A chair control mechanism having relatively tiltable first and second frame members. A horizontal shaft extends through the frame members for tiltable interconnecting the same. Spring means is connected with the shaft and extends between the frame members for resisting relative tilting movement between the frame members in one direction.

23 Claims, 29 Drawing Figures
CHAIR CONTROL MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to chair control mechanisms of the type having two relatively tilttable frame members for supporting a tilttable chair back assembly relative to a fixed chair seat as in a stenographer's chair, or for supporting a tilttable chair seat and back assembly relative to a fixed base as in an office chair.

Hereinafter, a chair control mechanism for a stenographer's chair has been entirely different in construction than a chair control mechanism for an office chair. Moreover, a chair control mechanism embodying one form of tilt resisting spring means has been entirely different in construction than chair control mechanisms embodying other forms of tilt resisting spring means. As a consequence, the fabrication, assembly and inventory costs of prior art chair control mechanisms have remained relatively high.

SUMMARY OF THE INVENTION

The present invention is concerned with the provision of a "family" of various embodiments of low profile chair control mechanisms utilizing common basic parts. Each embodiment comprises a first frame member for attachment to the underside of a chair seat, a second frame member tiltably supported by, or tiltably supporting, the first frame member through a transverse shaft, and tilt resisting spring means.

Each form of the first frame member can be fabricated from a common basic stamping which is adapted for use with either a stenographer's chair or an office chair, and which is adapted for use with any one of several different types of tilt resisting spring means. Likewise, a number of forms of the second frame member can be each fabricated from a common basic stamping. By utilizing such common basic parts in the series of chair control mechanisms of the present invention, tooling, fabrication, assembly and inventory costs are minimized.

More particularly, the basic stamping for each form of the first frame member includes a forward web portion in which a passageway is provided. The passageway serves to receive either a conventional post support member or a spring tensioning member associated with the tilt resisting spring means. Also, each form of the second frame member includes a pair of spaced arm segments. When the first and second frame members are in assembled relation, the transverse shaft tiltably interconnecting the frame members is arranged rearwardly of the web portion, and the arm segments are engageable with the web portion for limiting relative tilting movement in both directions. By reason of the aforesaid relationships, the series of chair control mechanisms of the present invention are compact and efficient.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a stenographer's chair incorporating one embodiment of chair control mechanism of the present invention;

FIG. 2 is a side elevational view, on an enlarged scale, of the chair control mechanism of FIG. 1;

FIG. 3 is a view taken substantially along the line 3--3 in FIG. 2 looking in the direction indicated by the arrows;

FIG. 4 is a sectional view taken substantially along the line 4--4 in FIG. 3 looking in the direction indicated by the arrows;

FIG. 5 is a sectional view taken substantially along the line 5--5 in FIG. 3 looking in the direction indicated by the arrows;

FIG. 6 is a side elevational view of a stenographer's chair incorporating another embodiment of chair control mechanism of the present invention;

FIG. 7 is a side elevational view, on an enlarged scale, of the chair control mechanism of FIG. 6;

FIG. 8 is a view taken substantially along the line 8--8 in FIG. 7 looking in the direction indicated by the arrows;

FIG. 9 is a sectional view taken substantially along the line 9--9 in FIG. 8 looking in the direction indicated by the arrows;

FIG. 10 is a sectional view taken substantially along the line 10--10 in FIG. 8 looking in the direction indicated by the arrows;

FIG. 11 is a side elevational view of a stenographer's chair incorporating another embodiment of chair control mechanism of the present invention;

FIG. 12 is a partial plan view, on an enlarged scale, of the chair control mechanism of FIG. 11;

FIG. 13 is a sectional view taken substantially along the line 13--13 in FIG. 12 looking in the direction indicated by the arrows;

FIG. 14 is a sectional view taken substantially along the line 14--14 in FIG. 13 looking in the direction indicated by the arrows;

FIG. 15 is a side elevational view of a stenographer's chair incorporating another embodiment of chair control mechanism of the present invention;

FIG. 16 is a side elevational view, on an enlarged scale, of the chair control mechanism of FIG. 15;

FIG. 17 is a view taken substantially along the line 17--17 in FIG. 16 looking in the direction indicated by the arrows;

FIG. 18 is a sectional view taken substantially along the line 18--18 in FIG. 17 looking in the direction indicated by the arrows;

FIG. 19 is a sectional view taken substantially along the line 19--19 of FIG. 17 looking in the direction indicated by the arrows;

FIG. 20 is a side elevational view of a stenographer's chair incorporating a further embodiment of chair control mechanism of the present invention;

