United States Patent

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[54] **TILTING CHAIR MECHANISM**

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[58] **Field of Search** 248/371, 372, 373, 378, 379; 297/333, 301, 304

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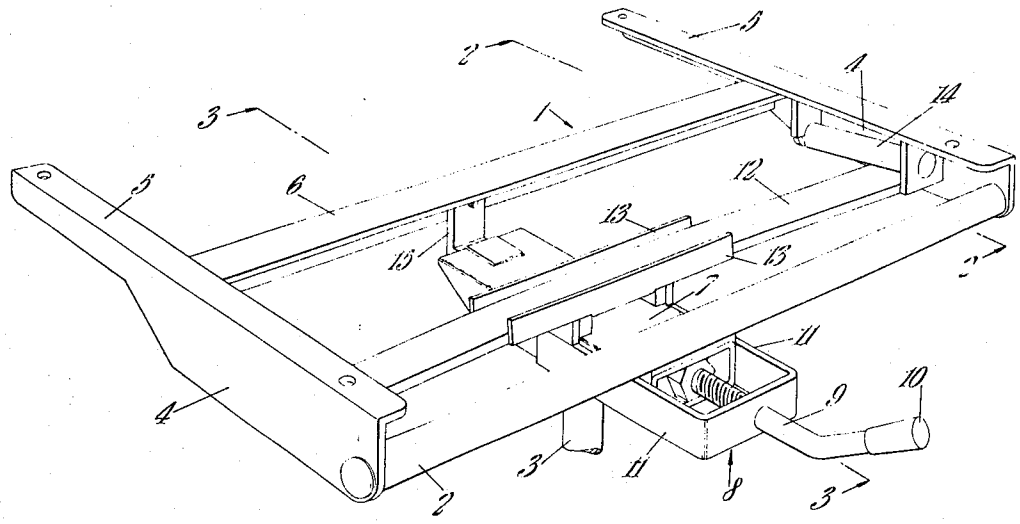
[57] **ABSTRACT**

A tiltable chair mechanism in which a seat supporting portion of the chair frame is pivotable relative to the rest of the chair frame, the pivotal movement being cushioned by a leaf spring means acting between the seat supporting frame portion and the rest of the chair frame.

6 Claims, 3 Drawing Figures



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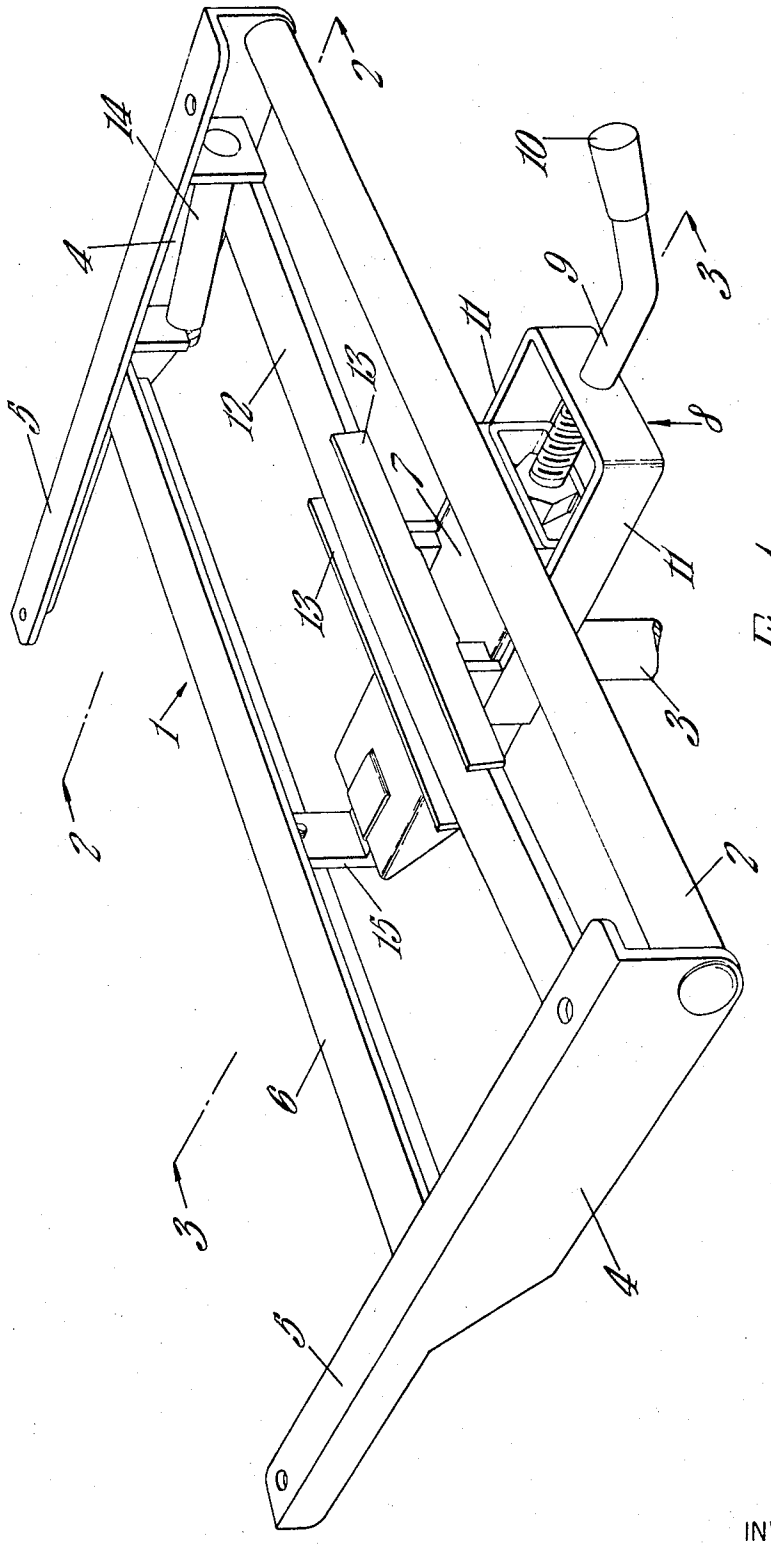

