

Sept. 5, 1967

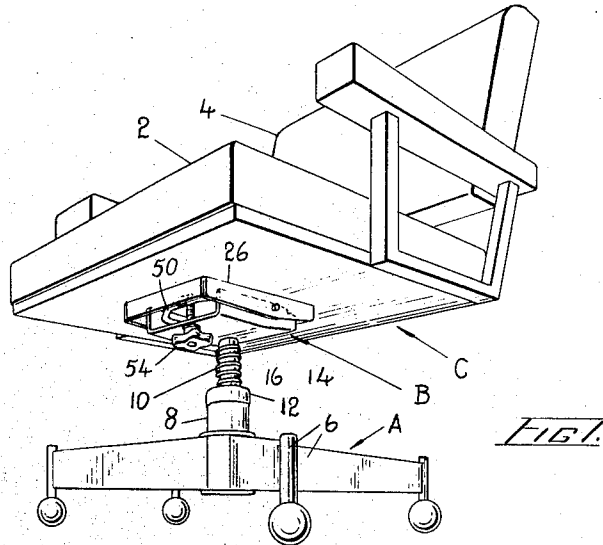
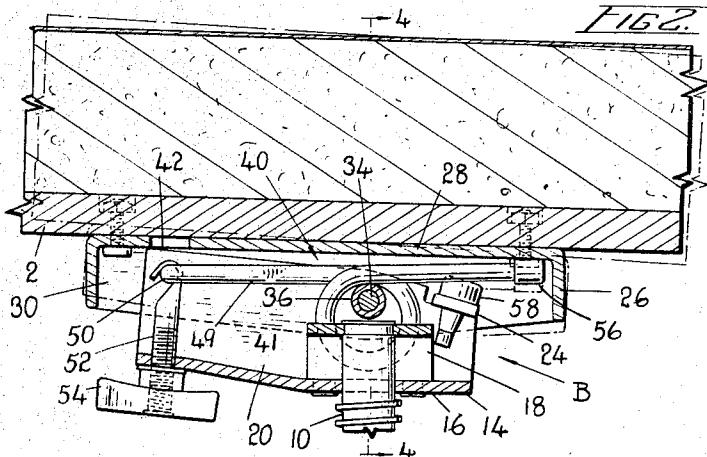
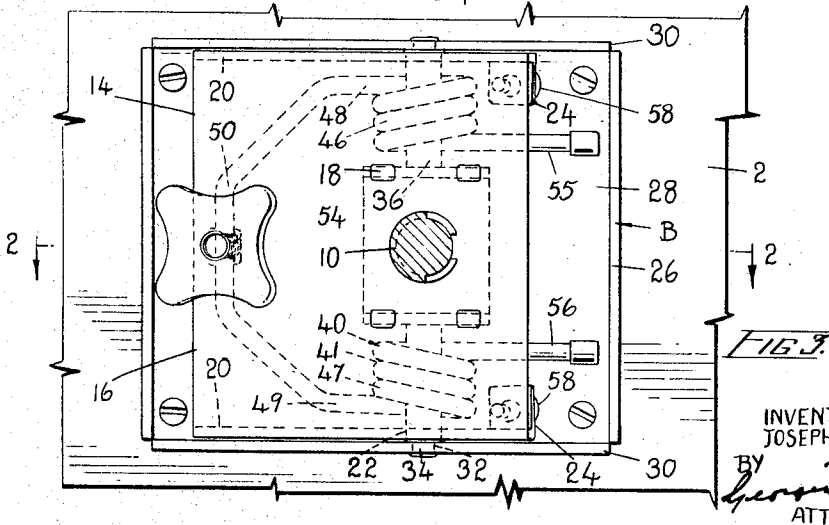
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3,339,973

