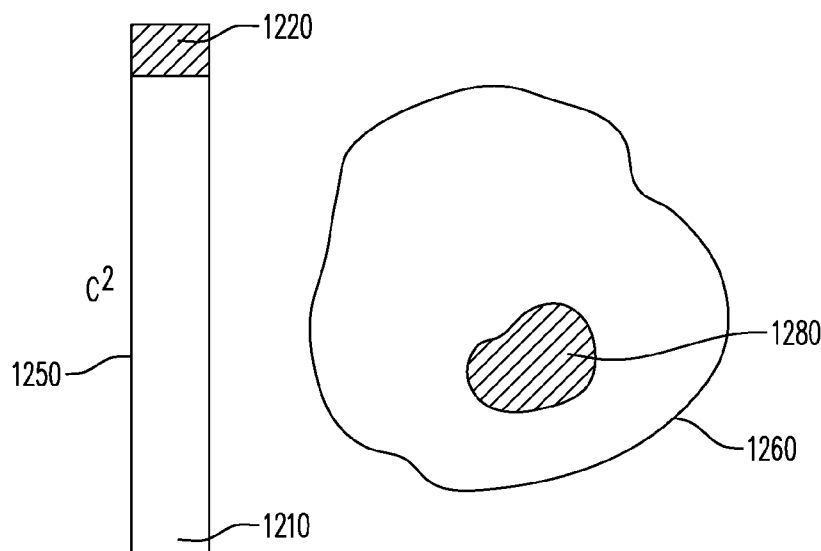




- (51) **International Patent Classification:**
A61B 8/08 (2006.01) *G06F 19/00* (2011.01)
- (21) **International Application Number:**
PCT/US2012/031429
- (22) **International Filing Date:**
30 March 2012 (30.03.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/469,295 30 March 2011 (30.03.2011) US
13/314,736 8 December 2011 (08.12.2011) US
- (71) **Applicant (for all designated States except US):** **HITACHI ALOKA MEDICAL, INC.** [JP/JP]; 6-22-1 Mure, Mitaka-shi, Tokyo (JP).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **TAMURA, Tadashi** [JP/US]; 1298 Hartford Turnpike, Unit 5h, North Haven, CT 06473 (US).
- (74) **Agent:** **TALWALKAR, Nandu, A.**; Buckley, Maschoff & Talwalkar Llc, 50 Locust Avenue, New Canaan, CT 06840 (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))

[Continued on next page]

(54) **Title:** METHODS AND APPARATUS FOR ULTRASOUND IMAGING**Figure 12**

(57) Abstract: A first ultrasound pulse is applied to biological tissue to create shear waves in the biological tissue, a focused ultrasound pulse is transmitted into the biological tissue, one or more ultrasound signals is received from the biological tissue, and shear waves are detected in the biological tissue based on the received one or more ultrasound signals. At least one shear wave propagation property associated with the detected shear waves is determined, and the determined at least one propagation property is displayed. Ultrasound beam steering is used to improve measurement accuracy.



-
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*
- (88) **Date of publication of the international search report:**
27 December 2012

A. CLASSIFICATION OF SUBJECT MATTER**A61B 8/08(2006.01)i, G06F 19/00(2011.01)i**

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)

A61B 8/08; A61B 8/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: ultrasound, shear wave, propagate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004-0068184 A1 (GREGG E. TRAHEY et al.) 08 April 2004	1,2,10,15-18,26
Y	See abstract, paragraphs [0030]-[0051], claim 1, and figures 1,3.	,31-34,42,47,48
A		8-9,11,24-25,27,40
		,41,43
Y	US 2010-0016718 A1 (FAN LIEXIANG et al.) 21 January 2010	3-7,12-14,19-23
A	See abstract, paragraphs [0019]-[0060], claim 8, and figures 1,4.	,28-30,35-39,44-46
A	US 2005-0165306 A1 (YI ZHENG et al.) 28 July 2005	8-9,11,24-25,27
	See abstract, paragraphs [0070]-[0074], claim 6, and figures 1,4.	,40-41,43
A	US 2004-0225215 A1 (QUERLEUX BERNARD et al.) 11 November 2004	1-48
	See abstract, paragraphs [0081]-[0087], claim 1, and figure 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 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 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

26 OCTOBER 2012 (26.10.2012)

Date of mailing of the international search report

30 OCTOBER 2012 (30.10.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM Tae Hoon

Telephone No. 82-42-481-5728



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/031429

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0068184 A1	08.04.2004	US 6764448 B2	20.07.2004
US 2010-0016718 A1	21.01.2010	DE 102009033286 A1 FR 2934054 A1	21.01.2010 22.01.2010
US 2005-0165306 A1	28.07.2005	US 2007-0038095 A1 US 7753847 B2 US 7785259 B2	15.02.2007 13.07.2010 31.08.2010
US 2004-0225215 A1	11.11.2004	EP 1473058 A1 EP 1473058 B1 JP 04-349924 B2 JP 2004-223265 A JP 4349924 B2 US 7901355 B2	03.11.2004 04.06.2008 31.07.2009 12.08.2004 21.10.2009 08.03.2011