#### (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

# (19) World Intellectual Property Organization International Bureau



## 

# (43) International Publication Date 6 August 2009 (06.08.2009)

# (10) International Publication Number WO 2009/095876 A3

- (51) International Patent Classification: G01N 23/12 (2006.01) G01N 33/28 (2006.01)
- (21) International Application Number:

PCT/IB2009/050365

(22) International Filing Date:

29 January 2009 (29.01.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/024,370 29 January 2008 (29.01.2008)

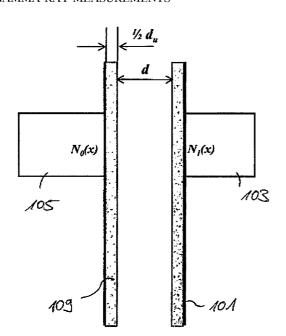
) US

- (71) Applicant (for all designated States except US): SER-VICES PETROLIERS SCHLUMBERGER [FR/FR]; 42, rue Saint Dominique, F-75007 Paris (FR).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): PINGUET, Bruno [FR/FR]; 8, Route de Clamecy, F-58140 Lormes (FR). CUMBE, Carlos [CO/QA]; JNAN Garden Villa 22 Alwaab Street, Doha, 8746 (QA).

- (74) Agent: ETUDES & PRODUCTIONS SCHLUM-BERGER; 1, rue Henri Becquerel, B.P. 202, F-92142 Clamart (FR).
- (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, 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, 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, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR),

[Continued on next page]

(54) Title: DETECTION AND AUTOMATIC CORRECTION FOR DEPOSITION IN A TUBULAR USING MULTI-ENERGY GAMMA-RAY MEASUREMENTS



measuring the water-liquid- ratio of the fluid as a function of time and determining that a deposit exists if the measured water-liquid-ratio of the fluid as a function of time is linear.

(57) Abstract: A method to detect deposits (109) in a tubular (101) in which a fluid is flowing is disclosed. The method comprises

Figure 2b



# 

OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

## 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))

(88) Date of publication of the international search report:

30 December 2009

#### INTERNATIONAL SEARCH REPORT

International application No PCT/IB2009/050365

A. CLASSIFICATION OF SUBJECT MATTER INV. G01N23/12 G01N33/28

According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

 $\begin{array}{ll} \mbox{Minimum documentation searched (classification system followed by classification symbols)} \\ \mbox{G01N} & \mbox{G01F} \end{array}$ 

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
A	WO 2007/098328 A (BP CORP NORTH AMERICA INC [US]; JOHNSON TINA [GB]; COWIE LAURENCE [US]) 30 August 2007 (2007-08-30) paragraphs [0008] - [0011], [0017] - [0019], [0025], [0027], [0033]		
A -	WO 01/25762 A (DANIEL IND INC [US]) 12 April 2001 (2001-04-12) abstract; figure 1 page 8, line 19 - page 9, line 19	1–21	
A	US 4 788 852 A (MARTIN WALLACE W [CA] ET AL) 6 December 1988 (1988–12–06) cited in the application column 1, line 45 – column 2, line 54; figures 1,2	1-21	
	-/		

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 document but published on or after the international filing date     *L* document which may throw doubts on priority_claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)     *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	<ul> <li>"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</li> <li>"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</li> <li>"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.</li> <li>"&amp;" document member of the same patent family</li> </ul>
Date of the actual completion of the international search	Date of mailing of the international search report
11 November 2009	18/11/2009
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2	Authorized officer
NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016	Steinmetz, Johannes

## INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/050365

WO 99/60387 A (SCHLUMBERGER LTD [US]; SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER TECHNOLO) 25 November 1999 (1999–11–25) abstract; figure 1a	Relevant to claim No.	
	0 (continuation of second sheet) (April 2005)	th (contributation of second-shared (April 200s)

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2009/050365

Patent document cited in search report	:	Publication date		Patent family member(s)	Publication date
WO 200709832	В А	30-08-2007	NONE	W	<u> </u>
WO 0125762	А	12-04-2001	AU CA EP NO	7751300 A 2385283 A1 1218728 A1 20021571 A	10-05-2001 12-04-2001 03-07-2002 03-06-2002
US 4788852	A	06-12-1988	CA DE EP JP JP JP NO	1257712 A1 3676999 D1 0236623 A1 1887643 C 6014015 B 62184339 A 173469 B	18-07-1989 21-02-1991 16-09-1987 22-11-1994 23-02-1994 12-08-1987 06-09-1993
WO 9960387	Α	25-11-1999	AU CA CN EP NO US	4083399 A 2332376 A1 1309768 A 1078251 A2 20005844 A 6097786 A	06-12-1999 25-11-1999 22-08-2001 28-02-2001 12-01-2001 01-08-2000