United States Patent

Robinson et al.

[15] **3,662,984**

[45] **May 16, 1972**

[54] SIX-WAY SEAT TRACK

[72] Inventors: **David S. Robinson**, Detroit; **James A. Gavagan**, Center Line, both of Mich.

[73] Assignee: **Lear Siegler, Inc.**, Santa Monica, Calif.

[22] Filed: **Oct. 6, 1969**

[21] Appl. No.: **864,000**

[52] **U.S. Cl.** **248/394**

[51] **Int. Cl.** **A47c 3/20**

[58] **Field of Search** 248/393, 394, 376, 371, 372, 248/394, 396

[56] **References Cited**

UNITED STATES PATENTS

3,460,793	8/1969	Posh	248/394
3,572,818	3/1971	Lohr	248/396
2,091,899	8/1937	Whedon et al.	248/394
2,215,012	9/1940	McGregor	248/394
2,239,917	4/1941	Hunter et al.	248/394
2,609,029	9/1952	Haberstump	248/394
2,795,267	6/1957	Williams	248/394
2,916,082	12/1959	Wilkinson et al.	248/376

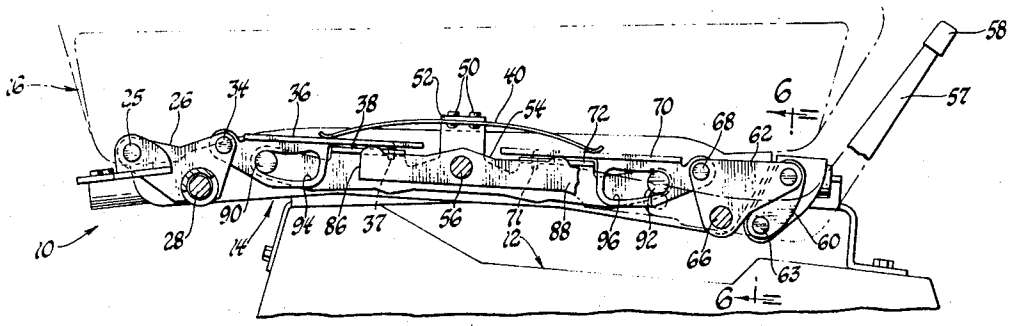
Primary Examiner—Edward C. Allen

Attorney—McGlynn, Reising, Milton & Ethington

[57] **ABSTRACT**

An adjustable seat assembly including a base, a seat frame and means for independently adjusting the vertical elevation of the front and rear portions of the seat frame relative to the base, including on each side of the assembly a pair of links which are pivotally connected between the base and the front and the rear of the frame for rotation between various angular positions to determine the vertical elevation between the front and rear of the seat frame and the base. Each link has connected thereto a latch member which is longitudinally displaced in accordance with the pivotal movement of the associated link. The frame carries catch means including horizontal portions having a plurality of longitudinally spaced slots which are selectively engaged by the respective latch members. A spring biases the latch members into the slots. An actuator means in the form of a manually operated handle is employed to selectively disengage either of the latch members from the catch means thereby to permit independent elevation of the front or rear of the seat frame relative to the base. The rear elevation adjustment is spring assisted.

