(No Model.) 2 Sheets—Sheet 1.

M. D. & T. A. CONNOLLY.

TILTING OR ROCKING CHAIR.

No. 354,042. Patented Dec. 7, 1886.

Fig. 1

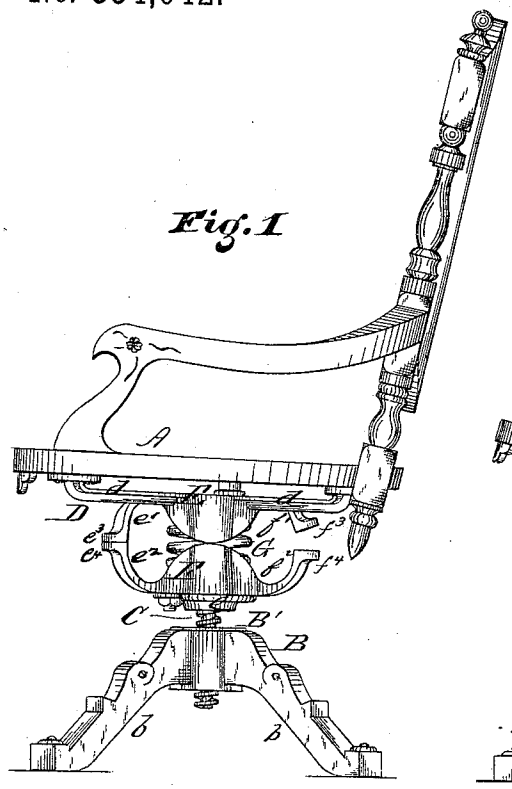


Fig. 2

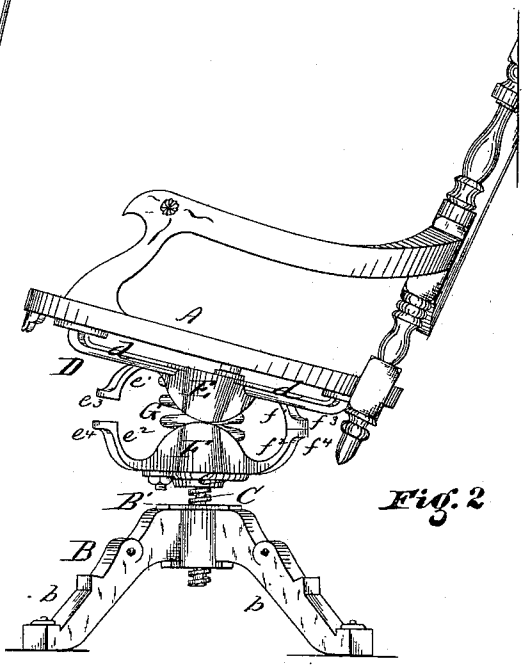


Fig. 3

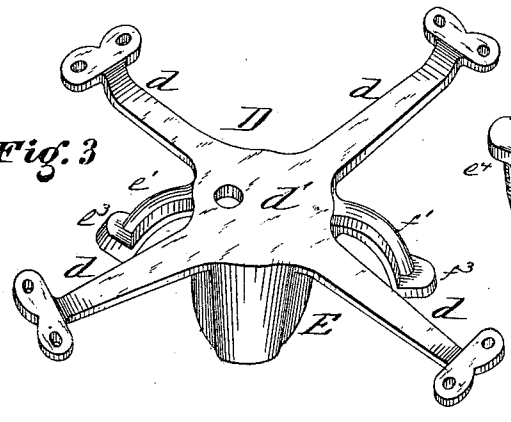
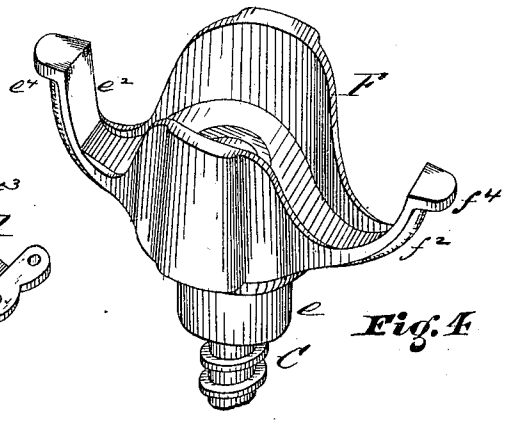


Fig. 4



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(No Model.) 2 Sheets—Sheet 2.

