(12) UK Patent Application (19) GB (11) 2 397 047 (13) A

(43) Date of A Publication 14.07.2004

(21) Application No: 0300608.7

(22) Date of Filing: 10.01.2003

(51) INT CL[7]: B60R 21/20

(52) UK CL (Edition W): B7B BSBCR B601

(56) Documents Cited:
EP 0965494 A2 EP 0940299 A1
US 5893579 A US 5749597 A

(58) Field of Search:
UK CL (Edition V) B7B
INT CL[7] B60R
Other: Online: EPODOC, WPI, JAPIO

(71) Applicant(s):
Autoliv Development AB
(Incorporated in Sweden)
Patents Department, S-447 83 Vargarda, Sweden

(72) Inventor(s):
Gilles Garret

(74) Agent and/or Address for Service:
Forrester Ketley & Co
Forrester House, 52 Bounds Green Road, LONDON, N11 2EY, United Kingdom

(54) Abstract Title: **Vehicle seat and airbag unit**

(57) A vehicle seat 1 comprises an airbag unit 23 mounted to an internal frame 10,(6 see fig 1) of an upholstered back-rest 5, wherein airbag inflation is capable of deflecting part of the upholstery 7 causing it to lie between the airbag 27 and a seat occupant 16. The seat 1 comprises a squab (2 see fig 1) and preferably includes foam material and a rigid rear panel. During a side impact, the airbag 27 causes part of the upholstery 7 to separate along a break line 20 and pivot about a notch 19 in the foam. The break line 20 may be near to the rear of a side wall of the back-rest 5 and secured by a fabric hook and loop fastener. The airbag unit 23 may comprise an inflator 24 mounted inboard of part of the frame 10 and an elongate plastic U-shaped housing (41, see fig 5) extending around the frame part 10. The airbag 27 may be folded in a zigzag manner or spirally coiled.