8 Claims, 6 Drawing Figures



Patented May 16, 1972 **3,662,984**

2 Sheets-Sheet 1

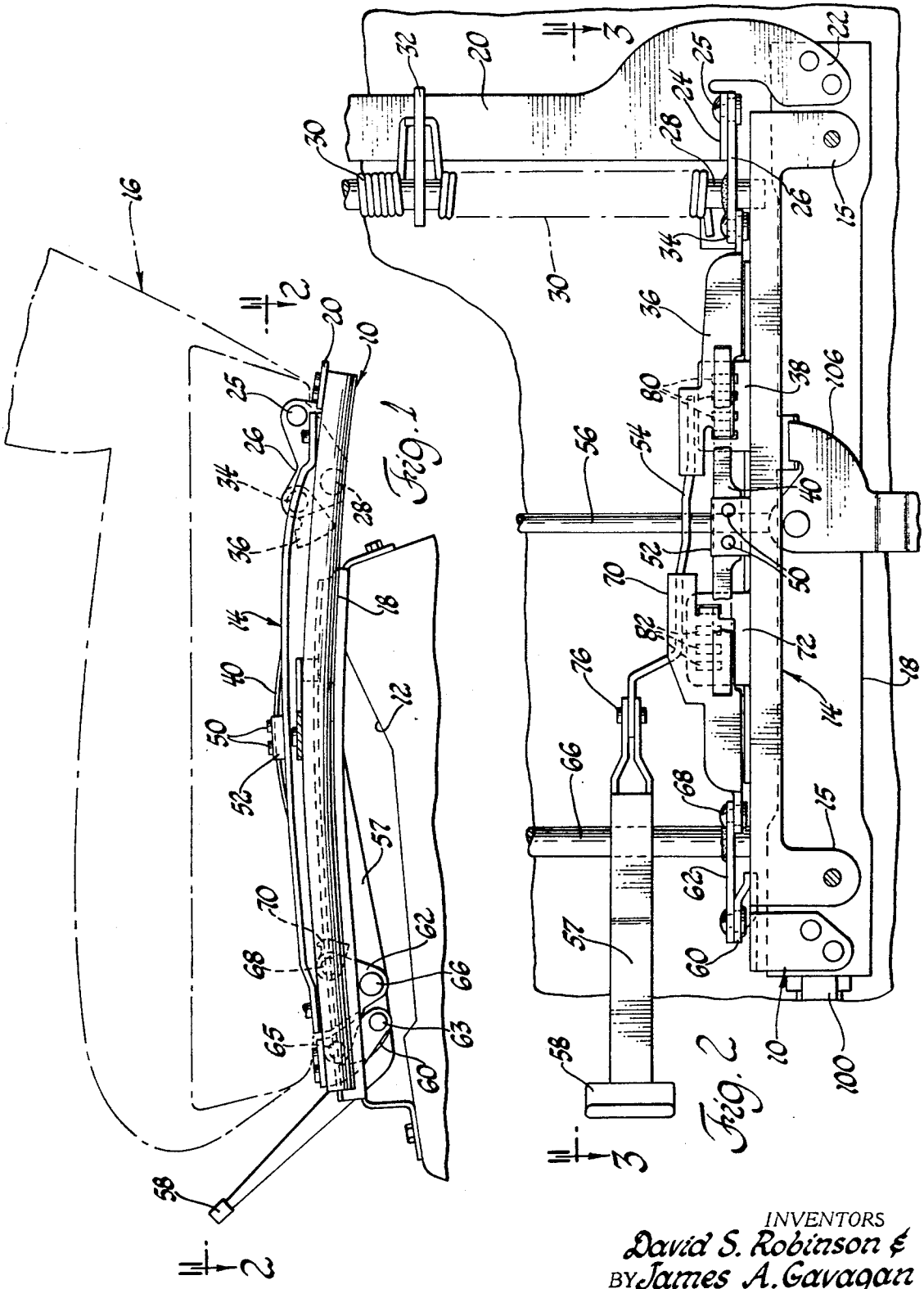


Fig. 1

Fig. 2

INVENTORS
David S. Robinson &
BY James A. Gavagan
Barnard, McGlynn & Rising
ATTORNEYS