M. D. & T. A. CONNOLLY.

TILTING OR ROCKING CHAIR.

No. 354,042. Patented Dec. 7, 1886.

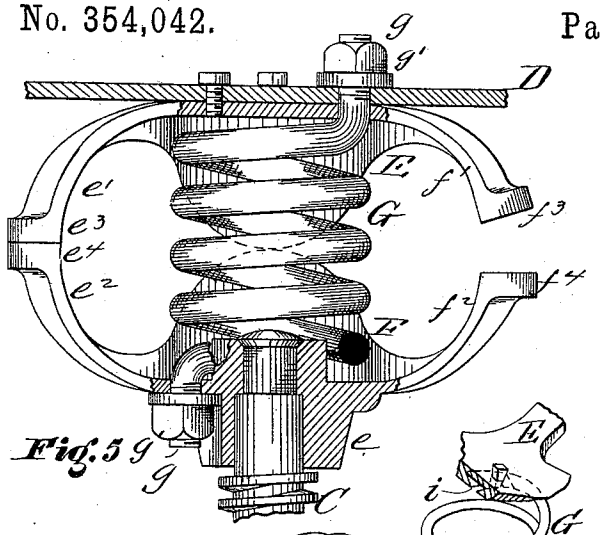


Fig. 5

Fig. 8

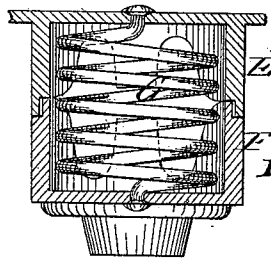


Fig. 7

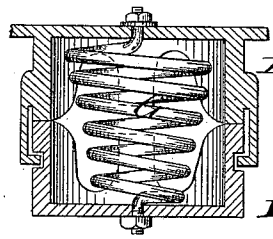


Fig. 9



Fig. 15

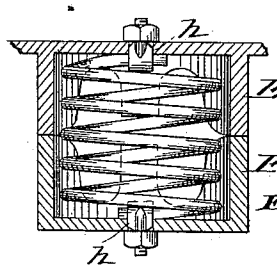


Fig. 10

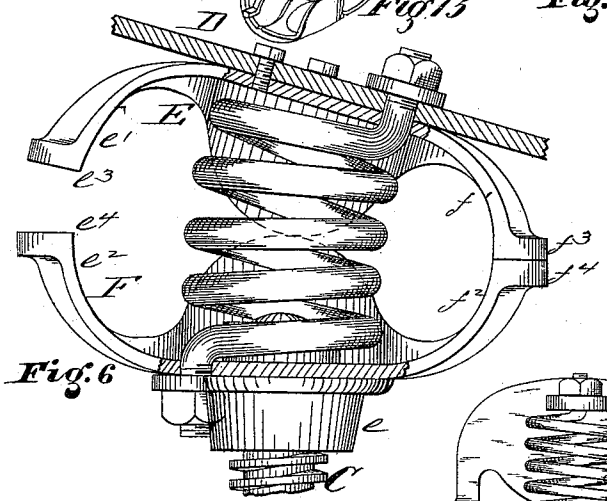
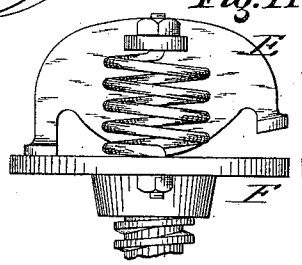


Fig. 6

Fig. 11



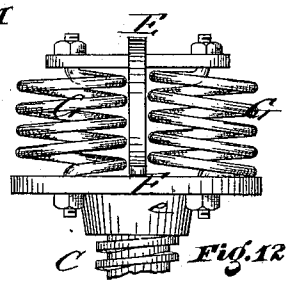


Fig. 12

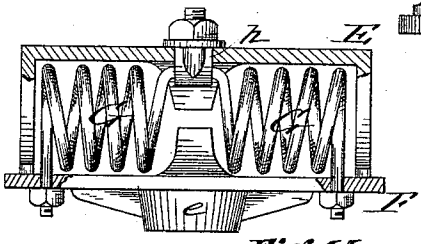


Fig. 14

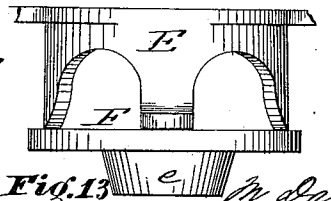


Fig. 13

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UNITED STATES PATENT OFFICE.

