United States Patent [19]

Fries

[11] **3,758,157**

[45] **Sept. 11, 1973**

[54] **CHAIR**

[75] Inventor: **Bernard J. Fries**, Jenison, Mich.

[73] Assignee: **Steelcase, Inc.**, Grand Rapids, Mich.

[22] Filed: **Sept. 20, 1971**

[21] Appl. No.: **182,064**

[52] **U.S. Cl.** **297/300**, 297/304, 297/306, 248/373

[51] **Int. Cl.** **A47c 3/00**

[58] **Field of Search** 297/300, 301, 304, 297/298, 302, 303, 305–309; 248/371–384

[56] **References Cited**

UNITED STATES PATENTS

2,153,327	4/1939	Herold	297/304 X
2,662,586	12/1953	Cramer	297/304 X
3,417,956	12/1968	Helms	297/303 X
2,087,253	7/1937	Herold	297/304 X
2,110,874	3/1938	Herold	297/305
3,672,721	6/1972	Williams	297/304 X
2,901,027	8/1959	Dickson	297/305
3,598,354	8/1971	Williams	248/373
2,838,096	6/1958	Heavern	297/305
3,111,343	11/1963	Pearson	297/306
3,295,888	1/1967	Poland	297/309

FOREIGN PATENTS OR APPLICATIONS

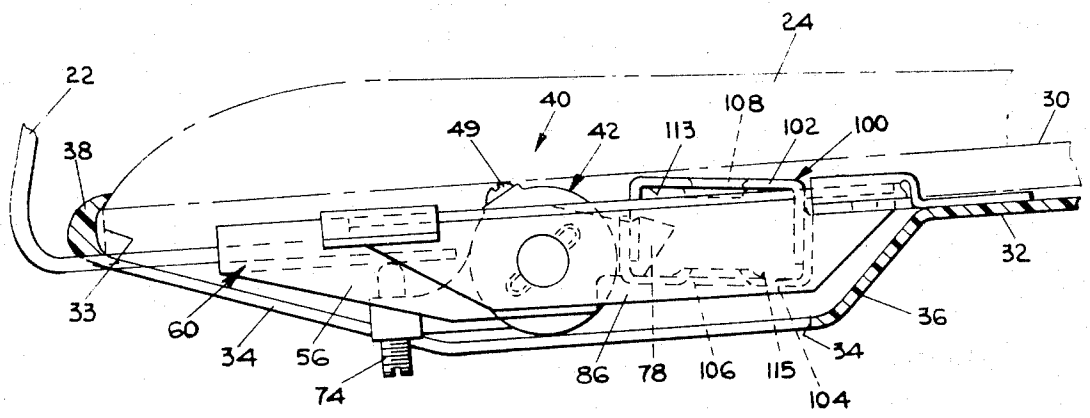
185,562	3/1937	Switzerland	248/372

Primary Examiner—Bernard A. Gelak
Assistant Examiner—Peter A. Aschenbrenner
Attorney—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

A tension control member controls tilting movement of the chair, or at least a portion thereof such as seat or back, relative to the chair support. The chair seat has an internal body supporting shell whose bottom portion is enclosed by a cover member. The tension control mechanism is anchored to the shell and fully enclosed by the cover to preclude its visual appearance when the chair is viewed in profile. The low profile arrangement of the chair control provides a relatively flat and smooth appearing cover member.

