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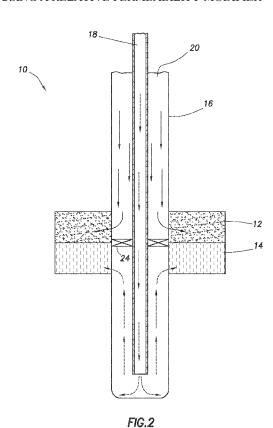
US

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(54) Title: METHODS FOR PROTECTING A HYDROCARBON-PRODUCING ZONE OF A SUBTERRANEAN FORMATION USING A RELATIVE PERMEABILITY MODIFIER



(57) Abstract: A relative permeability modifier may be used to protect a hydrocarbon-producing zone of a subterranean formation without detrimentally affecting its ability to produce hydrocarbons. Methods for protecting a hydrocarbon-producing zone of a subterranean formation can comprise: introducing a first treatment fluid comprising a relative permeability modifier to a hydrocarbon-producing zone of a subterranean formation also comprising a water-producing zone; concurrently with or after introducing the first treatment fluid to the hydrocarbon-producing zone, introducing a second treatment fluid comprising a sealant composition to the water-producing zone; and allowing the relative permeability modifier to substantially prevent the sealant composition from entering the hydrocarbon- producing zone.

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EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, Published: 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).

### **Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

- 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))

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## **INTERNATIONAL SEARCH REPORT**

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A. CLASSIFICATION OF SUBJECT MATTER INV. E21B43/14 E21B33/138 ADD.									
According to International Patent Classification (IPC) or to both national classification and IPC									
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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 d	ata base consulted during the international search (name of data bas	e and, where practicable, search terms use	ed)						
EPO-Internal, WPI Data									
C. DOCUMENTS CONSIDERED TO BE RELEVANT									
Category*	Citation of document, with indication, where appropriate, of the rele	vant passages	Relevant to claim No.						
Х	US 5 002 127 A (DALRYMPLE DWYANN AL) 26 March 1991 (1991-03-26) the whole document	[US] ET	1-14						
А	US 6 476 169 B1 (EOFF LARRY S [US 5 November 2002 (2002-11-05) cited in the application claim 1	S] ET AL)	8						
А	US 7 114 568 B2 (EOFF LARRY S [US 3 October 2006 (2006-10-03) cited in the application paragraph [0011]	S] ET AL)	8						
A	US 7 759 292 B2 (EOFF LARRY S [US 20 July 2010 (2010-07-20) cited in the application claim 1	S] ET AL)	8						
Further documents are listed in the continuation of Box C.  X See patent family annex.									
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the pri	•	"&" document member of the same patent f	iamily						
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20 May 2014		28/05/2014							
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  Maukonen, Kalle							

### **INTERNATIONAL SEARCH REPORT**

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5002127	Α	26-03-1991	NONE		•
US 6476169	B1	05-11-2002	CA CO EP US	2357844 A1 5221131 A1 1193365 A1 6476169 B1	28-03-2002 28-11-2002 03-04-2002 05-11-2002
US 7114568	B2	03-10-2006	NONE		
US 7759292	B2	20-07-2010	US US US US US US WO	2004229757 A1 2005155796 A1 2006234874 A1 2006240994 A1 2011294704 A1 2012231978 A1 2005071219 A2	18-11-2004 21-07-2005 19-10-2006 26-10-2006 01-12-2011 13-09-2012 04-08-2005