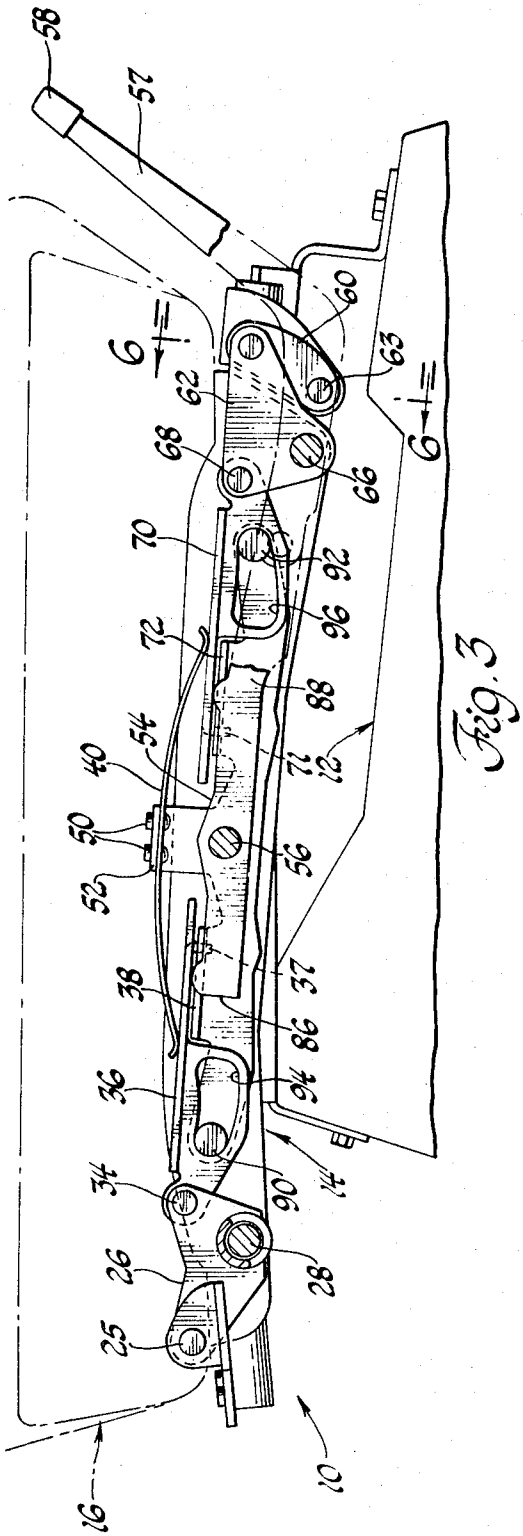


Fig. 3

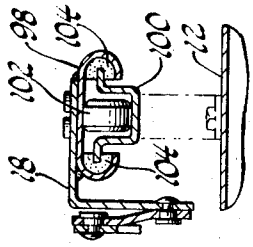


Fig. 6

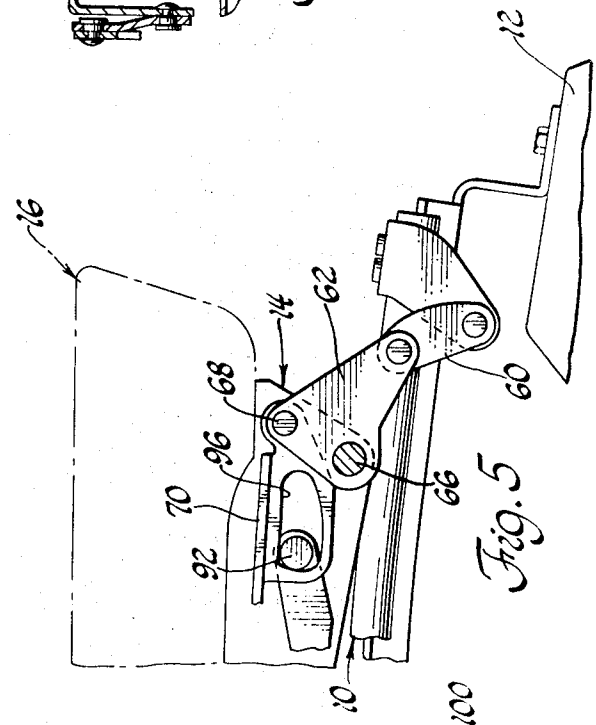


Fig. 5

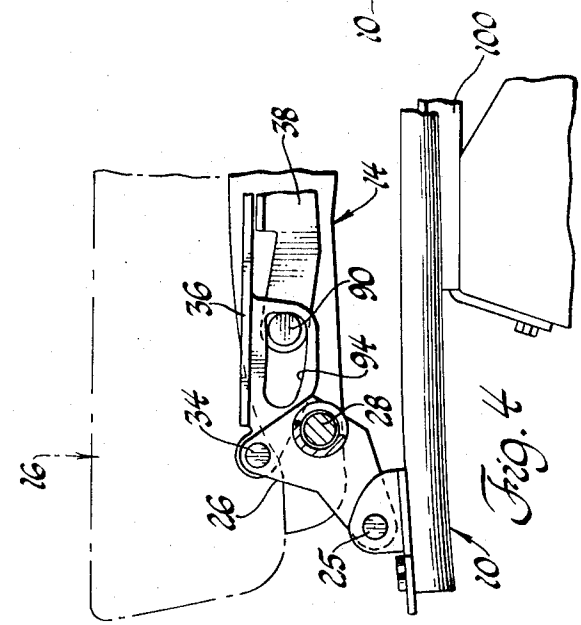


Fig. 4

INVENTORS
David S. Robinson &
BY James A. Gavagan
Barnard, McGlynn & Reising
ATTORNEYS

SIX-WAY SEAT TRACK

This invention relates to seat assemblies an more particularly to a seat assembly in which the front and rear of a seat are independently adjustable in elevation relative to a base.