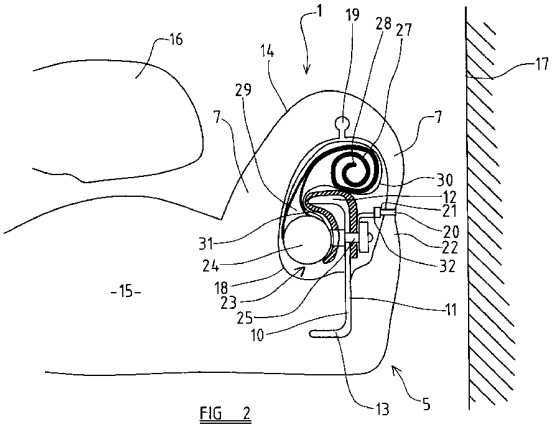


FIG 2

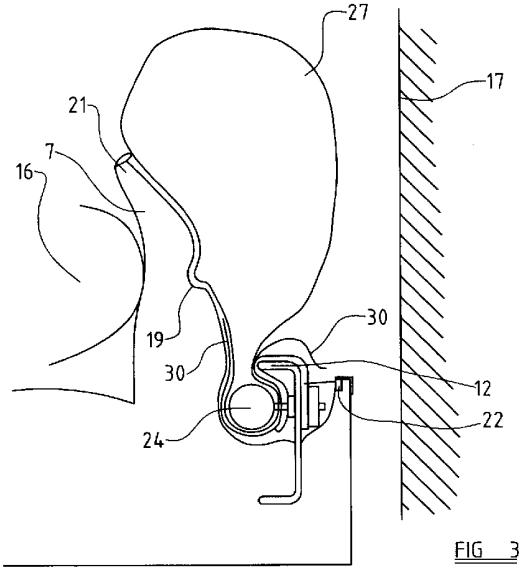


FIG 3

GB 2 397 047 A

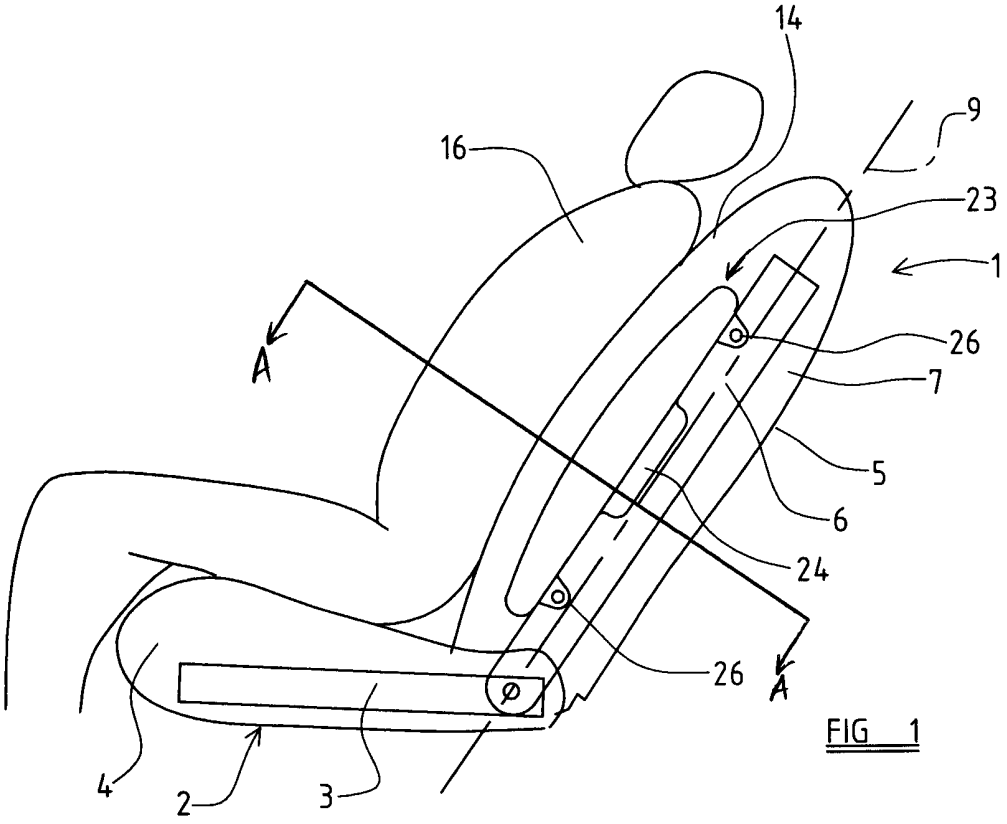

14
16
9
23
1
A
26
7
5
6
24
26
A
4
2
3

FIG 1

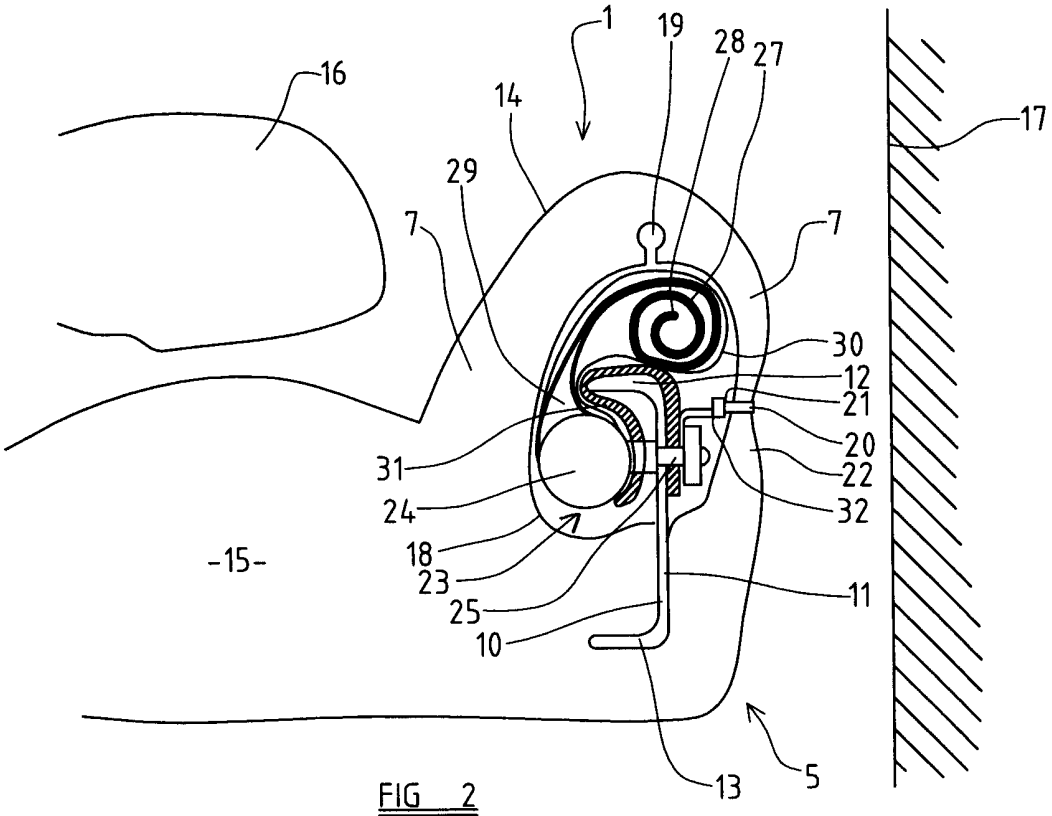

1
19
28
27
16