31 Claims, 10 Drawing Figures



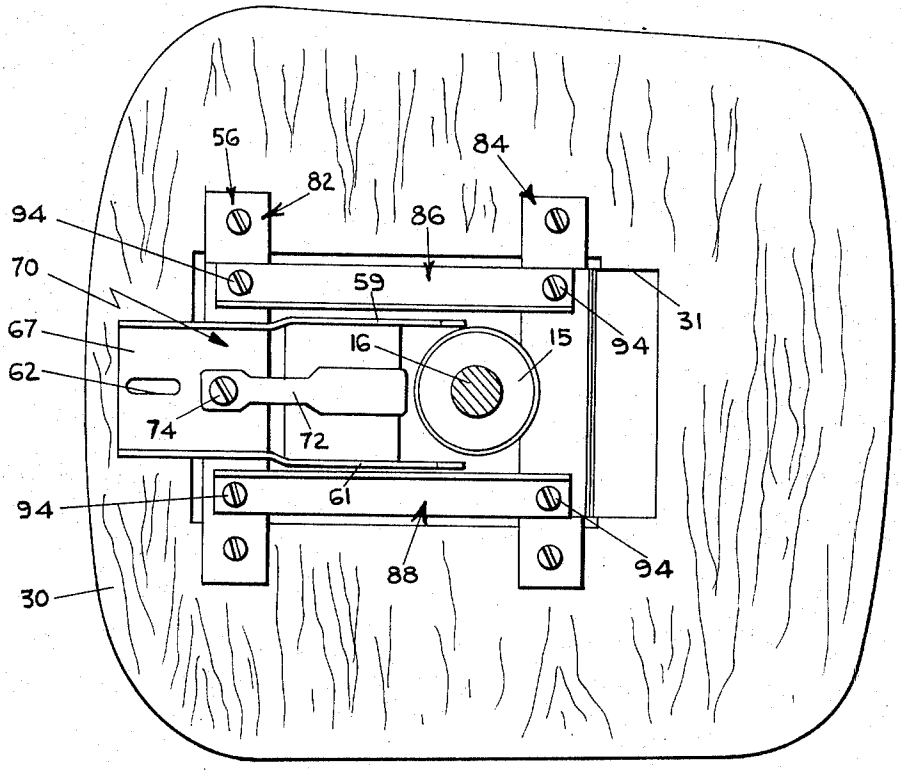


FIG. 2

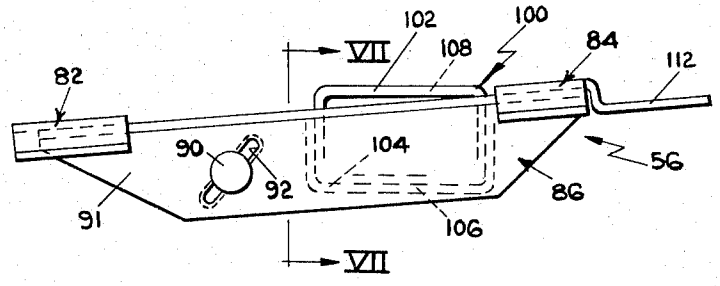


FIG. 4

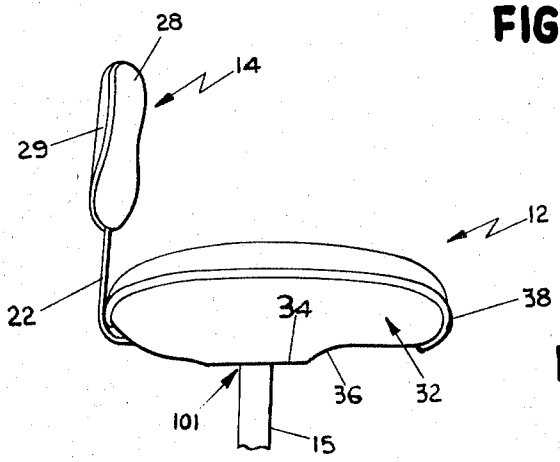


FIG. 1

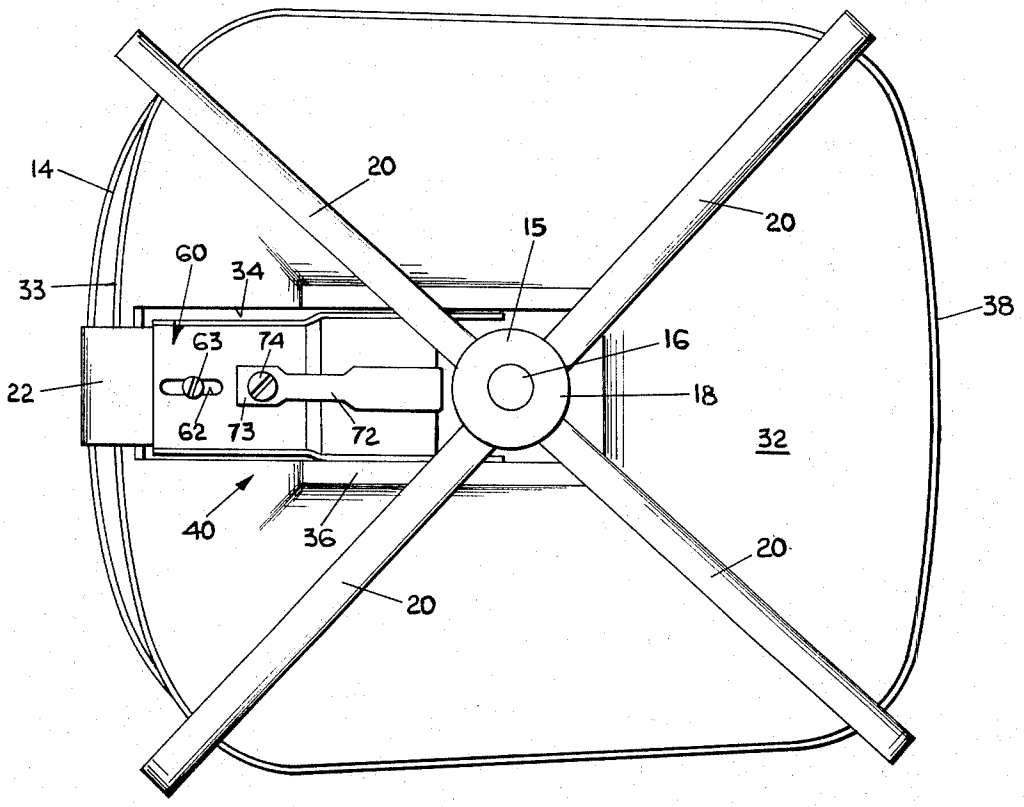

14
20
15
20
60
34
33
38
63
74
16
22
18
62
73
72
32
40
36
20
20

FIG. 3

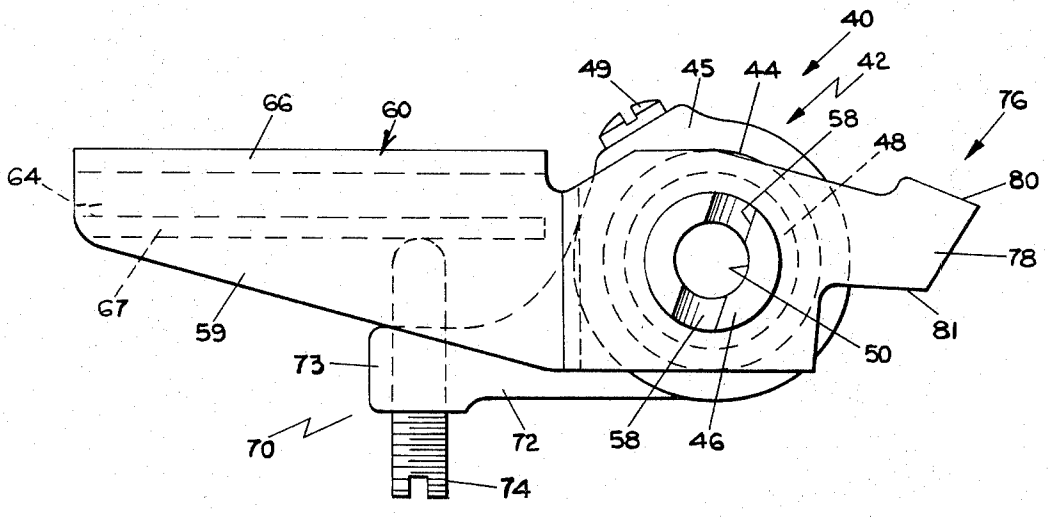

40
49
45
44
42
66
60
58
76
48
64
80
78
67
59
81
50
73
70
72
58
46
74

FIG. 5

