ADJUSTMENT MECHANISM FOR A VEHICLE SEAT HEADREST

An adjustment mechanism (30) comprising elongate, substantially parallel first and second legs (32, 34) adapted to extend substantially vertically from the seatback and into the headrest and along which movement of the headrest in opposite first and second directions relative to the legs occurs. Each leg defines a plurality of notches (92) arranged along its length. First and second locking members (70, 72) each are pivotally connected to the headrest, have a latch (90), and are rotatably biased towards latching positions in which their latches are respectively received in one of the plurality of notches in an adjustment mechanism engaged state. The mechanism also includes an actuator (46, 104) having movement relative to the legs between a first condition into which it is biased and in which it is out of operable engagement with the first and second locking members, and a second condition in which it is in operable engagement with the first and second locking members.
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CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of US Provisional Patent Application No. 61/339,179 filed March 1, 2010, the disclosure of which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to vertically-adjustable automotive vehicle headrests and particularly to adjustment mechanisms therefor.

2. Description of the Related Art

[0003] It is often desirable to provide a vehicle seat with a headrest that is vertically adjustable. Typically, unintentional downward movement of such headrests are selectively fixed against vertical movement by an adjustment mechanism, particularly against downward movement which could otherwise occur under the influence of gravity or other forces, the headrest adjustment mechanism having an engaged state (in which at least downward movement is prevented) and a released state (in which vertical movement of the headrest up and down relative to the seatback is permitted). Some such headrests may be adjusted upwards without movement of the adjustment mechanism from the engaged state to the released state.
Headrest adjustment mechanisms often contain interengaging metal parts that are in direct contact, particularly in the engaged state. The direct metal-to-metal contact of these parts, which are normally subjected to vibration during vehicle operation, may generate objectionable noise. This problem is exacerbated when the headrest adjustment mechanism is located in the headrest itself, which is located directly behind the seat occupant's head. It is desirable to address the aforementioned noise problem while providing the adjustment functionality of prior headrests.

SUMMARY OF THE INVENTION

The present invention provides an adjustment mechanism for controlling adjusting movements of a vehicle seat headrest relative to the vehicle seat seatback that addresses the aforementioned noise problem. It provides an adjustment mechanism including elongate, substantially parallel first and second legs adapted to extend substantially vertically from the seatback and into the headrest and along which movement of the headrest in opposite first and second directions relative to the legs occurs. Each leg defines a plurality of notches arranged along its length. First and second locking members are each pivotably connected to the headrest and have a latch. The first and second locking members are rotatably biased towards latching positions in which their latches are respectively received in one of the plurality of notches in the first and second legs in an adjustment mechanism engaged state. The first and second locking members have rotatable movement away from their respective latching positions towards unlatched positions in which their respective latches are out of contact with the
first and second legs in an adjustment mechanism released state. An actuator for the adjustment mechanism has movement relative to the legs between a first condition into which it is biased and in which it is out of operable engagement with the first and second locking members, and a second condition in which it is in operable engagement with the first and second locking members. Movement of the adjustment mechanism from its engaged state towards its released state is urged by movement of the actuator in its second condition.

[0006] The present invention also provides an adjustment mechanism for controlling adjusting movements of a vehicle seat headrest relative to the vehicle seat seatback, including elongate, substantially parallel first and second metal legs adapted to extend substantially vertically from the seatback and into the headrest and along which movement of the headrest in opposite first and second directions relative to the legs occurs. Each leg defines a plurality of notches arranged along its length. First and second locking members are each pivotably connected to the headrest and have a latch, the first and second locking members are rotatably biased towards latching positions in which their latches are respectively received in one of the plurality of notches in the first and second legs in an adjustment mechanism engaged state. The first and second locking members have rotatable movement away from their respective latching positions towards unlatched positions in which their respective latches are out of contact with the first and second legs in an adjustment mechanism released state. Each of the locking members has a body including a metal portion that defines the locking member latch, and a silencer of a dampening material softer than the metal portion that partially covers
the metal portion. In the adjustment mechanism engaged state the silencer extends between an upper edge of the metal portion defining the latch and its respective leg when the locking member latch is received in a notch and during headrest movement in the first direction relative to the legs. In the adjustment mechanism engaged state headrest movement in the second direction relative to the legs is opposed by metal-to-metal contact between the latch and the notch in which it is received.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0007] To accomplish the above and related objects, the invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific constructions illustrated. Moreover, it is to be noted that the accompanying drawings are not necessarily drawn to scale or to the same scale. In particular, the scale of some of the elements of the drawings may be exaggerated to emphasize characteristics of the elements.

