

A SEATBELT RESTRAINT

TECHNICAL FIELD

This invention relates to an improved seatbelt restraint and more particularly a seatbelt restraint that provides greater potential to prevent submarining or jack-knifing of the occupant of a seat during impact as well as improving upon other safety issues that a conventional seatbelt and or buckle may inflict or potential hazards to the wearer at the time of impact.

BACKGROUND ART

Conventional seatbelt restraint arrangements for the most part involve a retractable/extendible belt anchored at the top and bottom of one side of the seat wherein the tongue of the seatbelt restraint is able to slide along that belt and be drawn across the occupant of the seat to establish what would best be described as a lap-sash configuration wherein on the other side of the anchored retractable/extendible belt there is a secured buckle or seat receiver for the tongue of the seatbelt restraint to be fastened therein.

Thus in use for the most part one section of the fastened lap-sash belt encircles the user's thighs.

During significant braking or upon impact, forces cause a tightening of the belt where there is opportunity for the belt buckle once it has been fastened within the receiving portion of the belt arrangement to raise substantially upward potentially crushing into the abdomen of the seated occupant wearing the belt restraint.

Still further any upward movement of that configuration of the belt which is encircling the thighs of the occupant means that there is far greater

tendency or opportunity for the wearer of the seatbelt to slide out from under the belt.

Hence any upward movement of the configuration of the belt that is encircling the seat occupant's thighs whether caused by the upward
5 movement of the belt buckle or otherwise is going to leave a gap through which the occupant of the seat who is supposedly held within the restraint of the belt, could quite easily submarine there out from.

While it is advantageous to have a certain amount of relative movement of the belt buckle and receiving portion with respect to any forces that
10 immediately tighten the belt in order to reduce the chest loading upon the seat occupant at impact, any substantial upright vertical movement of the belt buckle within the receiving portion, or upward movement of the belt configuration that is encircling the upper thighs of the occupant of the seat is not favourable because as introduced above this leads to potential risk
15 to the seat occupant in being able to not only submarine out of the seatbelt restraint arrangement but also could lead to abdominal injuries by the belt or buckle.

Therefore there needs to be a way in which to reduce this substantial vertical upright movement of the belt buckle and that portion of the belt
20 which is resting above the thighs of the occupant once restrained in the belt configuration so that when the belt begins to tighten on impact or sudden braking, the belt of the belt restraint will still allow minimal movement to avoid chest loading and so forth upon the seat occupant but it will do so however without allowing a substantial upward or vertical rising
25 of either or both the belt buckle or that part of the belt which is resting or encircling about the thighs of the occupant thereby avoid any submarining effect, and tightly holding occupant in seat.

Accordingly it is an object of this invention to provide such an improvement that will prevent substantial upward movement of the belt buckle and that portion of the belt encircling the user's thighs when the occupant of the seat is buckled in place within the seatbelt restraint.

5 Accordingly in one form of the invention there is provided a seatbelt restraint arrangement including:

a retractable/extendible belt anchorable at substantially upper and lower points on a first side of a seat,

said retractable/extendible belt having a slidable tongue adapted to
10 be drawn across an occupant of the seat fastenable into a buckle, wherein said buckle is anchorable on a second side of the seat, such that the fastening of the tongue slidable along the retractable/extendible belt into the buckle allows for a lap-sash configuration of the belt across the occupant of the seat wherein a lower portion of the lap-sash configuration
15 of the belt encircles at least the upper thighs of the occupant of the seat;

a slidable pull down wedge wherein said wedge is adapted at one end to engage with the buckle, including a belt portion anchoring said buckle on the second side of the seat, or wherein said wedge is adapted at one end on the first side of the seat at a substantially lower portion of the
20 retractable/extendible belt and at another end of the wedge on either first or second side is adapted to engage a support length such that on impact as forces cause a tightening effect upon the retractable/extendible belt and the buckle or that part of the retractable/extendible belt that is encircling the thighs of the occupant of the seat attempts to rise substantially
25 vertically upwards the slidable pull down wedge is forced to move forwardly along the support length thereby substantially preventing vertical upward movement of the buckle and/or upward movement of that part of the retractable/extendible belt that encircles the occupant's thighs.

