A SAFETY DEVICE

Abstract: A safety device is provided which is to be mounted on the back-rest of a motor vehicle. The device includes a first elongate restraining portion (11) which may be a strap or which may be inflatable. One end of this portion is secured to an anchoring point (23) in the region of the upper edge of the back-rest of a seat, and the other end is secured to an anchoring point (25) on the side edge of the back-rest of the seat. The device is movable, in response to a signal from a crash sensor, from an initial position to a deployed position by means of an inflatable locating finger (6) which is secured to an anchoring point (27) located at a point where the top of the back-rest merges with the side of the back-rest. The elongate restraining portion (11) is positioned to be located forwardly of the front face of the back-rest while extending between the anchoring point (23, 25).
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG). 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.

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“A SAFETY DEVICE”

THE PRESENT INVENTION relates to a safety-device.

It has been proposed to utilise various types of safety device to restrain an occupant in a seat in a vehicle in the event that an accident should occur.

A very common safety device that is in everyday use is a safety-belt which is called a “three-point” safety-belt. Such a safety-belt typically extends from a floor-mounted retractor through a guide or pillar-loop mounted on the pillar or “B”-Post of the vehicle, or one side of the seat, with the safety-belt then passing diagonally across the torso of the occupant to a releasable buckle provided adjacent the waist of the occupant at the other side edge of the seat. Finally, the seat-belt passes across the lap of the occupant to an anchoring point provided adjacent the base of the “B”-Post on the first side of the seat. There are many minor modifications of this basic design, with anchoring points being mounted on the vehicle or on the seat.

Whilst this conventional three-point belt provides a good restraining characteristic in the event of a front impact, the conventional system can prove inadequate in certain side impact situations, especially if the side impact
situation is such that the occupant of the vehicle tends to move away from the guide which guides the safety-belt over his shoulder.

The present invention seeks to provide an improved safety device.

According to one aspect of this invention there is provided a safety device mounted on the back-rest of a vehicle seat, the safety device comprising an elongate restraining portion having two opposed ends, one end being secured to an anchoring point on or in the region of the upper edge of the back-rest of the seat, and the other end being secured to an anchoring point on or in the region of a side edge of the back-rest of the seat, the device being movable, in response to a signal, from an initial position to a deployed position in which the elongate restraining portion extends forwardly of the back-rest to extend between the anchoring points and to have at least part thereof spaced forwardly of the front face of the back-rest.

Preferably the restraining portion is an elongate inflatable element configured to move to said deployed position on inflation thereof.

Conveniently the device includes at least one inflatable locating finger extending from a point intermediate the ends of the restraining portion, and extending to a further anchoring point provided on the back-rest, the finger being inflatable by gas from a gas generator such that, the restraining portion is guided, at least partially by the effect of the or each inflatable finger, to a predetermined position relative to the seat.

According to another aspect of this invention there is provided a safety device to be mounted in a vehicle, the safety device including an elongate restraining portion to extend between two spaced-apart anchoring points
provided on the vehicle, and at least one inflatable locating finger extending from a point intermediate the ends of the restraining portion, and extending to a further anchoring point provided on the vehicle, the finger being inflatable by gas from a gas generator such that, the restraining portion is guided, at least partially by the effect of the or each inflatable finger, to a predetermined position relative to the seat.

Preferably the restraining portion is inflatable, and is adapted to be inflated simultaneously with inflation of the or each inflatable finger.

Conveniently the inflatable restraining portion is in communication with the or each inflatable finger.

Preferably three of said inflatable fingers are provided.

The invention also relates to a safety device as described above when mounted on a vehicle seat, the opposed ends of the restraining portion being connected to a first anchoring point provided at the top of the back-rest of the seat, and a second anchoring point provided at the side edge of the seat at a position below the level of the top of the back of the seat, the arrangement being such that, on inflation of the or each inflatable finger, the restraining portion of the element is located adjacent and embracing a shoulder of an occupant of the seat.

Preferably a finger is connected to an anchoring point in the region of the junction between the top and the side of the back-rest of the seat.
Conveniently the vehicle seat is provided with a three-point safety-belt having a diagonal strap portion adapted to retain the other shoulder of the seat occupant.

