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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 March 2013 (14.03.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/036353 A1

(51) International Patent Classification:
C02F 1/469 (2006.01) *C02F 9/00* (2006.01)
C02F 1/46 (2006.01) *C02F 1/461* (2006.01)
B01D 61/42 (2006.01)

(21) International Application Number:
PCT/US2012/050508

(22) International Filing Date:
13 August 2012 (13.08.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201110265274.X 8 September 2011 (08.09.2011) CN

(71) Applicant *(for all designated States except US)*: **GENERAL ELECTRIC COMPANY** [US/US]; 1 River Road, Schenectady, NY 12345 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **XIONG, Rihua** [CN/CN]; General Electric Company, Global Research, One Research Circle, Bldg K1-3A59, Niskayuna, NY 12309 (US). **YANG, Linglu** [CN/CN]; General Electric Company, Global Research, One Research Circle, Bldg K1-3A59, Niskayuna, NY 12309 (US).

(74) Agents: **WINTER, Catherine, J.** et al.; General Electric Company, Global Patent Operation, 2 Corporate Drive, Suite 648, Shelton, CT 06484 (US).

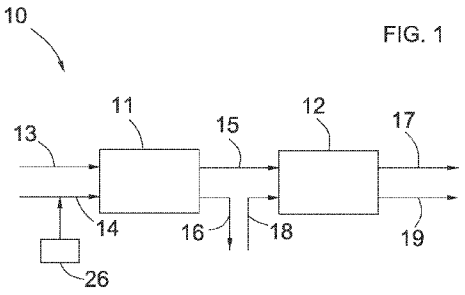
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, 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, 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, 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))*

(54) **Title**: DESALINATION SYSTEM AND METHOD

FIG. 1



(57) **Abstract**: A desalination system is provided. The desalination system comprises a desalination apparatus. The desalination apparatus comprises first and second electrodes, and a first group of paired ion exchange membranes disposed between the first and second electrodes to form a first group of alternating first and second channels. The first channels are configured to receive a first stream for desalination and the second channels are configured to receive a second stream to carry away ions removed from the first stream, respectively. The desalination apparatus further comprises a plurality of spacers disposed between each pair of the adjacent ion exchange membranes and between the first and second electrodes and the respective ion exchange membranes. Wherein each of the ion exchange membranes in the first group is a cation exchange membrane. A desalination system and a method for removing ions from an aqueous stream area also presented.

WO 2013/036353 A1

DESALINATION SYSTEM AND METHOD

Abstract

A desalination system is provided. The desalination system comprises a desalination apparatus. The desalination apparatus comprises first and second electrodes, and a first group of paired ion exchange membranes disposed between the first and second electrodes to form a first group of alternating first and second channels. The first channels are configured to receive a first stream for desalination and the second channels are configured to receive a second stream to carry away ions removed from the first stream, respectively. The desalination apparatus further comprises a plurality of spacers disposed between each pair of the adjacent ion exchange membranes and between the first and second electrodes and the respective ion exchange membranes. Wherein each of the ion exchange membranes in the first group is a cation exchange membrane. A desalination system and a method for removing ions from an aqueous stream area also presented.

(Fig. 1)