Fig. 1.

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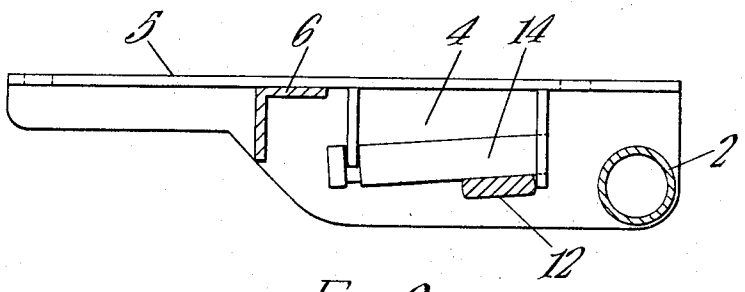

Fig. 2.

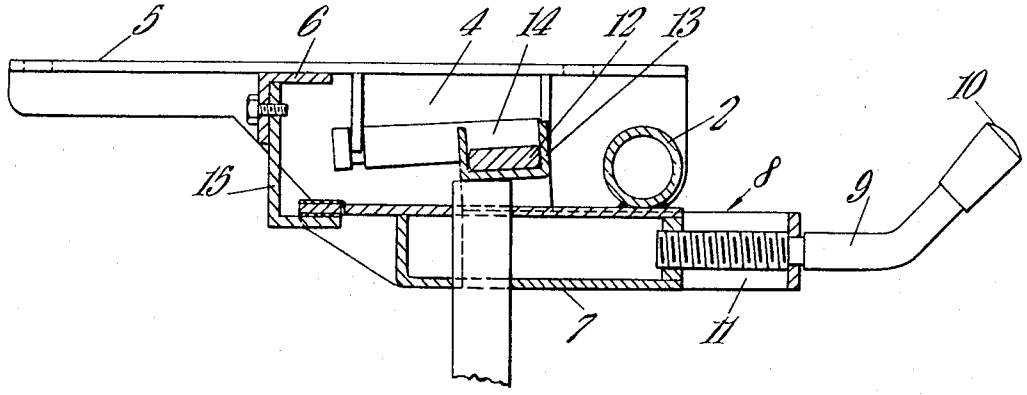

Fig. 3.

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TILTING CHAIR MECHANISM

The present invention relates to tilting chairs and more particularly to a mechanism for use in such chairs which allows the chair body to be tilted against the action of a restraining force.

A restraining force is provided to allow the tilting movement of the chair to be controlled and to cause the chair seat to return to a normal position when it is not required to be tilted by the occupant or when it is no longer occupied. In practice it is desirable to be able to adjust the strength of the restraining force in order that the chair may be properly used to its full advantage by persons of widely differing weights. A heavy occupant of the chair requires the restraining force to be increased and vice versa for a light occupant.