[0008] Various other objects, features and attendant advantages of the present invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same, similar or corresponding parts throughout the several views, and wherein:

[0009] Figure 1 is a fragmentary front perspective view of a seat assembly having a headrest that includes a first embodiment headrest adjustment mechanism module, the padded headrest upholstered portion shown semi-opaque;
[0010] Figure 2 is rear plan view of the module shown in Figure 1 with the
module housing rearward part removed, the headrest in its lower-most position and the
headrest adjustment mechanism shown in an engaged state;

[0011] Figure 3 is similar to Figure 2, but showing the headrest adjustment
mechanism in a released state;

[0012] Figure 4 is similar to Figure 2, with the headrest adjustment mechanism in
an engaged state, but showing the headrest in its upper-most position and additional
characteristics of the adjustment mechanism;

[0013] Figure 5 is an enlarged, fragmented partial rear plan view of headrest
adjustment mechanism in an engaged state;

[0014] Figure 6 is a fragmented partial top view of the headrest adjustment
mechanism shown in Figure 1;

[0015] Figure 7 is a fragmented partial front perspective view of the headrest
adjustment mechanism shown in Figure 6;

[0016] Figure 8 is a fragmented top view of the headrest adjustment mechanism
shown in Figure 6;

[0017] Figure 9 is an enlarged fragmented partial rear view of the headrest
adjustment mechanism shown in Figure 6;

[0018] Figure 10 is similar to Figure 3, but showing a second embodiment
headrest adjustment mechanism module, the adjustment mechanism in a released state;
[0019] Figure 11 is similar to Figure 10, but showing a third embodiment headrest adjustment mechanism module, the adjustment mechanism in a released state.

[0020] While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and may herein be described in detail. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT(S)

[0021] Figure 1 shows automotive vehicle seat assembly 20 that includes seat back 22 and vertically-adjustable headrest 24 which is attached to seat back 22 through bar 26 which is fixed relative to the seatback. Bar 26, which may be of substantially circular cross-section, supports and is part of headrest 24, which further includes first embodiment headrest adjustment mechanism module 28 slidably attached to bar 26. A portion of bar 26 is disposed within and captured by module 28. Headrest adjustment mechanism 30 is generally housed within module 28 but includes portions of bar 26 and an actuator which project therefrom.

[0022] Bar 26 is substantially U-shaped, and includes first leg 32 and second leg 34 which depend downwardly into seat back 22, wherein they are fixed in position relative to seat back 22. Extending between the upper ends of first and second bar legs
32, 34 is horizontally extending intermediate arm 36. Radiused corners 38 of bar 26 form the junctures between legs 32, 34 and intermediate arm 36.

[0023] Housing 40 of module 28 includes a first, forward housing part 42 and a second, rearward housing part 44 which are respectively disposed on the opposite front and rear sides of bar 26 (relative to seat orientation as installed in a vehicle) and are slidably attached thereto. Thus, portions of bar legs 32, 34, and bar intermediate arm 36, are slidably disposed within module housing 40. First and second housing parts 42, 44 are attached together about bar 26, and housing 40 is fixed to the surrounding upholstered portion 45 of headrest 24 in which module 28 is installed. First and second housing parts 42, 44 are preferably molded plastic but may be stamped sheet metal. Bar 26 may be formed of steel rod.

[0024] Headrest adjustment mechanism 30 is actuated through push button 46 which is slidably disposed within collar 48, collar 48 having flange 50 which is disposed on the outer side surface 52 of headrest 24 as shown in Figures 1 and 2. Button 46 extends and is axially moved along substantially horizontal axis 54, and forms part of the adjustment mechanism actuator. Notably, the lateral side of headrest 24 on which push button 46 and collar 48 are located may be either the left or the right side of headrest 24. It is envisioned that a common module 28 design may be reversely oriented for use in headrests for both right and left-side seats. In other words, module housing first part 42 may be a forward part (as shown) or a rearward part, and module housing second part 44 may be a rearward part (as shown) or a forward part, with button 46 and flange 50 typically facing the location of passenger ingress and egress. The upholstered portion 45
of headrest 24 may be unique to each side of the vehicle, depending on its shape and covering, and the orientation of module 28. With reference to Figure 1, which shows a front perspective view of headrest 24, seat assembly 20 typically would be located on the left hand side of the vehicle.

[0025] With reference to Figure 2, module housing 40 has upper end wall 56 which extends substantially horizontally and terminates at its laterally opposite ends at housing corners 58 that are substantially complimentary to radiused corners 38 of bar 26. Headrest 24 is adjustably moveable between the limits of its vertical adjustment range in directions indicated by double-headed arrow 60, which has component up and down or first and second directions 60u and 60d respectively indicated by arrow 60. In Figures 2 and 3, headrest 24 is shown in its lower-most position, in which intermediate arm 36 of bar 26 and housing end wall 56 of module housing 40 are adjacent and may abut.