FIG. 21 is a side elevational view, on an enlarged scale, of the chair control mechanism of FIG. 20;

FIG. 22 is a view taken substantially along the line 22--22 of FIG. 21 looking in the direction indicated by the arrows;

FIG. 23 is a sectional view taken substantially along the line 23--23 of FIG. 22 looking in the direction indicated by the arrows;

FIG. 24 is a sectional view taken substantially along the line 24--24 of FIG. 22 looking in the direction indicated by the arrows;

FIG. 25 is a side elevational view of an office chair incorporating a further embodiment of chair control mechanism of the present invention;

FIG. 26 is a side elevational view, on an enlarged scale, of the chair control mechanism of FIG. 25;

FIG. 27 is a view taken substantially along the line 27--27 of FIG. 26 looking in the direction indicated by the arrows;
FIG. 28 is a sectional view taken substantially along the line 28—28 of FIG. 27 looking in the direction indicated by the arrows; and

FIG. 29 is a sectional view taken substantially along the line 29—29 of FIG. 28 looking in the direction indicated by the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, there is illustrated a stenographer's chair 10 incorporating one embodiment of chair control mechanism 12 of the present invention. The chair 10 includes a base frame 14 with supporting legs 16, a vertically adjustable threaded post 18, a fixed chair seat 20, and a pivotal or tiltable chair back bracket 22 carrying a chair back 24.

As shown in FIGS. 2-5, the chair control mechanism 12 comprises a first frame member or chair control seat support 26 which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 20 in operative position. The first frame member 26 has a pair of parallel elongated vertical side wall portions 28, laterally outwardly extending upper flange portions 30 which are suitably attached to the underside of the chair seat 20, and a lower transverse web portion or engagement means 32 interconnecting the forward sections of the side wall portions 28. The side wall portions 28 are provided with aligned openings 34. The web portion 32 is formed with an upwardly offset central section 36 through which a screw post bushing placement opening or passageway 38 is provided. Secured in the passageway 38 is a tubular post support member or screw post bushing 40 which receives and is seated upon the upper end of the threaded post 18.

The chair control mechanism 12 also comprises a second frame member or chair control body 42 which extends parallel to the first frame member 26. The second frame member 42 has a pair of parallel elongated vertical side wall portions 44, and an upper transverse web portion 46. The side wall portions 44 are formed with vertically spaced forwardly projecting arm means or segments 48 and 50, aligned slots 52 below the web portion 46, intermediate aligned openings 54, and rear inturned wings 55, while the web portion 46 is formed with an opening 56. A transverse support bar 58 is secured at its ends in the slots 52.

A transverse shaft or axle 60 in the form of a bolt extends through the side wall openings 34 of the first frame member 26 and the side wall openings 54 of the second frame member 42 whereby to pivotally or tiltable position the first and second frame members 26 and 42. The shaft or bolt 60 is secured in position by means of a nut 62. With the first and second frame members 26 and 42 in assembled relation, the spaced arm segments 48 and 50 are engageable with the opposed sides of the web portion 32 for limiting tilting movement of the second frame member 42 relative to the first frame member 26 in one direction. The spring means 64 includes a torsion elastomer unit 66 comprised of an inner sleeve member 68 on the shaft 60, an outer sleeve member 70 radially spaced from the inner sleeve member 68, and a resilient body member 72 intermediate of and bonded chemically to the inner and mechanically to the outer sleeve members 68 and 70 respectively. The ends of the inner sleeve member 68 are formed with notches 74, and, during assembly of the chair control mechanism 12, the side wall portions 28 are deformed inwardly adjacent the openings 34 to define ribs 76 that project into the notches 74 whereby the inner sleeve member 68 is nonrotatably secured in position relative to the first frame member 26. Disposed about the torsion elastomer unit 66 is a collar member 78 having a rearwardly extending arm portion 80. The collar member 78 is secured to the outer sleeve member 70 by means of a flared roll pin 82 disposed through a transverse strap or positioner 84, threaded through the collar 78 and engaged with the sleeve 70. Adjustable means 86 is carried by the arm portion 80 for adjusting tensioning the resilient body member 72 in torsion. The adjustable means 86 comprises a tensioning screw 88 threaded through the arm portion 80, engaged with the transverse bar 58 of the second frame member 42 and locked in position by a nut 90.