There are several known methods of providing the restraining force using for example a coil spring that is compressed as the seat is tilted or a torsion bar which is arranged to be twisted as the chair is tilted.

The present invention consists in a tiltable chair mechanism comprising a first frame portion, a second frame portion for supporting a chair seat, said second frame portion being pivotally attached to said first frame portion, and cantilever leaf spring means, extending generally in the direction of the pivotal axis of said members and acting between said two frame portions to resist tilting of the second frame portion relative to the first frame portion.

The first frame portion is normally stationary and stands on a leg or legs attached thereto.

Preferably the cantilever leaf spring in the form of a simple bar extends transversely of the chair frame and is adjustable in position so that the spring force exerted between said frame portions is adjustable in magnitude to enable the chair to properly accommodate persons of different weight.

To this end the central portion of the leaf spring may be supported on said first frame portion whilst the ends of the cantilever engage inclined means on said second frame portion so that as the leaf spring is moved transversely to its length, the ends thereof are guided by said means to bend the leaf spring in a bow shape. Depending on the direction of movement of the leaf spring, the spring force exerted between said frame portions is increased or decreased.

The invention will now be particularly described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a chair mechanism according to the invention;

FIG. 2 is a sectional view of the mechanism of FIG. 1 taken on line 2—2; and

FIG. 3 is a sectional view of the mechanism of FIG. 1 taken on line 3—3.

Referring to the drawings, a chair mechanism comprises a chair frame 1 which is pivotally connected to a tubular support 2, the whole of the chair mechanism being supported on a single central leg 3.

The frame 1 comprises a pair of side angles 4 extending longitudinally of the chair from front to back (right to left respectively in FIG. 1) and a pair of flat surfaces 5 on which can be affixed the seat of the chair (not shown). The two side angles 4 are interconnected towards their rear end by a cross-piece 6. Other frame members (not shown) can of course be attached to this basic frame to provide back and arm rests for the chair.

The central leg 3 directly supports an adjusting mechanism which includes a box-shaped member 7

around which slides a U-shaped bracket 8, extending longitudinally of the chair seat. A partially threaded rod 9 extends through the box-shaped member 7 and the end of the bracket 8 and terminates in a handle 10. By the action of the threaded part of the rod 9 engaging a threaded aperture in member 7, rotation of rod 9 causes the bracket 8 to slide longitudinally of the box-shaped member 7, being guided by the side portions 11 of the bracket 8. The box-shaped member 7 is fixedly attached, for example by welding, to the tubular support 2 so that upon rotation of said rod 9, the bracket 8 moves relative to the box-shaped member 7 and frame 1, supported by the leg 3 of the chair.

Extending transversely of the chair and resting on a seat or carriage formed on box-like member 7 is a cantilever bar 12, which acts as a leaf spring to provide the restraining force for the tilting movement of the chair. The seat is attached to the bracket 8 and moves or shifts with the bracket relative to box-like member 7 on rotation of the rod 9. Bar 12 is maintained laterally in position on the seat by two guides 13. Each end of bar 12 is restrained under a replaceable cam member 14 supported by the side angles 4. The cam members 14 are inclined with respect to the longitudinal length of side angles 4, in a direction downwardly towards the rear of the seat. Longitudinal movement of the bar 12 is limited by the side walls of angles 4.

It can be seen that the chair seat being pivotally attached to support 2 is maintained in a normal position by cantilever bar 12. In order that the normal position of the seat can remain constant, a stop 15 is provided near the lower edge of cross-piece 6 which stop abuts against an extension of box-like member 7, the stop being held in this position by the resilience of the cantilever bar 12. As rearward weight is applied to the chair seat, the chair will pivot about support 2 and its rear part will move downwardly against the spring force of bar 12 applied to side angles 4. Downward travel of the rear chair seat is limited by a corss-piece 6 which eventually also abuts the extension of member 7. The spring force of bar 12 has a cushioning effect on movement of the chair and will return the seat to its normal position on removal of said weight.

To increase the spring force applied by bar 12 to accommodate a heavier load on the chair, the rod 9 is suitably rotated to effect a rearward movement of the bracket 8 together with bar 12 relative to the box-like member 7. As bracket 8 is thus moved, the ends of the bar 12 are forced downwards relative to the middle of the bar because of their engagement with inclined cam members 14. The center portion of bar 12 remains at the same level and therefore bar 12 becomes more bow-shaped, consequently exerting a stronger upward force on side angles 4. The spring force acting upwardly on side angles 4 is reduced by reverse movement of the member 9.