An advantage of such an arrangement is that through the use of the slidable pull down wedge which is in communication with the support length means that when the forces which cause the tightening effect upon the belt which conventionally would simply lead to an upward movement of the belt buckle and/or that portion of the belt encircling the occupant of the seat's thighs, this vertical upward movement is advantageously translated to a general slight forward and pull down movement caused by the ability of the slidable pull down wedge to move along a certain portion of the support length.

10 As explained precedingly preferably there is still the requirement to allow some relative movement of the belt upon initial impact in order to reduce the chest loading upon the seat occupant.

Nonetheless while there is the requirement to allow a certain degree of relative movement of the belt buckle it would be disadvantageous to have the movement of the belt buckle moving in a substantially upright vertical direction as the buckle may push itself uncomfortably and at potential risk into the abdomen of the seated occupant and still worse any upward movement of that part of the belt which is encircling at least the upper thighs of the occupant of the seat means that there is a greater spacing available for the occupant to simply slide out from under the belt.

Advantageously with this invention the ability to maintain a certain amount of relative movement of the belt when tightening is still allowed however this is translated from a conventional upward movement to a slight forward and even potentially downward movement as the slidable pull down wedge slides its way forward along the support length thereby virtually pushing the buckle or that part of the belt which is encircling the thighs of the user downward.

In preference there are two slidable pull down wedges each with a corresponding support length wherein each slidable pull down wedge is located on the first and second side of the seat respectively.

5 In preference the buckle is anchored to the second side of the seat through a length of belt.

In preference the slidable pull down wedge engages the buckle along that part of the belt.

In preference the support length is a length of belt extending substantially laterally across a base side of the seat on either or both sides.

10 In preference in one embodiment of the invention the slidable pull down wedge is a strap having enclosed circular ends wherein each enclosed circular end is adapted to encircle at one end a length of belt connected to the buckle or that length of belt which is substantially at the base portion of the belt of the first side and at the other end of the encircled strap this
15 encircled member is able to be circled about the length of belt acting as the support length.

An advantage of such an arrangement for this particular embodiment is that as can be seen, the actual slidable pull down wedge can be of a simplistic configuration wherein a strap or a length of belt can simply have
20 two circular type enclosures able to engage a length of belt at each of the respective ends and once again upon impact the actual forces causing the tightening of the belt will see that forward movement of the slidable pull down wedge along the length of the support length which in itself can in fact be a simple length of belt or strap.

25 Preference in a further embodiment of the invention the pull down slidable wedge is a substantially ring clamp.

In preference the ring clamp is adapted to encircle the support length and also encircle a length of belt anchoring the buckle and/or that part of the retractable/extendible belt which is near the lower portion of the retractable/extendible belt on the first side of said seat.

- 5 As can be seen from this preferred embodiment it is the ring clamp which is acting as the slidable pull down wedge and as it is confined to both the support length which preferably would be an anchored strip of belt or similar such arrangement at one end and also clamping together either that length of belt which is anchoring the buckle in the seatbelt restraint or
10 alternatively on the other side which would be the substantial base portion of the retractable/extendible belt is able to keep down both the buckle and/or that part of the belt which is encircling the upper thighs of the seat occupant as the vertical upward movement once the force has caused the tightening effect on the belt are translated to the general sliding along of
15 the ring clamp which is able then to in fact pull down the buckle and/or that part of the belt which is encircling the thighs of the seat occupant.

- In preference in a further embodiment of the invention the retractable/extendible belt on the first side of the seat extends beyond the anchor point along a partial external base length of the seat the belt then
20 passing under, on top of or through the seat base or cushion of the seat to protrude on the opposite side of the seat base to the anchor point of the buckle of the seat belt restraint.

- In preference the belt portion which is anchoring the buckle is in a continuous length with that part of the retractable/extendible belt protruding
25 out from the opposite side of the seat base or cushion.

In preference that part of the retractable/extendible belt that is exposed on the first side of the seat before passing under, through or on top of the seat base or cushion and that part of the retractable/extendible belt that

protrudes out of the opposite side of the seat up to the anchor point of the second side of the seat provides the support lengths to which the slidable pull down wedge can move along during impact or sudden braking when forces on the belt cause the belt to tighten.

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BRIEF DESCRIPTION OF THE DRAWINGS

In order now to describe the invention in greater detail illustrations and accompanying text will be presented to provide preferred embodiments of the invention.