14
17
29
7
7
30
12
21
20
31
22
24
32
18
23
11
25
10
13
5

FIG 2

-15-

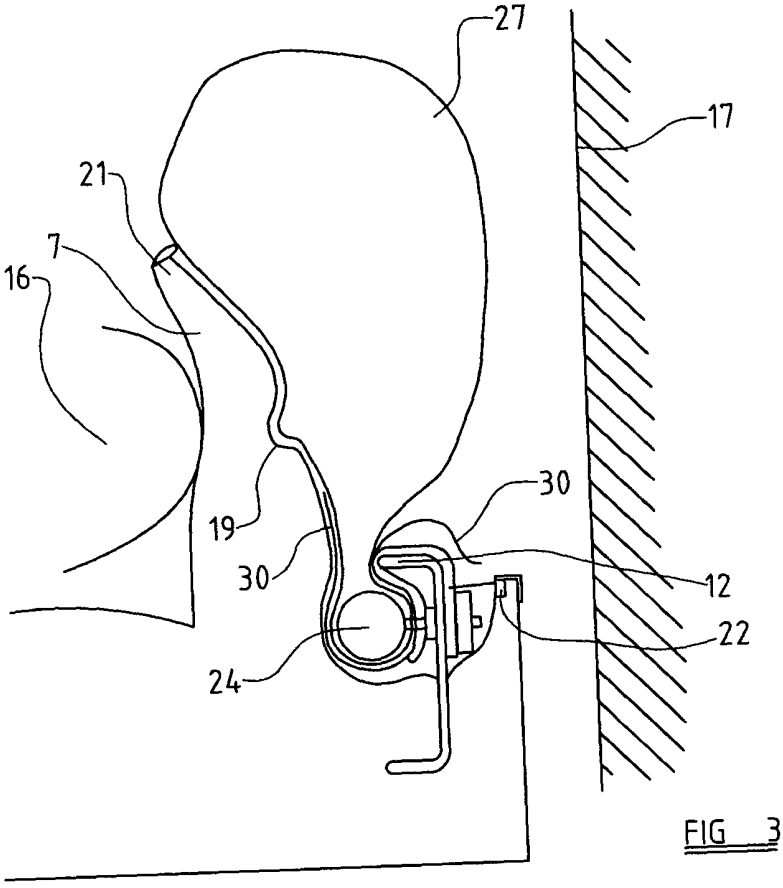


FIG 3

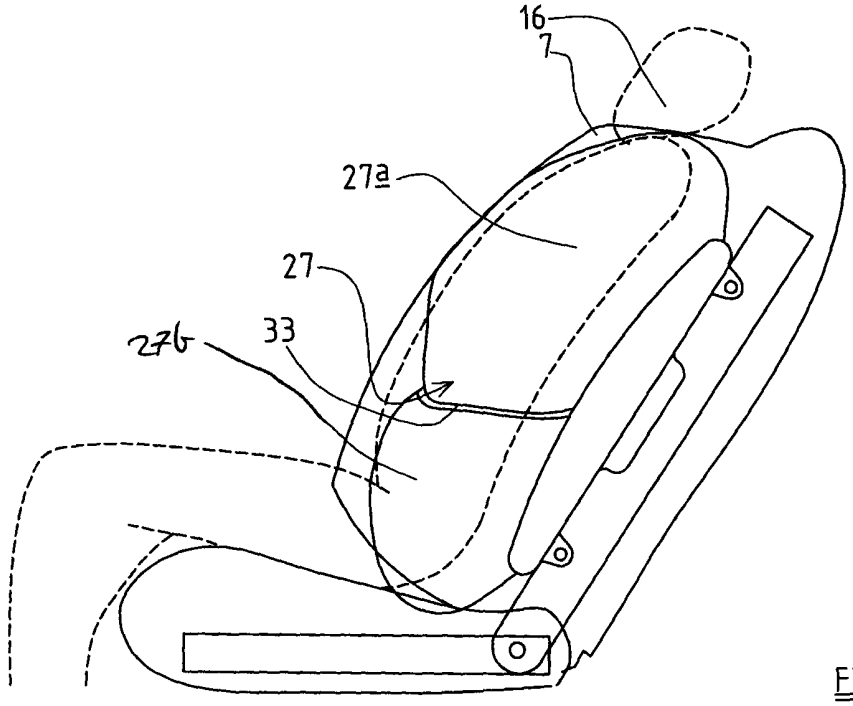


FIG 4

FIG 5

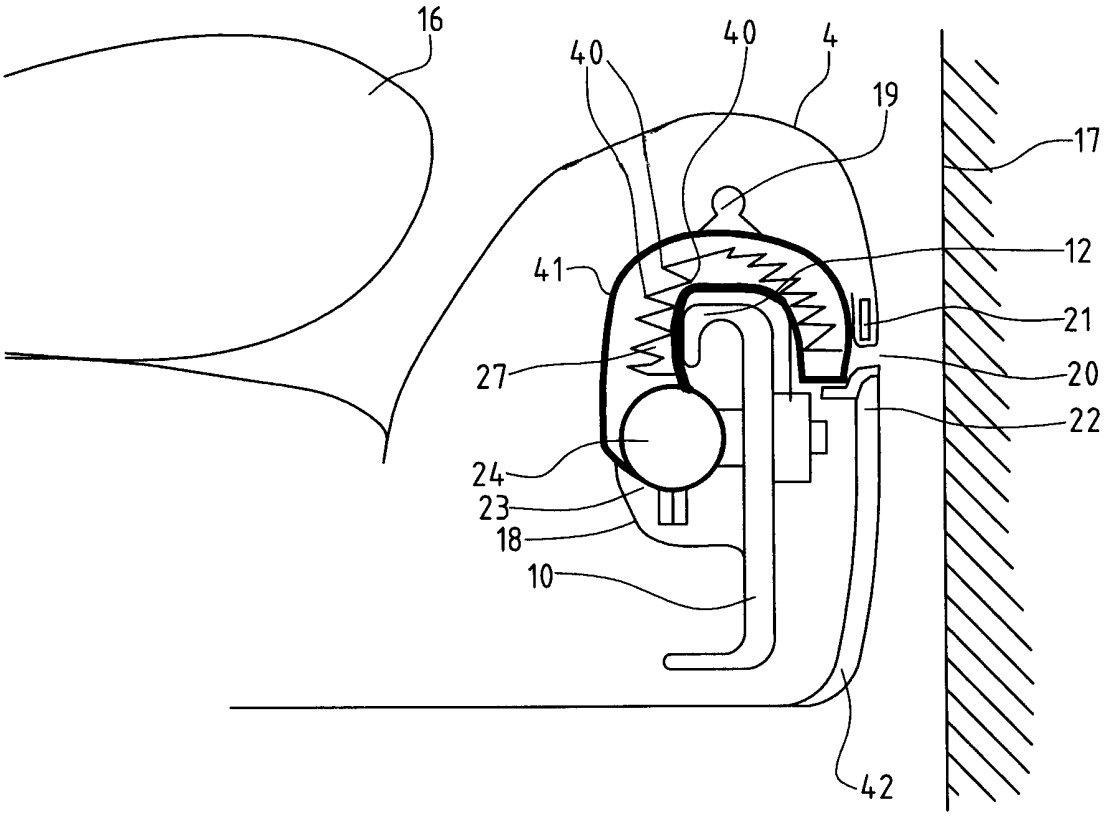
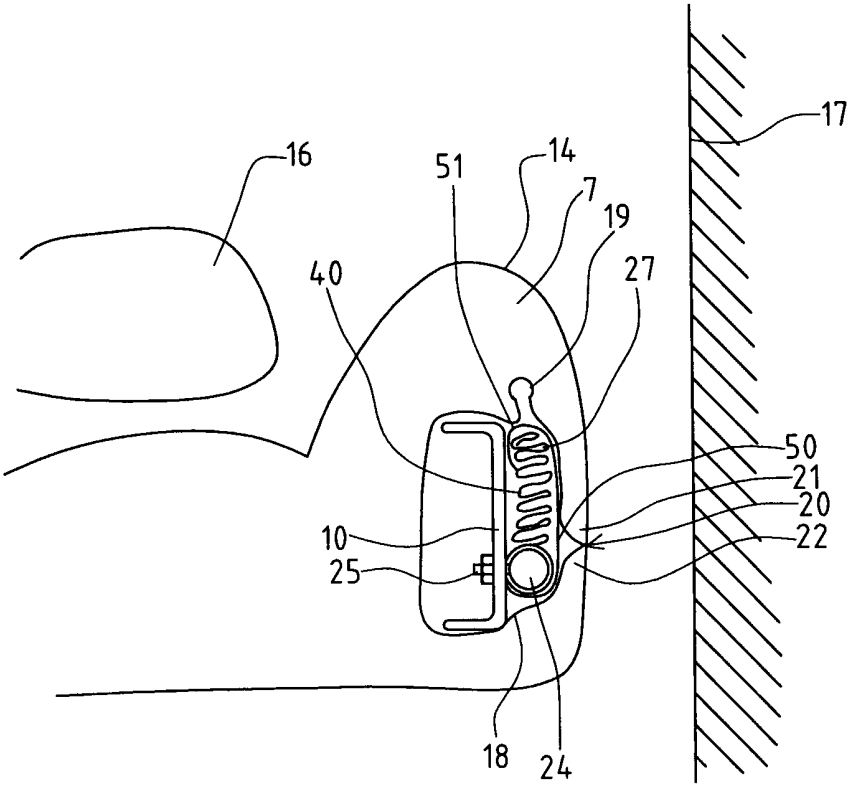

