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Other: **No search performed: Section 17(5)(b)**

(54) Abstract Title: **Vehicle seat with automatically moving bolster**

(57) A vehicle seat assembly 110 has a rear frame 114 pivotally connected to a seat base, or squab frame 112. Folding the rear frame forward, see figure 4, causes a side bolster 164 to move from a first, in use position to a second folded position wherein said bolster lies substantially flat. A torsion spring 166 acts to bias the bolster to either the in use or fold flat positions. The bolster has a first wire 162 that may be rotatably attached to a front crossbar 136 and is rotatably attached at the opposing end to a rear crossbar 138. A second curved wire 164 is attached to the first wire and is axially curved. Rotation of the first wire 162 with respect to the frame 120a causes the second wire 164 away from the associated side frame 140 and thus rotates the bolster.

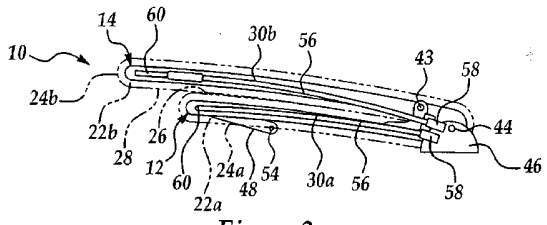

Figure 2

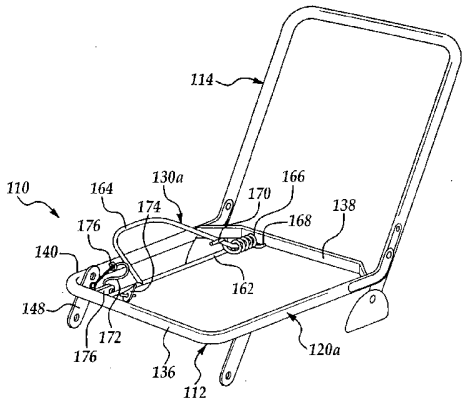

Figure 3

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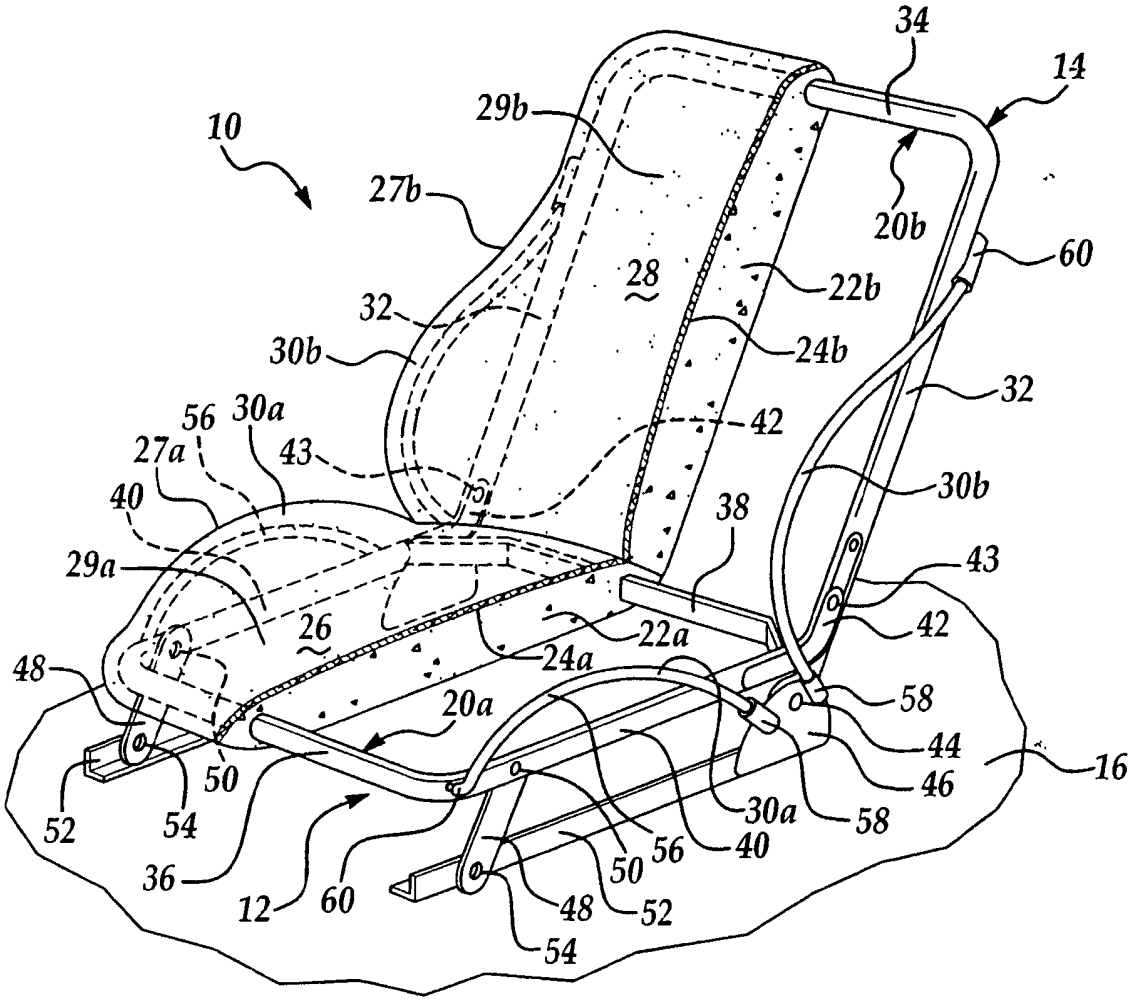

