

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 March 2008 (06.03.2008)

PCT

(10) International Publication Number
WO 2008/028131 A3

(51) International Patent Classification:
E21B 10/60 (2006.01)

(21) International Application Number:

PCT/US2007/077390

(22) International Filing Date: 31 August 2007 (31.08.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/824,374 1 September 2006 (01.09.2006) US

60/828,337 5 October 2006 (05.10.2006) US

(71) Applicant (for all designated States except US): **HAL-LIBURTON ENERGY SERVICES, INC.** [US/US]; Hal-liburton Energy Services, Inc., 10200 Bellaire Boulevard, Houston, Texas 77072-5299 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HO, Tuck L.** [MY/US]; 9503 Fernwood Forest, Houston, TX 77040 (US). **CRAWFORD, Micheal B.** [US/US]; 9 Alba Road, Montgomery, Texas 77356 (US).

(74) Agents: **FELGER, Thomas R.** et al.; Baker Botts L.L.P., 98 San Jacinto Boulevard, 1500 San Jacinto Center, Austin, Texas 78701 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, 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, 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, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

[Continued on next page]

(54) Title: **ROLLER CONE DRILL BITS WITH IMPROVED FLUID FLOW**

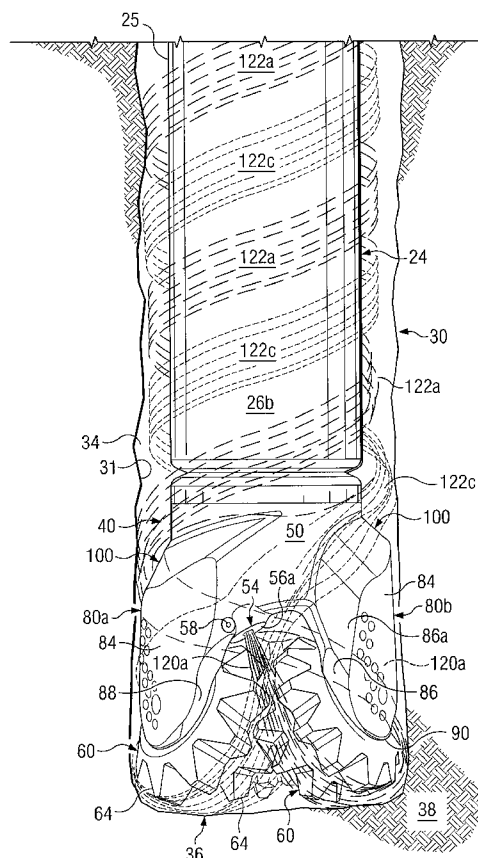


FIG. 2

(57) Abstract: Roller cone drill bits operable to form a borehole. A number of support arms may extend from each drill bit. A cutter cone assembly may be mounted on each support arm. A number of cutting elements or inserts may be disposed on an exterior surface of a cone assembly. A lifting surface may be formed on each support arm extending between a leading edge and a trailing edge of each support arm such that the lifting surfaces directs cuttings upward in a borehole. A wedge shaped portion may be formed on each support arm proximate the lifting surface and the trailing edge. An inlet to each lifting surface may be formed on the leading edge of each support arm.

WO 2008/028131 A3



PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

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

21 August 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/77390

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - E21B 10/60 (2008.01)

USPC - 175/393

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) - E21B 10/60 (2008.01)

USPC - 175/227, 327, 332, 336, 337, 339, 340, 341, 353, 376, 393, 398, 424; 299/79.1, 81.1, 81.3, 85.1; 508/150, 155, 167

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)

MicroPatent (US, USPG-PUB, EPO, DERWENT), IP.com, DialogPro, Google Patents

Search Terms: drill, bit, cone, halliburton, spindle, roller, fluid

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,755,297 A (YOUNG et al) 26 May 1998 (26.05.1998) entire document	1-22
A	US 6,296,067 B1 (SLAUGHTER, JR. et al) 02 October 2001 (02.10.2001) entire document	1-22
A	US 7,059,430 B2 (SINGH et al) 13 June 2006 (13.06.2006) entire document	1-22

☐ 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

24 January 2008

Date of mailing of the international search report

01 APR 2008

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