Feb. 14, 1961 H. W. PARROTT ET AL 2,971,569

TILTABLE OFFICE CHAIR

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Fig. 1.

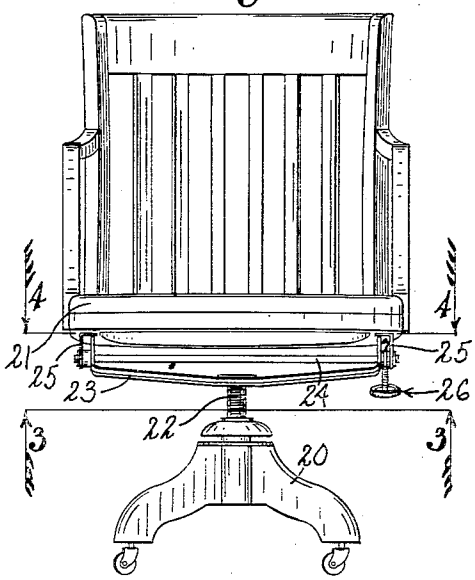

Fig. 2.

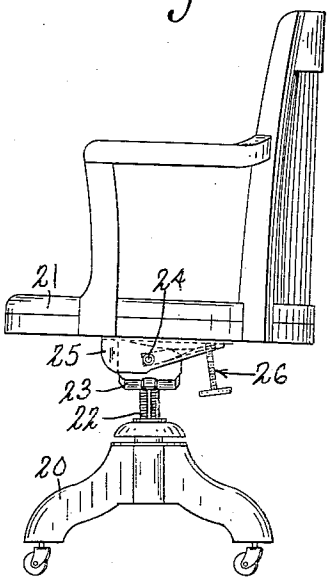

Fig. 3.

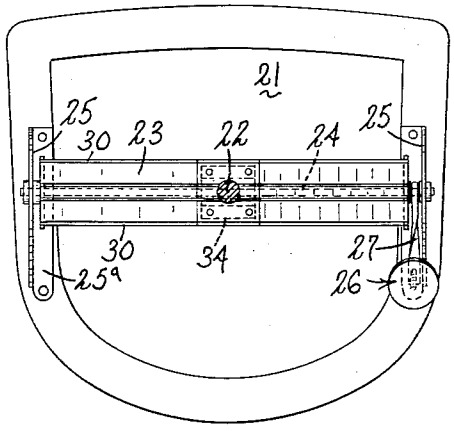

Fig. 4.

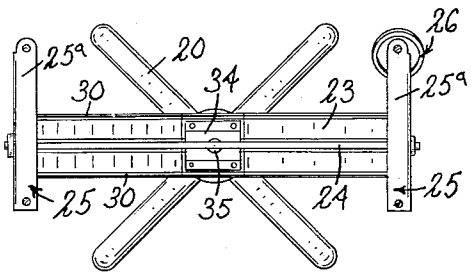

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Fig.5.

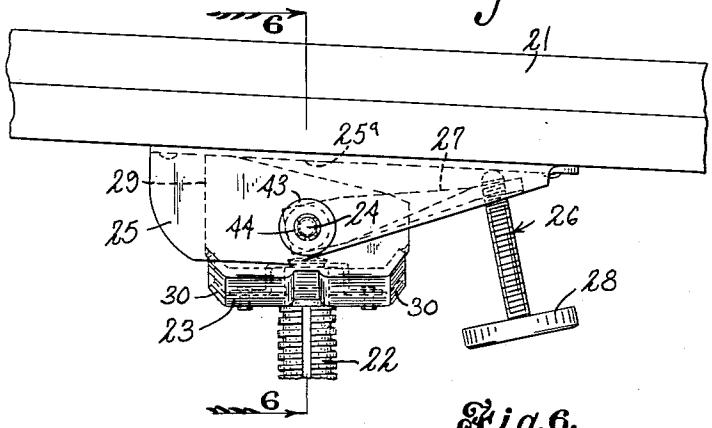

Fig.6.

