



(51) International Patent Classification:
E21B 33/06 (2006.01) **E21B 47/09** (2006.01)

(21) International Application Number:
PCT/US201 1/041894

(22) International Filing Date:
24 June 201 1 (24.06.201 1)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/360,783 1 July 2010 (01.07.2010) US
13/168,594 24 June 201 1 (24.06.201 1) US

(71) Applicant (for all designated States except US): **NATIONAL OILWELL VARCO, L.P.** [US/US]; 7909 Parkwood Circle Drive, Houston, TX 77036 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIOTTA, Joseph, James** [US/US]; 31414 Evergreen Park Lane, Conroe, TX 77385 (US). **ENSLEY, Eric, Trevor** [US/US]; 20823 Oak Orchard Ct., Cypress, TX 77433 (US). **JOHNSON, Christopher, Dale** [US/US]; 14718 Bladenboro Drive, Cypress, TX 77429 (US).

(74) Agent: **SALAZAR, Jennie**; JL Salazar Law Firm, 1934 West Gray Street, Suite 401, Houston, TX 77019-4805 (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, RO, RS, RU, 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.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, 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:
23 February 2012

(54) Title: BLOWOUT PREVENTER MONITORING SYSTEM AND METHOD OF USING SAME

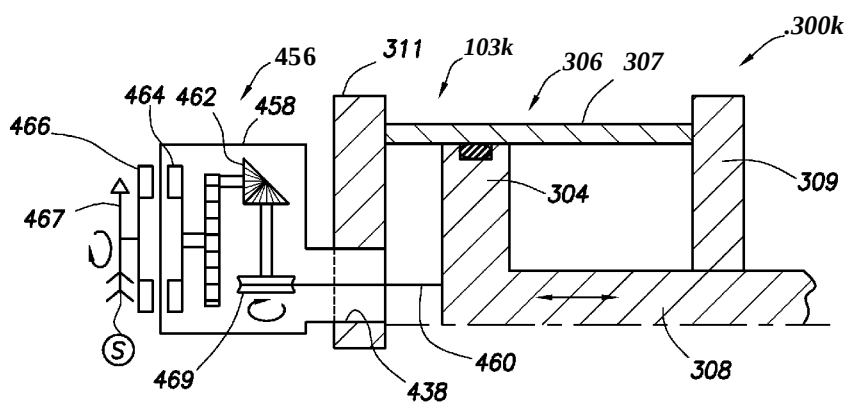


FIG. 4K

(57) Abstract: A blowout preventer for sealing a tubular of a wellbore is provided. The blowout preventer has a housing having a bore therethrough for receiving the tubular, at least one ram slidably positionable in the housing (each of the rams having a ram block for sealing engagement about the tubular), an actuator for selectively driving the ram block (the actuator comprising a piston slidably positionable in a cylinder), and a monitor for detecting the piston therein. The monitor has a visual indicator on an exterior of the cylinder. The visual indicator is operatively coupled to the piston for displaying a position of the piston as the piston travels within the cylinder whereby a position of the ram may be determined.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US201 1/041894**A. CLASSIFICATION OF SUBJECT MATTER****E21B 33/06(2006.01)i, E21B 47/09(2006.01)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)

E21B 33/06; E21B 47/01; E21B 29/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: wellbore, blowout preventer, ram block, monitoring

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0196888 A1 (ROBERT ARNOLD JUDGE et al.) 21 August 2008 See the abstract, figures 2-3, and claims 1-23	1-41
A	US 5074518 A (JOE BERRY) 24 December 1991 See the abstract, figures 1-6, and claim 1	1-41
A	US 2007-0102655 A1 (FRANK BENJAMIN SPRINGETT) 10 May 2007 See the abstract, figures 1A-8, and claims 1-22	1-41
A	US 4540046 A (STANLEY f. GRANGER et al.) 10 September 1985 See the abstract, figures 1-10, and claims 1-42	1-41

☐ 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 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

04 JANUARY 2012 (04.01.2012)

Date of mailing of the international search report

05 JANUARY 2012 (05.01.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsu-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

