

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 September 2007 (13.09.2007)

PCT

(10) International Publication Number
WO 2007/102940 A3

(51) International Patent Classification:
G03B 21/00 (2006.01)

(21) International Application Number:
PCT/US2007/001571

(22) International Filing Date: 22 January 2007 (22.01.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/779,556 6 March 2006 (06.03.2006) US

(71) Applicant (for all designated States except US): **INNOVATIONS IN OPTICS, INC.** [US/US]; 82 Cummings Park, Woburn, Massachusetts 01801 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BRUKILAC-CHIO, Thomas J.** [US/US]; 48 Maple Ridge Road, Reading, Massachusetts 01867 (US). **DEMILO, Charles A.** [US/US]; 6 Curtis Street, Marblehead, Massachusetts 01945 (US).

(74) Agent: **CAUFIELD, Francis, J.**; 6 Apollo Circle, Lexington, MA 02421-7025 (US).

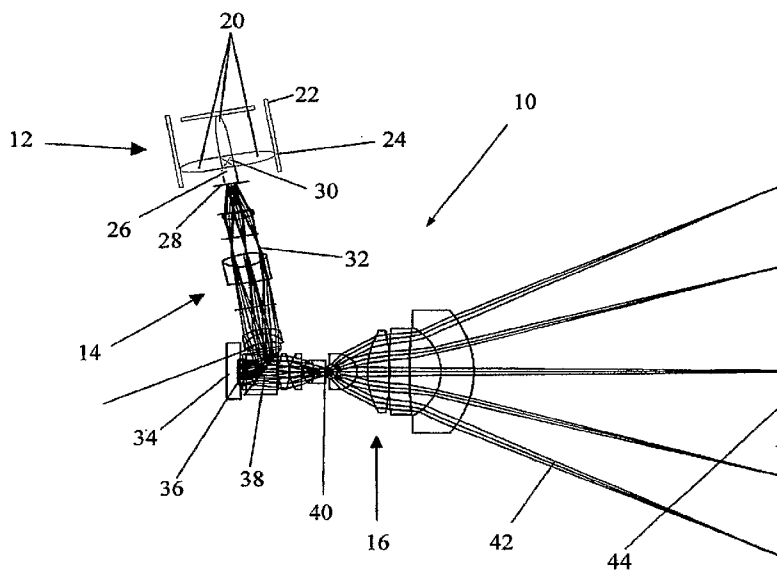
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,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

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, 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, IS, IT, LT, LU, LV, 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).

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:
10 July 2008

(54) Title: LIGHT EMITTING DIODE PROJECTION SYSTEM



(57) Abstract: The present invention generally relates to video and/or television projection systems, and more particularly, to LED based light source systems utilizing generally non-rotationally symmetric, preferably oblong or rectangular, non-imaging collection optics for providing improved projection systems relative to arc lamp and other LED based light source systems. The non-rotationally symmetric non-imaging collection optics are configured to operate with LEDs to provide preferred, generally, uniform light distributions whose étendues match those of downstream applications such as those encountered in projection systems. Also provided are various arrangements for coupling LED output to the entrance aperture of collection optics and for coupling the outputs from a plurality of collection optic outputs to form single beams of illumination of preferred patterns, intensities, and color.

WO 2007/102940 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/01571

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G03B 21/00 (2007.01)

USPC - 353/31

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(8) - G03B 21/00, 21/28 (2007.01)

USPC - 353/31, 98

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 practicable, search terms used)

PatBase, MicroPatent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0043400 A1 (ERCHAK et al) 02 March 2006 (02.03.2006) entire document	33 and 34
Y	US 6,318,863 B1 (TIAO et al) 20 November 2001 (20.11.2001) entire document	1-10, 14-17, 21-25, 27, and 29-32
Y	US 6,967,986 B2 (KOWARZ et al) 22 November 2005 (22.11.2005) entire document	15-17, 22-25, 27, and 29
Y	US 6,968,103 B1 (SCHROLL et al) 22 November 2005 (22.11.2005) entire document	8-10, and 32
Y	US 7,001,084 B2 (CARPENTER et al) 21 February 2006 (21.02.2006) entire document	7
Y	US 2005/0169579 A1 (TEMKIN et al) 04 August 2005 (04.08.2005) entire document	6-10, and 32
Y	US 6,205,998 B1 (WINSTON) 27 March 2001 (27.03.2001) entire document	1-10, 14-17, 21-25, 27, and 29-32
Y	US2005/0275819 A1 (TOLBERT et al) 15 December 2005 (15.12.2005) entire document	10, 21, and 32

 Further documents are listed in the continuation of Box C.

* 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 application or patent 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

05 July 2007

Date of mailing of the international search report

01 MAY 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774