M. DANIEL CONNOLLY, OF PHILADELPHIA, PA., AND THOMAS A. CONNOLLY, OF WASHINGTON, D. C., ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE ROCKER SPRING COMPANY, OF CHICAGO, ILL.

TILTING OR ROCKING CHAIR.

SPECIFICATION forming part of Letters Patent No. 354,042, dated December 7, 1886.

Application filed July 30, 1886. Serial No. 14,470. (No model.)

To all whom it may concern:

Be it known that we, M. DANIEL CONNOLLY and THOMAS A. CONNOLLY, citizens of the United States, residing, respectively, at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, and at the city of Washington, in the District of Columbia, have jointly invented new and useful Improvements in Tilting or Rocking Chairs, of which the following is a specification, reference being had to the accompanying drawings, wherein—

Figures 1 and 2 are side elevations of a chair constructed according to our invention. Figs. 3 and 4 are perspective views of the upper and lower rockers, respectively. Figs. 5 and 6 are side views, partly in elevation and partly in section, of parts embodying our improvement. Figs. 7, 9, 10, and 14 are views in section illustrating modifications. Figs. 8 to 15 are perspective views of modifications. Fig. 11, 12, and 13 are views in elevation showing modifications.

In the accompanying drawings, A indicates a chair-seat, and B a base, of the usual or any suitable construction, for a revolving chair. Such base ordinarily consists of four legs, *b b b b*, fastened in a central nut, B'.

C is a spindle, which turns in the nut B', and is preferably, but not necessarily, threaded, so as to secure vertical adjustment for the chair-seat.

D is a spider, consisting of four arms, *d d d d*, united by a center, *d'*, said spider consisting usually of a casting.

E and F are rockers attached, respectively, to the head or top of the spindle C and to the spider D; or the rocker F may, by preference, be integral with the spider, being cast therewith. The rocker F is preferably formed with a central boss, *e*, in which the end of the spindle C is rigidly secured by plugging or equivalent means, and the upper rocker, E, may be secured to the spider D in a similar manner or by bolting the parts together. These rockers are of cylindrical box form, with front and back curved, or other projections or arms, $e' e^2 f' f^2$, terminating in shoulders $e^3 e^4 f^3 f^4$, which serve as stops to limit the movement of the chair-seat in rocking. The two front stops, $e' e^2$, come together when the chair-seat is horizontal, or preferably before the seat reaches a horizontal position, so that the normal position of said seat will be slightly inclined downwardly toward the rear. The edges of the boxes form the rockers and are curved reversely—*i. e.*, both of the upper boxes from a center above, and both the lower from a center below, their line or point of contact. Such curves preferably describe segments drawn from a center in the base or end of the boxes, so that the line of contact and extremity of movement of said boxes shall be about or in the middle of a spring uniting the latter.

G represents the spring, which is preferably arranged with its axis vertical, its ends being attached, respectively, to the rocker-boxes, the curved edges of the latter being in contact. The spring may be secured to the rocker-boxes in any suitable manner—as for instance, by bending its ends *g g* on opposite sides of the same diametrical line, then passing them through holes in the ends of the rocker-boxes and securing them by nuts *g' g'* on the outside; or clamps or clips *h h*, as shown in Figs. 10 and 14, may be employed, the ends of the springs not then requiring to be bent; or the castings E and F may have openings or sockets *i*, as shown in Fig. 8, into which the respective ends of the spring may be passed, and secured by means of nuts, keys, gibs, or equivalent retaining devices.

When the chair-seat is tilted or depressed in the rear, the upper rocker will roll upon the lower and the spring will bend, its coils opening slightly in front and correspondingly approaching in the rear, the motion thus produced being an actual rocking motion upon a changing fulcrum, differing wholly from the motion of ordinary tilting-chairs, in which the movement is upon a pivot, forming a fulcrum of fixed position. The backward rock is resisted by the tendency of the spring to retain its normal position and the forward motion is assisted by the same tendency, the result be-

ing a delightfully easy and comfortable motion, unapproached by that of any tilting or oscillating chair with which we are acquainted.