16
40
40
4
19
17
41
12
21
27
20
22
24
23
18
10
42

FIG 6


17
16
51
14
7
19
40
27
50
21
20
10
22
25
18
24

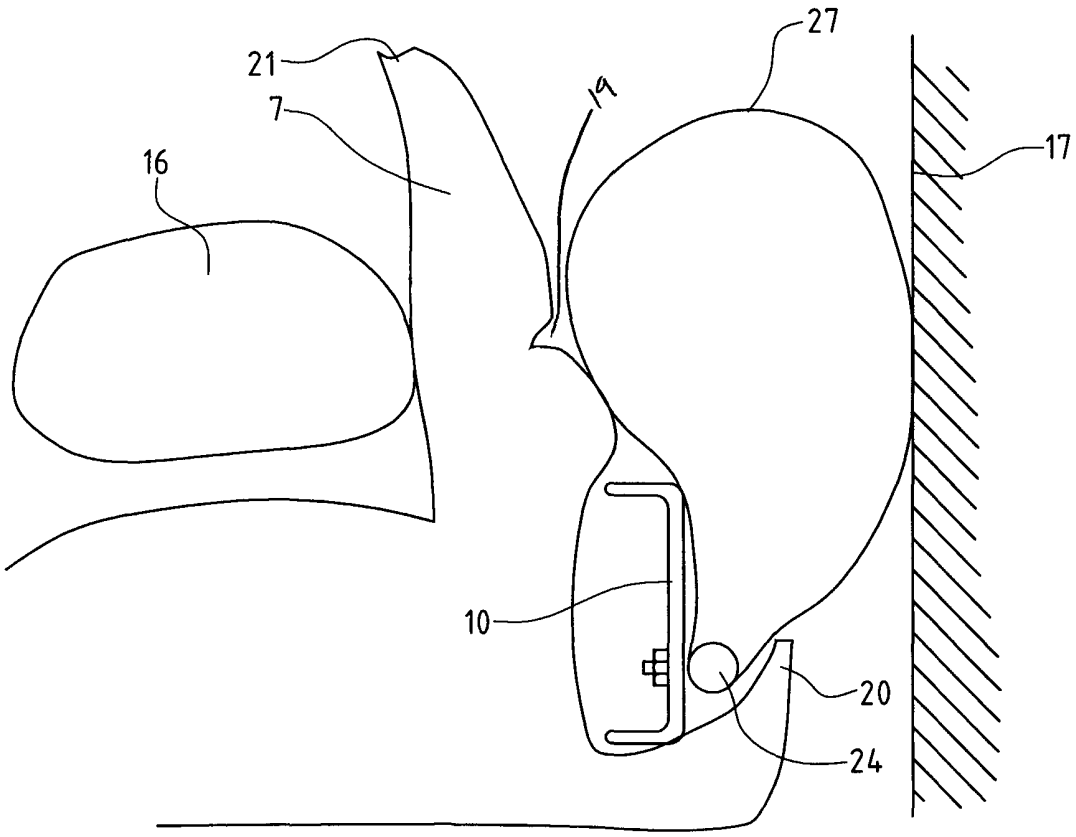


FIG 7

2397047

PATENTS ACT 1977

P17151GB-NHF/SJP/mm

DESCRIPTION OF INVENTION

IMPROVEMENTS IN OR RELATING TO VEHICLE SEATS AND AIR-BAG UNITS

THE PRESENT INVENTION relates to a vehicle seat, and also to an air-bag unit suitable for mounting on a vehicle seat.

It is known to provide motor vehicle seats with one or more air-bags configured so that the air-bag may be inflated in a side impact crash situation, in order to provide lateral protection to an occupant of the seat. One such known type of arrangement comprises an air-bag module mounted to the back-rest of a vehicle seat, the air-bag module being arranged so that the air-bag is inflated in a forwards direction relative to the back-rest such that the air-bag is deployed to the side of an occupant of the seat, so that the inflated air-bag extends between the occupant and the side-panel, door or window of the motor vehicle.

