United States Patent

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[54] **CHAIR CONTROL**
3 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **248/373,** 297/301
[51] **Int. Cl.** **A47c 7/00**
[50] **Field of Search** 297/301, 304, 316, 306, 333, 302, 303; 248/373

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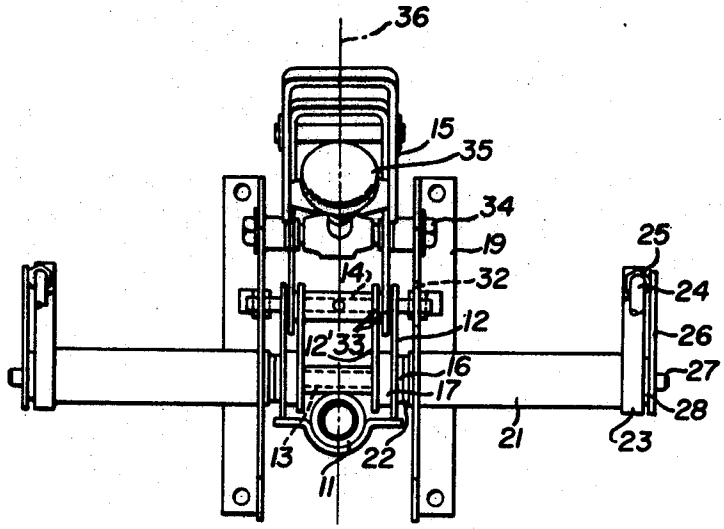
ABSTRACT: This invention is a chair control for controlling tilting of a seat in relation to a pedestal or a seat back in relation to a seat or both types of movement. A chair control is frequently sold as a unit to a chair manufacturer for fitting to a pedestal and a seat. The control uses torsion bar restraint against tilting with a single bar providing restraint against both types of tilting. The reaction is taken at the center of the torsion bar at slightly spaced points for separation of the reaction stresses. Two parts of the torsion bar may have different torsional stress characteristics so that one will fail before the other and the occupant will not be likely to be thrown from the seat due to all torsional restraint disappearing at one moment.



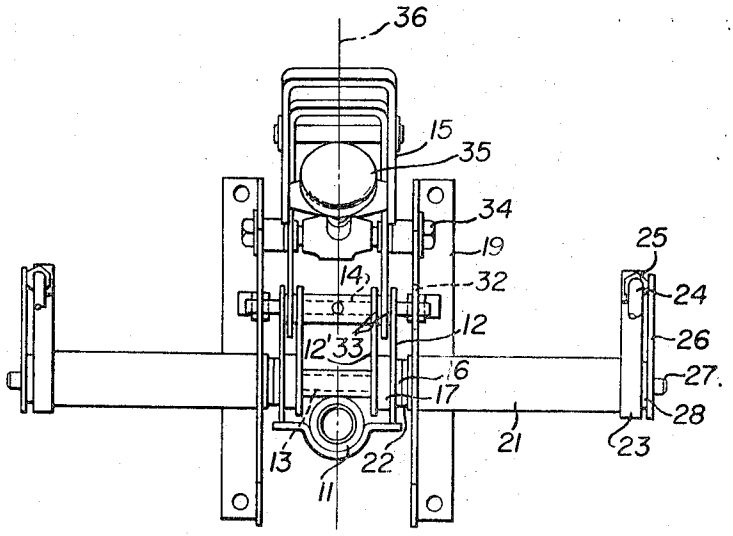


FIG. 1a.

FIG. 1.