Figure 1

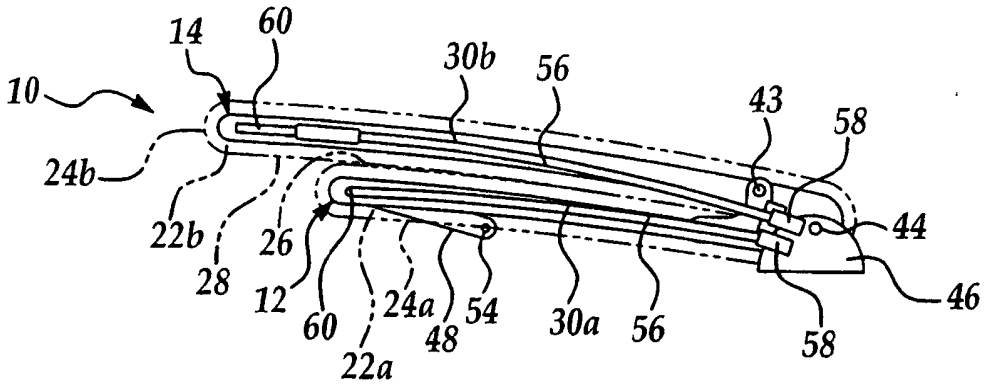

Figure 2

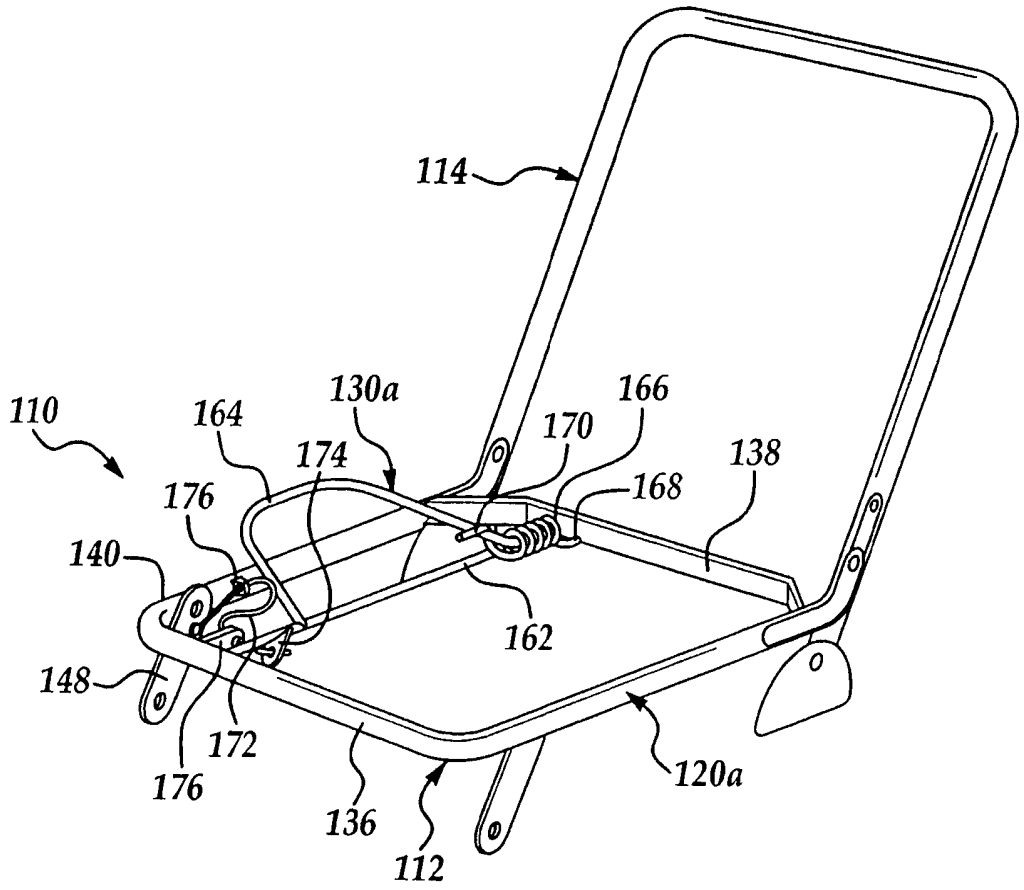

Figure 3

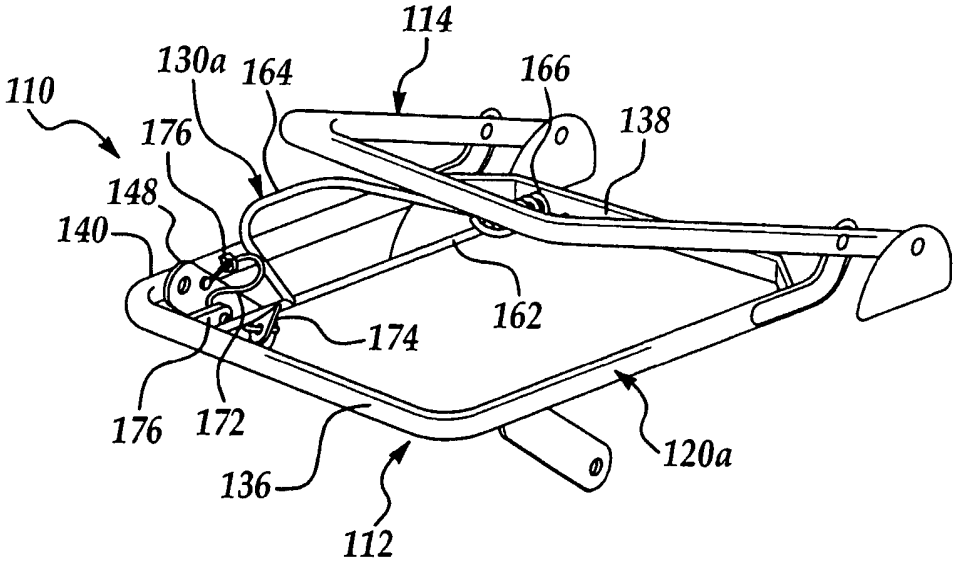

Figure 4

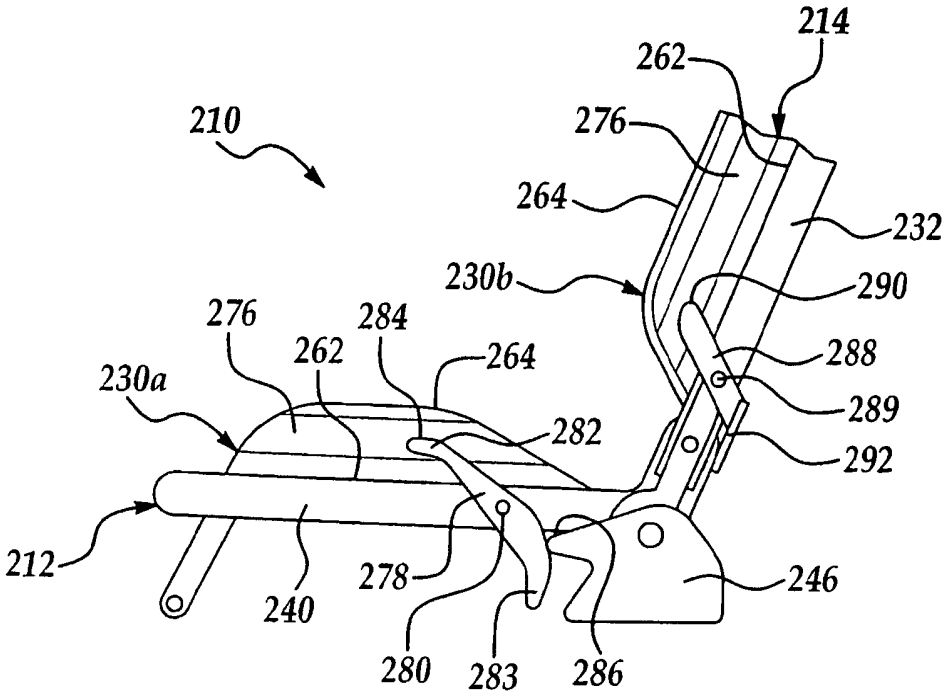

Figure 5

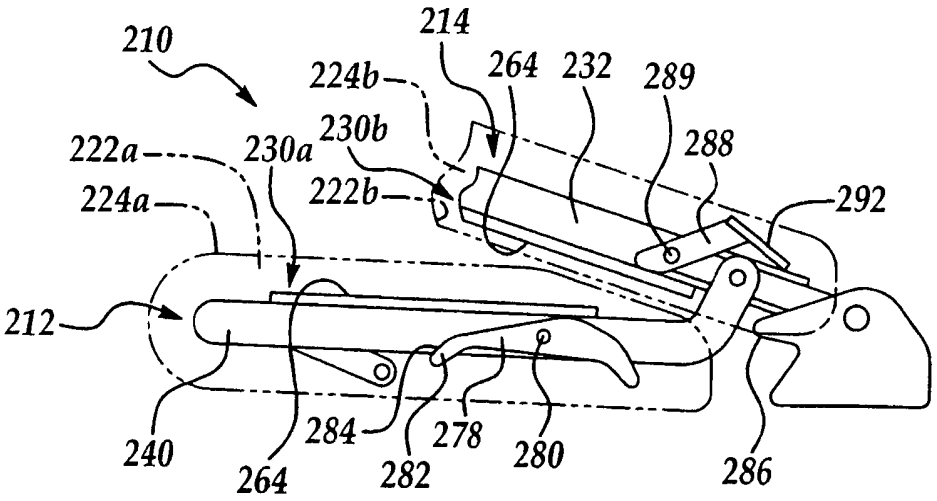

Figure 6

VEHICLE SEAT ASSEMBLY HAVING MOVABLE BOLSTERS

The present invention relates, generally, to a vehicle seat assembly and, in particular, to a vehicle seat assembly having movable bolsters.

A passenger occupying a seat of a vehicle may move in a lateral direction with respect to the seat during, for example, a collision or sharp turn of the vehicle. As a result of such movement, the passenger may impact another passenger or the interior of a wall of the vehicle, which is undesirable.

To reduce lateral movement of the passenger with respect to the vehicle seat, it is known to provide the seatback portion and/or the lower seat assembly of the vehicle seat assembly with one or more bolsters. Typically, the bolsters are disposed on lateral sides of the seat assembly, and the sitting surface curves upwardly at the bolsters to provide for a curved, or "bucket" type, seat. A sitting surface with increased curvature at the bolsters is more likely to reduce lateral movement of the passenger. As such, it is desirable that the bolsters extend sufficiently away from the sitting surface and about the passenger to reduce lateral movement of the passenger while providing for comfort of the passenger as well.

Although extending the bolsters further from the surround seating surface may be desirable for reducing lateral movement of the passenger and for increasing passenger comfort, such bolsters can increase the size of a stowed seat assembly. For example, if a seatback folds down over the lower seat assembly for storage of the seat, the bolsters of the seatback can abut against the lower seat assembly, and/or the bolsters of the lower seat assembly can abut against the seatback, thereby reducing movement of the seatback toward the lower seat assembly. Thus, the further that the bolsters extend away from the surrounding seating surface, the less compact the vehicle seat assembly becomes when the seatback is in the folded position. Thus, there is a need in the related art for a vehicle seat assembly with bolsters that can move such that the seat assembly can be stowed in a more compact configuration. More generally there is a need for an improved or alternative vehicle seat assembly.

According to the present invention there is therefore provided a vehicle seat assmbly as described in the accompanying claims.

