

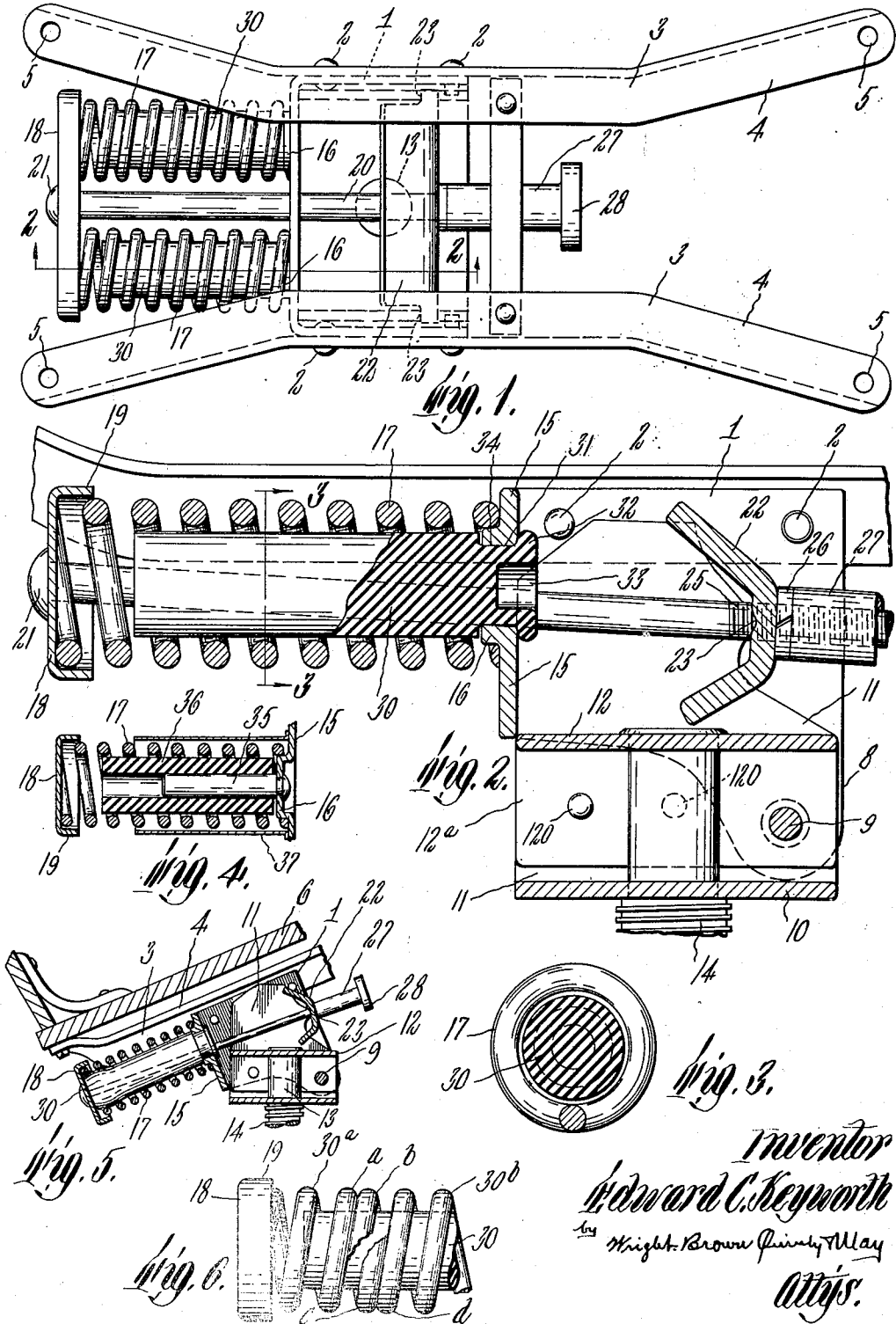
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CHAIR IRON

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## CHAIR IRON

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Chair irons for tilting office chairs and the like are commonly provided with one or more springs designed to more or less counterbalance the weight of the occupant of the chair so as to make it easy for him to tilt the chair as desired, the springs acting to cushion the tilting motion and to return the chair to its normal upright position when the occupant rises. The service to which these springs is subjected is found in time to render them brittle, so that they are liable to break suddenly. As heretofore constructed and arranged, the breaking of a spring causes the spring to lose its counterbalance effect almost, if not quite entirely, allowing the occupant of the chair to lurch backwardly with considerable violence and sometimes causing the chair to upset with resultant danger of injury to the occupant.