A manually adjustable seat assembly in which the front and rear of a seat frame are independently adjustable in elevation relative to a base is disclosed in the prior art. That assembly, like other prior art assemblies employs sector shaped lever arms pivotally interconnected between the base and a seat frame, the narrow end of the arms being pivotally connected to the base and an intermediate point being connected to the seat frame. The large end of the arms is provided with a number of notches which cooperate with latching means on the frame to latch each lever arm in one of several possible angular positions. The lever arms rotate about horizontal axes and because of their length require considerable vertical clearance between the support surface and the bottom of the seat on the seat frame.

The present invention provides independent vertical adjustment of the front and rear of a seat assembly and, further, reduces the vertical clearance previously required for the adjuster and latching apparatus by eliminating the notched sector shaped lever arms and providing a latch mechanism which operates with a substantially horizontal travel. In general, the present invention contemplates, on each side of a seat assembly, rotatable links which pivotally connect a seat frame to a base adjacent the front and rear portions of the seat frame such that the links are pivotally rotatable to vary the elevation between the front and rear portions of the seat frame and the base. To each link is pivotally connected a latch member which is substantially longitudinally displaced by rotation of the link. The frame carries catch means engageable with the latch members at each of a plurality of longitudinally spaced locations, such engagement being operative to prevent displacement of the latch member and, accordingly, to prevent pivotal displacement or rotation of the associated link. Actuator means are provided for selectively disengaging the latch members from the catch means thereby to permit independent adjustment of the front and rear of the seat frame in elevation relative to the base.

In a preferred embodiment the links on opposite sides of the seat frame adjacent the front of the frame are synchronously connected as are the links on opposite sides of the assembly at the rear thereof. The actuator means is operated by a handle which synchronously and selectively lifts one or the other of two pairs of latch members out of engagement with the respective catch means. This lifting action is accomplished against the bias force of a flat spring which is suitably connected to the seat frame. The disengagement between the latch members and the catch means permits the latch members to be longitudinally displaced in accordance with the pivotal rotation of the links which interconnect the base and the seat frame. In the preferred embodiment, the seat base is supported relative to a support surface by means of a longitudinally adjustable seat track whereby the overall assembly forms a so-called "six-way" seat track.

The invention may be best understood by reference to the following description of a specific embodiment. This description is to be taken with the accompanying figures of which:

FIG. 1 is a side view of a seat assembly employing the invention;

FIG. 2 is a plan view of approximately one-half of the seat assembly of FIG. 1;

FIG. 3 is a side view of the fully-lowered seat assembly taken along a section line 3—3 of FIG. 2;

FIG. 4 is a side view of another part of the FIG. 3 assembly in a raised position;

FIG. 5 is a side view of another part of the FIG. 3 assembly in a raised position; and,

FIG. 6 is a front view of a sliding channel track taken along a line 6—6 of FIG. 3.

Referring to FIGS. 1 and 2, the seat assembly embodying the invention comprises a base 10 resting on a support surface 12, and a seat frame 14 having horizontal tabs 15 adapted to receive a seat cushion and backrest combination 16. Except for the actuator handles and associated parts, the assembly is generally symmetrical about a longitudinal centerline and the description will proceed with reference to only one side thereof.