JUNG Sug Woo

Telephone No. 82-42-481-8443



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US20 11/04 1894

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
us 2008-0196888 A1	21.08.2008	AR 070577 A1	21.04.2010
		AU 2002-343464 B2	04.06.2009
		AU 2004-282 188 A9	28.04.2005
		AU 2004-282 188 B2	24.12.2009
		AU 2008-216 193 A1	21.08.2008
		AU 2008-216 193 B2	02.06.2011
		AU 2008-216248 A1	21.08.2008
		AU 2008-216253 A1	21.08.2008
		AU 2008-216257 A1	21.08.2008
		AU 2008-216264 A1	21.08.2008
		CA 2461898 A1	03.04.2003
		CA 2542674 A1	28.04.2005
		CA 2652680 A1	29.11.2007
		CA 2677653 A1	21.08.2008
		CA 2677692 A1	21.08.2008
		CA 2677698 A1	21.08.2008
		CA 2678354 A1	21.08.2008
		CA 2682747 A1	21.08.2008
		CN 100479930 C	22.04.2009
		CN 101300026 A	05.11.2008
		CN 101565858 A	28.10.2009
		CN 101573781 A	04.11.2009
		CN 101627516 A	13.01.2010
		CN 101674759 A	17.03.2010
		CN 101675213 A	17.03.2010
		CN 1744954 A	08.03.2006
		EP 1432527 A2	30.06.2004
		EP 1682568 A2	26.07.2006
		EP 2038915 A2	25.03.2009
		EP 2114195 A1	11.11.2009
		EP 2114213 A2	11.11.2009
		EP 2118985 A2	18.11.2009
		EP 2384662 A2	09.11.2011
		JP 2005-505915 A	24.02.2005
		JP 2007-517500 A	05.07.2007
		JP 2009-537987 A	29.10.2009
		JP 2010-517724 A	27.05.2010
		JP 2010-518808 A	27.05.2010
		KR 10-0942320 B1	12.02.2010
		KR 10-2006-0 109904 A	23.10.2006
		KR 10-2009-0 120464 A	24.11.2009
		TW 200805690 A	16.01.2008
		us 2003-0068900 A1	10.04.2003
		us 2003-0148380 A1	07.08.2003
		us 2005-0164515 A9	28.07.2005
		us 2005-0170336 A1	04.08.2005
		us 2006-012 1346 A1	08.06.2006
		us 2008-0189854 A1	14.08.2008
		us 2008-0190861 A1	14.08.2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US20 11/04 1894

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		us 2008-0190980 A1	14, 08. 2008
		us 2008-019 1565 A1	14, 08. 2008
		us 2008-0194226 A1	14, 08. 2008
		us 2008-0195960 A1	14, 08. 2008
		us 2008-0196 163 A1	21, 08. 2008
		us 2008-019622 1 A1	21, 08. 2008
		us 2008-0197306 A1	21, 08. 2008
		us 2008-02 13663 A1	04, 09. 2008
		us 2008-0242552 A1	02, 10. 2008
		us 2009-0044579 A1	19, 02. 2009
		us 2009-02696 19 A1	29, 10. 2009
		us 2010-0044366 A1	25, 02. 2010
		us 2010-0053928 A1	04, 03. 2010
		us 2010-010 1879 A1	29, 04. 2010
		us 201 1-003 1457 A1	10, 02. 2011
		us 201 1-0097556 A1	28, 04. 2011
		us 7488593 B2	10, 02. 2009
		us 7576507 B2	18, 08. 2009
		us 7659680 B1	09, 02. 2010
		us 7661 156 B2	16, 02. 2010
		us 7832706 B2	16, 11. 2010
		us 7836530 B2	23, 11. 2010
		us 7895865 B2	01, 03. 2011
		us 7960721 B2	14, 06. 2011
		us 7980305 B2	19, 07. 2011
		us 8060959 B2	22, 11. 2011
		Wo 03-026590 A3	03, 04. 2003
		Wo 2005-037856 A3	28, 04. 2005
		wo 2007-136841 A3	29, 11. 2007
		wo 2008-100992 A1	21, 08. 2008
		wo 2008-100993 A1	21, 08. 2008
		wo 2008-100994 A1	21, 08. 2008
		wo 2008-100995 A1	21, 08. 2008
		wo 2008-100996 A2	21, 08. 2008
		wo 2008-10 1000 A3	21, 08. 2008
		wo 2008-10 1001 A2	21, 08. 2008
		wo 2008-10 1002 A1	21, 08. 2008
		wo 2008-10 1003 A1	21, 08. 2008
		wo 2008-10 1004 A1	21, 08. 2008
		wo 2008-10 1005 A1	21, 08. 2008
		wo 2008-10 1006 A1	21, 08. 2008
		wo 2008-10 1007 A2	21, 08. 2008
		wo 2008-10 1008 A1	21, 08. 2008
		wo 2008-10 1009 A1	21, 08. 2008
		wo 2008-10 1010 A1	21, 08. 2008
		wo 2008-10 1011 A1	21, 08. 2008
		wo 2008-10 1012 A1	21, 08. 2008
		wo 2008-10 1013 A1	21, 08. 2008
		wo 2008-10 1014 A1	21, 08. 2008
		wo 2008-10 1015 A1	21, 08. 2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US20 11/04 1894

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		W0 2008-101016 A3	21.08.2008
		W0 2008-101017 A2	21.08.2008
		W0 2008-101018 A1	21.08.2008
		W0 2008-101019 A2	21.08.2008
		W0 2008-101020 A1	21.08.2008
		W0 2008-101021 A2	21.08.2008
		W0 2008-101022 A2	21.08.2008
		W0 2008-101023 A1	21.08.2008
		W0 2008-101030 A1	21.08.2008
		W0 2008-101031 A3	21.08.2008
		W0 2008-101032 A1	21.08.2008
		W0 2008-101033 A2	21.08.2008
		W0 2008-101034 A2	21.08.2008
		W0 2008-101035 A3	21.08.2008
		W0 2009-100046 A1	13.08.2009
		W0 2011-011759 A3	27.01.2011
US 5074518 A	24.12.1991	None	
US 2007-0102655 A1	10.05.2007	US 7331562 B2	19.02.2008
		W0 2007-052082 A2	10.05.2007
		W0 2007-052082 A3	28.06.2007
US 4540046 A	10.09.1985	JP 06-086793 B2	02.11.1994
		JP 60-085189 A	14.05.1985