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[Continued on next page]

(54) Title: METHODS OF MAKING AND USING LIQUID FILTER MEDIA

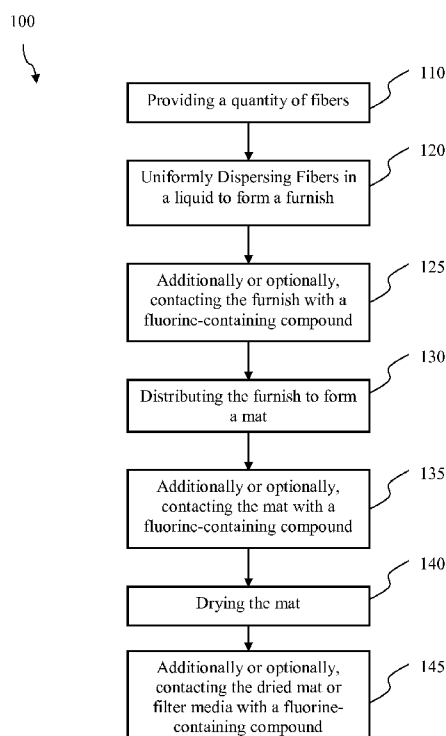


Figure 1

(57) Abstract: Filtration media for filtering a liquid includes a plurality of fibers having a coating thereon of a fluorine containing compound. Also disclosed are processes for forming fibrous non-woven liquid filtration media having the coating of the fluorine containing compound. Suitable fluorine containing compounds generally include fluoropolymers, fluorinated hydrocarbons, fluoroacrylate polymers, and the like. The liquid filtration media having the coating of the fluorine containing compound provides markedly improved dirt holding capacity and efficiency properties, among others.



GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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))*

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

22 November 2012

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/030719

A. CLASSIFICATION OF SUBJECT MATTER

INV. B01D39/20 D21H13/40 D21H17/11
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 D21H D04H

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	US 2006/096263 A1 (KAHLBAUGH BRAD E [US] ET AL) 11 May 2006 (2006-05-11) cited in the application	1-9,16
A	paragraphs [0001], [0014], [0015], [0011], [0037] - [0039]; claims 1,15 -----	10-15
X	US 2006/277877 A1 (SHIELDS CHRISTOPHER S [US]) 14 December 2006 (2006-12-14)	1-9,16
A	paragraphs [0008], [0017], [0021], [0047], [0051]; claims 1,6,14 -----	10-15



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

13 June 2012

Date of mailing of the international search report

09/10/2012

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/030719

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.:

1-17

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: 1-17

claims 1 - 17 relate to wet laid nowoven liquid filtration media and methods of forming such wet laid nowoven liquid filtration media, whereby the methods require the fluorine compound to be added to the furnish during the wet laying process.

2. claims: 18-21

claims 18-21 relate to methods of forming a fibrous liquid filtration media, which do not have to be wet laid, where a fluorine compound coated onto the fibers defining the non-woven liquid filtration media using a plasma.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/030719

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006096263	A1	11-05-2006	AU 2005304879 A1 18-05-2006 BR PI0515733 A 05-08-2008 CA 2586636 A1 18-05-2006 CN 101934172 A 05-01-2011 CN 101947400 A 19-01-2011 EP 1827649 A2 05-09-2007 EP 2308579 A1 13-04-2011 EP 2311542 A1 20-04-2011 EP 2311543 A1 20-04-2011 JP 2008518772 A 05-06-2008 JP 2012050985 A 15-03-2012 KR 20070085812 A 27-08-2007 RU 2009147316 A 27-06-2011 US 2006096263 A1 11-05-2006 US 2007039300 A1 22-02-2007 WO 2006052732 A2 18-05-2006
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