration example of an imaging lens according to a first embodiment of the present invention. The configuration example corresponds to a lens configuration of a first numerical value example (Table 1 and Table 2) to be described later. Likewise, Figures 2 to 6 show cross sections of second to sixth configuration examples corresponding to the imaging lenses according to second to sixth embodiments to be described later. The second to sixth configuration examples correspond to lens configurations of the second to sixth numerical value examples (Tables 3 to 12) to be described later. In Figures 1 to 6, the reference sign Ri represents a radius of curvature of i-th surface, where the number i is the sequential number that sequentially increases as it gets closer to an image side (an imaging side) when a surface of a lens element closest to an object side is regarded as a first surface. The reference sign Di represents an on-axis surface spacing between i-th surface and (i+1)th surface on an optical axis Z1. Since the respective configuration examples are basically similar in configuration, the following description will be given on the basis of the first configuration example of the imaging lens shown in Figure 1, and the configuration examples shown in Figures 2 to 6 will be also described as necessary. Further, Figure 7 is an optical path diagram of the imaging lens L shown in Figure 1, and shows an optical path of rays 2 on the optical axis from an object point at the infinite distance and an optical path of rays 3 at the maximum angle of view.

An imaging lens L according to an embodiment of the present invention is appropriate to be used in various kinds of imaging apparatuses using imaging devices such as a CCD and a CMOS. Especially, the imaging lens L is appropriate to be used in relatively small-sized

mobile terminal apparatus, for example, such as a digital still camera, a cellular phone with a camera, a smartphone, a tablet terminal, and a PDA. This imaging lens L includes, along the optical axis Z1, a first lens L1, a second lens L2, a third lens L3, a fourth lens L4, and a fifth lens L5 in this order from the object side.

Figure 14 is a schematic diagram illustrating a cellular phone terminal, which is an imaging apparatus 1 according to an embodiment of the present invention. The imaging apparatus 1 according to the embodiment of the present invention includes imaging lens L according to the present embodiment and an imaging device 100 (refer to Figure 1), such as a CCD, which outputs imaging signals based on an optical image formed by the imaging lens L. The imaging device 100 is disposed at an image formation surface (image plane R14) of the imaging lens L.

Figure 15 is a schematic diagram illustrating a smartphone which is an imaging apparatus 501 according to an embodiment of the present invention. The imaging apparatus 501 according to the embodiment of the present invention includes a camera unit 541 including the imaging lens L according to the present embodiment and the imaging device 100 (refer to Figure 1), such as a CCD, which outputs imaging signals based on an optical image formed by the imaging lens L. The imaging device 100 is disposed at the image formation surface (image plane R14) of the imaging lens L.

Various optical members CG may be disposed between the fifth lens L5 and the imaging device 100 based on the configuration of a camera on which the imaging lens is mounted. For example, a flat-plate-shaped optical member, such as a cover glass for protecting an imaging surface and an infrared-ray cut filter, may be disposed. In this case, for example, a flat-plate-shaped cover glass to which a coating having an effect of a filter, such as an infrared-ray cut filter and an ND filter, has been applied, or a material having the same effect may be used as the optical member CG.

Alternatively, an effect similar to the optical member CG may be given to the fifth lens L5 or the like by applying a coating to

the fifth lens L5 or the like without using the optical member CG. Thereby, it is possible to reduce the number of components, and to reduce the total length.

Further, it is desirable that the imaging lens L includes an aperture stop St disposed on the object side of an object side surface of the second lens L2. Since the aperture stop St is disposed on the object side of the object side surface of the second lens L2 in such a manner, especially in a peripheral portion of an imaging area, it is possible to prevent an angle of incidence of rays, which pass through the optical system and are incident onto an imaging surface (imaging device), from becoming large. In order to further enhance this effect, it is more desirable that the aperture stop St be disposed on the object side of an object side surface of the first lens L1. Here, the expression "disposed on the object side of the object side surface of the second lens L2" means that the position of the aperture stop in the optical axis direction is the same as an intersection point between an on-axis marginal ray and the object side surface of the second lens L2 or located on the object side of the intersection point. Likewise, the expression "disposed on the object side of an object side surface of the first lens L1" means that the position of the aperture stop in the optical axis direction is the same as an intersection point between an on-axis marginal ray and the object side surface of the first lens L1 or located on the object side of the intersection point.

In the embodiments of the present invention, the imaging lenses of the third and sixth configuration examples (refer to Figures 3 and 6) are configuration examples in which the aperture stop St is disposed on the object side of the object side surface of the first lens L1, and the imaging lenses of the first, second, fourth and fifth configuration examples (refer to Figures 1, 2, 4 and 5) are configuration examples in which the aperture stop St is disposed on the object side of the object side surface of the second lens L2. It should be noted that the aperture stop St shown herein does not necessarily represent the size or shape thereof but shows the position thereof on the optical axis Z1.

When the aperture stop St is disposed on the object side of the object side surface of the second lens L2, a flare stop for suppressing a flare component or a ghost component may be further provided on the object side of the object side surface of the first lens L1. In the embodiments of the present invention, lenses as first and second configuration examples (Figures 1 and 2) are configuration examples in which the flare stop is provided. It should be noted that, in Figures 1 and 2, the flare stop is referenced by the reference sign St1, and the aperture stop is referenced by the reference sign St2. In this case, the aperture stop St2 is a stop that restricts an F-number, and the flare stop St1 is a stop that restricts rays at peripheral angles of view.

Furthermore, when the aperture stop St is disposed on the object side of the object side surface of the first lens L1 in the optical axis, it is desirable that the aperture stop St be disposed on the image side of a vertex of the surface of the first lens L1. When the aperture stop St is disposed on the image side of the vertex of the surface of the first lens L1 in such a manner, it is possible to reduce the total length of the imaging lens including the aperture stop St. In the above-mentioned embodiments, the aperture stop St is disposed on the image side of the vertex of the surface of the first lens L1. However, the invention is not limited to the embodiments, and the aperture stop St may be disposed on the object side of the vertex of the surface of the first lens L1. The arrangement, in which the aperture stop St is disposed on the object side of the vertex of the surface of the first lens L1, is slightly disadvantageous in terms of securing a peripheral light amount, compared with a case where the aperture stop St is disposed on the image side of the vertex of the surface of the first lens L1. However, the arrangement can prevent an angle of incidence of rays, which pass through the optical system and are incident onto the imaging surface (imaging device), from becoming large in the peripheral portion of the imaging area in a more desirable manner.

As in the imaging lenses according to the first, second, fourth and fifth embodiments shown in Figures 1, 2, 4 and 5, the aperture

stop St (St2) may be disposed between the first lens L1 and the second lens L2 in the optical axis direction. In this case, it is possible to satisfactorily correct a curvature of field. When the aperture stop St is disposed between the first lens L1 and the second lens L2 in the optical axis direction, as compared with a case where the aperture stop St is disposed on the object side of the object side surface of the first lens L1 in the optical axis direction, this arrangement is disadvantageous in securing telecentricity, that is, making the principal rays parallel to such an extent that the principal rays are regarded as the optical axis (setting an incident angle thereof on the imaging surface such that the angle is approximate to zero). Thus, by applying an imaging device which is recently implemented as the development in the imaging device technology advances and in which deterioration in the light receiving efficiency and occurrence of color mixture due to increase of incident angle are more reduced than in the conventional imaging device, it is possible to achieve optimum optical performance.