TORSION SPRING CHAIR CONTROL

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3 Sheets-Sheet 1



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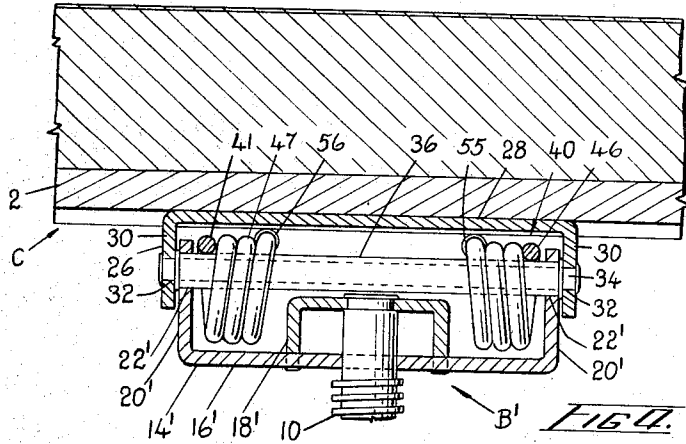
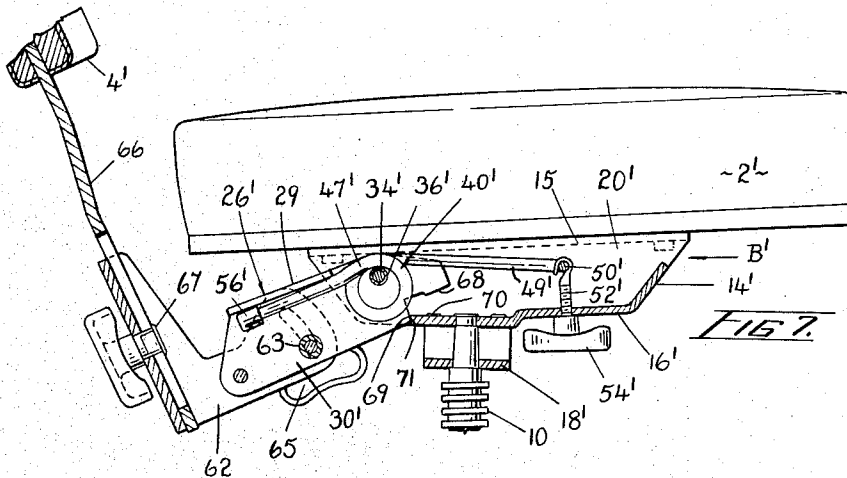
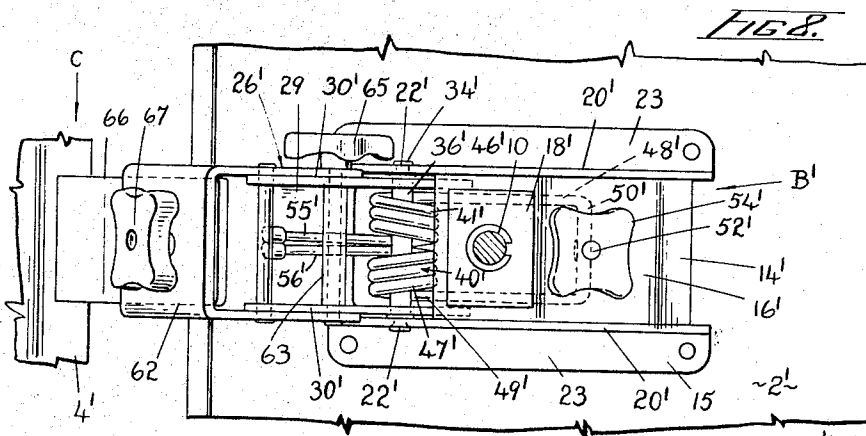
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3 Sheets-Sheet 2