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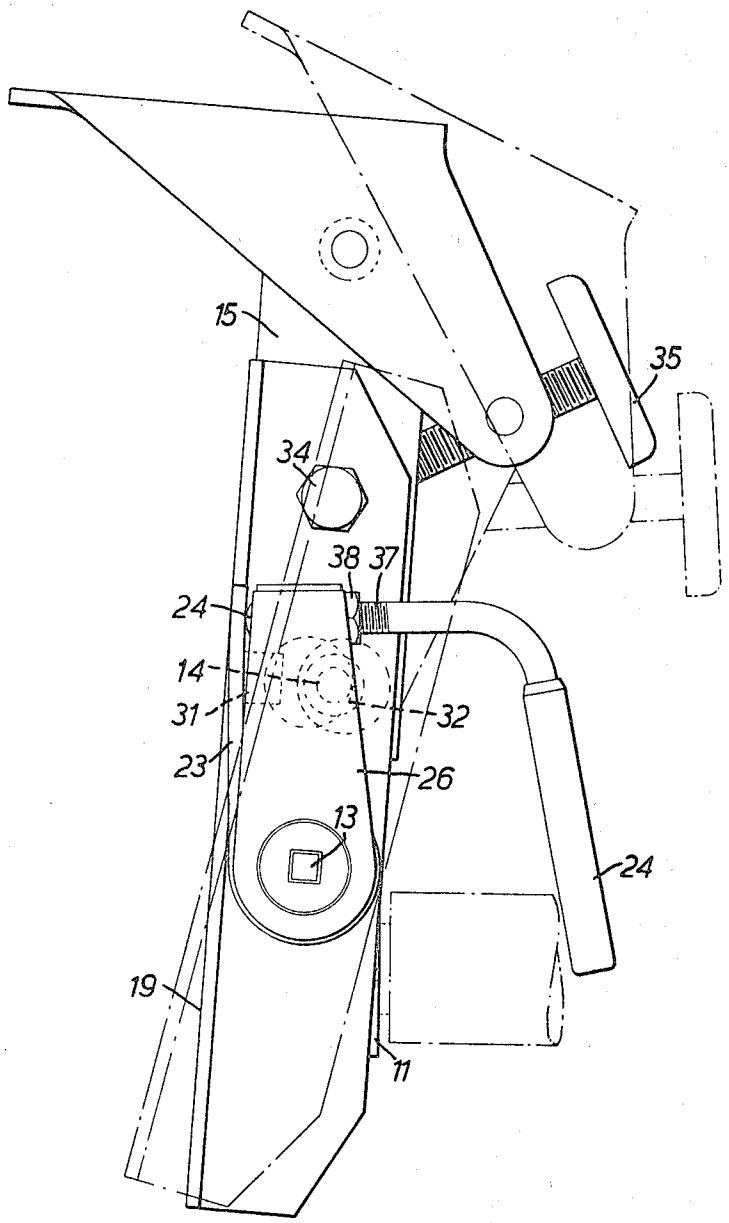

FIG. 2.

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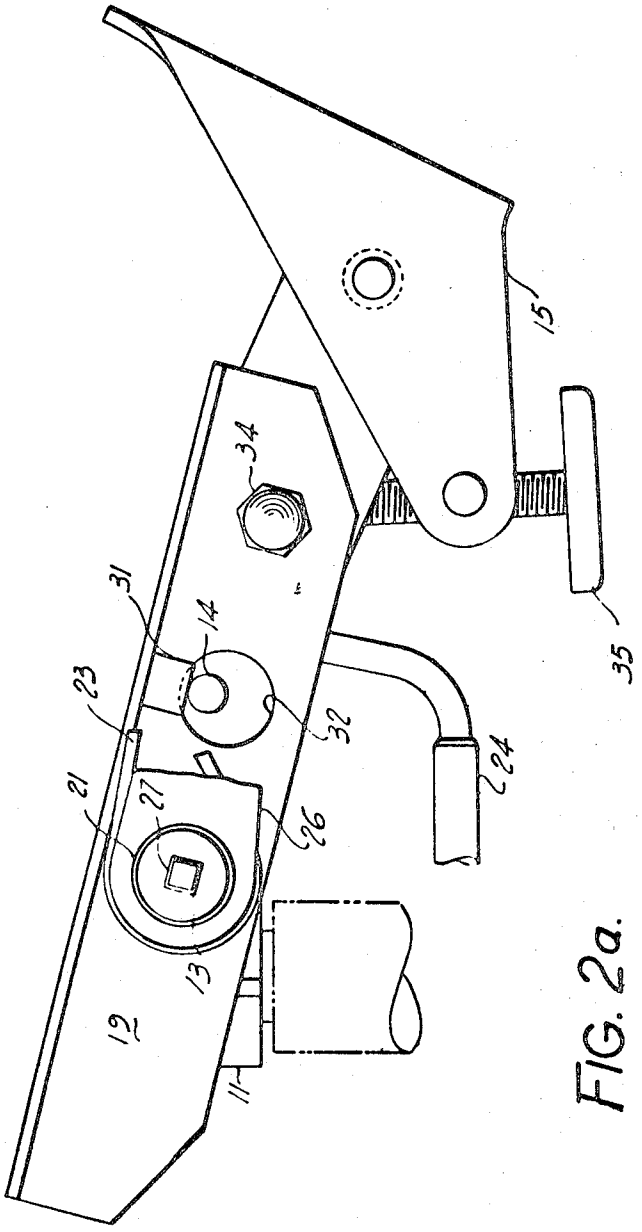

FIG. 2a.