The above-mentioned type of vehicle seat and "side air-bag" arrangement can suffer from disadvantages. For example, in current side air-bag systems of the general type described above, there can be a distance separating an occupant of the seat and the air-bag during the early stages of deployment of the air-bag. If this is the case, then it is possible for the occupant

of the seat, whose body moves relative to the seat in the event of a side impact crash situation by virtue of its inertia, not to bear against the inflating air-bag soon enough to prevent injury to the occupant.

Also, it is important for a side air-bag mounted to the back-rest of a vehicle seat to deploy in a manner which does not injure a person occupying the seat in an abnormal position such as, for example, where the occupant may be leaning to one side so that part of the occupant's body lies in front of the air-bag rather than to the side of the air-bag. A conventional side air-bag inflating in a forwards direction could injure a seat occupant sitting in such a position.

It has also been found that some side air-bag arrangements of the general type described above, do not absorb sufficient energy from an occupant's body moving in under its inertia, particularly in very severe crash situations.

The present invention therefore seeks to provide an improved vehicle seat and air-bag unit.

Accordingly, a first aspect of the present invention provides a vehicle seat comprising: a squab and a back-rest, the back-rest comprising a frame covered with upholstery; and an air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit; the air-bag unit being mounted to the back-rest frame so as to be substantially covered by the upholstery; wherein the upholstery of the back-rest has a break line positioned relative to the air-bag unit such that actuation of the air-bag unit will cause the upholstery to separate along the break line such that part of the upholstery will be deflected by the inflating air-bag so as to lie substantially between the air-bag and an occupant of the seat when the air-bag is substantially fully inflated.

Preferably, said break line is formed substantially longitudinally in a side wall of said back-rest, the break line being spaced substantially from the front edge of the side wall so as to be located substantially centrally between the front edge and rear edge of the side wall, or located closer to the rear edge than to the front edge.

According to another aspect of the present invention, there is provided a vehicle seat comprising: a squab and a back-rest, the back-rest comprising a frame covered with upholstery; and an air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit; the air-bag unit being mounted to the back-rest frame so as to be substantially covered by the upholstery; wherein the upholstery of the back-rest has a break line formed substantially longitudinally in one of said side walls; the break line being spaced substantially from the front edge of the side wall so as to be located substantially centrally between the front edge and rear edge, or located closer to the rear edge than to the front edge.

Preferably, said break line is positioned relative to the air-bag unit such that actuation of the air-bag unit will cause the upholstery to separate along the break line such that part of the upholstery will be deflected by the inflating air-bag so as to lie substantially between the air-bag and an occupant of the seat when the air-bag is substantially fully inflated.

Advantageously, said part of the upholstery to be deflected by the inflating air-bag comprises foam material.

Conveniently, the air bag unit is located in a cavity provided in said upholstery, part of said cavity defining a notch in said upholstery, the notch

being configured to allow part of the upholstery to pivot about the notch as the upholstery is deformed by the inflating air-bag.

Preferably, said air-bag unit comprises an arcuate or substantially U-shaped housing containing the air-bag, and wherein the air-bag unit is mounted such that said inflator is located substantially inboard of part of the frame and said housing extends around said part of the frame so that part of the housing is located substantially outboard of said part of the frame.

Advantageously, the air-bag is provided in a packed condition in which it is spirally rolled about an axis substantially parallel to axis of the backrest extending away from the squab.

Conveniently, the air-bag is rolled such that the tightest turn of the rolled outwardly relative to the seat, and wherein the inflator is mounted to direct gas into the air-bag in a generally forward direction relative to the backrest, such that the air-bag will unroll towards an occupant of the seat upon inflation.

Preferably, the air-bag is provided in a packed condition in which it is folded in a substantially zigzag manner about fold lines lying substantially parallel to the axis of the backrest extending away from the squab; and wherein the inflator is mounted to direct gas into the air-bag in a generally forward direction relative to the backrest.

Advantageously, said break line in the upholstery is provided between a cushioned front part of the upholstery and a substantially rigid rear part of the upholstery.

According to a still further aspect of the present invention, there is provided an air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit, the air-bag being packed within a substantially U-shaped housing at least partly defined by a pair of spaced-apart U-shaped side-walls.

Preferably, the housing is elongate and has a substantially U-shaped cross-section, an inner part being stronger than an outer part.

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

FIGURE 1 is a schematic side view of a vehicle seat in accordance with a first embodiment of the present invention;

FIGURE 2 is a sectional view taken along line A-A in Figure 1, illustrating one side part of the back-rest of the seat illustrated in Figure 1;

FIGURE 3 is a view corresponding generally to that of Figure 2, but illustrating an air-bag of the vehicle seat in a deployed condition and part of the upholstery of the vehicle seat in a deformed condition;

FIGURE 4 is a view corresponding generally to that of Figure 1 but illustrating the air-bag in a deployed condition;

FIGURE 5 is a view similar to that of Figure 2, but illustrating a second embodiment of the present invention;

FIGURE 6 is a view similar to that of Figure 5, but illustrating a still further embodiment of the present invention;

FIGURE 7 is a view corresponding to that of Figure 6, but illustrating the air-bag in a deployed condition and part of the upholstery of the seat in a deformed condition.

Referring initially to Figures 1 and 2 of the drawings, a vehicle seat 1 in accordance with the present invention is illustrated. The vehicle seat 1 has a squab 2 comprising a squab frame 3 which is covered by squab upholstery 4. Extending upwardly and slightly rearwardly from the rear part of the squab 2 is a back-rest 5 which comprises a back-rest frame 6 covered with back-rest upholstery 7. The lowermost part of the back-rest frame 6 is pivotally connected at 8 to the rear part of the squab frame 3 such that the angle of inclination of the back-rest 5 relative to the squab 2 can be adjusted in a manner known *per se*. The back-rest 5 has a major axis 9 which extends away from the squab.

The upholstery 4,7 of the squab 2 and the back-rest 5 typically comprises foam material covered with an outer covering of fabric, plastic or leather. The upholstery may additionally comprise springs in a conventional manner.

As illustrated most clearly in Figure 2, the frame 6 of the back-rest comprises a pair of spaced-apart metallic C-section beams 10 (as illustrated in Figure 2), each of which extends along a respective side region of the back-rest 5 so as to lie substantially parallel to the major axis 9 of the back-rest. Each beam 10 comprises a generally planar side plate 11 which is turned inwardly at its front and rear edges to define flanges 12,13 which are each directed inwardly towards the central region of the back-rest 5, thus forming the C-section.

As illustrated most clearly in Figure 2, the upholstery of the back-rest is wrapped around the frame 6 so as to define a bolster 14 at each side of the back-rest 5 (only one bolster illustrated in Figure 2). Each bolster extends forwardly of the central region 15 of the back-rest to be located adjacent the side of an occupant 16 sitting in the seat 1, thus providing lateral support. The bolster 14 illustrated in Figure 2 is the outboard bolster 14 of the seat and hence extends part-way between the seat occupant 16 and the side of the motor vehicle 17.

In the region of the outboard bolster 14 illustrated in Figure 2, there is provided a cavity 18 in the upholstery 7 of the back-rest 5. The cavity 18 extends forwardly from the beam 10, with the upholstery 7 being secured to the rear part of the beam 10. The cavity has a substantial extent in the direction parallel with the beam 10.

In the forwardmost region of cavity 18, there is provided a cut-out groove 19 in the upholstery, the groove 19 having a generally "key-hole" shaped cross-section and extending substantially parallel to the major axis of the back-rest 5 (i.e. into the page as viewed in Figure 2).

To the outboard side of the cavity 18, in the region where the upholstery 7 of the back-rest is thinnest, there is provided a pre-defined break line 20 in the upholstery, along which the immediately adjacent regions of the upholstery 21,22 are releasably secured to one another or with respect to one another as will be described in more detail hereinafter. The break line 20 is illustrated being located substantially mid-way between the front edge and the rear edge of the side wall of the backrest. However, it should be appreciated that the break line 20 could be located closer to the rear edge of the side wall.

An air-bag unit 23 is provided within the upholstery 7 of the back-rest 5, and is mounted to the beam 10 within the cavity 18. As illustrated in Figure 1, the air-bag unit 23 is generally elongate and is oriented such that it is substantially parallel to the major axis 9 of the back-rest 5 extending away from the squab 2.

The air-bag unit 23 includes an inflator 24 such as, for example, a gas generator. The inflator 24 is cylindrical and of elongate form. The inflator 24 is located generally centrally along the length of the air-bag unit 23 and is secured to the in-board side of the side plate 11 of the beam 10 by one or more mounting bolts 25 as illustrated in Figure 2. The inflator 24 is thus located behind the forward flange 12. The upper and lower ends of the air-bag unit 23 are also secured to the beam 10 via respective mounting lugs 26 as illustrated in Figure 1.

The air-bag unit 23 comprises an inflatable air-bag 27 which is connected to the inflator 24. As illustrated in Figure 2, the air-bag 27 extends forwardly from the inflator 24 into the main part of the recess 18 in front of the forward flange 12 where it turns outwardly and is then rolled about an axis lying substantially parallel to the major axis 9 of the back-rest 5, (extending into the page as viewed in Figure 2). The air-bag 27 is "outboard rolled". In other words, the air-bag is rolled outwardly relative to the seat. The air-bag 27 illustrated is rolled such that its innermost turn 28 is located forwardly and slightly outboard of the inflator 24. It will also be seen that the innermost turn 28 of the rolled air-bag 27 is located outboard of the region 29 of the air-bag which is connected to the inflator 24.

The rolled air-bag 27 is initially held within a foil bag 30.

Mounted between the inflator 24 and the front region of the beam 10 is a plastic protector 31 which extends around the front inwardly-directed flange 12 and the forwardmost part of the beam 10. The protector serves to protect parts of air-bag 27 from snagging or becoming otherwise damaged by contact with the metal beam 10.

Extending outwardly from the protector 31 is a mounting bracket 32 to which the regions 21,22 of the upholstery immediately adjacent the break line 20 are releasably secured by way of, for example, fabric hook and loop-type fastener such as that provided under the Trade Mark VELCRO, which could be provided along the length of the break line 20 or at its discreet spaced apart positions therealong. Alternatively, the bracket 32 may carry one or more clips which serve to clip together the regions of 21,22 of upholstery adjacent the break line 20. Also, as a further alternative, the mounting bracket 32 could be integrally formed with the protector 31 as a single component.

Upon actuation of the air-bag unit 23, for example when an ignition signal indicative of an imminent or extant crash situation is received from a crash sensor, the inflator 24 is actuated which serves to expel gas into the rolled air-bag 27. This causes the air-bag 27 to inflate, bursting out of the foil bag 30. Because of the manner in which the air-bag 27 is initially rolled, the air-bag 21 unfurls as it inflates, so that the air-bag inflates in a generally forwards direction between the seat occupant 16 and the side door 17 of the vehicle, mounting towards the seat occupant from the side.

