Dec. 19, 1944. W. F. HEROLD 2,365,468

TILTING CHAIR MOUNTING

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Fig. 1.

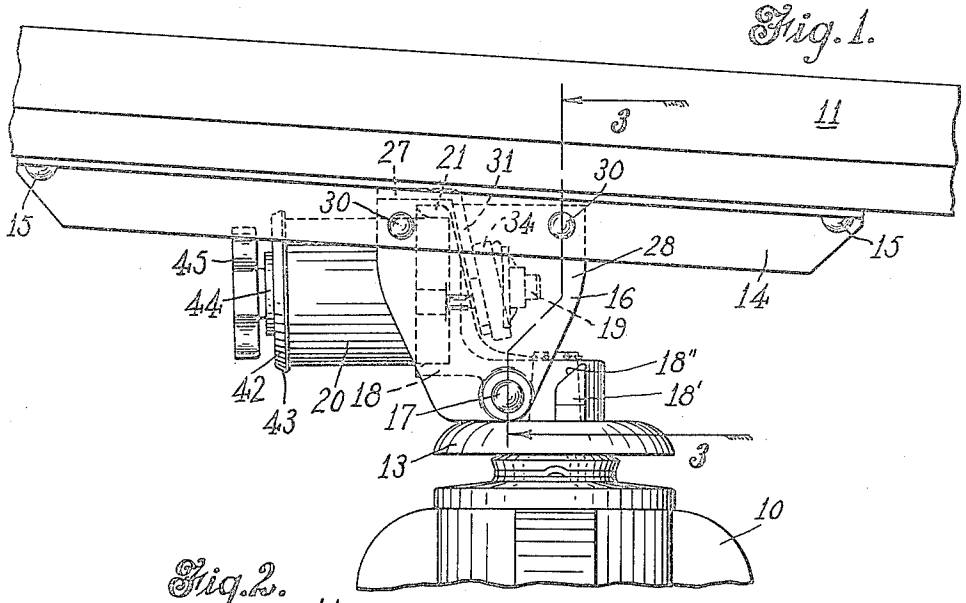


Fig. 2.

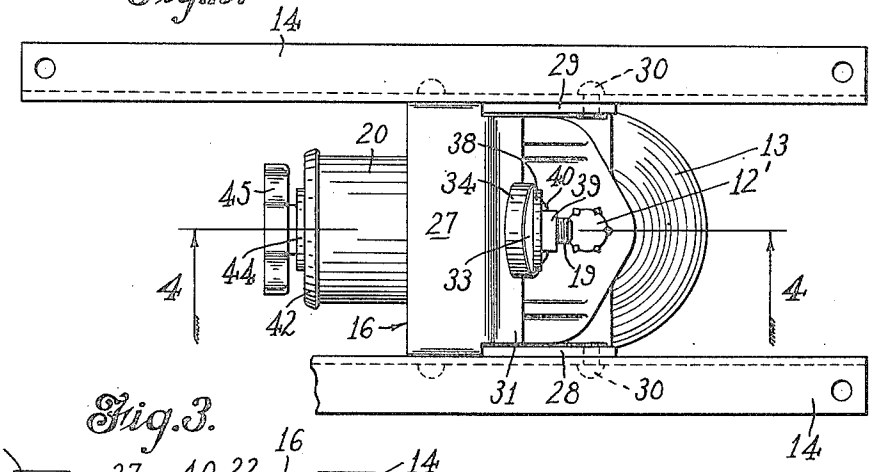
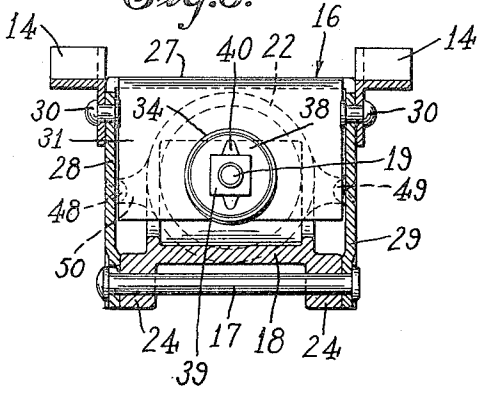


Fig. 3.



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Fig. 4.

