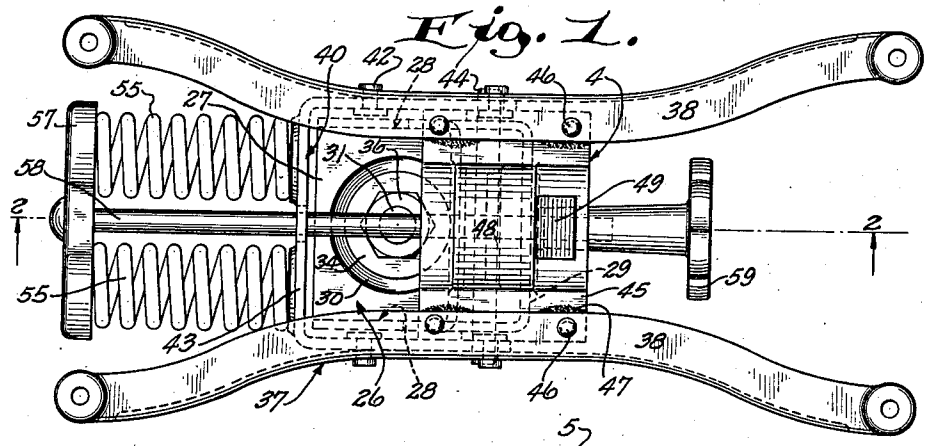
July 2, 1946. H. W. BOLENS 2,403,425

TILTABLE CHAIR

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Fig. 1.



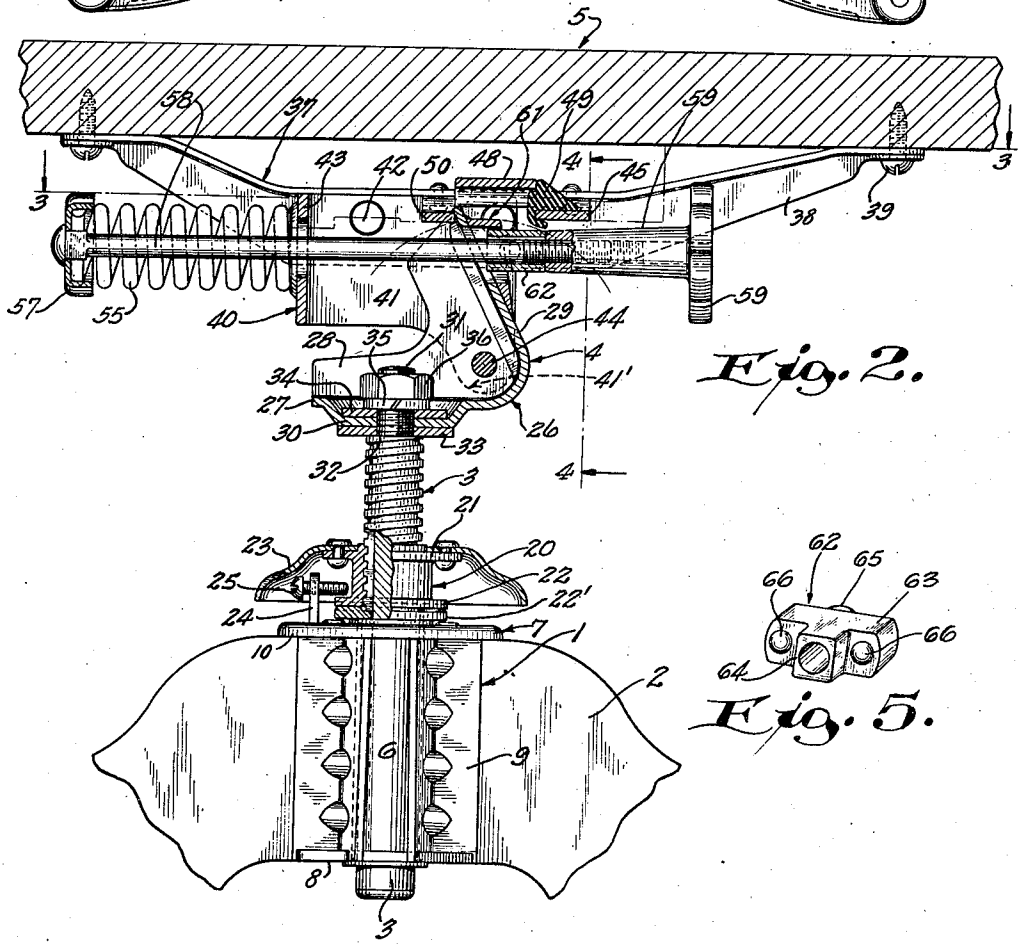


Fig. 2.

