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(54) Title: REGENERABLE DESICCANT ITEM COMPRISING BENTONITE MATERIAL AND A POLYMER

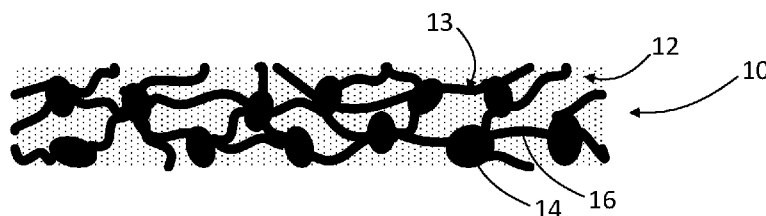


FIG. 1

(57) Abstract: A desiccant member is disclosed that comprises a polymer material and a bentonite material. The desiccant member is capable of absorbing moisture from an atmosphere containing siloxanes, organic compounds having a boiling point greater than 60°C, or mixtures thereof. The desiccant member is contamination resistant and may be regenerable. The desiccant member may have a high working moisture capacity that is suited for demanding environments.



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/041114

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01D53/02 B01D53/26
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)
B01D

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	James Dawson: "Bentonite Clay vs Silica Gel Desiccants James Dawson USA Canada", WEB, 23 February 2015 (2015-02-23), pages 1-3, XP055517962, Retrieved from the Internet: URL:https://www.jamesdawson.com/blog/index.php?mode=post&id=6 [retrieved on 2018-10-23]	1-6,8-11
Y	see the entire document ----- -/--	1-13



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

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/041114

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SÜD-CHEMIE INC.: "Desiccant Requirements Pharmaceuticals", 31 December 2004 (2004-12-31), pages 1-4, XP055518588, Retrieved from the Internet: URL: https://www.telatemp.com/images/product_images/Desiccant%20Information-Pharma.pdf [retrieved on 2018-10-24]	1-6,8-11
Y	see, page 2/4, Desi-pak(TM); page 3/4 "rigid barrier (volume)", "flexible barrier (area)" (TM); see page 4/4 Dunnage compensation	1-13
X	----- MADHUCHHANDA SARKAR ET AL: "Polypropylene-clay composite prepared from Indian bentonite", BULLETIN OF MATERIALS SCIENCE., vol. 31, no. 1, 1 February 2008 (2008-02-01), pages 23-28, XP055518585, IN ISSN: 0250-4707, DOI: 10.1007/s12034-008-0005-5	1-6,8, 11-13
Y	see in particular Abstracts "Bentonite in PP matrix."; see table 1; See entire point "3.2 Characterization of polypropylene-bentonite clay composite"	1-13
X	----- VIKAS MITTAL: "Polyurethane-Bentonite Nanocomposites: Morphology and Oxygen Permeation", ADVANCES IN POLYMER TECHNOLOGY., vol. 33, no. 3, 7 March 2014 (2014-03-07), pages 1-7, XP055518674, US ISSN: 0730-6679, DOI: 10.1002/adv.21416	1,2,4,7, 11-13
Y	see , in particular "NANOCOMPOSITE SYNTHESIS AND SUBSTRATE COATING" at page 21416 ----- -/--	1-13

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2018/041114

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Hussam-Aldeen Kalaleh ET AL: "Preparation of a clay based superabsorbent polymer composite of copolymer poly (acrylate-co-acrylamide) with bentonite via microwave radiation", RESEARCH AND REVIEWS IN POLYMER, 23 November 2013 (2013-11-23), pages 145-150, XP055518555, Retrieved from the Internet: URL:https://www.tsijournals.com/articles/preparation-of-a-clay-based-superabsorbent-polymer-composite-of-copolymer-poly-acrylate-co-acrylamide-with-bentonite-via-m.pdf [retrieved on 2018-10-24]	1,2,7, 11-13
Y	see, in particular page 146, left column, line 8 to right column, line 29; see also page 148, point "water absorptivity" to page 149, right column, line 21.; see in particular, page 146, left col., lines 38-40 = "clean discs of approximately 1mm thickness"	1-13
X	----- CAISA JOHANSSON ET AL: "Hydrophobically modified poly(vinyl alcohol) and bentonite nanocomposites thereof: Barrier, mechanical, and aesthetic properties", JOURNAL OF APPLIED POLYMER SCIENCE, vol. 132, no. 13, 13 December 2014 (2014-12-13), pages n/a-n/a, XP055518581, US	1,2,7, 11-13
Y	ISSN: 0021-8995, DOI: 10.1002/app.41737 see, in particular page 41737 paragraphs "Film Casting and Measurement of Thickness"; "Water Vapor Transmission Rate" and "Mechanical Properties" (100 micrometre thickness)	1-13
Y	----- US 5 593 482 A (DAUBER EDWIN G [US] ET AL) 14 January 1997 (1997-01-14) see, in particular claims 1,4,5,9; examples 1-2 ----- -/--	4

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2018/041114

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CSABA KENYŐ ET AL: "Functional packaging materials: factors affecting the capacity and rate of water adsorption in desiccant composites", JOURNAL OF POLYMER RESEARCH, vol. 20, no. 11, 19 October 2013 (2013-10-19), XP055518716, NL ISSN: 1022-9760, DOI: 10.1007/s10965-013-0294-2 see, in particular table 1 and figures 8,9 see also "Conclusions" -----	1-13
Y	US 6 352 578 B1 (SAKATA SOICHIRO [JP] ET AL) 5 March 2002 (2002-03-05) see in particular claims 1-5 -----	1-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/041114

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.:

1-13

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: 1-13

(First Invention) the wordings of claims 1-13 a mixed composition comprising a polymer and a bentonite material with particular technical features explicitly defined therein.

2. claims: 14-16

(Second invention) the wordings of claims 14-16 concern an enclosure assembly comprising a housing first chamber with a heater and a port therein containing inside a bentonite material and a valve assembly as explicitly cited in the wording of claim 14 as well as other elements such as a venting port and a working mode defined in the wording of claims 15 and the presence of a dessicant therein as disclosed in the wording of claim 16.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/041114

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5593482	A	14-01-1997	NONE

US 6352578	B1	05-03-2002	CN 1270539 A 18-10-2000
			JP 3977514 B2 19-09-2007
			JP H11333226 A 07-12-1999
			KR 20010021830 A 15-03-2001
			TW 422725 B 21-02-2001
			US 6352578 B1 05-03-2002
			WO 9961134 A1 02-12-1999
