#### (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

# (19) World Intellectual Property Organization International Bureau





(43) International Publication Date 23 July 2009 (23.07.2009)

(10) International Publication Number WO 2009/091422 A3

(71) Applicant (for all designated States except US): BAKER

Houston, TX 77210-4740 (US).

HUGHES INCORPORATED [US/US]; P.O. Box 4740,

- (51) International Patent Classification: *E21B 43/1185* (2006.01) *E21B 47/12* (2006.01)
- (21) International Application Number:

PCT/US2008/074010

(22) International Filing Date:

22 August 2008 (22.08.2008)

(25) Filing Language:

English

(26) Publication Language:

English

US

(30) Priority Data:

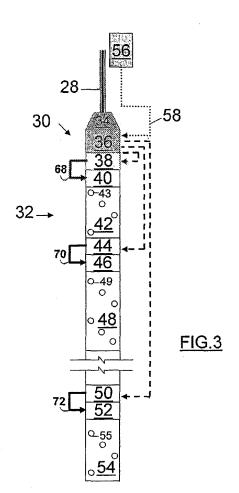
11/841,062

20 August 2007 (20.08.2007)

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HILL, Freeman, L. [US/US]; 11918 Sunset Lake Court, Houston, TX 77065 (US). CRESSWELL, Gary, J. [GB/US]; 330 Rayford Road #353, Spring, TX 77386 (US). CHANCE, David, M. [US/US]; 3003 Memorial Court #2322, Houston, TX 77007 (US). EVANS, Randy, L. [US/US]; 9707 Garden Row, Sugar Land, TX 77478 (US).
- (74) Agents: CARSON, Matt, W. et al.; Baker Hughes Incorporated, P.O. Box 4740, Houston, TX 77027-4740 (US).

[Continued on next page]

(54) Title: WIRELESS PERFORATING GUN INITIATION



(57) Abstract: A perforating system and method for wellbore perforating. The system comprises a perforating string (7) having a perforating gun (13) with shaped charges (16), a communication module (36) for receiving detonation signals (58), and a controller (38) associated with each perforating gun. The module (36) receives surface signals for gun detonation and wirelessly transmits the signals to selected guns via the associated controllers.

## 

- (81) Designated States (unless otherwise indicated, for every Declarations under Rule 4.17: 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).

- 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))
- the filing date of the international application is within two months from the date of expiration of the priority period (Rule 26bis.3)
- (88) Date of publication of the international search report: 4 March 2010

#### INTERNATIONAL SEARCH REPORT

International application No PCT/US2008/074010

A. CLASS	IFICATION OF SUBJECT	MATTER
INV.	E21B43/1185	E21B47/12

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) E21B

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 practical, search terms used)

#### EPO-Internal

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Χ	US 5 445 228 A (RATHMELL JAMES J [US] ET	17-21,
Υ	AL) 29 August 1995 (1995-08-29) column 7, lines 10-53	26-28,32 1-16,
		22-25,
		29-31
Υ	US 6 464 021 B1 (EDWARDS JOHN E [GB])	1-16,
	15 October 2002 (2002-10-15) column 6, lines 8-35	29-30
Υ	US 6 536 524 B1 (SNIDER PHILIP M [US])	5
	25 March 2003 (2003-03-25) column 2, lines 19-41	
γ	US 2006/196665 A1 (LAGRANGE TIMOTHY E [US]	9-13,
	ET AL) 7 September 2006 (2006-09-07) paragraph [0010]	22-25,31
1		
	1	

X Further documents are listed in the continuation of Box C.	X 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 document 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 another 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 clted 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.  "8" document member of the same patent family
Date of the actual completion of the international search  14 December 2009	Date of mailing of the international search report $21/12/2009$
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016	Authorized officer  Garrido Garcia, M

1

#### INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/074010

		PC17U32UU8/U74U1U
C(Continua	tion). DOCUMENTS CONSIDERED TO BE RELEVANT	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Х	US 2004/134658 A1 (BELL MATTHEW ROBERT GEORGE [US] ET AL) 15 July 2004 (2004-07-15) paragraphs [0065], [0069], [0072]; figure 7	17-22, 26-28
X	US 2003/001753 A1 (CERNOCKY EDWARD PAUL [US] ET AL) 2 January 2003 (2003-01-02) paragraphs [0032], [0033]	28
A	US 2003/098157 A1 (HALES JOHN H [US] ET AL) 29 May 2003 (2003-05-29) paragraphs [0021], [0023] 	1-32

### INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2008/074010

		<del></del>				T
Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 5445228	Α	29-08-1995	NONE-			
US 6464021	B1	15-10-2002	AU AU BR CA CN DE DE DK EP ID NO RU US US	725157 6809098 9801745 2239280 1208809 69816372 69816372 882871 0882871 20626 982483 2178520 6028534 6234257 6691779	A A A1 A D1 T2 T3 A2 A C2 A B1	05-10-2000 03-12-1998 13-10-1999 02-12-1998 24-02-1999 21-08-2003 15-04-2004 18-08-2003 09-12-1998 28-01-1999 03-12-1998 20-01-2002 22-02-2000 22-05-2001 17-02-2004
US 6536524	B1	25-03-2003	NONE			
US 2006196665	A1	07-09-2006	AR AU CA EP WO	053821 2006218751 2599811 1853792 2006093941	A1 A1 A2	23-05-2007 08-09-2006 08-09-2006 14-11-2007 08-09-2006
US 2004134658	A1	15-07-2004	DK EP US US US US US US	1606491 1606491 2006060355 2004206503 2005121195 2005056426 2006000613 2004063526	A1 A1 A1 A1 A1 A1	30-04-2007 21-12-2005 23-03-2006 21-10-2004 09-06-2005 17-03-2005 05-01-2006 29-07-2004
US 2003001753	A1	02-01-2003	NONE			
US 2003098157	A1	29-05-2003	GB NL NL NO	2382603 1021908 1021908 20025698	C2 A1	04-06-2003 05-08-2003 02-06-2003 30-05-2003