[0026] As shown in Figure 2, first and second housing parts 42, 44 each include upper bosses 62 and lower bosses 64 through which, when housing parts 42 and 44 are mated to each other, a fastener such as a rivet or screw may be inserted to secure the module housing parts together. The periphery of each of housing parts 42 and 44 has flanges 65 located on the outside of U-shaped bar 26 and in which holes 66 are located. Holes 66 of the housing parts 42, 44 are aligned, and fasteners such as rivets or screws may be received therethrough and used to secure the first and second module housing parts 42, 44 together.

[0027] First housing part 42 has a pair of pivot standards 68 that extend from its interior surface into the interior of module housing 40. Referring to Figures 2 and 3,
pivot standards 68 are positioned on axis 69, which is substantially parallel with axis 54. First and second locking members 70, 72, which are preferably stamped sheet metal but may be powdered metal parts, are pivotably disposed on pivot standards 68 and are rotatable thereabout as headrest adjustment mechanism 30 is moved between its engaged state E (Figure 2) and released state R (Figure 3), the pivot standards 68 establishing pivot centers of their respective first and second locking members 70, 72. The upward movement of headrest 24 relative to bar 26 is limited by the abutting engagement of bar intermediate arm 36 and the upper surface of the outer periphery of bosses 62 within housing 40 as shown in Figure 4, which shows headrest 24 in its upper-most position and mechanism 30 in its engaged state E.

[0028] In the released state R of mechanism 30, headrest 24 is permitted to move relative to bar 26 in both directions 60u, 60d of arrow 60 between its upper and lower limits. In the engaged state E of mechanism 30, headrest 24 may be pulled upwardly, in the direction 60u of arrow 60, relative to bar 26 but is prevented from moving downwardly, in the direction 60d of arrow 60, relative to bar 26, as discussed further below. In other words, the headrest 24 is moveable in the first 60u and second 60d directions relative to the legs 32, 34 in the adjustment mechanism released state R; the headrest 24 is moveable in the first direction 60u relative to the legs 32, 34 in the adjustment mechanism engaged state E; and the headrest 24 is immoveable relative to the legs 32, 34 in the second direction 60d in the adjustment mechanism engaged state E.

[0029] Projecting into the interior of module housing 40 from the interior surface of first module housing part 42 are a pair of abutment standards 74 each respectively
located just inboard of bar first and second leg 32, 34, and a pair of spring standards 76. Arm 78 of first locking member 70 extends upwardly from the connection to its pivot standard 68 and is operatively connected to its respective spring standard 76 through first biasing member or tension spring 82. Similarly, arm 80 of second locking member 72 extends upwardly from the connection to its pivot standard 68 and is operatively connected to its respective spring standard 76 through second biasing member or tension spring 84. Thus, the lower portions of first and second locking members 70, 72 are biased towards abutment standards 74. During assembly of module 28, prior to bar 26 being positioned into first part 42 or second part 44 of housing 40, the lower ends of first and second locking members 70, 72 are biased by their respective springs 82, 84 into abutting contact with abutment standards 74, which limit the laterally outward rotation of locking members 70, 72 about pivot standards 68. Once assembly of module 28 and mechanism 30 is complete, abutment standards 74 and the lower portions of locking members 70, 72 with which they were previously in abutting contact, are maintained out of contacting engagement to preclude rattling contact therebetween. The spaced arrangement between abutment standards 74 and locking members 70, 72 is maintained in the adjustment mechanism engaged state E by the abutting engagement between bar legs 32, 34 and the respective latches 90 of locking members 70, 72, the latches 90 described further below.

[0030] Between its connection to pivot standard 68 and its lowermost end, first locking member 70 has generally elongate body 86. Similarly, between its connection to pivot standard 68 and its lowermost end, second locking member 72 has generally
elongate body 88. Projecting from each of bodies 86, 88 in a laterally outward direction toward bar legs 32, 34, respectively, is triangular latch portion 90 which in the mechanism's engaged state E may be received in one of a series of notches 92 that are aligned axially along each of bar legs. The series of notches 92 in bar legs 32, 34 are positioned such that a corresponding notch 92 in one the legs is horizontally aligned with its corresponding notch in the other leg. In engaged state E, locking members 70, 72 have a locking position in which their latches 90 are in contact with legs 32, 34, and as the latches are moved upwardly along the legs and become aligned with notches 92, they are each received in the aligned notch of the contacted leg.

