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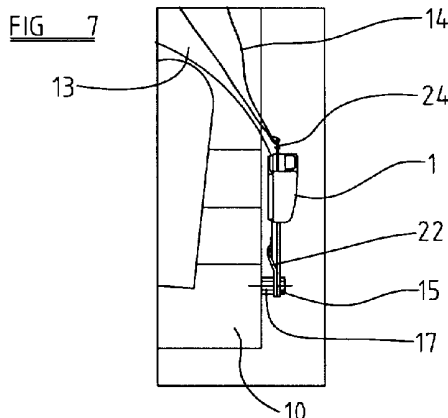
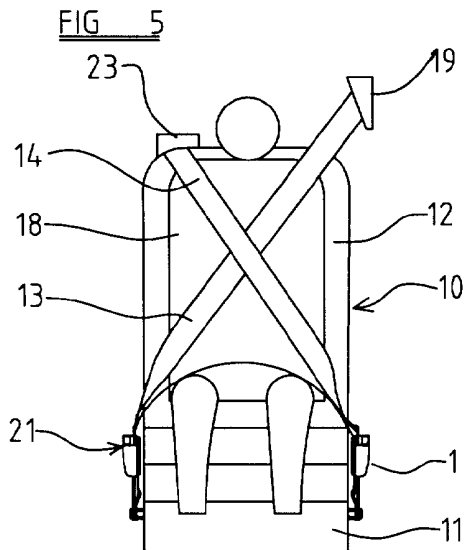
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(56) Documents Cited:
**EP 0820909 A2 DE 019850368 A
US 5513897 A US 5123673 A
US 20020089163 A1**

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UK CL (Edition V) **B7B**
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Other: **Online: WPI, EPODOC, JAPIO**

(54) Abstract Title: **Three point seat belt with additional diagonal belt**

(57) A safety harness for a vehicle seat 10 has a conventional three-point seat belt 13 and an additional two-point shoulder belt 14. The 2 point shoulder belt 14 has a tongue 24 received within a buckle 1 located on the outboard side of the seat. The buckle 1 has a slot (6, Fig 2 or 39, Fig 12) through which an end of the other seat belt 13 passes before being attached to mounting plate 22. The buckle 1 is biased (by torsion spring 17) into a position aligned with the backrest 12 when the seat is unoccupied, so that the occupant when entering the seat does not sit on it. Part of the buckle 1 is formed of rubber or other deformable material to minimise damage to the occupant in the event of a crash. Both seat belts have retractors 19, 23 and pre-tensioners.