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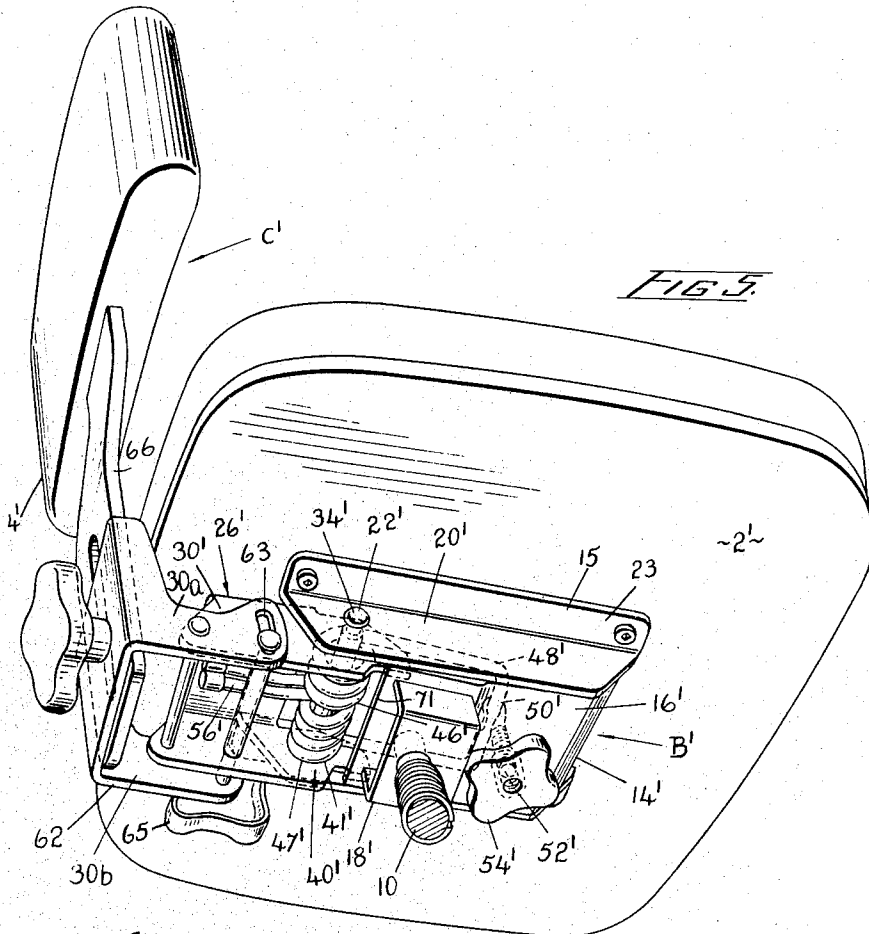
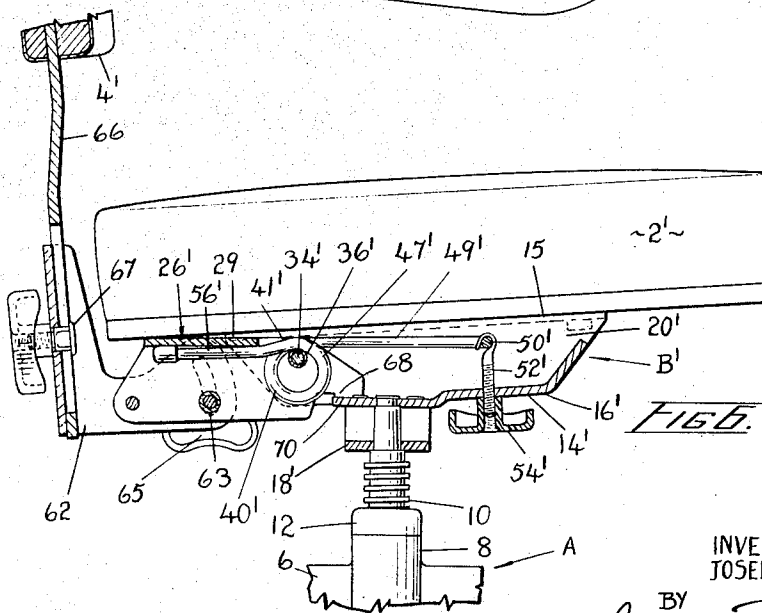
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TORSION SPRING CHAIR CONTROL

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3 Sheets-Sheet 3



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TORSION SPRING CHAIR CONTROL

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ABSTRACT OF THE DISCLOSURE

A chair control for tilting chairs, secretarial chairs, and posture chairs having a helical torsion spring which urges a pivotally movable member of the control to retain the chair seat or chair back in a normal position and to yieldably resist the movement of seat or back away from the normal position.

This invention relates to a chair control for such commonly known types of chairs as tilter chairs, secretarial chairs and posture chairs.

