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(54) Title: GAP-BASED DATA TRANSMISSION MANAGEMENT FOR AT BIT MEASUREMENT TOOL

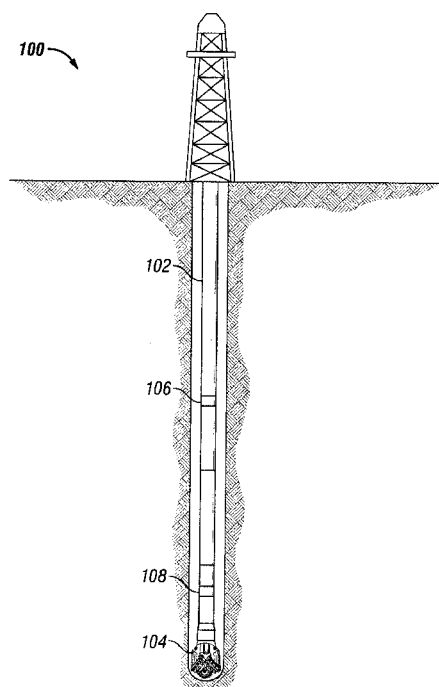


FIG. 2

(57) Abstract: A method of transmitting data using a two sub gap-based downhole tool is disclosed. The downhole tool includes a first measurement system having a first sub gap for transmitting data to surface, and a second measurement system having a second sub gap for transmitting data to the first measurement system. The method includes transmitting data at any time from only one of the first measurement system or second measurement system, and dividing data transmitting times between the first and second measurement systems whereby each measurement system is instructed when and when not to transmit data, the second measurement system overriding the first measurement system in the event of a conflict



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).

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<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - G01V 3/26 (2014.01) CPC - G01V 3/20 (2014.11) According to International Patent Classification (IPC) or to both national classification and IPC</p>																							
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) IPC(8) - G01V 3/28, 3/26, 3/18, 3/00, H04J 3/22 (2014.01) USPC - 340/854.4, 853.3, 370/468, 324/324</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched CPC - G01V 2200/00, 2200/16, 2210/14, 3/02, 3/20 (2014.11) Keyword Delimited</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Orbit, Google Patents, Google Scholar</p> <p>Search terms used: downhole tool, drillstring, drill string, measurement system</p>																							
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X --- Y</td> <td>US 2006/0062249 A1 (HALL et al.) 23 March 2006 (23.03.2006) entire document</td> <td>5-9 --- 1-4, 11, 13, 14</td> </tr> <tr> <td>X --- Y</td> <td>CA 2 854 440 A1 (DONDERICI et al.) 15 November 2011 (15.11.2011) entire document</td> <td>10, 15 --- 11-14</td> </tr> <tr> <td>Y</td> <td>US 2013/0027216 A1 (JANTZ et al.) 31 January 2013 (31.01.2013) entire document</td> <td>1-4</td> </tr> <tr> <td>Y</td> <td>US 2011/0031972 A1 (PELLETIER et al.) 10 February 2011 (10.02.2011) entire document</td> <td>12</td> </tr> <tr> <td>Y</td> <td>US 2004/0207538 A1 (WEI et al.) 21 October 2004 (21.10.2004) entire document</td> <td>3</td> </tr> <tr> <td>Y</td> <td>CA 2 127 921 A1 (MEYER et al.) 13 July 1994 (13.07.1994) entire document</td> <td>2</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X --- Y	US 2006/0062249 A1 (HALL et al.) 23 March 2006 (23.03.2006) entire document	5-9 --- 1-4, 11, 13, 14	X --- Y	CA 2 854 440 A1 (DONDERICI et al.) 15 November 2011 (15.11.2011) entire document	10, 15 --- 11-14	Y	US 2013/0027216 A1 (JANTZ et al.) 31 January 2013 (31.01.2013) entire document	1-4	Y	US 2011/0031972 A1 (PELLETIER et al.) 10 February 2011 (10.02.2011) entire document	12	Y	US 2004/0207538 A1 (WEI et al.) 21 October 2004 (21.10.2004) entire document	3	Y	CA 2 127 921 A1 (MEYER et al.) 13 July 1994 (13.07.1994) entire document	2
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<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>“A” document defining the general state of the art which is not considered to be of particular relevance</td> <td>“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</td> </tr> <tr> <td>“E” earlier application or patent but published on or after the international filing date</td> <td>“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</td> </tr> <tr> <td>“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)</td> <td>“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</td> </tr> <tr> <td>“O” document referring to an oral disclosure, use, exhibition or other means</td> <td>“&” document member of the same patent family</td> </tr> <tr> <td>“P” document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			“A” document defining the general state of the art which is not considered to be of particular relevance	“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	“E” earlier application or patent but published on or after the international filing date	“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	“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)	“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	“O” document referring to an oral disclosure, use, exhibition or other means	“&” document member of the same patent family	“P” document published prior to the international filing date but later than the priority date claimed												
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<p>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</p>		<p>Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>																					