Base 10 includes a pair of laterally spaced channel members 18 joined at the rearward extremeties thereof by a cross member 20. Each end of the cross member 20 has a curved end portion 22 which passes around a bent up flange 24. The flange 24 is pivotally connected at 25 to a generally triangular link 26. Link 26 is secured such as by welding to a laterally extending shaft 28 which is, in turn, pivotally connected into the frame 14. Accordingly, rotation of link 26 about the pivotal connection 25 varies the height or elevation of the rear of frame 14 relative to the base 10 by the distance between the connection 25 and the shaft 28. Clockwise rotation as seen in FIG. 1, tends to raise the frame 14. Such clockwise rotation is assisted by a pair of helical springs 30 wound about shaft 28 and secured against unwinding at one end by base 10 and at the other end by a flat terminal bracket 32 which is welded on shaft 28. Springs 30 tend to raise frame 14 relative to base 10 and, thus, oppose the vertical force created by an occupant of the seat-backrest combination 16. Since shaft 28 is secured to a link 26 at each end, synchronous rotation of the links is provided.

Continuing with the description of the apparatus at the rear of the assembly, link 26 is pivotally connected at the upper corner thereof, designated by numeral 34, to a latch member 36 which extends horizontally and inwardly toward the lateral centerline of the assembly. Latch member 36 includes a depending dog 37, best shown in the reversed view of FIG. 3, which is engageable with a slotted catch member 38 mounted on frame 14 to prevent longitudinal displacement thereof and, thus, to prevent rotation of link 26. Engagement between the latch member 36 and the catch member 38 is ensured by a flat band bias spring 40 which is secured by rivets 50 to an upstanding and bent over bracket 52 formed integrally with member 38. The latch and catch members 36 and 38 can be disengaged by a pivotal actuator 54 which is mounted on a pivotal shaft 56 and which is operated by an arm 57 having a handle 58 protruding from the front of the assembly for operation by the occupant. Shaft 56 is pivotally mounted in frame 14 and produces simultaneous and synchronous operation of the actuators 54 on the laterally opposite sides of the seat assembly.

Looking now to the front of the assembly, i.e., the left of FIGS. 1 and 2, means are also provided for varying the height of the front of frame 14 relative to the base 10. This means is generally reversely symmetrical to the rear height adjustment elements described above except for the inclusion of an additional link 60 which is pivotally connected between base 10 and triangular link 62 to permit the necessary longitudinal displacement between base 10 and frame 14 produced during a height adjustment.

Link 60 is pivotally connected at 63 to the base 10 and at 65 to the triangular link 62. Triangular link 62 is secured to a laterally extending shaft 66 which is pivotally connected to the seat frame 14. Accordingly, rotation of link 62 permits variation in the height or elevation of the front of frame 14 relative to the base 10, counterclockwise rotation of line 62 raising the frame 14. The third and innermost corner of link 62 is pivotally connected at 68 to a second latch member 70 which extends horizontally and inwardly toward the lateral centerline of the assembly. Latch member 70 includes a depending dog 71 which is engageable with a slotted catch member 72 which is formed integrally with the catch member 38 and mounted on frame 14 to prevent longitudinal displacement of the latch member 70 and, thus, to prevent rotation of link 62. Engagement between the latch member 70 and the catch member 72 is ensured by the spring 40 which extends in opposite longitudinal directions from the central securement bracket 52. Again, suitable operation of the actuator 54

produces disengagement of the latch member **70** from the catch member **72**, this operation being accomplished by operation of the handle **58** by the occupant.

The arm **57** of handle **58** is pivotally supported on the shaft **66** to form a fulcrum point. Arm **57** is pivotally connected at **76** to the actuator member **54** as best shown in FIG. **2** such that pivotal displacement of handle **58** in a vertical plane pivots the actuator **54** in a selected direction.

The specific nature as well as the functional interrelationship of the latch members **36** and **70** and the catch members **38** and **72** and the actuator member **54** will be described with reference to FIGS. **2** through **5**. As shown in FIG. **2**, the catch members **38** and **72** are formed along with the spring securement bracket **52** as an integral unit and mounted on the inside surface of the frame **14**. The assembly include two such units, one on each side of the frame **14**. Catch members **38** and **72** are similar and are oppositely spaced about the lateral centerline of the assembly defined by shaft **56**. Member **38**, for example, is disposed in a horizontal plane and has formed therein a plurality of longitudinally spaced rectangular slots **80**. Similarly, the catch member **72** is horizontally disposed and has formed therein a plurality of longitudinally spaced slots **82**. The corresponding latch members **36** and **70** are provided with latch dogs **37** and **71**, respectively, which extend into the slots **80** and **82** of the catch members **38** and **72** and are normally maintained therein by the force of spring **40**. The latch dogs, thus, operate to prevent longitudinal displacement in either direction of the latch members **36** and **70** relative to the frame **14**. Since the slots **80** and **82** are longitudinally spaced, the latch members **36** and **70** may be independently latched in any of the longitudinal locations defined by the slots, thus, to latch the front and rear of the seat in selected elevations relative to the base **10**.