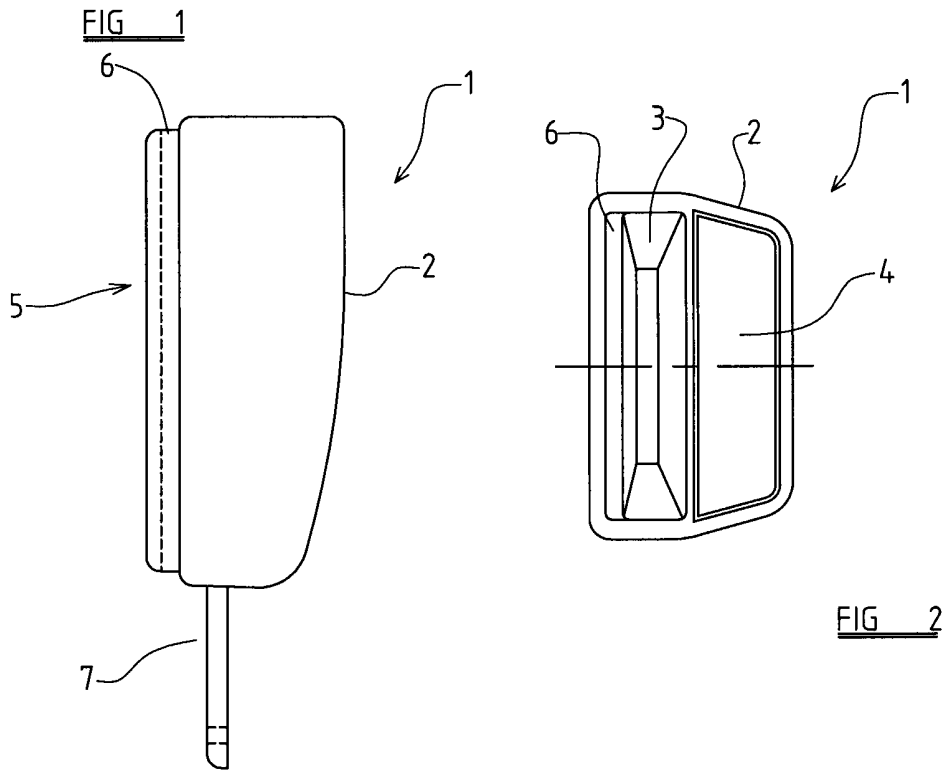


FIG 2

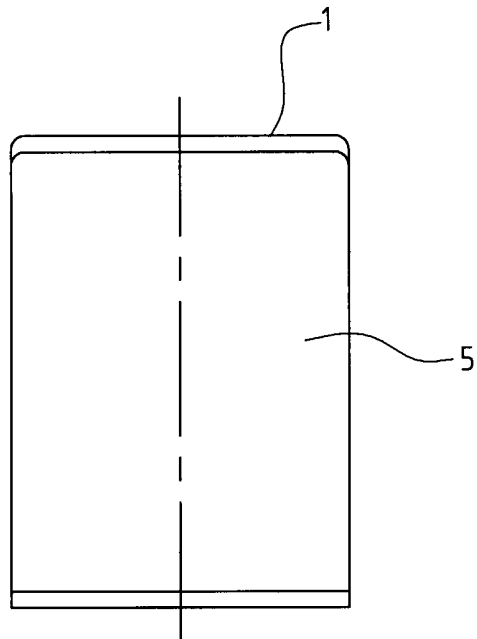


FIG 3