As shown in FIG. 4, the second frame member 42 serves to support the chair back bracket 22. Specifically, the lower end of the bracket 22 is seated between the web and bar portions 46 and 58, and is secured to the web portion 46 by means of a screw 92 and a nut member 94. The transverse bar 58 and side wall wings 55 serve to retain the bracket 22 in position in the event the screw 92 works loose or the bracket 22 breaks away from the screw 92. The bar 58 also provides a working surface for the tensioning screw 88. As shown in FIG. 2, the second frame member 42 and the chair back bracket 22 are tilttable between the solid and dotted line positions.

Referring now to FIG. 6, there is illustrated a stenographer's chair 10a incorporating another embodiment of chair control mechanism 12a of the present invention. The chair 10a includes a base frame 14a with supporting legs 16a, a vertically adjustable threaded post 18a, a fixed chair seat 20a, and a pivotal or tiltable chair back bracket 22a carrying a chair back 24a.

As shown in FIGS. 7-10, the chair control mechanism 12a comprises a first frame member 26a which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 20a in operative position. The first frame member 26a has a pair of parallel elongated vertical side wall portions 28a, laterally outwardly extending upper flange portions 30a which are suitably attached to the underside of the chair seat 20a, and a lower transverse web portion or engagement means 32a interconnecting the forward sections of the side wall portions 28a. The side wall portions 28a are provided with aligned openings 34a. The web portion 32a is formed with an upwardly offset central section 36a through which a passageway 38a is provided. Secured in the passageway 38a is a tubular post support member 40a which receives and is seated upon the upper end of the threaded post 18a.

The chair control mechanism 12a also comprises a second frame member 42a which extends parallel to the first frame member 26a. The second frame member 42a has a pair of parallel elongated vertical side wall
portions 44a, and an upper transverse web portion 46a. The side wall portions 44a are formed with vertically spaced forwardly projecting arm means or segments 48a and 50a, aligned slots 52a below the web portion 46a, and intermediate aligned openings 54a; while the web portion 46a is formed with an opening 56a. A transverse support bar 58a is secured at its ends in the slots 52a.

A transverse shaft 60a in the form of a bolt extends through the side wall openings 34a of the first frame member 26a and the side wall openings 54a of the second frame member 42a whereby to pivotally or tiltably interconnect the first and second frame members 26a and 42a. Arranged intermediate of the first and second frame members 26a and 42a are an adaptor sleeve 96 and spacer rings 98. The shaft or bolt 60a is secured in position by means of a nut 62a. With the first and second frame members 26a and 42a in assembled relation, the spaced arm segments 48a and 50a are engageable with the opposed sides of the web portion 32a for limiting tilting movement of the second frame member 42a relative to the first frame member 26a in both directions. To accommodate the described tilt limiting means and to minimize the overall height of the chair control mechanism 12a, the transverse shaft 60a is offset rearwardly of the web portion 32a.

Spring means 100 torsionally encircles the transverse shaft 60a and extends between the first and second frame members 26a and 42a for resisting tilting movement of the second frame member 42a relative to the first frame member 26a in one direction. The spring means 100 includes a double wound helical coil torsion spring 102 comprised of two coil sections 104 and 106 with an intermediate loop extension or first extension means 108 and with a pair of free end extensions or second extension means 110. The loop extension 108 is engaged with a bearing plate 112, while the free end extensions 110 are engaged under the web portion 32a of the first frame member 26a. Adjustable means 114 is carried by the bearing plate 112 for adjustably tensioning the coil spring 102. The adjustable means 114 comprises a tensioning screw 116 threaded through the bearing plate 112 and engaged with the transverse bar 58a of the second frame member 42a.

As shown in FIG. 9, the second frame member 42a serves to support the chair back bracket 22a. Specifically, the lower end of the bracket 22a is seated between the web and bar portions 46a and 58a, and is secured to the web portion 46b by means of a screw 92a and a nut member 94a. As shown in FIG. 7, the second frame member 42a and the chair back bracket 22a are tiltable between the solid and dotted line positions.

Referring now to FIG. 11, there is illustrated a ste- nographer's chair 10b incorporating another embodiment of chair control mechanism 12b of the present invention. The chair 10b includes a base frame 14b with supporting legs 16b, a vertically adjustable threaded post 18b, a fixed chair seat 20b, and a pivotal or tiltable chair back bracket 22b carrying a chair back 24b.

As shown in FIGS. 12-14, the chair control mechanism 12b comprises a first frame 26b which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 20b in operative position. The first frame member 26b has a pair of parallel elongated vertical side wall portions 28b, laterally outwardly extending upper flange portions 30b which are suitably attached to the underside of the chair seat 20b, and a lower transverse web portion or engagement means 32b interconnecting the forward sections of the side wall portions 28b. The side wall portions 28b are provided with aligned openings 34b. The web portion 32b is formed with an upwardly offset central section 36b through which a passageway 38b is provided. Secured in the passageway 38b is a tubular post support member 40b which receives and is seated upon the upper end of the threaded post 18b.

