A seat assembly having a seat bottom, a seat back, and a head restraint assembly. The head restraint assembly may be disposed on the seat back and may move from a first position to a second position when the seat bottom is rotated about a first axis of rotation with respect to the seat back.
SEAT ASSEMBLY HAVING A FOLDING SEAT BOTTOM AND HEAD RESTRAINT

TECHNICAL FIELD

[0001] The present application relates to a seat assembly having a folding seat bottom and a head restraint.

BACKGROUND

[0002] A seat assembly having a moveable head restraint is disclosed in U.S. Pat. No. 7,210,734.

SUMMARY

[0003] In at least one embodiment a seat assembly is provided. The seat assembly may include a seat mounting bracket, a seat bottom, a seat back, and a head restraint assembly. The seat bottom may be disposed proximate the seat mounting bracket and may be configured to rotate about a first axis of rotation. The seat back may be disposed proximate the seat bottom. The head restraint assembly may be disposed on the seat back and may be configured to move between a first position and a second position. The head restraint assembly may move from the first position to the second position when the seat bottom is rotated about the first axis of rotation with respect to the seat back.

[0004] In at least one embodiment a seat assembly is provided. The seat assembly may include a seat mounting bracket, a seat bottom, a seat back, a head restraint assembly, and an actuator unit. The seat bottom may have a seat bottom frame that is rotatably disposed on the seat mounting bracket. The seat bottom frame may include a cam. The seat back may have a seat back frame that may be disposed on the seat bottom frame. The head restraint assembly may be disposed on the seat back frame and may be configured to move between a first position and a second position. The actuator unit may be disposed on the seat back frame. The head restraint assembly may move from the first position to the second position when the seat bottom is rotated with respect to the seat back and the cam actuates the actuator unit.

[0005] In at least one embodiment a seat assembly is provided. The seat assembly may include a seat mounting bracket, a seat bottom, a seat back, and a head restraint assembly. The seat bottom may have a seat bottom frame that may be disposed on the seat mounting bracket and may rotate about a first axis of rotation. The seat back may be disposed on the seat bottom frame. The head restraint assembly may be disposed on the seat back and may be configured to move between a first position and a second position. The head restraint assembly may move from the first position to the second position when the seat bottom is rotated about the first axis of rotation toward the seat back.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective view of an exemplary seat assembly.
[0007] FIGS. 2-4 are fragmentary side views illustrating movement of the seat assembly.
[0008] FIG. 5 is a fragmentary side view of another embodiment of a seat assembly.

DETAILED DESCRIPTION

[0009] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale; some features may be exaggerated or minimized to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for teaching one skilled in the art to variously employ the present invention.

[0010] Referring to FIG. 1, an exemplary seat assembly is shown. The seat assembly may be configured for use in a vehicle, such as a motor vehicle like a car or truck. In at least one embodiment, the seat assembly may be configured as a rear seat, such as a second or third row seat that may be disposed behind a driver seat. Moreover, the seat assembly may have a bench seat configuration that may include seating positions for multiple occupants.

[0011] The seat assembly may include a seat bottom and a seat back that may cooperate to support a seat occupant. The seat bottom and seat back may each include a trim cover that may provide an exterior surface upon which a seat occupant may sit. Each trim cover may at least partially cover or conceal a cushion.

[0012] Referring to FIG. 2, the seat bottom may include at least one seat mounting bracket and a seat bottom frame.

[0013] The seat mounting bracket may facilitate attachment or mounting of the seat assembly to a mounting surface, such as a floor pan of a vehicle. Two seat mounting brackets may be provided that are disposed along opposing lateral sides of the seat bottom. The seat mounting bracket may be fixedly or removably disposed on the mounting surface.

[0014] The seat bottom frame may be rotatably disposed on the seat mounting bracket to facilitate storage or stowing of the seat assembly. More specifically, the seat bottom and seat bottom frame may be configured to rotate about a first axis of rotation. The seat bottom frame may have a unitary construction or may be assembled from multiple components. In at least one embodiment, the seat bottom frame may include a first frame member and a second frame member.