In order that the invention may be more readily understood, and so that 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 plan view of an element forming a safety device in accordance with the invention,

FIGURE 2 is a plan view corresponding to Figure 1 showing a preferred element forming a safety device in accordance with the invention,

FIGURE 3 is a diagrammatic view of a vehicle seat illustrating, in phantom, the initial positioning of an element as shown in Figure 1 or Figure 2,

FIGURE 4 is a view, corresponding to Figure 3, but illustrating, in phantom, an occupant of the seat, and showing a safety device incorporating the element of Figure 2 in the deployed condition,

FIGURE 5 is a side view of the seat of Figure 4,

FIGURE 6 is a plan view of an element for forming a further safety device in accordance with the invention,

FIGURE 7 is a side view of a seat with a safety device incorporating an element as shown in Figure 6 with the safety device in the deployed condition,
FIGURE 8 is a side view of part of a vehicle seat provided with an element forming a further embodiment of the invention, showing the element inflated,

FIGURE 9 is a front view of part of the seat of Figure 8, and

FIGURE 10 is a top view of part of the seat of Figures 8 and 9.

In the preferred embodiments of the invention which will be described below, an element is provided which is mounted on the vehicle seat, the element having a first elongate portion which extends between two spaced-apart anchoring points, and a further portion which extends from an intermediate part of the elongate portion to a third anchoring point, at least that further portion being inflatable. The inflatable portion serves, on inflation, to move the first elongate portion to a desired position relative to an occupant of the seat, for example, to a position in which the elongate portion embraces a shoulder of the seat occupant, that shoulder not being restrained by a conventional three-point belt, while the other shoulder is restrained by the three-point belt.

It will be appreciated, therefore, that in the preferred embodiments of the invention which are to be described below, when the described safety device is deployed, both of the shoulders of the occupant of the seat are restrained, and thus the occupant of the seat is held in position more securely than if simply a conventional three-point safety-belt is utilised.

Referring initially to Figure 1 of the accompanying drawings, an element 1 forming part of a safety device in accordance with the invention is
illustrated. The element 1 comprises a first elongate portion in the form of an elongate strap 2, provided, at each end thereof, with an anchoring region 3, 4. The anchoring regions may comprise an anchoring plates which is secured to the strap 2, or may simply comprise apertured terminal regions of the strap 2. Each anchoring region is adapted to be secured to an anchoring point in or on a motor vehicle by an appropriate anchoring device such as a bolt or the like. The anchoring points may be located on the back-rest of a vehicle seat.

Extending from an intermediate point 5, which is located between the ends of the elongate element 2, is a further elongate element or arm 6 which is inflatable. The element or arm 6 is thus in the form of an elongate air-bag, and is associated with a gas generator 7 adapted to supply gas to the air-bag in response to a signal from an appropriate sensor 8. The arm 6 terminates in an anchoring region 9 adapted to be secured to an appropriate anchoring point on the vehicle seat.

Figure 2 illustrates an element 10 for use in a modified and preferred embodiment of a safety device in accordance with the invention in which the element has the same general configuration as shown in Figure 1, but the elongate strap 2 is replaced by a portion in the form of an elongate inflatable member 11 which is connected with the inflatable element or arm 6 such that gas from the gas generator 7 will simultaneously inflate both the inflatable element or arm 6 and the elongate inflatable member 11.

Figure 3 illustrates the back-rest 20 of the vehicle seat which is provided with a head-rest 21. A recess 22, shown in phantom, is provided at the top of the back-rest of the seat to receive an element such as, in the described embodiment, the element 10 as shown in Figure 2. The element 10 is retained in position within the recess with the anchoring region 3 secured to a first
anchoring point 23 provided at the end of one elongate arm 24 of the recess 22, and the anchoring region 4 connected to a second anchoring point 25 provided at the other end of the arm 24 of the recess 22. The first anchoring point 23 is located on the upper substantially horizontal edge of the back-rest 20, and the second anchoring point 25 is located on the side edge of the back-rest 20. The arm 24 of the recess 22 extends across part of the top of the back-rest 20 and part-way down the side of the back-rest 20. The recess 22 includes a further rearwardly extending portion 26 which extends rearwardly from a central part of the arm 24 across the shoulder of the back-rest. The anchoring region 9 of the element or arm 6 is secured to a further anchoring point 27 provided at the rearmost end of the arm 26 of the recess 22. The further anchoring point 27 is located in the region where the upper edge of the back-rest merges with the side edge of the back-rest, at a position near the rearmost face of the back-rest 20.