The chair control mechanism 12b also comprises a second frame member 42b which extends parallel to the first frame member 26b. The second frame member 42b has a pair of parallel elongated vertical side wall portions 44b, and an upper transverse web portion 46b. The side wall portions 44b are formed with vertically spaced forwardly projecting arm means or segments 48b and 50b, and intermediate aligned openings 54b; while the web portion 46b is formed with an opening 56b.

A transverse shaft 60b in the form of a bolt extends through the side wall openings 34b of the first frame member 26b and the side wall openings 54b of the second frame member 42b whereby to pivotally or tiltably interconnect the first and second frame members 26b and 42b. The shaft or bolt 60b is secured in position by means of a nut 62b. With the first and second frame members 26b and 42b in assembled relation, the spaced arm segments 48b and 50b are engageable with the opposed sides of the web portion 32b for limiting tilting movement of the second frame member 42b relative to the first frame member 26b in both directions. To accommodate the described tilt limiting means and to minimize the overall height of the chair control mechanism 12b, the transverse shaft 60b is offset rearwardly of the web portion 32b.

Spring means 118 is connected with the transverse shaft 60b and extends between the first and second frame members 26b and 42b for resisting tilting movement of the second frame member 42b relative to the first frame member 26b in one direction. The spring means 118 includes a leaf spring 120 having a first arm portion 122, and a second arm portion 124 and an intermediate arcuate portion 126. The first arm portion 122 is engaged under the web portion 32b of the first frame member 26b, while the intermediate portion 126 is engaged with the shaft 60b. Adjustable means 128 extends between the second arm portion 124 and the second frame member 42b for adjustably tensioning the leaf spring 120. The adjustable means 128 comprises a tensioning screw 130 which is threaded through a nut 132 secured to the leaf spring 120 and which is engaged with the lower end of the chair back bracket 22b that is secured to the web portion 46b of the second frame member 42b by means of a screw 92b and a nut member 94b. The second frame member 42b and the chair back bracket 22b are tiltable from the position shown in FIG. 13 clockwise toward a position where the lower arm segments 50b engages the web portion 32b of the first frame member 26b.

Referring now to FIG. 15, there is illustrated a ste- nographer's chair 10c incorporating another embodiment of chair control mechanism 12c of the present invention. The chair 10c includes a base frame 14c with supporting legs 16c, a vertically adjustable threaded post 18c, a fixed chair seat 20c, and a pivotal or tiltable chair back bracket 22c carrying a chair back 24c.
As shown in FIGS. 16–19, the chair control mechanism 12c comprises a first frame member 26c which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 20c in operative position. The first frame member 26c has a pair of parallel elongated vertical side wall portions 28c, laterally outwardly extending upper flange portions 30c which are suitably attached to the underside of the chair seat 20c, and a lower transverse web portion or engagement means 32c interconnecting the forward sections of the side wall portions 28c. The sidewall portions 28c are formed with aligned slots 134 and ear portions 136. The web portion 32c is formed with an upwardly offset central section 36c through which a passageway 38c is provided. Secured in the passageway 38c is a tubular post support member 40c which receives and is seated upon the upper end of the threaded post 18c.

The chair control mechanism 12c also comprises a second frame member 42c which extends parallel to the first frame member 26c. The second frame member 42c has a pair of parallel elongated vertical side wall portions 44c, and an upper transverse web portion 46c. The side wall portions 44c are formed with vertically spaced forwardly projecting arm means or segments 48c and 50c, aligned slots 52c between the web portion 46c, and intermediate aligned openings 54c; while the web portion 46c is formed with an opening 56c. A transverse support bar 48c is secured at its ends in the slots 52c.

A transverse shaft 138, which is rectangular in cross section at least at its ends, extends through the side wall slots 134 of the first frame member 26c and the side wall openings 54c of the second frame member 42c whereby to pivotally or tiltably interconnect the first and second frame members 26c and 42c. Three sides of the side wall slots 134 conform to three sides of the ends of the shaft 138; hence, the slots 134 nonrotatably receive the ends of the shaft 138. Prior to assembly, the ear portions 136 are disposed in a spread-apart position to permit the shaft 138 to be moved into the slots 134. After the shaft 138 has been placed in the slots 134, the ear portions 136 are deformed or forced together to maintain the shaft 138 in the slots 134. Also, the ends of the shaft 138 are notched to defined shoulders 140 that engage the side wall portions 28c of the first frame member 26c for locating the shaft 138 endwise.