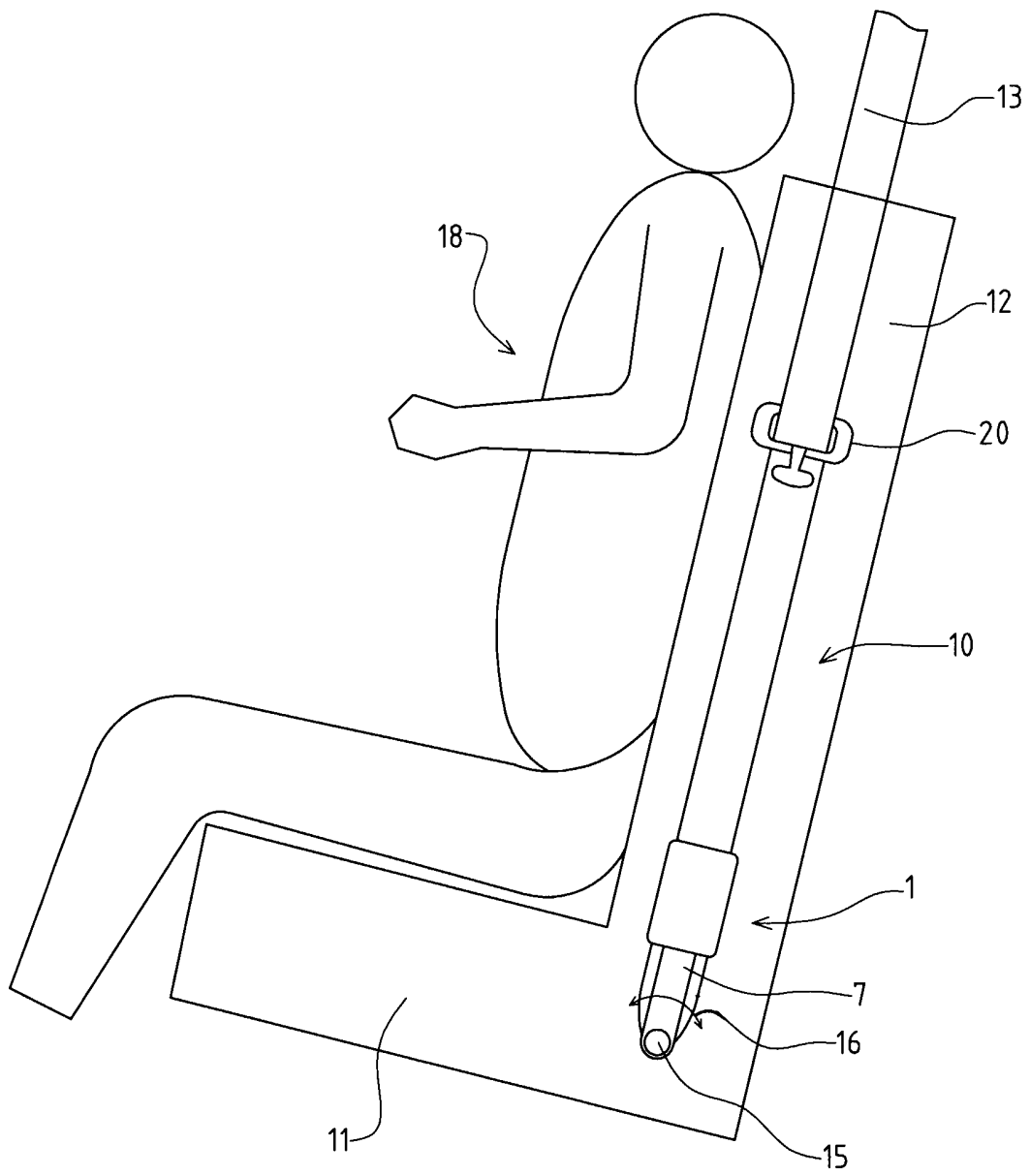


FIG 4

FIG 5

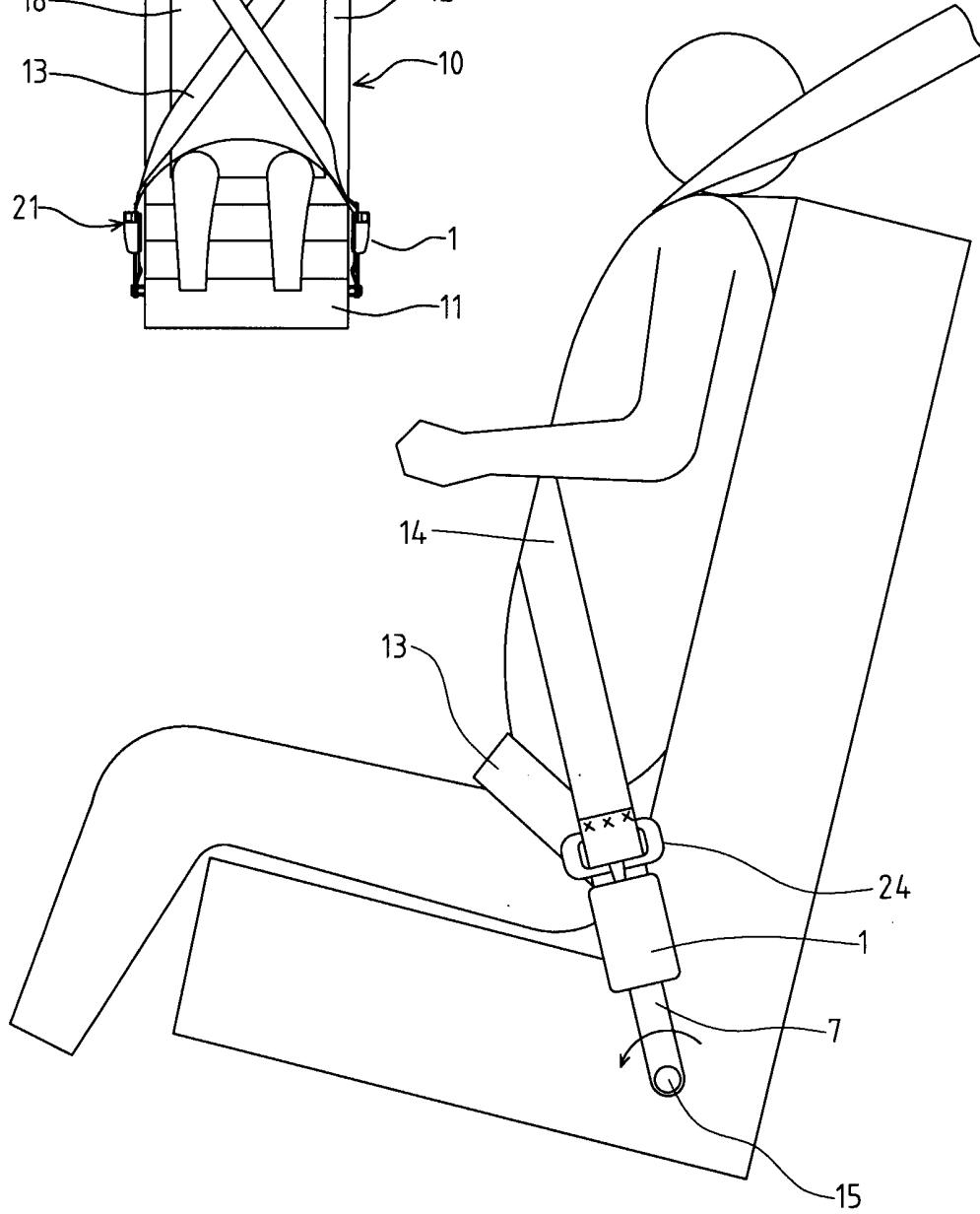
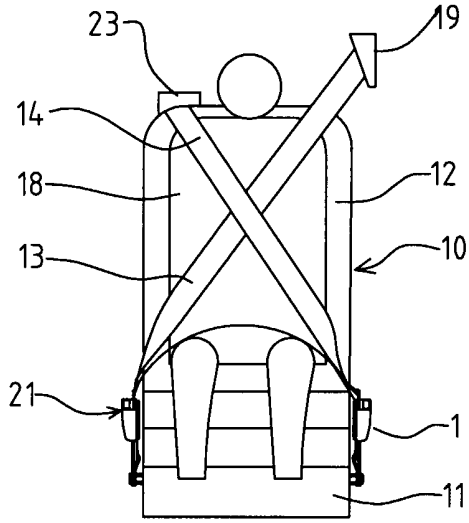