In some cases only one of the boxes may have a curved edge, the other presenting a straight or other line on its edge; but we prefer the double-reverse curve already described, as this construction will allow a greater range of motion and an easier movement within a given space.

Due regard should be had to proper dimensions of the various parts, and while such dimensions may be considerably varied and still preserve excellent effects, we have obtained the best results with a spring consisting of five coils of one-half inch tempered steel having an internal or mandrel diameter of two and one-half inches, the boxes being in proportion.

To prevent bending or rubbing, the boxes should be of an internal diameter a fraction greater than the external or greatest diameter of the spring, and to give a perfect seat for the end coils of the spring on the ends or bases of the boxes such ends should be beveled or inclined on their inner sides conformable to the pitch of the coil.

To give sufficient bearing-surfaces on the edges of the rocker-boxes, they should be swelled or re-enforced about their middles by the provision of cheek-pieces cast integral with said boxes.

Where the person occupying the chair sits squarely upon the seat, in the usual and appropriate manner, there is no liability on the part of the spring to open on either side, and the rocking may be effected, preferably backward and forward, without any wabbling. If, however, through carelessness or a desire for an easy, irregular position or attitude, the weight be thrown to a considerable extent on one side, there is a slight tendency, particularly with a heavy occupant of the seat, for the edges of the boxes to part slightly on one side. To prevent this opening, one of the boxes—it matters not which—may be provided with lugs on either side, which will move in slots on channels, or over or under shoulders in the other box, as shown in Figs. 7 and 9. These should be so formed, in order to prevent binding or friction, that in the normal rocking there will be no contact between said lugs and the edges of the slots or channels or faces of the shoulders. As soon, however, as the weight of the occupant of the chair-seat is thrown sufficiently to one side to produce a tendency to open the spring on the side the lug on that side of the box will meet the shoulder or edge of the slot or channel and arrest such tendency.

We have shown the rockers in several figures as being of cylindrical outline; but this is by no means essential, (though it is perhaps the most symmetrical and compact form,) and the sides of the boxes may, if desired, be parallel or otherwise arranged. We have shown the spring as directly over the spindle and directly under the center or union of the spider, and this arrangement should in all cases be preserved; but as the leverage upon the spring is exerted from the rear of the seat, it is plain that such leverage will be proportioned to the length of the arms of the spider; hence if the rear arms of the latter be shorter than the forward arms the leverage required to rock the seat backwardly will be less than if the spider-arms were of uniform length, so that by shortening the rear arms slightly a proportionate reduction in the strength of the spring may be made.

To limit the backward and forward motion of the spring, we have provided stops, which are projections from the boxes. These stops may, if desired, be cushioned and provided with a set-screw or other means of adjusting the extent of the backward and forward motion. The stop for limiting the backward motion is shown in the rear in Figs. 1, 2, &c.; but it may be in front, as shown in Fig. 15.

We have described the boxes E and F as rocker-boxes; but it is obvious that in a strict sense only one of them—*i. e.*, the upper—actually rocks, the other, or lower, being stationary; but in a liberal meaning of the term both may be called "rockers," as if both are alike, while one alone moves, the other, by reason of its curvature, produces an effect upon such rocking movement.

Instead of making two boxes with curved edges meeting at the middle of the height of the spring, one of said boxes may be deeper than the other, so that their edge-line of normal contact will be either above or below a plane passing through the middle of the spring, or one rocker-box, either the upper or lower, may be employed, a plain base or cap being substituted for the other.

Some of the advantages of this improvement are: First, a perfect rocking motion is obtained for a revolving chair, something not hitherto achieved, so far as we are aware; second, a single metallic spring forms the sole connection for a pair of rockers interposed between the spindle and the spider of a revolving chair, serving, therefore, to hold such rockers in their proper relative position, and by resisting the rocking motion in one action and assisting it in the other producing an easy, comfortable, and agreeable motion, closely resembling that of an old-fashioned rocking-chair, and wholly different from the abrupt jerk of a pivoted tilting-chair and the swaying motion produced in a seat oscillating on long plate-springs; third, the seat being made permanently fast to the spider, and the center of motion or joint being below the spider and directly over the spindle, and hence out of the way, there is no danger of contact with the clothing or members of the occupant of the chair-seat, such as there is, for example, in the common forms of tilting-chairs, where the joint is between the spider and the chair-seat, the latter turning on the former, hence parting from it in front when tilted and

