

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 June 2007 (21.06.2007)

PCT

(10) International Publication Number
WO 2007/069213 A3

(51) International Patent Classification:
G02B 3/14 (2006.01)

(21) International Application Number:

PCT/IB2006/054846

(22) International Filing Date:

14 December 2006 (14.12.2006)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/751,424 16 December 2005 (16.12.2005) US

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(71) Applicant (for AE only): **U.S. PHILIPS CORPORATION** [US/US]; 1251 Avenue of the Americas, New York, New York 10020 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **DOBRUSSKIN, Christoph** [DE/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

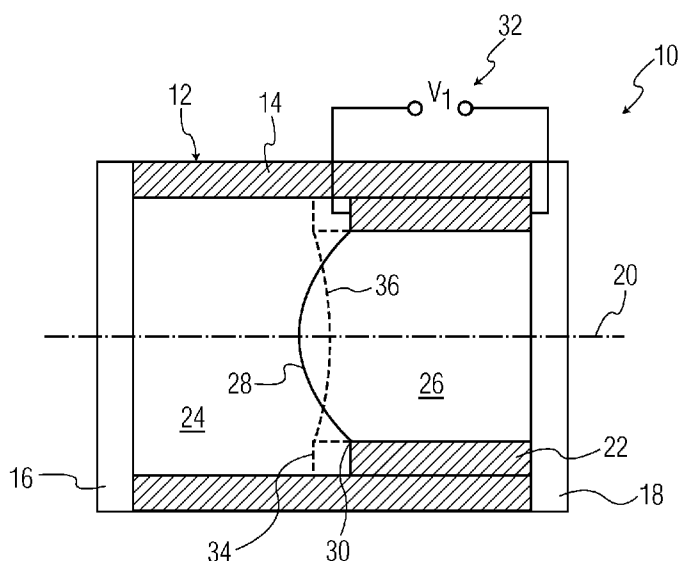
(74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o Frank J. KEEGAN, P.O. Box 3001, 345Scarborough Road, Briarcliff Manor, NY 10510-8001 (US).

(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).

[Continued on next page]

(54) Title: **PIEZOELECTRIC VARIABLE FOCUS FLUID LENS AND METHOD OF FOCUSING**



(57) Abstract: A variable focus lens (10) comprises a fluid chamber (12) having an optical axis (20). One or more piezoelectric element (22) is disposed about the optical axis within a portion of the fluid chamber. First and second fluids (24, 26) are disposed within another portion the fluid chamber and in contact with one another over a meniscus (28, 36) extending transverse the optical axis, the first and second fluids being substantially immiscible and having different indices of refraction. The perimeter of the meniscus is fixedly located on a surface in relationship to the one or more piezoelectric element, wherein responsive to application of a voltage potential (32) to the one or more piezoelectric element, the one or more piezoelectric element controllably alters one or more of (i) a shape of the meniscus or (ii) a translation of the meniscus.

WO 2007/069213 A3



Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report*

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

11 October 2007

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/IB2006/054846

A. CLASSIFICATION OF SUBJECT MATTER

INV. G02B3/14

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)

G02B

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.
A	WO 2005/096028 A (1 LTD [GB]) 13 October 2005 (2005-10-13) the whole document	1-25
A	GB 1 327 503 A (BOSCH GMBH ROBERT) 22 August 1973 (1973-08-22) page 1, line 58 - page 2, line 17 page 2, line 47 - line 83	
A	NL 8 501 101 A (OPTISCHE IND DE OUDE DELFT NV) 1 April 1986 (1986-04-01) abstract; figure 1	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family 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.

Z document member of the same patent family

Date of the actual completion of the international search

6 June 2007

Date of mailing of the international search report

22/06/2007

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

Feeney, Orla

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2006/054846

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005096028 A	13-10-2005	GB 2427283 A	20-12-2006
GB 1327503 A	22-08-1973	NONE	
NL 8501101 A	01-04-1986	NONE	