# United States Patent

**Robinson**

[15] **3,669,398**

[45] **June 13, 1972**


## [54] ADJUSTABLE SEAT SUPPORTING ASSEMBLY


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[22] Filed: **July 23, 1970**

[21] Appl. No.: **57,692**

[52] **U.S. Cl.**.....**248/373,** 248/394, 248/421

[51] **Int. Cl.**.....**F16m 11/24,** F16m 13/00, B60n 1/02

[58] **Field of Search**.....248/371, 372, 373, 378, 382, 248/383, 384, 394, 396, 397, 421, 423



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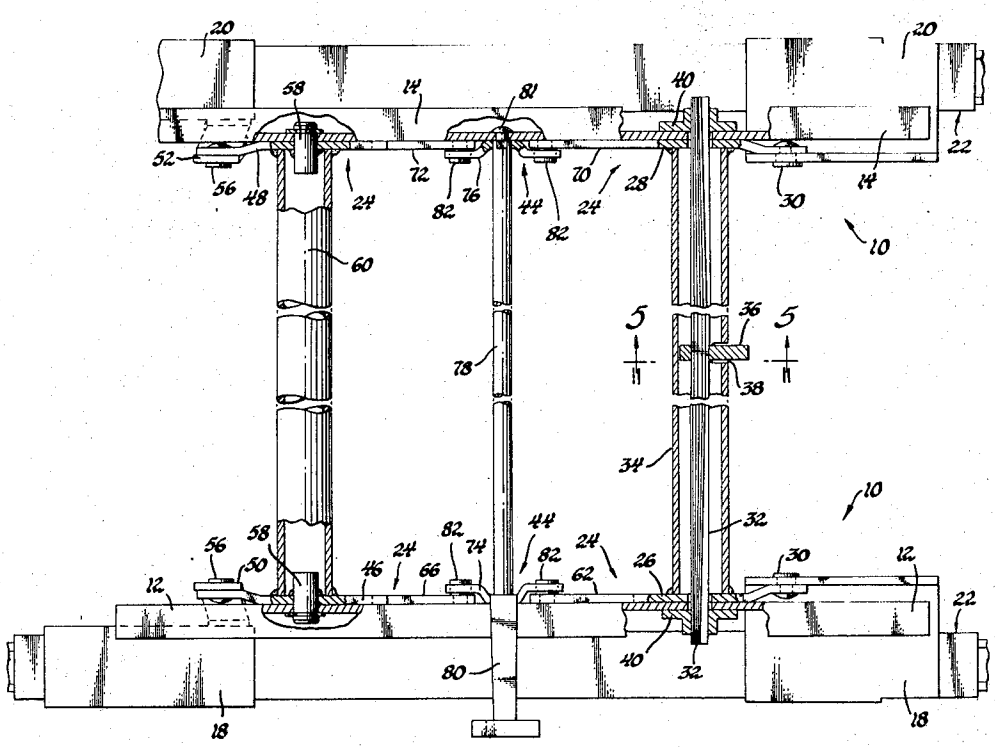
[57] **ABSTRACT**

An adjustable seat supporting assembly including a pair of spaced seat support members and base means. The seat support members are supported on the base means by elongated levers. Each lever is pivotally connected to the base means and independently pivotally connected to the seat support members. There are two sets of levers on each side of the assembly. The levers on each side of the assembly have ends facing one another with notches therein. Control links and latching plates are secured to the seat support members for selectively allowing the levers to pivot to adjust the vertical position of the seat support members. The improvement comprises the use of a torsion bar associated with the levers at the rear of the assembly. The torsion bar is twisted to react between the seat support members and the rear levers to urge the rear levers to pivot in a manner to raise the rear portion of the seat support members.