[0015] The first frame member may have any suitable configuration. For example, the first frame member may be generally U-shaped and may generally extend along front and lateral sides (e.g., left and right sides) of the seat bottom. The first frame member may be provided with wires or any suitable surface to support the cushion.

[0016] In addition, the first frame member may be integrally formed with or fixedly disposed on one or more second frame members. For example, each end of the first frame member may be fixedly disposed on a corresponding second frame member in any suitable manner, such as with one or more fasteners or by welding. In addition, the first frame member may extend from the second frame member such that the first frame member is disposed at an angle with respect to the mounting surface and positioned below the first axis of rotation.

[0017] The second frame member may be configured to rotate about the first axis of rotation. For example, the second frame member may be rotatably disposed on a seat mounting bracket with a mounting feature, such as a pin or bushing. The mounting feature may be fixedly disposed on or integrally formed with the seat mounting bracket.
the second frame member 32 in one or more embodiments. In at least one embodiment, a mounting feature 34 may be provided with each seat mounting bracket 20 such that the mounting features 34 are coaxially disposed along the first axis of rotation 26.

[0017] A cam 36 may also be provided with the seat bottom frame 22. The cam 36 may be located above the first axis of rotation 26 and may facilitate actuation of a head restraint assembly as will be discussed in more detail below. In at least one embodiment, the cam 36 may be fixedly disposed on or with respect to the second frame member 32.

[0018] The seat back 14 may be configured to support the back of a seat occupant. The seat back 14 may include a seat back frame 40 and a head restraint assembly 42. The seat back 14 may or may not be configured to move when the seat bottom 12 is moved. For instance, the seat back 14 may be fixedly disposed on the seat mounting bracket 20 or another mounting surface in embodiments where the seat back 14 does not move in response to actuation of the seat bottom 12. In the embodiment shown, the seat back 14 is configured to move when the seat bottom 12 is moved as will be discussed in more detail below.

[0019] The seat back frame 40 may have a unitary construction or may be assembled from multiple components. In at least one embodiment, the seat back frame 40 may include a pair of side members 50, an upper cross member 52, and a lower cross member 54. The upper and lower cross members 52, 54 may be spaced apart from each other and may interconnect the side members 50.

[0020] The seat back 14 and seat back frame 40 may be configured to move or pivot with respect to a second axis of rotation 56. As such, the seat bottom 12 and seat back 14 may pivot about different axes of rotation when the seat bottom 12 is actuated. For example, the seat back frame 40 may be pivotally coupled to the seat bottom 12 with a bracket 60. In at least one embodiment, the bracket 60 may be generally L-shaped and may include a first arm and a second arm that may extend at an angle from the first arm. The first arm may be fixedly disposed on a side member 50 in any suitable manner, such as with a fastener or by welding. The second arm may be pivotally coupled to a portion of the seat bottom frame 22, such as the second frame member 32. For instance, a mounting feature 62, such as a pin, may be provided to couple the second frame member 32 to the bracket 60. The mounting feature 62 may be coaxially disposed with or extend along the second axis of rotation 56. In addition, the second axis of rotation 56 may be disposed above the first axis of rotation 26.

[0021] The head restraint assembly 42 may be moveably disposed on the seat back frame 40. The head restraint assembly 42 may move in different manners or directions in various embodiments. For instance, the head restraint assembly 42 may rotate about an axis or retract with respect to the seat back 14. The head restraint assembly 42 may include a support post 70 and a headrest 72 that may be disposed on the support post 70. In at least one embodiment, the support post 70 may be fixedly disposed on a portion of the seat back frame 40, such as the upper cross member 52, and the headrest 72 may move with respect to the support post 70. Alternatively, the support post 70 may be moveably disposed on a portion of the seat back frame 40, which may allow the head restraint assembly 42 to be extended away from or retracted toward the top of the seat back 14. An example of an extendable/retractable head restraint assembly is shown in FIG. 1, which shows a headrest 72 in an exemplary retracted position in solid lines and in an exemplary extended position in phantom. In addition, the head restraint assembly may be provided with a thinner profile or “shingle” configuration than is shown in FIG. 1 in one or more embodiments.

