

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
26 June 2003 (26.06.2003)

PCT

(10) International Publication Number  
**WO 03/051681 A1**

(51) International Patent Classification<sup>7</sup>: **B60R 21/16**

(21) International Application Number: PCT/SE02/02255

(22) International Filing Date: 6 December 2002 (06.12.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0130357.7 19 December 2001 (19.12.2001) GB

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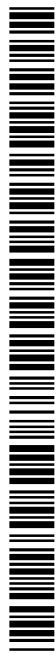
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

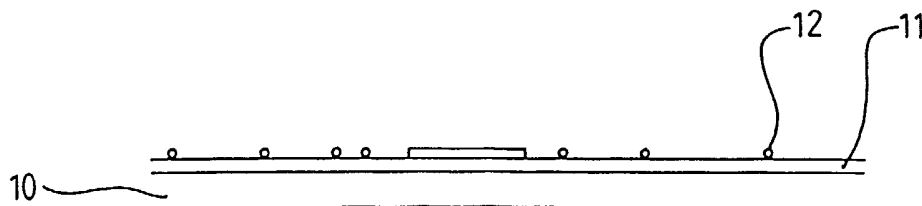
Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



(54) Title: "AN AIR-BAG"



(57) Abstract: An air-bag is formed from a reinforced material. The material is formed from a thin layer, such as a layer (10) of plastics material which is reinforced by randomly oriented fibres (12) which are adhered to the layer (10) by adhesive (11). The reinforced fabric is tear-resistant.

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**“AN AIR-BAG”**

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**THE PRESENT INVENTION** relates to an air-bag and more particularly relates to an air-bag for use in a motor vehicle. The invention also relates to a material for use in making an air-bag and to a method of making such a material.

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It has been proposed to provide air-bags located at many positions within motor vehicles, with the air-bags being adapted to be inflated in the event that an accident should occur to provide protection for an occupant of the vehicle. It has been proposed to make air-bags from various fabrics and materials. A woven fabric has been widely used, but it has been found that when a tear appears in the fabric, it is commonplace for the tear to increase in size rapidly due to the fact that the fabric is woven, and, at any one instant, the load appearing between the two opposed edges of the tear is applied to only one or two fibres. Thus the fibres break sequentially enabling the tear to grow rapidly.

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It has been proposed to provide an air-bag formed from a plastics material film and a reinforcing member arranged in connection with the film for arresting the propagation of a tear in the film. US-A-5746446 shows an arrangement of this type, but the member associated with the plastics material film is a net. Thus this arrangement also suffers from the problem of a tear

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being prone to extend in length due to the sequential breaking of parts of the net.

According to one aspect of this invention, there is provided an air-bag,  
5 the air-bag being formed from a layer of material, the layer being reinforced by randomly orientated fibres.

Preferably, the fibres are extruded.

10 Conveniently, the fibres are relatively long having average length in excess of 25mm.

Preferably, the fibres are adhered to the plastics film.

15 Alternatively, the fibres are embedded in the plastics film.

Conveniently, at least one area of the material forming the air-bag has a larger proportion of fibres than another area of the material forming the air-bag.

20 Preferably, at least one area of the material forming the air-bag have different properties to the properties of the fibres in the rest of the material.

Conveniently, said layer is a plastics material film.

25 According to another aspect of this invention there is provided a material for use in forming an air-bag the material comprising a plastics film to which is adhered a plurality of fibres in a random orientation.

Preferably the fibres are extruded fibres.

Conveniently the fibres have a average length in excess of 25mm.

5           According to the further aspect of this invention there is provided a method of manufacturing a material for use in making an air-bag, the method comprising the steps of taking a layer of material, applying adhesive to one side of the layer, and bonding a plurality of fibres in a random orientation to the adhesive.

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In one embodiment of the invention the fibres are applied to the adhesive by a spreading machine which spreads the fibres across an adhesive coated side of the plastics material.