FIG 6

FIG 7

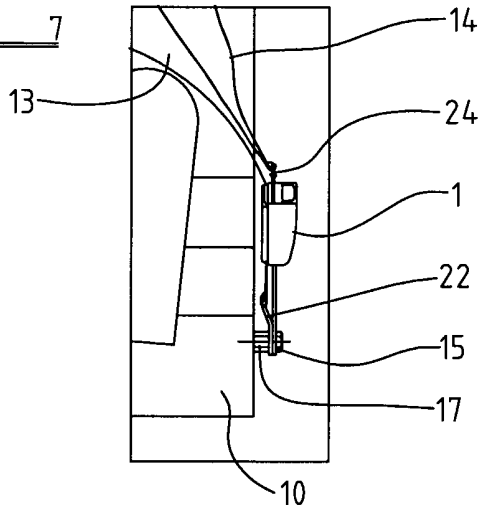


FIG 8

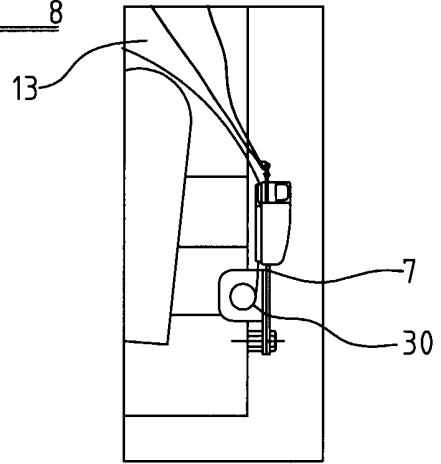


FIG 9

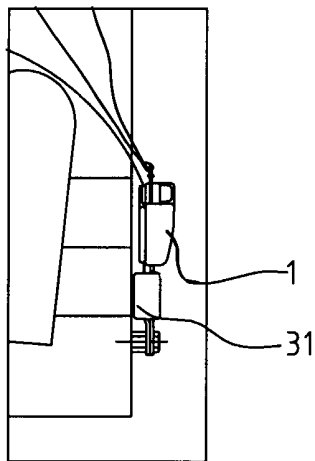


FIG 10

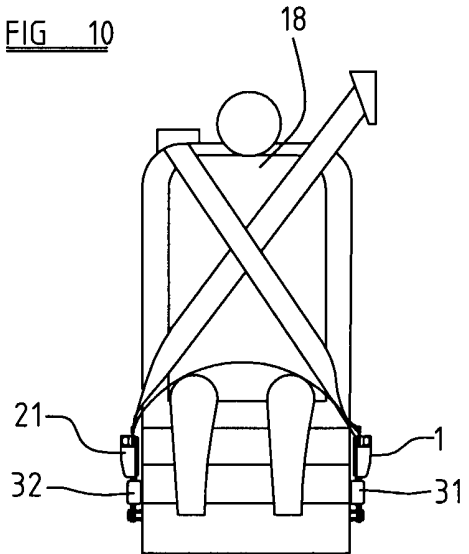


FIG 11

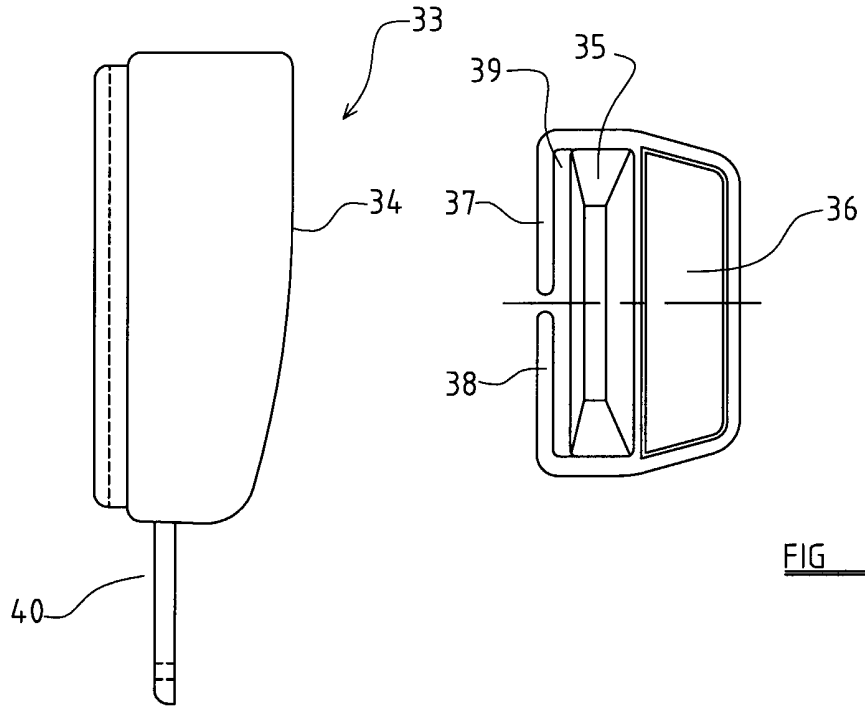


FIG 12

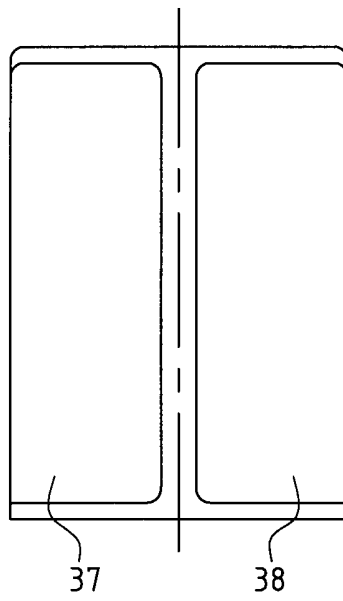


FIG 13

5 **DESCRIPTION OF INVENTION**

**“IMPROVEMENTS IN OR RELATING TO SAFETY ARRANGEMENT
FOR A VEHICLE”**

10

THE PRESENT INVENTION relates to a safety arrangement for a vehicle and more particularly relates to a safety arrangement which includes a 3-point seat belt and a 2-point seat belt.

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A typical seat belt in use in a motor vehicle, such as a motor car, is a so-called 3-point seat belt. When in use, such a 3-point seat belt typically extends from the first point adjacent one shoulder of the seat occupant, diagonally across the chest of the occupant to a second point which is located to one side of the occupant adjacent the occupant’s hips. The belt then extends transversely across the lap of the occupant to a third point which is adjacent the other side of the seat, again adjacent the occupant’s hips.

20

It is possible for a seat occupant, under certain circumstances, to “twist” out of such a 3-point seat belt during an impact, and it has therefore been proposed to use, in combination with a conventional 3-point seat belt, an additional 2-point belt running from first point adjacent the other shoulder of the seat occupant diagonally across the chest of the occupant to a point adjacent the third point of the conventional 3-point seat belt. The combination of the 3-

point seat belt with the additional 2-point seat belt provides a better retention of an occupant in a seat during an impact situation, with the ability to take higher loads. Also, the loads are more evenly distributed on the body of the occupant which may reduce the risk of injury. Such a combined 3-point belt and 2-point
5 belt may be especially beneficial in a side impact or roll-over situation.

Of course, the combination of a conventional 3-point seat belt with an additional 2-point seat belt requires more space than that required for a conventional 3-point belt, and the combined arrangement will be more complex