With the first and second frame members 26c and 42c in assembled relation, the spaced arm segments 48c and 50c are engageable with the opposed sides of the web portion 32c for limiting tilting movement of the second frame member 42c relative to the first frame member 26c in both directions. To accommodate the described tilt limiting means and to minimize the overall height of the chair control mechanism 12c, the transverse shaft 138 is offset rearwardly of the web portion 32c.

Spring means 142 is connected with the transverse shaft 138 and extends between the first and second frame members 26c and 42c for resisting tilting movement of the second frame member 42c relative to the first frame member 26c in one direction. The spring means 142 includes a torsion elastomer unit 144 comprised of a sleeve member 146 radially spaced from the shaft 138, and a resilient body member 148 intermediate of and bonded to the shaft 138 and sleeve member 146. Disposed about the torsion spring unit 144 is a col-

lar member 78c having a rearwardly extending arm portion 80c. The collar member 78c is secured to the sleeve member 146 by means of a flared roll pin 150 disposed through a transverse strap or positioner 84c, threaded through the collar 78c and engaged in the sleeve 146. Adjustable means 86c is carried by the arm portion 80c for adjusting tensioning the resilient body member 148 in torsion. The adjustable means 86c comprises a tensioning screw 88c threaded through the arm portion 80c, engaged with the transverse bar 58c and locked in position by a nut 90c. The lower end of the chair back bracket 22c is seated between the web and the bar portions 46c and 58c, and is secured to the web portion 46c of the second frame member 42c by means of a screw 92c and a nut member 94c. As shown in FIG. 16, the second frame member 42c and the chair back bracket 22c are tiltably between the solid and dotted line positions.

Referring now to FIG. 20, there is illustrated a stegogram's chair 10d incorporating a further embodiment of chair control mechanism 12d of the present invention. The chair 10d includes a base frame 14d with supporting legs 16d, a vertically adjustable threaded post 18d, a fixed chair seat 30d, and a pivoting or tiltable chair back bracket 22d carrying the chair seat 20d.

As shown in FIGS. 21–24, the chair control mechanism 12d comprises a first frame member 26d which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 20d in operative position. The first frame member 26d has a pair of parallel elongated vertical wall portions 28d, laterally outwardly extending upper flange portions 30d which are suitably attached to the underside of the chair seat 20d, and a lower transverse web portion or engagement means 32d interconnecting the forward sections of the side wall portions 28d. The side wall portions 28d are provided with aligned openings 34d. The web 32d is formed with an upwardly offset central section 36d through which a passageway 38d is provided. Secured in the passageway 38d is a tubular post support member 40d which receives and is seated upon the upper end of the threaded post 18d.

The chair control mechanism 12d also comprises a second frame member 42d which extends parallel to the first frame member 26d. The second frame member 42d has a pair of parallel elongated vertical side wall portions 44d, and an upper transverse web portion 46d. The side wall portions 44d are formed with vertically spaced forwardly projecting arm means or segments 48d and 50d, and intermediate aligned openings 54d; while the web portion 46d is formed with an upwardly offset central section 36d through which a passageway 38d is provided. Secured in the passageway 38d is a tubular post support member 40d which receives and is seated upon the upper end of the threaded post 18d.

A transverse shaft 60d in the form of a bolt extends through the side wall openings 34d of the first frame member 26d and the side wall openings 54d of the second frame member 42d whereby to pivotally or tiltably interconnect the first and second frame members 26d and 42d. The shaft or bolt 60d is secured in position by means of a nut 62d. With the first and second frame members 26d and 42d in assembled relation, the spaced arms segments 48d and 50d are engageable with the opposed sides of the web portion 32d for limiting tilting movement of the second frame member 42d relative to the first frame member 26d in both directions. To accommodate the described tilt limiting means and to minimize the overall height of the chair control mecha-
nism 12d, the transverse shaft 60d is offset rearwardly of the web portion 32d.

