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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR OPERATION OF REVERSE OSMOSIS UNITS

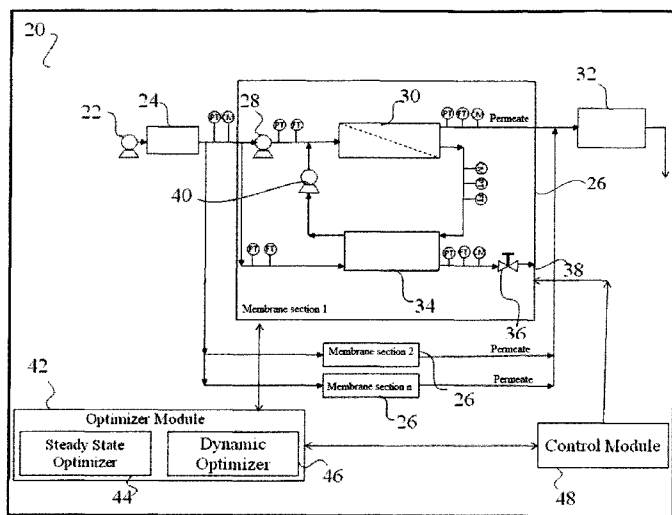


FIG. 1

(57) Abstract: In one aspect, the invention provides a RO system (20) comprising an energy recovery device (ERD) (34). The system comprises a water intake pump (22) to provide a feed water; a pre-treatment section (24) to pre-treat the feed water to provide a pre-treated water; a membrane section (26); an optimizer module (42) to estimate a value for at least one operating variable associated with at least one decision variable, wherein the decision variable is associated with at least one objective constraint; and a control module (48) for operating the RO unit at the estimated value of the at least one operating variable. The RO unit is characterized by a total energy consumed, wherein the energy recovered by ERD impacts the total energy consumed, and the at least one decision variable is selected from a group consisting of flow rate at high pressure pump (28); pressure at high pressure pump outlet; flow rate at re-circulation pump (40); pressure of low pressure brine reject stream; or combinations thereof.

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— *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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INTERNATIONAL SEARCH REPORT

International application No PCT/IB2011/001309

A. CLASSIFICATION OF SUBJECT MATTER INV. B01D61/06 B01D61/12 C02F1/44 ADD.		
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 C02F		
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 practicable, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/010243 A1 (DEGREMONT [FR]; BONNELYE VERONIQUE [FR]; FIEVEZ ERIC [FR]) 28 January 2010 (2010-01-28) the whole document -----	1-8
X	WO 2010/109265 A1 (ABB RESEARCH LTD [CH]; SUBBIAH SENTHILMURUGAN [IN]; MEKAPATI SRINIVAS) 30 September 2010 (2010-09-30) page 4, line 16 - page 6, line 27; figures 1-5 -----	1-8
E	EP 2 368 624 A1 (KLEIN SCHANZLIN & BECKER AG [DE]) 28 September 2011 (2011-09-28) the whole document -----	3-8
A	US 6 556 930 B1 (LUECK STANLEY R [US]) 29 April 2003 (2003-04-29) the whole document -----	1-8
<input 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	"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	
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"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)	"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	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search <div style="text-align: center; font-weight: bold;">4 November 2011</div>	Date of mailing of the international search report <div style="text-align: center; font-weight: bold;">12/07/2012</div>	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <div style="text-align: center; font-weight: bold;">Marti, Pedro</div>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2011/001309

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010010243 A1	28-01-2010	AU 2009274391 A1 EP 2315622 A1 FR 2933969 A1 US 2011147285 A1 WO 2010010243 A1	28-01-2010 04-05-2011 22-01-2010 23-06-2011 28-01-2010

WO 2010109265 A1	30-09-2010	NONE	

EP 2368624 A1	28-09-2011	DE 102011005964 A1 EP 2368624 A1	15-12-2011 28-09-2011

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8

Reverse osmosis system and method of operating a reverse osmosis unit.

1.1. claims: 1, 2

Reverse osmosis system comprising a water intake pump; a pre-treatment section; a membrane section with a high pressure pump, a membrane train, a post-treatment section, an energy recovery device, at least one valve, and a recirculation pump; an optimizer module; and a control module.

1.2. claims: 3-8

Method of operating a reverse osmosis unit which comprises at least one RO membrane train, at least one energy recovery device, at least one pump, and at least one valve.

2. claims: 9, 10

Claim 9: A tool that uses the method of claim 3.

Claim 10: A reverse osmosis system that comprises the tool of claim 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/001309

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:

see additional sheet

1. As all required additional 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 fees, this Authority did not invite payment of additional fees.
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.:

1-8

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.