The actuator member **54** is also shown in FIG. **3** to include longitudinally opposite lifter portions **86** and **88** which are symmetrically spaced about the lateral centerline defined by shaft **56**. The lifter portions **86** and **88** underlie the inwardly projecting horizontal surfaces of the latch members **36** and **70** which are best shown in the plan view of FIG. **2** such that rotation of the actuator member **54** in the clockwise direction (FIG. **3**) lifts latch member **36** out of engagement with the catch member **38** against the opposing force of spring **40** thereby to permit adjustment of the elevation of the rear of frame **14** relative to the base **10**. Similarly, counterclockwise rotation of actuator **54** lifts latch member **70** out of engagement with catch member **72** and permits adjustment of the elevation of the front of the seat frame **14** relative to the base **10**. Because of the pivotal connection of the handle arm **57** to the shaft **66**, downward displacement of handle **58** as shown in FIG. **3** produces a counterclockwise rotation of actuator member **54**. Assuming the latch member is disengaged from catch member **72**, the seat **16** can be adjusted by the occupant to the desired elevation. This adjustment rotates link **62** and displaces latch member dog **71** over the slots **82** of the catch member **72** until handle **58** is released. At this point, the spring **40** urges the latch dog into the next adjacent slot **82** in the catch member **72**, thus, latching the front of the seat in the desired position.

As best shown in FIG. **3**, the travel of the latch members **36** and **70** relative to the frame **14** is limited by means of laterally protruding rivet stops **90** and **92** secured to frame **14**. The rivet stops **90** and **92** extend through and cooperate with elongated slots **94** and **96**, respectively, formed in the vertical portions of the latch members **36** and **70**. Accordingly, the latch member **36** and **70** are prevented by interaction between the slots and the rivet stops from traveling longitudinally beyond the outermost slots **80** and **82** in either direction.

Referring to FIG. **6**, the base **10** is mounted on the support surface **12** by means of a longitudinally sliding seat track thereby to permit longitudinal adjustment of the position of the seat **16** relative to the support surface **12**. This track assembly is conventional in construction and is shown in FIG. **6** to comprise an upper track member **98** mounted on the channel member **18** and a lower track member **100** mounted on the support surface **12**. The track assembly further includes a plurality of self-lubricating rollers **102** and track interconnecting inserts **104** which facilitate the longitudinal sliding displacement between the track members **98** and **100**. As shown in FIG. **2**, a manually operable latch **106** is mounted on track member **98** for latching the track members **98** and **100** in any of several longitudinal spaced positions.

The operation of the vertical adjustment mechanism of the illustrated embodiment is best described with reference to FIGS. **3**, **4**, and **5**. FIG. **3** shows both the front an rear adjuster mechanisms in the fully lowered position. Looking to the rear of the assembly, i.e., to the left in FIG. **3**, in the fully lowered position the link **26** is rotated to the clockwise position about the pivotal connection **25**. The cross-shaft **28** which is pivotally connected to the seat frame **14**, thus, rotated to the lowermost position relative to the base **10**. Moreover, the latch member **36** is urged fully to the right, as shown in FIG. **3**, such that the rivet stop **90** engages the left-hand most surface of the slot **94**. In addition, the dog **37** of the latch member **36** is disposed in the innermost slot **80** of the catch member **38**. Similarly, on the front of the assembly the link **62** is rotated to the extreme counterclockwise position lowering shaft **66** to the lowest position and extending the latch member **70** fully to the left as shown in FIG. **3**. The dog **71** of the latch member **70** engages the innermost slot **82** of the catch member **72**. The rivet stop **92** engages the right-hand most surface of the slot **96** in the latch member **70**.

