



- (51) **International Patent Classification:**
G01 V3/28 (2006.01)
- (21) **International Application Number:**
PCT/US20 13/059066
- (22) **International Filing Date:**
10 September 2013 (10.09.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant: HALLIBURTON ENERGY SERVICES INC.** [US/US]; 10200 Bellaire Blvd., Houston, Texas 77072 (US).
- (72) **Inventor: DONDERICI, Burkay;** 3121 Buffalo Speedway Apt. 8305, Houston, Texas 77098 (US).
- (74) **Agents: LAYE, Jade et al;** Haynes and Boone, LLP, 2323 Victory Avenue, Suite 700, Dallas, Texas 75219 (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, BN, 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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

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

(88) Date of publication of the international search report:

19 November 2015

(54) **Title:** SURFACE CALIBRATION OF A WELLBORE RESISTIVITY LOGGING TOOL

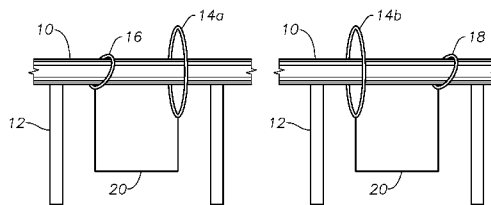


FIG. 1

(57) **Abstract:** Surface calibration of a resistivity logging tool is accomplished using a variety of methods in which separate external loop transmitters and receivers are utilized for calibration. The present disclosure relates generally to calibration techniques for well-bore logging tools and, more specifically, to a surface calibration method for a resistivity logging tool.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/059066

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G01V 3/28 (2014.01)

USPC - 324/339

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(8) - G01V 3/08, 3/10, 3/18, 3/28, 3/30 (2014.01)

USPC - 324/323, 333-339

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

CPC - G01V 3/28, 3/30, 13/00 (2013.01)

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

Orbit, Google Patents, Google Scholar, USPTO classification

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7414391 (Homan et al.) 10 July 2003 (10.07.2003) entire document	1, 2, 5-7, 15, 17
Y		3, 4, 8-14, 16, 18, 19
Y	US 487651 1 (Clark) 20 October 1988 (20.10.1988) entire document	3, 4, 8-14, 16, 18, 19
A	US 7027922 (Bespalov et al.) 25 August 2003 (25.08.2003) entire document	1-19
A	US 6597993 (Strickland et al.) 5 November 2002 (05.11.2002) entire document	1-19
A	US 7282704 (guo) 28 May 2004 (28.05.2004) entire document	1-19
A	US 7769572 (Srnka et al.) 27 August 2002 (27.08.2002) entire document	1-19
A	US 8173954 (Duraj) 30 December 2009 (30.12.2009) entire document	1-19
A	US 8258790 (Folberth et al.) 20 November 2008 (20.11.2008) entire document	1-19

Further documents are listed in the continuation of Box C.

* 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 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 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

31 January 2014

Date of mailing of the international search report

19 FEB 2014

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:
Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774