

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
25 June 2009 (25.06.2009)

(10) International Publication Number  
**WO 2009/079631 A3**

- (51) **International Patent Classification:**  
*E21B 47/01* (2006.01)      *G01N 29/00* (2006.01)
- (21) **International Application Number:**  
PCT/US2008/087463
- (22) **International Filing Date:**  
18 December 2008 (18.12.2008)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
61/014,601    18 December 2007 (18.12.2007)      US  
12/331,023    9 December 2008 (09.12.2008)            US
- (71) **Applicant (for all designated States except US):** **BAKER HUGHES INCORPORATED** [US/US]; P.O.Box 4740, Houston, TX 77210-4740 (US).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **RECHMANN, Hanno** [DE/DE]; Haferkamp 5, D-29336 Nienhagen (DE).
- (74) **Agents:** **CARSON, Matt, W.** et al.; Baker Hughes Incorporated, P.o.box 4740, Houston, TX 77210-4740 (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, 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, 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.

(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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

**Published:**

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

[Continued on next page]

(54) **Title:** DOWNHOLE TOOL DAMAGE DETECTION SYSTEM AND METHOD

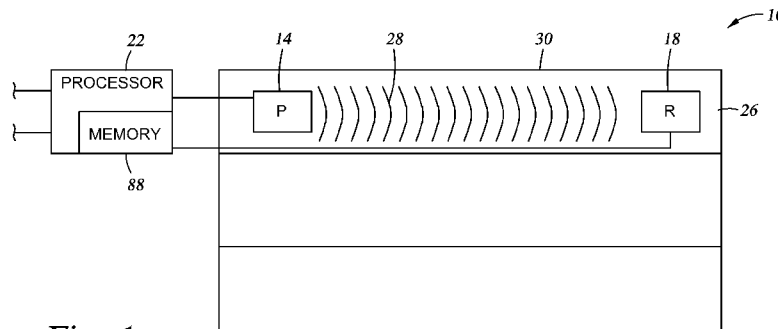
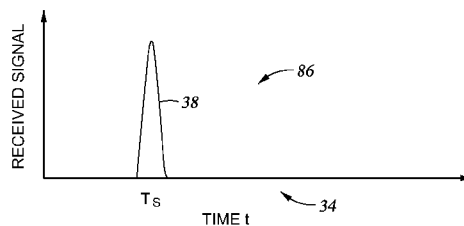
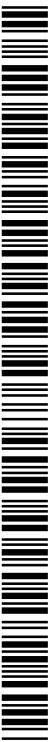


Fig. 1



(57) **Abstract:** A downhole tool damage detection method includes, transmitting ultrasonic energy through a downhole tool, receiving ultrasonic energy transmitting through the downhole tool, monitoring the received ultrasonic energy for changes over time, and alerting that damage in the downhole tool may exist in response to finding the changes.



WO 2009/079631 A3

**(88)** Date of publication of the international search report:  
24 September 2009

**A. CLASSIFICATION OF SUBJECT MATTER****E21B 47/01(2006.01)i, G01N 29/00(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)

IPC: E21B 47/01, H04R 17/00, G01N 29/00, 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 since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS(KIPO internal) &amp; keywords: ultrasonic energy, acoustic energy, transducer

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7 234 519 B2(FRIPP et al.) 26 JUNE 2007	22
Y	See the Abstract, Fig. 2, Columns 3,4,8,10 and Claims 30-36	1-21
X	US 2007/0206440 A1(FRIPP et al.) 6 SEPTEMBER 2007	22
Y	See the Abstract, Fig. 2, Paragraphs 38,47 and Claims 13-15	1-21
Y	EP 0131065 A2(LIVINGSTON, WAYLON A.) 16 JANUARY 1985	1-21
A	See the Abstract, Figs. 2,3 and Pages 5-8	22
A	US 6 082 193 A(PAULSON) 4 JULY 2000	1-22
	See the Abstract and Fig. 1	
A	US 5 854 422 A(MCKEON et al.) 29 DECEMBER 1998	1-22
	See the Abstract and Fig. 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

"&amp;" document member of the same patent family


Date of the actual completion of the international search

03 AUGUST 2009 (03.08.2009)

Date of mailing of the international search report

**03 AUGUST 2009 (03.08.2009)**

Name and mailing address of the ISA/KR


 Korean Intellectual Property Office  
 Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KOO, BON CHEOL

Telephone No. 82-42-481-5803



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2008/087463**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7 234 519 B2	26.06.2007	AU 2004-201437 A1	28.10.2004
		CA 2463019 A1	08.10.2004
		EP 1467060 A1	13.10.2004
		US 2004-0200613 A1	14.10.2004
		US 7325605 B2	05.02.2008
		US 2007-0206440 A1	06.09.2007
US 2007/0206440 A1	06.09.2007	AU 2004-201437 A1	28.10.2004
		CA 2463019 A1	08.10.2004
		EP 1467060 A1	13.10.2004
		US 2004-0200613 A1	14.10.2004
		US 7234519 B2	26.06.2007
		US 7325605 B2	05.02.2008
EP 0131065 A2	16.01.1985	NONE	
US 6 082 193 A	04.07.2000	CA 2273979 A1	11.06.1998
		JP 2001-508538 A	26.06.2001
		WO 1998-025121 A1	11.06.1998
US 5 854 422 A	29.12.1998	NONE	