[0022] In at least one embodiment, the headrest 72 may be configured to rotate about a third axis of rotation 74. In one or more embodiments, the third axis of rotation 74 may extend substantially parallel to the first and/or second axes of rotation 26, 56. In addition, the third axis of rotation 74 may be coaxially disposed with or may extend substantially parallel to a cross member portion of the support post 70 that may be at least partially disposed in the headrest 72.

[0023] The headrest 72 may include a latching mechanism 76 that may be configured to control movement of the headrest 72. Examples of exemplary latching mechanisms are disclosed in U.S. Patent Publication No. 2010/0283305 which is assigned to the assignee of the present application and is incorporated by reference. In at least one embodiment, the latching mechanism 76 may be disposed in the headrest 72 and may include a biasing member and a moveable latch.

[0024] The biasing member, which may be a torsion spring, may be disposed in the headrest 72 and may be disposed about the cross member of the support post 70. The biasing member may exert a biasing force that may urge the headrest 72 to rotate about the third axis of rotation 74 and toward the seat bottom 12, or in a counterclockwise direction from the perspective shown.

[0025] The latch may also be disposed in the headrest 72 and may move between a latched position and an unlatched position. Rotation of the headrest 72 about the third axis of rotation 74 in at least one direction may be inhibited when the latch is in the latched position. Rotation of the headrest 72 about the third axis of rotation 74 may be permitted when the latch is in the unlatched position. For example, the latch may retain the headrest 72 in a predetermined initial position when in the latched position. Movement of the latch to the unlatched position may release the headrest 72 and allow the headrest 72 to pivot toward the seat bottom 12 in response to the biasing force exerted by the biasing member. In addition, the latching mechanism 76 may be configured to permit manual repositioning of the headrest 72. For instance, the headrest 72 may be manually pivoted back to the initial position where the latch may reset to the latched position. Therefore, manual movement of the headrest 72 until the latch is unlatched.

[0026] An actuator unit 90 may be provided to selectively control movement of the head restraint assembly 42 when the seat bottom 12 is moved with respect to the seat back 14. Various actuator unit embodiments are contemplated. In FIG. 2, the actuator unit 90 may include a lever 92 and a linkage 94. In one embodiment, the lever 92 may be configured to pivot about a lever axis or a fourth axis of rotation 96 and with respect to the seat back frame 42. For example, the lever 92 may be pivotally disposed on a mounting feature such as a pin 98 that may extend along the fourth axis of rotation 96. The pin 98 may be disposed on or engage the bracket 60 or a linkage mounting bracket 100 that may be fixedly positioned with respect to the seat back frame 42.

[0027] In at least one embodiment, the lever 92 may include a first end 110, a second end 112, a first surface 114, and a second surface 116. The first and second ends 110, 112 may be disposed opposite each other and may be disposed on opposite sides of the fourth axis of rotation 96. The first surface 114 may be disposed opposite the second surface 116.
and may extend from the first end 110 to or toward the second end 112. The first surface 114 may face toward and may be configured to engage the cam 36. The first surface 114 may include a convex portion 120 that may extend from the first end 110 and a concave portion 122 that may extend from the convex portion 120. The convex portion 120 may have an apex 124, or point along the convex portion 120 that may be disposed at the greatest distance from the second surface 116.

