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(54) **Title:** HELMETS FOR PROTECTION AGAINST RIFLE BULLETS

(57) **Abstract:** A helmet shell is formed having an outer section of fibrous layers, a middle section of fibrous layers and an inner section of fibrous layers. The outer section layers contain high tenacity abrasive fibers in a resin matrix. The middle section layers contain high strength polyolefin fibers and are in the form of woven or knitted fabrics with a resin matrix. The inner section layers contain high strength polyolefin fibers and are in the form of non-woven fabrics with a resin matrix. The helmet is lightweight and resists penetration of rifle bullets.

**A. CLASSIFICATION OF SUBJECT MATTER***F41H 1/04(2006.01)i, F41H 1/08(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 F41H

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)

eKIPASS(KIPO internal)

Keywords: helmet, fibrous, layer, resin, polyolefin, fiber, bullet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	KR 20-0392560 Y1 (AGENCY FOR DEFENSE DEVELOPMENT) 19 August 2005 See abstract, all figs, and all claims	1-6, 8-10 7
Y A	US 05075904 A (YOSHIKAZU SHIRASAKI et al.) 31 December 1991 See abstract, all figs, and all claims	7 1-6, 8-10
A	KR 10-2003-0013888 A (LEE, KANG SOO) 15 February 2003 See abstract, fig1, and claim 1	1-10
A	KR 10-0436948 B1 (AKZO NOBEL NV) 16 September 2004 See abstract and all claims	1-10

 Further documents are listed in the continuation of Box C. See patent family annex.

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2008/086021**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20-0392560 Y1	19.08.2005	NONE	
US 05075904 A	31.12.1991	EP 0412452 A2 EP 0412452 A3 JP 3069603 A JP 3069604 A JP 3069605 A KR 10-1991-0004131 A	13.02.1991 19.11.1992 26.03.1991 26.03.1991 26.03.1991 28.03.1991
KR 10-2003-0013888 A	15.02.2003	NONE	
KR 10-0436948 B1	16.09.2004	KR 10-1998-0703662 A AT 198794 T AU 5686096 A CA 2217445 A1 CA 2217445 C CN 1072795 C CN 1181132 A DE 19613583 A1 DE 19613583 C2 DE 59606345 D1 DK 820576 T3 EP 0820576 B1 EP 0820576 A1 ES 2153575 T3 IL 117791 D0 IL 117791 A JP 11-503512 A JP 3771938 B2 NO 308970 B1 NO 974523 A NO 974523 D0 US 6012178 A WO 96-32620 A1	05.12.1998 15.02.2001 30.10.1996 17.10.1996 14.06.2005 10.10.2001 06.05.1998 31.10.1996 09.07.1998 22.02.2001 29.01.2001 17.01.2001 28.01.1998 01.03.2001 04.08.1996 05.04.1998 26.03.1999 10.05.2006 20.11.2000 30.09.1997 30.09.1997 11.01.2000 17.10.1996