

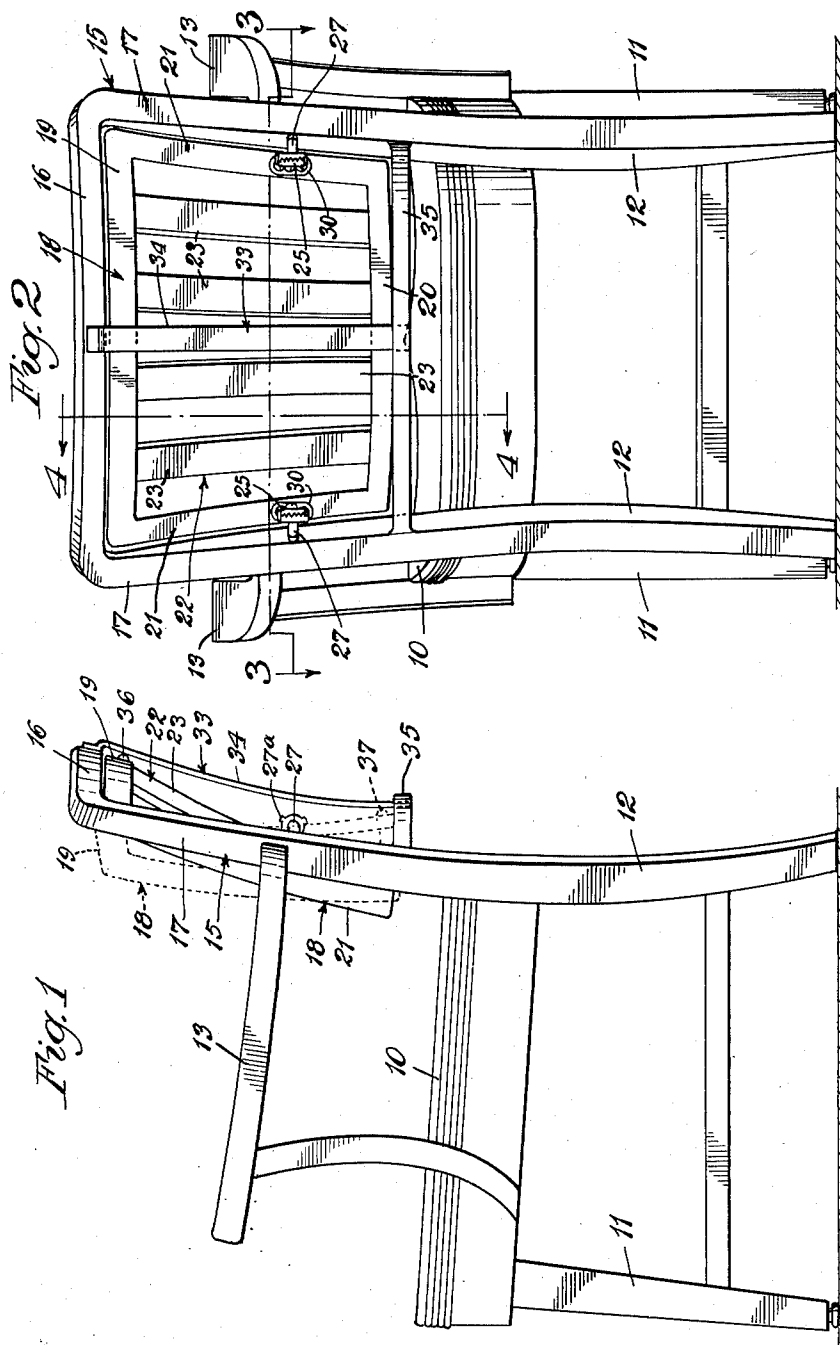
Oct. 7, 1952

J. S. BURDICK
TILTING CHAIR BACK

2,612,939

Filed May 15, 1950

2 SHEETS—SHEET 1



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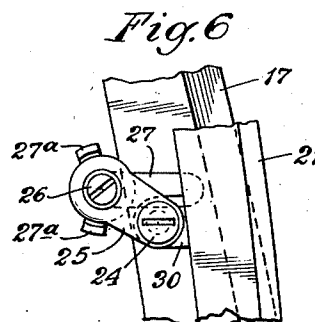
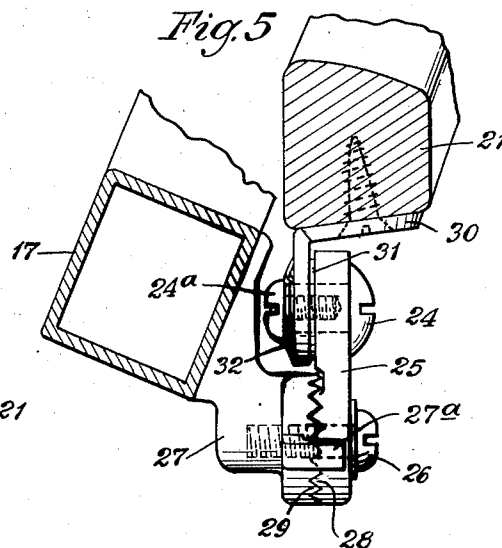
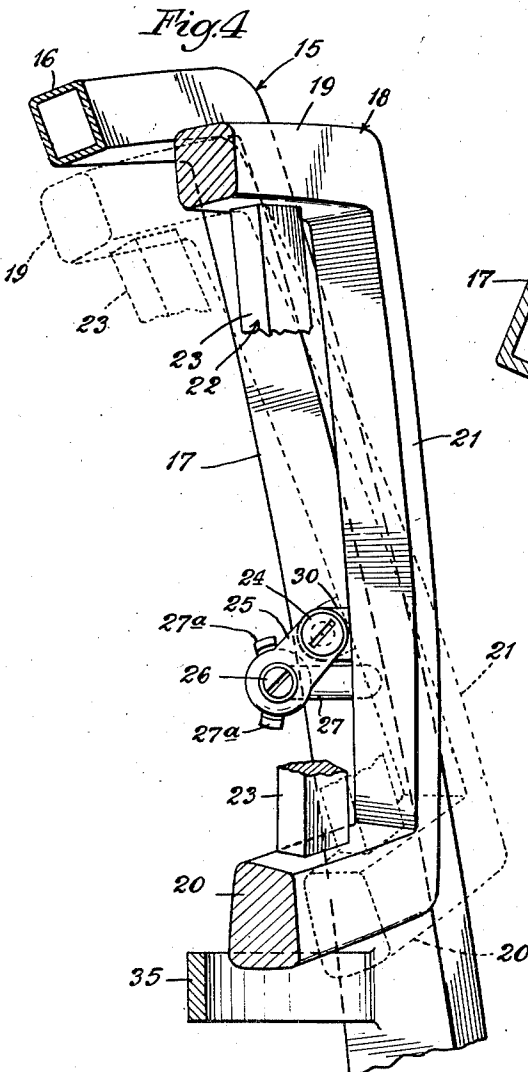
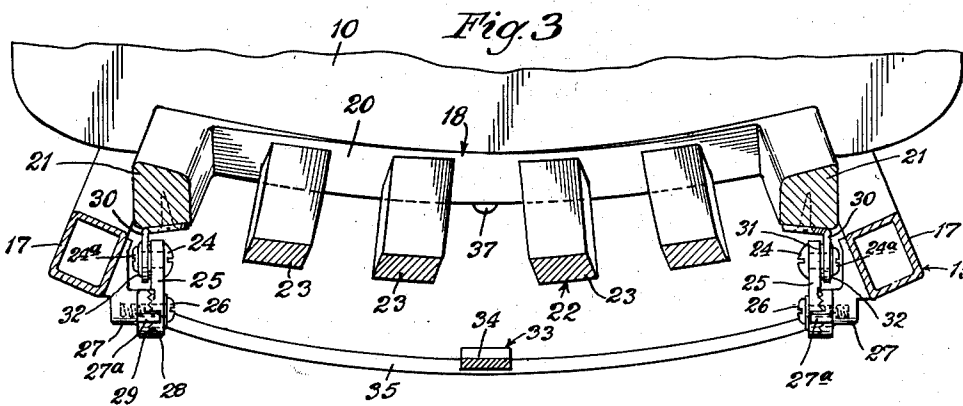
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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TILTING CHAIR BACK

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10 Claims. (Cl. 155—156)

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This invention relates to improvements in chair back construction and, more particularly, to chair backs having a stationary outer frame. A stationary chair back construction of the kind heretofore commonly used fails to properly fit the backs of the greater number of its occupants regardless of its shape, form or dimensions.

