



(43) International Publication Date
13 December 2012 (13.12.2012)

- (51) International Patent Classification:
D06M 17/00 (2006.01) *B32B 7/12* (2006.01)
D06M 17/04 (2006.01)
- (21) International Application Number:
PCT/US2012/029937
- (22) International Filing Date:
21 March 2012 (21.03.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
13/072,523 25 March 2011 (25.03.2011) US
- (71) Applicant (for all designated States except US): **HONEYWELL INTERNATIONAL INC.** [US/US]; Patent Services M/S AB/2B, 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **ARDIFF, Henry Gerard** [US/US]; Honeywell International Inc., Patent Services M/S AB/2B, 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245 (US). **GRUNDEN, Bradley** [US/US]; Honeywell International Inc., Patent Services M/S AB/2B, 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245 (US). **BARTELT, Tyler** [US/US]; Honeywell International Inc., Patent Services M/S AB/2B, 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245 (US).
- (74) Agent: **BEATUS, Carrie**; Honeywell International Inc., Patent Services M/S AB/2B, 101 Columbia Road, P.O. Box 2245, Morristown, New Jersey 07962-2245 (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, 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, KM, 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, 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, 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).

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:
14 March 2013

(54) Title: METHODS TO IMPROVE THE PROCESS-ABILITY OF UNI-DIRECTIONAL COMPOSITES

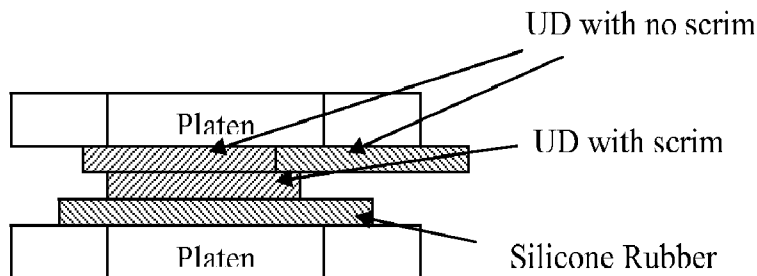


FIG. 1

(57) Abstract: A method of producing composites useful for the formation of armor and armor sub-assembly intermediates. More particularly, improved ballistic resistant composites and a method for the production of ballistic resistant composites and armor sub-assembly intermediates from composites that have resin-poor surfaces resulting from the non-uniform impregnation polymeric binder materials in fiber layers.

WO 2012/170100 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/029937

A. CLASSIFICATION OF SUBJECT MATTER

D06M 17/00(2006.01)i, D06M 17/04(2006.01)i, B32B 7/12(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)

D06M 17/00; B32B 5/26; B32B 5/22; B32B 5/12; B32B 7/00

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: fiber layer, binder, thermoplastic polymer, composite, impregnate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011-0003112 A1 (KRUEGER RONALD G. et al.) 06 January 2011 See paragraphs [0069], [0072], [0092], [0150], and [0191]; and figure 1.	1-10
A	US 05587230A A (LIN; LEROY C. et al.) 24 December 1996 See column 2, lines 35-37; column 5, lines 22-27; column 7, lines 9-21; and column 9, lines 36-37.	1-10
A	US 7288307 B2 (BHATNAGAR, A. et al.) 30 October 2007 See column 1, lines 35-47; and column 2, lines 53-59.	1-10

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 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

18 JANUARY 2013 (18.01.2013)

Date of mailing of the international search report

21 JANUARY 2013 (21.01.2013)

Name and mailing address of the ISA/KR



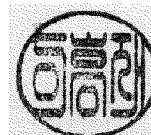
Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Lee, Heung Jae

Telephone No. 82-42-481-8305



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/029937

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011-0003112 A1	06.01.2011	US 2010-0282063 A1 US 7910503 B2 WO 2011-034609 A1	11.11.2010 22.03.2011 24.03.2011
US 05587230A A	24.12.1996	EP 0658589 A1 EP 0658589 B1 US 05552208A A	21.06.1995 27.08.2003 03.09.1996
US 7288307 B2	30.10.2007	US 2005-153098 A1	14.07.2005