[0029] The linkage 94 may be configured to transmit force from the lever 92 to the latching mechanism 76 to facilitate movement of the head restraint assembly 42. In at least one embodiment, the linkage 94 may be a cable such as a Bowden cable. A first end of the linkage 94 may be disposed proximate the second end 112 of the lever 92. For instance, the second end 112 of the lever 92 may include a tab having an opening that receives and retains the first end of the linkage 94. A second end of the linkage 94 may be coupled to the latching mechanism 76. For example, the linkage 94 may extend through the seat back 14 and the support post 70 and into the headrest 72 such that a second end is coupled to the latch of the latching mechanism 76. As such, rotation of the lever 92 may actuate the linkage 94 to release the latching mechanism 76 as will be discussed in more detail below.

[0030] Referring to FIGS. 2-4, operation of at least one embodiment of the seat assembly will now be described in more detail. In these figures an outline of seat assembly is shown in phantom. This embodiment is described primarily with respect to an embodiment in which the headrest may move when the seat back is folded toward the seat back, but may also be applied to embodiments in which movement occurs when the seat bottom is unfolded away from the seat back, either alone or in combination with movement when the seat bottom is folded toward the seat back.

[0031] In FIG. 2, the seat assembly 10 is shown in an initial configuration in which the seat bottom 12 is in an unfolded position. The seat bottom 12 may be positioned at a maximum distance from the seat back 14 when in the unfolded position. In addition, the head restraint assembly 42 is shown in an exemplary first position or initial position in which the head restraint assembly 42 is positioned to support the head of a seat occupant. As such, the headrest 72 may generally extend upward or away from the seat bottom 12 when in the first position. Moreover, the latching mechanism 76 may be in a latched position to inhibit movement of the head restraint assembly 42. As such, the latching mechanism 76 may inhibit rotation of the headrest 72 about the third axis of rotation 74. The cam 36 may be positioned near the first end 110 of the lever 92. As such, the cam 36 may generally rest against a portion of the first surface 114 located between the first end 110 and the apex 124.

[0032] In FIG. 3, the seat bottom 12 is shown partially folded toward the seat back 14. As the seat bottom 12 is folded, the seat bottom frame 22 rotates about the first axis of rotation 26. Movement of the seat bottom frame 22 moves the cam 36 along the first surface 114 of the lever 92 toward the apex 124. Movement of the cam 36 toward the apex 124 rotates the lever 92 about the fourth axis of rotation 96 in a clockwise direction from the perspective shown. Rotation of the lever 92 actuates the linkage 94, which moves the latching mechanism 76 from the latched position to the unlatched position, thereby allowing the headrest 72 to rotate about the third axis of rotation 74 and toward the seat bottom 12, or in a counterclockwise direction from the perspective shown. In at least one embodiment, the latching mechanism 76 may be unlatched when the lever 92 is sufficiently rotated about the fourth axis of rotation 96, such as when the cam 36 engages or is disposed proximate the apex 124. In addition, the seat back 14 and seat back frame 40 may begin to pivot about the second axis of rotation 56 when the seat bottom 12 is folded toward the seat back 14 due to the interconnection between the seat back frame 40 and the second frame member 32. The seat back 14 may pivot or rotate toward the seat bottom 12 before the head restraint assembly 42 moves with respect to the seat back 14 in one or more embodiments.

[0033] In FIG. 4, the seat bottom 12 is shown fully folded toward the seat back 14 or in a folded position. As such, the seat bottom 12 and seat bottom frame 22 may be rotated about the first axis of rotation 26 such that the seating surfaces of the seat bottom 12 and seat back 14 face toward and are positioned in close proximity to each other to reduce the package space of the seat assembly 10. In addition, movement of the seat bottom frame 22 moves the cam 36 past the apex 124 such that the cam 36 may be positioned proximate the concave portion 122 of the lever 92. As such, the lever 92 may rotate about the fourth axis of rotation 96 in a counterclockwise direction with respect to FIG. 3 from the perspective shown. The headrest 72 rotates about the third axis of rotation 74 toward the seat bottom 12 and to a second position. The headrest 72 may extend toward and may engage or be positioned in close proximity to the seat bottom 12 when in the second position to reduce the package space of the seat assembly 10. In addition, the seat back 14 and seat back frame 40 are pivoted further about the second axis of rotation 56 and move closer to the seat bottom 12. In one or more embodiments, the seat back 14 and/or seat back frame 40 may be disposed in a substantially vertical position when the seat bottom 12 is fully folded. In addition, the seat bottom 12 and the first frame member 30 may be disposed in a substantially vertical position when the seat bottom 12 is fully folded.

