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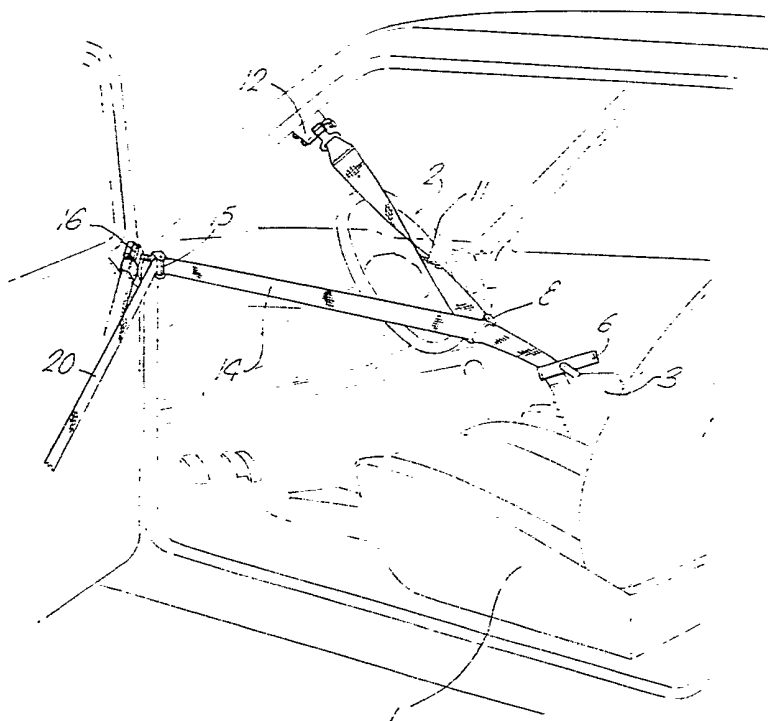
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(58) Field of search
UK CL (Edition J) A3V VRB VRE
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(54) Passive safety seat belt arrangement

(57) Part of the safety belt passes from the floor of the vehicle adjacent the squab of the seat at the centre of the vehicle through a guide which is mounted on an extendable lifter 3. A further portion of belt extends from the lifter to a movable carriage 12 mounted on a rail extending above and across the top of the door opening. Another seat belt portion 20 extends from a carriage movable along a rail mounted on the door of the vehicle towards the lifter. When a person leaves or enters the vehicle the carriages move to forward-most positions on their rails and the lifter extends to raise the guide to a position above the level of the squab of the seat 1 thus moving the portions of the seat belt to positions which provide unobstructed access to the seat.

Fig.1.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy

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Fig.1.