In an embodiment of the invention, which addresses the disadvantages in the related art, there is provided a vehicle seat assembly having a lower seat assembly with a lower sitting surface and a seatback with a seatback sitting surface. At least one of the lower seat assembly and the seatback is adapted for movement. The seat assembly also includes at least one bolster adapted for movement to thereby change curvature of at least one of the lower sitting surface and the seatback sitting surface. The bolster automatically moves due to movement of at least one of the lower seat assembly and the seatback.

The seat assembly can be stowed in a more compact manner due to the movable bolsters. Furthermore, the bolsters move automatically during movement of the seatback and lower seat assembly for the convenience of the passenger and to ensure that the bolsters are in a proper position when a passenger occupies the seat assembly.

Other objects, features, and advantages of the present invention will be readily appreciated as the same becomes better understood while reading the subsequent description when taken in conjunction with the accompanying drawings.

The present invention will now therefore be described by way of example only with reference to the following figures in which:

Figure 1 is a partially cut away, perspective view of one embodiment of a vehicle seat assembly of the present invention with the seatback shown in an upright position;

Figure 2 is a side view of the vehicle seat assembly of Figure 1 with the seatback shown in a folded position;

Figure 3 is a perspective view of another embodiment of the vehicle seat assembly of the present invention with the seatback shown in an upright position;

Figure 4 is a perspective view of the vehicle seat assembly of Figure 3 with the seatback shown in a folded position;

Figure 5 is a side view of another embodiment of the vehicle seat assembly of

the present invention with the seatback shown in an upright position; and

Figure 6 is a side view of the vehicle seat assembly of Figure 5 with the seatback shown in a folded position.

Referring now to the drawings, where like numerals are used to designate like structure throughout the figures, one embodiment of a vehicle seat assembly built according to the present invention is generally indicated at 10 in Figures 1 and 2. The seat assembly 10 generally includes a lower seat assembly 12 and a seatback 14, both of which are supported above the floor 16 of a vehicle. At least one of the lower seat assembly 12 and the seatback 14 is adapted for movement as will be discussed in greater detail below. For instance, in the embodiment shown, the seatback 14 can move between an upright position (Figure 1), in which the seatback 14 extends upward perpendicularly from the lower seat assembly 12, and a folded position (Figure 2), in which the seatback 14 is substantially parallel and atop the lower seat assembly 12. As will be described in greater detail below, the lower seat assembly 12 also moves relative to the vehicle floor 16 due to movement of the seatback 14 between the upright and folded positions. Those having ordinary skill in the art will appreciate that the seatback 14 and lower seat assembly 12 could move in any suitable manner relative to the vehicle floor 16 without departing from the scope of the invention. For example, the seatback 14 could fold down toward the vehicle floor 16 after the lower seat assembly 12 has been rotated perpendicularly from the vehicle floor 16, or the seatback 14 and lower seat assembly 12 could move in any other suitable fashion. Also, the seatback 14 and lower seat assembly 12 could move manually or automatically.

The lower seat assembly 12 includes a frame 20a, a cushion 22a, and a trim cover 24b. The seatback 14 similarly includes a frame 20b, a cushion 22b, and a trim cover 24b. The frames 20a, 20b (shown partially in phantom in Figure 1) are generally rigid and provide structural strength for the vehicle seat assembly 10 as will be described in greater detail below. The cushions 22a, 22b (partially shown in Figure 1 and shown in phantom in Figure 2) each provide cushioned support for passengers (not shown) of the vehicle seat assembly 10. The trim covers 24a, 24b (partially shown in Figure 1 and shown in phantom in Figure 2) at least partially cover the respective

cushions 22a, 22b and provide a comfortable surface to sit upon. Each frame 20a, 20b, cushion 22a, 22b, and trim cover 24a, 24b can be made of any suitable material.

The trim cover 24a of the lower seat assembly 12 defines a lower sitting surface 26 which is generally horizontal and that supports the pelvis and thigh area of the passenger. The lower sitting surface 26 includes lateral sides 27a and a middle portion 29a lying between the lateral sides 27a. The trim cover 24b of the seatback 14 defines a seatback sitting surface 28 which is generally vertical when the seatback 14 is in the upright position and supports the passenger's back. The seatback sitting surface includes lateral sides 27b and a middle portion 29b lying between the lateral sides 27b.

At least one of the lower seat assembly 12 and the seatback 14 includes at least one bolster 30a, 30b. For example, in the embodiment shown, the lower seat assembly 12 includes a plurality of bolsters 30a disposed on opposite lateral sides of the lower seat assembly 12. Also, the seatback 14 includes a plurality of bolsters 30b are disposed on opposite lateral sides of the seatback 14. It should be appreciated that the bolsters 30a, 30b of the embodiment shown include the lateral sides of the respective trim cover 24a, 24b, cushion 22a, 22b, and components that will be described in greater detail below that are generally disposed within the respective cushion 22a, 22b.

The bolsters 30a, 30b are adapted for movement to thereby change the curvature of at least one of the lower sitting surface 26 and the seatback sitting surface 28. More specifically, each bolster 30a, 30b is adapted for movement between an extended position (Figure 1) and a retracted position (Figure 2). In the extended position (Figure 1), the bolsters 30a of the lower seat assembly 12 increase the curvature of the lower sitting surface 26 such that the lateral sides 27a of the lower sitting surface 26 curve upward from the middle portion 29a of the lower sitting surface 26. In the retracted position (Figure 2), the bolsters 30a reduce the curvature of the lower sitting surface 26 such that the lateral sides 27a of the lower sitting surface 26 are substantially co-planar with the middle portion 29a of the lower sitting surface 26. Likewise, the curvature of the seatback sitting surface 28 increases when the bolsters 30b of the seatback 14 are in the extended position, and the curvature of the seatback sitting surface 28 is reduced when the bolsters 30b are in the retracted position. When the bolsters 30a, 30b are in the extended position, the bolsters 30a, 30b are positioned partially about the passenger of the vehicle seat assembly 10 to thereby reduce lateral movement of the passenger.

