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[Continued on next page]

(54) Title: ELECTROLYTIC ON-SITE GENERATOR

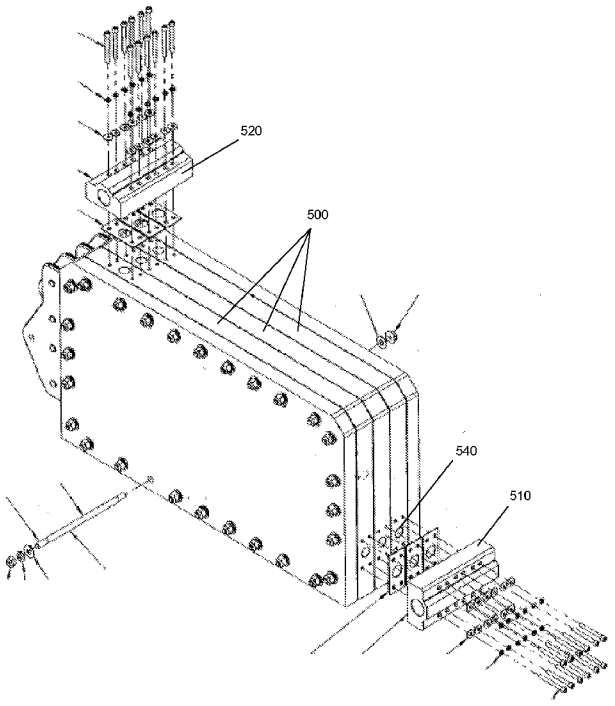

FIG. 4

(57) Abstract: Method and apparatus for a low maintenance, high reliability on-site electrolytic generator incorporating automatic cell monitoring for contaminant film buildup, as well as automatically removing or cleaning the contaminant film. This method and apparatus preferably does not require human intervention to clean. For high current density cells, cleaning is preferably performed by reversing the polarity of the electrodes and applying a lower current density to the electrodes, preferably by adjusting the salinity or brine concentration of the electrolyte while keeping the voltage constant. Electrolyte flow preferably comprises water and brine flows which are preferably separately monitored and automatically adjusted. For bipolar cells, flow between modules arranged in parallel is preferably approximately equally distributed between modules and between intermediate electrodes within each module.

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Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

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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31 May 2012

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

C02F 1/461(2006.01)i, C25F 7/00(2006.01)i, C25B 9/00(2006.01)i, C23F 13/00(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)

C02F 1/461; C25B 9/00; C25D 21/12; C25F 1/00; C25B 15/00; C25F 7/00

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: electrolytic cell, brine flow, water flow, oxidant tank, electrode polarity, flow rate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2009-0229992 A1 (SANCHEZ, JUSTIN et al.) 17 September 2009 see claims 1,10-17,22,27-30; figs. 1,2; paragraphs [0026]-[0029],[0036]	1-4,5,6,7,8-9,10 ,11-13,14-27 28-38
X A	US 2008-0237054 A1 (SANCHEZ, JUSTIN et al.) 02 October 2008 See claims 1,2,4-7,10,11,14-20; fig. 1; paragraphs [0020]-[0022]	1-4,5,6,7,8-9,10 ,11-13 14-38
A	US 05853562 A (EKI, TOSHIO et al.) 29 December 1998 See claims 1-4; figs. 1,12	1-38
A	US 2004-0195104 A1 (MINATO, SHINICHIRO) 07 October 2004 See claims 1,2,7; figs. 2,3	1-38

☐ 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 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	Date of mailing of the international search report
30 MARCH 2012 (30.03.2012)	**09 APRIL 2012 (09.04.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
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Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/046610

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-13 are directed to the method and apparatus for operating an electrolytic cell comprising automatically and separately adjusting the brine flow rate and water flow rate or control box operated in response to a water flow rate, a water pressure, brine flow rate etc.
Claims 14-27 are directed to the method of cleaning an electrolytic cell comprising reversing electrode polarity.
Claims 28-38 are directed to the method and apparatus of bipolar electrolytic cell comprising the step of mixing the electrolyte flows between the intermediate electrodes in a gap region or via openings in one or more of the intermediate electrodes; or a gap region in each module or openings in one or more of the intermediate electrodes to facilitate uniformity of electrolyte.

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/046610

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