For all positions of the cantilever bar 12 and the consequent range of forces acting on the seat of the chair, the angular range of tilting movement of the seat remains constant, being determined solely by stop 15 and the stop provided by cross-piece 6.

It is convenient to provide an adjustable stop so that the range of tilting movement can n also be varied. To this end an adjustable bolt or wedge can be provided for example, in cross-piece 6, to limit the degree of

movement between cross-piece 6 and box-like member 7.

It will be realized that means other than inclined surface cam members 14 can be used to bend cantilever bar, 12, for example a pair of inclined, longitudinally-extending slots in side angles 4. In this case, the bar 12 is of a length sufficient to project through the slots in side angles 4.

In the above-described embodiment, the adjustment of spring return force is achieved by deflecting the ends of bar 12 relative to the center thereof, in this case deflecting said ends along inclined cam surfaces. This is effected by moving the bar 12 relative to the frame and cam surfaces. Many alternative systems can be devised utilizing this principle other than that described, for example the bar 12 and box 7 can be fixed relative to leg 3, and the frame 1 arranged to move relative thereto by being attached to bracket 8 via member 2. In a further modification the member 7 can be inclined, the cam members or slots being horizontal.

A further possible form of the chair mechanism provides a cam member associated with the central support of bar 12, by means of which the center of the bar 12 can be raised relative to its ends to vary the spring force therein. The cam member can be wedge shaped and be moved transversely of the center of the bar 12 to raise it. Alternatively the cam member is a short bar preferably of generally rectangular cross-section with rounded edges or of oval cross-section, and is permanently positioned under the bar 12 and extends transversely thereof. The short bar is arranged to be rotated about its longitudinal axis whereby the center of the bar 12 is raised or lowered.

In a further embodiment, the bar 12 is fixed in respect of sliding movement relative to leg 3 and deflection of the ends of bar 12 is effected by arranging to move cams 14 relative to the bar 12.

An arrangement according to the present invention can be conveniently used on a chair, the central leg support of which is arranged for pivotal movement about a vertical axis.

I claim:

1. A tiltable chair mechanism comprising:

a first frame portion;

a second frame portion for supporting a chair seat;

said second frame portion being pivotably attached to said first frame portion and being capable of pivotal movement relative to said first frame portion about a pivotal axis;

cantilever leaf spring means being centrally supported by said first frame portion and free ends of said leaf spring means engage said second frame portion so as to act between said frame portions to resist pivoting of said second frame portion toward said first frame portion;

an adjusting mechanism for varying the residual tension in said leaf spring means;

said adjusting mechanism effecting bowing of said leaf spring means; and

wherein cam means are provided having an inclined surface associated with said second frame portion and co-operate with the free ends of said leaf spring means so that when said leaf spring means and said cam means are moved relative to each other by said adjusting mechanism, the degree of bowing of said leaf spring means is changed.

2. A tiltable chair mechanism comprising a first frame portion, a second frame portion for supporting a chair seat, said second frame portion being pivotably attached to said first frame portion and capable of pivotal movement relative to said first frame portion about a pivotal axis, shiftable cantilever leaf spring means extending across the chair mechanism parallel to said pivotal axis acting between said frame portions to resist pivoting of the second frame portion and a mechanism for adjusting the tension of said spring means comprising stationary cam means associated with one of said frame portions, said cam means having surface means engaging the ends of said spring means to provide a varying residual tension in said spring means dependent on the position of said spring means along said surface means, and means for slidably moving said spring means along said surface means to adjust said residual tension in said spring means.

3. A tiltable chair mechanism as claimed in claim 2 wherein a central portion of said bar is held in a carriage shiftable along a path at right angles to said pivotal axis and opposite end portions of said bar provide a pair of cantilever leaf springs, said cam means comprising a pair of cam members on opposite sides of said chair mechanism, said cam members engaging respective ones of said springs.

4. A tiltable chair mechanism as claimed in claim 3 wherein said cam members comprise inclined bars.

5. A tiltable chair mechanism as claimed in claim 2 wherein said spring means is disposed in a carriage mounted for movement on said first frame portion, and said cam means is mounted on said second frame portion.

6. A tiltable chair mechanism as claimed in claim 5 wherein said means for moving said spring means comprises screw means rotationally mounted in said first frame portion and attached to said carriage.

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