

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 October 2009 (22.10.2009)

PCT

(10) International Publication Number
WO 2009/129492 A3

(51) International Patent Classification:

C01B 31/34 (2006.01) *B22F 7/08* (2006.01)
C01G 41/00 (2006.01) *E21B 10/46* (2006.01)
B22F 1/00 (2006.01) *E21B 10/08* (2006.01)

(71) Applicant (for all designated States except US): **SMITH INTERNATIONAL, INC.** [US/US]; P.O. Box 60068, Houston, TX 77205-0068 (US).

(21) International Application Number:

PCT/US2009/041014

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SHENG, Xiayang** [CN/US]; 12626 Mesquite Hollow Ln., Sugar Land, TX 77478 (US). **LOCKSTEDT, Alan, W.** [US/US]; 31203 Vickie Lane, Magnolia, TX 77354 (US). **LOCKWOOD, Gregory, T.** [US/US]; 1407 Pine Walk Dr., Pearland, TX 77581 (US).

(22) International Filing Date:

17 April 2009 (17.04.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(74) Agents: **BERGMAN, Jeffrey, S.** et al.; Osha · Liang LLP, 909 Fannin Street, Suite 3500, Houston, TX 77010 (US).

(30) Priority Data:

61/046,293 18 April 2008 (18.04.2008) US
12/189,992 12 August 2008 (12.08.2008) US

[Continued on next page]

(54) Title: MATRIX POWDER FOR MATRIX BODY FIXED CUTTER BITS

(57) Abstract: A matrix powder for forming a matrix bit body, the matrix powder essentially consisting of a plurality of carbide particles having a particle size distribution of $\pm 20\%$ of a median particle size; and a plurality of metal binder particles is disclosed.

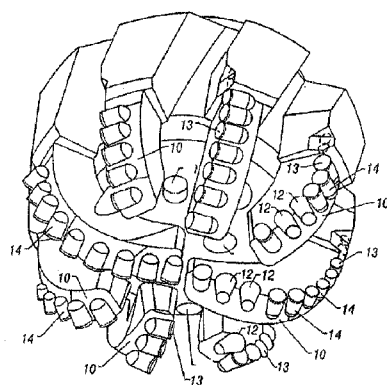


Figure 1A

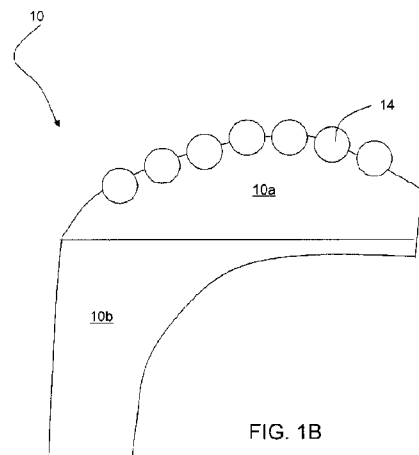


FIG. 1B



WO 2009/129492 A3

(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, 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, MK, 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).

Declarations under Rule 4.17:

- 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))

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

4 March 2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/041014**A. CLASSIFICATION OF SUBJECT MATTER***C01B 31/34(2006.01)i, C01G 41/00(2006.01)i, B22F 1/00(2006.01)i, B22F 7/08(2006.01)i, E21B 10/46(2006.01)i, E21B 10/08(2006.01)i*

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 C01B, B21K, B32B, C22C, E21B

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKIPASS(KIPO internal) "matrix powder", "cutter bits", "carbide", "particle size distribution"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0032335 A1 (KEMBAIYAN) 16 Feb. 2006 See Abstract; Paragraph [0022]-Paragraph [0039]; Figure 1.	1-20
X	US 2007/0277646 A1 (TERRY et al.) 6 Dec. 2007 See Abstract; Paragraph [0014]-Paragraph [0056]; Figure 3.	1-20
X	WO 2007/041606 A2 (KENNAMETAL INC.) 12 Apr. 2007 See Abstract; Paragraph [0021]-Paragraph [0057].	1-20
A	US 2007/0102200 A1 (CHEO et al.) 10 May 2007 See Abstract; Claim 1; Figure 1.	1-20

 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 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

30 NOVEMBER 2009 (30.11.2009)

Date of mailing of the international search report

30 NOVEMBER 2009 (30.11.2009)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Jin Hong

Telephone No. 82-42-481-8649



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/041014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0032335 A1	16.02.2006	CA 2466436 A1 US 2004-0245024 A1	05.12.2004 09.12.2004
US 2007-0277646 A1	06.12.2007	EP 2024524 A1 US 07575620 B2 WO 2007-145844 A1	18.02.2009 18.08.2009 21.12.2007
WO 2007-041606 A2	12.04.2007	AU 2006-299399 A1 AU 2006-299399 A1 EP 1945428 A2 KR 10-2008-0063384 A US 2008-236333 A1 WO 2007-041606 A3	12.04.2007 02.10.2006 23.07.2008 03.07.2008 02.10.2008 15.11.2007
US 2007-0102200 A1	10.05.2007	CA 2621421 A1 CA 2630914 A1 CA 2630917 A1 CA 2667079 A1 CA 2668192 A1 CA 2668416 A1 CN 101356340 A CN 101292054 A CN 101356031 A EP 1922428 A1 EP 1957223 A1 EP 2089604 A1 EP 2066864 A1 EP 2079898 A1 EP 2084305 A1 EP 2084306 A1 EP 1960630 A1 US 2008-0128176 A1 US 2008-0083568 A1 US 2008-0073125 A1 US 2008-0029310 A1 US 2007-0102202 A1 US 2007-0102199 A1 US 2007-0102198 A1 US 2007-0056777 A1 US 07597159 B2 US 2007-0056776 A1 WO 2007-058904 A1 WO 2007-030707 A1 WO 2009-086081 A2 WO 2008-057489 A1 WO 2009-086081 A3 WO 2008-042329 A1 WO 2008-042328 A1 WO 2008-027464 A1 WO 2007-058905 A1 WO 2008-042330 A1	15.03.2007 24.05.2007 24.05.2007 10.04.2008 10.04.2008 15.05.2008 28.01.2009 22.10.2008 28.01.2009 21.05.2008 20.08.2008 19.08.2009 10.06.2009 22.07.2009 05.08.2009 05.08.2009 27.08.2008 05.06.2008 10.04.2008 27.03.2008 07.02.2008 10.05.2007 10.05.2007 10.05.2007 15.03.2007 06.10.2009 15.03.2007 24.05.2007 15.03.2007 09.07.2009 15.05.2008 09.07.2009 10.04.2008 10.04.2008 06.03.2008 24.05.2007 10.04.2008