Looking to FIG. **4** the condition of the rear adjuster apparatus is shown when the seat assembly is fully raised. In the raised position the link **26** is rotated in the counterclockwise direction causing the pivotal connection **34** and the shaft **28** to rise vertically relative to the previous position shown in FIG. **3**. The counterclockwise rotation of link **26** longitudinally displaces the latch member **36** to the left as shown in FIG. **4** until the rivet stop **90** engages the right-hand most surface slot **94**. At this point the dog **37** of latch member **36** is in the outermost slot of the associated catch member **38**.

In FIG. **5**, the relative position of the various elements of the FIG. **3** assembly is shown when the seat **16** is in the fully raised position. In this position, the link **62** is rotated clockwise from the previous position shown in FIG. **3** whereas the interconnecting link **60** is rotated slightly in the counterclockwise direction to compensate for the counterclockwise rotation of the rear triangular link **26** as previously described. The link **62**, as shown in FIG. **5**, causes the shaft **66** which is pivotally connected to frame **14** to rise, thus, elevating the seat combination **16** relative to the base **10**. The rotation of link **62** causes a longitudinal displacement of pivot point **68** thereby longitudinally displacing the latch member **70** to the right, as shown in FIG. **5**. In the extreme raised position the rivet stop **92** engages the left-hand most surface of the slot **96** in the latch member **70**. Although not shown in FIG. **5**, the dog **71** of the latch member **70** engages the outermost slot **82** in the associated catch member **72**.

The adjuster assembly described above, thus, occupies a minimum of vertical space beneath the seat and backrest combination **16** and permits independent adjustment of the height or elevation of the front and rear of the seat frame **14** relative to the base **10**. Both the front and rear may be latched in each of several elevations by suitable operation of handle **58** and manual adjustment of the seat elevation. Finally, fore-and-aft adjustment in the position of the entire assembly relative to the support surface **12** may be accomplished by operation of the adjuster latch **106** and the longitudinal track mechanism shown in FIG. **6** of the drawing. It is, however, to be understood that the foregoing description is illustrative in nature and is not to be construed in a limiting sense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for selectively and independently varying the height of the front and rear of a seat assembly relative to a support surface comprising: a base; a frame; first and second pairs

of links pivotally connecting the front and rear, respectively, of the frame to the base and pivotally rotatable to permit independent elevation of the front and rear relative to the base; first and second pairs of latch members connected to the first and second pairs of links, respectively, and being longitudinally and oppositely displaceable by the links; catch means on each side of the frame and engageable with the respective pairs latch members for preventing longitudinal displacement thereof; and actuator means on each side of the frame for selectively disengaging the pairs of latch members from the catch means; each of said latch members including a first portion connected to the associated link and a second portion terminating in a vertical dog, the catch means including first and second pluralities of longitudinally spaced slots for receiving the dogs of the first and second latch members, spring means on each side of the frame for biasing the first and second pairs of latch members into engagement with the catch means and including for each of said spring means a flat, resilient band extending longitudinally in opposite directions from a fixed center over and engaging the first and second latch members.

2. Apparatus as defined in claim 1 including a pair of additional links pivotally connecting the first pair of links to the base.

3. Apparatus as defined in claim 1 including track means for permitting longitudinal displacement of the base relative to the surface.

4. Apparatus as defined in claim 1 including means one the sides of the frame for limiting the longitudinal travel of the first and second pairs of latch members.

5. Apparatus as defined in claim 1 including first and second cross members connected between the links of the first and second pairs of links respectively.

6. Apparatus as defined in claim 1 wherein the actuator means includes adjacent each side portion a pivotal lifter extending longitudinally from a central pivotal point under and in engagement with a latch member of the first and second pairs of latch members, and means for selectively pivoting the lifters in synchronism to lift one or the other of the latch members.

7. Apparatus as defined in claim 6 wherein each of the catch means comprises an elongated rigid member secured to the frame and having a pair of longitudinally spaced horizontal plate portions, each of the plate portions having a plurality of longitudinally spaced slots therein for receiving the latch members in engagement therewith.

8. Apparatus as defined in claim 7 wherein the rigid members each includes a central horizontal portion, said spring means being centrally connected to the central horizontal portion and extending longitudinally in opposite directions therefrom to overly each of the spaced horizontal tabs.

* * * * *