In the imaging lens L, the first lens L1 has a positive refractive power in the vicinity of the optical axis, and has a meniscus shape which is convex toward the object side in the vicinity of the optical axis. As shown in the embodiments, by making the first lens L1, which is a lens closest to the object, have a positive refractive power and have a meniscus shape which is convex toward the object side in the vicinity of the optical axis, the position of the rear side principal point of the first lens L1 can be set to be close to the object, and thus it is possible to appropriately reduce the total length.

The second lens L2 has a biconcave shape in the vicinity of the optical axis. Thereby, it is possible to appropriately suppress occurrence of a high-order spherical aberration while satisfactorily correcting a chromatic aberration, and it is also possible to appropriately reduce the total length.

The third lens L3 has a meniscus shape which is convex toward the object side in the vicinity of the optical axis. Thereby, the position of the rear side principal point of the third lens L3 can

be more appropriately set to be close to the object side, and thus it is possible to appropriately reduce the total length. As long as the third lens L3 has a meniscus shape which is convex toward the object side in the vicinity of the optical axis, it is possible to adopt a configuration in which the third lens L3 has a positive refractive power in the vicinity of the optical axis, and it is also possible to adopt a configuration in which the third lens L3 has a negative refractive power in the vicinity of the optical axis. As in the imaging lenses according to the first to third embodiments shown in Figures 1 to 3, when the third lens L3 is configured to have a positive refractive power in the vicinity of the optical axis, it is possible to more appropriately reduce the total length. Further, as in the imaging lenses according to the fourth to sixth embodiments shown in Figures 4 to 6, when the third lens L3 is configured to have a negative refractive power in the vicinity of the optical axis, it is possible to more satisfactorily correct a chromatic aberration.

The fourth lens L4 has a meniscus shape which is convex toward the image side in the vicinity of the optical axis. Thereby, it is possible to appropriately correct astigmatism. It is desirable that the fourth lens L4 have a positive refractive power in the vicinity of the optical axis. Thereby, especially at the medium angle of view, it is possible to prevent the angle of incidence of rays, which pass through the optical system and are incident onto the image formation surface (imaging device), from becoming large, and thus it is possible to satisfactorily correct a lateral chromatic aberration while appropriately reducing the total length.

The fifth lens L5 has a negative refractive power in the vicinity of the optical axis. A lens, which has a negative refractive power in the vicinity of the optical axis, is disposed to be closest to the image side of the imaging lens, whereby the imaging lens can be more appropriately made to have a telephoto type configuration as a whole, and thus it is possible to appropriately reduce the total length. In addition, since the fifth lens L5 has a negative refractive power in the vicinity of the optical axis, it is possible to appropriately correct a curvature of field. When the fifth lens L5

is concave toward the image side in the vicinity of the optical axis, it is possible to satisfactorily correct a curvature of field while more appropriately reducing the total length. In order to further enhance this effect, as shown in the first, second, and sixth embodiments, it is desirable that the fifth lens L5 have a meniscus shape which is concave toward the image side in the vicinity of the optical axis.

The fifth lens L5 has at least one inflection point within an effective diameter of the image side surface. The "inflection point" on the image side surface of the fifth lens L5 is defined as a point at which the shape of the image side surface of the fifth lens L5 changes from a convex shape to a concave shape (or from a concave shape to a convex shape) toward the image side. The inflection point can be disposed at an arbitrary position on the outside in a radial direction from the optical axis as long as the point is within the effective diameter of the image side surface of the fifth lens L5. As shown in the respective embodiments, by forming the image side surface of the fifth lens L5 in a shape in which the image side surface has at least one inflection point, especially in a peripheral portion of an image formation area, it is possible to prevent the angle of incidence of rays, which pass through the optical system and are incident onto the image formation surface (imaging device), from becoming large.

According to the imaging lens L, in the imaging lens which is composed of five lenses as a whole, a configuration of each lens element of the first to fifth lenses L1 to L5 is optimized. Therefore, it is possible to achieve a lens system that has high resolution performance while decreasing the total length thereof.

In the imaging lens L, in order to enhance the performance thereof, it is desirable that at least one surface of each lens of the first to fifth lenses L1 to L5 be formed as an aspheric surface.

Further, it is desirable that each of the lenses L1 to L5 constituting the imaging lens L be not formed as a cemented lens but a single lens. The reason is that, compared with a case where any of the lenses L1 to L5 is formed as a cemented lens, since the

number of aspheric surfaces increases, a degree of freedom in design of each lens is enhanced, and it is possible to appropriately achieve reduction in the total length thereof.

Next, effects and advantages of the conditional expressions of the imaging lens L configured as described above will be described in detail.

First, it is desirable that the focal length f1 of the first lens L1 and the focal length f of the whole system satisfy the following conditional expression (1).

$$1.4<f/f1<4 \quad (1)$$

The conditional expression (1) defines a desirable numerical range of a ratio of the focal length f of the whole system to the focal length f1 of the first lens L1. By securing the refractive power of the first lens L1 such that f/f1 is greater than the lower limit of the conditional expression (1), the positive refractive power of the first lens L1 does not become excessively weak relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length. By maintaining the refractive power of the first lens L1 such that f/f1 is less than the upper limit of the conditional expression (1), the positive refractive power of the first lens L1 does not become excessively strong relative to the refractive power of the whole system, and thus it is possible to satisfactorily correct especially a spherical aberration. In order to further enhance this effect, it is more desirable to satisfy the conditional expression (1-1), and it is even more desirable to satisfy the conditional expression (1-2).

$$1.5<f/f1<3.5 \quad (1-1)$$

$$1.6<f/f1<3 \quad (1-2)$$

Further, it is desirable that the focal length f2 of the second lens L2 and the focal length f of the whole system satisfy the following conditional expression (2).

$$-3<f/f2<-0.85 \quad (2)$$

The conditional expression (2) defines a desirable numerical range of a ratio of the focal length f of the whole system to the focal length f2 of the second lens L2. By maintaining the refractive

power of the second lens L2 such that f/f2 is greater than the lower limit of the conditional expression (2), the refractive power of the second lens L2 does not become excessively strong relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length. By securing the refractive power of the second lens L2 such that f/f2 is less than the upper limit of the conditional expression (2), the refractive power of the second lens L2 does not become excessively weak relative to the refractive power of the whole system, and thus it is possible to satisfactorily correct especially a longitudinal chromatic aberration. In order to further enhance this effect, it is more desirable to satisfy the conditional expression (2-1), and it is even more desirable to satisfy the conditional expression (2-2).

$$-2.5<f/f2<-0.9 \quad (2\text{-}1)$$

$$-2<f/f2<-0.95 \quad (2\text{-}2)$$

It is desirable that a composite focal length f12 of the first lens L1 and the second lens L2 and the focal length f of the whole system satisfy the following conditional expression (3).

