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Lara [MX/US]; 9205 Shadowcrest, College Station, TX 77845 (US). WATANAWANAVET, Somsak [TH/US]; 401 Stasney, Suite 220, College Station, TX 77840 (US).

(74) Agent: WILLIAMS, Bradley, P.; Baker Botts L.L.P., 2001 Ross Avenue, Suite 600, Dallas, TX 75201 (US).

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(71) Applicants (for all designated States except US): **THE TEXAS A & M UNIVERSITY SYSTEM** [US/US]; Office Of Technology Commercialization, 3369 TAMU, College Station, TX 77843-3369 (US). **STARROTOR CORPORATION** [US/US]; 1805 Southwood Drive, College Station, TX 77840 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HOLTZAPPLE, Mark, T.** [US/US]; 1805 Southwood Drive, College Station, TX 77840 (US). **RABROKER, George, A.** [US/US]; 8713 Sandstone Drive, College Station, TX 77845 (US). **ZHU, Li** [CN/US]; 700 Dominik Drive, Apt. 3102, College Station, TX 77840 (US). **RUIZ, Jorge H.J.**,

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

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9 October 2008

(54) Title: DESALINATION SYSTEM

(57) Abstract: In accordance with particular embodiments, a desalination system includes a plurality of evaporators. The plurality of evaporators includes at least a first evaporator and a last evaporator. The plurality of evaporators are arranged in cascading fashion such that a concentration of salt in a brine solution increases as the brine solution passes through the plurality of evaporators from the first evaporator towards the last evaporator. The desalination system also includes a plurality of heat exchangers. An input of each evaporator is coupled to at least one of the plurality of heat exchangers. The system also includes a vapor source coupled to at least one of the plurality of evaporators.



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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER					
INV.	C02F1/04	BOIDI/OO	B01D1/26	B01D1/28	F04F5/46
	C02F1/20	C02F1/42	C02F1/66		
ADD.	C02F103/08				
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 F04F F28F F28D

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
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 3 741 879 A (BEST T) 26 June 1973 (1973-06-26)	1, 45
Y	claims 1,4; figures 1,2,6	2-22, 46-57

X	ALASFOUR F N ET AL: "Thermal analysis of ME-TVC+MEE desalination systems" DESALINATION, ELSEVIER, AMSTERDAM, NL, vol. 174, no. 1, 1 April 2005 (2005-04-01), pages 39-61, XP004891607 ISSN: 0011-9164	1
Y	figure 2	2-22, 45-57

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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C	<input checked="" type="checkbox"/> See patent family annex
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* Special categories of cited documents	
<p>1A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>1E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>*P" document published prior to the international filing date but later than the priority date claimed</p>	<p>1T" 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</p> <p>"X1" 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</p> <p>"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</p> <p>1&" document member of the same patent family</p>

Date of the actual completion of the international search 18 February 2008	Date of mailing of the international search report 24/07/2008
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Name and mailing address of the ISA/ European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel (+31-70) 340-2040, Tx 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Van Iddekinge, R
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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/080954

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	<p>R.BILLET: "Evaporation" ULLMANN' S ENCYCLOPEDIA OF INDUSTRIAL CHEMISTRY, 15 June 2000 (2000-06-15), pages 1-36, XP002469298 Retrieved from the Internet: URL :http://mrw.interscience.wiley.com/emrw /9783527306732/ueic/article/b03_03/current /pdf></p> <p style="text-align: center;">-----</p>	<p>1-22, 45-57</p>

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/080954

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 allsearchable 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

see additional sheet

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

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-22,45-57

a desalination system comprising a plurality of evaporators,
a plurality of heat exchangers and a vapor source and
coresponding desalination method

2. claims: 23-44

a desalination system comprising a plurality of evaporators
and a plurality of vapor sources

3. claims: 58-61

an ejector with a two stage high pressure steam delivery
mechanism

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/080954

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3741879	A	26-06-1973	NONE	

US 4511436	A	16-04-1985	DE 3219387 A1	01-12-1983
			FR 2527090 A1	25-11-1983
			IT 1161816 B	18-03-1987
			JP 1599739 C	31-01-1991
			JP 2022716 B	21-05-1990
			JP 58205577 A	30-11-1983
			NL 8300103 A	16-12-1983