Spring means 64d is connected with the transverse shaft 60d and extends between the first and second frame members 26d and 42d for resisting tilting movement of the second frame member 42d relative to the first frame member 26d in one direction. The spring means 64d includes a torsion elastomer unit 66d comprised of an inner sleeve member 68d on the shaft 60d, an outer sleeve member 70d radially spaced from the inner sleeve member 68d, and a resilient body member 72d intermediate of and bonded chemically to the inner and mechanically to the outer sleeve members 68d and 70d respectively. The ends of the inner sleeve member 68d are formed with notches 74d, and, during assembly of the chair control mechanism 12d, the side wall portions 28d are deformed inwardly adjacent the openings 34d to define ribs 76d that project into the notches 74d whereby the inner sleeve member 68d is nonrotatably secured in position relative to the first frame member 26d. Disposed about the torsion elastomer unit 66d is a collar member 78d having a rearwardly extending arm portion 80d. The collar member 78d is secured to the outer sleeve member 70d by means of a screw 82d disposed through a transverse strap or positioner 84d, threaded through the collar 78d and engaged in the sleeve 70d. Adjustable means 86d is carried by the arm portion 80d for adjustably tensioning the resilient body member 72d in torsion. The adjustable means 86d comprises a tensioning screw 88d threaded through the arm portion 80d, engaged with the web portion 46d of the second frame member 42d and locked in position by a nut 90d.

Mounted adjacent the rear end of the second frame member 42d is a generally L-shaped chair back support member 156 to which is connected the lower end of the chair back bracket 22d. The chair back support member 156 is pivotally mounted between the side wall portions 44d by means of a transverse spring pin member 158. Adjustable means 160 extends through the slot 154 and the chair back support member 156 for adjusting the angular position of the latter relative to the second frame member 42d. The adjustable means 160 comprises a bolt-like stem member 160, having an upper end portion 164 that projects through the slot 154, an intermediate portion 166 presenting an annular spherical surface 168 that engages the underside of the hemispheric portion 152 at the sides of the slot 154, and a lower threaded portion 170 threaded through the chair back support member 156. The upper end portion 164 of the member 162 is maintained within the slot 154 by a spring slip 172. The second frame member 42d, the chair back support member 156 and the chair back bracket 22d are tiltable from the position shown in FIG. 21 clockwise toward a position where the lower arm segments 50d engage the web portion 32d of the first frame member 26d.

Referring now to FIG. 25, there is illustrated an office chair 174 incorporating a further embodiment of chair control mechanism 12e of the present invention. The chair 174 includes a base frame 176 with supporting legs 178, a vertically adjustable through post 180, and a pivotal or tiltable chair seat 182 with a back 184 and arms 186 fixed thereto.

As shown in FIGS. 26-29, the chair control mechanism 12e comprises a first frame member 26e which is fabricated as an integral metal stamping and which extends forwardly and rearwardly of the chair seat 182 in operative position. The first frame member 26e has a pair of parallel elongated vertical side wall portions 28e, laterally outwardly extending upper flange portions 30e which are suitably attached to the underside of the chair seat 182, and a lower transverse web portion or engagement means 32e interconnecting the forward sections of the side wall portions 28e. The side wall portions 28e are formed with aligned openings 34e. The web portion 32e is formed with an upwardly offset central section 36e through which a passageway 38e is provided.

The chair control mechanism 12e also comprises a second frame member or chair control body 188 which extends parallel to the first frame member 26e. The second frame member 188 has a pair of parallel elongated vertical side wall portions 190, and a lower transverse web portion 192. The side wall portions 190 are formed with vertically spaced forwardly projecting arm means or segments 194 and 196, the upper arm segments 194 of which are notched at 198 and interconnected by a strap member 200. The side wall portions 190 are also formed with intermediate aligned openings 202, while the web portion 192 is formed with a screw post bushing placement opening 204. Secured in the web opening 204 is a tubular post support member 40e which receives and is seated upon the upper end of the threaded post 180.

A transverse shaft 60e in the form of a bolt extends through the side wall openings 34e of the first frame member 26e and the side wall openings 202 of the second frame member 188 whereby to pivotally or tiltably interconnect the first and second frame members 26e and 188. The shaft or bolt 60e is secured in position by means of a nut 62e. With the first and second frame members 26e and 188 in assembled relation, the spaced arm segments 194 and 196 are engageable with the opposed sides of the web portion 192 for limiting tilting movement of the first frame member 26e relative to the second frame member 188 in both directions. To accommodate the described tilt limiting means and to minimize the overall height of the chair control mechanism 12e, the transverse shaft 60e is offset rearwardly of the web portion 192.