$$0.78<f/f12<2.5 \quad (3)$$

The conditional expression (3) defines a desirable numerical range of a ratio of the focal length f of the whole system to the composite focal length f12 of the first lens L1 and the second lens L2. By securing the composite refractive power of the first lens L1 and the second lens L2 such that f/f12 is greater than the lower limit of the conditional expression (3), the composite refractive power of the first lens L1 and the second lens L2 does not become excessively weak relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length. By maintaining the composite refractive power of the first lens L1 and the second lens L2 such that f/f12 is less than the upper limit of the conditional expression (3), the composite refractive power of the first lens L1 and the second lens L2 does not become excessively strong relative to the refractive power of the whole system, and thus it is possible to satisfactorily correct particularly a spherical aberration and a longitudinal chromatic aberration. In

order to further enhance this effect, it is desirable to satisfy the conditional expression (3-1), and it is more desirable to satisfy the conditional expression (3-2).

$$0.8<f/f12<2 \quad (3\text{-}1)$$

$$0.9<f/f12<1.8 \quad (3\text{-}2)$$

Further, it is desirable that the composite focal length f345 of the third to fifth lenses L3 to L5 and the focal length f of the whole system satisfy the following conditional expression (4).

$$-2<f/f345<0 \quad (4)$$

The conditional expression (4) defines a desirable numerical range of a ratio of the focal length f of the whole system to the composite focal length f345 of the third to fifth lenses L3 to L5. By maintaining the composite refractive power of the third to fifth lenses L3 to L5 such that f/f345 is greater than the lower limit of the conditional expression (4), the composite refractive power of the third to fifth lenses L3 to L5 does not become excessively strong relative to the refractive power of the whole system, and thus, especially at the medium angle of view, it is possible to prevent the angle of incidence of rays, which pass through the optical system and are incident onto the image formation surface (imaging device), from becoming large. By securing the composite refractive power of the third to fifth lenses L3 to L5 such that f/f345 is less than the upper limit of the conditional expression (4), the composite refractive power of the third to fifth lenses L3 to L5 does not become excessively weak relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length. In order to further enhance this effect, it is desirable to satisfy the conditional expression (4-1), and it is more desirable to satisfy the conditional expression (4-2).

$$-1.5<f/f345<-0.05 \quad (4\text{-}1)$$

$$-1.2<f/f345<-0.05 \quad (4\text{-}2)$$

Further, it is desirable that the focal length f1 of the first lens L1 and the focal length f3 of the third lens L3 satisfy the following conditional expression (5).

$$-0.5<f1/f3<0.4 \quad (5)$$

The conditional expression (5) defines a desirable numerical range of a ratio of the focal length f1 of the first lens L1 to the focal length f3 of the third lens L3. When the third lens L3 has a negative refractive power, by securing the refractive power of the third lens L3 relative to the refractive power of the first lens L1 such that f1/f3 is greater than the lower limit of the conditional expression (5), the negative refractive power of the third lens L3 does not become excessively strong relative to the refractive power of the first lens L1. As a result, it is possible to appropriately reduce the total length. When the third lens L3 has a positive refractive power, by securing the refractive power of the third lens L3 relative to the refractive power of the first lens L1 such that f1/f3 is less than the upper limit of the conditional expression (5), the positive refractive power of the third lens L3 does not become excessively strong relative to the refractive power of the first lens L1. As a result, it is possible to satisfactorily correct a spherical aberration. In order to further enhance this effect, it is more desirable to satisfy the conditional expression (5-1).

$$-0.4<f1/f3<0.2 \quad (5-1)$$

It is desirable that the paraxial radius of curvature R3f of the object side surface of the third lens L3 and the paraxial radius of curvature R3r of the image side surface of the third lens L3 satisfy the following conditional expression (6).

$$-1<(R3f-R3r)/(R3f+R3r)<1.2 \quad (6)$$

The conditional expression (6) defines each of a desirable numerical range of the paraxial radius of curvature R3f of the object side surface of the third lens L3 and a desirable numerical range of the paraxial radius of curvature R3r of the image side surface of the third lens L3. By setting the paraxial radius of curvature R3f of the object side surface of the third lens L3 and the paraxial radius of curvature R3r of the image side surface of the third lens L3 such that (R3f-R3r)/(R3f+R3r) is greater than the lower limit of the conditional expression (6), it is possible to appropriately reduce the total length. By setting the paraxial radius of curvature R3f of the object side surface of the third lens L3 and the paraxial

radius of curvature R3r of the image side surface of the third lens L3 such that (R3f-R3r)/(R3f+R3r) is less than the upper limit of the conditional expression (6), it is possible to satisfactorily correct a spherical aberration. In order to further enhance this effect, it is more desirable to satisfy the following conditional expression (6-1).

$$-0.6<(R3f-R3r)/(R3f+R3r)<1 \quad (6-1)$$

Further, it is desirable that the focal length f5 of the fifth lens L5 and the focal length f of the whole system satisfy the following conditional expression (7).

$$-4<f/f5<-0.2 \quad (7)$$

The conditional expression (7) defines a desirable numerical range of a ratio of the focal length f of the whole system to the focal length f5 of the fifth lens L5. By maintaining the refractive power of the fifth lens L5 such that f/f5 is greater than the lower limit of the conditional expression (7), the refractive power of the fifth lens L5 does not become excessively strong relative to the positive refractive power of the whole system, and thus, especially at the medium angle of view, it is possible to prevent the angle of incidence of rays, which pass through the optical system and are incident onto the image formation surface (imaging device), from becoming large. By securing the refractive power of the fifth lens L5 such that f/f5 is less than the upper limit of the conditional expression (7), the refractive power of the fifth lens L5 does not become excessively weak relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length while satisfactorily correcting a curvature of field. In order to further enhance this effect, when the composite refractive power of the first to third lenses L1 to L3 is positive, it is more desirable to satisfy the conditional expression (7-1).

$$-3<f/f5<-0.4 \quad (7-1)$$

Further, it is desirable that the focal length f of the whole system, the half angle of view ω, and the paraxial radius of curvature R5r of the image side surface of the fifth lens L5 satisfy the following conditional expression (8).

$$0.5<f\cdot\tan\omega/R5r<10 \quad (8)$$

The conditional expression (8) defines a desirable numerical range of a ratio of the paraxial image height ($f\cdot\tan\omega$) to the paraxial radius of curvature R5r of the image side surface of the fifth lens L5. By setting the paraxial image height ($f\cdot\tan\omega$) relative to the paraxial radius of curvature R5r of the image side surface of the fifth lens L5 such that $f\cdot\tan\omega/R5r$ is greater than the lower limit of the conditional expression (8), an absolute value of the paraxial radius of curvature R5r of the image side surface of the fifth lens L5, which is a surface of the imaging lens closest to the image side, does not become excessively large relative to the paraxial image height ($f\cdot\tan\omega$), and thus, it is possible to sufficiently correct a curvature of field while reducing the total length. Further, by setting the paraxial image height ($f\cdot\tan\omega$) relative to the paraxial radius of curvature R5r of the image side surface of the fifth lens L5 such that $f\cdot\tan\omega/R5r$ is less than the upper limit of the conditional expression (8), the absolute value of the paraxial radius of curvature R5r of the image side surface of the fifth lens L5, which is a surface of the imaging lens closest to the image side, does not become excessively small relative to the paraxial image height ($f\cdot\tan\omega$), and thus, especially at the medium angle of view, it is possible to prevent the angle of incidence of rays, which pass through the optical system and are incident onto the image formation surface (imaging device), from becoming large. In order to further enhance this effect, it is desirable to satisfy the conditional expression (8-1).