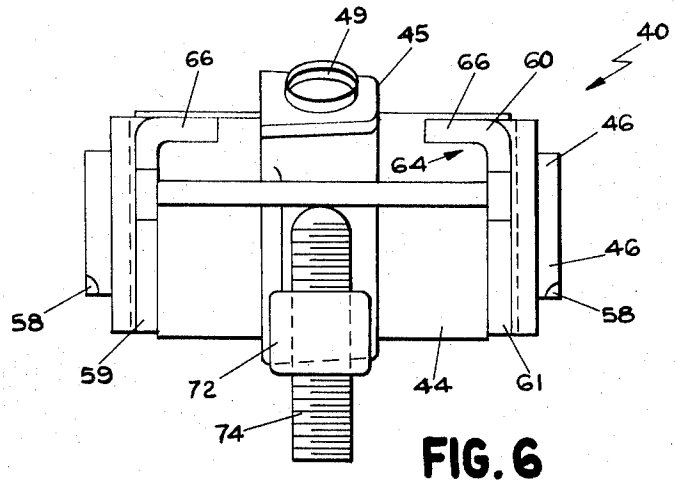


FIG. 6

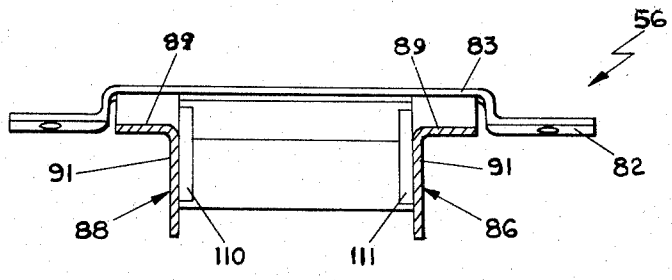


FIG. 7

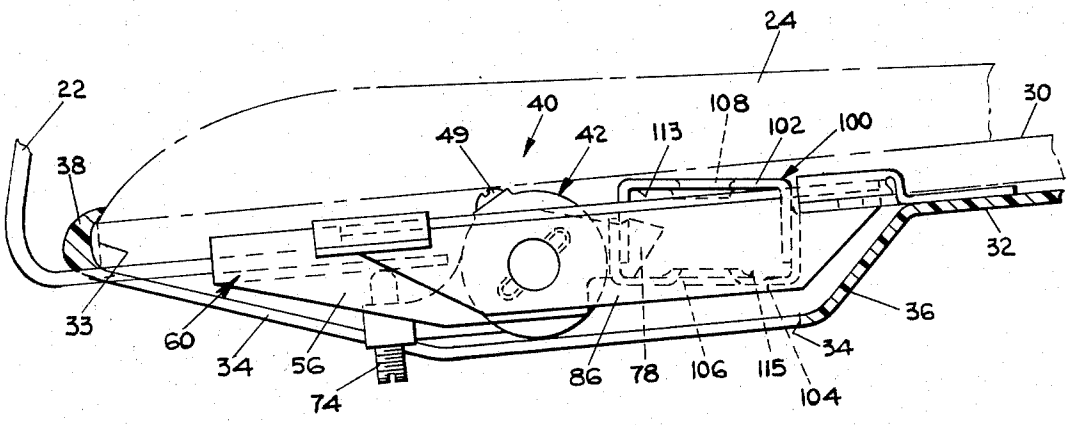


FIG. 8

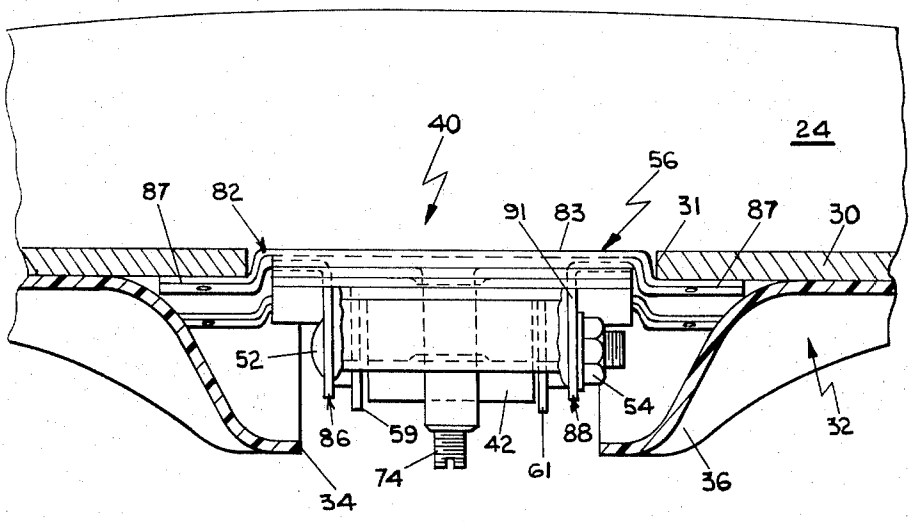

40
24
56
87
82
91
83
31
87
30
52
54
86
59
42
88
32
74
61
36
34

FIG. 9

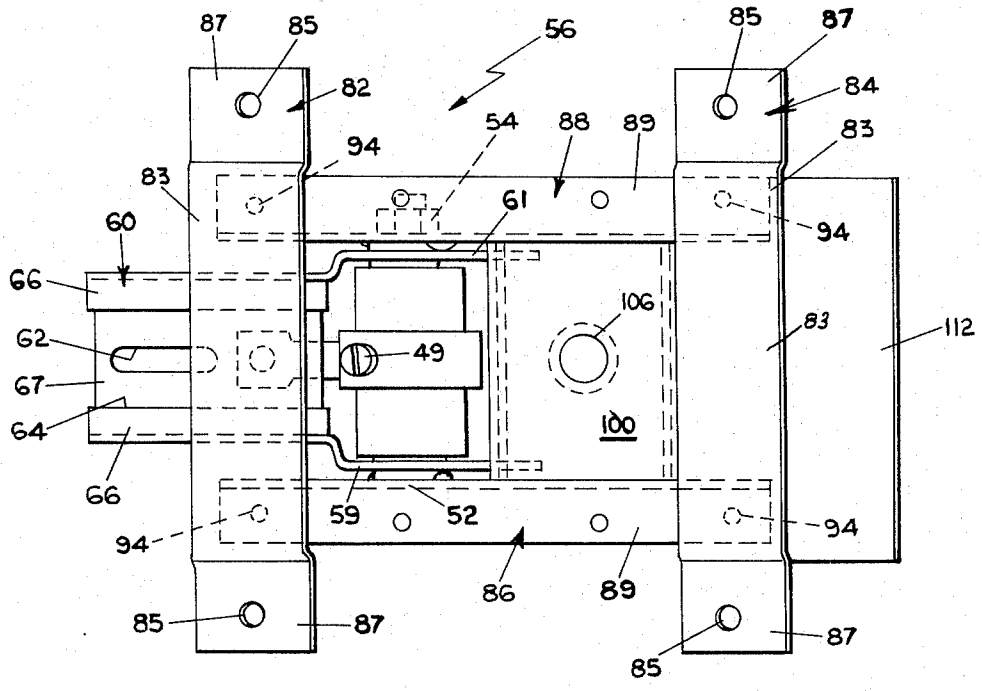

87
85
56
85
87
82
84
54
88
89
83
94
83
61
94
60
66
106
62
49
83
112
67
64
100
66
59
52
94
94
86
89
85
87
87
85