- 10 Figure 1 is a perspective view of the seatbelt restraint in a preferred embodiment of the invention.

Figure 2 is a perspective view of part of the illustration presented in Figure 1 showing a rearward and side view of the preferred embodiment presented in Figure 1.

- 15 Figure 3 is a general front perspective view of a further preferred embodiment of the invention.

Referring now to the drawings in greater detail.

- 20 Figures 1 and 2 represent one embodiment of the invention where the slidable pull down wedge is a ring clamp (24) shown on the non-buckle side (5) of the seat (18).

Alternatively Figure 3 has the slidable pull down wedge member (46) on the buckle side (31).

Nonetheless it is to be appreciated that the respective slidable pull down wedges can be positioned on either side of the seats in each of the

preferred embodiments shown, and in fact in some embodiments not shown in the illustration can also be included on both sides of the seatbelt restraint arrangement.

In Figures 1 and 2 the seat (18) includes a seatbelt restraint arrangement shown generally as (10) which has a retractable/extendible belt (12) which is anchored generally on one side (5) of the seat (18) at points (14) and (16).

On the other side (3) of the seat (18) there is a buckle (9) which has received the slidable tongue (9) which is able to slide along the length of the retractable belt (12) so that when in use as a restraint across an occupant (the occupant not shown in the illustrations), a lap-sash configuration is formed of the retractable/extendible belt (12) which could best be divided up into section (13) sash which comes across the shoulder of the occupant and across the chest and sections (15) lap which substantially encircles the thigh of the occupant when positioned in the seat (18).

In the preferred embodiments shown in Figures 1 and 2 there is an additional part of the retractable/extendible belt (19) that can pass through or on the seat or cushion of the seat (18) albeit for this invention that is not an essential feature of the preferred embodiment.

What is essential to the invention and perhaps best seen in Figure 2 is that an anchor clip (20) is anchored to the main seat frame (22) to which a substantially base portion of the retractable/extendible belt (12) is anchored thereto.

The anchored clip (20) actually divides the retractable/extendible belt into portion (15) which is substantially encircling the thighs of an occupant if they were to sit on the seat (18) and then what best could be described as

the support length (17) which in this preferred embodiment is a continuation length of the retractable/extendible belt that passes in through slot (25) to present portion at (19) of the retractable/extendible belt which protrudes out from the other side (23) of the seat (18) to be then anchored
5 on that side (3) of the seat (18).

It is however the length of belt (17) which is an important part of the invention as it provides a secured length to which the slidable pull down wedge (24) which in this embodiment is a ring clamp (24) to be able to engage that length of belt (17) and also engage the lower end of the
10 retractable/extendible belt (12) shown generally as (21) through a simple hemmed circular enclosure (26).

As can be seen if vertical upward movement is placed on portion (15) of the retractable/extendible belt (12) instead of causing that portion (15) of the retractable/extendible belt (12) to rise upwards thereby providing a
15 spacing to which submarining of the occupant is more likely, any vertical upward movement is alternatively translated to a downward and slightly forward pulling effect as the ring clamp (24) acting as the slidable pull down wedge runs its way along the length (17) of that part of the retractable/extendible belt (12).

20 In the embodiment shown in Figure 3 the retractable/extendible belt (28) is anchored at point (30) and also (32) on side (43) of the seat (45).

In the embodiment shown in Figure 3 the retractable/extendible belt is in fact a single continuous belt which starting at the anchor point (30) passes along anchor point (32) along an exposed length (34) on side (43) of the
25 seat (45) passing into the seat along a portion referred to generally as (36) and then protruding out at (37) from the seat (45) to present a length of the belt shown generally as (38) which passes through anchor (40) to provide a length of the belt (42) which terminates in the buckle (44) which is

adapted to receive the tongue (31) of the continuous retractable/extendible belt.

Once again while the aspect of the slidable pull down wedge in this embodiment shown in Figure 3 includes the strap (46) which has the
5 encircling end which positions itself about that part of the belt (38) which is protruding out (37) from the seat (45) on the buckle side (41) of the seat (45) could easily be included on the other side (43) of the seat (45) where the figures (33) and (35) have been directed to.

