

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 December 2004 (02.12.2004)

PCT

(10) International Publication Number
WO 2004/105390 A3

(51) International Patent Classification⁷: H04N 9/31

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(21) International Application Number:
PCT/US2004/011275

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(22) International Filing Date: 13 April 2004 (13.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/439,449 16 May 2003 (16.05.2003) US

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

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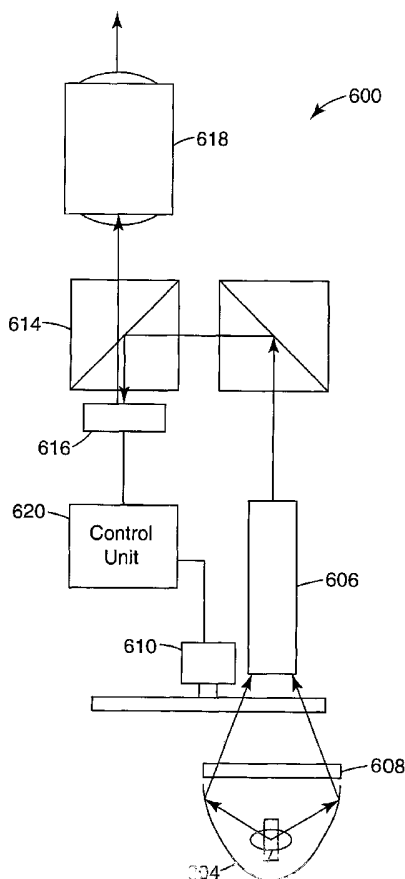
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(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: HIGHLY EFFICIENT SINGLE PANEL AND TWO PANEL PROJECTION ENGINES

(57) Abstract: Single imager projection systems suffer from low light throughput, compared to three imager systems, because only one color band is illuminated at any one time. As a result, there is a need to increase the operating efficiency of the single imager projection system. The invention is directed to the incorporation of a high extinction ratio pre-polarizer, such as a compensated, multi-layer polarizer, in a single or dual imager projection system. This permits illumination with low f-number illumination light, and thus increases the efficiency of the projection system. The pre-polarizer may be incorporated within a polarization recovery unit to further enhance system efficiency.



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GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG,

Published:

— with international search report
 — before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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

14 April 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/011275

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H04N9/31		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 398 364 B1 (BRYARS BRETT J) 4 June 2002 (2002-06-04) column 6, line 33 - line 40 column 10, line 63 - column 11, line 18; figure 4	1-19
Y	US 6 486 997 B1 (AASTUEN DAVID J W ET AL) 26 November 2002 (2002-11-26) cited in the application column 4, line 9 - line 13 column 16, line 59 - line 65; figure 24 column 26, line 28 - line 34	1-19
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents :		
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed		*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family
Date of the actual completion of the international search 10 December 2004		Date of mailing of the international search report 07.02.2005
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Lim, J

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/011275

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>DUELLI M ET AL: "POLARIZATION RECOVERY SYSTEM BASED ON LIGHT PIPES" PROCEEDINGS OF THE SPIE, SPIE, BELLINGHAM, VA, US, vol. 4657, 20 January 2002 (2002-01-20), pages 9-16, XP009009490 ISSN: 0277-786X page 1 page 15</p>	12-15
A	<p>US 5 982 541 A (DOBROWOLSKI JERZY A ET AL) 9 November 1999 (1999-11-09) column 15, line 63 - column 16, line 5</p>	1,20
A	<p>'Online! XP002289044 04-05-2003 Retrieved from the Internet: URL:http://web.archive.org/web/20030504210709/http://optics.unaxis.com/pod/SysDirs/publish/release/106RE.pdf> whole doc</p>	1,20
X	<p>EP 1 081 964 A (SHARP KK) 7 March 2001 (2001-03-07) column 17 - column 21</p>	20-25, 28-30, 32,33
X	<p>WO 00/63738 A (U S PREC LENS INC) 26 October 2000 (2000-10-26) page 10, line 6 - page 11, line 7 page 15, line 4 - line 6 figures 2,9</p>	20,21, 23-30,33
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A	<p>US 2003/038923 A1 (AASTUEN DAVID J W ET AL) 27 February 2003 (2003-02-27) paragraph '0032!</p>	1,17,18, 20,33
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/011275

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

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

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

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

see additional sheet

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

Remark on Protest

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

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-19

A single imager light projection system comprising a pre-polarizer with a high extinction ratio

2. claims: 20-33

An imaging core for a projection system using both polarization directions.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/011275

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