FIG. 10

CHAIR

BACKGROUND OF THE INVENTION

This invention relates to tilt chairs, and more particularly, to a novel tension control recessed in the seat portion of the chair.

A principal object of any chair design is to achieve a chair which has sufficient strength to withstand its intended use while at the same time is as aesthetically appealing as possible. In practice however, these two objectives are not necessarily compatible.

In tilt chiars, there is an added requirement for a tension control which controls the rate at which the chair is tilted. The same is true whether it is the seat which tilts or the back rest relative to the seat. Present chair controls utilize some type of tensioning or biasing means to resist the tilting movement of the chair. Associated with these means are some type of adjustment means for varying and the preset tension to the bias.

Present chair designs and tension control designs have a variety of individual disadvantages such as the overall complexity and operation of the controls and the overall manufacturing cost. However, they all have one common disadvantage which is the overall size or bulkiness of the chair control. Present proposals call for at least a portion of the control assembly to be visually exposed when the chair is viewed in profile. This distracts significantly from the overall appearance of the chair. While this problem is minimized in those facilities where the chairs are used in confined areas so that the seat member primarily shields the chair control, there are many uses such as for example secretarial chairs which are used in office areas or other unconfined areas wherein the chair is quite visible in profile and the exposed chair control significantly detracts from its overall appearance.

Another problem is created through the use of complicated chair control arrangements. One commonly used mechanism includes a torsion member having inner and outer elements joined by a rubber body therebetween. The tiltable portion of the chair, for example the chair back, is mounted to the ends of the inner member and is fixed against rotation with respect thereto. The outer member is then integrally fixed to a spindle holder to thereby support the entire torsion member. This requires either an expensive casting including an integral torsion member and spindle mounting or a complicated arrangement of the tiltable member with respect to the non-tiltable member in which the inner joint element includes a bolt passing therethrough and being joined to a support housing positioned to the outside of the point where the tiltable member is fixedly mounted to the inner member. The latter arrangement requires the use of bushings between the support housing and the tiltable member.

Thus, there is a need for an improved tilt chair design or chair tension control design which precludes the visual appearance of the chair control when the chair is viewed in profile.

SUMMARY OF THE INVENTION

The present invention relates to an improved tilt chair assembly which substantially eliminates the problems of prior art constructions as above described. This is accomplished by providing a new and improved chair tension control which when anchored to the under portion of the seat member is recessed so that it is not visually exposed to the eye of an observer when the chair is viewed in profile.

Further, in accordance with this invention, no special tools are required to assemble the recess chair control since in a preferred aspect, the chair control is shielded by a cover member which is installed after the chair control is mounted to the seat member.

Also, in accordance with this invention the overall size of the tension control is significantly reduced without reducing its strength as compared to existing tension control designs. This means that the overall size of the cover member is not relatively bulky when compared to the size of the seat member itself so that the overall appearance of the chair is greatly enhanced.

More specifically, the new and improved tilt chair design of this invention includes a chair tension control, a base, a body support member and a back rest. My improvement is comprised of a body support member having a shell to which is mounted a cover member enclosing the bottom portion of the shell. The chair tension control provided by this invention has a relatively low or flat profile to permit said control to be anchored to the shell and enclosed by said cover member to preclude its visual appearance when the chair is viewed in profile.

In a preferred form, the back rest is tiltable relative to the body support member and the tension control includes a tensioning joint interconnected to the back rest and seat to permit tilting of the back rest. An elongated opening is provided in the cover member to permit the interconnection of the back rest to the control joint and permit tilt movement of the back rest in a generally vertical plane about a horizontal axis without interference from the cover member.

Another aspect of this invention provides a dome portion on the cover for fully enclosing the spindle holder which is likewise mounted to the shell, the dome portion precluding the visual appearance of the spindle holder and upper end of the spindle when the chair is viewed in profile.

It is another object of this invention to provide a simplified chair control arrangement in which the inner member of a torsion joint having inner and outer members joined by a rubber body therebetween extends beyond the ends of the outer member and is non-rotatably joined to a support housing. A tiltable mounting bracket is then rotatably mounted on the exposed ends of the inner member and means are provided for operably connecting the outer member to the mounting bracket such that tilting of the mounting bracket generates a torsion force between the inner and outer members.

Other aspects of the invention will be apparent from the following description of the preferred embodiment.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a profile view of the tilt chair provided by this invention;

FIG. 2 is a bottom plan view of the tension control assembly secured to the internal shell portion of the seat member;

FIG. 3 is a bottom plan view of the chair completely assembled;

FIG. 4 is a side elevation view of the tension control housing; for

FIG. 5 is a side elevation view of the tensioning joint which is enclosed within the control housing;

FIG. 6 is a rear elevation view of the tensioning joint;

FIG. 7 is a cross-sectional view taken along line VII—VII of FIG. 4;

FIG. 8 is a side elevation view of the assembled tension control with the cover member shown in cross section;

FIG. 9 is a front elevation view of the assembled tension control with the shell and cover member shown in cross section and with the spindle holder broken away; and

FIG. 10 is a plan view of the assembled tension control absent the seat member.