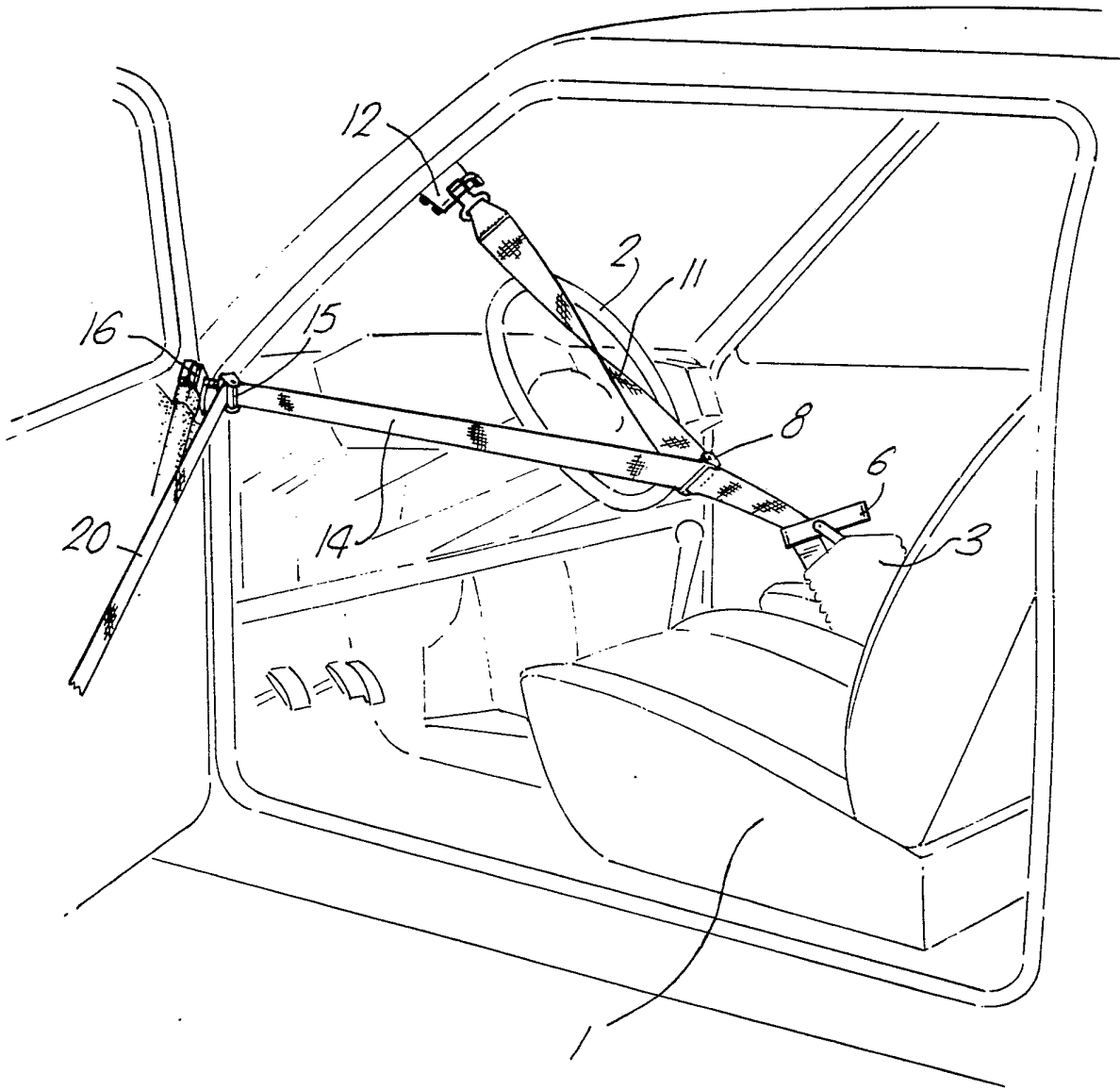
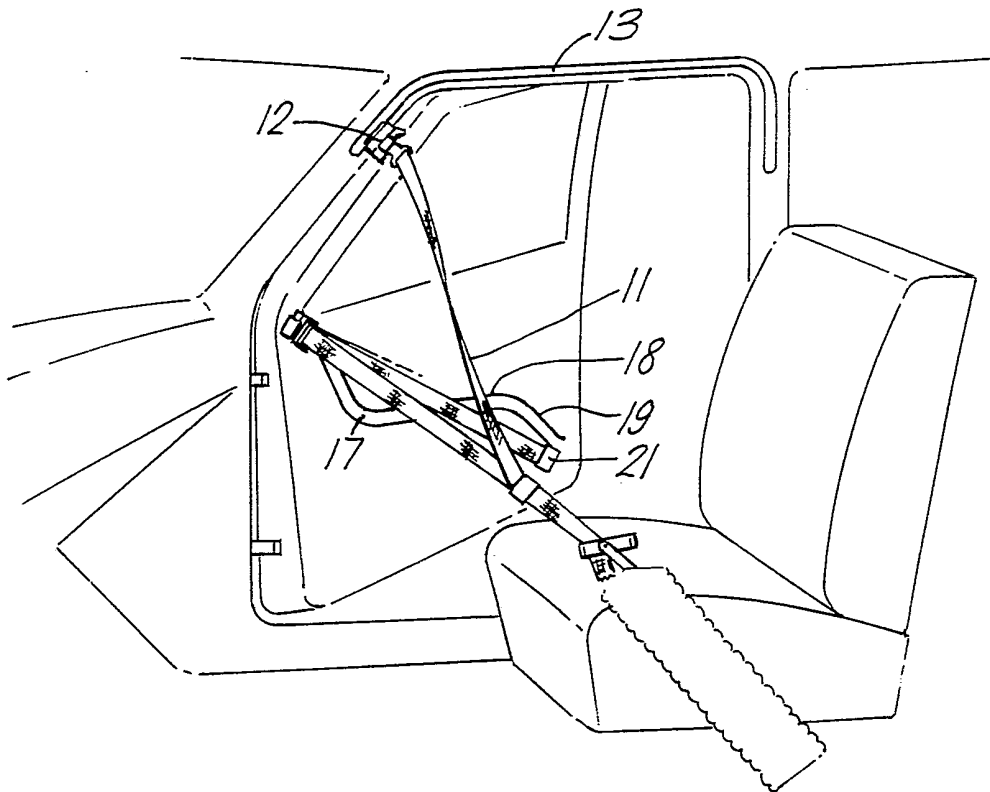