15           In an alternative embodiment of the invention the fibres are air-blown on to the adhesive.

In a further embodiment of the invention the fibres are initially located on a first surface and the adhesive coated film is lowered on to the fibres, with  
20 the adhesive coating coming into contact with the fibres.

Preferably, the layer of material is a film of plastics

In order that the invention may be more readily understood, and so that  
25 further features thereof may be appreciated, the invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a view illustrating the tearing of a fabric or net,

FIGURE 2 is a plan view of part of a material in accordance with the invention,

5           FIGURE 3 is a cross-sectional view of part of the material of Figure 2 and

FIGURE 4 is a view of an air-bag made from the material of Figures 2 and 3.

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Referring initially to Figure 1 of the accompanying drawings a woven or net-like material 1 is shown consisting of generally parallel yarns or fibres 2 constituting a "weft" and also generally parallel yarns or fibres 3 constituting a "warp". A "tear" has commenced as shown as the tear 4. It can be seen that the tear separates two distinct areas 5, 6 of the woven material, and if these areas tend to move further apart a substantial force is applied to the particular yarn or fibre 7 appearing at the base or apex of the tear. That particular yarn or fibre 7 may thus readily break, increasing the size of the tear 4 and then applying a similar pressure or force to the next adjacent weft yarn or fibre 8.

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20   Thus the tear can rapidly grow in size.

Figures 2 and 3 illustrate a material in accordance with the invention. The material of Figures 2 and 3 comprises a thin layer of material which in this embodiment is a plastics film 10. One surface of the film 10 is provided with an adhesive layer 11 which adheres randomly orientated fibres to the film 10.

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The plastics material film may initially be spread out flat on a bed or table. A layer of adhesive 11 may be applied to the top of the film and long fibres, such as extruded fibres 12, may be randomly spread out on the adhesive

layer 11. The fibres may be spread using a fibre spreading machine which may deposit fibres on the adhesive film 11 and, by means of a knife or blade having its lower edge spaced immediately above the adhesive film 11, may move the fibres across the top of the adhesive film until the fibres are spread evenly across and adhered to the adhesive film. Finally, the plastics film 10, the adhesive 11 and fibres 12 on top of the adhesive may be passed through an appropriate roller unit to ensure that the fibres 12 are firmly bonded, by the adhesive layer 11, to the film 10. As can be seen in Figure 2 the fibres adopt a random orientation or pattern. Figure 2 shows part of the film surrounding a hole or aperture 13.

The fibres used in performing the invention are preferably extruded fibres and may thus be fibres of a polyamide material or some other polymer material. However, other fibres may be utilised. Fibres may be long or short but it is preferred to use long fibres, as long fibres provide enhanced strength. It is preferred for the average length of the fibres to exceed 25mm.

While one method of applying the fibres to the adhesive coated layer or film has been described, the fibres may be applied to the adhesive using many alternative techniques. For example, fibres may be air-blown on to the adhesive layer. Alternatively the fibres may be spread out upon a table or other surface, and then the plastics material film, with one side thereof coated with adhesive, may be lowered on to the table, with the adhesive coating coming into contact with the fibres. A roller or other mechanism may be used to press the plastics film 10 downwardly so that the adhesive 11 becomes firmly bonded to the fibres 12.

Figure 3 illustrates an air-bag 20 made from a material as described above. The air-bag 20 is mounted in a steering wheel 21 of a motor vehicle to

provide protection for an occupant 22 of the vehicle. The air-bag is shown as it inflates. It may be desirable for a specific area of the material forming the air-bag, such as the area 23 which is the area of the air-bag which, when fully inflated, will be impacted by the occupant of the vehicle 22, to be somewhat stiffer than other areas of the air-bag. Thus the material used in the manufacture of the air-bag 20 may be such that the number of fibres present in the material will be increased or enhanced in the area 23 as opposed to the remaining areas of the material, thus enhancing the stiffness of this area. The air-bag has a vent hole 24. The area 25 of the material around the vent hole may have fibres with different properties as compared with the fibres in other parts of the material forming the air-bag. The fibres may be stronger, for example by being of greater diameter, to withstand the high load generated adjacent the vent hole.