Spring means 64e is connected with the transverse shaft 60e and extends between the first and second frame members 26e and 188 for resisting tilting movement of the first frame member 26e relative to the second frame member 188 in one direction. The spring means 64e includes a torsion elastomer unit 66e comprised of an inner sleeve member 68e on the shaft 60e, an outer sleeve member 70e radially spaced from the inner sleeve member 68e, and a resilient body member 72e intermediate of and bonded chemically to the inner and mechanically to the outer sleeve members 68e and 70e respectively. The ends of the inner sleeve member 68e are formed with notches 74e, and, during assembly of the chair control mechanism 12e, the side wall portions 190 are deformed inwardly adjacent the openings 34e to define ribs 208 that project into the notches 74e whereby the inner sleeve member 68e is nonrotatably secured in position relative to the first frame member 26e. Disposed about the torsion elastomer unit 66e is a collar member 78e having a forwardly extending arm portion 80e. The collar member 78e is secured to the outer sleeve member 70e by means of a flared roll pin 82e threaded through the collar 78e and engaged in the
sleeve 70e. Adjustable means 86e is carried by the arm portion 80e for adjustably tensioning the resilient body member 72e in torsion. The adjustable means 86e comprises a spring tensioning member or screw 88e threaded through the arm portion 80e, extending through the web passageway 38e of the first frame member 26e, engaged with the strap member 200 of the second frame member 188 and locked in position by a nut 90e. The first frame member 26e (together with the chair seat 182, back 184 and arms 186) is tiltable from the solid line position shown in Fig. 26 clockwise through the dotted line position toward a position where the web portion 32e engages the upper arm segments 194.

As will be appreciated from a comparison of the chair control mechanisms 12–12e disclosed herein: the first frame members 26–26c can be fabricated from common basic stampings in which appropriate openings and slots are thereafter selectively formed; the basic stamping common to the first frame members 26–26c is adapted for use with either a stenographer's chair (e.g., FIG. 1) or an office chair (e.g., FIG. 25); the common web passageways 38–38e serve to receive either a post support member (e.g., member 40, FIG. 4) or a spring tensioning member (e.g., member 88e, FIG. 28); the second frame members 42–42c can be fabricated from common basic stampings in which appropriate openings and slots are thereafter selectively formed; and the basic stampings common to the first and second frame members 26–26c and 42–42c are adapted for use with any one of several different forms of tilt resisting spring means.

While there has been shown and described preferred embodiments of the present invention, it will be understood by those skilled in the art that various modifications and rearrangements may be made therein without departing from the spirit and scope of the invention.

The invention claimed is:

1. A chair control mechanism comprising: a first frame member extending forwardly and rearwardly and having a pair of parallel elongated vertical side wall portions, laterally outwardly extending upper flange portions integral with said side wall portions for attachment to the underside of a chair seat, and a lower transverse web portion interconnecting only the forward sections of said side wall portions and forming a U-shaped frame member, said web portion defining a laterally extending abutment; a second frame member; a transverse shaft extending through said second frame member and said side wall portions of said first frame member rearwardly of said web portion of the latter whereby to tiltably position said first and second frame members, said second frame member has at least one pair of vertically spaced, forwardly projecting are segments engageable with opposed sides of said web portion abutment of said first frame member for limiting relative tilting movement between said first and second frame members in both directions, the axis of said transverse shaft lying substantially in the same horizontal plane as said web portion, and spring means connected with said transverse shaft and extending between said first and second frame members in one direction.

2. The chair control mechanism of claim 1 wherein said spring means includes an inner sleeve member on said shaft and nonrotatably secured in position relative to said first frame member, an outer sleeve member radially spaced from said first sleeve member, a resilient body member intermediate of and bonded to said inner and outer sleeve members, a collar member secured to said outer sleeve member and having an arm portion, and adjustable means carried by said arm portion and engaged with said second frame member for adjustably tensioning said resilient body member in torsion.

3. The chair control mechanism of claim 1 wherein said second frame member has a transverse web portion and a transverse bar portion; and including a chair back bracket one end of which is seated between said web and bar portions of said second frame member, and means for securing said chair back bracket to said web portion of said second frame member.

4. The chair control mechanism of claim 1 wherein said second frame member has an upstanding hemispheric portion with a slot therein; and including a chair back support member, a transverse pin member pivotally mounted said chair back support member to said second frame member, and adjustable means extending through said slot and said chair back support member for adjusting the angular position of the latter relative to said second frame member.

5. The chair control mechanism of claim 1 wherein said shaft is rectangular in cross section at least at its ends; wherein said first frame member is provided with a pair of slots that nonrotatably receive said ends of said shaft; and wherein said spring means includes a sleeve member surrounding said shaft in spaced relation thereto, a resilient body member intermediate of and bonded to said shaft and said sleeve member, a collar member on said sleeve member and having an arm portion, means securing said collar member to said sleeve member, and means carried by said arm portion and engaged with said second frame member for adjustably tensioning said resilient body member in torsion.

6. The chair control mechanism of claim 5 wherein said means securing said collar member to said sleeve member comprises a roll pin.