As the person skilled in the art will appreciate if the tongue (31) of the
10 retractable/extendible belt (28) is engaged in the buckle (44) and there is an occupant sitting in the seat (45) and there is a sudden impact or hard braking which causes forces that tighten the belt if the buckle (44) or that part of the retractable/extendible belt (28) which would encircle the upper thighs of the occupant (not shown) of the seat (45) to move in a vertical
15 upward direction, instead of moving in that vertical upward direction it is the slidable pull down wedges shown in Figure 3 as the strap (46) which instead will be pushed forward thereby in fact pulling the buckle (44) and/or that part of the retractable/extendible belt over the thighs of the occupant downwards.

20 Therefore instead of a conventional seatbelt restraint arrangement where upon forces causing tightening effect on the belt which could see the rising up of the buckle (44) or that part of the retractable/extendible belt that is encircling the thighs of the occupant which could lead to abdominal impact to the occupant or worse still creating spacing for the occupant to be
25 allowed to submarine out of the seatbelt restraint arrangement, both these problems have been avoided through the use of the slidable pull down wedge which in embodiment 1 shown in Figures 1 and 2 would be the ring clamp (24) and the embodiment shown in Figure 3 the strap member (46).

Advantageously not only is there forward slight downward movement keeping the occupant's thighs well encircled by the belt, there is also that allowed relative movement of this movement of the slidable pull down wedge along the support length which will allow removal of any chest loading upon the seat occupant at impact when forces act instantaneously to cause a tightening of the belt.

CLAIMS

1. A seatbelt restraint arrangement including:

5 a retractable/extendible belt anchorable at substantially upper and lower points on a first side of a seat,

said retractable/extendible belt having a slidable tongue adapted to be drawn across an occupant of the seat fastenable into a buckle, wherein said buckle is anchorable on a second side of the seat, such that the fastening of the tongue slidable along the retractable/extendible belt into
10 the buckle allows for a lap-sash configuration of the belt across the occupant of the seat wherein a lower portion of the lap-sash configuration of the belt encircles at least the upper thighs of the occupant of the seat;

a slidable pull down wedge wherein said wedge is adapted at one end to engage with the buckle, including a belt portion anchoring said
15 buckle on the second side of the seat, or wherein said wedge is adapted at one end on the first side of the seat at a substantially lower portion of the retractable/extendible belt and at another end of the wedge on either first or second side is adapted to engage a support length such that on impact as forces cause a tightening effect upon the retractable/extendible belt and
20 the buckle or that part of the retractable/extendible belt that is encircling the thighs of the occupant of the seat attempts to rise substantially vertically upwards as the occupant is jolted forward, the slidable pull down wedge is forced to move forwardly along the support length thereby substantially preventing vertical upward movement of the buckle and/or
25 upward movement of that part of the retractable/extendible belt that encircles the occupant's thighs.

2. The seatbelt restraint of claim 1 wherein there are two slidable pull down wedges each with a corresponding support length wherein each slidable pull down wedge is located on the first and second side of the seat respectively.
- 5 3. The seatbelt restraint of claim 1 wherein the buckle is anchored to the second side of the seat through a length of belt.
4. The seatbelt restraint of claim 3 wherein the slidable pull down wedge engages the buckle along that part of the belt.
- 10 5. The seatbelt restraint of claim 1 wherein the support length is a length of belt extending substantially laterally across a base portion of the seat on either or both sides.
6. The seatbelt restraint of claim 1 wherein the slidable pull down wedge is a strap having enclosed circular ends wherein each enclosed circular end is adapted to encircle at one end a length of belt connected to the buckle
15 or that length of belt which is substantially at the base portion of the belt of the first side and at the other end of the encircled strap this encircled member is able to be circled about the length of belt acting as the support length.
7. The seatbelt restraint of claim 1 wherein the pull down slidable wedge is
20 a ring clamp.
8. The seatbelt restraint of claim 7 wherein the ring clamp is adapted to encircle the support length and also encircle a length of belt anchoring the buckle and/or that part of the retractable/extendible belt which is near the lower portion of the retractable/extendible belt on the first side of said seat.

9. The seatbelt restraint of claim 1 wherein the retractable/extendible belt on the first side of the seat extends beyond the anchor point along a partial external base length of the seat the belt then passing under, on top of or through the seat base or cushion of the seat to protrude on the opposite side of the seat base to the anchor point of the buckle of the seat belt restraint.