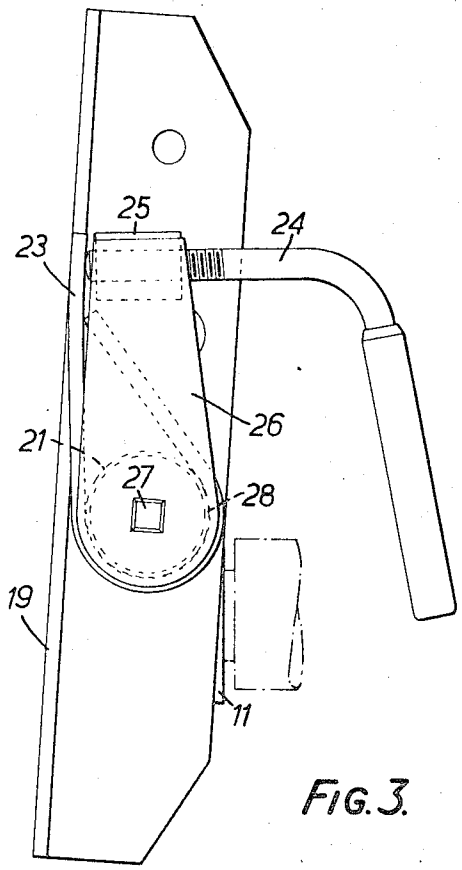

FIG. 3.

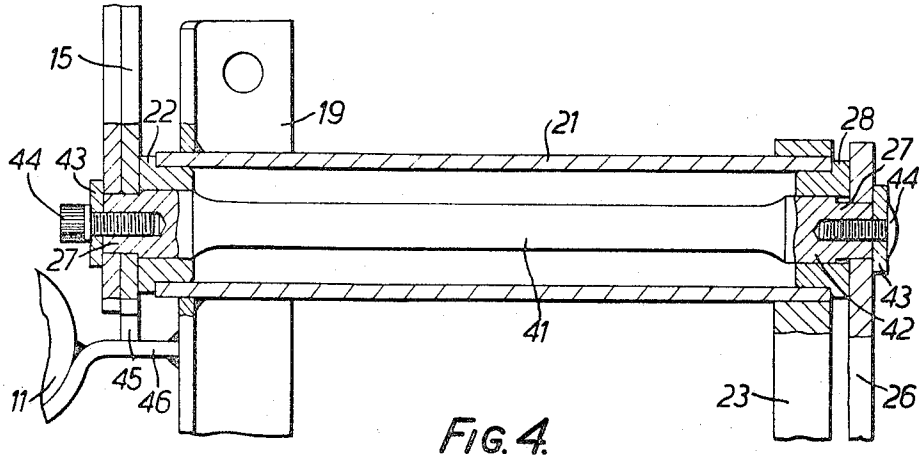

FIG. 4.

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CHAIR CONTROL

This invention relates to a chair control for controlling tilting of a seat in relation to a pedestal or tilting of a seat back in relation to a seat or both kinds of movement.

Prior art chairs are known in which restraint against tilting is provided by coil springs and there is also a proposal for a chair control using torsion bar restraint and in which a torsion bar extends from one side of the chair to the other, one end being keyed to the pedestal and the other end to the seat.

It is an object of the present invention to provide a single torsion bar arrangement for providing restraint against tilting of a spider for securing to a chair seat in relation to a member for securing to a pedestal and against tilting of a mounting for a seat back in relation to the spider.

A further object of the invention is to provide torsion bar restraint for a chair control in which a mounting for securing to part of a seat or to a base is coupled near the center of a torsion bar through two members spaced apart along the bar by a small distance in relation to the total length of the bar for separating the reaction stress at the center.

A further object of the invention is to provide a torsion bar in two portions each for providing part of the restraint against tilting, the two portions having different torsional deflection characteristics. Thus they may be of different shapes or different materials or may be treated differently or may be subjected to different stresses in the undeflected position. The bars may be two different parts of the length of a single bar or may be two separate bars.