In such chairs at least one of the major posture support members, namely the seat or the chair back, is movably supported relative to the chair base and is spring urged to a normal or first position so that the movable support member tilts backwardly therefrom under the influence of forces imposed by the weight of the chair's occupant.

At present, in most chairs of this type, torsion bars or compression springs are employed to restrain movement between the base and the movable posture support member. Chair constructions using the torsion bar principle to provide a means for yieldably cushioning the movement of the seat or the chair back, or both, have long been in use. One embodiment of the torsion type bar is illustrated in Canadian Patent 669,631, issued Sept. 3, 1963, and its corresponding U.S. Patent 3,027,191 issued Mar. 27, 1962.

One disadvantage in chairs employing the torsion bar is that the chair control is heavy and bulky since the control mechanism must be large to accommodate the long, heavy length of the torsion bar which is required in order to provide for proper flexing of the bar under the weight of the occupant of the chair. If a short length of torsion bar is used the torsion bar would have a more limited degree of twist which would be inadequate for the purpose of providing a fully flexing posture or tilter chair.

In my chair controls utilizing the torsion bar principle, the compromise in design necessitated by the requirement for a compact control permitting a wide degree of swing of the movable posture support member has resulted in a structurally weak torsion bar, i.e. a torsion bar having a comparatively short flexure life and/or an inadequate degree of deflection.

Another type of chair control using the torsion bar system is disclosed in Canadian Patent 668,015 and in its U.S. counterpart which was filed in the U.S. Patent Office on Aug. 16, 1956.

Another type of chair control which has been used for many years by the industry is one which uses a compression spring. In this, and in most other chair controls utilizing compression springs, the control generally is bulky and the spring itself, or a cover thereof, obtrudes and presents an unsightly profile below the chair seat which does not conform to the modern design concept of low profile and streamlining of the chair itself. In order to conform as much as possible to the aforementioned design criteria, it is the practice in most present day controls in which a compression spring is employed, to provide pivoted deflecting means for the spring wherein the pivot axis (which is transverse to the longitudinal axis of the spring) is close to the spring axis. As a result, the deflecting means is

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often effective through only a limited degree of arc with the resultant limitation that the degree of deflection of the movable posture support member is restricted.

It is an object of my invention to overcome the disadvantage of the prior structures above enumerated and to provide a chair control which is compact, unobtrusive and easy to manufacture; which presents a clean, uncluttered profile and lends itself to better design of the chair structure; which is capable of efficient operation through a wide degree of deflection, and which combines the advantages of the torsion bar principle and the compression spring structure.

To carry out the foregoing and other objectives and to achieve the foregoing and other advantages, I provide a posture or tilter chair having a base, posture support members attached thereto comprising a chair seat and a chair back at least one of which is backwardly tiltable about a horizontal axis from a normal position against a stop; a chair control including a first frame member mountable on the base and a second frame member attachable to the tiltable posture support member and pivotally connected to the first member for backward tilting movement from the normal position about the aforesaid horizontal axis, and spring biasing means urging the movable posture support member to its normal position comprising a torsion spring carried by the frame members and coiled around the said horizontal axis, said spring having a first end extending from one end of said coil and secured to the first frame member and a second end of said spring extending from the other end of said coil and biased against the tiltable posture support member, said spring being torsionally loaded under the influence of an external force effectively applied to tilt the movable support member.

A posture chair, sometimes called a secretarial chair, is one in which the chair back is mounted for backward tilting movement relative to the seat. That is, the seat is fixed and forms a part of the base structure for backward tilting movement. The seat back is held in its normal or upright position by a spring member such as the compression spring or the torsion bar previously described and the backward tilting movement is restrained by the spring member.

A tilter chair is one in which the seat and back are firmly fastened together and the seat is mounted on the base for pivotal tilting movement. The tilter chair is provided with a compression spring or a torsion bar which reacts to hold the seat in its normal horizontal position and return it to that position from a tilted position. The backward tilting movement of the chair seat and the chair back is, of course, restrained by the spring member.