When the bolsters 30a, 30b are in the retracted position, the vehicle seat assembly 10 is more compact for more convenient storage of the vehicle seat assembly 10.

As will be described in greater detail below, the bolsters 30a, 30b automatically move due to movement of at least one of the lower seat assembly 12 and seatback 14. For instance, in the embodiment shown, the bolsters 30a, 30b automatically move away from the extended position and toward the retracted position as the seatback 14 moves away from the upright position and toward the folded position. Also, the bolsters 30a, 30b automatically move away from the retracted position and toward the extended position as the seatback 14 moves away from the folded position and toward the upright position. Those having ordinary skill in the art will appreciate that the bolsters 30a, 30b could automatically move due to mechanical or electrical actuation without departing from the scope of the invention.

Referring still to Figures 1 and 2, specific components of the illustrated embodiment of the vehicle seat assembly 10 will now be discussed. As most clearly seen in Figure 1, the frame 20b of the seatback 14 includes a plurality of side frame members 32 and crossbar 34 connecting the side frame members 32 at upper ends thereof. The frame 20a of the lower seat assembly 12 includes a front crossbar 36 and a rear crossbar 38 which are substantially parallel and separated at a distance. The frame 20a of the lower seat assembly 12 also includes side frame members 40 disposed and attached at opposite ends of the front and rear crossbars 36, 38. The side frame members 40 also include ends 42 that extend past the rear crossbar 38 and curve upward so as to be generally co-axial with the side frame members 32 when the seatback 14 is in the upright position. Each end 42 is pivotally attached at attachment points 43 to a respective side frame member 32 of the frame 20b of the seatback 14.

The seat assembly 10 also includes a plurality of rear brackets 46 shown in Figures 1 and 2. The rear brackets 46 are disposed below the side frame members 32, and each side frame member 32 of the seatback 14 is pivotally attached to a respective rear bracket at pivot point 44. The vehicle seat assembly 10 further includes a plurality of linkages 48. The linkages 48 are each pivotally attached to one of the side frame members 40 at a respective pivot point 50.

The seat assembly 10 also includes a plurality of rails 52, which are operatively supported by the vehicle floor 16. Each of the rear brackets 46 is operatively attached to

one of the rails 52. Also, each linkage 48 is pivotally attached to the rail 52 at pivot points 54. The rails 52 can be of any suitable construction and can allow for movement (such as forward/aft and raising/lowering movement) of the vehicle seat assembly 10 relative to the vehicle floor 16.

As such, when the seatback 14 moves from the upright position (Figure 1) toward the folded position (Figure 2), the seatback 14 rotates about pivot points 44 and this movement pushes the lower seat assembly 12 forward due to forces transferred at the attachment points 43. The lower seat assembly 12 also moves downward toward the floor 16 of the vehicle as the linkages 48 rotate.

As shown in Figures 1 and 2, each bolster 30a, 30b includes at least one flexible member 56 that moves so as to move the bolster 30a, 30b between the extended position and the retracted position. For instance, in the embodiment shown, each flexible member 56 is disposed within the respective cushion 22a, 22b and is preferably flexible and of a fixed length. The flexible members 56 can be made from spring steel, glass reinforced plastic, carbon fiber or any other suitable material.

Each flexible member 56 includes a first end 58 and second end 60. In the lower seat assembly 12, the first end 58 of each flexible member 56 is fixed to a respective rear bracket 46, and the second end 60 of each flexible member 56 is fixed to a respective side frame member 40. In the seatback 14, the first end 58 of each flexible member 56 is fixed to a respective rear bracket 46, and the second end 60 of each flexible member 56 is fixed to a respective side frame member 32.

The relative distance between the first end 58 and the second end 60 of each flexible member 56 changes due to movement of the seatback 14 between the folded and upright positions. More specifically, as the seatback 14 moves from the folded position (Figure 2) to the upright position (Figure 1), the second end 60 of each flexible member 56 moves closer to the first end 58, thereby axially curving the respective flexible member 56. When the flexible member 56 is axially curved, it pushes the respective cushion 22a, 22b and trim cover 24a, 24b such that the respective bolster 30a, 30b is in the extended position. On the contrary, when the seatback 14 moves from the upright position (Figure 1) toward the folded position, the second end 60 of each flexible member 56 moves away from the first end 58 thereby axially straightening the flexible member 56. As such, the respective cushion 22a, 22b and trim cover 24a, 24b

are able to flatten, such that the respective bolster 30a, 30b is in the retracted position. In one embodiment, the flexible members 56 actively pull the cushion 22a, 22b and trim cover 24a, 24b toward the retracted position.

Thus, when the seat assembly 10 is to be stowed, the seatback 14 can be folded, and the bolsters 30a, 30b move into the retracted position. As such, the lower sitting surface 26 and the seatback sitting surface 28 are significantly flattened, thereby allowing the seatback 14 to move closer to the lower seat assembly 16 for more compact stowage of the seat assembly 10. Also, when the seatback 14 is unfolded, the bolsters 30a, 30b move into the extended position to reduce lateral movement of the passenger. Furthermore, the bolsters 30a, 30b move automatically during movement of the seatback 14 and lower seat assembly 12 for the convenience of the passenger and to ensure that the bolsters 30a, 30b are in a proper position when a passenger occupies the seat assembly 10.

Referring now to Figures 3 and 4, another embodiment of the vehicle seat assembly is generally indicated at 110, where like numerals increased by 100 are used to designate like structure with respect to the embodiment illustrated in Figures 1 and 2. In this embodiment, the bolster 130a of the lower seat assembly 112 includes a first wire 162 that is axially straight and is rotatably attached at one end to the front crossbar 136 and is rotatably attached at the opposite end to the rear crossbar 138. The bolster 130a also includes a second wire 164 that is fixed at both ends to the first wire, and is axially curved such that the second wire 164 extends over the respective side frame member 140. To move the bolster 130a from the retracted position to the extended position, the first wire 162 rotates relative to the frame 120a, thereby moving the second wire 164 away from the respective side frame member 140. As such, second wire 164 pushes the foam and trim cover (not shown) outward to increase curvature of the lower sitting surface (not shown). To move the bolster 130a from the extended position and toward the retracted position, the first wire 162 rotates in the opposite direction relative to the frame 120a, thereby moving the second wire 164 toward the respective side frame member 140. As such, the foam and the trim cover are allowed to flatten to reduce curvature of the lower sitting surface 126.

The seat assembly 110 also includes a biasing member 166 that biases the bolster 130a for movement toward either the retracted position or the extended position.

In the embodiment shown, the biasing member 166 is a torsion spring that is wrapped at least partially around the first and second wires 162, 164. The biasing member 166 includes a first end 168 mounted to the rear crossbar 138 and a second end 170 that abuts against the second wire 164 so as to bias the bolster 130a toward the retracted position. It should be appreciated, however, that the biasing member 166 could be of any suitable type and could be disposed in any suitable position.

The seat assembly 110 also includes a cable 172 and a bell crank 174 that is fixed to the first wire 162 of the bolster 130a. Actuation of the bell crank 174 preferably rotates the first wire 162, and thus the bolster 130a, between the extended and retracted positions. The cable 172 is attached at one end to one of the linkages 148, and the cable 172 is attached at the opposite end to the bell crank 174. In the embodiment shown, the cable 172 extends through tabs 176 included in the frame 120a of the lower seat assembly 112.

As the seatback 114 moves from the folded position to the upright position, the linkages 148 rotate as described above in reference to Figures 1 and 2. As the linkages 148 rotate, the tension in the cable 172 increases, and the cable 172 pulls and actuates the bell crank 174 to thereby rotate the bolster 130a toward the extended position against the biasing force supplied by the biasing member 166. When the seatback 114 moves from the upright position toward the folded position, the linkages 148 rotate as described above, and tension in the cable 172 reduces. This allows the biasing member 166 to rotate the bolster 130a from the extended position toward the retracted position.

Those having ordinary skill in the art will appreciate that the bolster 130a shown in Figures 3 and 4 could be representative of each bolster 130a of the lower seat assembly 112. It should also be appreciated that the bolster 130a shown in Figures 3 and 4 could be representative of bolsters of the seatback 114 as well. Furthermore, those having ordinary skill in the art will appreciate that the biasing member 166 could bias the bolster 130a away from the retracted position and toward the extended position and that the cable 172 could automatically rotate the bolster 130a away from the extended position and toward the retracted position as the seatback 114 moves from the upright position toward the folded position.

Referring now to Figures 5 and 6, another embodiment of the vehicle seat assembly is generally indicated at 210, where like numerals increased by 100 are used to

designate like structure with respect to the embodiment illustrated in Figures 3 and 4. The seat assembly 210 includes a plurality of bolsters 230a, 230b associated with the lower seat assembly 212 and the seatback 214, respectively. Although the bolsters 230a, 230b of only one lateral side of the seat assembly 210 is shown in Figures 5 and 6, it should be appreciated that the bolsters 230a, 230b of the opposite lateral side of the seat assembly 210 are substantially similar.

As shown in Figure 5, the bolsters 230a of the lower seat assembly 212 include a first wire 262 and a second wire 264 similar to the bolster 130a shown in Figures 3 and 4. Each bolster 230a also includes an elongate paddle 276 that extends substantially parallel to the side frame members 240 and is attached at each end to the respective second wire 264 of the bolster 230a.

The lower seat assembly 112 further includes a plurality of lower levers 278, each associated with a respective bolster 230a. Each lower lever 278 is pivotally attached at a pivot point 280 to one of the side frame members 240. Each lower lever 278 includes a first end 282 with a bolster camming surface 284. When the first end 282 of the lower lever 278 rotates toward the respective bolster 230a (Figure 5), the bolster camming surface 284 contacts and abuts against the paddle 276, to thereby cam the bolster 230a away from the retracted position and toward the extended position. When the first end 282 of the lower lever 278 rotates away from the bolster 230a, the bolster 230a can move away from the extended position and toward the retracted position as shown in Figure 6.

Each rear bracket 246 includes a lever camming surface 286 that extends toward the respective lower lever 278. The lower seat assembly 212 moves forward and backward relative to the rear brackets 246 as the seatback 214 moves between the upright and folded positions similar to the embodiments described above in relation to Figures 1 - 4. As such, the lower levers 278 of the lower seat assembly 212 move toward and away from the lever camming surfaces 286 of the rear brackets 246 as the lower seat assembly 212 moves.

Accordingly, as the seatback 214 moves from the folded position (Figure 6) to the upright position (Figure 5), the lower levers 278 move toward and eventually abut against the respective lever camming surfaces 286 of the rear brackets. The lever camming surfaces 286 thereby cam and rotate the lower levers 278 about the respective

pivot points 280. As the lower levers 278 rotate, the bolster camming surfaces 284 eventually abut against the paddles 276 and cam the respective bolsters 230a away from the retracted position and toward the extended position. On the contrary, as the seatback 214 moves from the upright position toward the folded position, the lower seat assembly 212 moves away from the rear brackets 246. Once the lower levers 278 are no longer in abutment with the lever camming surfaces 286, the bolsters 230a can move from the extended position toward the retracted position.

The seatback 214 also includes bolsters 230b as shown in Figures 5 and 6. The bolsters 230b include a first wire 262, a second wire 264, and a paddle 276 like the bolsters 230a of the lower seat assembly 212. The seat assembly 210 also includes a plurality of seatback levers 288 that are each pivotally attached at a pivot point 289 to respective side frame members 232 of the seatback 214. Each seatback lever 288 includes a bolster camming surface 290. Also, the seatback levers 288 each include an interference member 292 included at an end opposite to that of the bolster camming surface 290. The interference member 292 is substantially flat and extends transversely from the axis of the seatback lever 288.

As the seatback 214 moves from the folded position (Figure 6) toward the upright position (Figure 5), the side frame members 232 eventually abuts against the interference members 292 thereby limiting the rotation of the seatback levers 288, and the bolster camming surfaces 290 of the seatback levers 288 abut against the paddle 276 of the bolsters 230b, thereby camming the bolsters 230b away from the retracted position and toward the extended position. As the seatback 214 moves away from the upright position and toward the folded position, the side frame members 232 move away from the interference members 292 of the seatback levers 288 thereby allowing the seatback levers 288 to rotate about the pivot points 289 and allowing the bolsters 230b to move from the extended position toward the retracted position.

In the embodiment shown in Figure 6, contact between the bolster 230a of the lower seat assembly 212 and the bolster 230b of the seatback 214 moves the bolsters 230a, 230b away from the extended position and toward the retracted position. In other words, when the seatback 214 moves from the upright position to the folded position, the trim cover 224b at the lateral sides of the seatback 214 contacts the trim cover 224a at the lateral sides of the lower seat assembly 212 to push each of the bolsters 230a,

230b from the extended position toward the retracted position. Those having ordinary skill in the art will appreciate, however, that the bolsters 230a, 230b could be biased toward the retracted position in a manner similar to the bolsters 130a, 130b of Figures 3 and 4.

In summary, each embodiment of the seat assembly 10, 110, 210 of the present invention can be stowed in a more compact manner due to the movable bolsters 30a, 30b, 130a, 130b, 230a, 230b included therein. Furthermore, the bolsters 30a, 30b, 130a, 130b, 230a, 230b move automatically during movement of the seatback 14, 114, 214 and lower seat assembly 12, 112, 212 for the convenience of the passenger and to ensure that the bolsters 30a, 30b, 130a, 130b, 230a, 230b are in a proper position when a passenger occupies the seat assembly 10, 110, 210.

The present invention has been described in an illustrative manner. It is to be understood that the terminology that has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the present invention may be practiced other than as specifically described.

CLAIMS

1. A vehicle seat assembly comprising:

a lower seat assembly with a lower sitting surface;

a seatback with a seatback sitting surface, wherein at least one of said lower seat assembly and said seatback is adapted for movement; and

at least one bolster comprising a first wire and a second wire that is axially curved and is fixed at each end of second wire to the first wire, the first wire being rotatably mounted to one of said lower sitting surface and said seatback sitting surface to allow the second wire and bolster to rotate relative to the respective lower sitting surface or said seatback to thereby change curvature of the respective lower sitting surface and said seatback sitting surface.

2. A vehicle seat assembly as set forth in claim 1 wherein said seatback is adapted to move relative to said lower seat assembly between an upright position and a folded position.

3. A vehicle seat assembly as set forth in claim 2 wherein said bolster automatically rotates as said seatback moves between the upright position and the folded position.

4. A vehicle seat assembly as set forth in preceding claim wherein contact between said seatback and said lower seat assembly as said seatback moves away from the upright position and toward the folded position causes said bolster to rotate.

5. A vehicle seat assembly as set forth in any preceding claim further comprising a biasing member that biases said bolster for movement.

6. A vehicle seat assembly as set forth in claim 5 wherein said biasing member is a torsion spring that is wrapped at least partially around the first wire.

7. A vehicle seat assembly as set forth in any preceding claim wherein at

least one of said lower seat assembly and said seat back further comprises at least one cushion covered by a trim cover, and said rotation of said bolster between the extended position and the retracted position pushes and pulls at least a portion of said cushion and trim cover.

8. A vehicle seat assembly as set forth in any preceding claim wherein each of said lower seat assembly and said seatback include at least one bolster.

9. A vehicle seat assembly as set forth in any preceding claim further comprising a paddle member attached to the second wire.

10. A vehicle seat assembly as set forth in any preceding claim further comprising at least one bolster camming surface that cams roatation of said bolster due to movement of at least one of said lower seat assembly and said seatback.

11. A vehicle seat assembly as set forth in claim 10 further comprising a lever that includes said bolster camming surface, and still further comprising a lever camming surface, wherein said lever moves toward and away from said lever camming surface such that lever camming surface cams movement of said lever, and the bolster camming surface cams said bolster, as said lever moves toward said lever.

12. A vehicle seat assembly as set forth in claim 10 further comprising a lever that includes said bolster camming surface and that includes an interference member that limits rotation of said lever such that said bolster camming surface of said lever cams said bolster.

13. A vehicle seat assembly as set forth in claim 12 wherein the interference member limits rotation of said lever as said seatback moves away from the folded position and toward the upright position such that said bolster camming surface of said lever cams rotation of said bolster.

14. A vehicle seat assembly as set forth in any of claims 1 to 9 wherein the

first wire is adapted to be rotated to rotate the bolster as said seatback moves between the upright position and the folded position.

15. A vehicle seat assembly as in any of claims 1 to 9 or claim 14 further comprising a cable operable to pull and rotate said bolster due to movement of at least one of said seatback and said lower seat assembly.

16. A vehicle seat assembly as in claim 15 wherein the cable is attached to the first wire to rotate the first wire due to movement of at least one of said seatback and said lower seat assembly.

17. A vehicle seat assembly as in claim 16 wherein the cable is attached to the first wire by a bell crank attached to the first wire.