As the air-bag 27 inflates and unfurls in this way, the forwardmost region of the seat upholstery 7, which is initially located around the front region

of the cavity 18, is urged forwardly which causes the upholstery to part along the break line 20. The key-hole-shaped groove 19 formed along the forwardmost region of the cavity 18 serves to permit the upholstery initially located in front of the cavity to deform about the groove 19 in the manner of a hinge, to ensure that the deformation of the upholstery is substantially unrestricted. The forwardmost part of the upholstery 7 thereafter moves so that it takes the form of a flange of upholstery extending generally forwardly between the inflated air-bag 27 and the seat occupant 16 as illustrated in Figure 3.

Figure 4 illustrates the inflated air-bag 27 from the side. The particular air-bag illustrated comprises two discreet inflatable chambers 27a and 27b which are separated from one another by a seam 33. However, it should be appreciated that the air-bag 27 could also comprise a single inflatable chamber.

It will therefore be appreciated, particularly from Figure 3, that the above-described vehicle seat arrangement is configured such that inflation of the air-bag deforms part of the upholstery such that the upholstery extends between the seat occupant 16 and the air-bag 27. This serves to reduce the degree of movement of the occupant's body in a side impact situation because the occupant's body will bear against the upholstery at an early point during the crash. The upholstery between the occupant 16 and the air-bag 27 also increases the degree of energy absorption provided.

Turning now to consider Figure 5, there is illustrated an alternative embodiment of the present invention. In this arrangement, the air-bag 27, instead of being rolled up as illustrated in the embodiment of Figure 2, is initially packed so as to be folded in a zig-zag manner about a plurality of fold

lines 40, each fold line 40 lying substantially parallel to the major axis 9 of the back-rest.

The packed air-bag 27 is held within an elongate plastic housing 41 having a generally U-shaped cross-section, which is located within the cavity 18 in the upholstery. The housing 41 extends from the inflator 24 which is again located inboard of the back-rest beam 10 and behind the front inwardly-directed flange 12, to a position outboard of the beam 10. The U-shaped housing 41 can therefore be considered to be wrapped around the forwardmost edge of the back-rest beam 10. The radially outer part of the housing is weakened so that on inflation of the air-bag this part of the housing will break, leaving the stronger inner part of the housing to act as a protector, protecting the inflating air-bag from contacting the metallic beam 10.

The cavity 18 is again provided with the elongate groove 19 in its forwardmost region, and is also again provided with an upholstery break line 20. In this arrangement, the two regions 21,22 of the upholstery immediately adjacent the break line 20 are releasably connected directly to the air-bag housing 41, again, for example, by way of fabric hook and loop-type fastener. Also, as illustrated, the rear part of the upholstery may comprise a substantially rigid shell 42, such that the break line 20 is defined between a front edge of the shell and a rear edge of a cushioned foam part of the upholstery.

Upon actuation of the arrangement illustrated in Figure 5, the inflator 24 again supplies gas to the initially packed air-bag 27 which causes the air-bag to inflate in a generally forwards manner, causing the break line 20 of the upholstery to rupture such that the fowardmost part of the upholstery in the region of the bolster 14 is deflected by the inflating air-bag in a manner substantially identical to that of the arrangement illustrated in Figure 3 so as to

be located between the seat occupant 16 and the fully inflated air-bag 27. The air-bag within its housing may easily be fitted to the beam 10 during manufacture of a seat.

Turning now to consider Figures 6 and 7, a still further embodiment of the present invention is illustrated. In this arrangement, the cavity 18 in the upholstery extends to the outboard side of the beam 10 of the back-rest frame. The forwardmost region of the upholstery cavity is again provided with a cut-out groove 19 running substantially parallel to the major axis 9 of the back-rest (i.e. directed into the page as viewed in Figure 6), and a break line 20 is again defined in the upholstery, in the rear part of the back-rest side wall.

In the arrangement of Figure 6, the air-bag unit is again located within the cavity 18, but this time is located so as to be located entirely outboard of the beam 10 of the back-rest frame. The air-bag unit again comprises an inflator 24 such as, for example a gas generator of a type known *per se*. The inflator 24 is connected to the air-bag 27 which is packed within a plastic housing 50 having a generally elongate cross-section as viewed in Figure 6, such that the air-bag housing extends forwardly from the inflator 24. The air-bag unit is mounted to the back-rest in the same general manner to the air-bag units of the previously-described embodiments such as, for example, by way of conventional mounting bolts 25 extending from the inflator 24 and through the beam 10.

In a similar manner to that of Figure 5, it will be seen from Figure 6 that the air-bag 27 is initially packed inside the housing 50 by being zig-zag-folded about a plurality of fold lines 40, each fold line being oriented so as to extend substantially parallel to the major axis 9 of the back-rest (i.e. into the page as viewed in Figure 6). The folded air-bag 27 extends forwardly from the inflator

24 to terminate, after its forwardmost fold 51, at the forwardmost part of the housing 50.

Upon actuation of the air-bag unit, the inflator 24 supplies a volume of gas to the air-bag 27, so as to inflate the air-bag 27 in a generally forwards direction, thereby urging the region of the upholstery 7 passing around the front of the cavity 18 forwardly. The regions 21,22 of upholstery located immediately at the front and rear of the upholstery break line 20 are thus torn apart. The air-bag 27, as well as inflating generally forwardly, also inflates in an outward direction towards the side of the motor vehicle 17. The inflating air-bag 27 therefore bears against the innermost surface of the side 17 of the motor vehicle as illustrated in Figure 7. Because the side of the motor vehicle 17 resists any further inflation of the air-bag 27 in an outboard direction (to the right as illustrated in Figure 7), the air-bag 27 therefore also tends to inflate towards the inboard direction (to the left as illustrated in Figure 7). It will therefore be appreciated that the inflating air-bag 27 again deforms the front part of the upholstery 7 which originally extended around the front of the cavity 18, so that a finger of upholstery extends between the seat occupant 16 and the inflated air-bag 27. The groove 19 again permits generally restricted deformation of the upholstery in this manner by allowing the aforementioned finger upholstery to pivot around the groove 19.