Fig. 2.



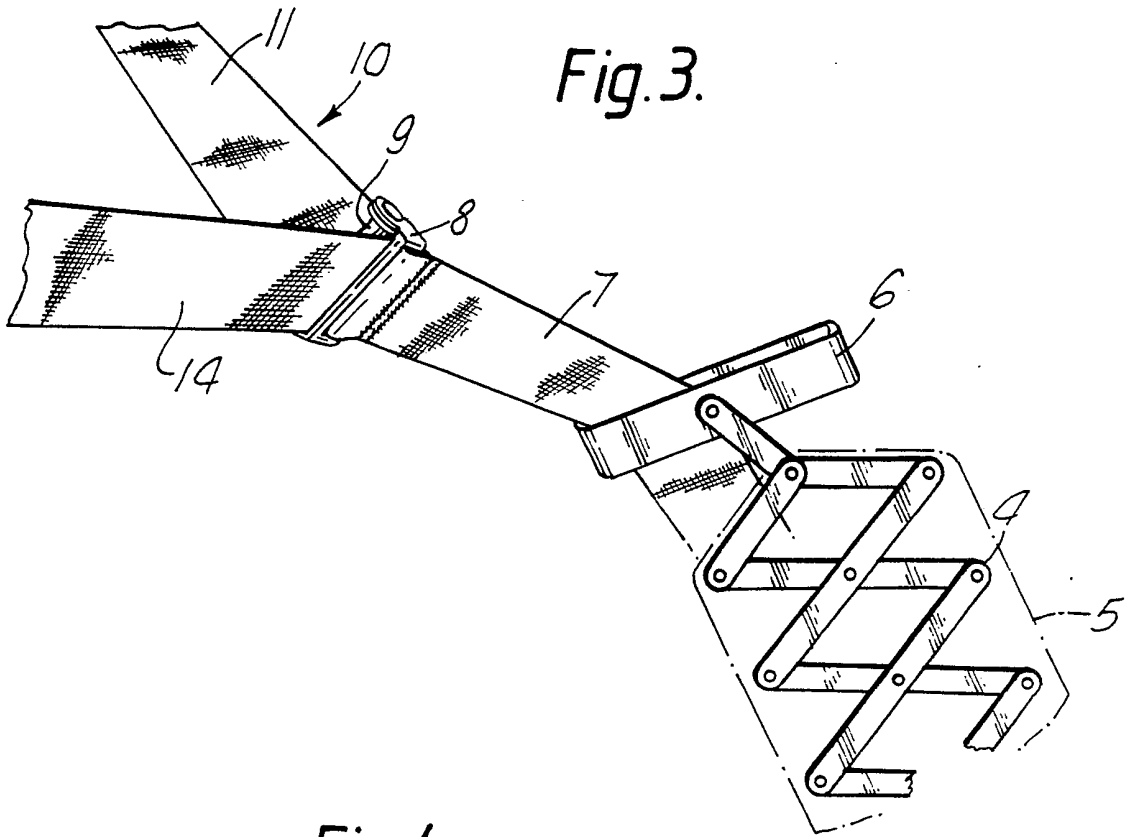
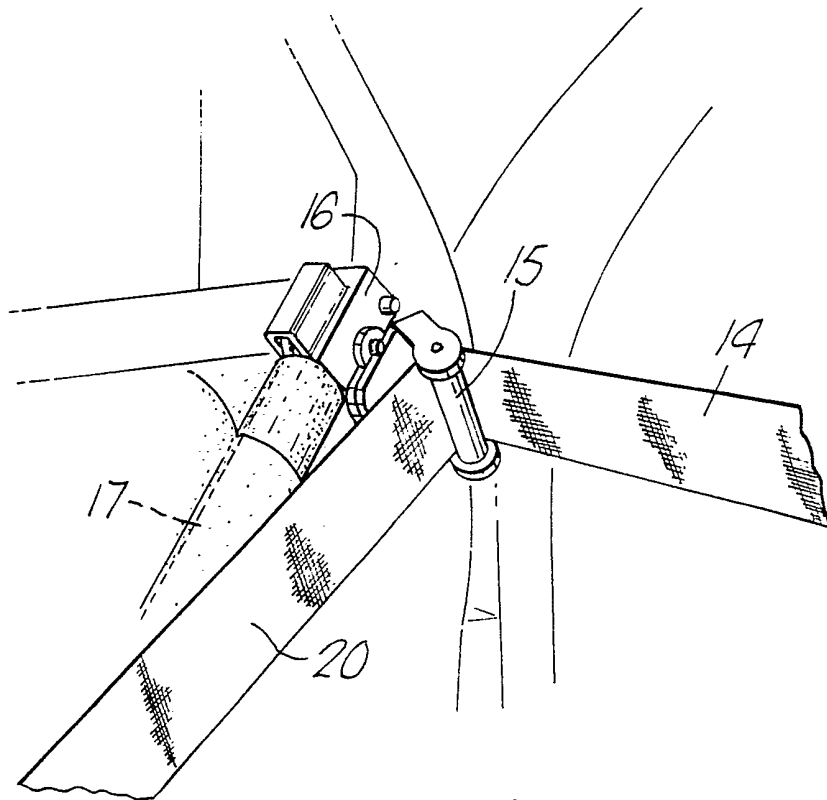