10 when in use. However, there are additional specific problems.

Typically the second point of the 3-point belt is constituted by a buckle mounted to the motor vehicle which is to receive a tongue which is slideably mounted on the seat belt. Typically this buckle is mounted "in board" of the
15 motor vehicle, thus being located towards the centre of the vehicle. If an additional 2-point belt is provided there will be a need for a corresponding buckle on the "out board" side of the seat, at a position located between the seat and the adjacent door. It is possible that an occupant, on entering the seat may accidentally sit on this buckle with rather painful consequences. Also if a seat
20 belt buckle is positioned on the out board side of the seat between the seat and the door, if there is a side impact situation, the seat belt buckle may be pressed by the inwardly moving part of the door of the vehicle into firm contact with the pelvis of the seat occupant, thus additionally injuring the occupant.

25 The present invention seeks to provide an improved safety arrangement.

According to the present invention, there is provided a safety arrangement associated with a vehicle seat, the safety arrangement including a 3-point seat belt and a 2-point seat belt; the 3-point seat belt having one end

thereof connected to a retractor provided on one side of the seat and being provided with a tongue, there being a buckle to co-operate with the tongue provided on the other side of the seat; the 2-point seat belt having one end thereof connected to a retractor provided on the said other side of the seat and
5 being provided with a second tongue, there being a second buckle provided on the said one side of the seat to engage and retain the said second tongue; the second buckle being movable from a first position, occupied when the safety arrangement is not in use, to a second position, occupied when the safety arrangement is in use, against a bias which biases the said second buckle to the
10 first position; the second buckle defining a guide passage through which a terminal part of the 3-point safety belt passes.