10. The seatbelt restraint of claim 9 wherein the belt portion which is anchoring the buckle is in a continuous length with that part of the retractable/extendible belt protruding out from the opposite side of the seat base or cushion.

11. The seatbelt restraint of claim 10 wherein that part of the retractable/extendible belt that is exposed on the first side of the seat before passing under, through or on top of the seat base or cushion and that part of the retractable/extendible belt that protrudes out of the opposite side of the seat up to the anchor point of the second side of the seat provides the support lengths to which the slidable pull down wedge can move along during impact or sudden braking when forces on the belt cause the belt to tighten.

ABSTRACT

A seatbelt restraint having a belt anchorable at upper and lower points on a first side of a seat, wherein a slidable tongue is drawn across an
5 occupant of the seat fastenable into a buckle on a second side of the seat for a lap-sash configuration of the belt that encircles at least the upper thighs of the occupant of the seat; a slidable pull down wedge wherein said wedge adapted to engage with the buckle or a belt portion at one end and to engage a support length at the other end such that on impact as forces
10 cause a tightening effect upon belt the slidable pull down wedge is forced to move forwardly along the support length thereby substantially preventing vertical upward movement of the buckle and/or upward movement of that part belt that encircles the occupant's thighs.

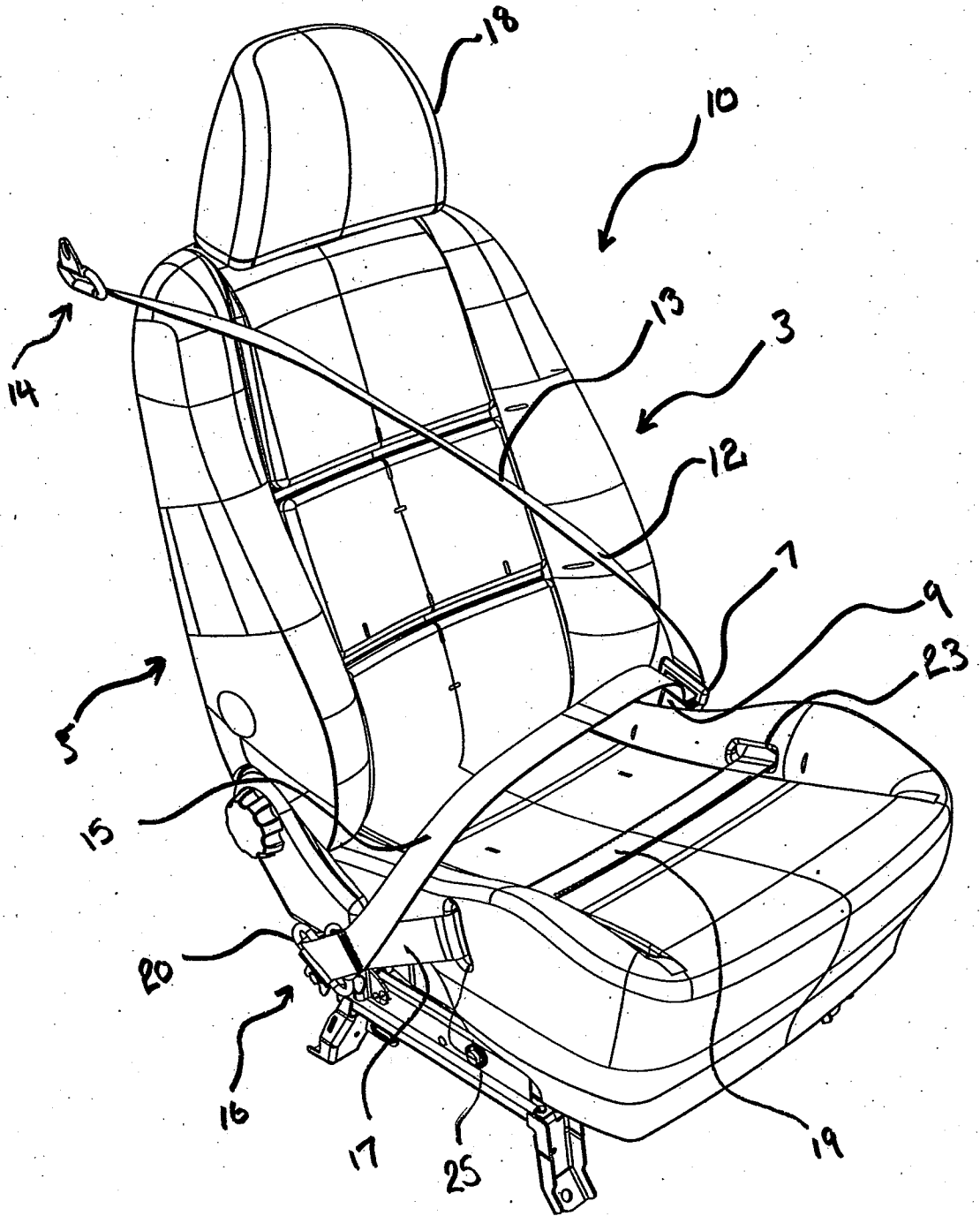


FIGURE 1.

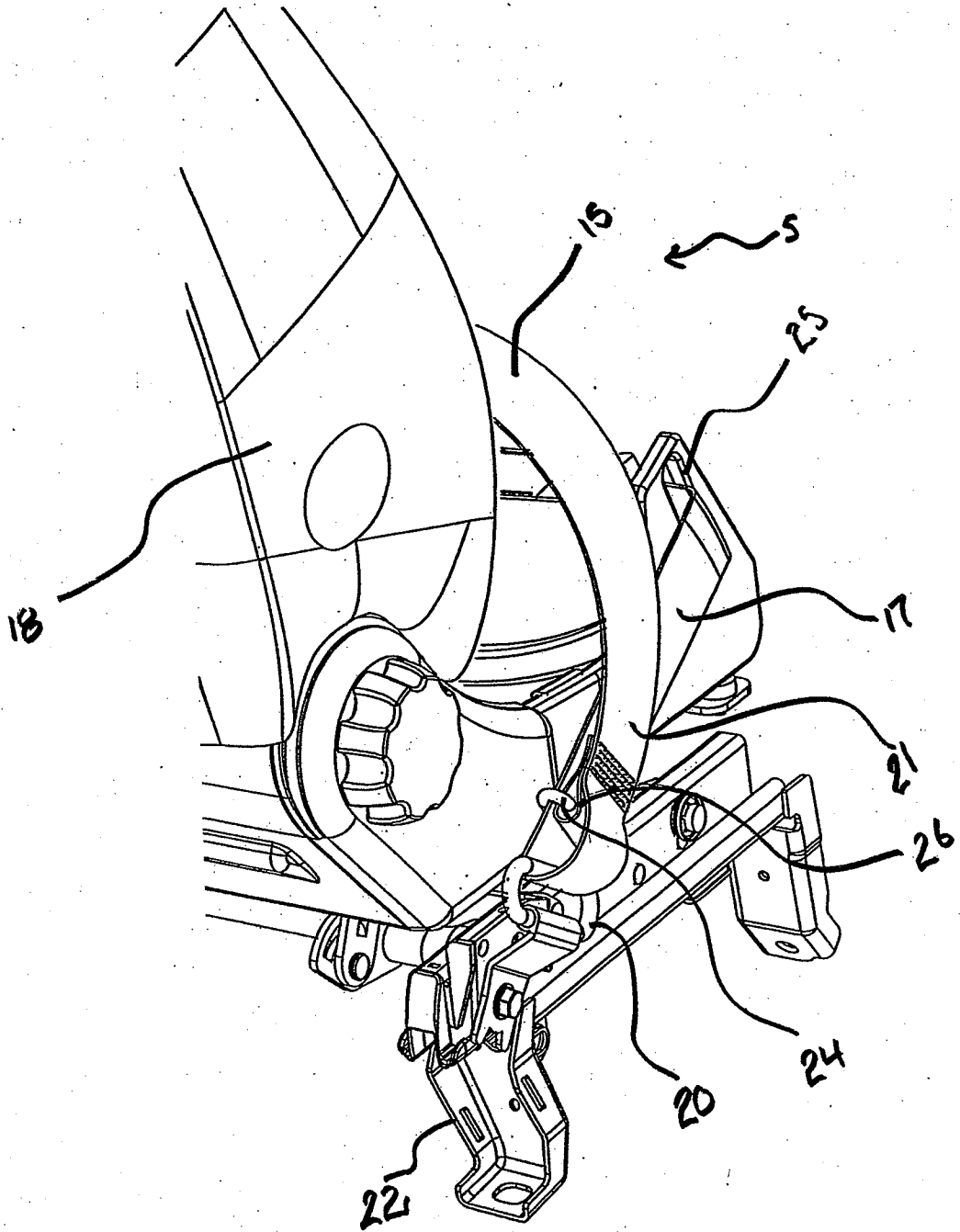


FIGURE 2

