



- (51) International Patent Classification: *G01V 1/38* (2006.01) *G01V 1/02* (2006.01)
- (21) International Application Number: PCT/IB2012/051154
- (22) International Filing Date: 12 March 2012 (12.03.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 61/452,356 14 March 2011 (14.03.2011) US
- (71) Applicant (for all designated States except CA, US): **GECO TECHNOLOGY B.V.** [NL/NL]; Gevers Deynootweg 61, NL-2586 BJ S Gravenhage (NL).
- (71) Applicant (for CA only): **SCHLUMBERGER CANADA LIMITED** [CA/CA]; 525-3rd Avenue Southwest, Calgary, Alberta T2P 0G4 (CA).
- (71) Applicant (for KR only): **SCHLUMBERGER SEACO, INC** [PA/KR]; 2nd Floor, Jun-il Building, Seocho-Dong, Seoul 1579-9 (KR).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **LAWS, Robert** [GB/GB]; Schlumberger Cambridge Research Limited, High Cross, Madingley Road, Cambridge, Cambridgeshire CB3 0EL (GB).
- (74) Agents: **FORD, Michael, F.** et al.; Schlumberger Cambridge Research Limited, High Cross, Madingley Road, Cambridge, Cambridgeshire CB3 0EL (GB).
- (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,

[Continued on next page]

(54) Title: MARINE VIBRATOR SWEEPS WITH REDUCED SMEARING AND/OR INCREASED DISTORTION TOLERANCE

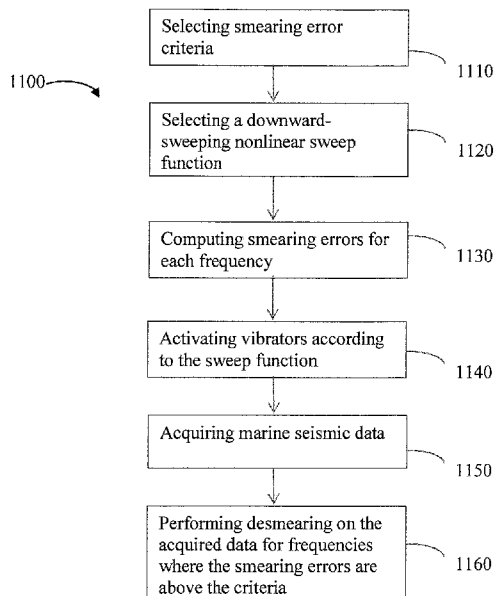


FIG. 11

(57) Abstract: A marine seismic survey using one or more moving marine seismic vibrators, where the vibrator sweeping function is based on smearing error criteria and is a downward-sweeping non-linear sweep function. The acquired seismic data can either be used as is without desmearing or desmeared easily.





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).

— 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:
20 December 2012

Published:

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2012/051154**A. CLASSIFICATION OF SUBJECT MATTER***G01V 1/38(2006.01)i, G01V 1/02(2006.01)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)

G01V 1/38; G01V 1/24; G01V 1/28; G01V 1/40; G01V 1/00

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: seismic, vibrator, smearing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0076730 A1 (MARVIN L. JOHNSON et al.) 19 March 2009 See paragraphs 39-45 and figures 1,2.	1-21
A	US 6151556 A (KENNETH PAUL ALLEN) 21 November 2000 See column 2, line 22 - column 6, line 29 and figures 1-3.	1, 10, 15
A	US 4782446 A (JERRY W. EHLER et al.) 01 November 1988 See column 6, line 9 - column 9, line 20 and figures 1,2.	1, 10, 15
A	US 6049507 A (KENNETH PAUL ALLEN) 11 April 2000 See column 6, lines 1-44 and figures 2,3.	1, 10, 15

 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

16 OCTOBER 2012 (16.10.2012)

Date of mailing of the international search report

18 OCTOBER 2012 (18.10.2012)

Name and mailing address of the ISA/KR

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

Facsimile No. 82-42-472-7140

Authorized officer

MYUNG Dae Keun

Telephone No. 82-42-481-8417



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IB2012/051154

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0076730 A1	19.03.2009	US 8050867 B2 WO 2007-130551 A2 WO 2007-130551 A3	01.11.2011 15.11.2007 14.08.2008
US 6151556 A	21.11.2000	AU 2000-57430 A1 AU 2000-57430 B2 CA 2375495 A1 CA 2375495 C EP 1204885 A1 WO 00-79303 A1	09.01.2001 22.04.2004 28.12.2000 16.11.2004 15.05.2002 28.12.2000
US 4782446 A	01.11.1988	None	
US 6049507 A	11.04.2000	CA 2278131 A1 CA 2278131 C CN 1206545 C0 CN 1246623 A0 GB 2339906 A	22.01.2000 25.03.2003 15.06.2005 08.03.2000 09.02.2000