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B03D 1/14 (2006.01) **B01F 3/04** (2006.01)
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(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, PA, 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.

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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))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

(54) Title: DISSOLVED AIR FLOTATIONS SYSTEM WITH ENERGY RECOVERY DEVICES

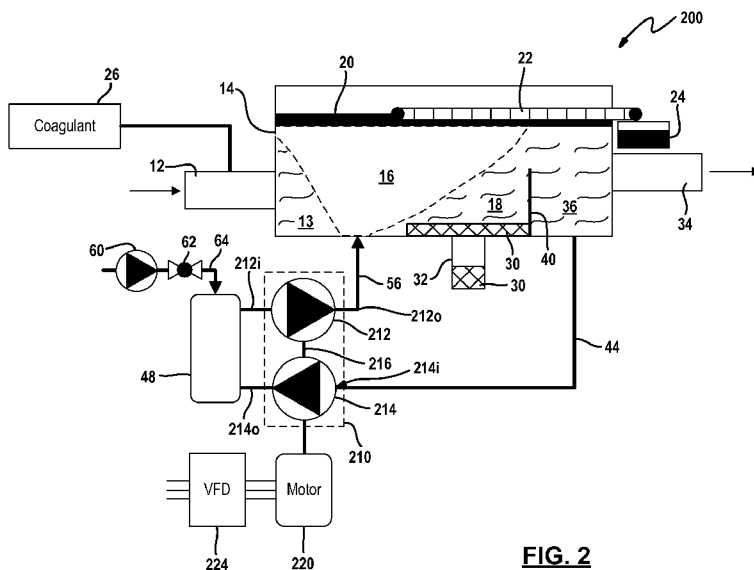


FIG. 2

(57) Abstract: A system and method of operating the same includes an absorption tank having a compressor communicating gas thereto, a suspended solid filtration tank having a primary inlet, a secondary inlet, a primary outlet and a secondary outlet and a pump comprising a pump inlet coupled to the secondary outlet and a pump outlet communicating fluid to the absorption tank. The absorption tank forms a solution from the fluid and gas. A turbine mechanically couples the pump with a common shaft extending to the pump. The turbine has a turbine inlet coupled to the absorption tank and a turbine outlet coupled to the secondary inlet. The turbine depressurizes the solution. The system may also use a centrifugal pump in place of a turbine and absorption tank.



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- *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))*

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/040830

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B03D1/02 B03D1/14 B03D1/24 C02F1/24 B01F5/16
 B01F3/04 F04D7/04 F04D31/00
 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)
 B03D C02F F04D B01F

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 94 04 988 U1 (MENKE LUCAS DIPL ING [DE]) 30 June 1994 (1994-06-30) pages 5,6,11; figures 1,4 -----	1-8
X	US 3 501 000 A (ROBERTS THOMAS E JR) 17 March 1970 (1970-03-17) the whole document -----	1-8
X	WO 2011/038452 A1 (GHD PTY LTD [AU]; WOODTHORPE MARK OWEN [AU]) 7 April 2011 (2011-04-07) claims 1,6 -----	1-8
X	US 2009/023816 A1 (LEFEVRE BENOIT [FR] ET AL) 22 January 2009 (2009-01-22) paragraph [0058] - paragraph [0098]; figures 1-5 ----- -/--	9,13-18

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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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 16 January 2014	Date of mailing of the international search report 24/01/2014
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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, Fax: (+31-70) 340-3016	Authorized officer Roider, Josef
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/040830

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 714 237 A (ETABLISSEMENTS DAUBRON SOC D) 10 November 1931 (1931-11-10) page 1 - page 3; figure 1 -----	9,11-18
A		10,23
X	DE 43 15 234 A1 (KHS PROCESSTECHNIK GMBH [DE] KHS MASCH & ANLAGENBAU AG [DE]) 10 November 1994 (1994-11-10) page 1 - page 3; figure 1 -----	9,13-18
X	DE 563 471 C (ARMATUREN & MASCHINENFABRIK A) 5 November 1932 (1932-11-05) page 1 - page 3; figure 1 -----	9,13-18
X	GB 408 468 A (EGON MARTIN MULLER) 12 April 1934 (1934-04-12) page 1 - page 2; figure 1 -----	9,13-18
Y	US 2 742 424 A (SADDINGTON ARTHUR W ET AL) 17 April 1956 (1956-04-17) column 2 - column 6; figure 1 -----	19-22
Y	US 1 894 393 A (BIGELOW GEORGE E) 17 January 1933 (1933-01-17) page 1 - page 3; figure 1 -----	19-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2013/040830

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
DE 9404988	U1	30-06-1994	NONE	

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US 1894393	A	17-01-1933	NONE	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/040830

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.:

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: 1-8

Absorption tank connected to a gas compressor and a solid filtration tank with a circulation pump between the tanks and a turbine for expanding the fluid in the absorption tank connected the the pump for recovering expansion energy.

2. claims: 9-23

Centrifugal pump with plurality of pumping stages with a inner shell clearance, connected to a gas compressor
