

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 September 2007 (07.09.2007)

PCT

(10) International Publication Number
WO 2007/100956 A3

(51) International Patent Classification:
E21B 43/26 (2006.01)

(21) International Application Number:
PCT/US2007/061602

(22) International Filing Date: 5 February 2007 (05.02.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/363,540 27 February 2006 (27.02.2006) US

(71) Applicant (for all designated States except US):
GEOSIERRA, LLC [US/US]; 3560 Engineering Drive,
Norcross, Georgia 30092 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **HOCKING, Grant**
[AU/US]; 3973 Merriweather Woods Drive, Alpharetta,
Georgia 30022 (US).

(74) Agent: **LISCHER, Dale**; Smith, Gambrell & Russell LLP,
1230 Peachtree Street, Suite 3100, Promenade II, Atlanta,
Georgia 30309 (US).

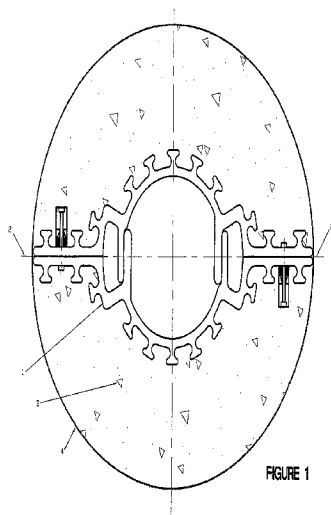
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, 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, NL, PL, 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:
12 March 2009

(54) Title: INITIATION AND PROPAGATION CONTROL OF VERTICAL HYDRAULIC FRACTURES IN UNCONSOLIDATED AND WEAKLY CEMENTED SEDIMENTS



(57) Abstract: A method and apparatus for initiating and propagating a vertical hydraulic fracture in unconsolidated and weakly cemented sediments from a single bore hole to control the fracture initiation plane and propagation of the hydraulic fracture, enabling greater yield and recovery of petroleum fluids from the formation. An injection casing with multiple fracture initiation sections is inserted and grouted into a bore hole. A fracture fluid carrying a proppant is injected into the injection casing and opens the fracture initiation sections to dilate the formation in a direction orthogonal to the required fracture azimuth plane. Propagation of the fracture is controlled by supplying fracture fluid independent to the two opposing wings of the hydraulic fracture. The injection casing initiation section remains open after fracturing providing direct hydraulic connection between the production well bore, the permeable proppant filled fracture and the formation.

WO 2007/100956 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/61602

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - E21B 43/26 (2008.04) USPC - 166/308.1 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 E21B 43/26 (2008.04) USPC 166/308.1 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC 166/305.1,308.1,308.2; Backward/forward citation searches; Text search Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WEST (PQPB, USPT, USOCR, EPAB, JPAB); Terms: (wellbore downhole borehole) and fractur\$3 with (fluid liquid); Google("hydraulic fracturing azimuth control")		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,443,227 B1 (Hocking et al.) 03 Sep 2002 (03.09.2002) figs. 1-11 and col 7, ln 55 - col 8, ln 50	1-26
A	US 6,938,693 B2 (Boney et al.) 06 Sep 2005 (06.09.2005) figs. 1-5	1-26
A	US 6,216,783 B1 (Hocking et al.) 17 Apr 2001 (17.04.2001) figs. 1-6	1-26
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 11 Nov 2008 (11.11.2008)		Date of mailing of the international search report 08 DEC 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: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774