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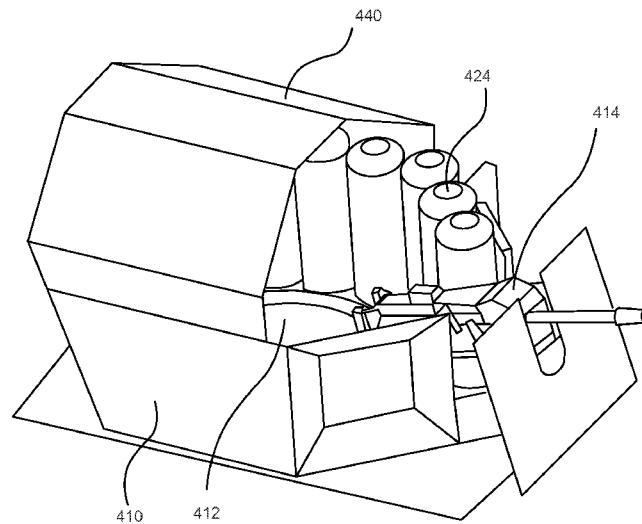


FIG. 4

(57) Abstract: A turret airbag system is provided including a plurality of airbags disposed within the turret to protect an occupant of the turret from injury and/or ejection from the turret. Turret airbags may be configured in padding around a turret access opening, and/or as substantially cylindrical airbags that deploy between the occupant of the turret and a wall or exterior opening of the turret. In some examples, the turret airbag(s) may be integrated with a countermeasure system that deploys explosion countermeasures and activates the turret airbags based on sensor data and multiple thresholds that indicate a collision event, a rollover event and/or an explosion event.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/16446

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - F41H 7/02 (2014.01) CPC - F41H 5/20 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 (8): F41H 7/02 (2014.01) CPC: F41H 5/20 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched IPC(8): F41H 7/02 (2014.01) CPC: B60R 21/16; F41H 5/20,7/02 USPC: 89/36.08,36.13,918,935; 180/271,274,282; 280/728.1,734,735; 340/436; 701/36,38 (keyword limited; terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatBase; PubWEST (PGPB,USPT,USOC,EPAB,JPAB); Google (Patents,Scholar,Web) Search terms used: air bag armor vehicle rollover countermeasure sensor turret military impact explosion tank car weapon eject overturn prevent counter wall open thrust anti roll threshold processor		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 19932277 A1 (GRUNEWALD) 11 January 2001 (11.01.2001), entire document, especially Fig 1-2; col 1, ln 43-54; col 2, ln 7-11, ln 16-20, ln 28-42, ln 46-53	1-9
Y		10-20
Y	US 2011/0245994 A1 (SLOMAN) 06 October 2011 (06.10.2011), para [0030], [0032]-[0033], [0037]	10-14
Y	WO 2012/085138 A1 (SVANE et al.) 28 June 2012 (28.06.2012), Fig 2-3; pg 1, ln 8-18; pg 6, ln 21-32; pg 11, ln 9-11, ln 15-30; pg 13, ln 35 to pg 14, ln 2; pg 14, ln 4-5; pg 14, ln 29 to pg 15, ln 7; pg 15, ln 23-24; pg 16, ln 1-9, ln 32-35	15-20
Y	US 8,146,993 B2 (SCHNEIDER et al.) 03 April 2012 (03.04.2012), col 8, ln 39-42	17
A	GB 1278829 A (HEWITT) 21 June 1971 (21.06.1971), entire document, especially pg 1, ln 19-25, ln 60-79	15-20
A	US 7,494,153 B2 (WANG) 24 February 2009 (24.02.2009), entire document	15-20
A	US 8,095,269 B2 (PRUETT et al.) 10 January 2012 (10.01.2012), entire document	15-20
A	US 2012/0239247 A1 (ERIDON) 20 September 2012 (20.09.2012), entire document	15-20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 19 October 2014 (19.10.2014)		Date of mailing of the international search report 28 NOV 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/16446

