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2,537,071

CHAIR HAVING SPRING SUPPORTED SEAT AND BACK

Filed July 30, 1945

2 Sheets-Sheet 1

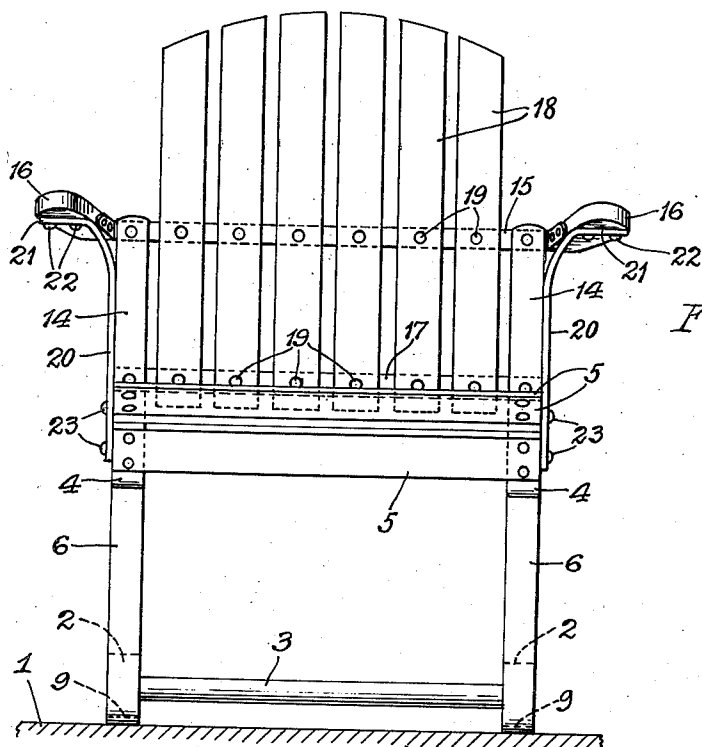


Fig. 1.

Fig. 2.

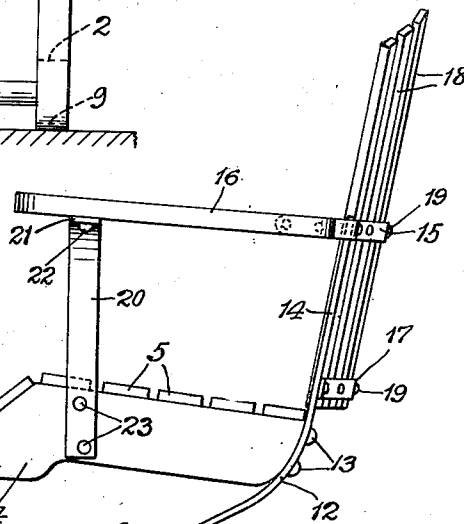
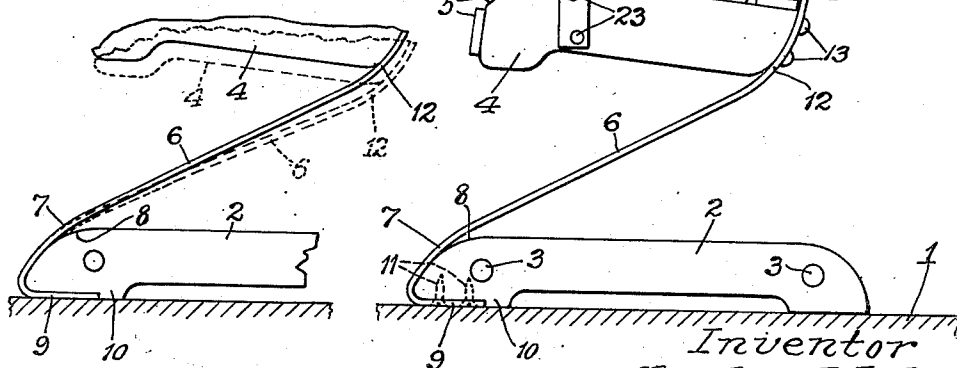


Fig. 3.