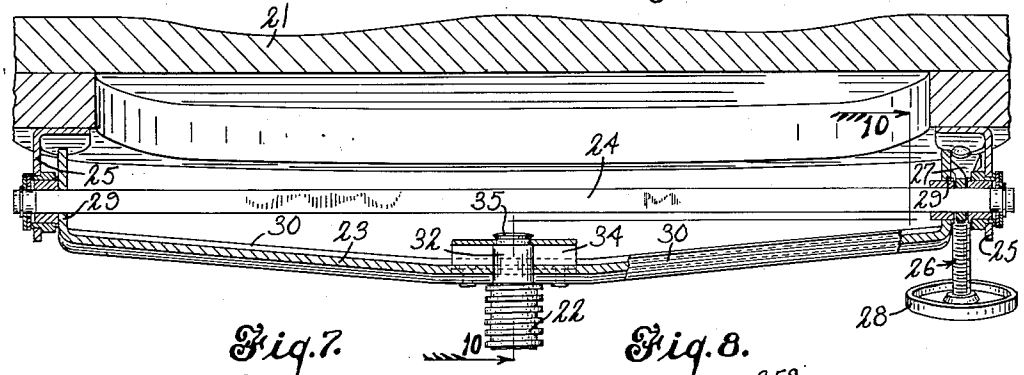

Fig.7.

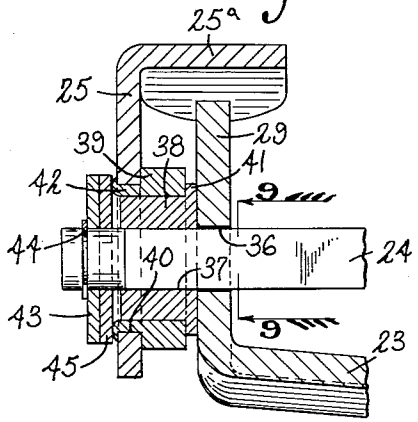

Fig.8.

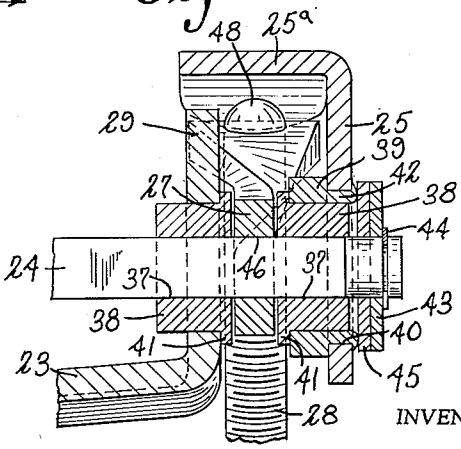

Fig.9.

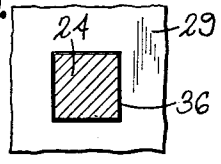

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Fig.10.

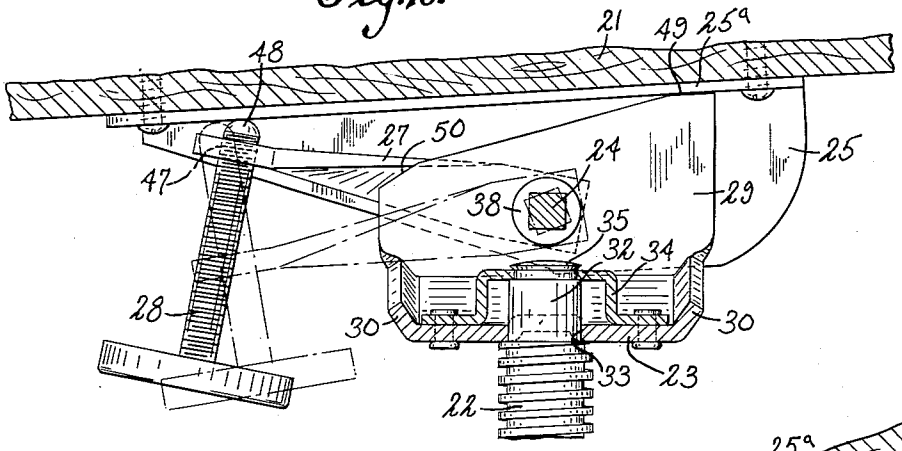


Fig.11.