[0031] As mentioned above, in the engaged state E of mechanism 30, headrest 24 is permitted to be pulled upwardly relative to bar 26 in direction 60u of arrow 60, but is prevented from moving downwardly in direction 60d. Notches 92 in each leg 32, 34 are arranged in a sawtooth manner, as best shown in Figure 5, with each notch 92 having an oblique, lower retention surface 91 and an oblique, upper ramped surface 93. These lower and upper surfaces 91, 93 may be planar and may form a right or an oblique angle relative to each other. Each latch 90 has a lower engagement surface 87 and an oblique upper ramped surface 89 that respectively generally complement the lower and upper surfaces 91, 93 of notches 92, although the latch lower surface 87, when mechanism 30 is in its engaged state E, is substantially horizontal or parallel to axis 69. The notch lower retention surfaces 91 of each bar leg 32, 34 lie in planes that are at angles Θ of approximately 25° from horizontal and relative to axis 69, and the notch lower retention surface 91 of one of the notches 92 is in superposed, abutting engagement with the
substantially horizontal, lower retention surface 87 of the latch 90 received in that notch, near the corner 103 that the latch lower surface 87 forms with the latch upper surface 89, when mechanism 30 is in its engaged state E. So configured, latches 90 may be rotated about pivot standards 68 out of the notches 92 in which they are received without requiring movement between the headrest 24 and the bar 26 (e.g., without requiring that the operator lift the headrest or support its weight) prior to the disengagement of the latches 90 from the notches 92; and the abutment between the substantially horizontal latch lower engagement surface 87, near corner or tip 103, and the downwardly angled notch lower retention surface 91, prevents the downward movement of headrest 24 relative to bar 26 in mechanism engaged state E. The sliding engagement between the upper ramped surfaces 89 of latches 90 and legs 32, 34 permits the upward movement of headrest 24 relative to bar 26 in mechanism engaged state E. During upward headrest movement in engaged state E, which results from the upholstered portion 45 of headrest 24 being moved manually vertically away from seat back 22, the locking members 70, 72 are pivotably moved about pivot standards 68 against and with the bias of tensioned biasing members or tension springs 82, 84 as latches 90 are moved out of and into adjacent notches 92 in the series of notches in bar legs 32, 34. In other words, the latches 90 are received into each horizontally-aligned pair of notches 92 in bar legs 32, 34 they encounter, and are forced out of each pair of notches they pass, as the headrest is raised in direction 60u.

[0032] Push button 46 includes first and second fingers 96, 97 that straddle bar first leg 32 and a portion of body 86 of first locking member 70. In the engaged state E,
terminal end 98 of button first finger 96 is normally out of abutting contact with side
surface 95 of engagement boss 94. The flat terminal end 98 of button first finger 96 is
brought into abutting contact with the parallel, interfacing side surface 95 of engagement
boss 94 as button 46 is depressed. Referring to Figures 2-4, further depression of button
46 forces rotation of first locking member 70 counter-clockwise about its pivot standard
68 against the bias of tension spring 82, which forces tip 103 of latch 90 downward and
along the notch lower retention surface 91 and out of notch 92 in bar first leg 32.

[0033] Referring to Figures 6 and 8, body 86 of locking member 70 includes an
engagement boss 94 connected thereto that extends along an axis 101 in a direction
substantially perpendicular to axis 54 along which push button 46 moves. Engagement
boss 94 includes a flat side surface 95 extending between body 86 and the free end of
boss 94 which, as shown, defines retention shoulder 99 extending from surface 95 that
prevents finger 96 of button 46 from bending away from body 86 along axis 101 and
slipping from surface 95 over the terminal end of boss 94. Thus, button finger terminal
end 98 is prevented from being forced out of engagement with boss surface 95 when
button 46 is subjected to crucial axial loads along axis 54.

[0034] Referring to Figures 2-4, the first module housing part 42 includes a pair
of slide bosses 100 projecting from the interior surface thereof and into the interior of
module housing 40. Preferably, slide bosses 100 lie on push button axis 54 as shown.
Slots 102 of substantially planar release link 104, which extend in parallel with axis 54,
receive and are slidably engaged with slide bosses 100. Release link 104, which is
preferably made of molded plastic but may be stamped sheet metal, may also be retained
in sliding engagement with module housing first part 42 through hooks 106 that are formed in the housing first part, as shown. Release link 104 and button 46, which move together, comprise the adjustment mechanism actuator.

