



(51) International Patent Classification:

F17C 1/00 (2006.01) *F17C 1/02* (2006.01)
F17C 1/06 (2006.01) *B60K 15/073* (2006.01)
F17C 1/14 (2006.01)

(21) International Application Number:

PCT/MY2008/000194

(22) International Filing Date:

22 December 2008 (22.12.2008)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

PI 20072293 21 December 2007 (21.12.2007) MY

(71) Applicant (for all designated States except US): **UNIVERSITI PUTRA MALAYSIA** [MY/MY]; 43400 UPM Serdang, Selangor (MY).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **AHMADUN, Fakhru'l-Razi** [MY/MY]; Jabatan Kejuruteraan Kimia & Alam Sekitar, Fakulti Kejuruteraan, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor (MY). **SALLEH, Mohamad, Amran, Mohd** [MY/MY]; Jabatan Kejuruteraan Kimia & Alam Sekitar, Fakulti Kejuruteraan, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor (MY). **SAAD, Elsadiq, Mahdi, Ahmed** [SD/MY]; Mechanical Department, Faculty of Engineering, International Islamic University Malaysia, PO Box 10, 50728 Kuala Lumpur (MY).

(74) Agent: **ABDULLAH, Mohd, Bustaman**; Bustaman, Lot C9-3, Jalan Selaman 1, Dataran Palma, 68000 Ampang, Selangor (MY).

(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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, 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))
- of inventorship (Rule 4.17(iv))

Published:

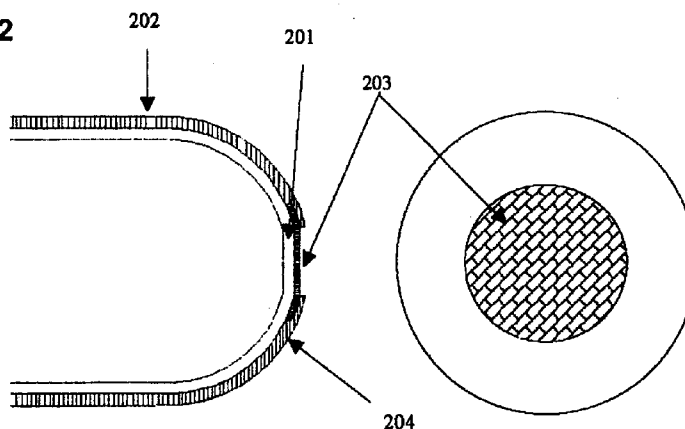
- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

29 October 2009

(54) Title: COMPRESSED NATURAL GAS COMPOSITE TANK FOR VEHICLES

Fig. 2



(57) Abstract: The present invention relates to a reinforced compressed natural gas (CNG) composite tank and a method of making the same for direct injection in vehicle systems at high pressure wherein the method of making a reinforced CNG composite tank having a desired tank configuration with a cylindrical protuberance on one end of the tank and bossless dome section on the other end, comprises: (a) layering the middle of the dome section of the back end of the liner with layers of carbon fibers; (b) overlaying the liner with a tow of carbon fibers in epoxy resin by winding process; and (c) heating the composite layer of the composite tank by curing process in a mobile oven. The composite tank provided is constructed from aluminum alloy material based liner reinforced with carbon fiber/epoxy composite.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2008/000194**A. CLASSIFICATION OF SUBJECT MATTER***F17C 1/00(2006.01)i, F17C 1/06(2006.01)i, F17C 1/14(2006.01)i, F17C 1/02(2006.01)i, B60K 15/073(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)

IPC F17C1/00

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 since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006-0163261 A1 (Naoki Sugiura, et al) 27.07.2006 see whole document	1-6
A	JP 17-291415 A (Honda motor co ltd, et al) 20.10.2005 see paragraph <16>	1,4

☐ 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

31 AUGUST 2009 (31.08.2009)

Date of mailing of the international search report

31 AUGUST 2009 (31.08.2009)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YOO, Hyun Duk

Telephone No. 82-42-481-5410



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/MY2008/000194

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0163261 A1	27.07.2006	CN 1839278 A	27.09.2006
		CN 100434788 C	19.11.2008
		CN 1839278 A0	27.09.2006
		EP 1659331 A1	24.05.2006
		WO 2005-022026 A1	10.03.2005
		WO 2005-022026 A1	10.03.2005
JP 17-291415 A	20.10.2005	NONE	