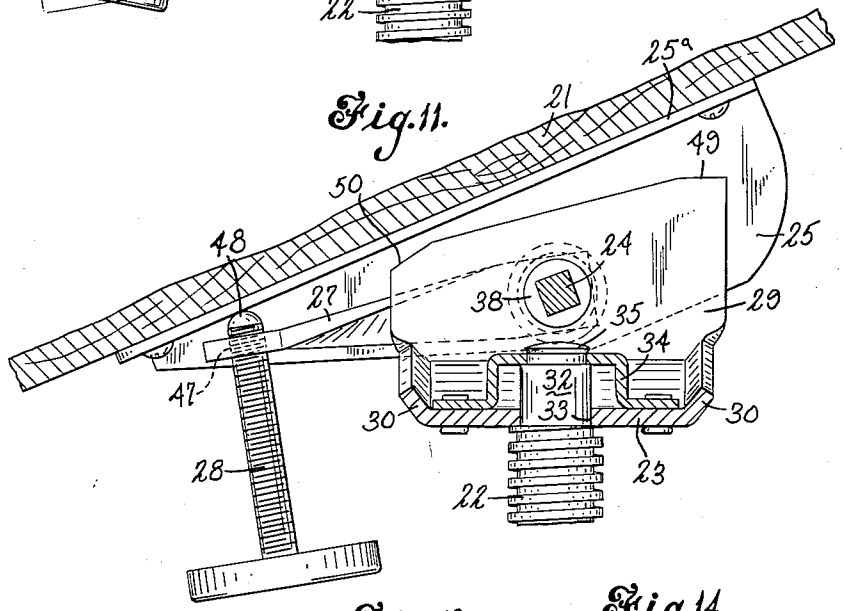


Fig.13.

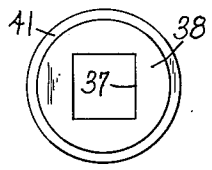


Fig.14.

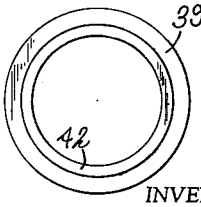
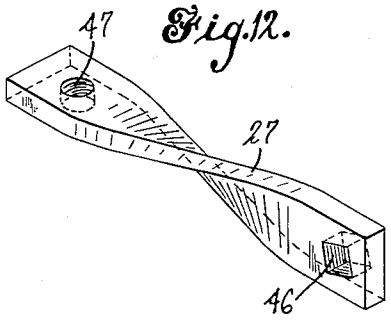


Fig.12.



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2,971,569

TILTABLE OFFICE CHAIR

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Filed Aug. 16, 1956, Ser. No. 604,394

6 Claims. (Cl. 155—77)

This invention relates to tiltable office chairs and other chairs where the seat is mounted for rearward tilting under the control of a torsion element such as a torsion bar located under the seat and extending transversely of the seat.

Controls for chairs of this general type are disclosed in prior patents but, in general, the prior controls or irons have been costly to produce or have not functioned satisfactorily or have been open to other objections.

An object of the present invention is to provide a tilting chair control of the torsion bar type which is simple in structure and relatively inexpensive and which will operate very satisfactorily.

Another object of the invention is to provide a chair control of this kind in which the force exerted by the torsion bar upon the seat and tending to hold the chair seat in a given normal position can be easily adjusted by the user of the chair to suit different conditions of use.

A further purpose of the invention is to provide a novel and beneficial arrangement of a transversely directed torsion bar, a lower frame carried by a screw spindle or the like and through the ends of which the torsion bar is extended, and seat-attached members located adjacent the ends of the bar.

In the accompanying drawings:

Fig. 1 is a front elevation of an office chair embodying these improvements;

Fig. 2 is a side elevation of the same;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is a section on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary view showing on a larger scale certain parts appearing in Fig. 2;

Fig. 6 is a section on line 6—6 of Fig. 5;

Fig. 7 is a fragmentary view showing on a larger scale certain parts appearing at the left hand portion of Fig. 6;

Fig. 8 is a similar fragmentary view showing on a larger scale certain parts appearing at the right of Fig. 6;

Fig. 9 is a section on line 9—9 of Fig. 7;

Fig. 10 is a section on line 10—10 of Fig 6;

Fig. 11 is a view similar to Fig. 10 showing a rearwardly tilted position of the chair seat;

Fig. 12 is a detail perspective view of the adjusting lever bar;

Fig. 13 is a face view of one of the bearing sleeves which is locked to the torsion bar; and

Fig. 14 is a face view of a bushing in which such a sleeve is supported.

