



(51) International Patent Classification:
E21B 7/02 (2006.01)

(21) International Application Number:
PCT/EP2014/056294

(22) International Filing Date:
28 March 2014 (28.03.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PCT/EP2013/063492 27 June 2013 (27.06.2013) EP

(71) Applicant: SANDVIK MINING AND CONSTRUCTION OY [FI/FI]; Pihtisulunkatu 9, FIN-33330 Tampere (FI).

(72) Inventors: UOTILA, Jarkko; Sandvik Mining and Construction Oy, Pihtisulunkatu 9, FIN-33330 Tampere (FI). NURMINEN, Petri; Sandvik Mining and Construction Oy, Pihtisulunkatu 9, FIN-33330 Tampere (FI). TALAS-NIEMI, Jari; Sandvik Mining and Construction Oy, Pihtisulunkatu 9, FIN-33330 Tampere (FI).

(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, IR, 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:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

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

[Continued on next page]

(54) Title: ARRANGEMENT FOR CONTROLLING AUTOMATED DRILLING OPERATION MODE

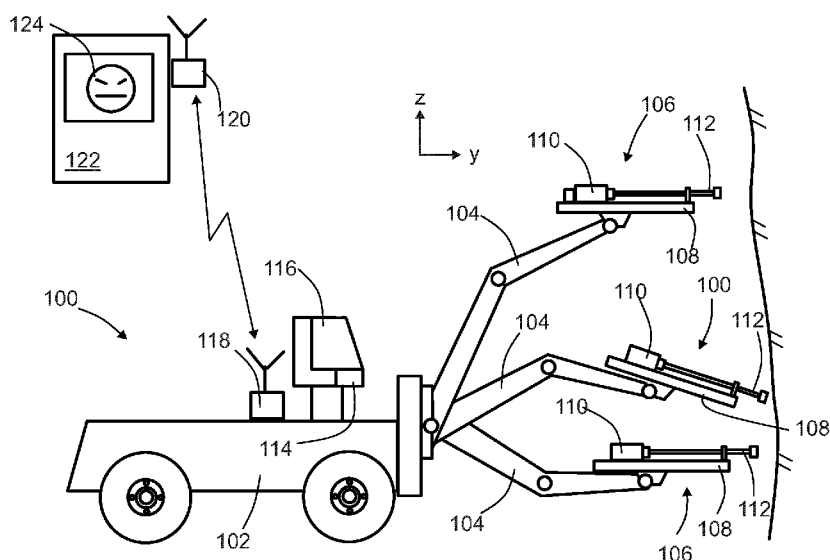


Fig. 1

(57) Abstract: A method for controlling an automated drilling process on a work machine (100), the method comprising: obtaining, from at least one input, data determining operations of the work machine; generating reference data based on the data determining previous operations of the work machine in substantially the same area; detecting a region of interest in the reference data; and controlling, in response to the work machine or its drilling process approaching a point corresponding to the region of interest in the reference data, the work machine to provide an operator with an option to manually assist the operations of the work machine at said point.



— *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:**
7 May 2015

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/056294

A. CLASSIFICATION OF SUBJECT MATTER
INV. E21B7/02
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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/050186 A1 (WILSON HENRY E [US] ET AL) 13 December 2001 (2001-12-13) paragraph [0081]	1-39
X	DE 44 45 420 C1 (KALI & SALZ AG [DE]) 2 November 1995 (1995-11-02) column 2, lines 11-27	1-39
X	US 2003/015351 A1 (GOLDMAN WILLIAM A [US] ET AL) 23 January 2003 (2003-01-23) paragraph [0146]	1-6,10, 12,13, 18,19, 23,25, 26,31, 32,36, 38,39
	-/--	

☒ 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 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

16 March 2015

Date of mailing of the international search report

26/03/2015

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

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/056294

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009/250263 A1 (SAHA HEIKKI [FI]) 8 October 2009 (2009-10-08) paragraphs [0023], [0043] -----	1-39
A	US 2013/060458 A1 (MAKELA HANNU [FI] ET AL) 7 March 2013 (2013-03-07) paragraphs [0034] - [0036] -----	1-39
A	US 2009/078438 A1 (MUONA JOUKO [FI]) 26 March 2009 (2009-03-26) abstract -----	1-39

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2014/056294

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001050186	A1	13-12-2001	NONE
DE 4445420	C1	02-11-1995	NONE
US 2003015351	A1	23-01-2003	US 2003015351 A1 23-01-2003 US 2004182606 A1 23-09-2004 US 2005284661 A1 29-12-2005
US 2009250263	A1	08-10-2009	AU 2006286466 A1 08-03-2007 CA 2619066 A1 08-03-2007 CN 101253471 A 27-08-2008 EP 1920319 A1 14-05-2008 FI 20055460 A 01-03-2007 JP 5049974 B2 17-10-2012 JP 2009506239 A 12-02-2009 US 2009250263 A1 08-10-2009 WO 2007026052 A1 08-03-2007 ZA 200801660 A 28-01-2009
US 2013060458	A1	07-03-2013	AU 2011251868 A1 06-12-2012 CA 2796986 A1 17-11-2011 CL 2012003115 A1 03-05-2013 CN 102893176 A 23-01-2013 EP 2569652 A1 20-03-2013 US 2013060458 A1 07-03-2013 WO 2011141629 A1 17-11-2011
US 2009078438	A1	26-03-2009	AU 2006263767 A1 04-01-2007 CA 2612219 A1 04-01-2007 CN 101208494 A 25-06-2008 EP 1896684 A1 12-03-2008 FI 20055351 A 28-12-2006 JP 4598126 B2 15-12-2010 JP 2008546938 A 25-12-2008 RU 2376464 C2 20-12-2009 US 2009078438 A1 26-03-2009 WO 2007000488 A1 04-01-2007 ZA 200800588 A 28-01-2009