[0035] As best seen in Figures 2-4, release link 104 has a central spring slot 108 that extends in parallel with and preferably, as shown, along axis 54. Disposed in spring slot 108 is third biasing member or compression spring 110. Spring boss 112 projects from the interior surface of housing first part 42 and into the interior of housing 40, and is slidably disposed in release link spring slot 108. Boss 112 retains one end of compressed biasing member 110. Release link 104 includes a tab 109 extending from one end of spring slot 108, toward spring boss 112, and retains the opposite end of compression spring 110. Rightward movement of release link 104 as shown in Figures 2-4 compresses spring 110, and release link 104 is guided in directions along axis 54 by the sliding engagement of slots 102 with slide bosses 100 and of spring slot 108 with spring boss 112, and of release link 104 with hooks 106.

[0036] Referring to Figures 6-8, release link 104 includes engagement tip 114 that is biased by third biasing member or compression spring 110 into continuous abutting engagement with flat terminal end 115 of button second finger 97. Button 46 is biased outwardly along axis 54 by compression spring 110. Depressing button 46 forces release link 104 in a direction parallel with axis 54 against the biasing force of compression spring 110. As shown, release link engagement tip 114 and abutting button finger terminal end 115 are both elongate, longitudinally crossed, and together define a plane 105 that is substantially normal to axis 54 and moves axially therealong.
with button 46, the movements of release link 104 and button 46 being united through their continuous engagement in plane 105. Button 46 and release link 104 together form the actuator for adjustment mechanism 30.

[0037] Release link 104 includes leg 116 that extends upwardly and rightwardly as viewed in the Figures toward arm 80 of second locking member 72. Release link leg 116 has an end surface 118 defined on a substantially vertically extending linear edge of the arm 116 that is spaced from the adjacent, superposed curved edge 120 of arm 80 of second locking member 72 in the button released condition BR, but which is brought into engagement with curved edge 120 as button 46 is depressed and the button and release link 104 are moved rightwardly along axis 54 as viewed in Figures 2-4.

[0038] Herein, the button's first, normal, released condition is referred to as the actuator BR condition, and is one in which depression of the push button from a location outside of the headrest is absent. One of ordinary skill in the art will understand from the foregoing that depressing push button 46 along axis 54 and out of the actuator BR condition will induce immediate movement of release link 104 along axis 54 against the biasing force of compressed biasing member 110, due to the continuous abutting engagement between button finger terminal end 115 and release link engagement tip 114 as best understood with reference to Figures 6-8.

[0039] It will also be understood by one of ordinary skill in the art that continued depressing motion of button 46 closes the separation between terminal end 98 and engagement boss surface 95 of first locking member 70 and bring them into abutment, establishing a second condition in which the continued depressing motion of button 46
imparts counterclockwise rotation of member 70 about its respective pivot standard 68 against the biasing force of tension spring 82. The imparted counterclockwise rotation of member 70 brings its latch 90 out of engagement with notch 92 in bar first leg 32 as shown in Figure 3.

[0040] It will further be understood by one of ordinary skill in the art that the continued depression motion of button 46 and release link 104 closes the separation between end surface 118 of release link leg 116 and curved edge 120 of arm 80 of second locking member 72, and brings them into abutment, establishing a second condition in which the continued depressing motion of button 46 imparts clockwise rotation of member 72 about its respective pivot standard 68 against the biasing force of tension spring 84. The imparted clockwise rotation of member 72 brings its latch 90 out of engagement with notch 92 in bar second leg 34, as shown in Figure 3. Once locking members 70, 72 are rotated into their respective unlatched positions, in which their respective latches 90 are out of contact with legs 32, 34, mechanism 30 is in its released state R.

[0041] Normal vehicle operation typically occurs with the headrest adjustment mechanism 30 in its engaged state E, its button 46 released and the actuator in its BR condition. Rattling during vehicle operation due to intermittent contact between interengageble component parts located in the vehicle seat headrest would be objectionable, and particularly so due to the proximity of these components to the seat occupant's ears. Headrest 24 minimizes the possibility of rattling by providing for the continuous biasing force of compression spring 110 that induces continuous abutting
engagement of button finger terminal end 115 and release link engagement tip 114; and for separation between release link leg end surface 118 and arm curved edge 120 of second locking member 72, and between button finger terminal end 98 and interfacing surface 95 of engagement boss 94, in the engaged state E, with the actuator in its BR condition (i.e., button 46 released and not depressed). Thus, it is ensured that no rattling between these respectively engaging components of adjustment mechanism 30 occurs during vehicle operation, when the actuator is in its BR condition.