In the example shown in the drawings a tiltable office chair has a back and side arms in fixed relation to the seat and carried from the upper end of a screw spindle which permits swiveling and vertical adjustment. The screw spindle is supported in a base in the customary manner. The screw spindle in this embodiment is attached at its upper end to an elongated member disposed beneath the chair seat and forming the lower frame of a chair control or iron which supports the seat for

tilting movement. Forming a part of this control is a torsion bar which extends transversely of the seat in a location below the lower seat surface, this torsion bar being extended at its ends through such lower frame member. The control further comprises plate members attached to the seat at the under surface of the latter so as to be adjacent the ends of the torsion bar, the extremities of said bar being mounted in the respective plates, with one end of the torsion bar in fixed relationship to the frame member and the other end of the bar being capable of turning or twisting occasioned by the rearward tilting of the seat. When the seat is rearwardly tilted from the normal position for upright seating the free end of the torsion bar is twisted through the medium of a lever device in a manner such that the torsion effect is increased.

In the drawings, the base of the chair is indicated at 20, the seat at 21, the height-adjusting spindle at 22, the elongated frame member beneath the chair seat at 23, the torsion bar at 24 and the two plate members fixed to the seat at 25. The lever device used for twisting the free end of the torsion bar is indicated generally at 26 and this comprises a lever body 27 and an associated adjusting screw 28.

The member 23, providing an elongated frame carried by the upper end of the screw spindle 22, is generally in the shape of a wide, shallow yoke fastened at its middle part to the upper end of the screw spindle and having relatively short upwardly extending integral arms 29 through which the ends of the torsion bar 24 are projected, as best shown in Fig. 6. From the midpoint where it is fastened to the screw spindle, the main part or body of the yoke is sloped upwardly toward the extremities to a slight extent. The cross section of this part of the yoke is preferably that shown in Fig. 10, the same being channel shaped and the channel being wide and shallow, the sides of the channel being provided by short upwardly and outwardly sloped flanges 30. For fastening this member to the upper end of the screw 22 the screw is provided with a reduced cylindrical part 32 which is set in a hole 33 in the frame, as shown in Fig. 10. A transverse strap or plate 34 is fastened to the bottom of the channel member by means such as rivets and this part 34 has a hole in which an upward extension of cylindrical part 32 is engaged and riveted over, as shown at 35. This provides in this embodiment a construction in which the extreme upper end of the screw spindle is at approximately the same level as the lower ends of the arms or extensions 29.

The torsion bar 24 is preferably of square or substantially square cross section through the greater part of its length, and the left hand end portion (Fig. 6) is of this cross section where it passes through the corresponding arm 29, this arm having a square hole 36 by which it is engaged with the bar so as to prevent axial turning of this part of the bar. The squared part of the bar is continued beyond arm 29 to engage a square opening 37 of a bearing sleeve 38 which is received in a bushing 39 mounted in an opening 40 in the adjacent seat-attached plate 25. Each of the plates 25 used in this structure has an upright main portion extending transversely of the chair seat and an upper integral flange 25a by means of which the plate is secured to the lower face of the chair seat as by screws or the like. The particular plate 25 now under discussion has the opening 40 in its upright part (Fig. 7). The bearing sleeve 38 has an integral collar 41 at its inner end abutting the arm 29 and the bushing 39 surrounds this sleeve with the body part of the bushing abutting at one end the collar 41 and at the other end the inner face of plate 25. An extension 42 on bushing 39 engages opening 40 in the attaching plate and is riveted over at its outer end to lock the bushing

to the attaching plate. The extreme end of the torsion bar extends outwardly somewhat beyond the bearing sleeve **38** and in this location the cross section of the bar is round and the bar is grooved to permit a washer **43** with a round hole to be held on this part of the bar by means of a snap ring **44**. A washer **45** is held in place by washer **43** against the outer end of the bushing, as shown in Fig. 7.