Preferably, the guide passage defined by the second buckle is formed as part of the housing of the second buckle.

15

Advantageously, the guide passage is formed by two inwardly directed wings.

Conveniently, at least part of the second buckle is formed of a
20 deformable material.

Preferably, the deformable material is a resiliently deformable material.

Advantageously, the deformable material is a rubber based material.

25

Conveniently, the deformable material at least partly defines the guide passage.

Preferably, the second buckle is mounted in position by means of an elongate mounting element which is connected to the seat for movement rotationally about a substantially horizontal axis.

5 Advantageously, a torsional spring provides the bias.

Conveniently, a pretensioner is associated with the 3-point seat belt.

Preferably, the pretensioner associated with the 3-point seat belt is
10 incorporated within the retractor of the 3-point seat belt.

Advantageously, the pretensioner associated with the 3-point seat belt is associated with a buckle.

15 Conveniently, a pretensioner is associated with the 2-point seat belt.

Preferably, the pretensioner associated with the 2-point seat belt is incorporated in the retractor of the 2-point seat belt.

20 Advantageously, the pretensioner associated with the 2-point seat belt is associated with a buckle.

Conveniently, the second buckle, when in the first position, is located adjacent the backrest of the seat, and when in the second position is located
25 forwardly of the backrest of the seat

In order 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 side view of a seat belt buckle forming part of an
5 embodiment of the invention;

FIGURE 2 is a top view of the buckle of Figure 1;

FIGURE 3 is a front view of the buckle of Figure 1;
10

FIGURE 4 is a side view of a seat provided with the combination of a
3-point seat belt and a 2-point seat belt, the seat having the buckle of Figures 1
to 3 mounted on it;

FIGURE 5 is a front view of the seat of Figure 4 illustrating the seat belt
15 combination in use;

FIGURE 6 is a side view of the seat of Figure 5;

FIGURE 7 is a enlarged view of the buckle of Figures 1 to 3 when in
20 use;

FIGURE 8 is a view corresponding to Figure 7 illustrating a modified
embodiment of the invention;

FIGURE 9 is a view corresponding to Figure 7 illustrating a further
25 modified embodiment of the invention;

FIGURE 10 is a view corresponding to Figure 5 illustrating a further modified embodiment of the invention;

FIGURE 11 is a view corresponding to Figure 1 illustrating a modified
5 buckle;

FIGURE 12 is a view corresponding to Figure 2 illustrating the buckle of Figure 11; and

10 FIGURE 13 is a view corresponding to Figure 3 illustrating the buckle of Figures 11 and 12.

Referring initially to Figures 1 to 3, a buckle 1 is illustrated. The buckle 1, as will become clearer from the following description, is configured
15 to receive and retain a tongue which is provided on a seat belt, and is provided with a guide to guide the seat belt.

The buckle 1 comprises a housing 2. The housing 2 defines a slot 3 adapted and configured to receive a tongue mounted on a seat belt. The
20 housing 2 is also provided with a push button 4 adapted to actuate a mechanism within the housing. As is conventional in buckles used with seat belts, the mechanism within the housing 2 is such that when the tongue is introduced through the slot 3, the mechanism engages and retains the tongue until the push button 4 is depressed, which causes the mechanism to release and eject the
25 tongue.

Provided on one side of the housing 2 is a projection 5. The projection 5, in the illustrated embodiment, is formed of a deformable material, which can deform with the absorption of energy. Thus a material having resilient

properties, such as a rubber or rubber-like material may be ideal. The projection 5 defines a through-passage 6 which is dimensioned to receive and guide a portion of seat belt.

5 The housing 2 is provided with an elongate mounting element in the form of a rigid steel mounting plate 7 which extends from the housing 2 at the end thereof opposite to the tongue-receiving slot 3. The mounting element 7 is formed integrally with or is securely connected to the mechanism within the housing 2 so that the mounting element 7 may securely mount the mechanism
10 in position.

Turning now to Figures 4 to 7, the buckle 1 is illustrated mounted on a seat 10, the seat 10 having a squab 11 and backrest 12. The seat 10 is provided with a 3-point seat belt 13 and also a 2-point seat belt 14 shown (in use) most
15 clearly in Figure 5.