**16 Claims, 6 Drawing Figures**



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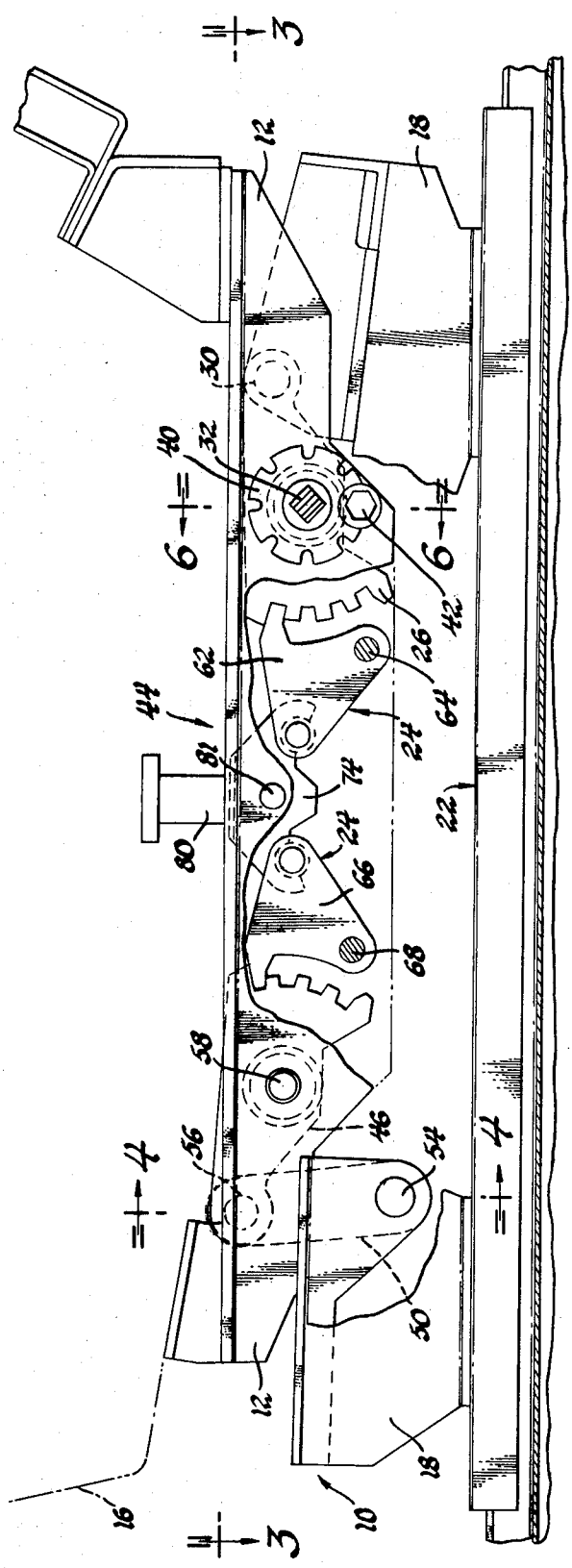


