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EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID,
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LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN,
MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH,
PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV,
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR MEASURING A TIME-VARYING MAGNETIC FIELD AND METHOD FOR PRO-
DUCTION OF A HYDROCARBON FLUID

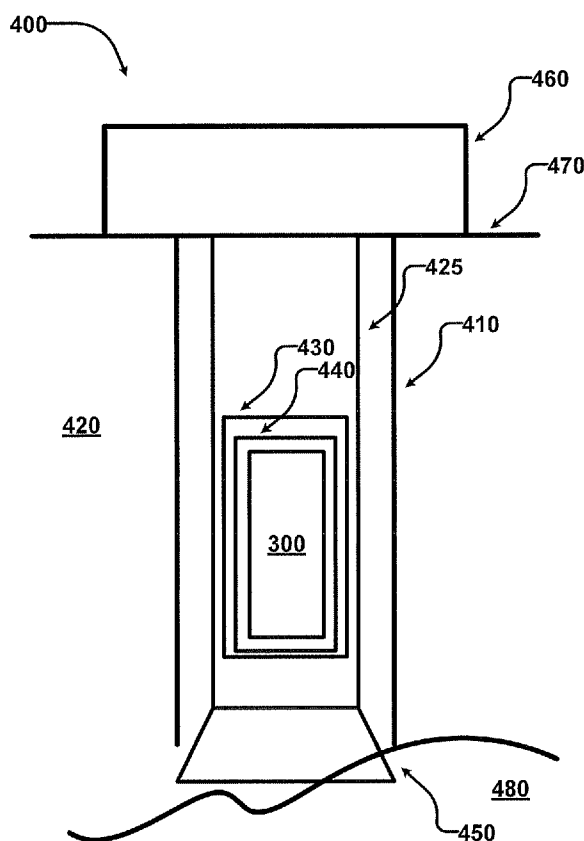


Figure 4

(57) Abstract: In accordance with the present disclosure, a sys-
tem and a method are disclosed for measuring a time varying
magnetic field. In one aspect, a system comprises a plurality
of induction coils arranged to measure the time varying mag-
netic field using at least one voltage induced in at least one of
the induction coils in the plurality of induction coils, a plurality
of snubber circuits connected to the plurality of induction coils,
each of the snubber circuits of the plurality of snubber circuits
arranged to suppress a resonance of a respective one of the in-
duction coils of the plurality of induction coils, and a summing
circuit connected to each of the snubber circuits of the plurality
of snubber circuits, the summing circuit arranged to sum voltages
induced in each of the induction coils in the plurality of induction
coils.



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A. CLASSIFICATION OF SUBJECT MATTER**G01R 29/08(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)

IPC 8 G01R, G01V

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 since 1975

Japanese Utility models and applications for utility models since 1975

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

eKIPASS(KIPO internal) "time varying magnetic field", "coil resonance"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/0202699 A1 (AREADY REIDERMAN) 14 September 2006 See paragraphs [0021] - [0053] and figures 1, 3, 4 Cited in the application	1-3, 9-11, 15
A	US 6,100,696 A (PAUL L. SINCLAIR) 8 August 2000 See column 8 line 15 - column 8, line 35 and figures 3, 6	1-3, 9-11, 15
A	US 5,955,884 A (CHRISTOPHER C. PAYTON et al.) 21 September 1999 See the abstract, claim 1 and figure 1	1-3, 9-11, 15



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

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"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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2008/068895**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.: 5, 7, 13,
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:
Claims 5, 7, 13 are unclear because these claims refer to one of claims 4, 6 and 12 violating PCT Rule 6.4(a).
3. ☒ Claims Nos.: 4, 6, 8, 12, 14
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:

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 fee, this Authority did not invite payment of any additional fee.
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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2008/068895

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0202699 A1	14.09.2006	None	
US 6100696 A	08.08.2000	AU 1999-23145 A1 AU 2314599 A CA 2318390 A1 CA 2318390 C EP 1046065 A1 EP 1046065 B1 NO 20003518 A NO 20003518 D0 WO 99-35515 A1	26.07.1999 26.07.1999 15.07.1999 08.05.2007 25.10.2000 23.07.2008 07.09.2000 07.07.2000 15.07.1999
US 5955884 A	21.09.1999	CA 2155691 A1 CA 2155691 C GB 2292460 A GB 9516513 D0 NO 314646 B1 NO 953079 D0 NO 953079 A	16.02.1996 14.10.2003 21.02.1996 11.10.1995 22.04.2003 07.08.1995 16.02.1996