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English

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15/896,156 14 February 2018 (14.02.2018) US(71) Applicant: **HONEYWELL INTERNATIONAL INC.**

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(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

(54) Title: DUAL STRIPPER WITH WATER SWEEP GAS

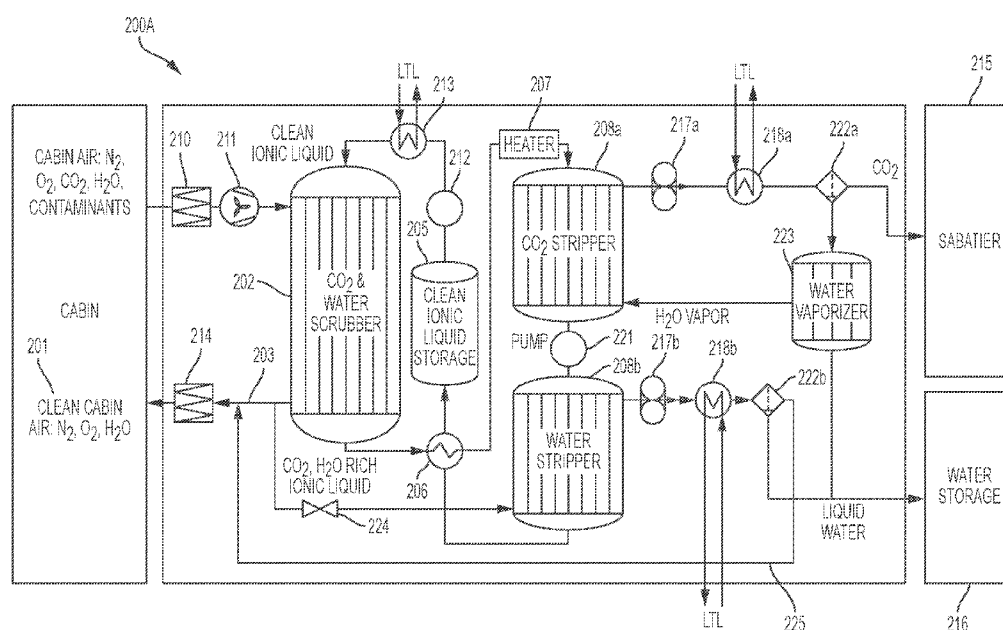


FIG. 2

(57) **Abstract:** An environmental control system includes an air conditioning subsystem and a contaminant removal subsystem downstream of the environment to be conditioned. The contaminant removal subsystem includes a first gas-liquid contactor-separator, a second gas-liquid contactor-separator, and a third gas-liquid contactor-separator. One of the first, the second, and the third gas-liquid contactor-separators is configured to receive used absorbent liquid having at least a first contaminant and discharge at least a first contaminant for recovery and reuse. Another of the first, the second and the third gas-liquid contactor-separators is configured to receive used absorbent liquid having at least a second contaminant and discharge at least the second contaminant for recovery and reuse.



AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, SA, 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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Published:

- *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))*
- *the filing date of the international application is within two months from the date of expiration of the priority period (Rule 26bis.3)*

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

04 October 2018 (04.10.2018)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/022382**A. CLASSIFICATION OF SUBJECT MATTER****B01D 53/78(2006.01)i, B01D 53/14(2006.01)i**

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 53/78; B01D 53/22; C01B 31/20; C01B 17/16; B01D 53/14

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: carbon dioxide, contaminant, gas-liquid contact, scrubber, stripper, recovery, absorbent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4997630 A (WAGNER, E. et al.) 05 March 1991 See abstract; claim 1; column 5, line 32- column 6, line 47; and figures 1, 2.	1-3
X	US 9155991 B2 (OGAWA, T. et al.) 13 October 2015 See abstract; column 2, line 67-column 6, line 57; and figure 2.	1-3
A	US 2015-0273386 A1 (THYSSENKRUPP INDUSTRIAL SOLUTIONS AG) 01 October 2015 See the entire document.	1-3
A	WO 86-02628 A1 (THE REGENTS OF THE UNIVERSITY OF CALIFORNIA) 09 May 1986 See the entire document.	1-3
A	WO 2012-123571 A1 (AKER PROCESS SYSTEMS AS) 20 September 2012 See the entire document.	1-3

☐ 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

"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

27 August 2018 (27.08.2018)

Date of mailing of the international search report

30 August 2018 (30.08.2018)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

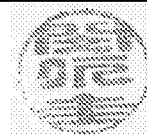


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INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2018/022382**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

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.: 4-7
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:

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 any 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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/022382

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4997630 A	05/03/1991	EP 0159495 A2 EP 0159495 B1 JP 04-21521 B2 JP 61-008112 A	30/10/1985 27/06/1990 10/04/1992 14/01/1986
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