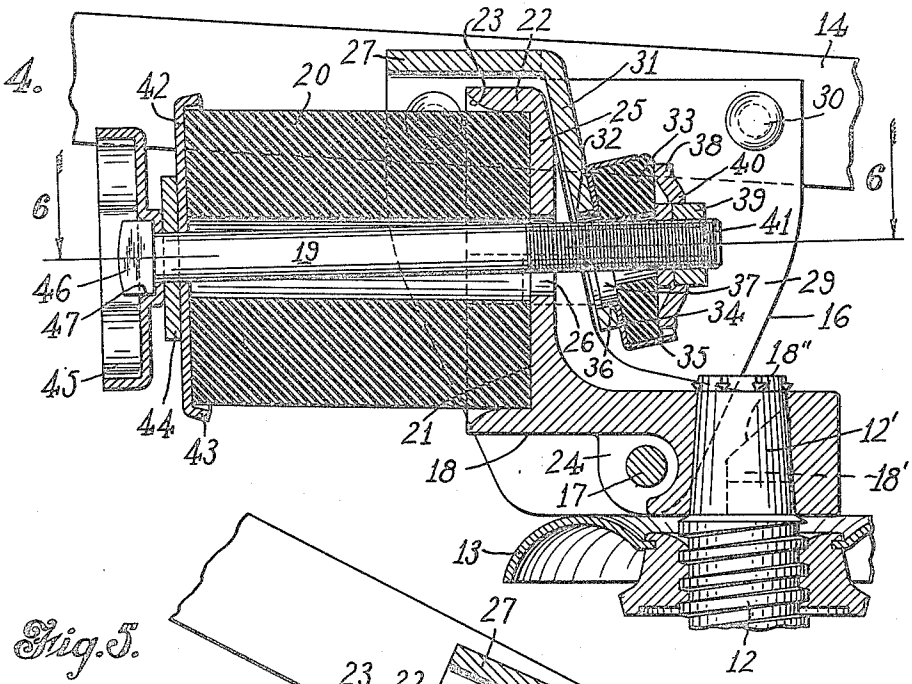
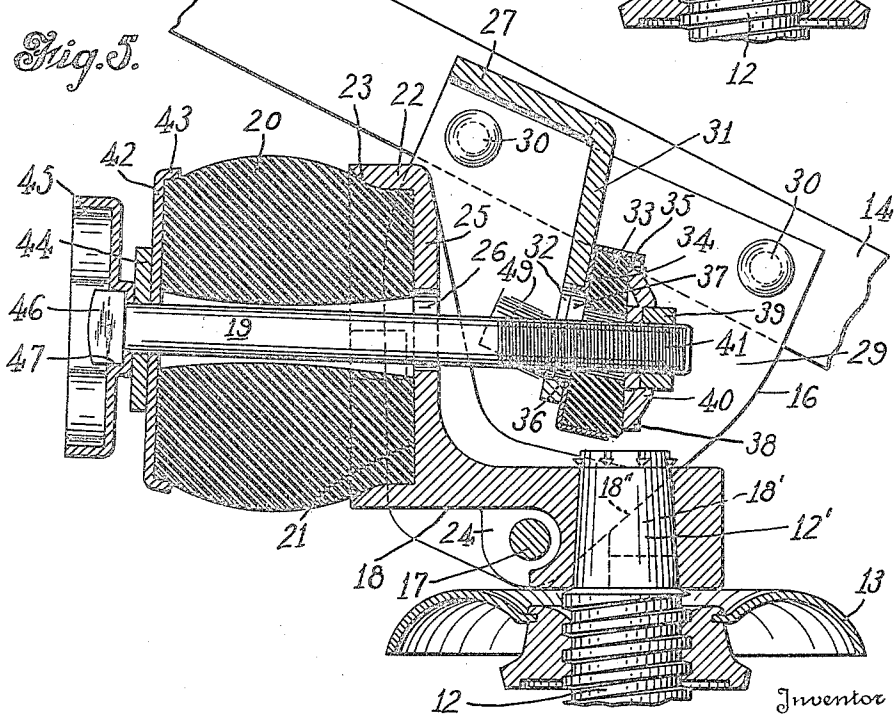


Fig. 5.



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Fig. 6.

