

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 May 2010 (20.05.2010)

(10) International Publication Number
WO 2010/056476 A3

(51) International Patent Classification:
C01B 31/34 (2006.01) *E21B 10/00* (2006.01)
B22F 3/12 (2006.01)

(21) International Application Number:
PCT/US2009/061636

(22) International Filing Date:
22 October 2009 (22.10.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/261,730 30 October 2008 (30.10.2008) US

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(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, 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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

[Continued on next page]

(54) Title: CARBURIZED MONOTUNGSTEN AND DITUNGSTEN CARBIDE EUTECTIC PARTICLES, MATERIALS AND EARTH-BORING TOOLS INCLUDING SUCH PARTICLES, AND METHODS OF FORMING SUCH PARTICLES, MATERIALS, AND TOOLS

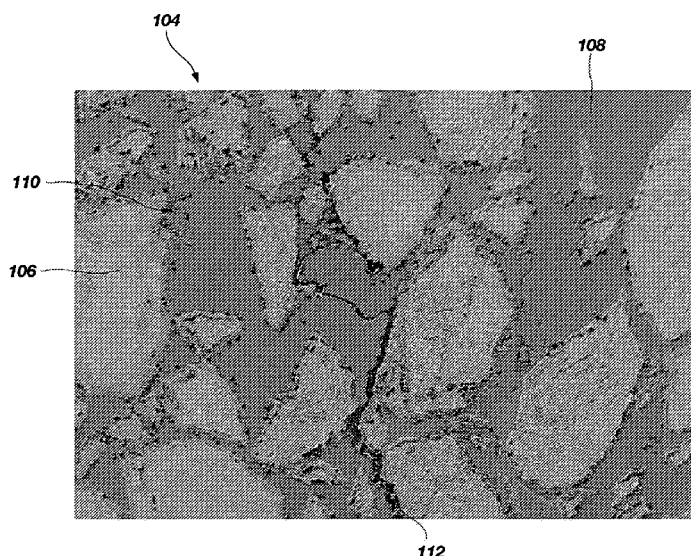


FIG. 1

(57) Abstract: Earth-boring tools for drilling subterranean formations include a particle-matrix composite material comprising a plurality of at least partially carburized monotungsten carbide and ditungsten carbide eutectic particles dispersed throughout a matrix material. In some embodiments, the particles are at least substantially fully carburized monotungsten carbide and ditungsten carbide eutectic particles. In further embodiments, the particles are generally spherical or at least substantially spherical. Methods of forming such particles include exposing a plurality of monotungsten carbide and ditungsten carbide eutectic particles to a gas containing carbon. Methods of manufacturing such tools include providing a plurality of at least partially carburized monotungsten carbide and ditungsten carbide eutectic particles or at least substantially completely carburized monotungsten carbide and ditungsten carbide eutectic particles within a matrix material.



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- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))* — *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))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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

29 July 2010

Published:

- *with international search report (Art. 21(3))*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/061636**A. CLASSIFICATION OF SUBJECT MATTER*****C01B 31/34(2006.01)i, B22F 3/12(2006.01)i, E21B 10/00(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)

C01B 31/34; C22C 29/02; C23C 8/20; E21B 10/00; E21B 10/36

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

Japanese utility models and applications for utility models

(Chinese Patents and application for patent)

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

eKOMPASS(KIPO internal) & Keywords: carburize, tungsten carbide, ditungsten carbide

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2007-0079905 A1 (CHRISTIAN GERK) 12 April 2007 See the abstract and paragraphs [03] - [39]	1,2,10 3-9,11-15
Y	US 2004-0060742 A1 (KUMAR T. KEMBAIYAN et al.) 01 April 2004 See the abstract and paragraphs [17] - [25]	3-9,11-15
A	US 6248149 B1 (ALAN J. MASSEY et al.) 19 June 2001 See the abstract and column 3 line 18 - column 5 line 44	1-15
A	US 6454028 B1 (STEPHEN M. EVANS) 24 September 2002 See the abstract and column 2 line 55 - column 4 line 46	1-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

31 MAY 2010 (31.05.2010)

Date of mailing of the international search report

01 JUNE 2010 (01.06.2010)

Name and mailing address of the ISA/KR

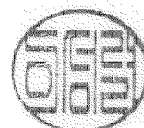
Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

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Telephone No. 82-42-481-5598



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/061636

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