(19) World Intellectual Property **Organization**

International Bureau



(43) International Publication Date 8 July 2004 (08.07.2004)

PCT

(10) International Publication Number WO 2004/057278 A3

- (51) International Patent Classification⁷: G01F 1/74, 1/86, G01N 21/55, 21/59
- (21) International Application Number:

PCT/EP2003/015031

(22) International Filing Date:

19 December 2003 (19.12.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

0230052.3

23 December 2002 (23.12.2002)

- (71) Applicant (for all designated States except US): BORE-ALIS TECHNOLOGY OY [FI/FI]; PO Box 330, FIN-06101 Porvoo (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): NIELSEN, Karl [SE/SE]; Pilvagen 1, S-444 47 Stenungsund (SE).
- (74) Agents: JACKSON, Robert, Patrick et al.; Frank B. Dehn & Co., 179 Queen Victoria Street, London EC4V 4EL (GB).

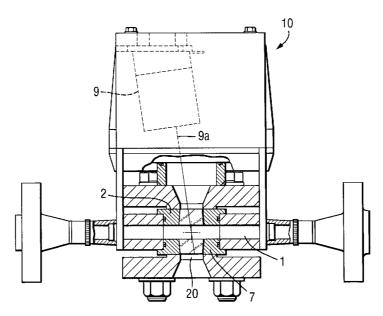
- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, EG, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

[Continued on next page]

(54) Title: CATALYST FLOW METER



(57) Abstract: An apparatus (10) for detecting the transmission of catalyst plugs through a conduit (105) leading to a, polymerisation reactor, comprising an optical radiation source (9) located outside the conduit which passes a light beam (9a) through the conduit along a light path and an optical radiation detector arranged to detect the light beam. When a catalyst plug passes through the conduit it blocks the light path and thus the light intensity recorded by the detector drops. In this way catalyst plugs can be detected. The apparatus can also be used to measure the mass of an object passing through a conduit by repeatedly detecting the speed of the material and the light intensity, multiplying the speed and intensity values to get a result curve and integrating this curve in order to obtain a value indicative of the mass of the material.



WO 2004/057278 A3



 before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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

29 December 2004

INTERNATIONAL SEARCH REPORT

International Application No

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G01F1/74 G01F1/86 G01N21/59 G01N21/55 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 7 GO1F GO1N 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, WPI Data, PAJ, INSPEC, COMPENDEX C. DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. Category ° 1,2,4-30 US 5 550 537 A (PERDUE KENNETH L) χ 27 August 1996 (1996-08-27) column 3, line 65 - column 6, line 56; figures 1a, 1b, 1c, 2, 3 WO 01/65234 A (UNIV MISSISSIPPI) 1,2,13, χ 14,23, 7 September 2001 (2001-09-07) 24,27-30 page 6, paragraph 3 - page 14, paragraph 2; figures 1-3,7,χ DE 30 42 622 A (BATTELLE INSTITUT E V) 10-15, 19 May 1982 (1982-05-19) 23,24, 27,30 the whole document -/---Further documents are listed in the continuation of box C. Patent family members are listed in annex. o Special categories of cited documents: *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 "A" document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the international "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to 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) involve an inventive step when the document is taken alone 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 "O" document referring to an oral disclosure, use, exhibition or other means in the art. *P* document published prior to the international filing date but later than the priority date claimed *&* document member of the same patent family Date of the actual completen of the international search Date of mailing of the international search report 09/11/2004 29 October 2004 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2

Fax: (+31-70) 340-3016

NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,

Politsch, E

INTERNATIONAL SEARCH REPORT

International Application No

		F/FP 03/15031		
	ation) DOCUMENTS CONSIDERED TO BE RELEVANT		<u> </u>	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X A	EP 0 571 269 A (COMMISSARIAT ENERGIE ATOMIQUE) 24 November 1993 (1993-11-24) column 2, line 15 - column 3, line 45; figures		1,7,10 13,27	
Ρ,Χ	WO 03/012375 A (HAPPEL JENS; MIC MEASURING IDEAS CONSULTING (DE)) 13 February 2003 (2003-02-13) page 7, line 26		1-3,7, 13-15, 23,27	
		,		
			,	
			,	
		•		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5550537	A	27-08-1996	CA EP WO	2190612 A1 0767894 A1 9530884 A1	16-11-1995 16-04-1997 16-11-1995
WO 0165234	A	07-09-2001	AU WO US	4541001 A 0165234 A1 2002024666 A1	12-09-2001 07-09-2001 28-02-2002
DE 3042622	Α	19-05-1982	DE	3042622 A1	19-05-1982
EP 0571269	Α	24-11-1993	FR EP	2691541 A1 0571269 A1	26-11-1993 24-11-1993
WO 03012375	A	13-02-2003	DE WO EP	10137009 C1 03012375 A2 1419366 A2	03-04-2003 13-02-2003 19-05-2004