Fig. 5.

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Fig. 3.

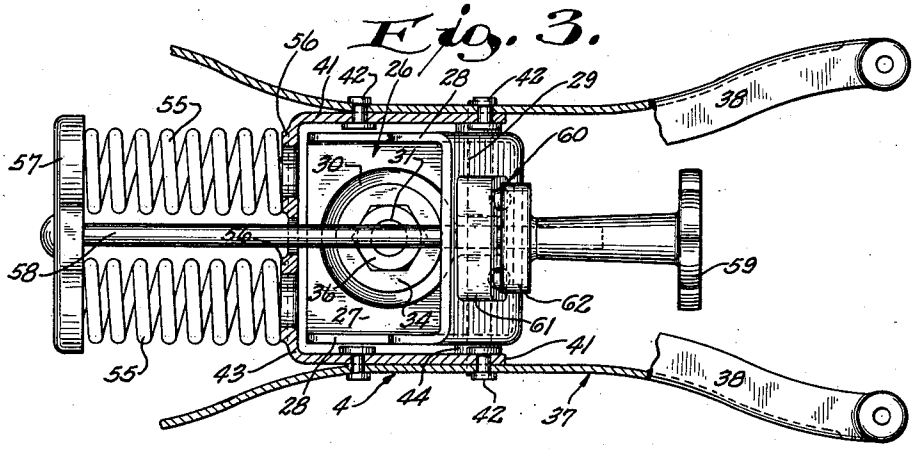
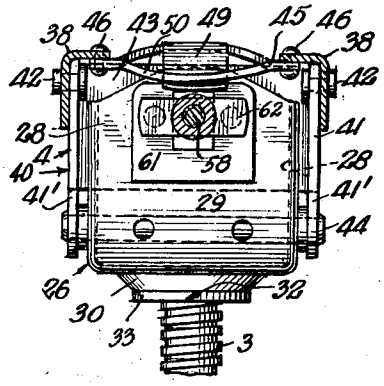


Fig. 4.



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TILTABLE CHAIR

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Application February 16, 1942, Serial No. 431,109

4 Claims. (Cl. 155—77)

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This invention relates to an improvement in tiltable chairs, and more particularly to an improvement in the hub of the base of such chairs, and in the chair iron which supports the seat on the base for tilting movement.

One object of the invention is to provide a simple, inexpensive, and highly effective rigid and secure connection between the spindle of a chair iron and the head at the upper end thereof.

A still further object of the invention is to provide an improved and simplified fulcrum for the tension rod incorporated in the manually adjustable means for resiliently resisting tilting of the seat, and to accomplish this in such manner as to smooth out the action and render the same noiseless while rendering the structure stronger and more durable.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts, which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a view in top plan of a chair iron constructed in accordance with the present invention;

Figure 2 is a fragmentary view, partly in central, vertical, longitudinal cross section, taken on line 2—2 of Figure 1, and partly in side elevation, illustrating the chair iron of Figure 1, and also a portion of the seat assembled with the spider thereof, the base for the chair iron, and fragments of the legs assembled with the base;

Figure 3 is a view in horizontal cross section taken on line 3—3 of Figure 2;

Figure 4 is a fragmentary view in transverse, vertical cross section, taken on line 4—4 of Figure 2; and

Figure 5 is a detail perspective view of the improved tiltable fulcrum block incorporated in the means for resiliently resisting rearward tilting of the seat of the chair.

Referring to the drawings, and more particularly to Figure 2, it will be seen that the chair embodying the present invention comprises generally a metal base or hub, designated as a whole at 1, and to which legs 2 are connected and secured in a manner which will hereinafter more clearly appear. The hub 1 supports the spindle 3 of the chair. A chair iron, designated generally at 4, is mounted on the upper end of the spindle and provides a support for the seat 5 of the chair.

The hub 1 comprises generally a central sleeve

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or tube 6, a circular cap or top plate 7, a bottom plate 8, and a plurality, preferably four, of leg brackets 9.

