



- (51) International Patent Classification:
B01D 53/04 (2006.01) F24F 7/00 (2006.01)
- (21) International Application Number:
PCT/US2013/051077
- (22) International Filing Date:
18 July 2013 (18.07.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/672,786 18 July 2012 (18.07.2012) US
61/814,834 23 April 2013 (23.04.2013) US
- (71) Applicant: ENVERID SYSTEMS, INC. [US/US]; 47 Grafton Street, Newton, MA 02459 (US).
- (72) Inventors: MEIRAV, Udi; 141 Hartman Road, Newton, MA 02459 (US). BIRAN, Israel; Harotem St. 7, 42910 Avihayil (IL). BECHAR, Abraham; 4 Recanati Street, Tel-Aviv (IL).
- (74) Agents: HOPKINS, Brian, P. et al.; Mintz Levin Cohn Ferris Glovsky and Popeo, P.C., Chrysler Center, 666 Third Avenue, New York, NY 10017 (US).
- (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, 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.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

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

13 March 2014

- (54) Title: REGENERATING ABSORBENTS FOR INDOOR AIR SCRUBBING

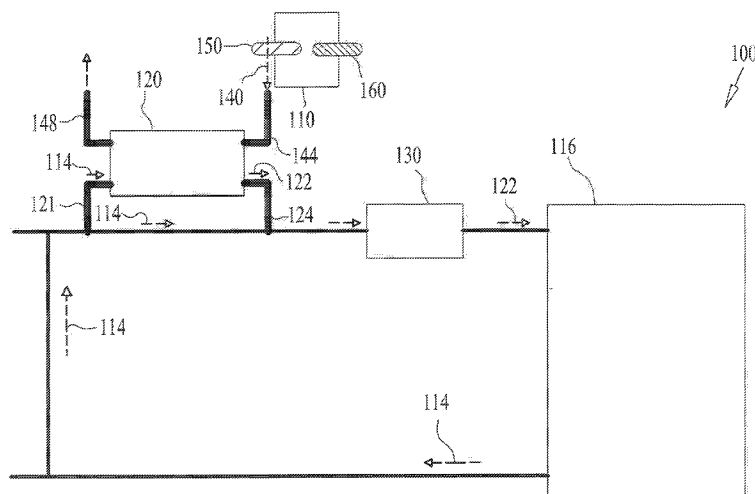


FIGURE 1A

- (57) Abstract: Some embodiments of the disclosure correspond to, for example, a system for scrubbing a mixture of gases and/or contaminants from indoor air from an enclosed space to remove at least one gas and/or contaminant from the mixture of gases and/or contaminants. The system may include one or more adsorbent materials configured to be cycled between adsorption and regeneration of at least one of gas and/or contaminant from the mixture of gases and/or contaminants via temperature swing adsorption cycle (for example), regeneration means configured to regenerate one or more adsorbent materials. The regeneration means may be configured at a regeneration temperature to regenerate the one or more adsorbent materials, and a heat pump may be configured to heat at least one of the purge gas and the adsorbent materials.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US13/51077

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B01D 53/04; F24F 7/00 (2013.01)

USPC - 96/108; 95/115, 116; 454/254

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)

IPC(8): B01D 53/04; F24F 7/00; F25B 13/00 (2013.01)

USPC: 96/108; 95/115, 116, 106; 454/254; 165/59; 429/410

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)

MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); ProQuest; IP.com; Google/Google Scholar; Key Words: gas*, air, scrub*4, separat*, purif*7, adsor*5, regenerat*3, recover*, heat pump, purg* gas, purg* air, refrigerant, coolant, cool*, heat*, temperature swing adsorption, thermal swing adsorption, compressor, condenser, evaporator, chiller, conduit*

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0260372 A1 (SKINNER, SG et al.) 22 October 2009; abstract; figures 1-2, 4, 8; paragraphs [0015]-[0020], [0029]-[0030], [0033], [0035], [0037]-[0038], [0040]-[0041], [0043]-[0044], [0049], [0052], [0054], [0056], [0059], [0061]-[0064], [0066]; claims 1, 19	1-3, 6, 9-10, 13, 15-19, 22-23, 26, 29-30, 33, 35-39, 42-45
Y		4-5, 7-8, 11-12, 14, 20-21, 24-25, 27-28, 31-32, 34, 40-41, 46
Y	US 5,984,198 A (BENNETT, GS et al.) 16 November 1999; column 6, lines 47-52	7-8, 27-28
Y	US 2005/0262869 A1 (TONGU, S et al.) 01 December 2005; abstract; paragraphs [0006], [0039]	8, 28
Y	US 2011/0265648 A1 (MEIRAV, U) 03 November 2011; figure 5; paragraphs [0012], [0052], [0057]; claim 1	4-5, 11-12, 24-25, 31-32, 46
Y	US 2011/0262327 A1 (DILLON, MA et al.) 27 October 2011; figure 14; paragraphs [0047], [0115], [0119], [0121]	14, 20-21, 34, 40-41
Y	US 5,584,916 A (YAMASHITA, K et al.) 17 December 1996; column 4, lines 4-9	4-5, 24-25
Y	WO 2008/155543 A2 (POWELL, R et al.) 24 December 2008; page 8, lines 24-25; examples 2-4	5, 25
A	US 5,046,319 (JONES, JA) 10 September 1991; entire document	1-46
A	US 2008/0210768 A1 (YOU, Y) 4 September 2008; entire document	1-46

☐ 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

"&" document member of the same patent family

Date of the actual completion of the international search

16 December 2013 (16.12.2013)

Date of mailing of the international search report

20 DEC 2013

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:

Shane Thomas

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774