A further object of the present invention is to provide a compact chair control mounting in which a spider for securing to a seat is associated with a torsion bar which extends laterally from a member for securing to a pedestal beyond the spider.

The invention may be carried into practice in various ways and two embodiments will be described by way of example with reference to the accompanying drawings, of which:

FIG. 1 is a plan view of one half of a symmetrical chair control embodying the invention;

FIG. 1*a* is a bottom plan view of both halves of the chair control;

FIG. 2 is an end elevation of the chair control of FIG. 1 showing some of the components in the undeflected (solid lines) as well as the deflected (chain lines) position;

FIG. 2*a* is a partial sectional view taken through the extending end of the torsion bar and encircling tube to illustrate the spider arm in deflected position;

FIG. 3 is an end view of the pretensioning mechanism; and

FIG. 4 is a view corresponding to FIG. 1 of a modification.

The chair control, which can be sold separately to a chair manufacturer, comprises a pedestal member 11 in the form of a mounting for fastening to the top of a chair pedestal, which mounting 11 is welded into a rigid structure comprising at each side of the centerline 36 arms 12 and 12′ defining the axis of the torsion bar 13, and also defining the axis of a pivot pin 14 serving as a fulcrum for a tiltable member 15 for supporting the back of the seat and as an anchorage for the arm 12′.

At each side, a nylon bush 16 is located in a corresponding hole in the arm 12 and has a central square hole in which the correspondingly shaped end of the torsion bar can be keyed. The torsion bar is also keyed in a square hole in the hardened torque arm 12′. Thus the center portion of the torsion bar 13 is keyed in relation to the pedestal member 11.

Spiders 19 for fixing to the under side of the chair seat at either side of the pedestal comprise metal flange members extending in a fore and aft direction. Each vertical flange has a hole in which is welded a metal tube 21 extending laterally outwards and surrounding the torsion bar 13. A second nylon bush 22 keyed to the torsion bar can turn inside the tube 21 so that the spider 19 can turn about the center of the torsion bar as the seat tilts in relation to the pedestal.

At the outer end, the tube 21 is welded to a rigid strap 23 which cooperates with the end of a screw 24 for adjusting the twist in the torsion bar in the undeflected position of the seat.

The screw 24 is threaded in a nut 23 carried by an arm 26 keyed to the free end 27 of the torsion bar. Also keyed at this end of the torsion bar is a third nylon bush 28 whose cylindrical surface can turn inside the end of the tube 21. Thus by manually adjusting a handle connected to the screw 24, the outer end of the torsion bar can be turned in relation to the spider 19 so that restraint against initial tilting of the spider in relation to the pedestal mounting 11 can be varied. A similar arm 26 at the other side of the control has a setscrew 37 and lock nut 38 for setting in primary stress during manufacture or assembly (FIG. 2).

The limits of tilt of the spider 19 are defined respectively by a block 31 secured to the under side of the horizontal flange as it makes contact with the pin 14 and by the edge 32 of a circular hole located in the vertical flange of the spider 19 as that edge makes contact with the under side of the pin 14 as can be best seen from FIG. 2.

The back support 15 can turn on four nylon washers 33 mounted on the pin 14 as shown best in FIG. 1 and this movement is effected automatically as the flange 19 tilts by virtue of a coupling shown generally at 34 between the rear end of the spider 19 and the back support member 15. The coupling permits, by provision of an elongated hole for example, some freedom of relative movement to allow for the fact that the spider 19 turns about the axis of the torsion bar 13 while the back support member 15 turns about the axis of the pin 14 which is laterally displaced to the rear of the bar 13.

However, it will be seen that the restraint against tilting of the seat back is provided by the same torsion bar which provides restraint against tilting of the seat.

The angle of the seat back in the undeflected position can be adjusted by a conventional nut and screw mechanism shown at 35.

A single torsion bar 13 has been described as extending from one side of the seat to the other to provide in effect two torsion bars on different sides of the central axis 36, but it is clear that two separate torsion bars could be provided instead if desired as described below with reference to FIG. 4. In either case one of the bars could be prestressed in the factory to provide some built-in restraint against deflection from the undeflected position of the spiders while adjustment of the twisting of the other torsion bar can be as shown in FIG. 1 under the control of the user so that he can add to the amount of restraint against tilting.