Whilst the invention has been described with reference to embodiments in which fibres are adhered to a plastics film, it is to be appreciated that a material in accordance with the invention may be fabricated using other techniques. For example, fibres may be incorporated into a hot-melt of polymer, with that hot-melt of polymer subsequently being processed to produce a film of plastics, that film of plastics having the elongate fibres incorporated therein.

In the present Specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

## CLAIMS:

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1. An air-bag, the air-bag being formed from a layer of material, the layer being reinforced by randomly orientated fibres.
- 10 2. An air-bag according to Claim 1 wherein the fibres are extruded.
3. An air-bag according to Claim 1 or 2 wherein the fibres are relatively long, having an average length in excess of 25mm.
- 15 4. An air-bag according to any one of the preceding claims wherein the fibres are adhered to the plastics film.
5. An air-bag according to any one of the preceding claims wherein the fibres are embedded in the plastics film.
- 20 6. An air-bag according to any one of the preceding claims wherein at least one area of the material forming the air-bag has a larger proportion of fibres than another area of the material forming the air-bag.
- 25 7. An air-bag according to any one of the preceding claims wherein at least one area of the material forming the air-bag has different properties to the properties of the fibres in the rest of the material.
8. An air-bag according to any one of the preceding claims wherein said  
30 layer is a plastics material film.



9. A material for use in forming an air-bag the material comprising a plastics material film to which is adhered a plurality of fibres in a random orientation.

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10. A material according to Claim 9 when the fibres are extruded fibres.

11. A material according to Claims 9 and 10 wherein the fibres have an average length in excess of 25mm.

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12. A method of manufacturing a material for use in making an air-bag, the method comprising the steps of taking a layer of material, applying adhesive to one side of the layer, and bonding a plurality of fibres in a random orientation to the adhesive.

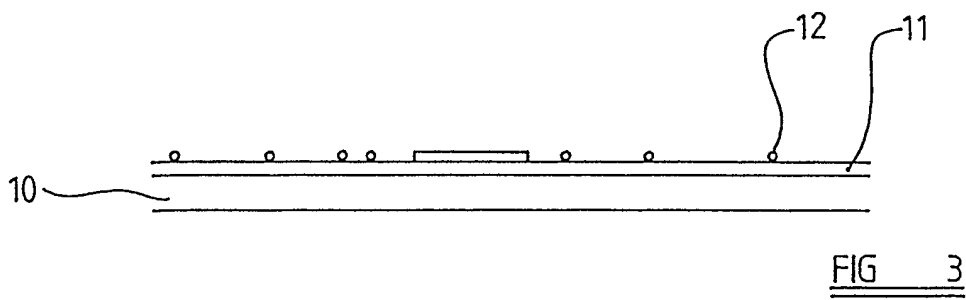
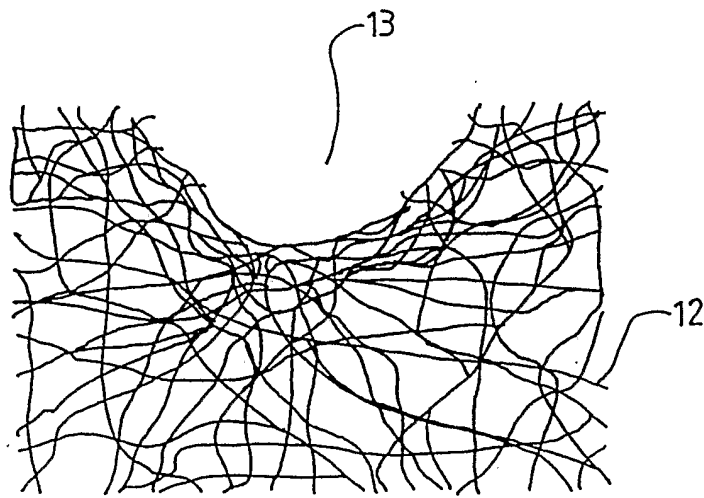
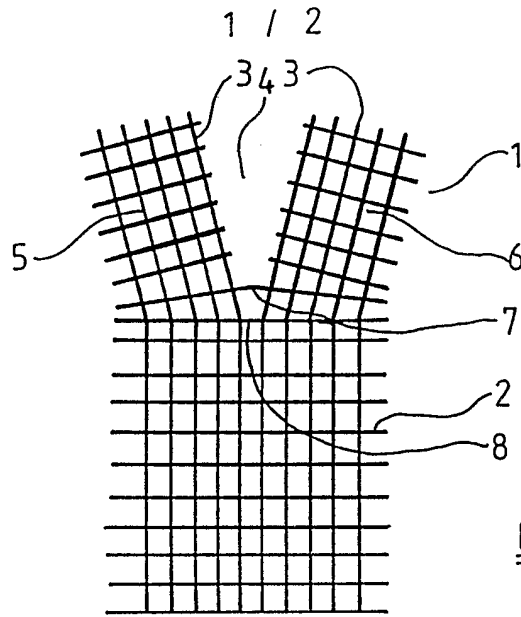
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13. A method according to Claim 12 wherein the fibres are applied to the adhesive by a spreading machine which spreads the fibres across an adhesive coated side of the plastics material.