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Fig. 4.

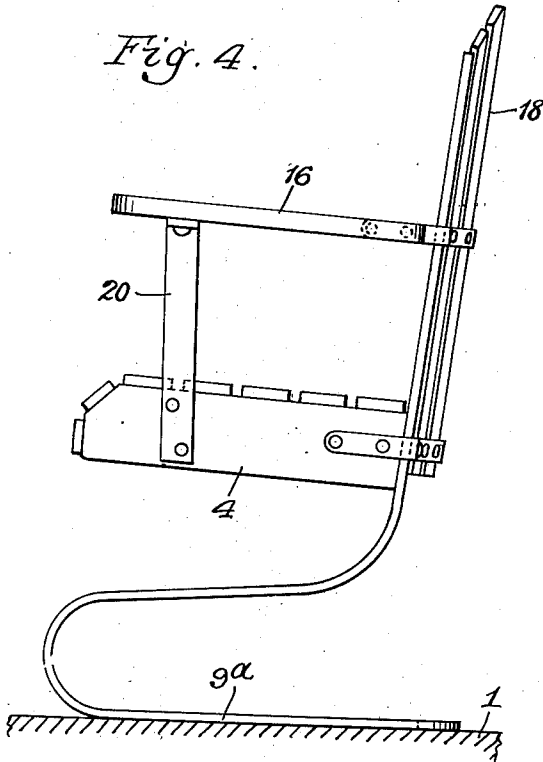
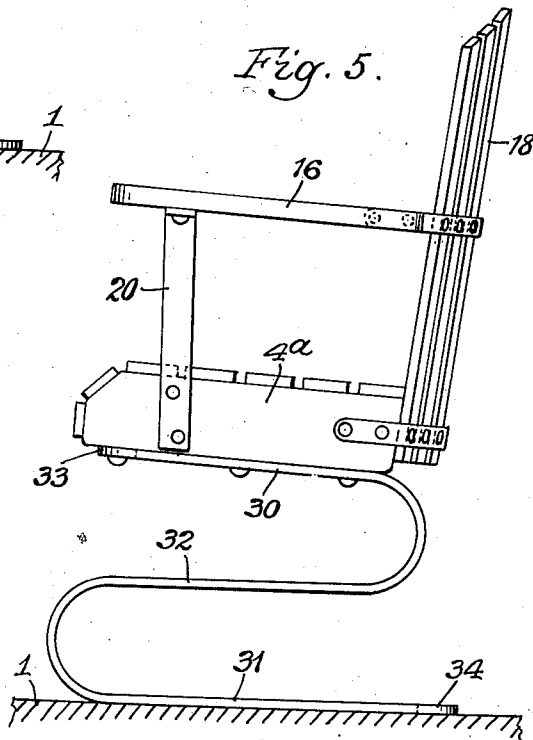


Fig. 5.



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UNITED STATES PATENT OFFICE

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CHAIR HAVING SPRING SUPPORTED SEAT
AND BACK

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3 Claims. (Cl. 155-51)

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This invention relates to seating equipment, such as chairs, or other articles of furniture for seating purposes, including seats for buses, railroad cars, airplanes and other transportational equipment.

One object is to provide an advantageous and efficient spring suspension for seating equipment.

Another object is to provide a spring suspension so arranged that the seating portion may rise and fall as a result of the spring action and in response to the weight on the seat, without substantial alteration in its angle of inclination.

Another object is to provide a spring suspension for seating equipment which is arranged beneath the seat and is adapted to permit a generally up and down movement of the seating portion which is substantially free from tilting, regardless of the weight of the person sitting on the seating portion.

Other objects will appear from time to time throughout the specification and claims.

In general in spring suspensions or spring furniture designed to obtain or permit a rocking motion, the downward movement of the seat, from the weight of the occupant, is likely to cause an undesirable tilting action of the seat and thus of the occupant. For many purposes this action is unsatisfactory, and one of the objects of the present invention is to make such tilting action unnecessary and to avoid it unless such a rocking motion is desired.

This invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a front elevation;

Figure 2 is a side elevation;

Figure 3 is a diagrammatic illustration of the spring action, which takes place when the seat portion illustrated in Figures 1 and 2 is depressed by the weight of the occupant; and

Figures 4 and 5 are diagrammatic illustrations of variant forms.

Like parts are indicated by like characters throughout the specification and the drawings.

As shown, the chair is supported on some floor or base 1 and comprises in itself a base formed of two members 2, 2 which may be connected by one or more cross members 3, 3. The chair, sofa or other article of furniture or seating equipment comprises two or more side members 4 joined by slats or side portions 5. The seat portion is supported from the base by two or more springs which include generally straight portions 6 and downwardly curved portions 7 which are fitted about and secured to correspondingly curved

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portions 8 of the base members 2. The spring portions 7 may terminate in members 9, each of which is positioned beneath a foot portion 10 of a base member 2 and is secured thereto by screws 11 or otherwise.

It will be noted that in the inactive position, as shown in Figure 2, in particular, the spring portion 7 is in part out of contact with the curved portion 8 of the base 2. This permits relative movement of the two parts toward and from each other. On the rising movement, the portion 7 might move further out of contact with the portion 8 than as indicated in Figure 2.

The spring portion 6 is integral with or attached to a curved spring portion 12 which, as shown in Figure 2 in particular, is curved in opposition to the portion 7. Each spring portion 12 is secured to a base member 2 by screws 13 or otherwise. The spring portion 12 may terminate at or near the upper surface of the member 4 or may extend, as shown in the figures, beyond that member to serve as a support for the arms. Thus a portion 14 is integral with the portion 12 and is secured to a member 15 which is itself secured to arms 16.

A member 17 may extend between the spring portions 14 and slats or back members 18 are secured to the portions 15 and 17 by screws or bolts 19 or otherwise. The arms 16 are supported on the portions 14 at their rear and adjacent their forward ends are supported on upright members 20 which are provided with outwardly bent portions 21. The portions 21 are fastened to the arms 16 by screws 22 or otherwise. At their lower ends the members 20 are secured by screws or bolts 23 to the side members 4 of the seat.

It is to be noticed that the springs which support the seat, whether the latter be a portion of a chair or a sofa or of some other article of furniture, include generally flat diagonal members terminating in two oppositely bent curved ends. The member 6, which is the generally flat portion, need not be absolutely flat; but in the main it is preferably of flat shape and whether it is flat or not, the portions 12 and 7 are oppositely curved or oppositely disposed with respect to each other.

The action of the spring is illustrated particularly in the diagram of Figure 3. As shown in that diagram, the spring is shown in full lines in the upright or unloaded position and in dotted lines in the depressed or loaded position. The arrangement of the parts is such that the seat portion when it is depressed; as by reason of a

load, descends substantially vertically with little or no tilting action and the spring portion 6 swings downwardly and rearwardly with little or no distortion, and the main part of the distortion occurs in the spring portion 7. The curvature of this portion is increased under load and it moves more or less increasingly into contact with the curved surface of the base member 2. Thus the shape and disposition of the base member 2 corresponds with the spring action to guide, limit and to control it.

The use and operation of this invention are as follows:

Whenever the article of furniture or seating equipment to which the springs of the design shown herewith may be applied, the spring action will be generally as illustrated in the diagram Figure 3 and as described below. The spring in general comprises a generally straight, relatively unbending central portion. When this portion is referred to as unbending, I do not mean that it is rigid and cannot bend, but I mean primarily that because of the design, ordinarily most of the bending occurs at the end of the spring, particularly the lower end.

When the article of furniture which is supported by one or more of these springs is placed under load, as for example in use, the spring portion 6 tilts about a moving center which is defined by the contact of the portion 7 with the surface 8 of the base, and this point of contact moves rearwardly as shown in Figures 2 and 3 so that as the load is increased, the portion 7 bends and the point of contact of the portion 7 with the surface 8 moves upwardly and rearwardly.

During this time the portion 6 acts primarily as a lever. At the same time, some additional bending occurs in the portion 12 and thus the angular relationship of the base 2 and the seat portion 4 remains substantially undisturbed. If these portions are initially parallel, they remain substantially parallel as the springs are brought under load. If these portions are initially angularly disposed with respect to each other, this angular relationship remains substantially unchanged as the springs are brought under load.

When the load is removed, the springs rise primarily because the portions 7 tend somewhat to straighten out and tend definitely to move out of contact with the portions 8 so that the point of contact between the two moves downwardly and forwardly as seen in Figures 2 and 3.

Whereas in the drawings herein I have illustrated a seat with a base 2, it will be understood that no such separate base is essential, even though under many circumstances it may be desirable. For example, the lower ends 9 of the springs 6 could be removably or permanently secured to a car floor or to a portion of any transportation equipment with which the seat is used. It is also possible and practical to extend the portions 9 rearwardly to take the place of the separate base portions 2. Thus the base portion in that event would be integral with the spring 6. It will be understood, therefore, that when in the claims I employ the term "base" I wish the term to be interpreted with sufficient breadth to cover either a separate base element, such as is shown at 2, or an integral base portion of the springs 6 and their lower rearward extensions 9.

Thus in Figure 4 the bottom spring portions 9a are illustrated, which may be cross connected at their rear ends. In Figure 5, I illustrate

a further variation of the device, in which a true S-shape form of spring is employed, having an upper seat supporting portion 30, a bottom ground engaging portion 31 and an intermediate reverse curved connecting portion 32, the springs at each side of the chair being suitably secured, for example at their upper end at 33 to the seat, and are rounded at their lower end, as at 34.

It will be understood, however, that the spring structure can be widely varied. In contrasting the form of Figure 5 with the forms of Figures 2 and 4, it will be noted that the seat extends forwardly from the spring structure, whereas in Figure 5 the seat portion 4a rests on the upper bend of the spring structure.

I claim:

1. In combination in an article of seating equipment, a base, said base being formed of a pair of separated members, and means for joining them, a seat, a back and a pair of arms, and means for supporting all of them yieldingly from said base, said means comprising a pair of independent springs having lower portions upwardly and rearwardly inclined, curved middle portions and upper portions rearwardly and upwardly inclined at a steeper inclination than the lower portions, said springs being secured at their lower ends to and in part extending about the forward ends of said base members, said seat being secured at its rear end to said springs intermediate their ends and extending forwardly therefrom, and said arms being secured to their springs above said seat and adjacent the upper ends of said springs.

2. In combination in an article of seating equipment, a base, said base being formed of a pair of separated members, and means for joining them, a seat, a back and a pair of arms, and means for supporting all of them yieldingly from said base, said means comprising a pair of independent flat springs having lower portions upwardly and rearwardly inclined, curved middle portions and upper portions rearwardly and upwardly inclined at a steeper inclination than the lower portions, said springs being secured at their lower ends to and in part extending about the forward ends of said base members, said seat being secured at its rear end to said springs intermediate their ends extending forwardly therefrom, and said arms being secured to their springs above said seat and adjacent the upper ends of said springs.

3. In combination in an article of seating equipment, a base, said base being formed of a pair of separated members, means for joining them, a seat, a back, and a pair of arms, and means for supporting all of them yieldingly from said base, said means comprising a pair of independent flat springs upwardly and rearwardly inclined from said base, said springs being secured at their lower ends to and in part extending about the forward ends of said base members, said seat being secured at its rear end to said springs intermediate their ends and extending forwardly therefrom, said springs being bent upwardly intermediate their ends to provide a curved portion substantially at the seat level, the rear end of the seat having portions curved to fit said curved portions of the springs and interfitting therewith, the springs beyond said curved portions including upright portions extending above the seat, and said arms and back being secured to the upright portions of the springs above said seat with the arms

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disposed adjacent to the upper ends of said springs.

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