$$0.7<f\cdot\tan\omega/R5r<3 \quad (8-1)$$

Further, it is desirable that the focal length f3 of the third lens L3 and the focal length f of the whole system satisfy the following conditional expression (9).

$$-0.9<f/f3<0.7 \quad (9)$$

The conditional expression (9) defines a desirable numerical range of a ratio of the focal length f of the whole system to the focal length f3 of the third lens L3. When the third lens L3 has a negative refractive power, by maintaining the refractive power

of the third lens L3 such that f/f3 is greater than the lower limit of the conditional expression (9), the negative refractive power of the third lens L3 does not become excessively strong relative to the refractive power of the whole system, and thus it is possible to appropriately reduce the total length. When the third lens L3 has a positive refractive power, by securing the refractive power of the third lens L3 such that f/f3 is less than the upper limit of the conditional expression (9), the positive refractive power of the third lens L3 does not become excessively strong relative to the refractive power of the whole system, and thus it is possible to satisfactorily correct a spherical aberration. In order to further enhance this effect, it is more desirable to satisfy the conditional expression (9-1).

$$-0.4<f/f3<0.5 \quad (9-1)$$

Further, it is desirable that the spacing D7 on the optical axis between the third lens L3 and the fourth lens L4 and the focal length f of the whole system satisfy the following conditional expression (10).

$$0.05<D7/f<0.2 \quad (10)$$

The conditional expression (10) defines a desirable numerical range of a ratio of the spacing D7 on the optical axis between the third lens L3 and the fourth lens L4 to the focal length f of the whole system. By securing the spacing D7 on the optical axis between the third lens L3 and the fourth lens L4 relative to the focal length f of the whole system such that D7/f is greater than the lower limit of the conditional expression (10), it is possible to appropriately suppress distortion which tends to occur when the total length is reduced. By maintaining the spacing D7 on the optical axis between the third lens L3 and the fourth lens L4 relative to the focal length f of the whole system such that D7/f is less than the upper limit of the conditional expression (10), it is possible to satisfactorily correct astigmatism. In order to further enhance this effect, it is desirable to satisfy the conditional expression (10-1).

$$0.07<D7/f<0.17 \quad (10-1)$$

Next, referring to Figures 2 to 6, imaging lenses according

to second to sixth embodiments of the present invention will be described in detail. In the imaging lenses according to the first to sixth embodiments shown in Figures 1 to 6, all surfaces of the first to fifth lenses L1 to L5 are formed to be aspheric. As in the first embodiment, the imaging lenses according to the second to sixth embodiments of the present invention substantially consist of, in order from the object side, five lenses of: the first lens L1 that has a positive refractive power and has a meniscus shape which is convex toward the object side; the second lens L2 that has a biconcave shape; the third lens L3 that has a meniscus shape which is convex toward the object side; the fourth lens L4 that has a meniscus shape which is convex toward the image side; and the fifth lens L5 that has a negative refractive power and has at least one inflection point on an image side surface. Hence, in the following first to sixth embodiments, only the different specific configurations of the lenses constituting the respective lens groups will be described. Since the configurations which are common among the first to sixth embodiments respectively have the same effects, configurations and effects thereof will be described in order of the sequence numbers of the embodiments, and the configurations and effects common to the other embodiments will not be repeatedly described but will be omitted.

In the imaging lens L according to the second embodiment shown in Figure 2, the lens configurations of the first to fifth lenses L1 to L5 are common to the first embodiment. Therefore, according to the respective lens configurations, it is possible to obtain the same effects as the respective corresponding configurations of the first embodiment.

As in the third embodiment shown in Figure 3, the fifth lens L5 may be configured to have a biconcave shape, and the configurations of the first to fifth lenses L1 to L5 may be common to the configurations of the first embodiment except that the fifth lens L5 has a biconcave shape. By making the fifth lens L5 have a biconcave shape, it is possible to set a strong negative refractive power, and thus it is possible to appropriately reduce the total length.

Further, in the third embodiment, according to the respective configurations of the first to fifth lenses L1 to L5 common to the first embodiment, it is possible to obtain the same effects as the respective corresponding configurations of the first embodiment.

As in the fourth embodiment shown in Figure 4, the third lens L3 may be configured to have a negative refractive power in the vicinity of the optical axis, and the configurations of the first to fifth lenses L1 to L5 may be common to the configurations of the third embodiment except that the third lens L3 has a negative refractive power in the vicinity of the optical axis. By making the third lens L3 have a negative refractive power in the vicinity of the optical axis, it is possible to satisfactorily correct a chromatic aberration. Further, in the fourth embodiment, according to the respective configurations of the first to fifth lenses L1 to L5 common to the third embodiment, it is possible to obtain the same effects as the respective corresponding configurations of the third embodiment.

In the imaging lens L according to the fifth embodiment shown in Figure 5, the lens configurations of the first to fifth lenses L1 to L5 are common to the fourth embodiment. Therefore, according to the respective lens configurations, it is possible to obtain the same effects as the respective corresponding configurations of the fourth embodiment.

As in the sixth embodiment shown in Figure 6, the fifth lens L5 may be configured to have a meniscus shape which is concave toward the image side, and the configurations of the first to fifth lenses L1 to L5 may be common to the configurations of the fourth embodiment except that the fifth lens L5 has a meniscus shape which is concave toward the image side. By making the fifth lens L5 have a meniscus shape which is concave toward the image side, it is possible to appropriately reduce the total length. Further, in the sixth embodiment, according to the respective configurations of the first to fifth lenses L1 to L5 common to the fourth embodiment, it is possible to obtain the same effects as the respective corresponding configurations of the fourth embodiment.

As described above, according to the imaging lens of the embodiment of the present invention, in the imaging lens which is composed of five lenses as a whole, the configurations of the respective lens elements are optimized. Therefore, it is possible to achieve a lens system having high resolution performance while reducing the total length.

By satisfying appropriately desirable conditions, it is possible to achieve higher imaging performance. Furthermore, according to the imaging apparatus of the embodiment, imaging signals based on an optical image, which is formed by the high-performance imaging lens according to the embodiment, are output. Therefore, it is possible to obtain a photographed image with high resolution in the range from the central angle of view to the peripheral angle of view.

Next, specific numerical examples of the imaging lens according to the embodiment of the present invention will be described. Hereinafter, a plurality of numerical examples will be described collectively.