DESCRIPTION OF THE PREFERRED EMBODIMENT

This invention relates to tilt chairs and will be specifically described in relation to a secretarial chair **10** shown in profile in FIG. **1.** Chair **10** includes a seat member **12** and a back rest **14** which is tiltable relative to the seat member. The seat member **12** is supported by a base **18** (FIG. **3**) which is adjustable relative to the seat by a spindle **16** enclosed in an outer tubing **15.** A back rest support element **22** and a bracket **60** pivotally interconnect back rest **14** to the underside of seat member **12.** A tension control assembly **40** which applies a bias to the bracket thus controlling the tilting movement of the back rest, is likewise anchored to the underside of seat member **12.** It is a principal object of this invention to provide an improved tension control construction which is fully enclosed by seat member **12** so that it is precluded from visual appearance when the chair is viewed in profile. While my invention is particularly described with respect to a secretarial chair with a non-tiltable seat, it will be appreciated that the broader aspects of the invention are equally applicable to a chair having the back rest, seat or both tiltable relative to each other and the base. In the broader aspects various types of tension control mechanisms and arrangements might be used to effectuate such a result.

Referring now specifically to FIGS. **1, 2** and **9,** seat member **12** includes an internal shell **30** preferably comprised of plywood or the like to give the shell rigidity. A seat cushion **24** is affixed to the top side of shell **30** and it will be appreciated that shell **30** and cushion **24** may be contoured for comfort and appearance. Shell **30** includes an elongated opening **31** to permit tension control assembly **40** to be anchored to the underside of shell **30** while at the same time being recessed at least partially within shell **30.**

The underside of shell **30** is enclosed by a cover member **32** which is connected to shell **30.** Appropriate fasteners or an adhesive can be used to connect the shell and cover together. Preferably, the peripheral juncture between shell **30** and cover **32** is shielded by a strip or spline of decorative trim **38.**

Referring briefly to FIG. **1,** back rest **14** includes a frontal cushion portion **28** affixed to a rear cover **29.** As noted earlier with regards to seat member **12,** cushion **28** and rear cover **29** may be appropriately contoured to enhance the overall appearance and comfort. A generally L-shaped back rest support element **22** is connected at one end to back rest **14** for supporting it in a generally vertical configuration. The opposite end of support element **22** is connected to bracket **60** which in turn cooperates with tension control assembly **40** to provide a bias tilt movement of back rest **14** relative to seat member **12.**

Base assembly **18** is conventional and includes spindle **16,** outer tubing **15** and legs **20** as shown in FIGS. **1** and **3.** The upper portion of spindle **16** is adjustably connected to a spindle holder assembly **100** (FIG. **8**) which will be described in more detail hereinafter.

Referring now specifically to FIGS. **8** and **9,** the relationship between tension control assembly **40,** seat member **12** and back rest **14** is shown. Control assembly **40** includes a rubber torsion joint **42** from which extends a torsion lever **72.** The rubber torsion joint **42** is interconnected to internal shell **30** by a support housing **56** and the tiltable back rest **14** an support element **22** is interconnected to control assembly **40** by means of a bracket **60** to which support element **22** is secured. The outer end of lever **72** includes an enlarged portion **73** through which extends a set screw **74.** Bracket **60** rests on adjustable screw **74** so that the amount of tension bias against the rotation of back rest **14** can be preselected and varied. Thus, as back rest **14** is tilted, the tilting force is transmitted through bracket **60,** adjustable screw **74,** and lever arm **72** to the rubber torsion joint **42.**

Referring more specifically to the details of the above construction, support housing **56** includes a pair of mounting brackets **82** and **84** (FIG. **10**) which include apertures **85** on each end for anchoring the brackets to shell **30.** Each bracket includes a raised mid-portion **83** (FIGS. **7** and **9**) offset from each end portion **87.** The length of raised portions **83** correspond generally to the width of elongated opening **31** provided in shell **30** but are slightly less so that control assembly **40** and support housing **56** is partially recessed within shell **30.** Brackets **82** and **84** are spaced from each other and interconnected to each other by a pair of spaced generally L-shaped side elements **86** and **88** (FIGS. **2** and **10**). One leg **89** of each side element is secured at each end to brackets **82** and **84** by fasteners **94** (FIG. **10**). The other leg **91** of side elements **86** and **88** provide the sides to which is mounted tension control assembly **40** which includes joint **42** (FIGS. **4** and **9**). Referring to FIG. **4,** each side element includes an opening **90** ofr receipt of a mounting bolt as will be described hereinafter. Preferably, the overall cross-sectional profile of joint **42** is roughly equal to the height of legs **91** of side elements **86** and **88** (FIG. **9**). Housing **56** is partially recessed within shell **30** as a result of the raised mid-portions **83** of brackets **82** and **84** (FIGS. **9** and **10**). Bosses **92** extend to each side of opening **90** on each side element to form a tongue and groove fit with portions of joint **42** as will also be described hereinafter.

As best disclosed in FIGS. **4, 8** and **10,** a generally box-shaped spindle holder **100** is shown welded within housing assembly **56.** Holder **100** comprises a pair of C-shaped channel members **102** and **104** fitted within one another and welded together (FIG. **4**). The web portion of bottom channel **104** includes an opening **106** through which the upper end of spindle **16** passes. A complementary opening is provided on the web portion of upper channel **102** to similarly receive the upper end of spindle **16.** Spindle holder **100** is mounted on housing assembly **56** intermediate side elements **86** and **88.** It is adapted to be partially recessed within shell opening **31** so that the overall profile of the entire tension control assembly **40** and spindle holder **100** remains essentially low. Holder **100** is oriented horizontally with respect to the slope of seat shell **30** to complement the vertical spindle.

Spindle holder **100** in accordance with this invention is in close proximity to torsion joint **42.** To acommodate free movement of torsion joint **42** in a manner which will be described hereinafter, spindle holder **100** includes a pair of slots **110** and **111** (FIG. 7), the purpose of which will become apparent hereinafter.

Rubber torsion joint **42** comprises an outer tubular joint element **44,** an inner concentric tubular joint element **46** and a cylindrical body of rubber **48** positioned coaxially between joint elements **44** and **46** (FIG. 5). Rubber body **48** is highly compressed and confined between joint elements **44** and **46** and is in effect bonded to their surfaces so that upon relative rotational movement between elements **44** and **46,** rubber body **48** is put under torsional strain which in effect biases the two joint elements against relative rotation.