[0042] Thus, mechanism 30 is moved from its engaged state E to its released state R as latches 90 are forced substantially simultaneously out of position within their respective notches 92 in bar legs 32, 34. In the released state R, headrest 24 may be moved vertically up or down relative to bar 26 and seatback 22 in either direction 60u or 60d of arrow 60. Figure 3 shows first and second contact regions 140 and 142 in which button finger 96 is in engagement with surface 95 of engagement boss 94 on first locking member 70, and release link leg 116 is in engagement with curved surface 120 of second locking member 72, respectively, during movement from the engaged state E to the released state R. The respective abutting contact in regions 140, 142 is maintained while button 46 is held depressed and mechanism 30 is in its released state R.

[0043] As more particularly shown in Figure 4, when button 46 is depressed and moved along axis 54 the above-described rotation of first locking member 70 is counterclockwise about its engaged pivot standard 68 and rotation of second locking member 72 is clockwise about its respective pivot standard 68, as respectively indicated by arrows 144 and 146. Those of ordinary skill in the art will appreciate that the opposite
directions of rotation of locking members 70, 72 about their respective pivot standards 68, respectively indicated by arrows 144, 146 in Figure 3, is accomplished by contact regions 140, 142 being on opposite sides of axis 69. That is, the actuator comprising button 46 and release link 104 is in operable engagement with the first and second locking members 70, 72 only in their respective contact regions 140, 142 that located on opposite sides of axis 69 that extends between the locking member pivot centers defined by pivot standards 68.

[0044] When button 46 is released, compression spring 110 forces button 46 toward the actuator normal, released condition BR. In actuator condition BR, the end 122 of button 46 may be flush with collar flange 50. Preferably, however, button end 122 projects axially outward from flange 50 when the actuator is in its normal, released condition BR, which facilitates button activation, i.e., its depression, by the operator’s entire palm, rather than requiring single digit actuation.

[0045] As button 46 returns toward its normal, released position in actuator condition BR, first tensioned biasing member 82 biases body 86 of first locking member 70 toward bar first leg 32, and latch 90 may then be received in a notch 92 of bar first leg 32; meanwhile, second tensioned biasing member 84 biases latch 90 of second locking member 72 toward bar second leg 34, whereby latch 90 may then be received in a notch 92 of bar second leg 34. Thus, mechanism 30 is returned to its engaged state E.

[0046] Referring to Figure 10, second embodiment headrest adjustment mechanism module 28a has headrest adjustment mechanism 30a in which springs 82, 84, and 110 of mechanism 30 have been omitted. First tension spring 82 and third
compression spring 110 are replaced by first biasing member or elastic band 124 which extends about arm 78 of first locking member 70 and about hook 136 provided on release link 104. First elastic band 124 is maintained in tension at all times, and is routed about spring standard 76 disposed between first arm 78 and hook 136. Second biasing member or tension spring 84 is replaced by second biasing member or elastic band 126 which extends about arm 80 of second locking member 72 and about spring standard 76 disposed between arm 80 and release link 104. Second elastic band 126 is also maintained in tension at all times. Headrest adjustment mechanism 30a functions substantially identically to mechanism 30, and except as noted above their structures are also substantially identical.

[0047] With reference to Figure 11, in third embodiment headrest adjustment mechanism module 28b having adjustment mechanism 30b, first biasing member or elastic band 124 is adapted to bias release link 104 only, and second biasing member or elastic band 126 is adapted to engage both locking members 70, 72 at a location above axis 69, biasing their arms 78, 80 together. First and second elastic bands 124, 126 of the second and third embodiment adjustment mechanisms are tensioned biasing members that are maintained in tension at all times. Headrest adjustment mechanism 30b functions substantially identically to mechanism 30a, and except as noted above their structures are also substantially identical.

[0048] With regard to each embodiment of the headrest adjustment mechanism 30, 30a, 30b disclosed herein, body 86, 88 of first and second locking members 70, 72 each includes a rubber or plastic silencer 130 which is fitted about and is over-flush with
the metal portion of the body 86, 88. Silencer 130 forms engagement boss 94 extending from body 86 as best shown in Figures 6 and 8. Silencer 130 insulates against direct metal-to-metal contact between operatively engaging parts of adjustment mechanism 30, 30a, 30b which could otherwise cause rattling or other objectionable noises while they are in intermittent contact, at least during the engaged state E.

[0049] Silencer 130 dampens noise that would otherwise result from contact between interengaged parts of mechanism 30, 30a, 30b. As can be best understood with reference to Figures 5 and 9, which shows locking member 70, silencer 130 is over-flush with the metal portion of its body 86. Silencer 130 is similarly configured with respect to the metal portion of body 88 of locking member 72. With respect to both locking members 70 and 72, it is preferred, however, that silencer 130 be over-flush only on the ramped upper surfaces 89, and not on retention surfaces 87 of latches 90. The over-flush portion of latch ramped upper surface 89 defined by silencer 130 is preferably in contact with bar 26 when latches 90 are received in notches 92 and when headrest 24 is moved upwards while in the engaged state E.