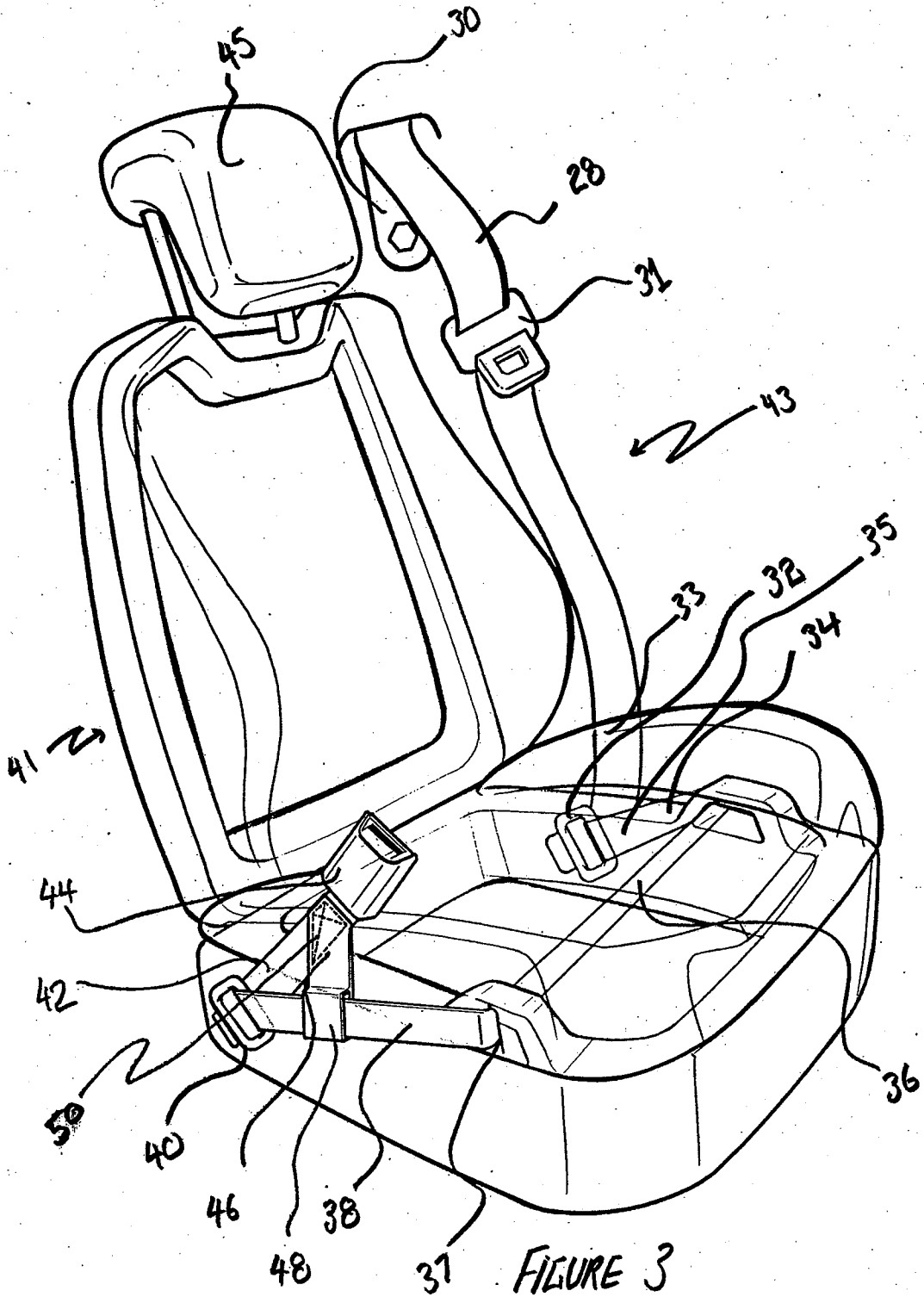


FIGURE 3