Secured to outer joint element **44** is torsion lever **72.** Lever **72** is integral with sleeve **45** which is fitted concentrically over the mid-portion of element **44** and attached thereto by a bearing stud **49** which when tightened anchors sleeve **45** to joint element **44.** The generally radially extended lever arm **72** extends outwardly from the axis of joint **42** and includes the enlarged end portion **73** in which is threadably mounted headless set screw **74.** As noted earlier, set screw **74** adjustably supports mounting bracket **60.**

The inner joint element **46** is constrained from rotation by its inner connection with support housing **56** (FIGS. **4, 7** and **10**) which anchors joint **42** to seat **12.** The end faces of element **46** each include a diametrical recess or indent portion **58** (FIG. 5) which is provided to receive correspondingly sized bosses **92** projecting inwardly from side **86** or **88** of support housing **56,** thereby preventing rotation of inner joint element **46** with respect to support housing **56.** Inner joint element **46** includes an axial bore **50** which is aligned with openings **90** of the side elements. A mounting bolt **52** (FIG. **9**) fits through openings **90** and axial bore **50** when joint **42** is aligned between the side elements. The attachment of a nut **54** to bolt **52** anchors the entire joint between side elements **86** and **88** of the support assembly. Hence, the outer joint element **44** and lever arm **72** rotate relative to inner joint element **46** which is constrained by support housing **56.**

Referring specifically to FIGS. **5, 6** and **10,** mounting bracket **60** is illustrated having a pair of spaced side arms **59** and **61** adapted to slide over the outer end of inner joint element **46.** A bushing or the like anchors the arms to element **46** while permitting free rotation relative thereto. Arms **59** and **61** extend in the same direction as lever arm **72** and are interconnected to each other along their lower edges by a web or bottom portion **67.** A flange **66** projects inwardly from the upper edges of each arm and is spaced from web portion **67** to define a trackway **64** for receiving and holding back rest support element **22.** An elongated slot **62** is provided in web **67** for receipt of a fore and aft locking screw **63** (FIG. **3**) which is threadable through slot **62** for abutment against support element **22** when inserted in trackway **64.** Thus, the person using chair **10,** can adjust the back rest fore and aft.

Mounting bracket **60** also includes a unique stop arrangement **76** which prevents overstressing torsion joint **42** while the chair is being used (FIGS. **5** and **8**). To accomplish this, arms **59** and **61** of mounting bracket **60** each include an ear-like projection **78** which extends radially away from the joint axis, in a direction opposite to trackway **64.** Ears **78** each include a flat stop surface **80** which comes into abutment with a portion of tension control assembly **40** and at that point wherein the joint has reached its maximum permissible stressing. Ears **78** extend in a direction toward the front edge of seat member **12.** However, spindle holder **100** is also positioned immediately in front of joint **42** so that stop means **76** would interfere therewith except for the slots **110** and **111** (FIGS. **7** and **8**) which were noted earlier. Slots **110** and **111** permit the insertion of ears **78** into spindle holder **100.** The underside **113** of the web portion of top "C" shaped channel **102** provides the stop engaging surface on which stop face **80** seats when the joint **42** has reached its maximum permissible stressing. A second stop surface **81** is provided on ears **78** (FIG. **5**) which engages the inner surface **115** of the web portion of bottom channel member **104** to prevent rotation of bracket **60** in a clockwise direction beyond the horizontal position of the bracket as shown in FIGS. **5** and **8.** This feature permits the user of chair **10** to preselect the pretension bias in joint **42.** This is accomplished simply by adjusting set screw **74** so that lever **72** is rotated in either the clockwise or counterclockwise direction relative to mounting bracket **60** thereby increasing or decreasing the tension in joint **42.** But for stop surface **81** or similar means, mounting bracket **60** would simply rotate relative to lever **72.** Thus, the unique stop arrangement **76** provided permits pretension selection of joint **42** and prevents the joint from being stressed beyond a maximum permissible level.

Having described the various components of support housing **56,** tension control assembly **40** and bracket **60,** the assembly of these elements should be obvious. Briefly, the rubber torsion joint **42** is secured within control support housing **56** by inner joint element **46.** This is accomplished by mounting bolt **52** (FIG. **9**) extending through axial bore **50** of inner joint element **46,** the bolt also extending through side elements **86** and **88** of support housing **56** and secured thereto by nut **54.** Inner joint element **46** is constrained from rotation by means of a construction which includes diametrical recess or indent portions **58** provided in end faces **51** and **53** which receive bosses **92** projecting inwardly from side elements **86** and **88.** Thus, when nut **54** is tightened, the inner joint element **46** is secured tightly between sides **86** and **88** of support housing **56.**

The mounting bracket **60** is secured for pivotal movement on inner joint element **46** previous to the assembly of element **46** between sides **86** and **88** of housing **56.** When thus assembled, mounting bracket **60** is free to rotate between the limits provided by stop arrangement **76** described above. Set screw **74** on lever arm **72** of tension control assembly **40** prevents counterclockwise rotation of bracket **60** in accordance with the tension in joint **42.** Thus, when a person sits on seat member **12** and leans back on back rest **14,** the force created thereby is transmitted through support element **22,** bracket **60** and lever **72** to rubber torsion joint **42.** Spindle holder **100** is welded or otherwise fastened to support housing **56** to permit quick and easy mounting of spindle **16** to holder **100** after the entire seat has been assembled.

Referring to FIG. **8,** cover member **32** is shown to enclose the entire bottom portion of seat member **12** to shield shell **30.** Cover member **32** includes portions depending downwardly below shell **30** to define dome **36**

which, as shown in FIGS. 1, 8 and 9, completely shields tension control assembly 40, spindle holder 100 and the upper portion of base assembly 18 when the seat is viewed in profile. An elongated opening 34 in cover 32 extends from dome 36, where it is spaced from the bottom of shell 30, rearwardly toward the rear edge 33 of seat member 12. Opening 34 permits facile insertion of spindle 16 in spindle holder 100. Opening 34 also permits pivotal movement of back rest support element 22, mounting bracket 60 and lever arm 72 about a horizontal axis without interfering with cover member 32. It also allows spindle 16 and outer tubing 15 to pass through for secure mounting to shell 30 or to rigid means secured thereto. In addition, opening 34 permits easy access to adjustment set screw 74.