18. A vehicle seat assembly comprising:

a lower seat assembly with a lower sitting surface;

a seatback with a seatback sitting surface, wherein at least one of said lower seat assembly and said seatback is adapted for movement; and

at least one bolster adapted for movement to thereby change curvature of at least one of said lower sitting surface and said seatback sitting surface; and

wherein said bolster automatically moves due to movement of at least one of said lower seat assembly and said seatback.

19. A vehicle seat assembly as set forth in claim 18 wherein said seatback is adapted to move relative to said lower seat assembly between an upright position and a folded position, and wherein said bolster automatically moves between an extended position and a retracted position as said seatback moves between the upright position and the folded position.

20. A vehicle seat assembly as set forth in claim 18 or 19 wherein said bolster includes at least one flexible member with a first end and a second end, and wherein the relative distance between said first end and said second end changes due to

movement of at least one of said lower seat assembly and said seatback.

21. A vehicle seat assembly as set forth in any of claims 18 to 20 further comprising at least one bolster camming surface that cams said bolster due to movement of at least one of said lower seat assembly and said seatback.

22. A vehicle seat assembly as set forth in claim 21 further comprising a lever that includes said bolster camming surface and still further comprising a lever camming surface, wherein said lever moves toward and away from said lever camming surface such that lever camming surface cams said lever and bolster camming surface cams said bolster as said lever moves toward said lever.

23. A vehicle seat assembly as set forth in claim 21 further comprising a lever that includes said bolster camming surface and that includes an interference member that limits rotation of said lever such that said bolster camming surface of said lever cams said bolster.

24. A vehicle seat assembly as set forth in any of claims 18 to 23 further comprising a biasing member that biases said bolster for movement.

25. A vehicle seat assembly as set forth in any of claims 18 to 24 wherein said biasing member is a torsion spring.

26. A vehicle seat assembly as set forth in any of claims 18 to 25 wherein each of said lower seat assembly and said seatback include at least one bolster, and wherein said contact between said bolster of said seatback and said bolster of said lower seat assembly causes movement of said bolster of said seatback and said bolster of said lower seat assembly.

27. A vehicle seat assembly as set forth in any of claims 18 to 26 further comprising a cable operable to pull and rotate said bolster due to movement of at least one of said seatback and said lower seat assembly.

28. A vehicle seat assembly comprising:

a lower seat assembly with a lower sitting surface;

a seatback with a seatback sitting surface, said seatback adapted to move relative to said lower seat assembly between an upright position and a folded position;

wherein at least one of said lower seat assembly and said seatback include at least one bolster adapted for movement between an extended position, wherein curvature of said corresponding one of said lower sitting surface and said seatback sitting surface is increased, and a retracted position, wherein curvature of said corresponding one of said lower sitting surface and said seatback sitting surface is reduced;

wherein said bolster automatically moves away from the extended position and toward the retracted position as said seatback moves away from the upright position and toward the folded position, and wherein said bolster automatically moves away from the retracted position and toward the extended position as said seatback moves away from the folded position and toward the upright position.

29. A vehicle seat assembly as set forth in claim 28 wherein said bolster includes at least one flexible member that moves so as to move said bolster between the extended position and the retracted position.

30. A vehicle seat assembly as set forth in claim 28 wherein said bolster includes at least one flexible member with a first end and a second end, and wherein the relative distance between said first end and said second end changes as said seatback moves between the upright position and the folded position to thereby move said bolster between the extended position and the retracted position.

31. A vehicle seat assembly as set forth in any of claims 28 to 30 further comprising at least one bolster camming surface that cams said bolster as said seatback moves.

32. A vehicle seat assembly as set forth in claim 31 further comprising a

lever that includes said bolster camming surface and still further comprising a lever camming surface, wherein said lever moves toward said lever camming surface when said seatback moves away from the folded position and toward the upright position, thereby causing the lever camming surface to cam said lever such that said bolster camming surface cams said bolster away from the retracted position and toward the extended position.

33. A vehicle seat assembly as set forth in claim 32 further comprising a lever that includes said bolster camming surface and that includes an interference member that limits rotation of said lever as said seatback moves away from the folded position and toward the upright position such that said bolster camming surface of said lever cams said bolster away from the retracted position and toward the extended position.

34. A vehicle seat assembly as set forth in any of claims 28 to 33 further including a biasing member that biases said bolster toward one of the retracted position and the extended position.

35. A vehicle seat assembly as set forth in claim 34, wherein said biasing member is a torsion spring.

36. A vehicle seat assembly as set forth in any of claims 28 to 35 wherein contact between said seatback and said lower seat assembly as said seatback moves away from the upright position and toward the folded position causes said bolster to move away from the extended position and toward the retracted position.

37. A vehicle seat assembly as set forth in any of claims 28 to 36 further comprising a cable operable to pull and rotate said bolster toward one of the retracted position and the extended position upon actuation by said cable.

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Application No: GB0715702.7 **Examiner:** Gareth Jones

Claims searched: 1-37 **Date of search:** 6 August 2008

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-7, 10, 11, 17, 20, 21 at least	WO03/008230 A1 (INTIER AUTOMOTIVE INC) See page 1 lines 1-12, page 4 line 6 - page 5 line 16, page 6 lines 1-9 and all figures.
X	1-3, 10-13, 17, 20, 21 at least	US 2004/0155501 A1 (Mc MILLEN et al) See paras (0036-0042, 0051-0053) and all figures.
X	1-3, 10, 11, 17,20, 21 at least	US 2005/0046252 A1 (Mc MILLEN) See at least paras (0042-0043) and all figures.

Categories:

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

Field of Search:

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

Worldwide search of patent documents classified in the following areas of the IPC

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

International Classification:

Subclass	Subgroup	Valid From
B60N	0002/44	01/01/2006
B60N	0002/64	01/01/2006