The principal object of the invention is to provide a simple form of tilting back unit mounted within the stationary chair back frame so as to automatically tilt or adjust itself to the proper angular position to fit the occupant's back.

A further object is to provide a tilting back unit which is capable of limited vertical adjustment relative to the side rails of a stationary back support, to accommodate persons of different sizes, with the object of making it possible for the placement of the convexity of the back unit in the correct tilt and vertical position, for the proper support of the lumbar region of the occupant's back.

While the invention is particularly adapted for use with office chairs, it can be applied to any design of chair having a stationary back frame and wherein the tilting back and its surrounding frame may be of simple slatted frame construction or of luxuriously upholstered construction.

The invention may best be understood by reference to the accompanying drawings, in which:

Figure 1 is a view in side elevation of a chair made in accordance with my invention;

Figure 2 is a rear view of the chair shown in Figure 1;

Figure 3 is an enlarged detailed section taken on line 3—3 of Figure 2;

Figure 4 is an enlarged detailed section taken on line 4—4 of Figure 2 and showing the tilting back unit in its positions of tilting adjustment;

Figure 5 is a detailed section showing the trunnion and adjustable mounting for the left-hand side of the tilting back unit as shown in Figure 3, but drawn to a larger scale than the latter figure;

Figure 6 is a partial view similar to Figure 4, with parts in different positions.

Referring now to the embodiment of my invention illustrated in the drawings, the same is shown as applied to an ordinary straight-back chair, including a seat 10, front legs 11, 11, rear legs 12, 12, arm rests 13, 13 and a back frame indicated generally at 15. In the form shown herein, the back frame includes a top rail 16 and upright side rails 17 which extend downwardly to the seat 10. As shown herein, the side rails 17 are continuous with the rear legs

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12. For the purpose of the present description however, it will be considered that the back frame 15 terminates at the seat 10, and is in fixed relation thereto.

A tilting back unit, indicated generally at 18, is arranged to fit within the open area formed by the top rail 16 and side rails 17 of the back frame 15. Said tilting unit consists of a second frame having top and bottom frame members 19 and 20 and side frame members 21, 21. The area between said frame members is filled by a suitable supporting web, indicated generally at 22, herein formed by a plurality of upright slats 23, 23. It will be understood, however, that the supporting web 22 of the tilting unit may be of various forms; as for instance, it may consist of a solid backing, or upholstered material. In any case, the front of the supporting web 22 of the tilting unit is preferably formed slightly convex in vertical section from top to bottom, and slightly concave in horizontal section, so as to present an approximate form-fitting surface for the back of the average user.

The tilting back unit 18 is arranged for tilting as a whole about a transverse axis intermediate its top and bottom frame members 19 and 20, said tilting axis being defined by a pair of pivot pins 24, 24, each mounted on one end of an adjusting arm 25 adjacent the inner sides of the side rails 17 of the open back frame 15. The opposite end of the two adjusting arms 25, 25 are mounted on bolts 26, 26 which have threaded engagement in trunnions 27, 27 suitably fixed to the inner faces of the upright side rails 17. The ends of the adjusting arms 25 engage the proximate faces of the trunnions 27 with suitable friction lock devices for holding each arm 25 and trunnion 27 against relative movement in various adjusted positions. In the form shown herein, said friction lock devices consist of serrated, interfitting teeth 28 and 29 on the arms 25 and trunnion 27, respectively. Said teeth hold each adjusting arm in any desired angular relation to the adjacent trunnion 27 when the bolt 26 is tightened.

In the form shown herein, a pair of L-shaped brackets 30, 30 connect the outer ends of the pivot pins 24, 24 to the rear face of the side frame members 21, 21 of the tilting back unit 18. Friction washers 31, 31 may be interposed between the adjacent faces of the L-shaped brackets 30 and the adjusting arm 25, and spring washers 32, 32 may be interposed between the outer heads 24a of pivot pins 24 and the L-shaped brackets 30 (see Figure 5).

As will be seen in Figures 1 and 2, the trunnions

27, 27 and the adjusting arms 25, 25 connected thereto are preferably disposed nearer the bottom than the top of the tilting unit 18, so that a relatively free tilting movement of the unit 18 is permitted about the axis defined by the pivot pins 24, 24 approximately at the level of the small of the back of the average occupant when seated in the chair in upright position. The arms 25, 25, however, can be adjusted to various angles with respect to the trunnions 27, 27 so as to shift the relatively free pivotal movement of the tilting unit into a slightly higher or lower position, as desired, to accommodate the unit to persons of different lengths of torso.

It will be observed further that the adjustment of the arms 25, 25 relative to the trunnions 27, 27 will cause a rearward movement of the axis of relatively free tilting movement of the back unit when the arms 25 are swung either upwardly or downwardly with respect to a forward, generally horizontal position of said arms. This type of adjustment affords a still greater latitude of adjusting movement of the back unit with respect to the chair as a whole, to satisfy the preference of the person who usually occupies the chair.

The trunnions 27, 27 are provided with inwardly extending stop members 27a, 27a in position to limit the angular and vertical adjustment of the arms 25 with respect to said trunnions so that the axis of relatively free pivoting movement of the tilting back unit defined by pivot pins 24 is maintained in advance of the axis about which the arms 25 are adjusted relative to the trunnions 27. Accordingly, in all permissible positions of vertical adjustment of the tilting back unit 18, the upright side frame members 21 of said tilting back unit are normally maintained in position well forwardly of and along the front faces of the proximate stationary side rails 17 of the chair adjacent the trunnions 27, as indicated in Figures 1, 3 and 4.

Rearward movement of the top of the tilting unit 18 is limited in all positions of vertical adjustment of arm 25 by engagement with a vertically disposed stop member 33, herein consisting of a slat 34 connected and extended between the rear face of the upper rail 16 of the stationary back frame and a horizontal rail 35 connecting the side rails 17, 17 of the stationary chair frame, generally in horizontal alignment with the bottom frame member 20. Suitable cushions or bumpers 36 and 37, of rubber or the like, may be provided on the rear faces of the top and bottom frame members 19 and 20 of the tilting unit to soften the impact against the vertical back stop member 33 or the intermediate rail 35, as the case may be, and render the unit noiseless in its operation. Where the stationary back frame includes a top rail 16, the upper end of the vertical back stop member is preferably arranged so that the front face of the upper frame member 19 of the tilting unit cannot swing rearwardly beyond the front face of said top rail 16, regardless of the vertical position of adjustment of the tilting unit as a whole.

The use and operation of the device above described is as follows:

The tilting back unit 18 is free to accommodate itself automatically to the backs of occupants of varying builds by tilting on the axis defined by the pivot pins 24, 24, merely by the pressure normally exerted against the chair back, in whatever seating position the occupant happens to assume in the chair. Since the back unit extends above and below its intermediate tilting axis with its major portion above said axis, it will be tilted

without conscious effort in the proper direction to balance the rearward pressures exerted thereon in the areas above and below said axis. Said axis is adjustable so as to be disposed substantially at the small of the back of the occupant, as will be further discussed.

Sufficient frictional tension may be maintained on the spring washers 32, 32 to maintain the tilting unit in any position of adjustment, until it is positively moved to another position.

The tilting back unit may therefore be readily accommodated to the back of the occupant as the position of the latter may be changed from time to time.

Moreover, the axis of tilting movement of the back unit 18 can be raised or lowered within certain limits by readjusting the arms 25, 25 into different angular positions where they will be maintained by tightening the bolts 26. In all positions of such vertical adjustment, the side frame members 21 of the tilting unit will be disposed well forwardly of the adjacent side rails 17 of the stationary back frame so that the occupant's back does not come into contact with the stationary side rails 17 at any time. Furthermore, the front face of the top frame member 19 of the tilting unit cannot swing rearwardly of the front face of the adjacent top rail 16 of the stationary back frame. This arrangement eliminates any possibility of discomfort to the occupant during relatively free tilting movements of the back unit 18, which otherwise might cause a portion of the occupant's back or head to be brought suddenly into contact with the side or top rails of the stationary back frame.

When the axis of tilting movement of the back unit is properly adjusted vertically so as to be substantially at the level of the small of the back of the user, the unit can be tilted automatically and relatively freely in either direction against slight frictional resistance, to readjust itself to the most comfortable position for the occupant.