In the preferred embodiment, cover member 32 is comprised of a plastic such as polypropylene which is both economical to mold or cast and yet will withstand a sufficient amount of abuse without affecting its overall clean looking appearance.

ASSEMBLY AND OPERATION

Turning now to FIGS. 2 and 10, the entire tension control assembly 40 and spindle holder 100 is shown mounted to shell 30 by support housing 56.

In accordance with the detailed description above, torsion joint 42 is connected to control housing 56 so that inner tension joint element 46 is constrained from rotating relative to support housing 56. Spindle holder 100 is then inserted for connection to side elements 86 and 88 of the control housing which is then anchored to the bottom of shell 30 with the raised portions 83 of mounting brackets 82 and 84 recessed partially within shell 30 through opening 31. The elongated opening 31 in shell 30 permits partial recessing of tension control 40 and spindle holder 100 to reduce its overall cross-sectional profile. With these assemblies mounted to shell 30, cover member 32 is positioned over the bottom of shell 30 to completely enclose tension control assembly 40 and spindle holder 100 as shown in FIGS. 3 and 9. The elongated opening 34 in cover member 32 permits tilt movement of the back rest support element 22 and mounting bracket 60 without interfering with cover 32. Opening 34 extends sufficiently to and beyond the center of cover 32 to permit base 18, specifically spindle 16, to be mounted within the cover 32 to spindle holder 100. Tubular cover 15 shields the spindle from the eye of an observer although the seat height is easily adjusted by rotating the seat and spindle holder about the spindle and base. The inverted dome portion 36 which extends generally downward at the center of cover 32 fully encloses the entire upper spindle assembly. Two simple adjustment screws 63 and 74 provide quick and easy orientation of the back rest in an arbitrary fore and aft position and permit an adjustment of the amount of pretension in the joint. Set screw 74 adjusts the pretension of the back rest while slot 62 and screw 63 permits the fore and aft adjustment of the back rest.

The unique orientation of a seat shell 30, shell opening 31, cover 32 and cover opening 34 provides an extremely attractive chair which when viewed in profile precludes the appearance of the tension control assembly 40 and spindle holder 100. At the same time, there are cost advantages in that the particular appearance of the shell, tension control and spindle holder are of no concern since cover member 32 completely shields their appearance from the eye of an observer.

Although but one embodiment has been shown and described in detail, it will be obvious to those having ordinary skill in this art that the details and construction of this particular embodiment may be modified in a great many ways without departing from the unique concepts presented. It is therefore intended that the invention is limited only by the scope of dependent claims rather than by particular details of construction shown, except as specifically stated in the claims.

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

1. In an improved chair having a seat member, a back rest member, and a chair base, said back rest member being tiltable relative to said base, the improvement comprising: control means for tensioning said back rest member; said seat member including an inner shell and an outer cover member enclosing the bottom portion of said inner shell; said control means having a relatively flat profile and being anchored to said shell and being operable independently of said cover to provide tension for said back rest when mounted on said shell; the contour of said cover deviating downwardly from the contour of said shell to define a generally hidden space therebetween; said control means being positioned within said generally hidden space whereby its visual appearance is precluded when said chair is viewed in profile.

2. The improved chair according to claim 1 wherein said inner shell includes an opening therein to permit a portion of said control means to be recessed within said shell to lower the overall cross-sectional profile of said control means and shell.

3. The improved chair according to claim 2 wherein said back rest member is interconnected to said tension control means by a support element; said cover member includes means defining an elongated opening to permit rotational movement of said support element in a vertical plane about a horizontal axis without contacting said cover member.

4. The improved chair according to claim 3 wherein said base includes a spindle connected to a spindle holder anchored to said shell said cover including a downwardly depending dome for enclosing said spindle holder and generally the top of said spindle, said elongated cover opening extending into said domed portion; said chair spindle extending through said opening, said cover member and domed portion completely enclosing said spindle holder and upper end of said spindle to preclude its visual appearance when said chair is viewed in profile.

5. The improved chair according to claim 1 wherein said back rest member is tiltable relative to said seat member, said tension control means includes a joint having a first element mounted for rotation about a horizontal axis relative to the remainder of said control means, said first joint element being operatively associated with said back rest so that said back rest and first joint element rotate jointly, bias means opposing said rotation.

6. The improved chair according to claim 5 wherein said joint has an overall cylindrical configuration mounted horizontally with respect to said seat member, said first joint element mounted co-axially relative to the remainder of said tension joint and including a gen-

erally horizontal and radially projecting arm adapted for interaction with a bracket, said bracket mounted for rotation about said joint axis and interconnected to said back rest member, said tension joint providing a relatively low profile compared to the seat profile for enclosure between said shell and cover member.

7. The improved chair according to claim **6** wherein said first joint element includes stop means for limiting the tiltable movement of said back rest member to prevent overstressing said tension joint.

8. The improved chair according to claim **7** wherein said stop means is comprised of a pair of spaced arms integral with said bracket and extending from each end of said cylindrical tension joint, said arms including a stop face on each outer end thereof for abutting against a portion of said tension control means to limit the tilting of said back rest.

9. The improved chair according to claim **6** wherein said back rest member includes a support element extending therefrom, said bracket including a trackway for receipt of said back rest support element, said back rest support element being slidable within said trackway to permit fore and aft adjustment of said back rest relative to said seat member, said bracket including means for clamping said back rest element to said bracket at desired fore and aft positions.

10. The improved chair according to claim **6** wherein said tension joint includes means for adjusting the pretension in the joint in opposition to the tilting of said back rest member.

11. The improved chair according to claim **10** wherein said adjustment means includes a set-screw threadable through said arm for abutment against said bracket for adjusting the pre-tension between said bracket and said first joint element.

12. The improvement according to claim **1** wherein said back rest member is interconnected to said tension control means by a support element, said cover having means defining an opening to permit pivotal movement of said support element in a vertical plane about a horizontal axis without contacting said cover member.