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: This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-14 directed to a turret for a vehicle, comprising: a first opening configured to allow access to the turret from an interior of the vehicle, and to at least partially accommodate a human torso; a wall at least partially surrounding said first opening; a plurality of airbags arranged at least partially around said first opening, and configured to deploy between said first opening and said wall of claim 1 or a method of protecting an occupant in a vehicle turret, comprising: detecting, by one or more computer processors, at least one of a rollover event or a collision event in the vehicle; deploying a plurality of airbags at least partially in the vehicle turret, wherein, the turret includes a first opening configured to allow access to the turret from an interior of the vehicle, and to at least partially accommodate a human torso, and a wall at least partially surrounding said first opening, and the plurality of airbags are arranged at least partially around the first opening, and deploy between the first opening and the wall of claim 10.

- Please see extra sheet -

- 1. [X] 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 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.:

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.
[X] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

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Continuation of Box No. III Observations where unity of invention is lacking

Group II: claims 15-20 directed to a vehicle safety system, comprising: a first sensor device including a plurality of sensors configured to detect a rollover event, an impact event, and an explosive event; a countermeasure; a turret airbag; a processor in communication with said first sensor device, said processor configured to process signals received from said first sensor device and to selectively initiate at least one of said countermeasure or said turret airbag based on results of processing the signals; wherein, initiating the turret airbag is based at least in part on the signals exceeding a first threshold, and wherein, initiating the countermeasure is based at least in part on the signals exceeding a second threshold, the second threshold being greater than the first threshold.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons:

Group I does not include the special technical feature of Group II which is a vehicle safety system, comprising: a first sensor device including a plurality of sensors configured to detect a rollover event, an impact event, and an explosive event; a countermeasure; a turret airbag; a processor in communication with said first sensor device, said processor configured to process signals received from said first sensor device and to selectively initiate at least one of said countermeasure or said turret airbag based on results of processing the signals; wherein, initiating the turret airbag is based at least in part on the signals exceeding a first threshold, and wherein, initiating the countermeasure is based at least in part on the signals exceeding a second threshold, the second threshold being greater than the first threshold.

Group II does not include the special technical feature of Group I which is a turret for a vehicle, comprising: a first opening configured to allow access to the turret from an interior of the vehicle, and to at least partially accommodate a human torso; a wall at least partially surrounding said first opening; a plurality of airbags arranged at least partially around said first opening, and configured to deploy between said first opening and said wall or a method of protecting an occupant in a vehicle turret, comprising: detecting, by one or more computer processors, at least one of a rollover event or a collision event in the vehicle; deploying a plurality of airbags at least partially in the vehicle turret, wherein, the turret includes a first opening configured to allow access to the turret from an interior of the vehicle, and to at least partially accommodate a human torso, and a wall at least partially surrounding said first opening, and the plurality of airbags are arranged at least partially around the first opening, and deploy between the first opening and the wall.

Common Technical Features

The only features shared by Groups I and II that would otherwise unify those groups are a vehicle with a turret airbag and a processor to detect one of a rollover event or a collision event. However, these shared technical features do not represent a contribution over the prior art, because the shared technical features are anticipated by reference DE 19932277 A1 (Grunewald).

Grunewald teaches the common features of a tank (which is a vehicle) with a turret airbag (to protect these crew members 3 and 4 an airbag system in the interior of the battle tank turret 1 is installed, Fig 1, 2; col 2, ln 21-23) and a processor to detect one of a rollover event or a collision event (control systems of the sensor-controlled gas source to inflate the airbags are not shown separately and are formed in the usual way for these facilities. It is possible to recognize that for a occurring with high acceleration skidding or rolling of the battle tank, including battle tanks tower 1, which leads to a triggering of the airbag system, the crew members 3 and 4 in their seats 3.1 or 4.1 are especially in the shoulder/head area are fixed for a short time so that contact with the environment to eliminate or greatly dampened, col 2, ln 43-53).

Therefore, Groups I and II lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.