Table 1 and Table 2, which will be given later, show specific lens data corresponding to the configuration of the imaging lens shown in Figure 1. Specifically, Table 1 shows basic lens data, and Table 2 shows data on aspheric surfaces. In the lens data shown in Table 1, the column of surface number Si shows the surface number of the i-th surface in the imaging lens of Example 1. The surface of the lens element closest to the object side is the first surface (the aperture stop St is the first), and surface numbers sequentially increase toward the image side. The column of the radius of curvature Ri shows values (mm) of the radius of curvature of i-th surface from the object side to correspond to the reference sign Ri in Fig. 1. Likewise, the column of the on-axis surface spacing Di shows spaces (mm) on the optical axis between the i-th surface Si and the (i+1)th surface Si+1 on the optical axis from the object side. The column of Ndj shows values of the refractive index of the j-th optical element from the object side for the d-line (587.56 nm). The column of vdj shows values of the Abbe number of the j-th optical element from

the object side for the d-line. It should be noted that, in each piece of lens data, as various data items, values of the focal length f of the whole system (mm), the back focal length Bf (mm), and the total lens length TL (mm) are respectively shown. In addition, the back focal length Bf indicates an air-converted value, and likewise, in the total lens length TL, the back focal length portion uses an air-converted value.

In the imaging lens according to Example 1, both surfaces of each of the first to fifth lenses L1 to L5 are aspheric. In the basic lens data shown in Table 1, the radii of curvature of these aspheric surfaces are represented as numerical values of the radius of curvature near the optical axis (paraxial radius of curvature).

Table 2 shows aspheric surface data in the imaging lens system according to Example 1. In the numerical values represented as the aspheric surface data, the reference sign "E" means that a numerical value following this is a "exponent" having a base of 10 and that this numerical value having a base of 10 and expressed by an exponential function is multiplied by a numerical value before the "E". For example, this means that "1.0E-02" is "1.0×10^{-2}".

As aspheric surface data, values of coefficients Ai and KA in the aspheric surface expression represented by the following expression (A) are shown. Specifically, Z represents the length (mm) of a perpendicular from a point on an aspheric surface at height h from an optical axis to a plane that contacts with the vertex of the aspheric surface (the plane perpendicular to the optical axis).

$$Z=C\cdot h^2/\{1+(1-KA\cdot C^2\cdot h^2)^{1/2}\}+\Sigma Ai\cdot h^i \quad (A)$$

Here,

Z is a depth of the aspheric surface (mm),

h is a distance (height) from the optical axis to the lens surface (mm),

C is a paraxial curvature = 1/R

(R: a paraxial radius of curvature),

Ai is an i-th order aspheric surface coefficient (i is an integer equal to or greater than 3), and

KA is an aspheric surface coefficient.

As in the imaging lens according to the above-mentioned Example 1, Tables 3 to 12 show specific lens data as Examples 2 to 6, corresponding to the configuration of the imaging lenses shown in Figures 2 to 6. In the imaging lenses according to Examples 1 to 6, both surfaces of each of the first to fifth lenses L1 to L5 are aspheric.

In Example 1, a flare stop having a diameter of 1.675 mm is disposed at a position of 0.101 mm from the vertex of the surface of the first lens L1 to the image side, and in Example 2, a flare stop having a diameter of 1.670 mm is disposed at a position of 0.101 mm from the vertex of the surface of the first lens L1 to the image side. But the descriptions of these flare stops are omitted in Tables 1 and 3. Figure 8, Section A to Section D show a spherical aberration, astigmatism (curvature of field), distortion (a distortion aberration), and a lateral chromatic aberration (a chromatic aberration of magnification) in the imaging lens of Example 1, respectively. Each aberration diagram illustrating a spherical aberration, astigmatism (curvature of field), and distortion (a distortion aberration) shows an aberration for the d-line (a wavelength of 587.56 nm) as a reference wavelength. The diagram of a spherical aberration diagram and the diagram of a lateral chromatic aberration diagram show also aberrations for the F-line (a wavelength of 486.1 nm) and the C-line (a wavelength of 656.27 nm). The diagram of a spherical aberration also shows an aberration for the g-line (a wavelength of 435.83 nm). In the diagram of astigmatism, the solid line indicates an aberration in the sagittal direction (S), and the broken line indicates an aberration in the tangential direction (T). Fno. indicates an F-number, and ω indicates a half angle of view.

Likewise, Figure 9, Section A to D to Figure 13, Section A to D show various aberrations of the imaging lenses of Examples 2 to 6.

Table 13 collectively shows values of the conditional expressions (1) and (10) of Examples 1 to 6 according to the present invention.

As can be seen from the above-mentioned numerical value data

and aberration diagrams, in each example, high imaging performance is achieved while the total length is reduced.

The imaging lens of the present invention is not limited to the above-mentioned embodiments and examples, and may be modified to various forms. For example, the values of the radius of curvature, the on-axis surface spacing, the refractive index, the Abbe number, the aspheric surface coefficient, and the like of the lens elements are not limited to the values shown in the numerical examples, and may have different values.

Further, in the description of each of all the examples, it is a premise that the imaging lens is used with fixed focus, but it may be possible to adopt a configuration in which focus is adjustable. For example, the imaging lens may be configured in such a manner that autofocusing is possible by extending the whole lens system or by moving some lenses on the optical axis.

[TABLE 1]

EXAMPLE 1
f=4.126, Bf=1.111, TL=4.137

Si	Ri	Di	ndj	νdj
*1	1.23831	0.557	1.54488	54.87
*2	93.70148	0.015		
3(APERTURE STOP)	∞	0.085		
*4	-12.66265	0.334	1.63351	23.63
*5	2.60879	0.243		
*6	3.15915	0.253	1.63351	23.63
*7	4.55163	0.506		
*8	-3.56285	0.379	1.63351	23.63
*9	-3.58353	0.258		
*10	1.98236	0.396	1.54488	54.87
*11	1.23910	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.413		
14	∞			

*:ASPHERIC SURFACE

[TABLE 2]

EXAMPLE 1 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	9.7589122E-01	-2.6729118E-02	4.7204449E-02	-2.6218167E-01
2	1.0000090E+00	-7.9154953E-02	8.3384460E-02	-6.1197888E-03
3	-1.6800000E+00	-3.8300234E-02	3.7458150E-01	-2.7551593E-01
4	3.1182039E+00	-7.3707562E-02	1.2126243E+00	-4.9458531E+00
5	6.9999076E-01	-2.6329653E-01	2.4873169E-01	6.8422800E-02
6	1.0000249E+00	-1.9056021E-01	1.2088188E-01	7.8189995E-02
7	-2.1000000E+01	-7.2840681E-02	-3.9284653E-01	5.2042516E-01
8	-2.8556198E+00	-1.2163394E-01	1.7522262E-02	-1.0676210E-02
9	-1.4000005E+01	-4.3055564E-01	2.7976405E-01	-9.4994461E-02
10	-5.9077860E+00	-2.7520458E-01	2.0923136E-01	-1.1952221E-01
	A10	A12	A14	A16
1	4.0997871E-01	-4.5226437E-01	1.0665075E-01	-8.1871346E-02
2	-2.0357974E-01	-9.6694982E-01	2.1915571E+00	-1.2401354E+00
3	-3.8447870E-01	-3.1121039E-01	2.3020800E+00	-1.6056084E+00
4	1.7803254E+01	-3.9765240E+01	4.8323265E+01	-2.3566996E+01
5	4.9267886E-01	-2.4199414E+00	3.4571789E+00	-1.8021267E+00
6	1.4186946E-01	-2.2779898E-01	-1.5644448E-02	4.4672840E-02
7	-4.7544883E-01	2.5326186E-01	-1.5953212E-02	-2.5450777E-02
8	3.2819033E-02	-8.8256572E-03	-7.6808797E-03	3.0337699E-03
9	1.2737276E-02	1.7450700E-03	-6.1232629E-04	3.3350877E-05
10	4.5143417E-02	-1.0711328E-02	1.3898779E-03	-7.1397774E-05