7. The chair control mechanism of claim 5 wherein three sides of each of said pair of slots conform to three sides of said ends of said shaft, and said first frame member is deformed at the end of each of said pair of slots to maintain said shaft in said slots.

8. The chair control mechanism of claim 5 wherein said ends of said shaft are notched to define shoulders that engage said side wall portions of said first frame member for locating said shaft endwise.

9. The chair control mechanism of claim 1 wherein said spring means includes a bearing plate, a helical coil spring disposed about said shaft and having first extension means engaged with said bearing plate and second extension means engaged with said first frame member, and adjustable means carried by said bearing plate and engaged with said second frame member for adjustably tensioning said coil spring.

10. The chair control mechanism of claim 9 wherein said coil spring comprises two coil sections with an intermediate loop extension that defines said first extension means and with a pair of free end extensions that define said second extension means.

11. The chair control mechanism of claim 1 wherein said spring means includes a leaf spring having first and second arm portions with said first arm portion engaged with said first frame member and having an intermediate portion engaged with said shaft, and adjustable
means extending between said second arm portion of said leaf spring and said second frame member for adjustably tensioning said leaf spring.

12. A chair control mechanism as defined in claim 1, including a passageway in said web portion for receiving either a post support member or a spring tensioning member.

13. The chair control mechanism of claim 12 wherein said web portion abutment has opposed sides engageable with said spaced arm segments for limiting relative tilting movement between said first and second frame members in both directions.

14. The chair control mechanism of claim 12 wherein said spring means includes a first sleeve member on said shaft and nonrotatably secured in position relative to said first frame member, a second sleeve member radially spaced from said first sleeve member, a resilient body member intermediate of and bonded to said first and second sleeve members, and a collar member secured to a second sleeve member and having an arm portion; and wherein an adjustable spring tensioning member is carried by said arm portion and engaged with said second frame member for adjustably tensioning said resilient body member in torsion.

15. The chair control mechanism of claim 12 wherein said second frame member has a transverse web portion and a transverse bar portion; and including a chair back bracket one end of which is seated between said web and bar portions of said second frame member, and means for securing said chair back bracket to said web portion of said second frame member.

16. The chair control mechanism of claim 12 wherein said second frame member has an upstanding hemispheric portion with a slot therein; and including a chair back support member, a transverse pin member pivotally mounting said chair back support member to said second frame member, and adjustable means extending through said slot and said chair back support member for adjusting the angular position of the latter relative to said second frame member.

17. The chair control mechanism of claim 12 wherein said shaft is rectangular in cross section at least at its ends; wherein said first frame member is provided with a pair of slots that nonrotatably receive said ends of said shaft; wherein said spring means includes a sleeve member surrounding said shaft in spaced relation thereto, a resilient body member intermediate of and bonded to said shaft and said sleeve member, a collar member on said sleeve member and having an arm portion, means securing said collar member to said sleeve member; and wherein an adjustable spring tensioning member is carried by said arm portion and engaged with said second frame member for adjustably tensioning said resilient body member in torsion.

18. The chair control mechanism of claim 17 wherein said means securing said collar member to said sleeve member comprises a roll pin.

19. The chair control mechanism of claim 17 wherein three sides of each of said pair of slots conform to three sides of said ends of said shaft, and said first member is deformed at the end of each of said pair of slots to maintain said shaft in said slots.

20. The chair control mechanism of claim 17 wherein said ends of said shaft are notched to define shoulders that engage said first frame member for locating said shaft endwise.

21. The chair control mechanism of claim 12 wherein said spring means includes a bearing plate, and a helical coil spring disposed about said shaft and having first extension means engaged with said bearing plate and second extension means engaged with said first frame member; and wherein said adjustable spring tensioning member is carried by said bearing plate and engaged with said second frame member for adjustably tensioning said coil spring.

22. The chair control mechanism of claim 21 wherein said coil spring comprises two coil sections with an intermediate loop extension that defines said first extension means and with a pair of free end extensions that define said second extension means.

23. The chair control mechanism of claim 12 wherein said spring means includes a leaf spring having first and second ends with said first end engaged with said first frame member and having an intermediate portion engaged with said shaft and wherein an adjustable spring tensioning member is engaged with said leaf spring adjacent said second end and with said second frame member for adjustably tensioning said leaf spring.
UNIVERS STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,881,772
DATED : May 6, 1975
INVENTOR(S) : Harry L. Mohrman

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

Column 11, line 55, change "are seg" to --arm seg--

Signed and Sealed this
thirteenth Day of April 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks