



(51) International Patent Classification:
G01S 15/00 (2006.01)

(21) International Application Number:
PCT/US2011/057929

(22) International Filing Date:
26 October 2011 (26.10.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/456,086 1 November 2010 (01.11.2010) US
13/282,257 26 October 2011 (26.10.2011) US

(71) Applicant (for all designated States except US): **ROWE TECHNOLOGIES, INC.** [US/US]; 12655 Danielson Ct., Suite 306, Poway, CA 92064 (US).

(72) Inventors; and
(71) Applicants : **ROWE, Francis, Dale** [US/US]; 12655 Danielson Ct., Suite 306, Poway, CA 92064 (US).
ROMEO, John [US/US]; 12655 Danielson Ct., Suite 306, Poway, CA 92064 (US).

(74) Agent: **GUTIERREZ III, Peter, J.**; Gazdzinski & Associates, PC, 16644 West Bernardo Drive, Suite 201, San Diego, CA 92127 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report (Art. 21(3))

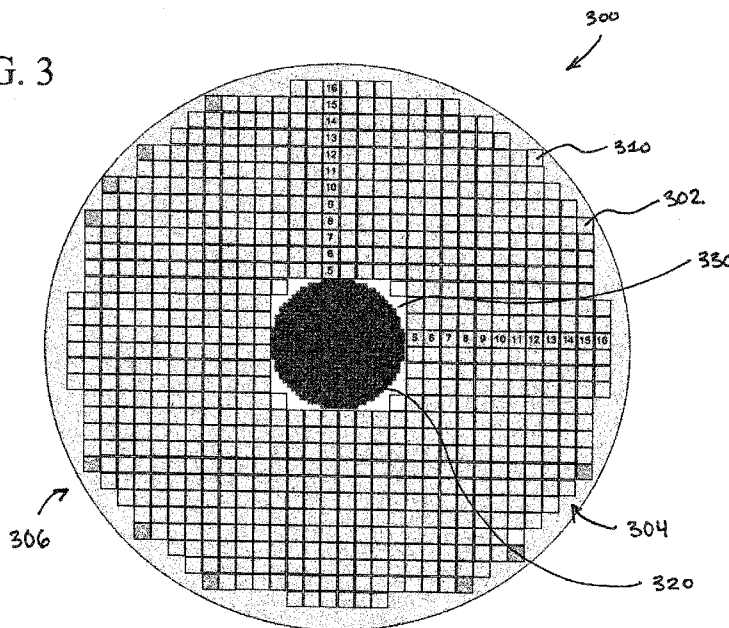
(88) Date of publication of the international search report:
10 April 2014

(15) Information about Correction:

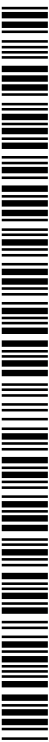
[Continued on next page]

(54) Title: MULTI FREQUENCY 2D PHASED ARRAY TRANSDUCER

FIG. 3



(57) Abstract: Improved two-dimensional planar array transducer and beamformer apparatus and methods. In one embodiment, the two-dimensional planar array transducer is capable of simultaneously or sequentially forming multiple acoustic beams in two axes and at two or more widely separated acoustic frequencies from a single flat planar array transducer. The transducer planar array consists of two or more electrically and acoustically independent two dimensional planar transducer array structures operating at different frequencies that are physically integrated onto a single multi frequency configuration. In an exemplary embodiment, a second higher frequency transducer array is positioned within the aperture area of a lower frequency planar array transducer. Methods of using the aforementioned two-dimensional planar array transducer and beamformer are also disclosed.



Previous Correction:
see Notice of 20 September 2012

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/057929

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - G01S 15/00 (2012.01)
 USPC - 367/90
 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) - A61B 8/14; G01S 15/00, 15/02, 15/58, 15/60, 15/66 (2012.01)
 USPC - 367/7, 89, 90, 91, 94, 103, 131, 137, 138; 600/459

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)
 Orbit Database, Google Patents, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2003/0076742 A1 (ROWE) 24 April 2003 (24.04.2003) entire document	1, 4, 7-14, 18-20 ----- 2, 3, 5, 6, 15-17
Y	US 2009/0182237 A1 (ANGELSEN et al) 16 July 2009 (16.07.2009) entire document	2, 3, 5, 6, 15-17
A	WO 2010/111157 A1 (SLOCUM et al) 30 September 2010 (30.09.2010) entire document	1-20
A	US 5,808,967 A (YU et al) 15 September 1998 (15.09.1998) entire document	1-20

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	"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
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Date of the actual completion of the international search 23 January 2012	Date of mailing of the international search report 30 JAN 2012
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