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- (75) **Inventor/Applicant (for US only):** **KISCHKAT, Tobias** [DE/DE]; Am Feuerwehrhaus 3 B, 29223 Celle, Niedersachsen (DE).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,

[Continued on next page]

(54) **Title:** METHOD FOR ANALYZING FLUID PROPERTIES

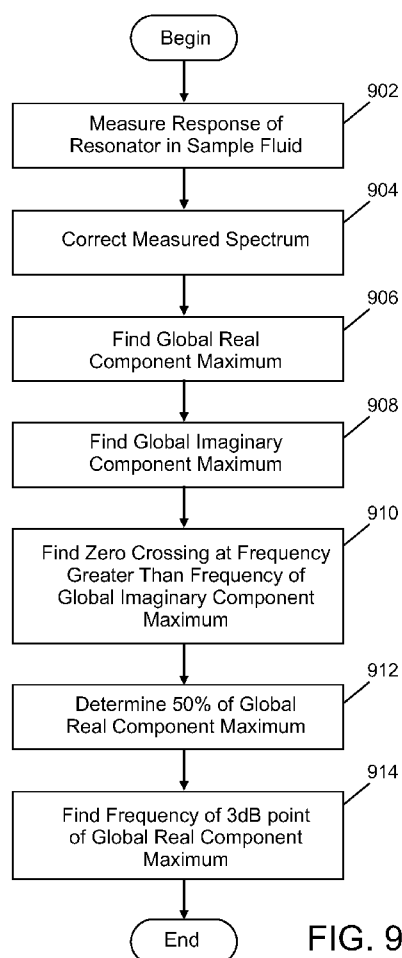


FIG. 9

(57) **Abstract:** A method for determining a property of a fluid includes: receiving at a computing device an admittance spectrum created by application of an excitation to a resonator contacting the fluid, the spectrum covering a first frequency range and having real and imaginary components; determining a resonant frequency of the admittance spectrum, the resonant frequency being a frequency at which a magnitude of the imaginary component is about zero; determining a bandwidth of the spectrum; and determining the property based on one or both of the resonant frequency and the bandwidth of the resonant frequency.





MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, 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))*

Published:

- *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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27 December 2012

A. CLASSIFICATION OF SUBJECT MATTER**E21B 49/08(2006.01)i, G01N 21/25(2006.01)i, G01N 21/62(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)

E21B 49/08; E21B 47/00; G01N 11/00; G01H 1/00; G01H 13/00

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: fluid, property, admittance spectrum, real component, imaginary component, bandwidth, property, density, viscosity, frequency

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YI LIU et al. `Measurement of density and viscosity of dodecane and decane with a pizelectric tuning fork over 298-448 K and 0.1-137.9 MPa` Sensors and Actuators A, 12 March 2011, Vol.167, pp.347-353.	1-4,8-10
Y	See abstract, pages 347 - 352 and figures 1 - 3.	12-18
A		5-7, 11, 19-28
Y	US 2008-0215245 A1 (REITTINGER, PETER W.) 04 September 2008 See paragraphs 0040, 0041, claims 1, 10 and figures 1, 4.	12-18
A	US 5201215 A (GRANSTAFF, VICTORIA E. et al.) 13 April 1993 See abstract, column 1, lines 13 - 17, column 3, lines 26 - 39, column 5, line 65 - column 7, line 3 and figures 1 - 4.	1-28
A	US 7036375 B2 (NOZAKI, TAKAAKI) 02 May 2006 See column 1, lines 6 - 12, column 5, lines 24 - 48 and claims 1, 21.	1-28



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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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Date of mailing of the international search report

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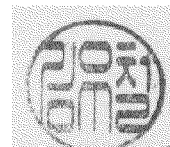
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0215245 A1	04.09.2008	GB 0912013 D0 GB 2460348 A GB 2460348 B N020092660A US 7844401 B2 WO 2008-089427 A2 WO 2008-089427 A3	19.08.2009 02.12.2009 16.11.2011 13.08.2009 30.11.2010 24.07.2008 02.10.2008
US 5201215 A	13.04.1993	None	
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