Fig. 3.

Fig. 4.



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DESCRIPTION OF INVENTION

Improvements in or relating to a safety belt arrangement

THE PRESENT INVENTION relates to a safety belt arrangement and more particularly to a safety belt arrangement for use in a motor vehicle.

It has been proposed previously to provide a so-called "passive" safety belt arrangement for use in a motor vehicle such as a motor car. A "passive" safety belt is a safety belt of the type which is provided with an associated mechanism adapted to place the safety belt on a person sitting in the motor vehicle automatically, without the person having to buckle or unbuckle the safety belt or carry out any other tasks.

Various passive safety belts of this type have been proposed before. Reference may be made, for example, to U.S.A. Specification 4222586 which discloses a passive safety belt wherein two ends of the safety belt are mounted to pass through guides which move along rails, one rail being mounted above the door opening for the person to be restrained, and the other rail being formed in the door. The retractor reel for this assembly is mounted in the door, and a centre part of the belt passes through an anchor loop mounted adjacent the centre of the vehicle.

One disadvantage of a belt of this type is that, when the door is open, the belt extends across the squab of the seat, and this belt portion interferes with any person entering the motor vehicle.

Other passive belt systems have been proposed, but none have been found to be totally satisfactory.

According to this invention there is provided a passive safety belt arrangement for restraining a person in a seat in a motor vehicle, said safety belt system comprising at least one belt portion passing from the floor of the vehicle adjacent the squab of the seat substantially at the centre of the vehicle through a guide means mounted on an extendable lifter, a further seat belt portion extending towards said lifter from a movable carriage mounted on a rail extending above and across the top of the door opening, and another seat belt portion extending from a carriage movable along the rail mounted on the door of the vehicle towards said lifter, the arrangement being such that when a person is to enter or leave the vehicle the carriages may move to forwardmost positions on their respective rails and the lifter may be extended to raise the guide means thereon to a position located above the level of the squab of the seat, thus moving the belt portions to positions providing unobstructed access to the seat.