At the right hand side (Fig. 6) of the chair seat the form of the torsion bar is the same as at the left hand side. Here the upper flange **25a** of the plate **25** is turned in the opposite direction so that the flanges of the plates extend toward each other. The cylindrical portion of the bar is equipped with washers **43**, **45** held in place by a snap ring, as above described. The square body of the bar adjacent the cylindrical extremity engages a bearing sleeve **38** held in a bushing locked in position in the plate in the manner previously described. However, in this part of the assembly the adjusting lever device **26** is employed and the bar portion or body **27** of this device is engaged with the torsion bar between the bearing sleeve associated with the plate **25** and a bearing sleeve **38** associated with the arm **29**. In this case, the bearing sleeve in the arm **29** is positioned differently from the bearing sleeve at the opposite side of member **27**, the collar or shoulder **41** being disposed at the right hand side of the sleeve and the collars or flanged portions of the two sleeves facing each other and providing between them a working space of the correct size for the turning of the lever body **27**.

Fig. 12 shows the shape of the lever body or bar **27**, the same being a metal bar bent to such shape that the respective end portions are in planes at right angles to each other, one end portion having a square hole **46** for engagement with the torsion bar and the other end portion having a threaded hole **47** engaging the shank of the screw **28**. At its inner extremity the shank or stem of the screw is rounded, as shown at **48**, and this rounded end is adapted to engage the lower surface of the adjacent flange **25a**, as shown in Figs. 10 and 11.

Each of the upwardly directed ends or arms of the frame member or yoke **23** is of substantially the same width as the channeled portion of said member and preferably is in planar form. Above the hole in each arm through which the torsion bar extends, the arm preferably has the shape shown in Fig. 10 so as to serve as a stop member limiting the tilting movement of the seat in opposite directions. For this purpose the arm is provided with edge surfaces adapted to make contact with the flange of the adjacent attaching plate. One of these surfaces is at an upper corner, as shown at **49**, and the other, indicated at **50**, is at a corner having a lower location, these surfaces being at the ends of an inclined upper edge of the plate. Fig. 10 shows a normal (untilted) position of the seat for upright seating in which the shank of the screw is projected to a small extent through the lever body **27** and abuts the attaching plate near one end of said plate, said plate being in contact in a location near its other end with the stop surface **49** of the yoke member. Fig. 11 shows these same parts in a position in which the chair seat is tilted rearwardly to a substantial extent; only a slight further tilting movement will bring the attaching plate into contact with the stop surface **50** of the yoke which will prevent further tilting.

It is believed that the operation of the chair iron will be quite clear from the foregoing description. The chair seat being in the untilted position, the rearward tilting motion will cause the torsion bar, whose left hand end (Fig. 6) is held by the lower frame member so that it is prevented from turning on its axis, to be twisted or torsioned from its right hand end to build up a force urging the seat toward its original position. The torsion spring provided in this way will ordinarily be pretensioned to a certain extent, and to accomplish this the screw shank is adjusted in the free end of the lever body. The adjusting device **26** can advantageously be located so that the adjusting screw is disposed rearwardly of the supporting spindle, as shown in Fig. 2, but, if desired, it can have a different location relatively to the seat.

The attaching plate members **25** can advantageously have the shape shown in the drawings, the upright portions of these plates being deeper toward the front of the chair and having lower edges sloped upwardly toward the rear, as shown in Figs. 2 and 5. By this arrangement there is ample clearance for rearward tilting movement of the seat. It will be noted from Fig. 10 that the distance from the torsion bar axis to the forward end of the adjacent attaching plate **25** is less than the distance from the axis to the rear end of the plate. In Figs. 10 and 11 only one of the yoke arms **29** is shown but it is to be understood that the other arm is also provided with stop surfaces **49** and **50**.

It is understood from the foregoing description that the torsion bar not only provides spring means normally holding the seat in the normal seating position, but also serves in connection with the lower frame or yoke member and the seat-attached members **25** to provide a pivotal support or axis for tilting movement of the seat.

The structure disclosed is a chair iron of the torsion bar type that is relatively simple and comparatively inexpensive and operates very satisfactorily. It will be understood from the foregoing description that the adjusting means for the torsion bar enables the adjustment to be made very easily and conveniently and permits nice adjustment so as to take care of various conditions in respect to the weight of the occupant and other factors.