Each type of chair is usually provided with an adjustment to vary the tension of the spring members in accordance with the desire of the person who will be using the chair. In addition to some means for adjusting the springs, the posture or secretarial chairs are sometimes provided with a separate means, independent of the spring adjustment means, for adjusting the position of the back to provide maximum comfort for the occupant of the chair. However, such adjustments, namely the adjustments of the spring tension and of the back itself is a matter well known to the persons engaged in this field and no particular description of the same is required except as to such as may be necessary to describe the present invention.

For an understanding of the present invention and its advantages, reference is to be had to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a perspective view of a tilter chair employing the chair control of the present invention;

FIGURE 2 is a cross-sectional view on the line 2—2 of FIGURE 3;

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FIGURE 3 is an underneath plan-view of the seat to show the chair control illustrated in FIGURES 1 and 2;

FIGURE 4 is a cross-section taken on the line 4—4 of FIGURE 2;

FIGURE 5 is a perspective view looking at the underside of a secretarial or posture chair in which the chair control of the present invention has been modified for application to that type of chair;

FIGURE 6 is a side elevation in cross-section through the center of the chair running from front to back thereof to show details of the construction;

FIGURE 7 is a cross-sectional view taken on the same line as FIGURE 6 with the back tilted; and

FIGURE 8 is a bottom plan view of the chair control shown in the position of FIGURE 7.

As already intimated, FIGURES 1-4 show the present invention as applied to a tilter chair and FIGURES 5-8 show the invention as applied to what is commonly known as a posture or secretarial chair. It will be apparent from the following description that while the same is described in conjunction with two types of chairs, that the invention can be readily adapted to other types of tilting chairs or any other structure in which it is desired to have one part tiltable relative to a stationary part. Consequently, the following description is for the purpose of exemplifying the same and not for the purpose of restricting the invention to the particular type of structure disclosed.

Referring now to FIGURES 1 to 4 wherein is shown a tilter chair including a base structure A connected, as by chair control means B, to tiltable support movable posture support members C comprising a seat 2 and a chair back 4. While the base structure may take many forms, the base illustrated comprises a fairly conventional form of structure for this type of chair. The base comprises a plurality of radially extending ball mounted leg portions 6 supporting a central upright post structure 8 including a freely rotatable spindle 10 provided with conventional locking means 12 whereby the spindle height is fixed.

The chair control B comprises a first frame member 14 mountable on the base A. The frame member includes a plate 16 apertured to receive the spindle 10 therethrough and an U-shaped bridge member 18 rigidly attached to the plate 16 and apertured to receive the spigotted end of the spindle 10. The first frame member 14 also includes spaced apart side walls 20 apertured at 22 defining pivot elements in the frame member 14. Lugs 24 remote from the pivot axis project inwardly from the side walls 20 are provided for a purpose to be described hereafter.

A second frame member 26 comprises a chair seat support member for the chair control B and is attachable to the underside of the seat 2. The second frame member 26 includes a plate portion 28 mounted against the underside of the seat 21 and spaced apart side walls 30 apertured as at 32 define pivot elements in the frame member 26. Means for pivotally mounting the second frame member 26 on the first frame member 14 for backward tilting movement of the movable posture support members C is provided by a pivot pin 34 connecting co-operating pivot elements 22 and 32. A nylon bushing 36 on the pivot pin 34 is positioned between the outer side walls 30 to provide bearing support for the movable portion of the pivot.

Tilt resisting spring biasing means 40 are provided for the chair control B to urge the movable posture support members C to a normal or first position against stops 42. One of said stops 42 is shown in the first position in FIGURE 2 of the drawings. The stops are defined by upper leading edge portions of the side walls 20 and in the first position they engage the underside of the plate 28.