The improved back structure is extremely simple in form and, in particular, retains the general appearance of a conventional chair, since the trunnions and vertical adjusting arms are disposed between the upright side rails of the back frame, so as to be practically invisible from front and sides of the chair.

Although I have shown and described certain embodiments of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without departure from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a chair having a seat and a substantially open back frame defined by continuous top and side rails, a back unit pivotally mounted in said open back frame for tilting movement on a transverse axis intermediate the top and bottom of said unit and approximately at the level of the small of the back of the average adult occupant, said back unit substantially filling said open back frame to form the back rest of said chair, the major portion of said unit being disposed above said axis to permit reversely tiltable adjustment by pressure of the occupant's back above or below said axis, the pivotal support for said back unit comprising a pair of trunnions fixed to the side rails of said open back frame and between which trunnions the back unit has limited relatively free tilting adjustment, said trunnions including arms, each having one of their ends adjustable on hori-

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zontal axes to varying fixed angular positions relative to said back frame, and the other end of each of said arms having the adjacent side of said back unit pivotally mounted thereon for tilting movement relative to said arms, and for vertical bodily adjustment relative to said back frame.

2. A chair structure in accordance with claim 1, wherein stop means are provided on the back frame for limiting the tilting movement of said back unit with the side margins of said unit disposed in the front of the side rails of said open back frame in all permissible positions of tilting movement and vertical adjustment of said back unit.

3. A chair structure in accordance with claim 2, wherein the stop means also limits the tilting movement of the upper margin of said back unit so that it does not pass rearwardly of the front surface of the adjacent top rail of the back frame in all permissible positions of tilting and vertical adjustment of said back unit.

4. A chair structure in accordance with claim 3, wherein the trunnions and adjustable arms are mounted on the inner faces of the side rails of said back frame and rearwardly of the lateral margins of said back unit.

5. In a chair having a seat and a substantially open back rest support including stationary upright side rails, a pair of rearwardly projecting trunnions mounted on said side rails substantially at the level of the small of the back of an average adult occupant, said trunnions having generally forwardly extending arms pivotally adjustable on horizontal axes to varying fixed angular positions relative to said trunnions and forwardly thereof, a back unit pivotally mounted intermediate its top and bottom for relatively free tilting movement on the ends of said arms to form the back rest of said chair, said back unit being vertically adjustable within said open back rest support by varying the angular positions of said arms relative to said trunnions.

6. A chair structure in accordance with claim 5, wherein stop means are provided for limiting the angular adjustment of said arms relative to said trunnions so as to maintain the front face of said back unit along the side margins thereof in front of the side rails of said back rest in all permissible positions of tilting movement and vertical adjustment of said back unit relative to said back frame.

7. A chair structure in accordance with claim 6, wherein the stop means are fixed on said trunnions and extend into position to be engaged by said arms at the limit of angular adjustment of the latter relative to said trunnions.

8. In a chair having a seat and a substantially

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open back frame defined by continuous top and side rails, a pair of rearwardly extending trunnions mounted on said side rails having arms pivotally adjustable on horizontal axes to varying fixed angular positions relative to said trunnions, a back unit pivotally mounted intermediate its top and bottom and approximately at the level of the small of the back of an average adult occupant for relatively free tilting movement on the ends of said arms, said back unit being vertically adjustable within said open back frame by varying the angular positions of said arms relative to said trunnions, said arms normally extending forwardly of their axes on said trunnions and being pivoted to the lateral margins of said back unit rearwardly of the latter.

9. A chair structure in accordance with claim 8, wherein stop means are provided for limiting the angular adjustment of said arms relative to said trunnions so as to prevent the front face of said back unit along the upper and side margins thereof, from passing rearwardly of the top and side rails, respectively, of said open back frame, in all permissible positions of tilting movement of said back unit relative to said arms.

10. In a chair having a seat and a back rest support including stationary upright side rails, a pair of rearwardly extending trunnions mounted on said side rails having forwardly projecting arms pivotally adjustable on horizontal axes disposed approximately at the level of the small of the back of an average adult occupant to vary the forward angle of said arms relative to said trunnions, a back unit pivotally mounted for relatively free tilting movement on the ends of said arms to form the back rest of said chair between said upright side rails, and said back unit being bodily adjustable vertically between said side rails by the angular adjustment of said arms.

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