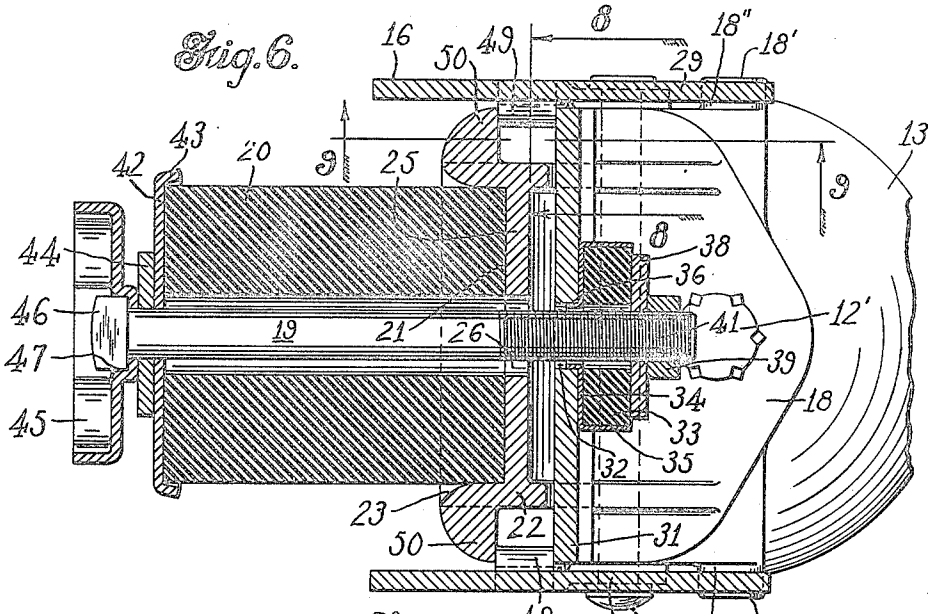


Fig. 7.

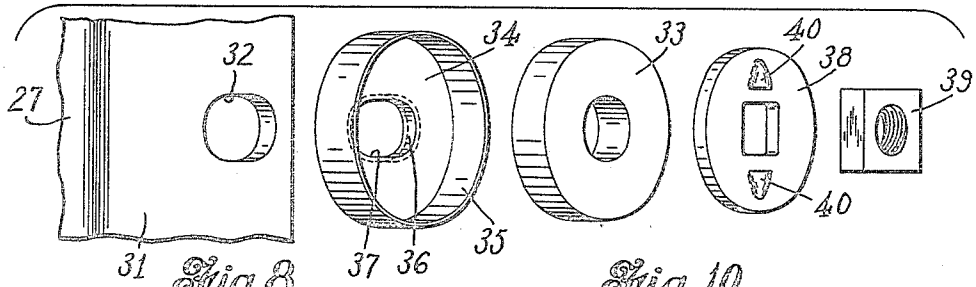


Fig. 8.

Fig. 10.

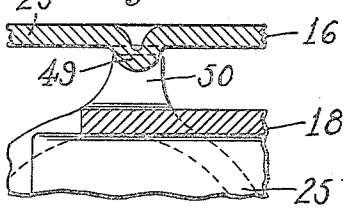
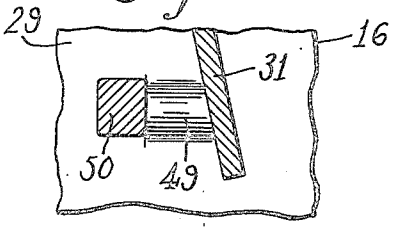
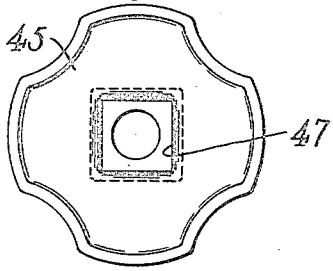


Fig. 9.





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2,365,468

TILTING CHAIR MOUNTING

Walter F. Herold, Easton, Conn., assignor to The Bassick Company, Bridgeport, Conn., a corporation of Connecticut

Application May 4, 1940, Serial No. 333,309

17 Claims. (Cl. 155—77)

This invention relates to tilting chair mountings such as employed in office chairs and like chairs.

One of the objects of my invention is to provide an improved mounting of the type in which the cushioning effect is produced by the use of a rubber block or biscuit, as distinguished from a spring.

It is also an object of my invention to provide a relatively simple and inexpensive mechanism for tiltably mounting the chair seat, which is very effective and satisfactory in operation as regards the control of the tilting movement.