coming down when closed upon a stop in line with the front edge of the seat; fourth, the entire device forming the rocker consisting of iron and steel, the work upon it may be completed in the foundry and machine-shop, so that the invention in a finished form may be furnished to chair-makers, who have merely to screw the spider to the seat and fit legs to the nut to perfect its application to a chair; fifth, the peculiar arrangement of the spring permits it to be made of such dimensions and strength that it will be impossible to break or strain it by any ordinary usage. and hence the durability of the device is secured.

We have shown and described our improvements embodying a spring having its longitudinal axis vertical—*i. e.*, the pitch of its coils being between two horizontal lines—and this we consider in all cases the most desirable form of construction or arrangement; but in some cases the longitudinal axis of the spring may be somewhat inclined from the perpendicular, so as to form a right angle with the plane of the chair-seat, and it may even be horizontal.

In Fig. 14 we have shown the spring with its axis horizontal. In this modification the swing or bending of the whole spring, which is secured by the arrangement first described, and which contributes largely to the ease and attractiveness of the movement, is not attained, and the rocking backward has the effect of uncoiling or of closing the end coils, and not opening the coils on one side of the axis and compressing them on the other.

Where the spring is arranged with its axis horizontal, if its coils be all in one direction its ends should be brought around so as to coincide with a line drawn directly through the middle of the boxes from the front to the rear stops. one end being fastened to the upper and the other to the lower box; but if, as it may, the spring have coils in reverse directions—*i. e.*, right and left coils—the middle of the spring may be secured to one of the boxes and the two ends to the other; or, as a substitute for the single spring with reverse coils, two springs, either end of each being attached to the respective boxes, may be employed. We have shown and described stops both in front and rear to limit the movement of the chair-seat, and such we consider always desirable; but, if preferred, either the front or rear stops may be dispensed with.

As the stops constitute an important feature of our invention in their relation to the spring and rockers, we deem it proper to suggest that they may be used even where the boxes are pivoted or otherwise coupled together than by means of a spring or springs. We regard such a use as the adoption of our invention, and particularly so where the front stops are employed, the spring being located either directly over or out of line with the spindle.

It is obvious that our invention is not limited to the location of the spring which connects the rockers directly in line with the spindle, although such an arrangement is unquestionably the most desirable, and the only one from which the best results will follow.

In Fig. 12 we have shown an arrangement by which two springs of light tension may be employed. These may be located within the rocker-boxes or on either side of a central upper rocker, or to an upper and a lower rocker. The figure referred to shows the lower support as being a flat plate; but such is not required.

We do not herein claim any special or particular means for effecting the rigid connection of the springs with the upper and lower portions of the chair, our invention being directed to the feature of applying the springs so that they will constitute the connection between the upper and lower portions of a chair, for holding the rockers and their lower support in alignment and proper relative position, as pointed out in the claims.

What we claim as our invention is—

1. The combination, in a chair, of a seat having rockers secured to its under side, a base having a lower support for said rockers, and a spiral spring or springs rigidly connected to said parts, respectively, and constituting the connection between the seat and base parts of the chair for holding the rockers and their lower support in alignment and proper relative position, substantially as described.

2. The combination, in a chair, of a seat having rockers secured to its under side, a base having a lower support for said rockers, and a spiral spring or springs rigidly connected to said parts, respectively, and located directly in the center of oscillation of the chair seat, and constituting the connection between the seat and base parts of the chair for holding the rockers and their lower support in alignment and proper relative position, substantially as described.

3. The combination, in a chair, of a seat having rockers secured to its under side, a base having a lower support for said rockers, a spiral spring or springs rigidly connected to said parts, respectively, and suitable stops to limit the movement of the seat, substantially as described.

In testimony that we claim the foregoing we have hereto set our hands.

M. DANL. CONNOLLY.
THOS. A. CONNOLLY.

Witnesses to signature of M. Danl. Connolly:
CHAS. F. VAN HORN,
SAML. J. VAN STAVOREN.
Witnesses to signature of Thos. A. Connolly:
V. CONNOLLY,
A. A. CONNOLLY.