It may also be pointed out that the assemblage and disassemblage of a chair iron as herein described can be very readily accomplished. It will be obvious, for example, that the torsion bar can be very easily and conveniently removed and replaced. It will be apparent, of course, that it is advantageous to use generally similar mountings for the torsion bar at the respective ends of the lower frame member or yoke. In the case illustrated where two sleeve bearings are used at one end of the chair and a third at the other end, these sleeves are of identical form and interchangeable, and the bushings and associated washers and snap rings are of identical structure at the two ends of the bar. Moreover, the torsion bar is symmetrical with respect to its midpoint and reversible end for end. These features reduce the cost and make the device very easy to assemble and disassemble and to repair at minimum expense.

Between the end portions of the torsion bar used for anchoring and torsioning the bar as described, the bar may, if desired, be of round or other cross section.

The invention can be embodied in other forms and various modifications and detail changes may be made without departure from the principles of the invention and the scope of the claims.

What we claim is:

1. A chair iron comprising a frame in the form of an upwardly directed wide shallow yoke having apertured short arms at the respective sides, a torsion bar of square cross section above and extending across the body of the yoke and having its ends projected through the respective arms, attaching plates for application to the lower surface of a chair seat at the respective sides of the chair having downwardly turned portions outside of the yoke arms and spaced therefrom, said plate portions being supported by the extremities of said bar, one end portion of said bar being locked to its corresponding yoke arm and the other end of the bar being fixedly engaged in bearings rotatable respectively in the arm at that end of the bar and in the plate at that end, a lever having one end fixed to the torsion bar between said bearings, and an adjusting screw having a shank extended through the remote end of said lever and adapted to be engaged by a plate when the seat is tilted rearwardly in order to effect a turning movement of the bar end.

2. A structure as defined in claim 1 in which at least one of the arms of said frame member extends upwardly past the remaining yoke structure and is provided with stop means to limit tilting movement of the seat in opposite directions.

3. A chair iron comprising a frame in the form of an upwardly directed wide shallow yoke having apertured short arms at the respective sides, a torsion bar above and extending across the body of the yoke and having its ends projected through the respective arms, attaching plates for application to the lower surface of a chair seat at the respective sides of the chair having downwardly turned portions outside of the yoke arms and spaced therefrom, the extremities of said bar supporting said plate portions, one end portion of said bar being locked to its corresponding yoke arm and the other end of the bar being fixedly engaged in bearings rotatable respectively in the arm at that end of the bar and in the plate at that end, a lever having one end fixed to the torsion bar between said bearings, and an adjusting screw having a shank extended through the remote end of said lever and adapted to be engaged by a portion of said plate when the seat is tilted rearwardly in order to effect a turning movement of the bar end.

4. A chair iron comprising a frame in the form of an upwardly directed wide shallow yoke having apertured short arms at the respective sides, a torsion bar above and extending across the body of the yoke and having its ends projecting through the respective arms, attaching plates for application to the lower surface of a chair seat at the respective sides of the chair having downwardly turned portions outside of the yoke arms and spaced therefrom, the extremities of said bar supporting said plate portions, one end portion of said bar being locked to its corresponding yoke arm and the other end portion of the bar being rotatable relative the arm at that end of the bar and also relative the plate supported at that end, a lever fixed to the end portion of the torsion bar which is rotatable relative its associated arm and plate and adjustable means coupled to the lever and cooperatively engaging the attaching plate and responsive to the tilting movements of the seat to effect a turning movement of the bar end fixed to the lever.

5. A structure as defined in claim 4 in which at least one of the arms of said frame member extends upwardly past the remaining yoke structure and is provided with stop means to limit tilting movement of the seat in opposite directions.

6. A chair iron comprising a frame in the form of an upwardly directed wide shallow yoke having apertured short arms at the respective sides, a torsion bar above and extending across the body of the yoke and having its ends projecting through the respective arms, attaching plates for application to the lower surface of a chair seat at the respective sides of the chair having downwardly turned portions outside of the yoke arms and spaced therefrom, the extremities of said bar supporting said plate portions, one end portion of said bar being locked to its corresponding yoke arm and the other end portion of the bar being rotatable relative the arm at that end of the bar and also relative the plate supported at that end, a lever fixed to the end portion of the torsion bar which is rotatable relative its associated arm and plate and adjustable means coupled to the lever and operatively cooperating with an element rigid with a seat and responsive to the tilting movements of the seat to effect a turning movement of the bar end fixed to the lever.

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