The mounting element 7 of the buckle 1 is connected to a point where the squab 11 and back rest 12 of the seat meet, by means of a horizontal bolt 15 in such a way that the mounting element 7 and buckle 1 may effect a rotational
20 movement about the horizontal axis defined by the bolt 15 as illustrated by the double headed arrow 16 in Figure 4. The bolt 15 is associated with a torsion spring 17 (Figure 7) which is provided to impart a rotational bias to the mounting element 7. In the described embodiment the bias is such that the buckle 1 is initially biased to a position in which the buckle lies immediately
25 adjacent part of the backrest 12 of the seat 10. The buckle 1 is mounted on the "out board" side of the seat 10, between the seat and the adjacent vehicle door and thus it will be understood that ordinarily the buckle 1 is biased to a position in which it cannot be sat upon by a seat occupant 18 entering or leaving the seat
10.

The 3-point seat belt 13 has one end thereof connected to a retractor mechanism 19. The retractor mechanism 19 may incorporate a pretensioner. The retractor mechanism 19 is mounted in a position above the buckle 1 and adjacent one shoulder of the seat occupant 18. The retractor 19 may, as shown, be mounted on to the body of the motor vehicle or alternatively may be connected directly to the back rest 12 of the vehicle seat 10.

The 3-point seat belt 13 has a conventional tongue 20 (see Figure 4) mounted thereon which is to be received within a conventional buckle 21 mounted on the in board side of the seat. The other end of the 3-point seat belt 13 passes through the passage 6 provided in the housing 2 of the out-board buckle 1 and is secured to a mounting plate 22 which is connected to the bolt 15 used to connect the mounting element 7 of the buckle 1 to the seat 10. This is illustrated most clearly in Figure 7.

It is to be appreciated that when the 3-point seat belt is not in use the seat belt will occupy the position illustrated in Figure 4 extending directly from the out-board buckle 1 upwardly to the retractor 19 (retractor 19 is not shown in Figure 4). However, when the 3-point seat belt 13 is in use, as shown in Figure 5, the out-board buckle 1 and its associated mounting element 7 will tend to rotate forwardly, in an anticlockwise direction as shown, about the axis as defined by the bolt 15, against the bias provided by the torsion spring 17, as the part of the seat belt 13 received within the guiding through-passage 6 will tend to drag the buckle forwardly.

The 2-point seat belt 14 has one end thereof connected to a retractor mechanism 23. The retractor mechanism 23 may incorporate a pretensioner. The retractor mechanism 23 is illustrated mounted in position on the back rest

12 of the seat 10. The other end of the 2-point safety belt 14 is provided with a tongue 24. The tongue 24 is adapted to be received within the slot 3 of the housing 2 of the out-board buckle 1 so as to be engaged by the mechanism within the buckle 1.

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It is to be appreciated, therefore, that in use of the combination 3-point seat belt and 2-point seat belt, the seat occupant 18 will initially position themselves on the seat 10, without sitting on the out-board buckle 1 because the buckle 1 is retained in alignment with the seat back 12 by the bias of the torsion spring 17. Initially the 3-point seat belt 13 will be mounted in its in-use position in a conventional manner by inserting the tongue 20 of the 3-point seat belt in the in board buckle 21. This action will tend to drag the buckle forwardly. Subsequently the 2-point seat belt 14 will be located in position by engaging the tongue 24 of the 2-point seat belt with the out-board buckle 1. The buckle 1 is then in the forward position as shown in Figure 6. The buckle 1 is then substantially in alignment with the hips of the seat occupant 18 but the innermost part of the buckle 1, as formed by the projection 5, is formed of deformable or yieldable material so that if the buckle 1 is moved inwardly towards the seat occupant 18 during a side impact, at least that part of the buckle 1 which becomes forced into contact with the seat occupant 18 is yieldable or deformable, thus minimising the risk of injury to the seat occupant 18.

Figure 8 illustrates a modified embodiment of the invention in which the end of the 3-point seat belt 13 which is not connected to the upper retractor 19 is, instead of being connected to the bolt 15, connected to a second retractor mechanism 30, that second retractor mechanism 30 being mounted on the support element 7 of the buckle 22. The 3-point seat belt still, however, passes through the passage 6 of the buckle 1.

Figure 9 illustrates a further embodiment of the invention in which the support element 7 of the buckle 1 is associated with a pretensioner 31. The end of the 3-point safety belt 14 which is passed through the through-passage 6 defined by the buckle 1 is connected to the pretensioner 31. The pretensioner 31 may operate simply to provide tension to the 3-point seat belt 13 or may be configured to apply pretension both to the 3-point seat belt 13 and the 2-point seat belt 14.

Figure 10 illustrates an embodiment of the invention in which, in addition to the pretensioner 31 associated with the buckle 1 on the "out board" side of the seat, a further pretensioner 32 is associated with the buckle 21 on the "in board" side of the seat 18. The pretensioner 32 will pretension the 3-point seat belt 13.