20 14. A method according to Claim 12 wherein the fibres are air-blown on to the adhesive.

25 15. A method according to Claim 12 wherein the fibres are initially located on a first surface and the adhesive coated film is lowered on to the fibres, with the adhesive coating coming into contact with the fibres.

16. A method according to any one of the Claims 12 to 15 wherein the layer of material is a film of plastics.



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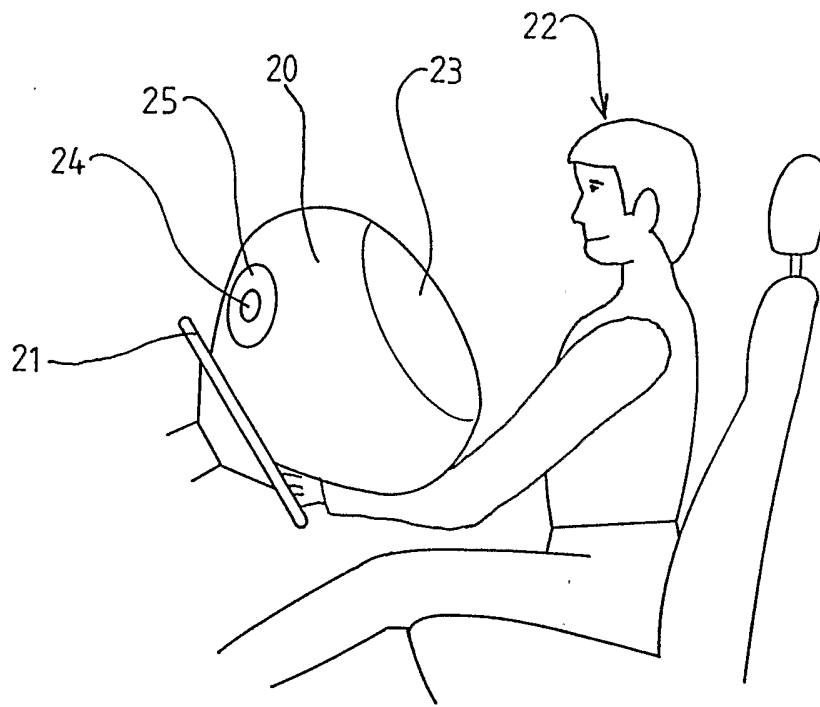


FIG 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/02255

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60R 21/16

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)

IPC7: B60R, B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 5836611 A (PALM), 17 November 1998 (17.11.98) --	1-16
A	US 5046759 A (ENNISS ET AL), 10 Sept 1991 (10.09.91) --	1-16

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

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"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

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

12 March 2003

Date of mailing of the international search report

25 -03- 2003

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## INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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