The aforementioned spring biasing means 40 comprise a torsion spring 41 including a pair of oppositely

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wound coils 46, 47 coiled about the pivot pin 34 and mounted between the spaced apart side walls 20. The torsion spring 41 also includes oppositely extending ends of each of said coils 46, 47 and a first end 48, 49 of each of said coils 46, 47 is joined by a connecting portion 50. The connecting portion 50 of the spring 41 is connected to the base mounted frame member 14 by connecting means comprising a threaded rod 52 which is hooked at one end over the connecting portion 50 and which extends at the other end through the plate 16 and is threaded into a manually operable tension adjusting nut 54. Each of the oppositely extending other ends 55, 56 of the torsion spring coils 46, 47 are biased against the plate 28 of the seat mounted frame member 26 to urge the seat 2, together with the chair back 4 rigidly connected thereto, to the first or normal position and to yieldably resist the backward tilting force imposed by the weight of the occupant. The torsion spring 41 is eccentrically biased about the pivot axis to urge the coils 46, 47 against the nylon bushing 36 on the pivot pin 34 to promote torsional bending thereabout when the spring is deflected. Rubber stops 58 are provided on each of the aforementioned lugs 24 below the plate to limit the backward tilt of the movable posture support members C.

Referring now to FIGURES 5 to 8 wherein is illustrated a posture or secretarial chair incorporating a modified chair control B' designed to provide yieldable, backward tilting support for only one tiltable posture support member, i.e. the chair back 4'. In this embodiment the seat 2' is rigidly connected to the base structure A.

The chair control B' includes a base mounted first frame structure 14' which includes a plate 16' apertured to receive the spigotted end of the spindle 10 and a U-shaped bridge member 18' rigidly attached to the plate 16' and apertured to receive the shank of the spindle 10. The first frame member 14' also includes a seat support member 15 attachable to the under side of the seat 2'. The seat support member 15 includes spaced apart side walls 20' apertured as at 22' defining pivot elements for the frame member 14'. Flanges 23 extend from each spaced apart side wall 20' for attachment of the seat support member 15 to the underside of the seat 2' as aforementioned, and to provide a rigid connection between the seat 2' and the base A.

A second frame member 26' of the chair control B' is attachable to the chair back 4'. The frame member 26' includes a plate portion 29 between side walls 30' apertured as at 32' defining pivot elements which co-operate with the first mentioned pivot elements 22' for backward tilting movement of the second frame member 26' about a horizontal axis parallel to the front of the seat 2. A hinge pin 34' is provided to connect the co-operating hinge elements 22' and 32' and a nylon bushing 36' on the pivot pin 34' is positioned between the outer side walls 20' to provide bearing support for the movable portion of the pivot.

The second frame member, generally indicated at 26' includes a U-shaped extension 62 remote from the pivot. Said extension is pivoted about a second axis remote from the pivot which extension is pivoted about the second axis parallel to the first mentioned horizontal axis. The U-shaped extension 62 has tilt adjusting means 63 provided therefor operative about the second axis, and suitable clamping means 65 are provided to lock the U-shaped extension 62 to the frame structure 26 between side walls 30a, 30b thereof. A slotted bar 66 is adjustably clamped as at 67, to the rear upstanding bridge portion of the U-shaped extension 62. The slotted bar 66 carries the chair back 4' at its upper end. When clamped together as by clamping means 65 and 67 the slotted bar 65, the U-shaped extension 62, and the second frame structure 26' together comprise tiltable support structure for the chair back 4'.

The side walls 20' of the second frame structure 26 include extensions thereof terminating in stops 68 and 69 which co-act with stops 70 and 71 on the plate 16' of the first frame structure 14' as will be hereinafter described.

Tilt resisting spring biasing means 40' are provided for the chair control B' to urge the chair back 4' to a normal or first position as illustrated in FIGURE 6 in which the stop 70 on the first frame member 14' is shown against the stop 68 on the second frame member 26'.

The aforementioned spring biasing means 40 comprise a torsion spring 41' including a pair of oppositely wound coils 46', 47' coiled about the hinge pin 34' and mounted between the spaced apart side walls 20'. The torsion spring 41' also includes oppositely extending ends of each of said coils 46', 47', and a first end 48', 49' of each of said coils 46', 47' is joined by a connecting portion 50'. The connecting portion 50' is connected to the base mounted frame structure 14' by connecting means comprising a threaded rod 52' which is hooked at one end over the connecting portion 50' and which extends at its other end through the plate 16' and is threaded into a manually operable tension adjusting nut 54' for the spring biasing means 40'. Said adjusting nut 54' being easily accessible on the outside of the first frame member 14'.