In one embodiment two seat belt portions pass through the guide means mounted on the lifter, one being formed integrally with or connected directly to said further portion and the other being formed integrally with or connected directly to said another portion, there thus being two separate belts, each belt being associated with a retractor mechanism. Preferably the retractor mechanism for each belt is located adjacent the base of the lifter.

In the presently preferred embodiment a single belt portion passes through the guide means mounted on the lifter, said single portion terminating with a hous-

ing supporting a roller, said further belt portion and said another belt portion being formed integrally and passing around the roller.

Preferably a retractor mechanism is provided adjacent the base of the lifter in order to retract the safety belt portion passing through the guide means on the lifter.

Conveniently said rail which extends above and across the door opening extends from a position adjacent the windscreen of a motor vehicle to a position on the B-pillar of the motor vehicle, there being means provided on the rail on said B-pillar to lock the carriage movable along the rail in position on the B-pillar.

Advantageously the further portion of the safety belt connected to the carriage movable along the rail passing above and across the door opening is releasably connected to said carriage.

Preferably said another belt portion engages a roller mounted on the carriage which is to move along the rail mounted on the door, the end of the safety belt being connected to an anchoring point on the door. The anchoring point may comprise a retractor.

Conveniently said retractor is adapted to wind in belt to a predetermined tension and then to lock.

Advantageously the said rail mounted on the door comprises an initial inclined portion adjacent the front side of the door extending from an elevated position to a lower position adjacent the centre of the door, a substantially horizontal central portion, and a final downwardly inclined portion extending towards the lower rear corner of the door.

Preferably the guide means on the lifter comprise a guide ring or loop or open guide element through which the safety belt or belts pass, the guide means being mounted on the lifter for upward and downward movement relative to the squab of the adjacent seat.

Conveniently said lifter comprises a lazy-tong assembly supporting the guide means.

In order that the present 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 perspective view of part of a motor vehicle provided with a safety belt system in accordance with the invention;

FIGURE 2 is another perspective view showing another part of the vehicle;

FIGURE 3 is an enlarged view of the lifter, and

FIGURE 4 is an enlarged view of the portion of the belt mounted on the door of the vehicle.

Referring initially to Figure 1 of the drawings the safety belt system illustrated is mounted in a motor vehicle to protect a passenger sitting on a seat 1, in this case the driver of the vehicle who will operate the steering wheel 2. The safety belt system incorporates an extendable lifter 3, which is illustrated in greater detail in Figure 3. The lifter is mounted on the floor of the vehicle in the centre of the vehicle adjacent the squab of the driver's seat 1.

The lifter 3 may comprise a lazy-tong construction 4, as shown in Figure 3, the lazy-tong construction being protected by a surrounding rubber gaiter 5. The upper end of the lazy-tong construction supports a guide element 6 through which passes a length of safety belt 7. The guide element 6 may comprise a complete ring or loop, or a broken ring or loop of "C" form. The lower portion of this length of safety belt passes through the gaiter 5 and is wound on to a conventional retractor reel. The free end of the length of safety belt 7 is connected to a housing 8 in which a roller 9 is rotatably mounted. The length of the lifter may be adjusted, and thus the position of the guide element 6 relative to the squab of the seat may be adjusted.

A further length of safety belt 10 passes round the roller, such that the safety belt 10 can roll through the housing 8. One end portion 11 of this further length of safety belt 10 extends, as can be seen in Figure 1, to a carriage 12 which is movable along a rail mounted above, and extending across, the door opening in the motor vehicle. Referring to Figure 2 a rail 13 of a corresponding seat belt arrangement mounted in a passenger's seat can be seen, and it will be observed that the rail 13 commences at a point where the rail extends part way down the A pillar of the motor vehicle, that is to say the pillar between the front door opening and the windscreen, and the rail then extends across the front door opening above the opening and finally extends down the B-pillar, that is to say the pillar between the front door opening and the rear door opening. The carriage may be of any suitable design, and the end of the belt portion 11 may be releasably connected to the carriage in some convenient manner.

