



(51) International Patent Classification:
E21B 10/20 (2006.01)

(21) International Application Number: PCT/US2012/024134

(22) **International Filing Date:** 7 February 2012 (07.02.2012)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) Priority Data:
61/441,907 11 February 2011 (11.02.2011) US

(71) **Applicant** (for all designated States except US): **BAKER HUGHES INCORPORATED** [US/US]; 2001 Rankin Road, Houston, Texas 77073 (US).

(72) Inventors; and

(75) **Inventors/Applicants (for US only): RICKS, Gregory L.** [US/US]; c/o Baker Hughes Incorporated, 2001 Rankin Road, Houston, Texas 77073 (US). **FELDERHOFF,**

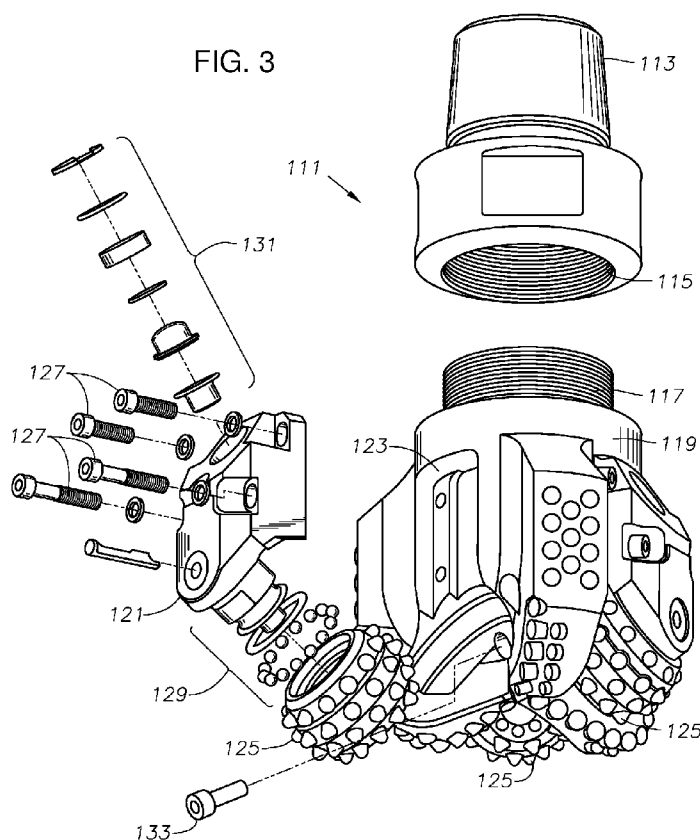
Floyd C. [US/US]; c/o Baker Hughes Incorporated, 2001 Rankin Road, Houston, Texas 77073 (US). **PESSIER, Rudolf Carl** [US/US]; c/o Baker Hughes Incorporated, 2001 Rankin Road, Houston, Texas 77073 (US).

(74) **Agent: TERRELL, David L.**; Locke Lord LLP, 2800 JP-Morgan Chase Tower, 600 Travis Street, Houston, Texas 77002-3095 (US).

(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, QA, RO, RS, RU, RW, 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.

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR LEG RETENTION ON HYBRID BITS



(57) Abstract: An earth boring drill bit comprising: one or more legs; a bit body having a blade and a slot for receiving the leg; and one or more wedge between the leg and the slot fixing the leg within the slot. The slot may have two parallel sidewalls with one of the sidewalls forming an acute angle and the other forming an obtuse angle. The wedge may be secured immediately next to the obtuse angled sidewall. The wedge may have two obtuse angled sides. One or more bolts through each wedge may secure both the wedge and the leg to the bit body. In a preferred embodiment, an obtuse angled sidewall of the wedge is preferably secured immediately next to an acute angled side of the leg.



(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, MD, 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, ML, MR, NE, SN, TD, TG).

Published:

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

25 April 2013

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/024134

A. CLASSIFICATION OF SUBJECT MATTER
INV. E21B10/20
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 4 456 082 A (HARRISON SIMON J [CA]) 26 June 1984 (1984-06-26) column 2, line 23 - line 39 column 3, line 10 - line 55 figure 1 -----	1-20
X	US 4 359 114 A (MILLER JAMES D ET AL) 16 November 1982 (1982-11-16) column 3, line 56 - column 4, line 14; figure 2 -----	1-20
A	US 4 641 718 A (BENGTSSON ULF A [SE]) 10 February 1987 (1987-02-10) column 1, line 59 - column 2, line 8 column 3, line 36 - line 49 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 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

26 February 2013

Date of mailing of the international search report

07/03/2013

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

Schneiderbauer, K

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/024134

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 4 108 259 A (DIXON ROBERT L ET AL) 22 August 1978 (1978-08-22) column 2, line 64 - column 3, line 10 -----	1-20
A	US 5 641 029 A (BEATON MICHAEL S [US] ET AL) 24 June 1997 (1997-06-24) column 4, line 40 - line 57 column 5, line 59 - column 6, line 25; figure 2 -----	1-20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/024134

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4456082	A	26-06-1984	NONE
US 4359114	A	16-11-1982	NONE
US 4641718	A	10-02-1987	AU 580307 B2 12-01-1989 AU 4306485 A 02-01-1986 CA 1235113 A1 12-04-1988 DE 3521159 A1 19-12-1985 NO 852444 A 19-12-1985 SE 457656 B 16-01-1989 SE 8403242 A 19-12-1985 US 4641718 A 10-02-1987 ZA 8503605 A 24-12-1985
US 4108259	A	22-08-1978	AU 514835 B2 26-02-1981 AU 3620378 A 22-11-1979 CA 1078818 A1 03-06-1980 GB 1581219 A 10-12-1980 IT 1094800 B 02-08-1985 US 4108259 A 22-08-1978 ZA 7802786 A 30-05-1979
US 5641029	A	24-06-1997	AU 6033996 A 24-12-1996 CN 1183824 A 03-06-1998 EP 0828915 A1 18-03-1998 US 5641029 A 24-06-1997 WO 9639568 A1 12-12-1996