[0050] Silencer 130 dampens the noise that would otherwise result from direct, metal-to-metal contact between latches 90 and notches 92, by extending beyond the ramped upper edge of the metal portion of body 86, 88 that defines latch 90. At each latch 90, the silencer 130 lies side-by-side with the planar surface of body 86, 88 and extends upwardly beyond the upper edge of the body's metal portion. Thus, the ramped upper edge of the locking member body metal portion interfaces but is spaced from bar legs 32, 34 by a portion of silencer 130 that extends therebetween, as shown in encircled
area 150 of Figure 5. The portion of the latch upper surface 89 defined by the over-flush edge of the silencer 130 is generally parallel with the portion of the latch upper surface 89 defined by the relatively under-flush edge of the body metal portion. Under the bias of tension springs 82, 84, the portions of locking member ramped upper surfaces 89 defined by silencer 130 are in contact with the upper surfaces 93 of the notches 92 in which the latches 90 are received and seated; and the spaced arrangement between the lower portions of locking members 70, 72 and abutment standards 74, although here in closest proximity to each other, is maintained by the notch-to-silencer contact.

[0051] Preferably, the silencer 130 is not over-flush relative to the lower, retention surfaces 87 of latches 90, particularly near tip 103. So providing such a partly over-flush silencer configuration on latch 90 achieves a silencing effect when the headrest is moved upwards while adjustment mechanism 30, 30a, 30b is in an engaged state E, as well as the stiffness of metal-to-metal contact between the lower retention surface 87 of latches 90 and the lower retention surfaces 91 of their respective notches 92, while locking the headrest against downward movement relative to seatback 22 when headrest 24 is subjected to gravity, and/or another downward force as may be experienced during a crash situation. Thus, it can be understood that each of the locking members 70, 72 has a respective body 86, 88 that includes a metal portion that defines the locking member latch 90, and a silencer 130 of a dampening material softer than the metal portion that partially covers the metal portion and that also defines the latch 90. In the adjustment mechanism engaged state E the silencer 130 extends between an upper edge of the body metal portion that defines the latch 90 and its respective leg 32, 34
when the locking member latch 90 is received in a notch 92 and during movement of headrest 24 in the first direction 60u relative to the legs 32, 34. In the adjustment mechanism engaged state E movement of headrest 24 in the second direction 60d relative to the legs 32, 34 is opposed by metal-to-metal contact between the latch 90 and the notch 92 in which it is received. It is to be noted that when the headrest 24 is moved upwards in direction 60u or downwards in direction 60d while adjustment mechanism 30, 30a, 30b is in a released state R, there is no interengaging connection between latches 90 and notches 92, indeed no contact between latches 90 and legs 32, 34, and issues of metal-to-metal noise arising therefrom do not exist.

[0052] As shown, silencer 130 may be slidably fitted onto the respective metal portion of locking member body 86, 88 and over its latch 90, but it is to be understood that alternative means may be employed for disposing silencer 130 about the outer surface of the metal portion of the body 86, 88 of each locking member 70, 72, and providing its over-flush relationship to the metal portion of body 86, 88 at latch 90. For example, the dampening material of silencer 130 may be overmolded onto the metal portion of body 86, 88. Moreover, in some embodiments engagement boss 94 may be integral with silencer 130, and so the rubber or plastic silencer material, which may be, for example, polyethylene (PE) or thermoplastic polyester elastomer (TPE), while suitably dampening, is also sufficiently rigid to support the load exerted thereon by button finger 96. Alternatively, a suitably rigid boss 94 may be affixed to the metal portion of locking member body 86, and may be metallic itself. For example, the metal portion of body 86 and boss 94 may be integrally formed as a powdered metal part.
[0053] Those of ordinary skill in the art will also recognize that locking member 70, 72 may be identical parts that are reversed in orientation such that the opposite sides of identical locking members superpose the interior surface of module first housing part 42. Alternatively, the metal portions only of bodies 86 and 88 may be identical parts.

[0054] The invention has been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation.