The other part 14 of the safety belt 10 that passes through the housing 8 extends across the motor vehicle to a further roller 15 which is mounted on a carriage 16 which is movable along a rail 17. The rail 17 is formed in the door and, adjacent the front portion of the door closest to the windscreen of the vehicle the rail 17 extends almost vertically upwardly, and then in a central region 18 of the rail it is substantially horizontal, and there is a final downward inclined portion 19 of the rail to a point where the rail terminates adjacent the lower rear corner of the door. The seat belt 14 passes round the roller 15, and the portion 20 of seat belt that emerges from the roller 15 extends to and is retracted by a retractor mechanism 21 which may be motor driven. The retractor mechanism 21 forms an anchor point for the belt which is mounted on the door.

In an alternative embodiment of the invention two retractor reels may be provided at the base of the lifter mechanism as illustrated in Figure 3, and thus two separate portions of safety belt may emerge through the guide element 6. One of these portions of safety belt may extend to the carriage 12, and the other portion of safety belt may extend either to a fixed anchorage mounted on the carriage 16 movable along the rail 17 or, alternatively, past a roller 15 on the carriage 16 to a fixed anchorage at the lower rear corner of the door, in the position illustrated for the described retractor 21.

In operation of the embodiment of the invention as described, initially the carriage 12 will occupy a position at the forward-most end of the rail 13, that is to say adjacent the windscreen of the motor vehicle. Also, the carriage 16 will occupy a position at a forward-most position on the rail 17, that is to say ad-

adjacent the front side of the door which is adjacent the windscreen. The lifter 3 will be in an extended position such that the guide element 6 will be in a position elevated above the squab of the seat 1.

When the door of the motor vehicle is opened, to occupy the position illustrated in Figure 1 and in Figure 2, it will be observed that all the described portions of the safety belt are located well above the squab of the seat 1. Thus a person may be able to enter the motor vehicle without engaging the safety belt in any way. If the person is the driver of the motor vehicle (for a left-hand drive vehicle, as illustrated) his hands will, almost automatically, rest upon the steering wheel, with his right hand passing over the seat belt portion 11, and his left hand passing between the seat belt portion 11 and the seat belt portion 14. When the door of the vehicle is closed, the carriages will be driven automatically, by means of appropriate motors, along their respective rails. The carriage 12 will thus move to a position on the B-post of the motor vehicle, and will be locked in that position in some suitable manner. Equally the carriage 16 will be moved along the rail 17 by an appropriate motor to occupy a position adjacent the lower rear corner of the door, that is to say beside the base of the back of the driver's seat. Simultaneously the lifter will be retracted so that the guide element 6 is withdrawn to a position below the level of the top of the squab of the driver's seat 1. It will be appreciated, at least by those skilled in the art, that when the carriages have executed the described movement, and the lifter has executed the described movement, the retractor mechanisms will retract any slack within the belt, and the belt will then be positioned in a correct position on the person to be restrained by the belt, with part of the belt extending across the hips of that person, and with

part of the belt extending across the chest of that person.

The retractor 21 may be a powered retractor, adapted to wind in the belt until it has the appropriate tension and then to lock the belt in position, or may be a spring retractor. If it is a spring retractor it is preferred that the strength of the spring in the spring retractor is carefully selected in comparison with the strength of the spring in the spring retractor provided at the base of the pre-lifter 3 so that the seat belt will always occupy the desired position.

It is to be understood that, when a person wearing the seat belt is intending to leave the motor vehicle, in response to an appropriate signal the various described components of the system will return to their initially-described position, thus enabling the person to leave the motor vehicle in an un-hindered manner.