The recess 22 and the element 10 within it are ordinarily, concealed beneath the fabric covering of the back-rest of the seat so as not to be obtrusive.

Figure 4 shows schematically the seat-back 20 of Figure 3, with the seat occupied by a seat occupant 30. The occupant is restrained by a conventional three-point belt having a portion 31 extending diagonally across his torso, passing over one shoulder and extending downwardly to a point adjacent his waist, and a second lap-strap portion 32 which extends across his waist region. Such a three-point belt is conventional.

Figure 4 also illustrates the element 10, as shown in Figure 2, after deployment of the described safety device in response to an appropriate signal from the sensor 8. The element 10 is thus in the deployed position.
The signal from the sensor 8 activates the gas generator 7 causing the elongate inflatable arm 6 to be inflated, and also causing the elongate inflatable element 11 to be inflated.

As the arm 6 is inflated, the arm extends forwardly substantially rigidly from the anchoring point 27, and thus moves the point 5 where the elongate arm 6 joins with the elongate inflatable element 11 forwardly relative to the back-rest of the seat. The elongate inflatable element 11 is thus moved forwardly passing over the shoulder of the occupant 30 of the seat, and, as the elongate element 11 also inflates, continued movement effected thereto by the inflating arm 6 tends to move the point 5 forwardly and inwardly. Thus the elongate inflatable member 11 is located in a position in which it extends between the two anchoring points 23 and 25 which are respectively located at the top of the back-rest and at the side of the back-rest, and is spaced forwardly, by the inflated arm 6, from the front face of the back-rest of the seat, and, consequently, the elongate member 11 is positioned in front of and partially embracing a shoulder of the occupant of the seat. As can be seen from Figure 4, the shoulder that is embraced by the element 10 is the shoulder that is not restrained by the diagonal portion 31 of the three-point safety-belt. Thus the occupant 30 is retained in the seat by the safety-belt 31, and by the element 10.

Whilst the embodiment described with reference to Figures 2 to 5 is a relatively simple embodiment, more sophisticated embodiments of the invention may be devised. Figure 6, for example, illustrates a further element 40 that can be used to form a safety device of the present invention. The element 40 includes an elongate restraining portion 41 that is adapted to be inflated provided, at the opposed ends thereof, with anchoring means 42, 43 adapted to be secured to spaced-apart anchoring points. Extending from
intermediate points along the length of the elongate restraining portion 41 are three inflatable fingers. Each finger is in communication with the elongate restraining portion 41 so that the portion 41 and the fingers may be inflated simultaneously. A first inflatable finger 44 terminates with an anchoring means 45. The second inflatable finger 46, which has a greater length than the inflatable finger 44, terminates with an anchoring means 47. The third inflatable finger 48, which is shorter than the inflatable finger 46, terminates with an anchoring means 49. Again a gas generator 50 is provided to inflate the inflatable part of the described element 40, the gas generator 50 being actuated in response to a signal from an appropriate sensor 51.

It is to be understood that the element 40 is again to be mounted on a seat back-rest with the elongate restraining portion 41 thereof extending between an anchoring point provided at the top of the back-rest, and an anchoring point provided at the side of the back-rest. Figure 7 illustrates the element 40 of Figure 6 as mounted on a vehicle seat-back and as deployed. It can be seen that each of the fingers 44, 46, 48 has the anchoring means thereof secured to a respective anchoring point 52, 53, 54, at points spaced-apart along the side edge of the back-rest of the seat. The fingers 44, 46, 48 serve, on inflation, to move the elongate restraining portion 41 of the element 40 to a position in front of and embracing a shoulder of an occupant of a vehicle seat.

Turning now to Figures 8, 9 and 10, a further embodiment of the invention is illustrated. In this embodiment of the invention, an elongate inflatable element 60 is provided, which is initially mounted in position within an appropriate concealed recess provided in the back-rest 1 of a vehicle seat. The elongate element 60 is of substantially uniform cross-circular section when inflated. The inflatable element 60 has a first end 62 thereof secured to a mounting point 63 provided in the horizontal upper edge of the seat, and the
other end 64 thereof connected to a mounting point 65 provided in the vertical side edge of the seat.