It is also proposed to provide a device of this type having a minimum amount of metal-to-metal contact and operating very silently and requiring a minimum amount of lubrication or other attention in service.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a side elevation of a chair mounting embodying my invention, the chair seat being shown in the normal or untilted position;

Fig. 2 is a top plan view of certain parts shown in Fig. 1, the chair seat being omitted;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is a longitudinal section on line 4—4 of Fig. 2;

Fig. 5 is a section similar to Fig. 4 but illustrating the positions of the parts when the chair is tilted to a substantial degree;

Fig. 6 is a section on line 6—6 of Fig. 4;

Fig. 7 is an exploded perspective view showing certain parts associated with the rear end of the compression rod or core member;

Figs. 8 and 9 are respectively sections on lines 8—8 and 9—9 of Fig. 6, and

Fig. 10 is a detail face view of the adjusting hand wheel associated with the rod.

In the drawings a portion of the supporting base member of the chair is shown at 10, and a portion of the chair seat is shown at 11. The particular mounting illustrated is of the swivel type and the screw-threaded spindle 12 screws up and down in the usual manner in the base 10, the vertical adjustment being accomplished by means such as a nut 13, the particular structure of which is not important. The chair seat has on its under side the usual spider arms 14, fastened to the seat by screws 15 or the like. Extending across between the spider arms and interconnecting them is a spanner member or spider horn 16, hereinafter more particularly described. This particular chair mounting is of the low-fulcrum type and the member 16 is fulcrumed at its lower part by means of a cross-pin or axle 17 to a frame member 18, which is rigidly fixed to the spindle 12, said member 18 constituting the fixed or stationary element of the pivotal or hinged joint between the spindle on the one hand and the spider arms on the other hand. This pivotal joint is under the control of a resilient control device comprising a bolt-like core member or rod 19, having mounted thereon preferably adjacent the front portion of the frame 18 a resilient compression member 20, preferably constituted by a resilient block or cylinder of rubber. This rubber block is a compression member controlling the tilting movement of the chair seat, and its compression can be adjusted by turning the rod 19 as hereinafter more particularly described.

Referring now to the details of the mechanism, it will be observed that the fixed member or frame 18 as it appears in vertical longitudinal section (Fig. 4) presents essentially an L-shape, the base of the L being attached to the screw spindle, and the upright or approximately upright member of the L acting as an abutment or reaction member for the rubber block. This frame member 18 can be of simple contour and can readily be made as a casting having on its forward face a round socket 21 in which a substantial portion of the rubber block is accommodated with a fairly snug fit. This socket 21 is provided by forming on the casting a forwardly projecting round rim 22, the inner surface of which is preferably somewhat flared, as shown at 23. The base part of the frame 18 can be readily attached in a rigid manner to the spindle 12 in an appropriate manner, for example, by providing the upper end of the spindle with a smooth conical end portion 12' which is staked in place in a corresponding conical socket in member 18. The pivotal connection of members 18 and 16 by means of pin or axle 17 may be facilitated by providing member 18 with downwardly projecting lugs 24 at points in front of the connection of spindle 12 to member 18, in which lugs the cross-pin 17 is received. The front upright wall 25 of member 18 is provided with a clearance slot 26 for the rod 19.

The spanner member 16 is preferably made of sheet metal which is stamped up to provide in general an inverted U, having an upper connecting portion 27, and downturned side portions or legs 28, 29. These downturned side portions are provided at their lower ends with per-

forations for the cross-pin 17 and at their upper parts they are connected in a suitable manner to the spider arms 14 by means such as rivets 30, these rivets preferably being located at the upper corners of the side pieces.

The connecting portion 27 of the spanner is of less width than the side members 28, 29 because a portion of the initial connecting metal of the spanner is bent downward to provide a reaction member, leaf or panel 31 through which the rod 19 extends. This panel 31 is formed by cutting at the rear the connecting portion of the spanner and then bending it down until it has a position such as shown in Fig. 4, where it faces at a slight angle the upright member of frame 18. In the untilted position of the chair, as shown in Fig. 4, these facing parts are quite close to each other. At its lower part substantially in line with slot 26, the panel 31 is provided with an elongated rounded slot 32, through which the rod 19 extends.