Whilst the invention has been described with reference to only two embodiments of the invention it is to be understood that many modifications may be effected without departing from the scope of the invention. For example, a manually releasable buckle may be provided within the described system, in case, for any reason, the drive motors should fail, which might otherwise prevent a person wearing the safety belt from escaping from the car, for example after an accident has arisen. Such a manually operable buckle may, for example, comprise a manually operable release mechanism to release the roller 9 from the housing 8 or to release the roller 15 from the carriage 16 or may comprise a conventional buckle of the type in which a tongue is inserted into and is retained by a mechanism within a housing. A buckle of this type, for example, may be incorporated in

the portion 7 of the described safety belt. However, as was mentioned, the end of the belt portion 11 may be releasably connected to the carriage 12.

In an alternative embodiment of the invention the retractor 21 may be replaced by a anchorage which anchors one end of the belt to the rear edge of the door. In this arrangement the lengths of the various described portions of the seat belt will have to be carefully selected.

Whilst one type of lifter has been described it is to be appreciated that many alternative arrangements may be devised, provided that the lifter incorporates a portion adapted to guide the safety belt and raise the guided portion of the safety belt to a level above the squab of the seat.

CLAIMS:

1. A passive safety belt arrangement for restraining a person in a seat in a motor vehicle, said safety belt system comprising at least one belt portion passing from the floor of the vehicle adjacent the squab of the seat substantially at the centre of the vehicle through a guide means mounted on an extendable lifter, a further seat belt portion extending towards said lifter from a movable carriage mounted on a rail extending above and across the top of the door opening, and another seat belt portion extending from a carriage movable along the rail mounted on the door of the vehicle towards said lifter, the arrangement being such that when a person is to enter or leave the vehicle the carriages may move to forward-most positions on their respective rails and the lifter may be extended to raise the guide means thereon to a position located above the level of the squab of the seat, thus moving the belt portions to positions providing unobstructed access to the seat.

2. A safety belt arrangement according to Claim 1 wherein two seat belt portions pass through the guide means mounted on the lifter, one being formed integrally with or connected directly to said further portion and the other being formed integrally with or connected directly to said another portion, there thus being two separate belts, each belt being associated with a retractor mechanism.

3. A safety belt arrangement according to Claim 2 wherein the retractor mechanism for each belt is located adjacent the base of the lifter.

4. A safety belt arrangement according to Claim 1 wherein a single belt portion passes through the guide means mounted on the lifter, said single portion terminating with a housing supporting a roller, said further belt portion and said another belt portion being formed integrally and passing around the roller.

5. A safety belt arrangement according to Claim 4 wherein a retractor mechanism is provided adjacent the base of the lifter in order to retract the safety belt portion passing through the guide means on the lifter.

6. A safety belt arrangement according to any one of the preceding Claims wherein said rail which extends above and across the door opening extends from a position adjacent the windscreen of a motor vehicle to a position on the B-pillar of the motor vehicle, there being means provided on the rail on said B-pillar to lock the carriage movable along the rail in position on the B-pillar.

7. A safety belt arrangement according to any one of the preceding Claims wherein the further portion of the safety belt connected to the carriage movable along the rail passing above and across the door opening is releasably connected to said carriage.

8. A safety belt arrangement according to any one of the preceding Claims wherein said another belt portion engages a roller mounted on the carriage which is to move along the rail mounted on the door, the end of the safety belt being connected to an anchoring point on the door.

9. A safety belt arrangement according to Claim 8 wherein said anchoring point comprises a retractor.

10. A safety belt arrangement according to Claim 9 wherein said retractor is adapted to wind in belt to a predetermined tension and then to lock.

11. A safety belt arrangement according to any one of the preceding Claims wherein the said rail mounted on the door comprises an initial inclined portion adjacent the front side of the door extending from an elevated position to a lower position adjacent the centre of the door, a substantially horizontal central portion, and a final downwardly inclined portion extending towards the lower rear corner of the door.

12. A safety belt arrangement according to any one of the preceding Claims wherein the guide means on the lifter comprise a guide ring or loop or open guide element through which the safety belt or belts pass, the guide means being mounted on the lifter for upward and downward movement relative to the squab of the adjacent seat.

13. A safety belt arrangement according to Claim 11 wherein said lifter comprises a lazy-tong assembly supporting the guide means.

14. A safety belt arrangement substantially as herein described with reference to and as shown in the accompanying drawings.

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