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

## (19) World Intellectual Property Organization International Bureau



## 

## (43) International Publication Date 18 August 2011 (18.08.2011)

# (10) International Publication Number WO 2011/098767 A3

- (51) International Patent Classification: *E21B 23/03* (2006.01) *E21B 47/09* (2012.01)
- (21) International Application Number:

PCT/GB2011/000181

(22) International Filing Date:

10 February 2011 (10.02.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

12/703,366 10 February 2010 (10.02.2010)

US

- (71) Applicant (for all designated States except US): HAL-LIBURTON ENERGY SERVICES, INC. [US/US]; P.O. Box 1431, Duncan, Oklahoma 73536 (US).
- (71) Applicant (for MW only): CURTIS, Philip, Anthony [GB/GB]; A A Thornton & Co., 235 High Holborn, London WC1V 7LE (GB).

- (72) Inventors: and
- (75) Inventors/Applicants (for US only): SURJAATMAD-JA, Jim, B. [US/US]; 1105 Timbercreek Drive, Duncan, Oklahoma 73533 (US). BAILEY, Michael [CA/US]; 1001 Palm Drive, Duncan, Oklahoma 73533 (US). HUNTER, Timothy, H [US/US]; Rt 1 Box 174, Duncan, Oklahoma 73533 (US).
- (74) Agents: CURTIS, Philip, Anthony et al.; A A Thornton & Co, 235 High Holborn, London WC1V 7LE (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, RO, RS, RU, 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.

[Continued on next page]

### (54) Title: SYSTEM AND METHOD FOR DETERMINING POSITION WITHIN A WELLBORE

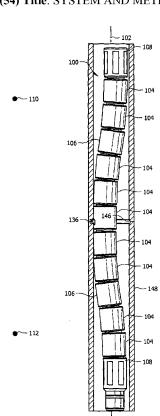


FIG. 1

(57) Abstract: A method of locating a wellbore feature, comprising delivering a mechanical position determination tool (100) into the wellbore, selectively causing an undulating curvature (110, 112, 114) of the mechanical position determination tool in response to a change in a fluid pressure, moving the mechanical position determination tool (100) along a longitudinal length of the wellbore, and sensing a change in resistance to continued movement of the mechanical position determination tool. A mechanical position location tool (100) for a wellbore, comprising pressure actuated elements configured to cooperate to selectively provide an unactuated state in which the mechanical position location tool lies substantially along a longitudinal axis (102) and the pressure actuated elements further configured to cooperate to selectively lie increasingly deviated from the longitudinal axis (102) in response to a change in pressure applied to the mechanical position location tool.

## 

(84) Designated States (unless otherwise indicated, for every Published: kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, 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).

- 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))
- (88) Date of publication of the international search report: 26 April 2012

## INTERNATIONAL SEARCH REPORT

International application No PCT/GB2011/000181

a. classification of subject matter INV. E21B23/03 E21B47/09 ADD.

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	EP 1 489 260 A1 (HALLIBURTON ENERGY SERV INC [US]) 22 December 2004 (2004-12-22) paragraphs [0006], [0054]; claim 10; figures 1-11	7,8		
Х	US 2003/217850 A1 (SHAW JOEL D [US] ET AL) 27 November 2003 (2003-11-27) paragraphs [0009], [0049], [0050]; figures 1-3	14-20		
А	US 4 067 386 A (WEISE STANLEY ALLAN) 10 January 1978 (1978-01-10) the whole document	1-20		
А	GB 2 452 416 A (SCHLUMBERGER HOLDINGS [VG]) 4 March 2009 (2009-03-04) the whole document	1-20		

X Further documents are listed in the continuation of Box C.	See patent family annex.	
"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	<ul> <li>"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.</li> <li>"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.</li> <li>"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.</li> <li>"&amp;" document member of the same patent family</li> </ul>	
Date of the actual completion of the international search  15 February 2012	Date of mailing of the international search report $07/03/2012$	
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  Manolache, Iustin	

## **INTERNATIONAL SEARCH REPORT**

International application No
PCT/GB2011/000181

Category* Citation of document, with indication, where appropriate, of the relevant passages  A US 2003/234106 A1 (SURJAATMADJA JIM B [US]) 25 December 2003 (2003-12-25) paragraphs [0008], [0049] - [0050]; figures 1-3	Relevant to claim No.
A US 2003/234106 A1 (SURJAATMADJA JIM B [US]) 25 December 2003 (2003-12-25)	
paragraphs [0008], [0049] - [0050]; figures 1-3	1-20

## **INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No
PCT/GB2011/000181

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1489260 A1	22-12-2004	CA 2466139 A1 EP 1489260 A1 NO 20041764 A US 2003234106 A1	06-11-2004 22-12-2004 08-11-2004 25-12-2003
US 2003217850 A1	27-11-2003	AU 2003231795 A1 CA 2486682 A1 DE 60302569 D1 DE 60302569 T2 DK 1507954 T3 EP 1507954 A1 US 2003217850 A1 WO 03100210 A1	12-12-2003 04-12-2003 05-01-2006 14-06-2006 20-02-2006 23-02-2005 27-11-2003 04-12-2003
US 4067386 A	10-01-1978	CA 1063513 A1 US 4067386 A	02-10-1979 10-01-1978
GB 2452416 A	04-03-2009	GB 2452416 A GB 2462737 A US 2009056937 A1	04-03-2009 24-02-2010 05-03-2009
US 2003234106 A1	25-12-2003	CA 2466139 A1 EP 1489260 A1 NO 20041764 A US 2003234106 A1	06-11-2004 22-12-2004 08-11-2004 25-12-2003