Associated with the panel 31 adjacent the rear face thereof is a cushioned swinging or tilting mounting for the rear end portion of rod 19, and this mounting may have the form herein shown, in which a round perforated rubber member 33, preferably having the shape of a round thick disk or short cylinder, is received and confined by a cup-like member 34. This member 34 is preferably constructed of sheet metal, having a rim 35 extending around and confining the periphery of disk 33. The member 34 also has preferably a narrow flange 36 extending around a rod-clearing opening 37 in the bottom of the cup-shaped member and projecting into and held removably in the slot 32, previously mentioned. At the rear, the rubber member 33 is confined by a rigid disk 38, preferably of metal, which overlies a substantial portion of the rear face of the rubber disk and is held adjustably in position relatively to rod 19 by means of a nut 39. The nut 39 is preferably held against rotation relatively to disk 38 by means such as small squared off lugs 40, struck up from the rear face of the disk 38. The nut 39 engages threads 41 on the rear end portion of rod 19.

At the forward end of the rubber block 20 the same is positioned and controlled by a metal member 42 preferably comprising a shallow sheet metal cup having a flaring rim 43 adjacent the side portion of the rubber block. In front of this retainer is a washer 44, both the washer and the retainer having sliding fit on rod 19. In front of washer 44 the rod is provided with manual manipulating means whereby the rod can be rotated for adjusting the compression of the compression member. This manipulating means comprises a suitable head structure associated with the rod, and in the present case I have illustrated an improved means for rotating the rod comprising a hand wheel or head 45 detachably and non-rotatively engaged with a square head 46 on the adjacent end of the rod.

Preferably the hand wheel 45 has the form illustrated in detail in Fig. 10, the same being a shallow sheet metal cup, the rimmed periphery of which, instead of being a true round, is slightly scalloped, as shown, so as to facilitate a firm grasp by the hand. The rim portion of the hand wheel projects in a forward direction (Fig. 4), and the rod head 46 is non-rotatively engaged in a correspondingly formed (in this case square) shallow socket 47 in the bottom of the cup, which socket has in its bottom a round opening to engage the body of the rod. It is only necessary to have the rod head partially received within the socket of the hand wheel, as in the example shown.

Reverting to the panel member 31 of the spanner, which is bent down to face a portion of the frame 18, it will be noted that the spanner is provided with abutment or stop means by which the panel 31 is strongly supported to prevent distortion or dislocation from its proper operative position. This stop means may comprise lugs 48, 49 carried by the spanner legs 28, 29 respectively, these lugs being engaged by the panel portion 31 at the respective sides of the latter in the manner shown in Fig. 6. The lugs 48, 49 can be conveniently formed by depressing portions of the spanner from the exterior of the spanner so as to create inward projections on the inner faces of the spanner legs. At their rear edges (Fig. 9) these lugs engage portions of the front face of panel portion 31. These lugs 48 and 49 also serve the further purpose of limiting relative movement of the frame 18 and spanner 16 in one direction, on account of the fact that in the normal position of the chair seat the lugs are closely behind, if not in contact with, lateral projections 50 formed integrally with the rim portion 22 of the frame member. By this arrangement forward and downward tilting of the chair seat beyond a predetermined position is prevented. Movement in the opposite direction is limited by lugs 18' on member 18 having inclined faces 18'' adapted to be contacted by the edges of the side pieces of the spanner member.

In the normal or untilted position of the chair seat, the principal parts have the relative positions best shown in Fig. 4. The rubber block 20 is under a substantial amount of compression. Owing to the fact that the small rubber block 33 is quite closely confined by its retainer cup and its washer, compressive action exerted by rod 19 causes this rubber member in the position of Fig. 4 to be deformed in the region of its rear face substantially in the manner shown in the drawings.

As the chair is tilted, the frame member and the spanner have relative movement which causes the further compression of the rubber cylinder 20 through the rearward and swinging movement of the rod 19 passing freely through a bore in this cylinder. The rubber cylinder is shortened considerably as the parts reach the position shown in Fig. 5. The rim 22 on the frame member restrains the rear portion of the cylinder from lateral and radial movement except so far as permitted by the flaring of the rim in the manner previously mentioned, and thereby a certain amount of control of the distortion of the rubber member is provided. The approximate shape of the rubber member or biscuit when the chair is fully tilted is shown in Fig. 5. It will also be noted from Fig. 5 that in this position the small rubber member 33, having its exterior more fully confined than in the case of the large member, is not materially changed in a forwardly and rearwardly dimension, the only material change being in the slant of the rear face portion, which in this position is substantially opposite the slant position of Fig. 4. The means confining the rubber disk limits its movement to an angular movement of the face portion supporting the enlargement carried by the rear end of the tension rod. When the two members of the pivoted structure are moved relatively to each other, an angular movement of the rod-supporting face portion of the

small rubber member is caused and the rod is supported in its movements in a noiseless manner.

