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- (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, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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Declarations under Rule 4.17:

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

[Continued on next page]

(54) **Title:** EMAT ACOUSTIC SIGNAL MEASUREMENT USING MODULATED GAUSSIAN WAVELET AND HILBERT DEMODULATION

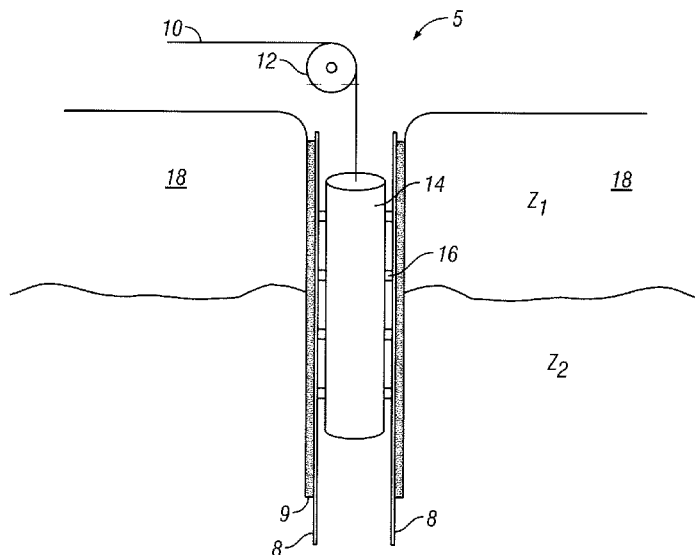


Figure 1
(Prior Art)

(57) **Abstract:** Casing signals generated by an EMAT in a borehole are processed using one or more band-limited Gaussian filters. By using the Hubert transform, an envelope of the filtered signals is determined and amplitudes and arrival times of individual arrivals are estimated. These can be used to estimate casing and cement properties.

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))* — *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))*

Published:

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12 August 2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/063876**A. CLASSIFICATION OF SUBJECT MATTER***G01V 1/40(2006.01)i, G01N 29/00(2006.01)i, E21B 47/14(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 1/40; G01N 29/04

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: casting, cement, acoustic pulse, gaussian, hilbert, bandpass

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4928269 A1 (KIMBALL; CHRISTOPHER V. et al.) 22 May 1990 See abstract, columns 2, 4, 11, 13 and figure 5.	1-19
A	US 5644550 A1 (PRIEST; JOHN F.) 01 July 1997 See abstract, columns 2, 3, 9, 10 and figures 1-2.	1-8
A	US 5216638 A1 (WRIGHT; PETER) 01 June 1993 See abstract, columns 5, 9 and figure 1.	3, 13
A	US 4255798 A1 (HAVIRA; R. MARK) 10 March 1981 See abstract, columns 9, 10 and figure 2.	9-17
A	US 6366531 B1 (VARSAMIS; GEORGIOS L. et al.) 02 April 2002 See abstract, columns 13, 14 and figure 1.	18, 19

 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

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18 JUNE 2010 (18.06.2010)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4928269 A1	22.05.1990	None	
US 5644550 A1	01.07.1997	CA 2208965 C GB 2314929 A	22.08.2006 14.01.1998
US 5216638 A1	01.06.1993	EP 0395499 A3 EP 0395499 B1	23.01.1991 28.07.1993
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US 6366531 B1	02.04.2002	DE 69941058 D1 EP 1116050 A1 EP 1116050 B1 N020010370A N020010370D0 US 6552962 B1 WO 00-17672 A1	13.08.2009 18.07.2001 01.07.2009 22.01.2001 22.01.2001 22.04.2003 30.03.2000