United States Patent

Van Ryn

[15] **3,690,726**

[45] **Sept. 12, 1972**

[54] THREE-QUARTER FOLD CHAIR

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[73] Assignee: **American Seating Company,** Grand Rapids, Mich.

[22] Filed: **Dec. 21, 1970**

[21] Appl. No.: **100,208**

[52] **U.S. Cl.**.....**297/332**

[51] **Int. Cl.**.....**A47c 1/12**

[58] **Field of Search**.....297/332, 333, 335, 336, 355; 248/413, 383; 287/101

[56] **References Cited**

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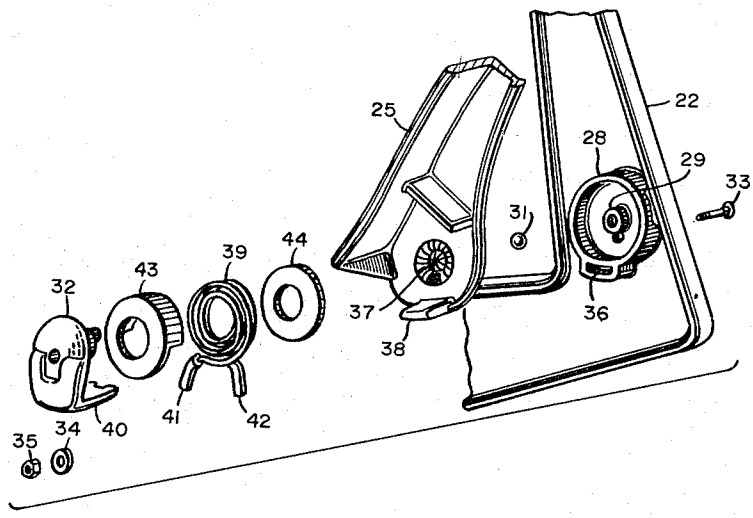
Primary Examiner—Francis K. Zugel

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[57] **ABSTRACT**

A stadium chair has a base pivotally supporting a seat on a ball bearing with a spring actuator depending from the seat lying between coil spring ends, the ends normally being spaced by a fixed arm depending from a tail back housing for the spring and arranged for normally supporting the seat in a three-quarter raised position but yielding for movement of the seat to fully raised or lowered positions.

