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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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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))

Published:

- with international search report (Art. 21(3))

[Continued on next page]

- (54) **Title:** A METHOD OF MAPPING RESERVOIR FLUID MOVEMENT USING GRAVITY SENSORS

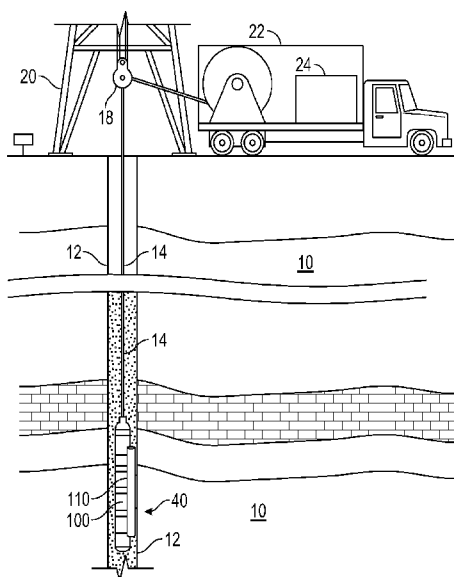


FIG. 1

(57) **Abstract:** The present disclosure relates to methods and apparatuses for acquiring multi-component gravity information for an earth formation. More particularly, the present disclosure relates to estimating the movement of fluid in an earth formation using at least one gravimeter configured to generate multi-component gravity information. The method may include estimating density changes in the earth formation. The method may include estimating a position of the at least one gravimeter. The apparatus may include a multi-component gravimeter configured to estimate gravity vectors for each vector component.



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A. CLASSIFICATION OF SUBJECT MATTER**G01V 7/00(2006.01)i, G01V 7/06(2006.01)i**

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 7/00; G01V 1/38; G01V 5/04; G01V 7/16

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: gravity sensor, multi, component

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010-0161226 A1 (HOMAN DEAN) 24 June 2010 See paragraphs 17,18,26,31 and fig. 2.	1-3,5,7-14,16 ,18-20
Y		4,6,15,17
Y	US 6954698 B2 (BJARNI V. TRYGGVASON) 11 October 2005	4,6,15,17
A	See column 7, line 36-65; column 9, line 20-column 11, line 16; and fig. 2.	1-3,5,7-14,16 ,18-20
A	US 2005-0240350 A1 (HAROLD ENGBRETSON et al.) 27 October 2005 See paragraphs 43-63, claim 1, and fig. 2.	1-20
A	US 7239577 B2 (STIG RUNE LENNART TENGHAMN et al.) 03 July 2007 See abstract; column 11, line 41-column 12, line 8; and fig. 1.	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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