



- (51) International Patent Classification:
B01D 63/10 (2006.01) *B01D 61/00* (2006.01)
- (21) International Application Number:
PCT/US2011/022476
- (22) International Filing Date:
25 January 2011 (25.01.2011)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/300,386 1 February 2010 (01.02.2010) US
61/423,081 14 December 2010 (14.12.2010) US
- (72) Inventors; and
- (71) Applicants : **HERRINGTON, Rodney** [US/US]; 8631 Glenridge Place NW, Albuquerque, New Mexico 87114 (US). **DRESTY, John E.** [US/US]; 118 Hopewell Road, South Glastonbury, Connecticut 06073 (US). **WINTER, Mark K.** [US/US]; 47 Hopmeadow Road, Bristol, Connecticut 06010 (US).
- (74) Agent: **LAMBRINOS, Matthew**; Franklin & Associates International LLC, 230 Saint Francis Drive, Suite 1, Santa Fe, New Mexico 87501 (US).
- (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, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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, 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).

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:
29 December 2011

(54) Title: SYSTEMS AND METHODS FOR FILTRATION

40

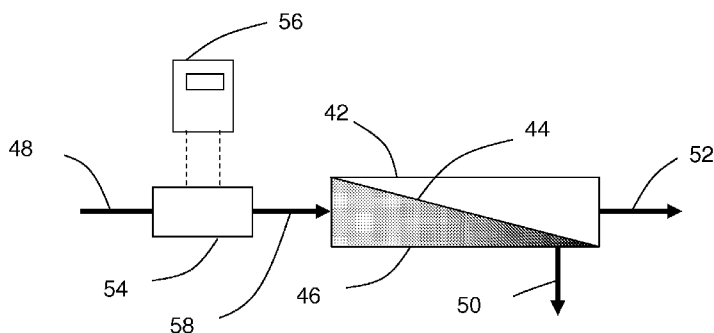




Fig. 5

(57) Abstract: Filtration systems (40) utilize a pre-treatment method to cause scale formation to occur on particles (94) in the fluid stream (96) rather than on the filter surface and may also destroy microorganisms in the fluid stream. More specifically, but not limited to, a filtration device can be a filtration membrane, such as spiral wound filtration membrane (60), that utilizes an open feed spacer (80), such for example an embossed or printed pattern on the membrane, to create a thin feed spacer channel which replaces a conventional feed spacer mesh material. System (40) further utilizes a treatment device (54) to enable a pulsed power, magnetic, electro-magnetic, electro-static, or hydrodynamic fluid treatment scheme to condition particles in the fluid stream (96) such that scale forming elements precipitate (94) on to the particles in the fluid stream rather than on the filtration surfaces.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/022476

A. CLASSIFICATION OF SUBJECT MATTER		
<i>B01D 63/10(2006.01)i, B01D 61/00(2006.01)i</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) B01D 63/10; B01D 65/08; C02F 1/52; C02F 1/54; B01D 61/12; C02F 1/28; B01D 65/00; G01N 15/08; B01D 61/00		
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: membrane , filter , scale		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6416668 B1 (AL-SAMADI; RIAD A.) 09 July 2002	1,40
Y	See claims 1,6,11; figures 1-4; column 8, line 30-column 8, line 52	2-31,34,36-39 ,41-44
A	See the whole document	32-33,35
X	US 2008-0105038 A1 (JONS STEVEN DOUGLAS et al.) 08 May 2008	32-33,35
Y	See claims 29,58; figures 1-3,5,10-11; paragraph [0047]	2-10,19-31,34 ,36-38,41-44
A	See the whole document	1,11-18,39-40
Y	KR 10-0918373 B1 (NATIONAL UNIVERSITY CHUNGNAM) 21 September 2009	11-18,25-31,39
A	See claims 2,3,5; paragraph <6>-<7>, <22>-<38>; figures 4,6; abstract	1-10,19-24,32-38 ,40-44
A	See the whole document	
A	US 6582605 B2 (KRULIK; GERALD A. et al.) 24 June 2003	1-44
A	See the whole document	
A	US 2004-0173528 A1 (RODNEY E. HERRINGTON et al.) 09 September 2004	1-44
A	See the whole document	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of 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 "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 26 OCTOBER 2011 (26.10.2011)		Date of mailing of the international search report 27 OCTOBER 2011 (27.10.2011)
Name and mailing address of the ISA/KR  Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsu-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140		Authorized officer SONG, Hyun Jung Telephone No. 82-42-481-5537 