Fig. 1

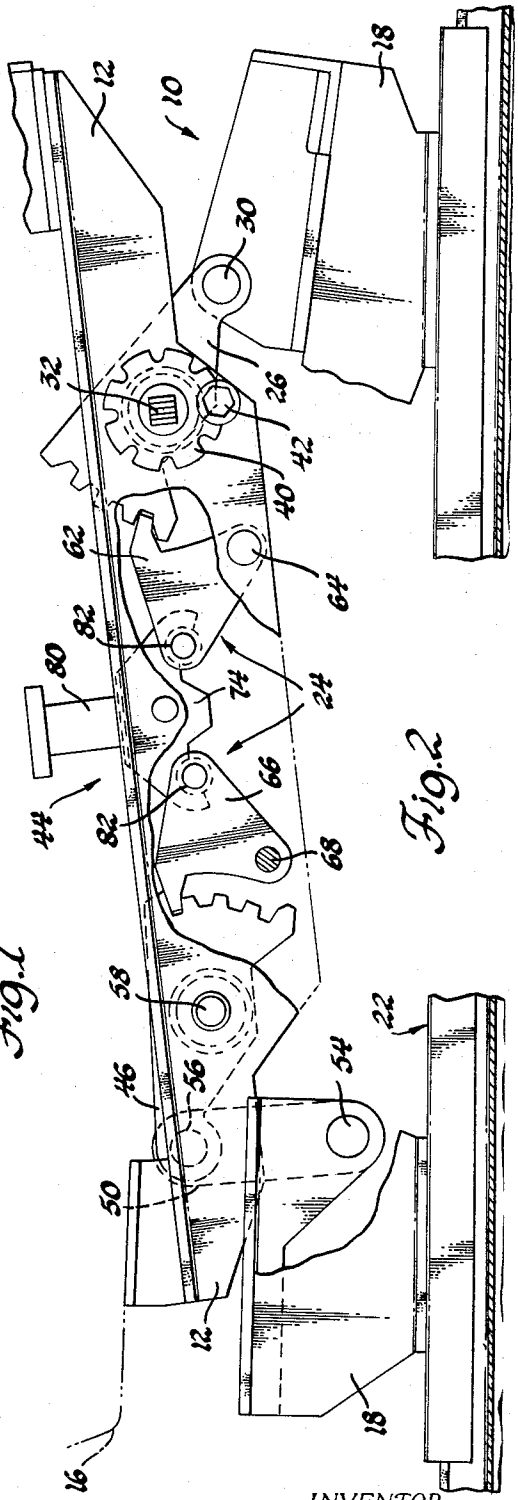


Fig. 2

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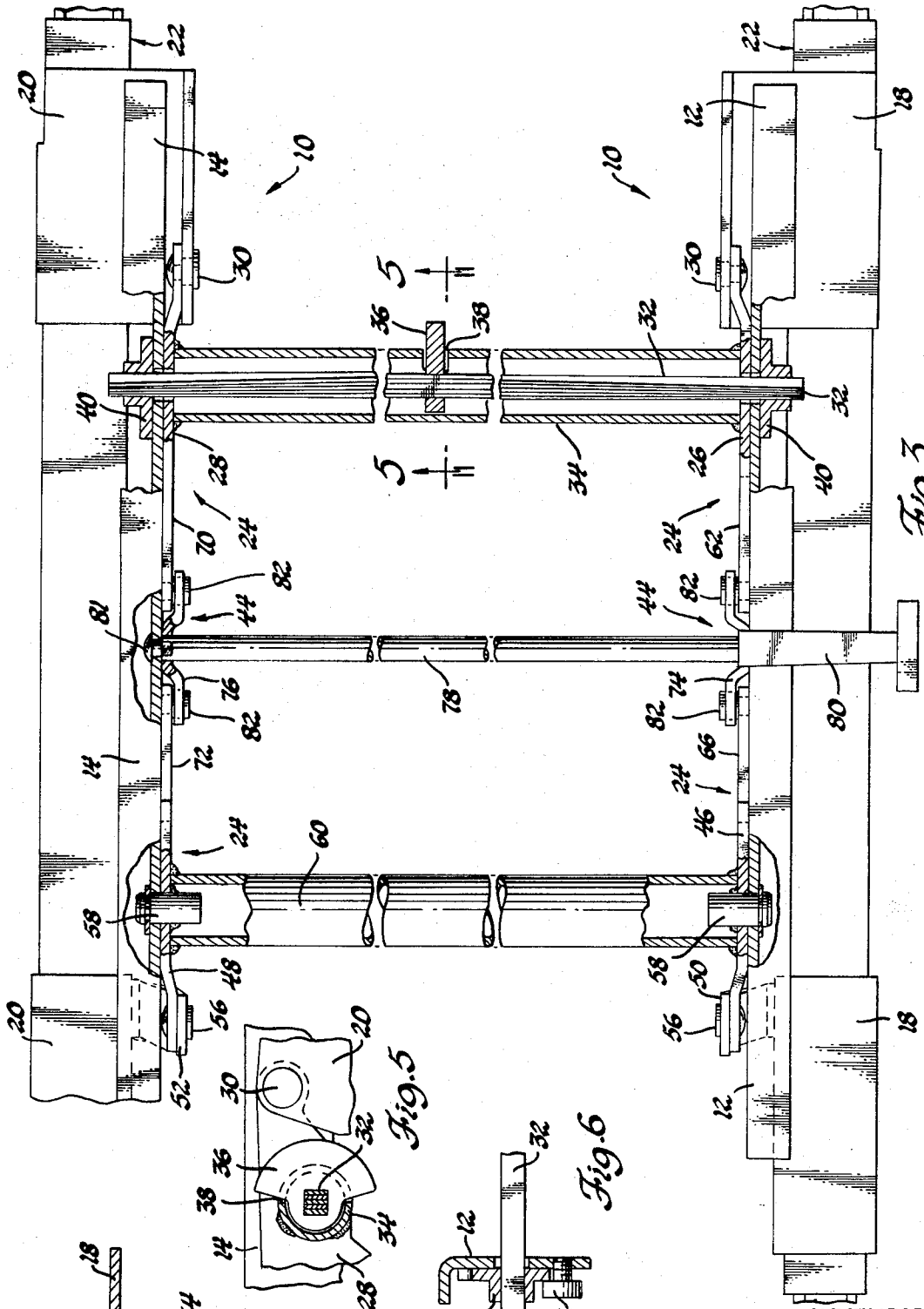