Each of the oppositely extending other ends 55', 56' of the torsion spring coils 46', 47' are biased against the plate 29 of the tiltable second frame structure 26' to urge the chair back 4' to its first or normal position by the chair occupant and to yieldably resist the backward tilting force imposed. The torsion spring 41' is eccentrically biased from the hinge axis to urge the coils 46', 47' against the nylon bushing on the hinge pin 34' to promote torsional bending thereabout when the spring is deflected under load. Stop 71 on the plate 16' and stop 69 on the extensions of the side walls 20' co-act to limit the backward tilt of the seat back as illustrated in FIGURE 7.

What I claim is:

1. In a chair having a base, posture support members attached thereto comprising a chair seat and a chair back at least one of which is backwardly tiltable about a horizontal axis from a normal position against a stop; a chair control including a first frame member mountable on the base and a second frame member attachable to the tiltable posture support member and pivotally connected to the first member for backward tilting movement from the normal position about the aforesaid horizontal axis, and spring biasing means urging the movable posture support member to its normal position comprising a torsion spring carried by the frame members and coiled around the said horizontal axis, said spring having a first end extending from one end of said coil and secured to the first frame member and a second end of said spring extending from the other end of said coil and biased against the tiltable posture support member, said spring being torsionally loaded under the influence of an external force effectively applied to tilt the movable support member means restraining eccentric displacement of the coils and promoting torsional bending of the spring under load, and a stop limiting the backward tilt of the posture member.

2. A chair control according to claim 1 including adjustable tensioning means for the spring between the base and the corresponding end of the coil.

3. A chair control according to claim 1, in which the torsion spring comprises a pair of oppositely wound coils including oppositely extending ends of each of said coils, a first end of each coil being biased against the movable frame member and the other end of each of said coils being joined and said joined end being connected to the base mounted frame member.

4. In a chair control for a chair having a fixed upright

support post mounted on a movable base, a chair seat having backward tilting movement about a horizontal axis for pivotal movement from a normal position; a chair control member comprising a lower frame member attachable to said base in a fixed position, a chair seat support member having front and rear ends, said seat support member being pivotally mounted on said fixed frame and attachable to the under side of the seat, and a coiled torsion spring coiled around the said horizontal axis, said torsion spring having a pair of first coil ends forming extensions thereof extending under the seat support member and reacting therewith to bias the seat support member to a normal position relative to said post and to yieldably resist the tilting movement therefrom and having a pair of second coil ends forming extensions extending under the front of the seat support member, the second coil ends being connected to the lower frame member adjacent the front end thereof, said torsion spring biasing the seat support member to its normal position and permitting tilting of the chair to a desired reclining position under an external force applied in a direction to cause tilting.

5. In a chair control for a chair having a fixed upright support post mounted on a movable base, a chair seat part, and a chair back part having backward tilting movement about a horizontal axis for pivotal movement from a normal substantially upright position; a chair control member comprising a lower frame member attachable to said base in a fixed position, a chair seat support member having a fixed part attached to the lower frame member and a back supporting member pivotally mounted on said fixed part for pivotal movement about the horizontal axis, said fixed part being attachable to the said seat and said back supporting member being attachable to said chair back, and a coiled torsion spring coiled around the said horizontal axis, said torsion spring having a pair of first coil ends forming extensions thereof extending under the back supporting member and reacting therewith to bias the back supporting member to a normal position relative to the seat and to yieldably resist the tilting movement thereof and having a pair of second coil ends forming extensions extending under the fixed part and connected to the lower frame member, said torsion spring biasing the back supporting member to its normal position and permitting tilting of the back supporting member to a desired reclining position under an external force applied in a direction to cause tilting.

6. A chair control according to claim 1, in which the torsion spring comprises a pair of oppositely wound coils including oppositely extending ends of each of said coils, a first end of each coil being biased against the movable frame member and the other end of each of said coils being joined and said joined end being adjustably connected to the base mounted frame member, whereby the tension of the torsion spring may be adjusted.

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