Referring now to Figures 11 to 13 a modified out-board buckle 33 is illustrated. The buckle 33 is provided with a housing 34 which defines a slot 35 adapted and configured to receive a tongue, such as the tongue 24 on the 2-point seat belt 14. The housing 34 is also provided with a push button 36 which again is associated with a conventional mechanism within the housing 34 as described above with reference to the buckle 1 of Figures 1 to 3. In this embodiment of the invention the housing 34 is provided with two wings 37, 38 which extend inwardly from opposite parts of the housing to define a guiding through-passage 39 between the wings and the rest of the housing, the through-passage 39 corresponding with the above described through-passage 6. The housing 34 is provided with a mounting element 40 corresponding to mounting element 7 described above.

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

5 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:

- 5 1. A safety arrangement associated with a vehicle seat, the safety arrangement including a 3-point seat belt and a 2-point seat belt; the 3-point seat belt having one end thereof connected to a retractor provided on one side of the seat and being provided with a tongue, there being a buckle to co-operate with the tongue provided on the other side of the seat; the 2-point seat belt
10 having one end thereof connected to a retractor provided on the said other side of the seat and being provided with a second tongue, there being a second buckle provided on the said one side of the seat to engage and retain the said second tongue; the second buckle being movable from a first position, occupied when the safety arrangement is not in use, to a second position, occupied when
15 the safety arrangement is in use, against a bias which biases the said second buckle to the first position; the second buckle defining a guide passage through which a terminal part of the 3-point safety belt passes.
2. A safety arrangement according to Claim 1 wherein the guide passage defined by the second buckle is formed as part of the housing of the second
20 buckle.
3. A safety arrangement according to Claim 2 wherein the guide passage is formed by two inwardly directed wings.
25
4. A safety arrangement according to any one of the preceding Claims wherein at least part of the second buckle is formed of a deformable material.

5. A safety arrangement according to Claim 4 wherein the deformable material is a resiliently deformable material.
6. A safety arrangement according Claims 4 or 5 wherein the deformable material is a rubber based material.
7. A safety arrangement according to any one of Claims 4 to 6 wherein the deformable material at least partly defines the guide passage.
- 10 8. A safety arrangement according to any one of the preceding Claims wherein the second buckle is mounted in position by means of an elongate mounting element which is connected to the seat for movement rotationally about a substantially horizontal axis.
- 15 9. A safety arrangement according to any one of the preceding Claims wherein a torsional spring provides the bias.
10. A safety arrangement according to any one of the preceding Claims wherein a pretensioner is associated with the 3-point seat belt.
- 20 11. A safety arrangement according to Claim 10 wherein the pretensioner associated with the 3-point seat belt is incorporated within the retractor of the 3-point seat belt.
- 25 12. A safety arrangement according to Claim 10 wherein the pretensioner associated with the 3-point seat belt is associated with a buckle.
13. A safety arrangement according to any one of the preceding Claims wherein a pretensioner is associated with the 2-point seat belt.

14. A safety arrangement according to Claim 13 wherein the pretensioner associated with the 2-point seat belt is incorporated in the retractor of the 2-point seat belt.

5

15. A safety arrangement according to Claim 13 wherein the pretensioner associated with the 2-point seat belt is associated with a buckle.

16. A safety arrangement according to any one of the preceding Claims wherein the second buckle, when in the first position, is located adjacent the backrest of the seat, and when in the second position is located forwardly of the backrest of the seat.

17. A safety arrangement substantially as herein and described with reference to and as shown in the Figures 1 to 7 of the accompanying drawings.

18. A safety arrangement substantially as herein and described with reference to and as shown in the Figures 1 to 7 of the accompanying drawings, as modified by Figure 8.

20

19. A safety arrangement substantially as herein and described with reference to and as shown in Figures 1 to 7 of the accompanying drawings, as modified by Figure 9.

20. A safety arrangement substantially as herein and described with reference to and as shown in Figures 1 to 7 of the accompanying drawings, as modified by Figure 10.

21. A safety arrangement substantially as herein and described with reference to and as shown in Figures 1 to 7 of the accompanying drawings, as modified by Figures 11 to 13.

5 22. Any novel feature or combination of features disclosed herein.



INVESTOR IN PEOPLE

Application No: GB 0227125.2
Claims searched: 1 - 21

Examiner: Bridie Collier
Date of search: 5 February 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
A		US 20020089163 A1 (FORD) See especially Fig 5
A		US 5513897 A (LEMMEN) See buckle 112
A		US 5123673 A (HOOVER) See Fig 2
A		EP 0820909 A2 (BMW) See Fig 1
A		DE 19850368 A (IPEN) See Fig 1

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 UKCV:

B7B

Worldwide search of patent documents classified in the following areas of the IPC⁷:

B60R

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

WPI, EPODOC, JAPIO