Fig. 3



Fig. 5



Fig. 6

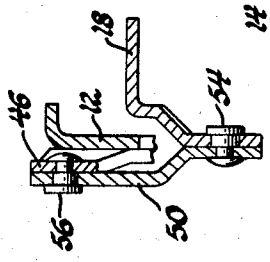

Fig. 4

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# ADJUSTABLE SEAT SUPPORTING ASSEMBLY

This invention relates to a seat supporting assembly of the type utilized in vehicles such as automobiles and trucks. More specifically, the instant assembly is one wherein the rear of the assembly is independently adjustable in elevation relative to the base.

This application represents an improvement over seat assemblies including a base with seat support members disposed above the base and connected to the base by at least one pair of levers. Each lever is pivotally connected to both the base and a seat support member so that angular movement of each lever adjusts the elevation of the rear portion of the seat assembly. A latch means engages the ends of the levers to determine the angular positions of the levers to thereby select a desired vertical position of the rear of the seat support members. These prior art assemblies employ a torque rod which extends between opposite sides of the assembly and is secured to the levers on opposite sides of the assembly. Band-type springs are disposed about the ends of the torque rod and react between the torque rod and the seat supporting members so as to urge the torque rods, and therefore the levers, to rotate in an upward direction to bias the rear of the seat assembly upwardly when the levers are unlatched.

Such prior art assemblies are disclosed in U.S. Pat. No. 3,460,793 and copending application Ser. No. 795,562 filed Jan. 31, 1969 and now abandoned in the names of Robert I. Homier and Raymond C. Posh and assigned to the assignee of the instant invention.

The instant invention represents an improvement over these prior art assemblies. The band-type springs utilized in the prior art assemblies have to be wound so tightly to provide sufficient torque for raising the rear portion of the seat assembly that the adjacent convolutions of the spring are in undesirably high frictional contact with one another and therefore adversely affect the biasing action of the springs.

Accordingly, it is an object and feature of this invention to provide such a seat adjusting assembly but with improved means for biasing the rear portion of the assembly to move upwardly.

In correlation with the foregoing object and feature, it is another object and feature of this invention to provide such a seat assembly which utilizes a torsion bar reacting between the levers on opposite sides of the assembly and the seat support members or the base means for urging the levers to rotate in a direction to raise the rear of the seat support members.

Other objects and attendant advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a fragmentary side elevational view partially broken away and showing the seat support members in the extreme low position;

FIG. 2 is a view similar to FIG. 1 but showing the rear of the seat support members in the extreme elevated position;

FIG. 3 is a fragmentary cross sectional view taken substantially along line 3—3 of FIG. 1;

FIG. 4 is a fragmentary cross sectional view taken substantially along line 4—4 of FIG. 1;

FIG. 5 is a fragmentary cross sectional view taken substantially along line 5—5 of FIG. 3; and

FIG. 6 is a fragmentary cross sectional view taken substantially along line 6—6 of FIG. 1.

Referring now to the drawings wherein like numerals indicate like or corresponding parts throughout the several views, an adjustable seat supporting assembly constructed in accordance with the instant invention is generally shown at 10.

The assembly includes first and second seat support members 12 and 14. The seat support members 12 and 14 are adapted to support a seat, the cushion of which is shown at 16 in phantom in FIGS. 1 and 2.