[0055] Obviously, many modification and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.
What is claimed is:

1. An adjustment mechanism for controlling adjusting movements of a vehicle seat headrest relative to the vehicle seat seatback, comprising:

   elongate, substantially parallel first and second legs adapted to extend substantially vertically from the seatback and into the headrest and along which movement of the headrest in opposite first and second directions relative to the legs occurs, each leg defining a plurality of notches arranged along its length;

   first and second locking members each pivotably connected to the headrest and having a latch, the first and second locking members rotatably biased towards latching positions in which their latches are respectively received in one of the plurality of notches in the first and second legs in an adjustment mechanism engaged state, the first and second locking members having rotatable movement away from their respective latching positions towards unlatched positions in which their respective latches are out of contact with the first and second legs in an adjustment mechanism released state; and

   an actuator having movement relative to the legs between a first condition into which it is biased and in which it is out of operable engagement with the first and second locking members, and a second condition in which it is in operable engagement with the first and second locking members, movement of the adjustment mechanism from its engaged state towards its released state urged by movement of the actuator in its second condition.
2. The adjustment mechanism of claim 1, wherein the actuator is in operable engagement with the first and second locking members only in respective contact regions located on opposite sides of an axis extending between the pivot centers of the first and second locking members.

3. The adjustment mechanism of claim 1, further comprising a housing to which the first and second locking members are pivotably connected, and into which the first and second legs extend, the housing and the legs having relative movement in the first and second directions.

4. The adjustment mechanism of claim 3, further comprising an intermediate arm extending between and interconnecting the legs within the housing, and wherein the housing is adapted to be surrounded and contained within an upholstered portion of the headrest, relative movement between the headrest and the legs in the first and second directions being restricted to a range between limits defined by abutting engagements between the intermediate arm and the housing.

5. The adjustment mechanism of claim 1, wherein the actuator comprises a release link and a push button, the adjustment mechanism moved from its engaged state with depression of the push button from a location outside of the headrest, the movements of the release link and the push button continuously united, the release link in operable engagement with the second locking member in the actuator second condition.
6. The adjustment mechanism of claim 5, wherein the push button comprises a first and second fingers, the first finger and the first locking member out of operable engagement in the actuator first condition and in operable engagement in the actuator second condition, the second finger and the second locking member out of operable engagement in the actuator first condition and in operable engagement through the release link in the actuator second condition.

7. The adjustment mechanism of claim 5, wherein the release link is out of operable engagement with the first locking member in the actuator second condition.

8. The adjustment mechanism of claim 5, wherein the actuator first condition is one in which depression of the push button from a location outside of the headrest is absent.

9. The adjustment mechanism of claim 5, further comprising a housing to which the first and second locking members are pivotably connected and into which the first and second legs extend, and a biasing member, the actuator being biased into its first condition by a force imparted to the release link by the biasing member.

10. The adjustment mechanism of claim 9, wherein the biasing member is a tensioned biasing member.
11. The adjustment mechanism of claim 10, wherein the release link is biased towards the actuator first condition, and one of the first and second locking members is biased towards its latching position by the tensioned biasing member.

12. The adjustment mechanism of claim 9, wherein the biasing member is a compressed biasing member.

13. The adjustment mechanism of claim 1, wherein each of the first and second locking members is biased toward its respective latching position by a tensioned biasing member.

14. The adjustment mechanism of claim 13, wherein both of the first and second locking members are biased towards their respective locking positions by a common tensioned biasing member.

15. The adjustment mechanism of claim 1, wherein the headrest is moveable in the first and second directions relative to the legs in the adjustment mechanism released state, the headrest is moveable in the first direction relative to the legs in the adjustment mechanism engaged state, and the headrest is immovable relative to the legs in the second direction in the adjustment mechanism engaged state.
16. An adjustment mechanism for controlling adjusting movements of a vehicle seat headrest relative to the vehicle seat seatback, comprising:

- elongate, substantially parallel first and second metal legs adapted to extend substantially vertically from the seatback and into the headrest and along which movement of the headrest in opposite first and second directions relative to the legs occurs, each leg defining a plurality of notches arranged along its length;

- first and second locking members each pivotably connected to the headrest and having a latch, the first and second locking members rotatably biased towards latching positions in which their latches are respectively received in one of the plurality of notches in the first and second legs in an adjustment mechanism engaged state, the first and second locking members having rotatable movement away from their respective latching positions towards unlatched positions in which their respective latches are out of contact with the first and second legs in an adjustment mechanism released state;

- wherein each of the locking members has a body comprising a metal portion that defines the locking member latch, and a silencer of a dampening material softer than the metal portion that partially covers the metal portion, and in the adjustment mechanism engaged state the silencer extends between an upper edge of the metal portion defining the latch and the respective leg when the locking member latch is received in a notch and during headrest movement in the first direction relative to the legs, and in the adjustment mechanism engaged state headrest movement in the second direction relative to the legs is opposed by metal-to-metal contact between the latch and the notch in which it is received.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. B60N2/48

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Date of the actual completion of the international search: 12 May 2011

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Authorized officer: Heinzl er, Markus

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