[TABLE 3]

EXAMPLE 2
f=4.119, Bf=1.069, TL=4.120

Si	Ri	Di	ndj	νdj
*1	1.23597	0.557	1.54488	54.87
*2	15.97054	0.020		
3(APERTURE STOP)	∞	0.081		
*4	−19.29047	0.334	1.63351	23.63
*5	3.10552	0.249		
*6	2.53139	0.265	1.54488	54.87
*7	2.70709	0.506		
*8	−3.97938	0.417	1.63351	23.63
*9	−2.24497	0.258		
*10	5.09366	0.370	1.63351	23.63
*11	1.57691	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.372		
14	∞			

*:ASPHERIC SURFACE

[TABLE 4]

EXAMPLE 2 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	−6.9000900E−01	7.8401227E−02	4.8724169E−02	−3.1032450E−01
2	1.0000000E+00	−1.4179856E−01	1.2622836E−01	−3.1360196E−02
3	1.0000000E+01	−7.7610199E−02	4.1593603E−01	−1.7738968E−01
4	3.1182039E+00	−3.5937525E−02	9.8686897E−01	−3.2805080E+00
5	3.1872442E−01	−2.7915128E−01	2.8423559E−01	−2.1820589E−01
6	−5.0999884E−01	−1.9620120E−01	1.1264694E−01	−3.2207096E−01
7	−6.8745315E−01	−7.2840681E−02	−6.8446726E−01	2.6980741E+00
8	−2.3946942E+00	−2.3349899E−01	8.5626683E−02	−8.4780380E−02
9	−1.0079967E+01	−7.6948035E−01	7.1798466E−01	−2.9803150E−01
10	−1.3546000E+01	−3.4848072E−01	2.9750460E−01	−1.5469280E−01
	A10	A12	A14	A16
1	7.3975458E−01	−1.2853745E+00	1.0201759E+00	−4.1573183E−01
2	−3.1147565E−01	−2.5924164E−01	1.1354658E+00	−7.4361120E−01
3	−7.7126641E−01	9.2770917E−01	5.6561007E−01	−8.0673585E−01
4	1.1724933E+01	−2.7522413E+01	3.6438963E+01	−1.9556633E+01
5	6.4639121E−01	−1.6044352E+00	2.2177373E+00	−1.1204967E+00
6	8.7809423E−01	−1.2333009E+00	8.1561032E−01	−1.8182400E−01
7	−8.5699151E+00	1.3930093E+01	−1.1707336E+01	3.6414691E+00
8	1.8481830E−02	−7.3019643E−02	6.5021917E−02	−6.0493130E−03
9	5.3075607E−02	1.4586291E−03	−1.9559157E−03	2.1244648E−04
10	5.0295407E−02	−9.7601077E−03	1.0070371E−03	−4.1856063E−05

[TABLE 5]

EXAMPLE 3
f=4.117, Bf=1.123, TL=4.117

SI	Ri	Di	ndj	νdj
1(APERTURE STOP)	∞	−0.252		
*2	1.21258	0.482	1.54488	54.87
*3	11.57312	0.141		
*4	−7.67379	0.202	1.63351	23.63
*5	3.45544	0.338		
*6	5.09875	0.287	1.63351	23.63
*7	14.62892	0.582		
*8	−2.51969	0.364	1.54488	54.87
*9	−1.10708	0.345		
*10	−2.07885	0.253	1.54488	54.87
*11	2.90776	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.425		
14	∞			

*:ASPHERIC SURFACE

[TABLE 6]

EXAMPLE 3 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	−5.9868050E+00	4.8641128E−01	−7.9546902E−01	2.1017252E+00
2	1.9240955E+00	−5.3853512E−02	2.1154063E−01	−4.4017448E−01
3	1.0921760E+01	−9.5725484E−02	7.5943447E−01	−1.9145869E+00
4	4.2702877E+00	−7.3659102E−02	7.7800384E−01	−1.3378460E+00
5	−3.0446805E−01	−2.3909795E−01	3.8056203E−02	−5.1291279E−02
6	−4.1652815E+00	−2.0169182E−01	1.5477070E−01	−8.7156700E−01
7	1.5660356E−01	5.7683409E−02	−3.0103142E−01	4.8387321E−01
8	−2.5416033E+00	1.0901372E−01	−2.8841662E−01	4.5116212E−01
9	−2.8886199E+01	−2.1705115E−01	1.5308753E−01	−3.9562058E−02
10	−9.1851222E+00	−2.2493967E−01	1.6877855E−01	−9.7203848E−02
	A10	A12	A14	A16
1	−4.6930095E+00	7.3788098E+00	−6.6387072E+00	2.5968201E+00
2	7.2411728E−01	−5.0309707E−01	−2.0972869E−01	4.1332784E−01
3	3.6385814E+00	−4.9896476E+00	4.2590990E+00	−1.6942132E+00
4	4.0930579E−01	5.4769361E+00	−1.1317295E+01	7.5185167E+00
5	5.3246530E−01	−1.2087019E+00	2.1064446E+00	−1.3514237E+00
6	2.7793661E+00	−4.6106123E+00	4.3246333E+00	−1.6422211E+00
7	−5.4851430E−01	3.6013932E−01	−9.6281745E−02	3.4936818E−03
8	−3.2780850E−01	1.2031213E−01	−2.1115167E−02	1.2566134E−03
9	−6.4447571E−05	2.4915794E−03	−5.5626637E−04	4.0985922E−05
10	3.7535798E−02	−9.2150833E−03	1.2851713E−03	−7.5129992E−05

[TABLE 7]

EXAMPLE 4
f=4.555, Bf=1.538, TL=4.260

Si	Ri	Di	ndj	νdj
*1	0.99476	0.506	1.54488	54.87
*2	253.01381	0.046		
3(APERTURE STOP)	∞	0.056		
*4	−22.24707	0.152	1.63351	23.63
*5	1.69768	0.243		
*6	253.00000	0.253	1.63351	23.63
*7	39.05374	0.506		
*8	−1.90297	0.354	1.63351	23.63
*9	−1.16022	0.151		
*10	−3.16206	0.455	1.54488	54.87
*11	3.61431	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.840		
14	∞			

*:ASPHERIC SURFACE

[TABLE 8]