In this connection an important safety feature is pointed out. In the usual case where the torsion bar or other spring controlling the chair control eventually breaks, the occupant could be thrown backwards and may be injured. In the present case it can be arranged that one torsion bar will fail before the other so that when the first bar fails the second bar will provide restraint against such ejection from the seat and the occupant can then have the first bar replaced before he uses the chair again.

It is possible to ensure that one bar fails before the other by having them of different materials or shapes by differential prestressing from opposite ends of the bar, or by having a laminated construction, or by ensuring that there is a different torsional stress in each in the undeflected position. Again one bar could be surface treated as by shot peening or heat treatment so that its fatigue strength will be greater than that of the other.

It will be seen that the mounting 11 is keyed near the center of the torsion bar 13 through the arms 12 and 12′ and the pin 14, whereas the spiders 19 for mounting the seat are keyed to the ends of the torsion bar at 27. This means that when tilting occurs the two ends of the bar twist in the same sense from the center rather than one end of the bar twisting in relation to the other end.

Also the keying at the center of the bar 13 is by means of the arms 12′ which are spaced apart by about 2 inches, each arm being about 1 inch from the center of the bar 13. This separates the parts of the stationary part of the bar 13 where the torsional reaction is taken leaving a dead part of the bar

which will be a little less than 2 inches in length due to the manufacturing tolerances of the square hole in each arm 12' and the square section of the bar 13. This arrangement whereby the reaction stresses are separated gives a substantially increased life to the bar.

It will also be seen that the mechanism shown in the drawings can be very quickly modified to be suitable for a single-action chair in which the whole seat can pivot in relation to the pedestal. Thus it is only necessary to remove the seat-back fitting 15 and its linkage at 33 and 34 respectively with the pivot pin 14 and the spider 19. In this way a standard fitting can be used for a single-action chair control and, with minor modifications, for a double-action chair control.

FIG. 4 is a modification of FIG. 1 in which the torsion bar 13 is replaced by two separate torsion bars 41 arranged end to end, and in which the control is modified to be for a back action, that is for controlling tilting of the seat back in relation to the seat and pedestal.

Similar components have been given the same reference numerals.

It can be seen that the pedestal mounting 11 is in a rigid assembly with the spiders 19 and the tubes 21 which are keyed at their outer ends to the outer ends of the torsion bar 41 in a mounting similar to that already described. The torsion bars 41 in fact are of circular section with enlarged square ends 42 keyed in the bushes 28 and the arms 26 and located axially by washers 43 and screws 44.

At the inner end the back mounting 15 is keyed to the square enlarged end 27 of each torsion bar on either side of the axis. There is thus space between the inner ends of the two torsion bars 41.

Stops limiting tilting are provided by portions 45 of the mounting 15 coming into contact with the framework 46 forming part of the pedestal mounting.

I claim:

1. A chair control having a post support member adapted to be carried on a post, the improvement comprising a torsion bar, means fixed to said post support member and fixed to said bar at spaced positions on opposite sides of said post support member for holding said bar against rotation at said positions, a pair of spider arms extending rearwardly from the axis of said bar for carrying a seat with each spider arm spaced adjacent a respective one of said positions, a tube for each spider arm encircling said bar, means securing one end of each tube to a respective one of said spider arms to prevent relative rotation between each spider arm and the respective tube end, and means securing the opposite end of each tube independently of the other tube nonrotatably to a respective end of said bar whereby said bar is stressed separately between each position and a respective end of said bar in response to pivotal movement of said spider arms about the axis of said bar with the portion of said bar between said two positions serving to isolate the stresses in one portion of said bar from stresses in the other portion of said bar.

2. The chair control claimed in claim 1 in which said post support fixed means are fixed to said bar at positions spaced axially of said bar substantially 1 inch on opposite sides of the center of said support member.

3. In the chair control claimed in claim 2, a back support, means pivotally interconnecting said back support and said spider arms along an axis located rearwardly of said torsion bar, a pivot pin for said back support for enabling said back support to pivot at a different angle than said spider arms about an axis located intermediate said bar and said rearwardly located axis, and means integrally formed on said means fixed to said post support extending rearwardly of said torsion bar and anchored to said pivot pin at spaced positions.