The spindle 3 is slidably and rotatably fitted in the central sleeve or tube 6 of the hub 1. A nut 20 is threaded on the spindle and is formed at its upper and lower ends with outwardly directed annular flanges 21 and 22. The lower flange 22 of the nut 20 rides on the flange 10 of the central sleeve or tube 6 of the hub 1, or, preferably, an annular washer 22' is interposed between the flanges 10 and 22. A cap-like hand-wheel 23 is riveted or otherwise suitably secured to the upper flange 21 of the nut 20. A vertical lug 24 is suitably secured to the top plate 7 of the base 1 and has an internally threaded opening therein to receive the threaded shank of the screw 25 which may be adjusted to overlie the lower flange 22 of the nut 20. The nut 20 may be adjusted by turning the hand-wheel 23 to raise or lower the spindle 3 and thereby determine the height of the seat of the chair.

The chair iron 4 includes a head-piece, designated at 26, and preferably made up of a stamping of heavy gauge sheet metal, having a horizontally disposed body portion 27 formed with integral upstanding side plates 28 and a front plate 29 formed integral with the body portion 27 and extending between and suitably connected to the front edges of the side plates 28. The body portion 27 is formed with a depression 30 provided with a central opening through which the reduced and threaded upper end 31 of the spindle 3 extends. At the juncture of the main portion of the spindle 3, and its reduced and threaded extension 31, a shoulder 32 is presented. An annular washer 33 is fitted on the reduced and threaded upper end 31 of the spindle 3, and in the assembly is interposed between the shoulder 32 and the underside of the depression 30 of the body portion of the head-piece 26. A second washer 34 is fitted on the upper end of the reduced end 31 of the spindle 3 above the body portion 27 of the head-piece. A lock washer 35 engages the top of this washer 34 and is in turn engaged by a nut 36 which, when tightened, provides a simple and inexpensive yet secure and rigid interconnection between the head-piece 26 and the spindle 3.

A spider, designated generally at 37, is pivotally supported on the head-piece 26. The spider comprises a pair of transversely spaced, longitudinally extending spider arms 38, the ends of which are apertured to adapt them to be suitably se-

cured, as for example, by means of screws 39 to the seat 5 of the chair. Intermediate their ends the arms 38 of the spider 37 are rigidly secured and interconnected by means of a sheet metal yoke or frame, designated generally at 40. This yoke 40 has side plates 41 vertically disposed and parallel to each other and riveted, as at 42, or otherwise rigidly connected to the vertical flanges of the spider arms 38. The side plates 41 of the yoke are cross connected at their rear ends by an integral end plate 43. The forward ends of the side plates 41 of the spider have downwardly directed apertured extensions 41', which are pivotally supported on the head-piece 26 by means of a pivot pin 44. The horizontal flanges of the arms 38 of the spider are also cross-connected by a cross-plate 45 which is horizontally disposed and has its ends underlapping the horizontal flanges of the spider arms 38 and rigidly secured thereto by means of rivets 46, and also by welds 47, if desired. A portion of the cross-piece 45, designated at 48, may be upwardly offset to accommodate a rubber bumper 49 which is cooperable with a stop 50 of the head-piece, as will hereinafter more clearly appear.

For the purpose of yieldably resisting rearward tilting of the chair and the seat, and normally biasing it to a vertical position, one or more springs 55 are employed. Obviously, rubber or similar elastic cushions may be employed in lieu of springs. In the construction illustrated, two springs are shown. One end of each spring 55 bears against the end plate 43 of the yoke 40. Preferably, the springs 55 are coil springs and the end plate 43 of the yoke 40 has annular spring seats 56 formed therewith and adapted to effectively interengage with the adjacent ends of the coil springs 55. The outer end of each spring 55 is engaged in a spring seat provided therefor in an adjustable abutment or cross-head 57. A tension rod 58 extends through a central opening in the cross-head, through an opening in the end plate 43 of the yoke 40 and opening in the front cross-plate 29 of the head-piece 26, and has its outer end threaded and engaged by a hand nut 59.