One of the objects of the present invention, therefore, is to provide means for holding the parts of the spring on breaking in axial alinement so that breakage in one place causes the spring length to shorten by a single convolution. The counterbalancing of the spring is then only slightly lessened, the broken parts snapping together so suddenly that the occupant of the chair experiences no noticeable shock.

A further desirable result which may be accomplished by the holding means of this invention is to additionally cushion the final portion of the tilting motion of the chair so that it comes to its limit of backward tilting movement without shock or jar.

For a more complete understanding of this invention, reference may be had to the accompanying drawing in which

Figure 1 is a top plan of a chair iron embodying this invention.

Figure 2 is a detail section on line 2—2 of Figure 1.

Figure 3 is a detail section on line 3—3 of Figure 2.

Figure 4 is a view similar to a portion of Figure 2, but to a smaller scale and showing a modification.

Figure 5 is a fragmentary view partly in section showing the chair at its rear limit of tilting and showing the construction of Figure 2.

Figure 6 is a fragmentary side elevation showing the position of the associated parts on breaking of a spring when this invention is employed.

Referring to the drawing, at 1 is indicated a substantially U-shaped member, to opposite arms of which are shown as secured by rivets 2, the angle-shaped bars 3, the upper flanges 4 of which

are provided with holes 5 by which these angle members may be secured to a chair seat 6, as shown in Figure 5. The member 1 is also provided with a pair of spaced ears 8 through which may extend a pivot 9 about which the chair may tilt. This pivot 9 secures the parts attached to the seat 6 to other parts secured to a chair base. These other parts as shown comprise a U-shaped member 10 through the sides 11 of which the pivot 9 passes. This member 10, together with a reinforcing top piece 12 which may be of inverted U-shape with its side portions 12a lapping the sides 11 of the member 10 and secured thereto as by rivets 120, are shown as secured to the upper end of the chair base standard 14. The wall member constituting the base 15 of the U-shaped member 1, which is substantially perpendicular to the chair seat, is shown as provided with a pair of seat portions 16 against which are seated the inner ends of a pair of coil springs 17. The outer ends of these springs 17 bear against a seat member 18 which has a rim 19 enclosing the ends of these springs. Between the springs a rod 20 is extended through the member 18 and is provided with a head 21 at its rear end. The forward end of the rod 20 passes through an abutment piece 22, the ends of which bear against edge projections 23 at the sides of the U-shaped member 10. The rod 20 thus extends eccentric to the pivot 9 so that when the chair is tilted rearwardly, as shown in Figure 5, the spring seat member 18 is brought toward the member 15, thus additionally compressing the springs between these parts. The outer end portion of the rod 20 is threaded as at 25 and has placed thereon a lock washer 26 bearing against the member 22 and an adjusting nut 27 which may have a hand wheel 28 (see Figure 5) on its outer end. By turning the wheel 28 the tension of the springs 17 may be adjusted to suit the requirements of the occupant of the chair, the springs more or less counterbalancing his weight as he tilts the chair rearwardly. This mechanism so far described is old and well known in the art.

It will be noted that should one of the springs 17 break, in the absence of some further mechanism, it might drop out from between its spring seats so that it would be no longer effective to cushion the rearward tilting of the chair. Such breakage will usually occur as the occupant is tilting rearwardly and if no means were taken to prevent it, this would result in the cushioning and counterbalancing effect of the broken spring to be suddenly released, thus permitting the chair to tilt back violently suddenly and perhaps

to an extent sufficient to cause the chair to upset. Such a possibility is prevented by the present invention, means being provided to hold either of the springs which may break in such a manner that it cannot fall out of place but must continue to exert a counterbalancing effort, even though it is somewhat reduced by the breakage.

This means may comprise a member arranged substantially coaxially of each of the springs, and as shown this member is a core 30 of such an external diameter slightly less than the internal diameter of the spring that when a spring breaks, it holds the broken parts in substantially axial alinement, as shown in Figure 6, in which the parts 30a and 30b of the broken spring are held in operative relation, the coils, however, collapsing on each by a single convolution at the break, bringing the parts a and b and c and d, respectively, into contact. For a purpose which will later appear this core member is preferably of yieldable material such as rubber.

In Figures 2 and 5 the core is shown as provided at its inner end with a portion 31 of reduced diameter beyond which is a head 32. The inner end of the core is recessed at 33 so as to permit the head 32 to be compressed sufficiently to be passed through the hole 34 in the seat portion 16, whereupon the head 32 may be released so as to expand on the inner side of the member 15 and hold the core in position.

Another means of supporting the core is shown in Figure 4 in which a pin 35 is passed through the seat member 16 and riveted over on its inner face, the core member being then in the form of a tube or sleeve 36, which may be placed over the pin 35. This figure shows, also, an external sleeve 37 secured to the member 15 and which also has the function of holding broken portions of the spring in alinement, and either this sleeve or the core may be used alone for this purpose if desired.

By making the core member of yieldable material, such as rubber, it may have another useful function besides its support of the broken parts of the spring. As shown in Figures 1, 2, 4 and 6, this core member is somewhat shorter than the normal distance between the spring seat portions, even when they are adjusted by manipulation of the hand wheel 28, and the extent to which it is shorter may be so proportioned that just before the chair reaches its rearward limit of tilting at which the member 15 engages a portion of the member 10, these parts constituting tilting limiting means, the end of the core member contacts with the seat member 18 and is compressed as the seat member is tilted to its extreme backward limit. Thus this core member acts as a cushioning element, increasing the resistance to rearward tilting of the chair near its tilting limit, thus acting to bring it to rest in its limit of backward tilting without shock or jar to the occupant.

From the foregoing description of certain embodiments of this invention, it should be evident to those skilled in the art that various changes and modifications may be made without departing from the spirit or scope of this invention as defined by the appended claims.

I claim:

1. A chair iron comprising members for securement to a chair seat and to a base, respectively, said members being pivoted together to permit tilting of said seat with respect to said base, means including a coil spring yieldingly holding said members in non-tilting position, a resilient core within said spring and of slightly less diam-

eter than the internal diameter of said spring effective when said spring breaks to hold the broken parts of said spring in substantially coaxial and operative condition, and an element engaging with said core near the limit of tilting motion of said members to further cushion the final tilting motion thereof.

2. A chair iron for a tilting chair, comprising parts pivoted together for attachment to the chair seat and to the chair base, respectively, one of said parts having a spring seat, a coil spring having one end engaging in said spring seat, a member having a spring seat engageable with the other end of said spring, means engaging said member and the other of said parts eccentric to the pivot between said parts for adjusting the tension of said spring and tending to hold said chair seat in non-tilted position, and a resilient core member within said spring and of a diameter slightly less than the interior of said spring and effective when said spring breaks to hold the broken parts of said spring substantially coaxial, said core being of a length to be compressed between said spring seats when said chair is near its limit of backward tilting and out of contact with one of said spring seats at all other times.

3. A chair iron for a tilting chair, comprising parts pivoted together for attachment to a chair seat and base, respectively, one of said parts having a pair of spaced spring seats, a pair of coil springs each having one end seated on one of said spring seats, a member having a pair of spring seats for engagement with the other ends of said springs, means securing said member to the other of said parts eccentric to said pivot, whereby said springs yieldingly hold said chair in non-tilted position, and a core of yieldable material within each of said springs and of slightly less diameter than the inside of its respective spring and of a length sufficient to cause axial compression thereof when said chair has been tilted to a predetermined extent, but insufficient to cause compression thereof when said chair is untilted.

4. A chair iron for a tilting chair, comprising parts pivoted together for attachment to a chair seat and base, respectively, one of said parts having a pair of spaced spring seats, a pair of coil springs each having one end seated on one of said spring seats, a member having a pair of spring seats for engagement with the other ends of said springs, means securing said member to the other of said parts eccentric to said pivot, whereby said springs yieldingly hold said chair in non-tilted position, and a core of yielding material within each of said springs and of slightly less diameter than the interior of its respective spring and secured to one of said spring seat portions, said cores being spaced from the other spring seat when the chair is in a non-tilted position and of lengths to be compressed between said spring seats when the chair is tilted to a predetermined extent.

5. In combination, a chair iron for a tilting chair, comprising parts pivoted together for attachment to a chair seat and base, respectively, one of said parts having a pair of spaced spring seats, a pair of coil springs each having one end seated on one of said spring seats, a member having a pair of spring seats for engagement with the other ends of said springs, means securing said member to the other of said parts eccentric to said pivot, whereby said springs yieldingly hold said chair in non-tilted position, posts secured at one end to one of said spring seat portions sub-

stantially concentric with said springs, and a tube of yieldable material carried by and surrounding each of said posts and projecting toward the other of said spring seat portions and of sufficient external diameter to hold, when its spring breaks, the broken portions of the spring in substantially coaxial and operative relation.

6. In combination, a chair iron for a tilting chair, comprising parts pivoted together for attachment to a chair seat and base, respectively, one of said parts having a pair of spaced spring seats, a pair of coil springs each having one end seated on one of said spring seats, a member having a pair of spring seats for engagement with the other ends of said springs, means securing said member to the other of said parts eccentric to said pivot, whereby said springs yieldingly hold said chair in non-tilted position, posts secured at one end to one of said spring seat portions substantially concentric with said springs, and a tube of yieldable material carried by and surrounding each of said posts and projecting toward the other of said spring seat portions and of sufficient external diameter to hold, when its spring breaks, the broken portions of the spring in substantial coaxial and operative relation, said tubes being of a length sufficient to be compressed between the spring seats for its respective spring as said chair approaches the limit of its backward tilting movement.

7. A chair iron comprising a wall member, means for securing said wall member to the lower face of a chair seat and substantially perpendicular thereto, a base member pivotally secured to said means on one side of said wall member, a coil spring engaging said wall member at one end, an element engaging the opposite end of said spring and operatively connected to said base member to cause said spring to yieldingly

hold said seat in non-tilted position and to more or less counterbalance the weight of the occupant of the chair seat as said seat is tilted, and a resilient bumper secured to said wall member and engageable with said element when said seat is tilted to a predetermined amount and extending coaxially within said spring and of a diameter slightly smaller than that of the inside of said spring to act when said spring breaks to hold the broken parts in substantially coaxial relation and maintaining them effective to partly counterbalance the weight of the chair occupant as said chair is tilted.

8. A chair iron comprising a wall member, means for securing said wall member to the lower face of a chair seat and substantially perpendicular thereto, a base member pivotally secured to said means on one side of said wall member, a coil spring engaging said wall member at one end, an element engaging the opposite end of said spring and operatively connected to said base member to cause said spring to yieldingly hold said seat in non-tilted position and to more or less counterbalance the weight of the occupant of the chair seat as said seat is tilted, a resilient bumper secured to said wall member and extending coaxially within said spring and of a diameter slightly smaller than that of the inside of said spring to act when said spring breaks to hold the broken parts in substantially coaxial relation and maintain them effective to partly counterbalance the weight of the chair occupant as said chair is tilted, and stops to limit the tilting of said seat, said bumper being of a length to engage said element and be compressed when said seat approaches its tilting limit.

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