Also included is a base means comprising the base members 18 and 20. The base means includes the tracks generally indicated at 22 for allowing horizontal fore and aft adjustment of the assembly. The tracks 22 are adapted to be attached to a support structure such as the floor of an automobile.



Positioning means, generally shown at 24, interconnect the seat support members 12 and 14 and the base members 18 and 20 for allowing movement of the seat support members 12 and 14 relative to the base members 18 and 20. The positioning means 24 includes lever means comprising the first and second levers 26 and 28. The levers 26 and 28 are pivotally connected to the base members 18 and 20 by the rivets 30. The levers 26 and 28 are independently pivotally connected to the seat support members 12 and 14 on the axis of a torsion bar 32.

Torsion bar 32 has a twisted position as illustrated in FIG. 3 and reacts between the levers 26 and 28 and either the base members 18 and 20 or the seat support members 12 and 14. In the illustrated embodiment and as will become more clear hereinafter, the torsion bar 32 reacts between the levers 26 and 28 and the seat support members 12 and 14 for urging the levers 26 and 28 to pivot relative to the base members 18 and 20 and relative to the seat support members 12 and 14 to move the seat support members 12 and 14 vertically upwardly relative to the base members 18 and 20.

The first and second seat support members 12 and 14 are disposed in spaced parallel relationship to one another. Actually the seat support members 12 and 14 are spaced a distance which accommodates a single bucket seat or are spaced sufficiently apart to accommodate a bench seat which extends all of the way across a vehicle.

There is also included means for non-rotatably attaching a first or central portion of the torsion bar 32 to the levers 26 and 28 and means for non-rotatably attaching a second or end portions of the torsion bar 32 to the seat support members 12 and 14. More specifically, a torque member comprising the torque tube 34 interconnects the first and second levers 26 and 28, as by being welded thereto. The torsion bar 32 is disposed within the torque tube 34 and extends through the levers 26 and 28 and through the seat support members 12 and 14. A restraint means or member 36 non-rotatably attaches the central portion of the torsion bar 32 to the torque tube 34. The restraint member 36 is non-rotatably attached to the torsion bar 32 midway between the ends of the torsion bar 32 and extends radially through a slot 38 in the torque tube 34.

The opposite ends of the torsion bar 32 are non-rotatably connected to the first and second seat support members 12 and 14 through torque adjustment means. The adjustment means includes the circular members 40 which are non-rotatably secured to the ends of the torsion bar 32. The circular adjustment members 40 interconnect the ends of the torsion bar 32 and the seat support members 12 and 14 for adjusting the amount of twist in the torsion bar 32 to adjust the amount of torque applied to the levers 26 and 28 by the torsion bar 32. Each circular member 40 has a plurality of slots or notches about the circumference thereof and a fastener 42 is disposed in one of the slots and is removably connected by threads to the adjacent seat supporting member.

The torsion bar 32 comprises a plurality of strips disposed in side-by-side relationship to define a four sided torsion bar; that is, a torsion bar having a generally square cross section. Also the strips defining the torsion bar 32 are preferably laminated together. It will be noted that the levers 26 and 28 pivot relative to the seat support members 12 and 14 about the axis of the torsion bar 32. The ends of the torsion 32 extend through the levers 26 and 28 and the seat support members 12 and 14; however, the torsion bar 32 could have a circular cross section at the point where it passes through the levers 26 and 28 and the adjacent seat support members 12 and 14. The torsion bar 32 is maintained in position because of the connection of the circular adjustment members 40 to the seat support members 12 and 14.

The amount of torque or twist provided by the torsion bar 32 may be adjusted when the seat is in the lowered position il-

lustrated in FIG. 1 by removing the fasteners 42 and rotating the circular members 40 so as to twist the torsion bar 32. The circular member 40 illustrated in FIG. 1 would be rotated in the counterclockwise direction until the desired twist is effected in the torsion bar 32 whereby the fastener 42 would be reinserted through a slot therein.