13. The improved chair according to claim **12** wherein said chair base includes an upstanding spindle connected to a spindle holder anchored to said shell and said cover member includes a downwardly depending dome for enclosing said spindle holder, said domed portion including a portion of said cover opening for receipt of a chair spindle, said cover member and domed portion completely enclosing said spindle holder and upper end of said spindle to pre-clude its visual appearance when said chair is viewed in profile.

14. The chair improvement according to claim **12** wherein said tension control means includes manual adjustment means for controlling the amount of preset tension in said tension means, said adjustment means being positioned within the confines of said cover member but accessible through said cover opening.

15. In an improved chair having a base, a seat member, and a control means for controlling the tilt of at least a portion of said chair, the improvement comprising: said seat member including an internal shell and cover member for enclosing at least the bottom portion of said shell; said control means being secured to said shell and being operable independently of said cover to provide tension for said back rest when mounted on said shell; said cover including portions depending downwardly below said shell and enclosing said control means so that it is recessed within the underside of said seat member to preclude its visual appearance when said chair is viewed in profile; said downwardly depending portions defining an opening spaced from said shell thorugh which chair support means can pass; chair support means passing through said opening and being operably connected to said shell.

16. The chair of claim **15** comprising: said shell having an opening therein to permit recessably mounting said control means to said shell, said control means being at least partially recessed within said opening when mounted to said shell.

17. The chair of claim **15** in which: said downwardly depending portions define a dome, projecting below the level of said shell.

18. The chair of claim **15** in which said opening spaced from said shell is sufficiently large to permit free access to said control means therethrough.

19. The chair of claim **2** in which said opening comprises an aperture through said inner shell; mounting brackets spanning generally the top of said aperture and being joined to said inner shell; said control means being mounted to said mounting brackets.

20. The chair of claim **20** in which each of said mounting brackets includes downwardly offset end portions, said end portions being joined to the outwardly disposed surface of said inner shell.

21. The chair of claim **16** in which said opening comprises an aperture through said inner shell; mounting brackets spanning generally the top of said aperture and being joined to said inner shell; said control means being mounted to said mounting brackets.

22. The chair of claim **21** in which each of said mounting brackets includes downwardly offset end portions, said end portions being joined to the outwardly disposed surface of said inner shell.

23. In a chair control for a tiltable chair back including a support housing for supporting the chair seat, a mounting bracket for supporting the chair back and a torsion member having inner and outer members with a rubber body therebetween, the improvement comprising: the ends of said inner member extending beyond the ends of said outer member and of said rubber body and being joined to said support housing in a non-rotatable manner with respect to said support housing; said mounting bracket including a side arm at each side thereof, each side arm being rotatably mounted on the exposed ends of said inner member, between said support housing and an end of said outer member; means operably connecting said outer member to said mounting bracket whereby tilting of said mounting bracket is resisted by torsion generated through said rubber body, between said inner and outer members.

24. The chair control of claim **23** which comprises: said support housing includes a spindle holder positioned adjacent said torsion member, on a side opposite said mounting bracket; at least one of said mounting bracket side arms including an ear projecting past said torsion member into engagement with said spindle holder; said spindle holder including a slot therein for receiving said ear, said slot being sufficiently large to allow tilting of said mounting bracket until said ear engages a portion of said spindle holder to limit further tilting.

25. The chair control of claim **23** in which said means operably connecting said outer member to said mounting bracket comprises: a lever extending from said

outer member and having a screw member threadably mounted near the end thereof; said screw member engaging said mounting bracket, allowing pretension adjustment by being threadably mounted in said lever.

26. In a chair control for a chair having a tiltable member and a mounting bracket for supporting said tiltable member being tiltably mounted to a non-tiltable support housing, said control including a torsion member having inner and outer members joined by a rubber body therebetween, the improvement comprising: the ends of said inner member extending beyond the ends of said outer member and of said rubber body and being joined to said support housing in a non-rotatable manner with respect to said support housing; said mounting bracket being rotatably mounted on the exposed ends of said inner member, between said support housing and the ends of said outer member; means operably connecting said outer member to said mounting bracket whereby tilting of said mounting bracket is resisted by torsion generated through said rubber body, between said inner and outer members.

27. The chair control of claim **26** which comprises: said support housing includes a spindle holder positioned adjacent said torsion member, on a side opposite said mounting bracket; at least one of said mounting bracket side arms including an ear projecting past said torsion member into engagement with said spindle holder; said spindle holder including a slot therein for receiving said ear, said slot being sufficiently large to allow tilting of said mounting bracket until said ear engages a portion of said spindle holder to limit further tilting.

28. The chair control of claim **26** in which said means operably connecting said outer member to said mounting bracket comprises: a lever extending from said outer member and having a screw member threadably mounted near the end thereof; said screw member engaging said mounting bracket, allowing pretension adjustment by being threadably mounted in said lever.

29. The chair of claim **27** in which said spindle holder comprises a generally tubular member having top and bottom walls joined by sidewalls; both said top and bottom walls being adapted to receive said spindle and to be secured thereto; said slot being in one of said sidewalls.

30. In a chair control for a chair having a tiltable member and a mounting bracket for supporting said tiltable member being tiltably mounted to a non-tiltable support housing, said control including a torsion member having inner and outer members joined by a rubber body therebetween, the improvement comprising: one of said inner and outer members being joined to said support housing in a non-rotatable manner with respect to said support housing; said mounting bracket being rotatably mounted on said torsion member; means operably connecting the other of said inner and outer members to said mounting bracket whereby tilting of said mounting bracket is resisted by torsion generated through said rubber body; said support housing including a spindle holder positioned adjacent said torsion member, and a side opposite said mounting bracket; said spindle holder including rigidly interconnected top and bottom walls, both said top and bottom walls being adapted to receive a spindle and to be secured thereto; said mounting bracket including an ear projecting past said torsion member into said spindle holder, between said top and bottom walls whereby said spindle holder acts in conjunction with said ear to provide means for limiting fore and aft tilting of said tiltable member.

31. The chair control of claim **30** in which said top and bottom walls are rigidly interconnected by spaced sidewalls, at least one of said sidewalls including a slot therein through which said ear projects.

* * * * *

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,758,157 Dated September 11, 1973

Inventor(s) Bernard J. Fries

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 10, line 24, after "Claim" delete ---20--- and insert "19"

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents