REVISED VERSION

(19) World Intellectual Property Organization

International Bureau

(43) International Publication Date 8 November 2007 (08.11.2007)





(10) International Publication Number WO 2007/126833 A9

Applicants (for all designated States except US): BAKER

HUGHES INCORPORATED [US/US]; P.O. Box 4740, Houston, TX 77210-4740 (US). **ARONSTAM, Peter, S.**

[US/US]; 5930 Solar Point Ln., Houston, TX 77041 (US).

FONTANA, Peter [AR/AR]; Av. Alicia Moreau de Justo

170 Piso 1, C1107AAd Capital Federal, Buenos Aires, Ar-

(51) International Patent Classification: E21B 21/08 (2006.01) E21B 7/00 (2006.01)

(21) International Application Number:

PCT/US2007/007595

(22) International Filing Date:

29 March 2007 (29.03.2007)

(25) Filing Language:

English

(26) Publication Language:

English

US

(30) Priority Data:

60/787,128

29 March 2006 (29.03.2006)

(72) Inventors; and

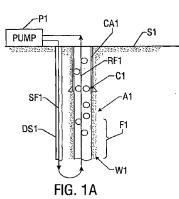
gentina (AR).

(75) Inventors/Applicants (for US only): KRUEGER, Sven [DE/DE]; Eichenring 127, 29308 Winsen/Aller (DE). KRUEGER, Volker [DE/DE]; Sassengarten 8, 29223 Celle (DE). BRUNS, Jens [DE/DE]; Elsternstieg 4, 31303 Burgdorf (DE). FINCHER, Roger, W. [US/US]; 23B Amherst Court, Conroe, TX 77304 (US). WATKINS, Larry, A. [US/US]; 10915 Tulip Garden Court, Houston, TX 77065 (US).

(74) Agents: LITTLEFIELD, Stephen, A. et al.; Baker Hughes Incorporated, 3900 Essex Lane, Suite 1200, Houston, TX 77027 (US).

[Continued on next page]

(54) Title: REVERSE CIRCULATION PRESSURE CONTROL METHOD AND SYSTEM



(57) Abstract: A system for reverse circulation in a wellbore include equipment for supplying drilling fluid into the wellbore bit via at least an annulus of the wellbore and returning the drilling fluid to a surface location via at least a bore of a wellbore tubular. The system also includes devices for controlling the annulus pressure associated with this reverse circulation. In one embodiment, an active pressure differential device increases the pressure wellbore annulus to at least partially offset a circulating pressure loss. In other embodiments, the system includes devices for decreasing the pressure in the annulus of the wellbore. For offshore application, annulus pressure is decreased to accommodate the pore and fracture pressures of a subsea formation. In still other embodiments, annulus pressure is decreased to cause an underbalanced condition in the well.

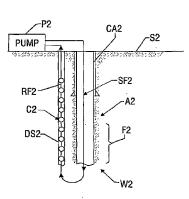


FIG. 1B



- (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, 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, 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, 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 (Art. 21(3))
- (88) Date of publication of the revised international search report:

11 December 2014

(15) Information about Correction: see Notice of 11 December 2014

INTERNATIONAL SEARCH REPORT

International application No PCT/US2007/007595

A. CLASSIFICATION OF SUBJECT MATTER INV. E21B21/08 E21B7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 $\begin{tabular}{ll} Minimum documentation searched (classification system followed by classification symbols) \\ E21B \end{tabular}$

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 practical, search terms used)

EPO-Internal, WPI Data

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/060385 A1 (AMAUDRIC DU CHAFFAUT BENOIT [FR] ET AL) 23 March 2006 (2006-03-23) the whole document	1-5,7,9, 10, 12-16,19
Υ		6,18,20
X	US 2005/061546 A1 (HANNEGAN DON M [US] HANNEGAN DON [US]) 24 March 2005 (2005-03-24) paragraphs [0057], [0058] figures 14,15 claims 1,4	1-5,7,8, 10,11,17
Υ	Claims 1,4	6,18,20
X	US 4 223 747 A (MARAIS LIONEL R) 23 September 1980 (1980-09-23) abstract	1-5,7, 10,20

X Further documents are listed in the continuation of Box C.	X 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 document but published on or after the international filling 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 filling 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 13 September 2007	Date of mailing of the international search report 1 8 0 CT. 2007
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk. Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Schouten, Adri

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/007595

	ontinuation). DOCUMENTS CONSIDERED TO BE RELEVANT					
ego ry*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.				
	US 4 368 787 A (MESSENGER JOSEPH U) 18 January 1983 (1983-01-18) abstract figure 1	1,12				
	US 4 137 975 A (PENNOCK MICHAEL D) 6 February 1979 (1979-02-06) abstract figures 1,2	1,12				
, .						
.						

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2007/007595

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
US 2006060385 A	23-03-2006	CA FR	2518879 A1 2875533 A1	17-03-2006 24-03-2006
US 2005061546 A	1 24-03-2005	CA WO GB	2539337 A1 2005028807 A1 2423544 A	31-03-2005 31-03-2005 30-08-2006
US 4223747 A	23-09-1980	AR AU BR CA ES FR GB NO	226152 A1 525032 B2 4110978 A 7807049 A 1103655 A1 474522 A1 2407336 A1 2006857 A 783618 A	15-06-1982 14-10-1982 01-05-1980 10-07-1979 23-06-1981 16-10-1979 25-05-1979 10-05-1979 30-04-1979
US 4368787 A	18-01-1983	NONE		
US 4137975 A	06-02-1979	NONE	الله و الله الله الله الله الله الله الل	