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- (71) Applicant: ARTEMIS RUBBER TECHNOLOGY INC
[—/US]; 4175 Mulligan, Longmont, Colorado 80504 (US).
- (72) Inventor: JAGER, Claudius; 300 Evergreen, Boulder,
Colorado 80304 (US).
- (74) Agent: STACHNIAK, Jennifer; Berenbaum Weinshienk,
370 Seventeenth Street, Suite 4800, Denver, Colorado
80202 (US).
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(54) Title: AERATION ELEMENT FOR THE GASIFICATION OF LIQUIDS

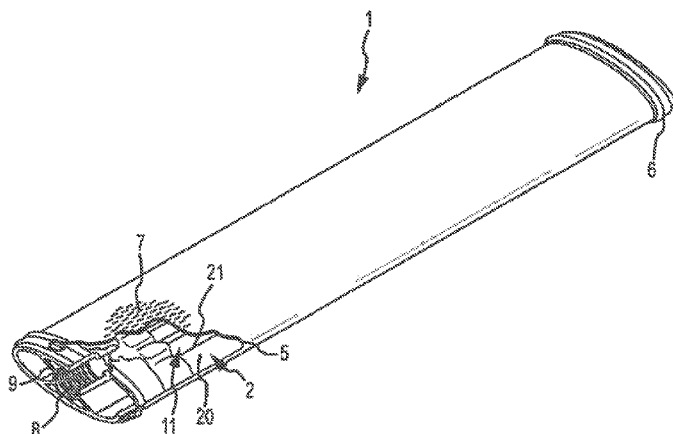


FIG.2

(57) Abstract: An aeration element for gasification or aeration of liquids includes an essentially flattened, rigid support element (2) having a substantially oval cross-section and corrugated outer surfaces (3, 4), the corrugated outer surfaces including ridges (20) defining grooves (21) therebetween; a threaded opening (8) for receiving a cooperating fitting for connection to an air supply; and a flexible membrane (5) of elastomeric material disposed around the support element (2). The membrane (5) has a plurality of slits (7), and wherein compressed gas is introduced between the support element (2) and the membrane (5), the gas can escape via these slits (7) into the surrounding liquid. A retaining clamp (6) holds the membrane around at least one end of the support element (2). A check valve assembly (15) prevents backflow of liquid, particles, sludge or debris into the interior of the support element (2).



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/29060

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B01D 47/02, C02F 3/18, F02M 7/24 (2014.01)

USPC - 210/170.06, 210/242.2, 210/350, 261/69.1, 261/74

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 47/02, C02F 3/18, F02M 7/24 (2014.01);

USPC- 210/170.06, 210/242.2, 210/350, 261/69.1, 261/74

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

CPC- B01D 47/02, C02F 3/18, F02M 7/24;

Patents and NPL (classification, keyword; search terms below)

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

Pub West (US EP JP WO), Pat Base (AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO), Google Patent, Google Scholar, Free Patents Online; search terms: aerate, diffuse, gasify, corrugate, ridge, groove, oval, ellipse, membrane, layer, film, slit, aperture, perforate, backflow, prevent, check, valve, compress, gas, vapor, vapour...

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2012/0061862 A1 (THARP et al.) 15 March 2012 (15.03.2012), Figs. 1, 2, 6; para [0016], [0017], [0024], [0043], [0044], [0045], [0058]-[0061]	1-2, 3/1, 3/2
Y	US 2007/0182036 A1 (JAGER) 09 August 2007 (09.08.2007), Figs. 7, 8; para [0002], [0015], [0020], [0023], [0029], [0038], [0039]	1-2, 3/1, 3/2
Y	US RE 33,812 A (SCHNEIDER) 04 February 1992 (04.02.1992), Fig. 1; col 1, ln 63 to col 2, ln 63; col 3, ln 8-42	2 and 3/2
Y	US 2010/0213624 A1 (MADSEN) 26 August 2010 (26.08.2010), para [0007]-[0060]	1-3
Y	US 6,406,005 B1 (LAWSON et al.) 18 June 2002 (18.06.2002), col 1, ln 62 to col 5, ln 59	1-3
Y	US 5,851,447 A (TYER) 22 December 1998 (22.12.1998), col 1, ln 40 to col 3, ln 35	1-3

 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

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"&" document member of the same patent family

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Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
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Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
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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.: 4-10
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 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.