By the construction described, a very effective control of the tilting movement of the chair through the rubber member 20 is obtained. Obviously the retainer 42 associated with the front portion of this member controls the contour of the member at the front, and holds it in position relatively to the compression rod. The small disk-like rubber member at the rear of the assembly, together with its associated parts, provided a very simple and quietly acting tilting mounting for the rear portion of the compression rod. When the spanner member is moved rearwardly by tilting the chair seat, the rear end portion of the rod is moved rearwardly through the disk-like rubber member, and the rod moving in an endwise direction pulls on member 42 to compress the compression member 20, the rod having having a free swinging and translatory movement.

It is obvious that for adjusting the compression of the resilient mounting for the chair seat it is merely necessary to turn the front hand wheel 45. This causes the rod to be turned in the nut 39, thereby increasing or decreasing the compressive action.

One of the important advantages of my invention is that the construction is simple and inexpensive, involving comparatively few parts. It is thought that the manner of assembling the device will be obvious, and it will be apparent that the parts can be assembled very readily and quickly. The parts are also very readily accessible for repair and replacement. It will be evident that, upon unscrewing rod 19 out of nut 39, the rod 19 can be pulled out of position in a direction toward the left of Fig. 4, the rod being then free to disengage the hand wheel and the washer 44, the retainer 43 and the rubber block 20 then being easily detachable from the front portion of the device. Similarly the nut 39, the washer 38, the rubber block 33, and the retainer 34 will be readily detachable from the rear portion of the assembly, and readily separable from each other. Thus any parts which become worn or damaged can be easily replaced. The reassembly of the parts can be very conveniently performed.

It will be understood that the compression rod has ample clearance in the frame member and in the spanner member, and that the respective ends of the compression rod are resiliently supported by rubber cushions. This makes for silent operation, and there is a minimum amount of metal-to-metal contact in the structure. A minimum amount of lubrication is required. The rubber cushions are not only quieter than springs, but the larger cushion is more effective in counterbalancing the chair seat, owing to the fact that in a rubber member a progressively stronger reaction can be built up as compression proceeds and this is done in my device. The rubber members also have the advantage of giving long service.

It will be understood that, while the rubber member 33 is considerably smaller than the member 20, it is also a compression member, and it also has a retainer at the front and another at the rear. The compression of member 33 is very slight, but notwithstanding this it will be observed from the foregoing description that I have provided two relatively swingable members in the nature of panels or leaf elements, through which freely passes a forwardly and rearwardly directed rod, there being compression members surrounding the rod, one in front of the front leaf element and the other in the rear of the other leaf element, and retainers being provided to act as heads for the compression members, confining each one of them at both ends, the inner retainers being carried by the respective leaf elements, and the outer retainers being mounted on the rod.

It will be understood that while I have illustrated and described only one form of my invention, the same can be embodied in many forms, and it will be understood that many modifications and changes in the organization of parts and in the details can be made without departure from the principles of the invention or the scope of the claims.

What I claim is:

1. In a tilting chair mounting, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, said leaf elements being cut away to provide clearance openings, a forwardly and rearwardly directed rod passing through said openings, resilient members surrounding and held on said rod, one in front of the front leaf element and the other in the rear of the other leaf element, and a retainer for one of said resilient members carried by one of said leaf elements and in freely detachable relation with respect to said leaf element, said retainer having a portion extending into the clearance opening of said element.

2. In a chair iron structure, a post-supported frame, a chair-seat-attached spanner member hinged to said frame for tilting movement about a horizontal axis, said spanner member having a clearance opening therein, and said frame having a part spaced somewhat forwardly of that part of the spanner member having the clearance opening and itself provided with a clearance opening in a portion of said frame acting as a resilient element supporting head, a rod passing freely through said clearance openings and having a substantial portion of its length disposed at the outer or remote side of said head, a resilient compression element for counterbalancing the chair seat disposed about and held on said rod at the last-named portion thereof, said rod extending at the other end beyond the clearance opening portion of the spanner member, means for swingingly mounting the last-named end of the rod with respect to the spanner member comprising a rubber block through which the rod extends, and enclosing and confining means for said block, said enclosing and confining means having a confining action on said block at the front and rear of the latter and also at the side.