The positioning means 24 also includes control means generally indicated at 44 for selectively allowing and preventing pivotal movement of the levers relative to the seat support members 12 and 14 and the base members 18 and 20. The positioning means 24 also includes connection means pivotally interconnecting the seat support members 12 and 14 and the base members 18 and 20 at the forward end of the assembly, i.e., at positions spaced from the first and second levers 26 and 28. The connection means includes third and fourth levers 46 and 48 and first and second links 50 and 52. The links 50 and 52 are pivotally connected at one end by the rivets 54 to the base members 18 and 20 and are pivotally connected at the other end by the rivets 56 to the third and fourth levers 46 and 48. The levers 46 and 48 are pivotally connected to the seat support members 12 and 14 by the stud shafts 58. A second torque tube 60 extends between and is connected to the third and fourth levers 46 and 48. The first and third levers 26 and 46 have spaced first ends extending toward one another and the second and fourth levers 28 and 48 have spaced first ends extending toward one another. These spaced first ends of the levers have notches therein.

The control means 44 is supported by the seat support members 12 and 14 for selectively engaging the notches in the first ends of the levers to independently control pivotal movement of the levers. More specifically, the control means 44 includes a first latch plate 62 rotatably connected by the rivet 64 to the first seat support member 12. The latch plate 62 includes a finger portion for movement into and out of engagement with the notches in the first lever 26. A second latch plate 66 is rotatably connected by the rivet 68 to the first seat support member 12 and includes a finger portion for movement into and out of engagement with the notches in the third lever 46. A third latch plate 70 is rotatably connected to the second seat support member 14 and includes a finger for movement into and out of engagement with the notches in the second lever 28. A fourth latch plate 72 is rotatably connected to the second seat support member 14 and includes a finger for movement into and out of engagement with the notches in the fourth lever 48.

A first control link 74 is rotatably connected to the first seat support member 12 between the first and second latch plates 62 and 66 and is engageable therewith for selectively disengaging the first and second latch plates from the first and third levers 26 and 46. A second control link 76 is connected to the second seat support member 14 between the third and fourth latch plates 70 and 72 and is engageable therewith for selectively disengaging the third and fourth latch plates from the second and fourth levers 28 and 48. A means comprising a rod 78 interconnects the control links 74 and 76 and a manual actuator or handle 80 extends from the control link 74 for selectively moving the control links.

Pins 82 extend from the latch plates and are engageable by the control links 74 and 76.

It will be appreciated that instead of utilizing the front levers 46 and 48 and the links 50 and 52, the front portion of the seat support members may be pivotally connected to the base means by other means that does not provide for vertical adjustment of the front portion of the seat support members.

As illustrated in FIG. 1, the rear portion of the seat support members are in the lower position. When in this position, the torsion bar 32 is twisted and is reacting between the levers 26 and 28 and the seat support members 12 and 14 to urge the rear portion of the seat support members to move upwardly. Such upward movement is, however, prevented because of the engagement of the latch plates 62 and 70 with the first and second levers 26 and 28. If it is desired to raise the rear portion of the seat support members, the handle 80 is rotated about the axis of the rivets 81 in the clockwise direction as shown in FIG. 1 to rotate the latch plates 62 and 70 to disengage the fingers thereof from the notches in the first and second levers 26 and 28. Upon such disengagement of the latch plates 62 and 70 from the ends of the levers 26 and 28, the torsion bar 32 supplies sufficient torque to move the rear of the seat supporting members 12 and 14 upwardly. As the rear portions of the seat support members 12 and 14 are thusly moving upwardly, the torsion bar 32 is unwinding.

If it is desirable to adjust the vertical position of the forward portions of the seat support members 12 and 14 the handle 80 is moved in the counterclockwise direction to disengage the latch plates 66 and 72 from the third and fourth levers 46 and 48 and the front portion of the seat assembly is manually raised by applying an upward lifting force thereto.

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.

Obviously, many modifications 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.

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

1. An adjustable seat supporting assembly comprising: at least one seat support member having longitudinally opposite ends, base means adapted for attachment to a support structure, positioning means interconnecting at least one of said opposite ends of said seat support member and said base means for allowing vertical movement of said seat support member relative to said base means, pivot means interconnecting said seat support member and said base means at the other of said ends to accommodate said vertical movement, said positioning means including a lever means pivotally connected to said base means and independently pivotally connected to said seat support member, a laterally extending torsion bar having a preloaded, twisted position and reacting between said lever means and one of said base means and said seat support member for constantly biasing said lever means to pivot relative to said base means and relative to said seat support member to move said seat support member relative to said base means so as to displace said seat support member vertically upwardly, and manually operable latch means for locking said seat support member in each of several vertically spaced positions against the bias of said torsion bar.

