

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
28 September 2006 (28.09.2006)

PCT

(10) International Publication Number
WO 2006/100624 A3

(51) International Patent Classification:

G11B 7/135 (2006.01) **G02B 3/14** (2006.01)

(21) International Application Number:

PCT/IB2006/050799

(22) International Filing Date: 14 March 2006 (14.03.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

05102367.9 24 March 2005 (24.03.2005) EP

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

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HENDRIKS, Bernardus, H., W.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **KUIPER, Stein** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).(74) Agents: **UITTENBOGAARD, Frank** et al.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(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, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, 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).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

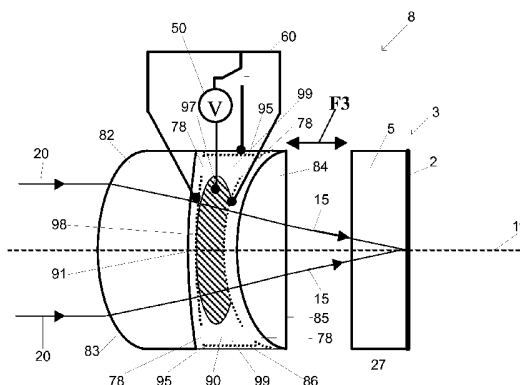
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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

16 November 2006

[Continued on next page]

(54) Title: OPTICAL SCANNING DEVICE



(57) **Abstract:** An optical scanning device for scanning an information layer of a first optical record carrier having a first cover layer thickness and an information layer of a second optical record carrier having a second, different cover layer thickness. The device includes an objective lens system for converging a radiation beam on the information layers. The objective lens system includes a first lens element and a second lens element spaced apart along an optical axis. The objective lens system further includes a switchable optical element comprising a first fluid, and a chamber positioned between said first lens and said second lens. The objective lens system is switchable between a first configuration in which the first fluid occupies an optically active portion of the chamber such that the objective lens system has a first focal length for scanning the information layer of the first optical record carrier, and a second configuration in which the first fluid does not occupy the optically active portion of the chamber such that the objective lens system has a second, different focal length for scanning the information layer of the second optical record carrier. The objective lens system is arranged to satisfy the condition: $\text{Focal2} - \text{Focal1} > 0.9 (T2 - T1)/N$, where $T1$ is the first cover layer thickness, $T2$ is the second cover layer thickness, $T2 > T1$, N is the refractive index of the second cover layer, Focal1 is the first focal length, and Focal2 is the second focal length.



A3

WO 2006/100624



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/IB2006/050799

A. CLASSIFICATION OF SUBJECT MATTER
INV. G11B7/135 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)
G11B 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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2004/027489 A (KONINKLIJKE PHILIPS ELECTRONICS N.V; FEENSTRA, BOKKE, J; HAYES, ROBERT) 1 April 2004 (2004-04-01) page 9, line 18 - page 12, line 15 abstract	1-14
A	WO 2004/077126 A (KONINKLIJKE PHILIPS ELECTRONICS N.V; HENDRIKS, BERNARDUS, H., W; KUIPE) 10 September 2004 (2004-09-10) page 4, line 18 - page 7, line 30; figures 1-4 abstract	1-14
A	WO 2004/077125 A (KONINKLIJKE PHILIPS ELECTRONICS N.V; KUIPER, STEIN; VISSER, DERK) 10 September 2004 (2004-09-10) page 4, line 15 - page 10, line 32; figures 1-6	1-14
	----- -/-	

☒ 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.

"&" document member of the same patent family

Date of the actual completion of the international search

4 September 2006

Date of mailing of the international search report

11/09/2006

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

Lehnberg, C

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2006/050799

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 081 388 A (WIDL ET AL) 27 June 2000 (2000-06-27) column 8, lines 38-58; figures 7,8 abstract -----	1-14
P,X	WO 2005/096029 A (KONINKLIJKE PHILIPS ELECTRONICS N.V; KUIPER, STEIN; HENDRIKS, BERNARDU) 13 October 2005 (2005-10-13)	1-10, 12-14
P,A	page 7, line 30 - page 13, line 33 page 21, line 5 - page 28, line 32; figures 1-3 abstract -----	11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2006/050799

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004027489 A	01-04-2004	AU 2003260825 A1 CN 1682143 A JP 2006500614 T US 2005270672 A1	08-04-2004 12-10-2005 05-01-2006 08-12-2005
WO 2004077126 A	10-09-2004	US 2006158971 A1	20-07-2006
WO 2004077125 A	10-09-2004	CN 1754112 A	29-03-2006
US 6081388 A	27-06-2000	AU 2692097 A WO 9736193 A1 EP 0890118 A1 JP 2000507415 T	17-10-1997 02-10-1997 13-01-1999 13-06-2000
WO 2005096029 A	13-10-2005	NONE	