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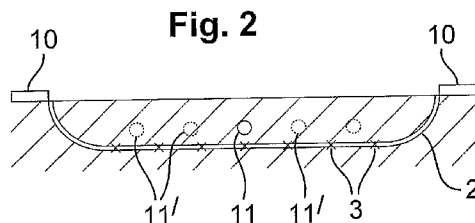
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
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(54) **Title:** SEISMIC SURVEY METHOD



(57) **Abstract:** A method of conducting a seismic survey comprising using at least one seismic source operable to emit an acoustic signal comprises: - providing a first receiver line extending in a first direction across a region of the ground to be surveyed; - locating at least one seismic receiver at a point on the first receiver line, the seismic receiver(s) being adapted to record reflected acoustic signals emitted by the seismic source(s); - providing a first pre-determined shot line having a plurality of shot points along its length, extending in a second direction and along which the seismic source(s) is movable; - operating the or one of the seismic source(s) to emit an acoustic signal at a first shot point on the pre-determined shot line, the reflection of the acoustic signal being recorded by the or one of the seismic receiver(s); and - operating the or one of the seismic source(s) to emit another acoustic signal at a second shot point on the pre-determined shot line, the reflection of the another acoustic signal being recorded by the or one of the seismic receiver(s); characterised in that at least one of the first receiver line and the first pre-determined shot line passes through or at least partially along a generally horizontal borehole extending through the region of the ground to be surveyed and the first pre-determined shot line transects the first receiver line.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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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)

G01V

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 355 477 A (BAKER HUGHES INC [US]) 25 April 2001 (2001-04-25)	1-3, 9-13
A	* abstract; figures 1,2,4	4-8, 14
Y	EP 0 780 701 A (GAZ DE FRANCE [FR]) 25 June 1997 (1997-06-25) column 8, line 54 - column 9, line 9; figure 4 * abstract; figure 2	1-14
Y	US 2003/202425 A1 (CURTIS MICHAEL P [US] ET AL) 30 October 2003 (2003-10-30) paragraphs [0008], [0011], [0037] * abstract; claims 39-41,44,46-48; figures 2,4,5 page 3, lines 13-21, paragraph 32	1-14
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 Further documents are listed in the continuation of Box C. See patent family annex.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/15850 A (BAKER HUGHES INC [US]) 16 April 1998 (1998-04-16) * abstract; figures 1-3 -----	1,12
A	US 5 886 255 A (ARONSTAM PETER SHEFFIELD [US]) 23 March 1999 (1999-03-23) page 9, line 15 - line 27; figure 6 column 6, lines 35-44,57,59 -----	1,12
A	US 2002/092701 A1 (NORRIS MICHAEL [US] ET AL) 18 July 2002 (2002-07-18) paragraphs [0012], [0043], [0049] - [0052]; figures 1,2,5 -----	1,12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2009/001272

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
GB 2355477	A	25-04-2001	CA 2320393 A1 NO 20004769 A	28-03-2001 29-03-2001
EP 0780701	A	25-06-1997	FR 2742879 A1 NO 965525 A	27-06-1997 23-06-1997
US 2003202425	A1	30-10-2003	AU 2003225118 A1 WO 03091749 A2	10-11-2003 06-11-2003
WO 9815850	A	16-04-1998	AU 730715 B2 CA 2268104 A1 GB 2354822 A GB 2354583 A GB 2334104 A NO 991667 A	15-03-2001 16-04-1998 04-04-2001 28-03-2001 11-08-1999 27-05-1999
US 5886255	A	23-03-1999	CA 2249197 A1 GB 2330413 A ID 21065 A NO 984586 A	14-04-1999 21-04-1999 15-04-1999 15-04-1999
US 2002092701	A1	18-07-2002	NONE	