

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 August 2007 (02.08.2007)

PCT

(10) International Publication Number  
**WO 2007/087060 A3**

(51) International Patent Classification:

C02F 3/00 (2006.01) C02F 3/30 (2006.01)  
C02F 3/02 (2006.01)

(21) International Application Number:

PCT/US2006/049223

(22) International Filing Date:

22 December 2006 (22.12.2006)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

11/339,186 25 January 2006 (25.01.2006) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, 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, LV, LY, MA, MD, 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.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

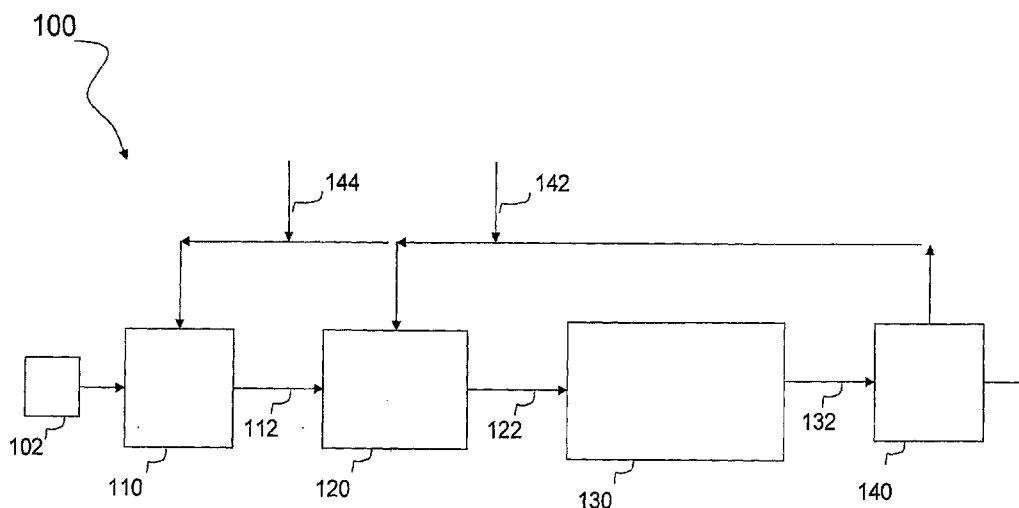
- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

31 January 2008

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: WASTEWATER TREATMENT SYSTEM AND METHOD



(57) Abstract: The invention is directed to a wastewater treatment system having an anoxic biological treatment zone, an aerobic biological treatment zone and a separator. The concentration of oxygen in streams within the system is strategically managed for improved removal of nutrient from the wastewater. A source of biodegradable carbon may be introduced to reduce the concentration of oxygen within the system. An effective treatment time under anoxic or aerobic conditions may further be varied.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/49223

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C02F 3/00, C02F 3/02, C02F 3/30 (2007.01)

USPC - 210/601, 210/620, and 210/630

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)

USPC: 210/601, 210/620, and 210/630

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC: all subclasses of 210 - see keywords below

Google Patent and Google Scholar Internet - see keywords below

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Electronic Databases Searched:USPTO WEST (PGPUB, EPAB, JPAB, USPT), Google patent, Google Scholar. Search Terms Used: bacteria, methanol, recycle or anoxic or aerobic, biolo\$ adj treatment, signal, wastewater, filtrate, adj treat\$, membrane, aerobic adj treat\$, separator, membrane module, methanol, waste water treatment,

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 6,743,362 B1 (Porteous et al.) 01 June 2004 (01.06.2004); entire document, especially abstract; figure 1; col 2, ln 55-65; col 2, ln 66 to col 3, ln 17; col 3, ln 42-46; col 3, ln 40-41; col 3, ln 15-27; col 1, ln 07-16; col 3, ln 24-26; col 3, ln 34-41	1, 2, 21-23, 30-33, 36, and 37 ----- 3, 4, 24-29, 34, 35, and 38-55
Y	US 2003/0038080 A1 (Vriens et al.) 27 February 2003 (27.02.2003); entire document, especially figure 3, 12-13; para [0011]; [0021]; [0023]; [0024]; [0028]; [0036];[0039]; [0041]; [0261]; [0272]; [0282]; [0312]; [0406]	3, 4, 7, 10, 11, 14, 24-29, 34, 35, and 38-55
Y	US 5,846,424 A (Khudenko, B.) 08 December 1998 (08.12.1998); entire document, especially abstract; figure 1 and 9; col 3, ln 13-32; col 3, ln 48-64;col 9, ln 06-20; col 5, ln 40 to col 6, ln 19;	5-20 and 56
Y	US 6,872,305 B2 (Johnson et al.) 29 March 2005 (29.03.2005); entire document, especially figure 3; col 3, ln 05-13	5-20 and 56
A	US 5,364,529 A (Morin et al.) 15 November 1994 (15.11.1994); entire document	5-20 and 56
A	US 6,361,695 B1 (Husain et al.) 26 March 2002 (26.03.2002); entire document	1-4 and 21-55

☐ Further documents are listed in the continuation of Box C.

## \* 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 another 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

20 October 2007 (20.10.2007)

Date of mailing of the international search report

26 NOV 2007

Name and mailing address of the ISA/US

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P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

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PCT OSP: 571-272-7774

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/49223

## 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:

Group I, claims 1-4 and 21-55, is directed to a wastewater treatment system that uses anoxic and aerobic treatment of the water.

Group II, claims 5-20 and 56, is directed to a wastewater treatment system that uses biological treatment zones and membranes connected in series.

The special technical feature of Group I is use of anoxic treatment zones, which is not present in Group II that has a special technical feature of membrane modules, recycle systems, and reactors in series. Accordingly, unity of invention is lacking under PCT Rule 13.1.

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 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.