3. In a tilting chair mounting, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, a forwardly and rearwardly directed rod passing freely through clearance openings in said elements, a large resilient compression member surrounding and held on said rod in front of the front leaf element, a small resilient element surrounding and held on said rod in the rear of the rear leaf element and acting as means for swingingly mounting the rear portion of the rod relatively to the rear leaf element, a nut on a threaded portion of the rod at the rear of the small resilient element, means for holding said nut stationary, and means associated with the forward end of the rod whereby the rod can be manually rotated for adjusting compression.

4. In a chair iron assembly, a swingable leaf element having a clearance opening therein, a rod extending through said opening and having

a threaded portion, a nut on the threaded portion of the rod, means including a resilient element and a washer on the rod for holding the nut against rotation, means by which the rod is turned manually, a fixed leaf element through which the rod extends, and a counterbalancing compression member whose compression is altered by turning the rod.

5. In a chair iron assembly, a compression rod having a threaded portion at one end, a nut engaging said threaded portion, means including a washer adapted to engage the nut to prevent its rotation, a polygonal head formed on the opposite end of the rod, and a hand wheel having an opening engaging the shank portion of the rod and provided with a socket in which said head is non-rotatively received.

6. In a tilting chair mounting, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, said leaf elements being provided with clearance openings, a forwardly and rearwardly directed rod passing through said openings, resilient members surrounding and held on said rod, one in front of the front leaf element and the other in the rear of the other leaf element, one of said resilient members being considerably larger than the other, the leaf element having the larger resilient member associated therewith being provided with an integral socket portion in which a portion of said resilient member is received, the leaf element with which the other resilient member is associated having a quick-detachable retainer for its associated resilient member, a nut engaging a threaded portion on the rear end of the rod, means for preventing rotation of said nut, and a hand wheel on the front end of the rod for turning the same.

7. In a tilting chair mounting, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, a forwardly and rearwardly directed rod passing freely through clearance openings in said elements, a large resilient compression member surrounding and held on said rod in front of the front leaf element, a small resilient element surrounding and held on said rod in the rear of the rear leaf element and acting as means for swingingly mounting the rear portion of the rod relatively to the rear leaf element, a nut on a threaded portion of the rod at the rear of the latter, means for holding said nut stationary, and means associated with the forward end of the rod whereby the rod can be manually rotated for adjusting compression, said last named means comprising a hand wheel in non-rotative but detachable engagement with said rod.

8. In a tilting chair mounting, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, a forwardly and rearwardly directed rod passing freely through clearance openings in said elements and having a threaded rear end portion, a large resilient compression member surrounding and held on said rod in front of the front leaf element, a small resilient element surrounding said rod in the rear of the rear leaf element, a cup-shaped retainer enclosing said resilient element at the front adjacent the rear leaf element, a nut on the threaded rear end portion of the rod, a washer interposed between said small resilient element and said nut and serving to confine said element and to hold said nut against rotation, and a removable hand wheel associated with the forward end of the rod whereby the rod can be manually rotated for adjusting compression, said hand wheel being removable only after removal of said rod from operative position.

9. In a tilting chair mounting, rubber cylinders substantially in axial alinement, a two-part pivotal structure between the cylinders, a tie member passing through the pivotal structure and through bores of the cylinders, and retainers for the inner ends of the cylinders carried by the respective parts of the pivotal structure, one of said cylinders being smaller than the other.

10. In a tilting chair mounting, a frame having an upright leaf portion, and a spanner member hinged to the frame and having an upright leaf portion, said leaf portions having opposing clearance openings, a rod passing freely through said openings in a forward and rearward direction, a compression member on the front end portion of the rod reacting against the frame, a compression element acting against the forward end of the compression member, an integral head on the forward extremity of the rod, a cupped rod-rotating wheel-like member having non-rotative engagement with said head but adapted to be disengaged from the head and rod when the rod is dismounted, the rear end portion of said rod being threaded, a nut engaging said threaded portion of the rod, and means interposed between the spanner member and the nut whereby the rear end portion of the rod is tiltably mounted from the spanner and the nut held against rotation.

11. In a chair iron structure, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, said leaf elements being cut away to provide clearance openings, a forwardly and rearwardly directed tension rod passing with clearance through said openings, resilient compression members surrounding and held on said rod one in front of the front leaf element and the other in the rear of the other leaf element, one of said resilient members being in the form of a rubber disk supported from one leaf element and supporting from its outer face an abutment carried by said rod so that the rod is thereby supported from said disk, and means coacting with said disk for limiting its compressibility to a low degree.

