

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 December 2007 (27.12.2007)

PCT

(10) International Publication Number
WO 2007/149680 A3

(51) International Patent Classification:

H01L 27/20 (2006.01)

(21) International Application Number:

PCT/US2007/069755

(22) International Filing Date: 25 May 2007 (25.05.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

11/473,096

22 June 2006 (22.06.2006) US

(71) Applicant (for all designated States except US): **GOOCH AND HOUSEGO PLC** [GB/GB]; The Old Magistrates Court, Llininster, Somerset TA19 0AB (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **PANNELL, Christopher, N.** [GB/US]; 8112 Banyan Blvd., Orlando, FL 32919 (US).

(74) Agent: **JETTER, Neil, R.**; DARBY & DARBY, P.O. Box 770, Church Street Station, New-York, NY 20008-0770 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, 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, LY, MA, MD, ME, 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, MT, 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).

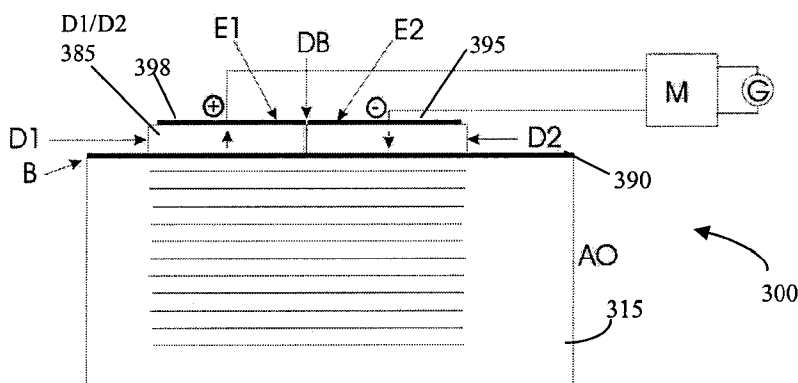
Published:

- 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:

27 March 2008

(54) Title: ACOUSTIC TRANSDUCERS HAVING LOCALIZED FERROELECTRIC DOMAIN INVERTED REGIONS



(57) Abstract: An acoustic transducer includes a ferroelectric transducer crystal 385 having at least one ferroelectric domain inverted region D1 and at least one non-inverted region D2. D1 is domain inverted (180 degrees out of phase) relative to domain D2. An electrode layer 390 is disposed on one side of the crystal 385 contacting both the domain inverted portion D1 and the non-inverted portion D2 of the crystal. On a side of the crystal opposite the electrode layer 390, a first electrode 398 is disposed on

the domain inverted portion D1 spaced apart from a second electrode 395 disposed on the non-inverted portion D2. As a result, the acoustic transducer provides sub-transducers hooked in series having effective areas defined by the areas of their respective electrodes. An acousto-optic (AO) device 300 includes an AO interaction crystal 315 attached to the electrode layer 390 which receives acoustic waves from the transducer 385.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/069755

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01L27/20

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)
B06B H01L

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DATABASE INSPEC [Online] THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; March 2006 (2006-03), NAKAMURA K ET AL: "An ultrasonic transducer for second imaging using a LiNbO3 plate with a local ferroelectric inversion layer" XP002464046 Database accession no. 8810529 cited in the application abstract; figure 1B & IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control IEEE USA, vol. 53, no. 3, March 2006 (2006-03), pages 651-655, ISSN: 0885-3010 ----- -/--	1,4

☒ 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

15 January 2008

Date of mailing of the international search report

06/02/2008

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

Koskinen, Timo

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/069755

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 550 792 A (CRANDALL F ANTHONY [US] ET AL) 27 August 1996 (1996-08-27) figure 1 -----	1,4
A	EP 0 615 225 A (HEWLETT PACKARD CO [US]) 14 September 1994 (1994-09-14) -----	1-20
A	US 2003/205947 A1 (KLEE MAREIKE KATHARINE [DE] ET AL) 6 November 2003 (2003-11-06) -----	1-20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/069755

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5550792	A	27-08-1996	NONE	
EP 0615225	A	14-09-1994	US 5381067 A	10-01-1995
US 2003205947	A1	06-11-2003	AT 330716 T	15-07-2006
			AU 2003219464 A1	17-11-2003
			CN 1649678 A	03-08-2005
			DE 60306367 T2	31-05-2007
			EP 1503871 A1	09-02-2005
			WO 03092916 A1	13-11-2003
			JP 2005523816 T	11-08-2005