



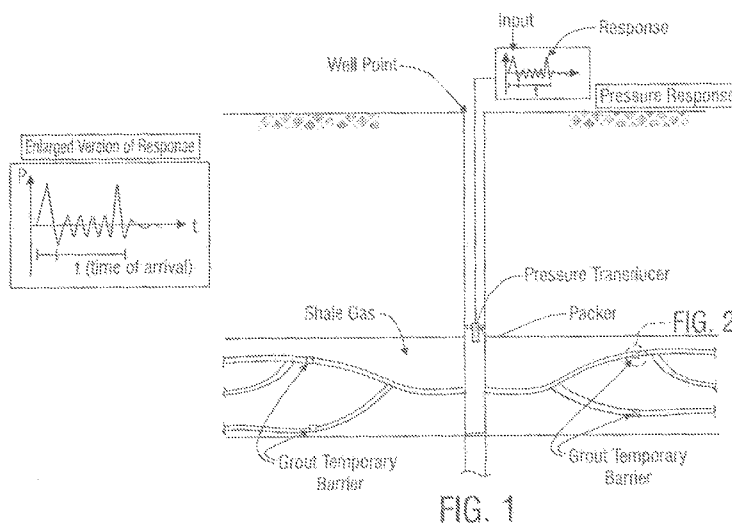
- (51) International Patent Classification:
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

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- (88) Date of publication of the international search report:
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(54) Title: APPARATUS AND METHODS FOR TRACKING THE LOCATION OF FRACTURING FLUID IN A SUBTERRANEAN FORMATION



(57) Abstract: In some embodiments, a method of determining the location of fracturing fluid in a subterranean formation includes providing purpose-designed additives (PDA) in the fracturing fluid. As the fracturing fluid moves through a fracture in the formation, the PDA solidifies and forms a barrier in the path of the fracturing fluid. In response to a pressure increase in the well contacting the barrier, at least one signal is generated and detected to provide information about the fracturing fluid and/or fracture.

WO 2012/106017 A3

INTERNATIONAL SEARCH REPORT

International application No PCT/US2011/057578
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A. CLASSIFICATION OF SUBJECT MATTER INV. E21B43/26 E21B47/10 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	WO 2010/068128 A1 (OSIPTSOV ANDREI ALEXANDROVICH [RU]; MEDVEDEV OLEG OLEGOVICH [UA]; WILL) 17 June 2010 (2010-06-17)	20-25		
A	abstract figure 6 page 5, line 31 - page 6, line 5 page 7, line 1 - line 10 page 11, line 2 - page 12, line 21 -----	1-19		
A	US 2006/113077 A1 (WILLBERG DEAN [RU] ET AL) 1 June 2006 (2006-06-01) abstract paragraph [0013] paragraph [0027] paragraph [0032] ----- -/--	1-19		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> "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 </td> <td style="width: 50%; border: none; vertical-align: top;"> "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 </td> </tr> </table>			"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
"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	Date of mailing of the international search report			
21 August 2012	29/08/2012			
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 Hustedt, Bernhard			

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2011/057578

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, P	<p>WO 2011/070453 A2 (SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER SERVICES PETROL [FR]; SCHLUMBER) 16 June 2011 (2011-06-16) abstract paragraph [0035] paragraph [0051] - paragraph [0057] paragraph [0063] - paragraph [0064] paragraph [0074] - paragraph [0077] -----</p>	1
A	<p>R.W. PAIGE ET AL: "Fracture Measurement Using Hydraulic Impedance Testing", PROCEEDINGS OF SPE ANNUAL TECHNICAL CONFERENCE AND EXHIBITION, 1 January 1992 (1992-01-01), XP55027331, DOI: 10.2523/24824-MS abstract Hydraulic Impedance Testing Methodology -----</p>	1
A	<p>R.D. BARREE ET AL: "A Practical Guide to Hydraulic Fracture Diagnostic Technologies", PROCEEDINGS OF SPE ANNUAL TECHNICAL CONFERENCE AND EXHIBITION, 1 January 2002 (2002-01-01), XP55027333, DOI: 10.2523/77442-MS abstract Microseismic Fracture Mapping -----</p>	1,14,15
X	<p>WO 00/29716 A2 (GOLDER SIERRA LLC [US]) 25 May 2000 (2000-05-25) abstract page 8, line 31 - page 9, line 17 page 10, line 11 - page 11, line 11 page 15, line 28 - page 19, line 21 -----</p>	20-25
X	<p>US 3 818 990 A (COULTER G) 25 June 1974 (1974-06-25) abstract column 2, line 22 - line 29 column 3, line 40 - line 60 column 4, line 41 - column 5, line 5 -----</p>	20-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2011/057578

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010068128	A1	17-06-2010	CA 2746368 A1 17-06-2010 US 2011272159 A1 10-11-2011 WO 2010068128 A1 17-06-2010

US 2006113077	A1	01-06-2006	AR 057963 A1 26-12-2007 CA 2632442 A1 14-06-2007 CN 101351523 A 21-01-2009 EA 200870014 A1 30-12-2009 US 2006113077 A1 01-06-2006 US 2008289823 A1 27-11-2008 WO 2007066254 A2 14-06-2007

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US 3818990	A	25-06-1974	NONE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/057578

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-19

A method for determining the location of fracturing fluid in a subterranean formation whereby purpose-designed fracturing fluid forms a temporary barrier in the formation that blocks further advancement of fracturing fluid, and detecting a signal in response to a pressure spike contacting the barrier, and determining data about the location of fracturing fluid proximate the barrier location.

2. claims: 20-25

Fracturing fluid containing gelling grout that comprises polymers, the fracturing being introduced in a subterranean formation, the grout hardening to form a temporary, water impermeable barrier that reflects and is pierced by a pressure pulse.