12. In a tilting chair mounting, the combination of a post, an L-shaped frame member rigid therewith having its upright portion disposed toward the front of the chair and of sufficient height to act as a supporting head for a resilient member, a spanner pivoted to the frame having an upper wall which, in the untilted position of the chair seat, extends across the upright portion of the frame member so as to overlie the same, said spanner having a wall bent down from the upper part thereof which, in the untilted position of the chair seat, extends downwardly behind and close to the upright portion of said frame member, said upright portion and said wall having clearance openings in close proximity to each other in the untilted position of the chair seat, a forwardly and rearwardly directed tension rod passing with clearance through said openings, a resilient compression member held on the rod in front of and seated against the supporting head provided by the upright portion of said frame member, means for tiltably supporting the rear end portion of the rod by the

spanner at the rear thereof so that the rod is capable of translating and swinging movements as the rear portion of the chair seat is depressed, and means associated with said rod for adusting the compression of said compression member.

13. In a tilting chair mounting, a tension rod of bolt-like form having a polygonal head at one end and provided with threads at the opposite end, a nut having internal threads engaged by said first-named threads, an adjusting wheel-like element held on the shank of the tension rod by said polygonal head and having a polygonal socket portion engaged with said head so that the rod can be rotated by manipulation of said wheel-like element, a pivoted frame and spanner structure through which said rod is extended, a cushioning compression element for said frame and spanner structure whose compression is adjusted by turning said rod in said nut, and means supported from said frame and spanner structure for preventing rotation of said nut, said last-named means comprising a washer socketing the nut and a resilient member against which the washer is supported.

14. In a chair iron structure, two relatively swingable members each having a leaf element spaced in a forward and rearward direction with reference to a leaf element of the other, said leaf elements being cut away to provide clearance openings, a forwardly and rearwardly directed tension rod passing with clearance through said openings, resilient compression members surrounding and held on said rod one in front of the front leaf element and the other in the rear of the other leaf element, one of said resilient members being considerably smaller than the other and being constituted by a block of rubberlike material, and means appurtenant to one of said leaf elements enclosing said block for limiting its compressibility to a low degree, said means being in close contact with all but a small portion of the superficial area of the block.

15. In a chair iron structure, two relatively swingable members, each comprising a leaf element, the leaf elements being spaced in a forward and rearward direction, said leaf elements being cut away to provide clearance openings, a forwardly and rearwardly directed rod passing freely through said openings, resilient members surrounding and held on said rod, one in the front of the front leaf element and the other in the rear of the other leaf element, one of said resilient members being a cushioning member and the other being constituted by a small rubber disk whose outer face engages and supports an abutment carried by one end portion of the rod, and means confining said rubber disk and limiting its action to a distortion of the disk changing the angle of the face portion supporting said abutment.

16. In a tilting chair mounting, a tension rod of bolt-like form having a polygonal head at one end and provided with threads at its opposite end, a nut having internal threads engaged by said first-named threads, an adjusting wheel-like element embracing the tension rod and retained on the rod by said polygonal head and having a polygonal socket portion engaged with said head so that the rod may be rotated by manipulation of said wheel-like element, a structure through which said rod is extended with clearance comprising a fixed frame and a spanner pivoted thereto, a cushioning compression element supported around the rod against said frame between the latter and said wheel-like element and whose compression is adjusted by turning said rod in said nut by manipulation of said wheel-like element, and means for supporting said nut from said spanner so that the nut is held against rotation.

17. In a tilting chair mounting, a tension rod of bolt-like form having a polygonal head at one end and provided with threads at its opposite end, a nut having internal threads engaged by said first-named threads, an adjusting wheel-like element held in place on the tension rod by said polygonal head and having a polygonal socket portion engaged with said head so that the rod may be rotated by manipulation of said wheel-like element, a structure through which said rod is extended with clearance comprising a fixed frame and a spanner pivoted thereto, a cushioning compression element supported against said frame whose compression is adjusted by turning said rod in said nut by manipulation of said wheel-like element, and means for supporting said nut from said spanner so that the nut is held against rotation, said last-named means including an elastic member supporting the nut and confined so as to have its compressibility limited to a low degree.

WALTER F. HEROLD.