The inflatable element 60, in its initial uninflated form, is concealed beneath a fabric cover of the back-rest of the seat.

In response to a signal that is supplied to a gas generator, in the event that an accident should occur, the inflatable element 60 inflates to occupy the position shown in Figures 8 to 10. The inflatable element 60 comprises an elongate restraining portion 66 which, as shown most clearly in Figures 9 and 10, extends at a position spaced in front of the front face 67 of the back-rest of the seat.

The inflatable element 60 is, in the uninflated state, specifically configured and mounted in position so that, on deployment of the safety device, when the inflatable element 60 becomes inflated and moves to the deployed position, as illustrated, the inflatable element automatically adopts a deployed configuration in which the elongate restraining portion is in the described position.

It is to be understood that if a person was sitting on the seat provided with the safety device, as described above with reference to Figures 8 to 10, in the event that an accident should arise, the restraining portion 66 would automatically be located in front of part of the shoulder of the seat occupant, with the parts of the inflatable element extending from the restraining portion 66 to the anchoring points 63 and 65 being so positioned to ensure that the inflatable element 60, as a whole, embraces and restrains the shoulder of a seat occupant.
Whilst the invention has been described with specific reference to arrangements which restrain a shoulder of an occupant of a seat, it is to be appreciated that further embodiments of the invention may restrain other parts of the body of a seat occupant.

In the present Specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".
CLAIMS:

1. A safety device mounted on the back-rest of a vehicle seat, the safety device comprising an elongate restraining portion having two opposed ends, one end being secured to an anchoring point on or in the region of the upper edge of the back-rest of the seat, and the other end being secured to an anchoring point on or in the region of a side edge of the back-rest of the seat, the device being movable, in response to a signal, from an initial position to a deployed position in which the elongate restraining portion extends forwardly of the back-rest to extend between the anchoring points and to have at least part thereof spaced forwardly of the front face of the back-rest.

2. A safety device according to Claim 1 wherein the restraining portion is an elongate inflatable element configured to move to said deployed position on inflation thereof.

3. A safety device according to Claim 1 wherein the device includes at least one inflatable locating finger at least one inflatable locating finger extending from a point intermediate the ends of the restraining portion, and extending to a further anchoring point provided on the back-rest, the finger being inflatable by gas from a gas generator such that, the restraining portion is guided, at least partially by the effect of the or each inflatable finger, to a predetermined position relative to the seat.

4. A safety device to be mounted in a vehicle, the safety device including an elongate restraining portion to extend between two spaced-apart anchoring points provided on the vehicle, and at least one inflatable locating finger
extending from a point intermediate the ends of the restraining portion, and extending to a further anchoring point provided on the vehicle, the finger being inflatable by gas from a gas generator such that, the restraining portion is guided, at least partially by the effect of the or each inflatable finger, to a predetermined position relative to the seat.

5. A safety device according to Claim 3 or 4 wherein the restraining portion is inflatable, and is adapted to be inflated simultaneously with inflation of the or each inflatable finger.

6. A safety device according to Claim 3, 4 or 5 wherein the inflatable restraining portion is in communication with the or each inflatable finger.

7. A safety device according to any one of Claim 6 wherein three of said inflatable fingers are provided.

8. A safety device according to Claim 4 or any Claim dependent thereon when mounted on a vehicle seat, the opposed ends of the restraining portion being connected to a first anchoring point provided at the top of the back-rest of the seat, and a second anchoring point provided at the side edge of the seat at a position below the level of the top of the back of the seat, the arrangement being such that, on inflation of the or each inflatable finger, the restraining portion of the element is located adjacent and embracing a shoulder of an occupant of the seat.

9. A safety device according to Claim 8 wherein a finger is connected to an anchoring point in the region of the junction between the top and the side of the back-rest of the seat.
10. A restraining device according to Claim 8 or 9 wherein the vehicle seat is provided with a three-point safety-belt having a diagonal strap portion adapted to retain the other shoulder of the seat occupant.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60R 21/18, B60R 22/03
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

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

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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