Interposed between the hand nut 59 and the cross-plate 29 of the head-piece is a novel type of fulcrum 60 for the tension rod 58. This fulcrum comprises in general a fixed fulcrum block or pad 61 integral with or rigidly secured to the cross member 29 of the head-piece and a tiltable fulcrum block 62 carried by the tension rod 58. The fixed fulcrum block 61 is centrally apertured to permit the tension rod 58 to pass freely therethrough and on the opposite sides of its central opening it is formed with semi-spherical recesses or seats. The tiltable fulcrum block 62 has a rectangular body portion 63 formed with oppositely directed central enlargements 64 and 65. The central portion of the body of the tiltable fulcrum block 62 and its enlargements 64 and 65 are formed with a continuous axial opening larger than the tension rod 58 and through which the tension rod 58 freely passes. The faces of the tiltable fulcrum block 62 on the opposite sides of the enlargement 64 have hardened steel balls 66 hammered into recesses therein so as to be permanently united thereto and yet present substantially semi-spherical projections of smooth hardened surface. The balls 66 are the conventional or standard ball bearings, although of course in this assembly they do not function in the same way as the conventional ball bearings, but serve rather as fixed anti-frictional bearings or anti-friction wear protuberances. Obviously, the balls 66, being hammered into the recesses, are permanently united to the wall of their recesses by the force of adhesion. In the assembly the tiltable fulcrum block 62 is slipped over the tension rod 58 and the spherical projections of its balls 66 engage the seats of the fixed fulcrum seat or pad 61. When the hand nut 59 is threaded on to the tension rod 58, the inner end of its sleeve-like body portion bears against the projection 65 of the tiltable fulcrum block.

In this construction, when the hand nut is tightened up, the springs 55 are appropriately tensioned. When the chair is in use, and the user tilts backwardly therein, the backward rocking movement of the yoke 40 will result in its end plate 43 compressing the springs and at the same time the tension rod 58 rocks or tilts. This tilting movement of the tension rod is very effectively accommodated by the tiltable fulcrum block with its hardened steel balls forming a permanent part thereof. The head-piece is well able to take any strains placed upon it since it is so firmly and rigidly interconnected with the spindle.

While I have shown and described one construction in which the invention may be advantageously embodied, it is to be understood that the construction shown has been selected merely for the purpose of illustration or example, and that various changes in the size, shape, and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A chair iron comprising a spindle having a reduced and threaded upper end with a shoulder at the juncture of the reduced and main portion of the spindle, a head-piece having a body plate provided with an apertured depression, the reduced portion of the spindle projecting through the aperture of the depression of the body plate, a washer interposed between the shoulder of the spindle and the underside of the depression of the body plate of the head-piece, a second washer fitted on the reduced portion of the spindle projecting through the opening in the body plate, the second washer being received in the depression, and a nut and lock washer combined with the upper end of the spindle above the second washer and coacting therewith to clamp and secure the head-piece to the spindle.

2. A chair iron comprising a spindle having a reduced and externally threaded upper end with an upwardly facing shoulder at the juncture of the main portion of the spindle and the reduced upper end thereof, a head-piece having a horizontal body plate provided with a depression formed with a central opening through which the reduced end of the spindle projects, a washer interposed between the shoulder of the spindle and the underside of the depressed portion of the body plate, a second annular washer fitted over the reduced end of the spindle and bearing against the floor of the depression, and a nut and lock washer coacting with the upper end of the spindle and with the second washer to secure the head piece in a position of rigid support on the spindle.

3. A chair iron comprising a spindle, a head-piece fixedly supported on the upper end thereof, a yoke pivoted to the head-piece, a seat carrying spider mounted on the yoke, and manually adjustable means for yieldably resisting tilting movement of the yoke relative to the head-piece and comprising a tensioning rod having a head

and a screw-threaded portion, an abutment engaged with the head, an elastically deformable element having one end engaged with the abutment and having its other end engaged with the yoke, said tensioning rod extending from the abutment through the head-piece, a fulcrum means including cooperable fulcrum members one fixed and one tiltable, and hardened steel balls interposed between said fulcrum members and permanently embedded for a portion of their extent in one of them so as to be permanently secured thereto by the force of adhesion although projecting therefrom for engagement in semi-spherical seats formed in the other fulcrum member, and a hand nut threaded on the tensioning rod and engageable with the tiltable fulcrum member.

4. A chair comprising a tiltable element, elastic means for elastically resisting tilting of the element and manually adjustable means for varying the tension of the elastic means and including an adjustable abutment, a tensioning rod therefor, a hand nut cooperable with the tensioning rod, a fulcrum means for the tensioning rod comprising a fixed fulcrum block provided with transversely spaced seats, a cooperable tiltable fulcrum block carried by the tensioning rod and hardened steel balls permanently secured to the tiltable abutment block by the force of adhesion, the balls being located on the opposite sides of the tensioning rod and projecting beyond the tiltable fulcrum block and engaging in semi-spherical seats formed in the fixed fulcrum block.

HARRY W. BOLENS.