It will therefore be appreciated that in each of the above-described embodiments, inflation of the air-bag serves to deform a region of the upholstery of the back-rest so that at least part of the upholstery extends between the seat occupant and the inflated air-bag. This provides an additional cushioning effect to protect the seat occupant in the event of the side of impact, and also ensures that the seat occupant's torso is restrained at an early stage in a crash situation.

Whilst the invention has been described with reference to embodiments in which the break line is an actual break with regions on either side of the break being held together with hook and loop material or clamps, in other embodiments the break line could be a line of mechanical weakness, where the upholstery is very thin or held together by a seam, so that the upholstery or the seam will actually rupture or break along the break line when the air-bag is inflated.

In the present specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A vehicle seat comprising: a squab and a back-rest, the back-rest comprising a frame covered with upholstery; and an air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit; the air-bag unit being mounted to the back-rest frame so as to be substantially covered by the upholstery; wherein the upholstery of the back-rest has a break line positioned relative to the air-bag unit such that actuation of the air-bag unit will cause the upholstery to separate along the break line such that part of the upholstery will be deflected by the inflating air-bag so as to lie substantially between the air-bag and an occupant of the seat when the air-bag is substantially fully inflated.

2. A vehicle seat according to claim 1, wherein said break line is formed substantially longitudinally in a side wall of said back-rest, the break line being spaced substantially from the front edge of the side wall so as to be located substantially centrally between the front edge and rear edge of the side wall, or located closer to the rear edge than to the front edge.

3. A vehicle seat comprising: a squab and a back-rest, the back-rest comprising a frame covered with upholstery; and an air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit; the air-bag unit being mounted to the back-rest frame so as to be substantially covered by the upholstery; wherein the upholstery of the back-rest has a break line formed substantially longitudinally in one of said side walls; the break line being spaced substantially from the front edge of the side wall so as to be located substantially centrally between the front edge and rear edge, or located closer to the rear edge than to the front edge.

4. A vehicle seat according to claim 3, wherein said break line is positioned relative to the air-bag unit such that actuation of the air-bag unit will cause the upholstery to separate along the break line such that part of the upholstery will be deflected by the inflating air-bag so as to lie substantially between the air-bag and an occupant of the seat when the air-bag is substantially fully inflated.

5. A vehicle seat according to any one of claims 1, 2 or 4, wherein said part of the upholstery to be deflected by the inflating air-bag comprises foam material.

6. A vehicle seat according to any one of claims 1, 2, 4 or 5, wherein the air bag unit is located in a cavity provided in said upholstery, part of said cavity defining a notch in said upholstery, the notch being configured to allow part of the upholstery to pivot about the notch as the upholstery is deformed by the inflating air-bag.

7. A vehicle seat according to any preceding claim, wherein said air-bag unit comprises an arcuate or substantially U-shaped housing containing the air-bag, and wherein the air-bag unit is mounted such that said inflator is located substantially inboard of part of the frame and said housing extends around said part of the frame so that part of the housing is located substantially outboard of said part of the frame.

8. A vehicle seat according to any preceding claim, wherein the air-bag is provided in a packed condition in which it is spirally rolled about an axis substantially parallel to axis of the backrest extending away from the squab.

9. A vehicle seat according to claim 8, wherein the air-bag is rolled outwardly relative to the seat, and wherein the inflator is mounted to direct gas into the air-bag in a generally forward direction relative to the backrest, such that the air-bag will unroll towards an occupant of the seat upon inflation.

10. A vehicle seat according to any one of claims 1 to 7, wherein the air-bag is provided in a packed condition in which it is folded in a substantially zigzag manner about fold lines lying substantially parallel to the axis of the backrest extending away from the squab; and wherein the inflator is mounted to direct gas into the air-bag in a generally forward direction relative to the backrest.

11. A vehicle seat according to any preceding claim, wherein said break line in the upholstery is provided between a cushioned front part of the upholstery and a substantially rigid rear part of the upholstery.

12. An air-bag unit comprising an inflatable air-bag connected to an inflator to inflate the air-bag upon actuation of the air-bag unit, the air-bag being packed within a substantially U-shaped housing at least partly defined by a pair of spaced-apart U-shaped side-walls.

13. An air-bag unit according to claim 12, wherein the housing is elongate and has a substantially U-shaped cross-section, an inner part being stronger than an outer part.

14. A vehicle seat substantially as hereinbefore described with reference to an as shown in figures 1 to 4 of the accompanying drawings.

15. A vehicle seat substantially as hereinbefore described with reference to and as shown in figure 5 of the accompanying drawings.

16. A vehicle seat substantially as hereinbefore described with reference to and as shown on figures 6 and 7 of the accompanying drawings.

17 An air-bag unit substantially as hereinbefore described with reference to and as shown in figure 5 of the accompanying drawings.

18. Any novel feature or combination of features disclosed herein.

Application No:	GB 0300608.7	**Examiner:**	Mark Thwaites
Claims searched:	1, 2 & 5 to 11	**Date of search:**	17 March 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1, 5, 10	US 5893579	(KIMURA) esp. figures 3 & 5
X	1, 5, 10	US 5749597	(SADERHOLM) esp. figures 2 & 3
X	1, 5, 10	EP 0965494 A2	(FUJI) esp. figures 1 & 2
X	1	EP 0940299 A1	(NISSAN) esp. figures 2 & 4

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

B7B

Worldwide search of patent documents classified in the following areas of the IPC[7]:

B60R

The following online and other databases have been used in the preparation of this search report.

Online: EPODOC, WPI, JAPIO