EXAMPLE 4 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	1.1921937E+00	−2.8552244E−02	1.9464672E−02	−1.7622814E−01
2	−7.2205120E+00	1.0009125E−01	5.6965587E−02	−1.2128920E−04
3	−1.6800098E+00	4.3862266E−01	−2.5955621E−01	−3.0871421E−01
4	3.1182039E+00	4.9953409E−01	7.4978015E−01	−4.0780165E+00
5	−1.6495744E+01	−7.5670799E−04	4.6703185E−01	6.5512652E−03
6	9.9999036E−01	2.7502524E−02	2.3242844E−01	−7.5662102E−02
7	−6.1085232E+00	−7.2840681E−02	−6.1939901E−02	4.0213149E−01
8	−1.9317843E+00	2.9226488E−03	1.6279485E−02	−1.1936707E−02
9	−1.4000001E+01	−1.4394163E−01	1.2958519E−01	−6.9903475E−02
10	−1.3546000E+01	−2.3244698E−01	1.8331804E−01	−1.1223612E−01
	A10	A12	A14	A16
1	4.3011057E−01	−4.4272734E−01	9.7079058E−02	−6.1193103E−02
2	−1.7377307E−01	−9.7305688E−01	2.2005578E+00	−1.2311427E+00
3	−4.2662287E−01	−2.3413149E−01	2.5428004E+00	−1.9963875E+00
4	1.8205811E+01	−3.8842459E+01	6.3021364E+01	−5.0226037E+01
5	8.6310550E−01	−8.0002749E−01	3.6125413E+00	−1.5876512E+01
6	5.4526971E−02	−6.2891755E−02	2.2916270E−01	−1.9122565E−01
7	−4.7056467E−01	2.4130912E−01	−2.7435913E−02	−2.7992163E−02
8	2.7648276E−02	−8.7177546E−03	−7.5782951E−03	1.4110223E−03
9	1.3115167E−02	1.8723448E−03	−5.6945481E−04	−2.7551420E−06
10	4.4224273E−02	−1.0817291E−02	1.3978168E−03	−7.0081151E−05

[TABLE 9]

EXAMPLE 5
f=5.956, Bf=2.438, TL=5.171

Si	Ri	Di	ndj	νdj
*1	1.12444	0.546	1.54488	54.87
*2	252.97534	0.030		
3(APERTURE STOP)	∞	0.069		
*4	−18.78836	0.227	1.63351	23.63
*5	2.25616	0.243		
*6	506.45581	0.253	1.63351	23.63
*7	4.36560	0.506		
*8	−99.83715	0.506	1.63351	23.63
*9	−1.70702	0.100		
*10	−2.17464	0.253	1.54488	54.87
*11	3.61429	0.500		
12	∞	0.300	1.51633	64.14
13	∞	1.740		
14	∞			

*:ASPHERIC SURFACE

[TABLE 10]

EXAMPLE 5 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	6.9377302E-01	-8.6315370E-03	-2.9322627E-03	-2.8236519E-01
2	1.0000090E+00	1.0299728E-02	-3.3338883E-02	-3.5854402E-01
3	9.8073731E+00	4.1860316E-01	2.4161475E-01	-7.6083670E-01
4	3.1182039E+00	4.6995645E-01	1.5149631E+00	-2.7101440E+00
5	6.1881621E-01	-1.9777356E-01	1.5104859E+00	-1.5044509E+00
6	9.9999979E-01	-1.3815608E-01	8.2457564E-01	-4.9516542E-01
7	3.2258104E-01	-7.2840681E-02	1.5663313E-01	9.8367802E-02
8	-2.6292010E+00	1.1379689E-01	-1.7291781E-02	2.9845655E-02
9	-1.4000002E+01	-4.4082972E-02	9.9278653E-02	-7.7922450E-02
10	1.3000586E-01	-1.8315230E-01	1.3758774E-01	-9.0542240E-02
	A10	A12	A14	A16
1	3.6582042E-01	-4.2467703E-01	-2.2631039E-01	-2.0944291E-02
2	-2.1599412E-01	-4.4977846E-01	2.5600140E+00	-1.9687116E+00
3	-7.7068397E-01	2.7743135E-01	2.0383002E+00	7.4259109E-01
4	1.3698992E+01	-3.8132984E+01	5.1107685E+01	-2.7851932E+01
5	1.4799995E+00	1.8815842E+01	-1.1654772E+02	1.7961509E+02
6	2.3119410E+00	-1.5309306E+01	2.6135941E+01	-1.0762516E+01
7	-2.7569022E-01	1.7783105E-01	-4.9261478E-02	3.9419268E-03
8	1.7970251E-04	-2.1611961E-02	4.0098433E-03	1.4790761E-03
9	2.0967820E-02	4.6775947E-03	-9.1757326E-04	-4.2752923E-04
10	4.2054637E-02	-1.3115957E-02	2.7031329E-03	-1.9876871E-04

[TABLE 11]

EXAMPLE 6
f=4.428, Bf=1.424, TL=4.387

Si	Ri	Di	ndj	νdj
1(APERTURE STOP)	∞	−0.278		
*2	1.17174	0.557	1.54488	54.87
*3	101.21828	0.101		
*4	−8.52605	0.334	1.63351	23.63
*5	3.10246	0.243		
*6	253.12530	0.354	1.54488	54.87
*7	7.08468	0.350		
*8	−4.62732	0.427	1.63351	23.63
*9	−2.28837	0.246		
*10	2.81503	0.351	1.63351	23.63
*11	1.45940	0.500		
12	∞	0.300	1.51633	64.14
13	∞	0.726		
14	∞			

*:ASPHERIC SURFACE

[TABLE 12]

EXAMPLE 6 · ASPHERIC SURFACE DATA				
SURFACE NUMBER	KA	A4	A6	A8
1	3.6898607E-02	4.1325089E-02	7.7959667E-02	-3.1320039E-01
2	-2.3337736E+01	-7.0438383E-02	1.2689897E-01	-1.6510709E-02
3	1.4512180E+00	1.0524624E-01	2.7959740E-01	-1.2882128E-01
4	3.1182039E+00	2.0460167E-01	9.3788710E-01	-3.1083520E+00
5	7.0000900E-01	-1.7148265E-01	2.9051562E-01	-5.2650666E-02
6	3.5470814E-01	-1.9176138E-01	1.7502659E-01	-3.4890662E-01
7	-2.3602970E+00	-7.2840681E-02	-8.4242604E-01	2.9509268E+00
8	-1.8311731E+00	-2.6699460E-01	9.1126040E-02	-1.0539776E-01
9	1.0044588E-01	-7.9144306E-01	7.1344844E-01	-2.9852745E-01
10	-1.0909351E+01	-3.3970419E-01	2.9895759E-01	-1.5487925E-01
	A10	A12	A14	A16
1	7.3615786E-01	-1.2805754E+00	1.0422927E+00	-4.0402215E-01
2	-3.3618937E-01	-3.1710410E-01	1.2488311E+00	-7.8867528E-01
3	-6.9518976E-01	8.8551140E-01	3.3513814E-01	-5.9764108E-01
4	1.1989263E+01	-2.7274104E+01	4.1138655E+01	-2.6221811E+01
5	1.2799215E+00	-6.0805643E-01	-6.5701417E+00	1.0955959E+01
6	8.6734211E-01	-1.2626762E+00	8.7271985E-01	-1.2234385E-01
7	-8.6810396E+00	1.3687948E+01	-1.1500705E+01	3.7304276E+00
8	1.2739701E-02	-7.4356044E-02	6.4549028E-02	-1.2957543E-02
9	5.3475537E-02	1.5902396E-03	-1.9540075E-03	1.7122320E-04
10	5.0278107E-02	-9.7894164E-03	1.0056192E-03	-4.1181094E-05