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/022476

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0314714 A1 (BENJAMIN MARK M. et al.) 24 December 2009 See the whole document	1-44

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/022476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6416668 B1	09.07.2002	None	
US 2008-0105038 A1	08.05.2008	CN 100493687 C CN 101018598 A CN 101018598 C0 EP 1793915 A1 EP 2319612 A1 JP 2008-511437 A JP 2008-511437 T KR 10-2007-0052288 A US 2010-0148752 A1 US 7698928 B2 WO 2006-026011 A1	03.06.2009 15.08.2007 15.08.2007 13.06.2007 11.05.2011 17.04.2008 17.04.2008 21.05.2007 17.06.2010 20.04.2010 09.03.2006
KR 10-0918373 B1	21.09.2009	None	
US 6582605 B2	24.06.2003	AU 2001-279291 A8 AU 2001-79291 A1 US 2002-0088759 A1 WO 02-04359 A1 WO 02-04359A9	21.01.2002 21.01.2002 11.07.2002 17.01.2002 06.02.2003
US 2004-0173528 A1	09.09.2004	AU 2000-51650 A1 AU 2001-19539 A1 AU 2004-224430 A1 AU 2004-224430 B2 AU 2004-224430 C1 AU 2005-217634 A1 AU 2005-217634 B2 AU 2005-217634 C1 CA 2492777 A1 CA 2556014 A1 CA 2557131 A1 CN 1942404 A CN 1942404 C0 EP 1322407 A1 EP 1453592 A1 EP 1453592 A4 EP 1453592 B1 EP 1603441 A2 EP 1720801 A1 JP 04-778502 B2 JP 2004-508170 A JP 2006-518666 A JP 2007-522941 A KR 10-2007-0016122 A US 2002-0020675 A1 US 2004-0011723 A1 US 2004-0178145 A1	12.12.2000 22.03.2002 07.10.2004 19.11.2009 29.04.2010 09.09.2005 08.10.2009 25.03.2010 30.01.2003 07.10.2004 09.09.2005 04.04.2007 04.04.2007 02.07.2003 08.09.2004 17.08.2005 23.12.2009 14.12.2005 15.11.2006 08.07.2011 18.03.2004 17.08.2006 16.08.2007 07.02.2007 21.02.2002 22.01.2004 16.09.2004

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/022476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2004-0211676 A1	28.10.2004
		US 2004-0226873 A1	18.11.2004
		US 2006-0157342 A1	20.07.2006
		US 2006-0157343 A1	20.07.2006
		US 6261464 B1	17.07.2001
		US 6524475 B1	25.02.2003
		US 6558537 B1	06.05.2003
		US 6736966 B2	18.05.2004
		US 7005075 B2	28.02.2006
		US 7008523 B2	07.03.2006
		US 7244357 B2	17.07.2007
		US 7297268 B2	20.11.2007
		US 7311831 B2	25.12.2007
		US 7740749 B2	22.06.2010
		WO 00-71783 A1	30.11.2000
		WO 02-20142 A1	14.03.2002
		WO 03-008076 A1	30.01.2003
		WO 2004-084698 A2	07.10.2004
		WO 2004-084698 A3	07.10.2004
		WO 2005-082787 A1	09.09.2005
		WO 2005-084178 A2	15.09.2005
		WO 2005-084178 A3	15.09.2005
US 2009-0314714 A1	24.12.2009	None	