

(19) World Intellectual Property
Organization
International Bureau



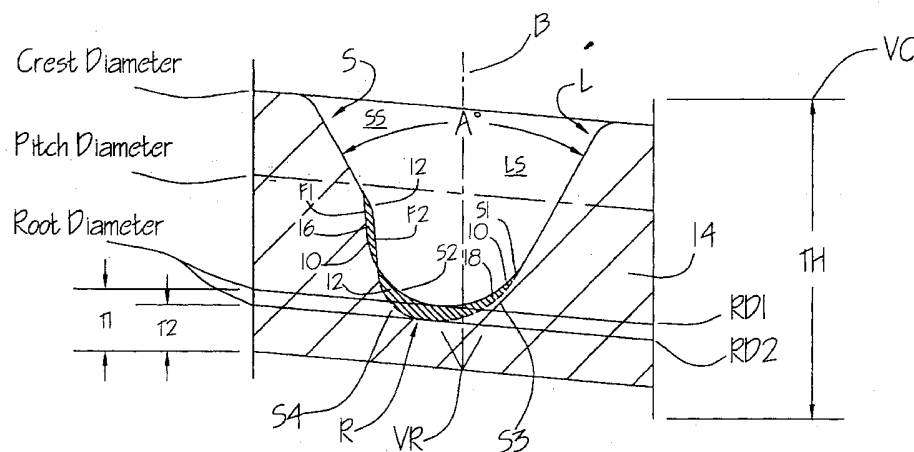
(43) International Publication Date
19 August 2004 (19.08.2004)

PCT

(10) International Publication Number
WO 2004/070097 A3

- (51) International Patent Classification⁷: **F16L 15/00**, 25/00
- (21) International Application Number:
PCT/US2004/002540
- (22) International Filing Date: 29 January 2004 (29.01.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/443,480 29 January 2003 (29.01.2003) US
- (71) Applicant (for all designated States except US): **GRANT PRIDECO, L.P.** [US/US]; 1450 Lake Robbins Drive, Suite 600, Houston, TX 77380 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BREIHAN, James, W.** [US/US]; 8710 Andonte Street, Houston, TX 77040 (US). **MURADOV, Andrei, M.** [RU/US]; 7818 Chateau Point Lane, Houston, TX 77041 (US).
- (74) Agent: **TORRES, Carlos, A.**; Browning Bushman, P.C., 5718 Westheimer, Suite 1800, Houston, TX 77057 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, 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, IT, LU, MC, NL, 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:
17 November 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FAST MAKE-UP FATIGUE RESISTANT ROTARY SHOULDERED CONNECTION

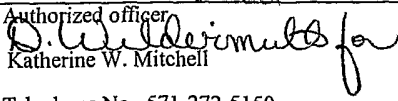


(57) Abstract: A thread form having improved strength and fatigue resistance. The root of the thread is cut on multiple cutting radii having displaced centers. At least two of the root surfaces are formed by cutting radii having lengths that are greater than the root truncation. The threads are used in a double start configuration to increase the connection strength and reduce makeup and breakout rotations.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/02540

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : F16L 15/00; F16L 25/00 US CL : 285/333,334,93,390 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) U.S. : 285/333,334,93,390 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched EAST Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/0130152 (DeLANGE et al) 08 July 2004 (08.07.2004), whole document.	1-24
A	US 6,485,061 A (MOSING et al) 26 Nov 2002 (26.11.2002), whole document.	1-24
A	US 2003/0132633 A1 (MAEDA et al) 17 Jul 2003 (17.07.2003), whole document.	1-24
A	US 6,848,724 B2 (KESSLER) 1 Feb 2005 (01.02.2005), whole document.	1-24
A	US 6,447,025 B1 (SMITH) 10 Sept 2002 (10.09.2002), whole document.	1-24
A	US 5,427,418 A (WATTS) 27 June 1995 (27.06.1995), whole document.	1-24
A	US 6,467,818 B1 (SNAPP et al) 22 Oct 2002 (22.10.2002), whole document.	1-24
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> 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	"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
"E"	earlier application or patent published on or after the international filing date	"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
"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)	"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
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 21 July 2005 (21.07.2005)		Date of mailing of the international search report 15 AUG 2005
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. (703) 305-3230		Authorized officer  Katherine W. Mitchell Telephone No. 571-272-5150