[TABLE 13]

VALUES IN CONDITIONAL EXPRESSIONS							
EXPRESSION NUMBER	CONDITIONAL EXPRESSIONS	EXAMPLE 1	EXAMPLE 2	EXAMPLE 3	EXAMPLE 4	EXAMPLE 5	EXAMPLE 6
(1)	f/f1	1.8	1.7	1.68	2.49	2.88	2.04
(2)	f/f2	-1.22	-0.98	-1.1	-1.83	-1.88	-1.25
(3)	f/f12	0.91	0.98	0.84	1.17	1.52	1.14
(4)	f/f345	-0.2	-0.37	-0.08	-0.42	-1.04	-0.48
(5)	f1/f3	0.15	0.05	0.2	-0.03	-0.3	-0.16
(6)	(R3f-R3r)/(R3f+R3r)	-0.18	-0.09	-0.48	0.73	0.98	0.95
(7)	f/f5	-0.55	-1.1	-1.88	-1.51	-2.43	-0.83
(8)	f·tanω/R5r	1.7	0.86	1.5	1.56	1.44	1.64
(9)	f/f3	0.27	0.09	0.34	-0.06	-0.86	-0.33
(10)	D7/f	0.12	0.12	0.14	0.11	0.08	0.08

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT2786580

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
TATSUYUKI OGINO	01/07/2014
MICHIO CHO	01/07/2014
YOSHIAKI ISHII	01/07/2014

RECEIVING PARTY DATA

Name:	FUJIFILM CORPORATION
Street Address:	26-30, NISHIAZABU 2-CHOME
Internal Address:	MINATO-KU
City:	TOKYO
State/Country:	JAPAN
Postal Code:	106-8620

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	14226172

CORRESPONDENCE DATA

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ATTORNEY DOCKET NUMBER:	8081-1131-1
NAME OF SUBMITTER:	ERIC JENSEN
SIGNATURE:	/Eric Jensen/
DATE SIGNED:	03/26/2014
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
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source=ASSMT#page2.tif

Docket No.:
Only After Sept 16, 2012

ASSIGNMENT WITH DECLARATION FOR PATENT APPLICATION (37 CFR 1.63)

特許出願宣誓書及び譲渡書 (37 CFR 1.63)

Japanese Language Assignment with Declaration

下記に署名した発明者（以下“譲渡人”）である私／我々は、下記で特定される出願書類の中に記載されたいくつかの改良について発明を行い、また、

Whereas, I/We, the undersigned inventor(s) hereinafter called assignor(s), have invented certain improvements described in the application identified below; and

富士フイルム株式会社（譲受人）は本出願および本発明に対する全ての権利、権原、および利益、ならびに当該出願および発明に対して得られる米国特許の取得を希望しているため、

Whereas, FUJIFILM Corporation (assignee), desires to acquire the entire right, title, and interest in the application and invention, and to any United States patents to be obtained therefor;

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Now therefore, for valuable consideration, receipt whereof is hereby acknowledged,

上記譲渡人である私／我々は、本宣誓書により、

i 上記指定された譲受人、その後継者および継承人に対して、以下の全てを売却、譲渡および移転します。
- すべての分割出願および継続出願を含めて、アメリカ合衆国で開示された本出願および本発明に対する全ての権利、権原および利益、

ならびに、
- 同出願書および発明に対して交付された米国特許証およびその全ての再発行（米国特許法第 119 条に基づく優先権主張の権利を含む）に対する全ての権利、権原および利益。

ii また、米国特許商標局長官に対して、本出願で記述された発明に対して交付された特許証を譲受人、その後継者および継承人に対し発行するよう要請し、また、追加の対価を受けることなく、譲受人の要求に応じて、米国出願に関連して譲受人が必要とみなすすべての書類の完成実施・署名を行います。

I/We, the above named assignor(s), hereby sell, assign and transfer to the above named assignee, its successors and assigns, the entire right, title and interest in the application and the invention disclosed therein for the United States of America, including all divisions, and continuations thereof, and all Letters Patent of the United States that may be granted thereon, and all reissues thereof, including the right to claim priority under 35 USC §119, and I/we request the Director of the U.S. Patent and Trademark Office to issue any Letters Patent granted upon the invention set forth in the application to the assignee, its successors and assigns; and I/we will execute without further consideration all papers deemed necessary by the assignee in connection with the United States application when called upon to do so by the assignee.

私は下記に記載の発明者として以下の通り宣言します。

As the below named inventor, I hereby declare that:

本「宣誓書付き譲渡書」は以下に関するものです。

☐ 添付の出願書、または

This assignment with declaration is directed to:

☒ The attached application, or

☐ _____年__月__日に出願された米国出願あるいは PCT 国際出願番号 _____（確認番号_____）

☐ United States Application or PCT International Application Number _____ filed on March 26, 2014 (Confirmation No 1892).

14/226,172

本出願書の名称は以下の通りです。

The application is entitled:
“IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS”

Japanese Language Assignment with Declaration

上記に特定された出願は私が作成した、または作成を許可したものです。

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

私は私が本宣言書内で請求されている発明を自らなした発明者、または共同発明者であると信じます。

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

私は本宣言付き譲渡書において故意になされた一切の虚偽の陳述が 18 USC 1001 に基づき罰金あるいは 5 年未満の拘禁または両方による処罰にあたることを理解しています。

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

STATEMENT OF ACCURATE TRANSLATION IN ACCORDANCE WITH 37 CFR §1.69(b):

The assignment with declaration is an accurate translation of the corresponding English language assignment with declaration.

Signature / Atsushi Nakamura /
Atsushi Nakamura

Date September 16, 2012

NAME OF SOLE OR FIRST INVENTOR: 唯一あるいは第一の発明者名	
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Inventor's signature 発明者の署名 Tatsuyuki Ogino	Date 日付 Jan. 07, 2014
NAME OF SECOND INVENTOR: 第二の発明者名	
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム） Michio	Family Name or Surname 姓 CHO
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NAME OF THIRD INVENTOR: 第三の発明者名	
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Inventor's signature 発明者の署名	Date 日付
NAME OF FIFTH INVENTOR: 第五の発明者名	
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム）	Family Name or Surname 姓
Inventor's signature 発明者の署名	Date 日付
NAME OF SIXTH INVENTOR: 第六の発明者名	
Given Name (first and middle [if any]) 名（[該当する場合]ミドルネーム）	Family Name or Surname 姓
Inventor's signature 発明者の署名	Date 日付