2. An assembly as set forth in claim 1 wherein said positioning means includes adjustment means for adjusting the amount of twist in said torsion bar to adjust the amount of torque applied to said lever means by said torsion bar.

3. An assembly as set forth in claim 1 wherein said torsion bar comprises a plurality of strips disposed in side by side relationship to define a four sided torsion bar.

4. An assembly as set forth in claim 1 including means for non-rotatably attaching a first portion of said torsion bar to said lever means and means for non-rotatably attaching a second portion of said torsion bar to said seat support member.

5. An assembly as set forth in claim 4 including a second seat support member disposed in spaced relationship to said first mentioned seat support member, and wherein said lever means includes a first lever interconnecting said first seat support member and said base means and a second lever interconnecting said second seat support member and said base means.

6. An assembly as set forth in claim 5 wherein said positioning means includes connection means pivotally interconnecting said seat support members and said base means at positions spaced from said first and second levers.

7. An assembly as set forth in claim 6 wherein said torsion bar has its opposite ends non-rotatably connected to said first and second seat support members respectively.

8. An assembly as set forth in claim 7 including a torque member interconnecting said first and second levers and restraint means non-rotatably attaching the central portion of said torsion bar to said torque member.

9. An assembly as set forth in claim 8 including adjustment means interconnecting said torsion bar and said seat support members for adjusting the amount of twist in said torsion bar to adjust the amount of torque applied to said levers by said torsion bar.

10. An assembly as set forth in claim 8 wherein said torque member comprises a tube secured at its ends to said first and second levers, said torsion bar being disposed within said tube and extending through said levers and said seat support members.

11. An assembly as set forth in claim 10 wherein said restraint means comprises a restraint member non-rotatably attached to said torsion bar midway between the ends thereof and extending radially through a slot in said tube.

12. An assembly as set forth in claim 11 wherein said torsion bar comprises a plurality of strips disposed in side by side relationship to define a four sided torsion bar.

13. An assembly as set forth in claim 12 including adjustment means interconnecting the ends of said torsion bar and said seat support members for adjusting the amount of twist in said torsion bar to adjust the amount of torque applied to said levers by said torsion bar.

14. An assembly as set forth in claim 13 wherein said adjustment means includes a circular member non-rotatably secured to each end of said torsion bar, each circular member having a plurality of slots about the circumference thereof, a fastener disposed in one of said slots and removably connected to the adjacent seat supporting member.

15. An assembly as set forth in claim 14 wherein said connection means includes third and fourth levers and first and second links, said links being pivotally connected at one end to said base means and pivotally connected at the other end to said third and fourth levers, said levers being pivotally connected to said seat support members, a second torque tube interconnecting said third and fourth levers, said first and third levers having spaced first ends extending toward one another, said second and fourth levers having spaced first ends extending toward one another, said control means being supported by said seat support members for selectively engaging said first ends of said levers to independently control pivotal movement of said levers.

16. An assembly as claimed in claim 15 wherein said levers have notches in said first ends thereof, said control means includes a first latch plate rotatably connected to said first seat support member for movement into and out of engagement with said notches in said first lever, a second latch plate rotatably connected to said first seat support member for movement into and out of engagement with said notches in said third lever, a third latch plate rotatably connected to said second seat support member for movement into and out of engagement with said notches in said second lever, a fourth latch plate rotatably connected to said second seat support member for movement into and out of engagement with said notches in said fourth lever, a first control link connejted to said first seat support member between said first and second latch plates and engageable therewith for selectively disengaging said first and second latch plates from said first and third levers, a second control link connected to said second seat support member between said third and fourth latch plates and engageable therewith for selectively disengaging said third and fourth latch plates from said second and fourth levers, means interconnecting said control links and actuator means for selectively moving said control links.

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