[0034] The head restraint assembly may be returned to the initial configuration by generally reversing the sequence depicted in FIGS. 2-4. For instance, the seat bottom 12 may be manually rotated about the first axis of rotation 26 in a counterclockwise direction from the perspective shown to return the seat bottom 12 and the seat back 14 to the initial positions shown in FIG. 2. Movement of the seat bottom 12 may or may not actuate the headrest 72 from the second position to the first position depending on the configuration of the seat assembly 10. In at least one embodiment, the headrest 72 may not move from the second position to the first position when the seat bottom 12 is unfolded. Rather, the headrest 72 may be manually moved back to the first position where the latching mechanism 76 may reengage the headrest 72 and be in the latched position to inhibit movement of the headrest 72. In at least one other embodiment, the actuator unit 90 may be configured to move the head restraint assembly 42 and/or headrest 72 back to the first position. For example, a second cable may be provided with the actuator unit 90 to pull the headrest 72 back to the first position when the seat bottom is 12 returned to the unfolded position.

[0035] Referring to FIG. 5, a second embodiment of a seat assembly is shown. In this embodiment, the actuator unit 90 includes a switch 130, a wire 132, and an actuator 134. The switch 130 may be mounted on the seat back frame 42 and/or the bracket 60. The switch 130 may be normally open and may include a lever arm 136 and a contact 138. The switch 130 may be configured to close when the cam 36 engages and actuates the lever arm 136 against the contact 138 when the
seat bottom 12 is moved from the unfolded position toward the folded position. An electrical signal or current may then be provided via the wire 132 to the actuator 134. The actuator 134 may be disposed in the head restraint assembly 42 and may be configured as an electrical machine, such as a solenoid or motor. The actuator 134 may actuate the latching mechanism 76 to the unlatched position when the switch 130 is closed to permit the headrest 72 to move as previously described. Moreover, in embodiments in which the actuator 134 is a motor, the electrical signal may be used to move the headrest 72 from the unfolded position to the folded position or vice versa.

[0036] In at least one other embodiment, the head restraint assembly may be configured such that the headrest 72 moves toward or away from the seat back 14 rather than rotating. As such, the headrest 72 may move between a first position or extended position in which the headrest 72 is spaced apart from the top of the seat back 14 and a second position or retracted position in which the headrest 72 is moved toward and may be disposed against the top of the seat back 14. Such movement may be realized by actuating the support post 70 with respect to the seat back frame 40. Such actuation may be accomplished using an actuator unit having one or more cables. An example of such a mechanism is disclosed in U.S. Pat. No. 7,210,734, which is assigned to the assignee of the present application and is incorporated by reference. For example, one or more cables may be used to couple the seat bottom 12 and the support post 70. Folding of the seat bottom 12 may actuate a cable which in turn may pull on the support post 70 and hence retract the headrest 72 toward the top of the seat back 14.

[0037] While exemplary embodiments are described above, it is not intended that these embodiments describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. Additionally, the features of various implementing embodiments may be combined to form further embodiments of the invention.

What is claimed is:

1. A seat assembly comprising:
   a seat mounting bracket;
   a seat bottom disposed proximate the seat mounting bracket and configured to rotate about a first axis of rotation;
   a seat back disposed proximate the seat bottom;
   a head restraint assembly disposed on the seat back and configured to move between a first position and a second position;
   wherein the head restraint assembly moves from the first position to the second position when the seat bottom is rotated about the first axis of rotation with respect to the seat back.

2. The seat assembly of claim 1 wherein the seat back rotates toward the seat bottom when the seat bottom is rotated toward the seat back.

3. The seat assembly of claim 2 wherein the seat back is configured to rotate about a second axis of rotation.

4. The seat assembly of claim 3 wherein the first axis of rotation is spaced apart from and disposed below the second axis of rotation.

5. The seat assembly of claim 3 wherein the second axis of rotation moves with respect to the first axis of rotation when the seat bottom is folded toward the seat back.

6. The seat assembly of claim 3 further comprising an L-shaped bracket that is disposed on the seat back, wherein the L-shaped bracket is coupled to the mounting bracket with a mounting feature that is disposed along the second axis of rotation.

7. The seat assembly of claim 1 wherein the head restraint assembly rotates about a third axis of rotation toward the seat bottom when the head restraint assembly moves from the first position to the second position.

8. The seat assembly of claim 1 wherein the head restraint assembly includes a headrest, wherein the headrest is spaced apart from a top of the seat back when in the first position and wherein the headrest engages the top of the seat back in the second position.

9. A seat assembly comprising:
   a seat mounting bracket;
   a seat bottom having a seat bottom frame that is rotatably disposed on the seat mounting bracket and that includes a cam;
   a seat back having a seat back frame that is disposed on the seat bottom frame;
   a head restraint assembly disposed on the seat back frame that is configured to move between a first position and a second position; and
   an actuator unit disposed on the seat back frame;
   wherein the head restraint assembly moves from the first position to the second position when the seat bottom is rotated with respect to the seat back and the cam actuates the actuator unit.

10. The seat assembly of claim 9 wherein the seat bottom frame is configured to rotate about a first axis of rotation and the seat back frame is configured to rotate about a second axis of rotation.

11. The seat assembly of claim 10 wherein the cam is fixedly disposed along the second axis of rotation.

12. The seat assembly of claim 9 wherein the actuator unit includes a lever and a linkage that has a first end disposed on the lever and a second end that engages the head restraint assembly, wherein the lever is coupled to the seat back frame and configured to rotate about a lever axis of rotation and wherein the cam rotates the lever when the seat bottom is folded toward the seat back.

13. The seat assembly of claim 12 wherein the lever includes a convex portion having an apex, wherein the head restraint assembly moves from the first position toward the second position when the cam is disposed proximate the apex.

14. The seat assembly of claim 13 wherein the lever includes a concave portion disposed adjacent to the convex portion, wherein the lever is disposed proximate the concave portion after the head restraint assembly moves from the first position toward the second position.

15. The seat assembly of claim 9 wherein the actuator unit includes a switch coupled to the seat back frame and an electrical machine disposed in a headrest of the head restraint assembly, wherein the electrical machine permits the head restraint assembly to move from the first position to the second position when the seat bottom is rotated toward the seat back such that the cam closes the switch.
16. A seat assembly comprising:
a seat mounting bracket;
a seat bottom having a seat bottom frame disposed on the
seat mounting bracket and configured to rotate about a
first axis of rotation;
a seat back disposed on the seat bottom frame; and
a head restraint assembly disposed on the seat back and
configured to move between a first position and a second
position;
wherein the head restraint assembly moves from the first
position to the second position when the seat bottom is
rotated about the first axis of rotation toward the seat
back.

17. The seat assembly of claim 16 wherein the head
restraint assembly does not move from the second position to
the first position when the seat bottom is rotated about the first
axis of rotation away from the seat back.

18. The seat assembly of claim 16 wherein the seat is
configured to rotate about a second axis of rotation, wherein
the seat back rotates about the second axis of rotation toward
the seat bottom when the seat bottom is rotated about the first
axis of rotation toward the seat back.

19. The seat assembly of claim 18 wherein the seat back
rotates about the second axis of rotation away from the seat
bottom when the seat bottom is rotated about the first axis of
rotation away from the seat back.

20. The seat assembly of claim 18 wherein the second axis
of rotation moves with respect to the first axis of rotation
when the seat bottom is rotated with respect to the seat mount-
ing bracket.

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