5 Claims, 14 Drawing Figures



Patented Sept. 12, 1972 3,690,726

4 Sheets-Sheet 1

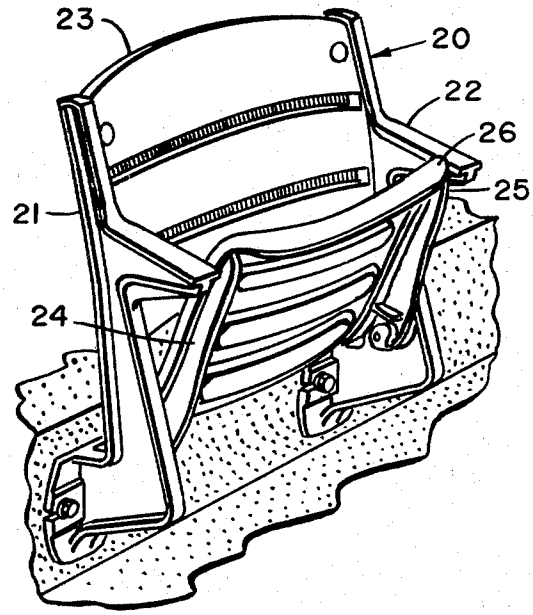


FIG. 1

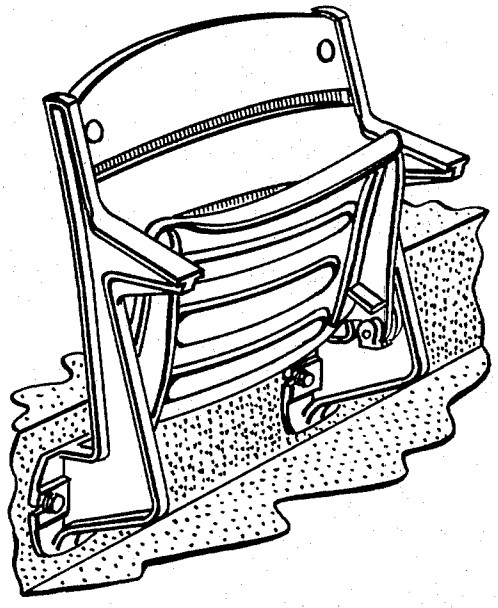


FIG. 2

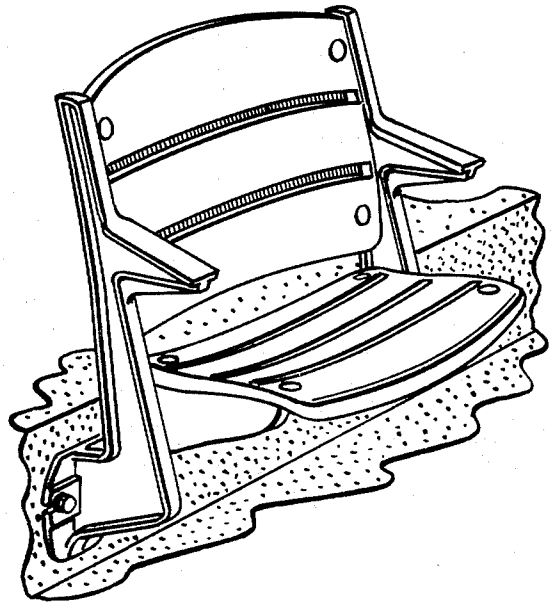


FIG. 3

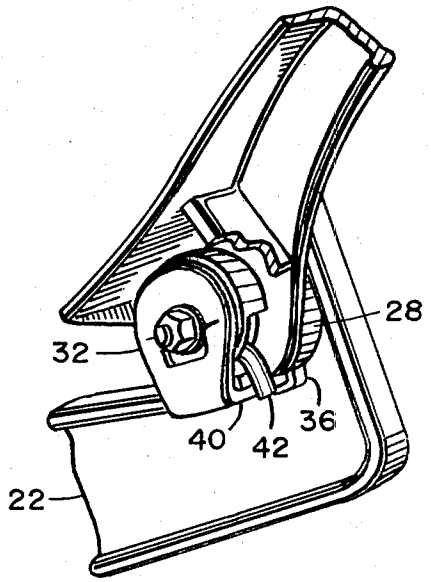


FIG. 4

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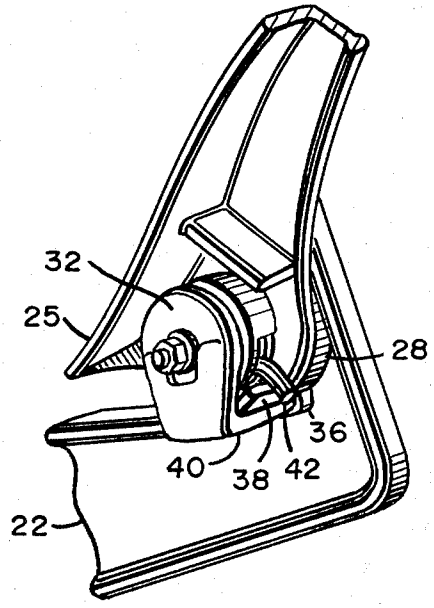


FIG. 5

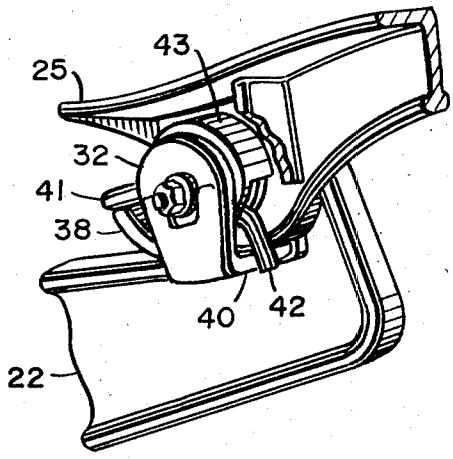


FIG. 6

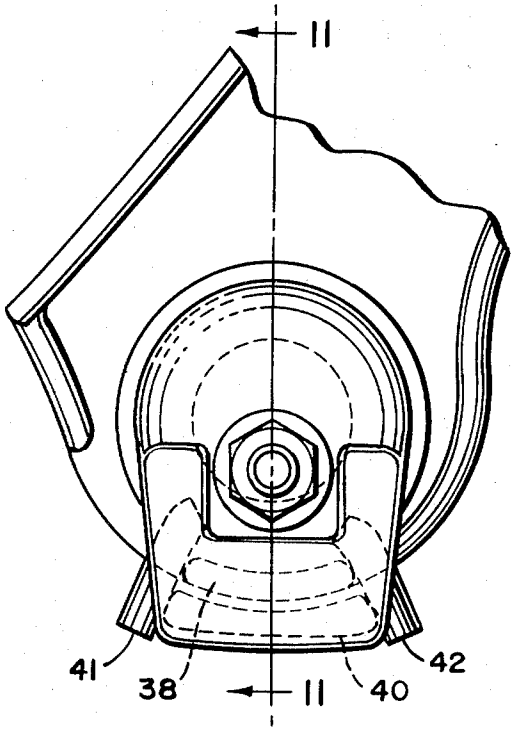


FIG. 7

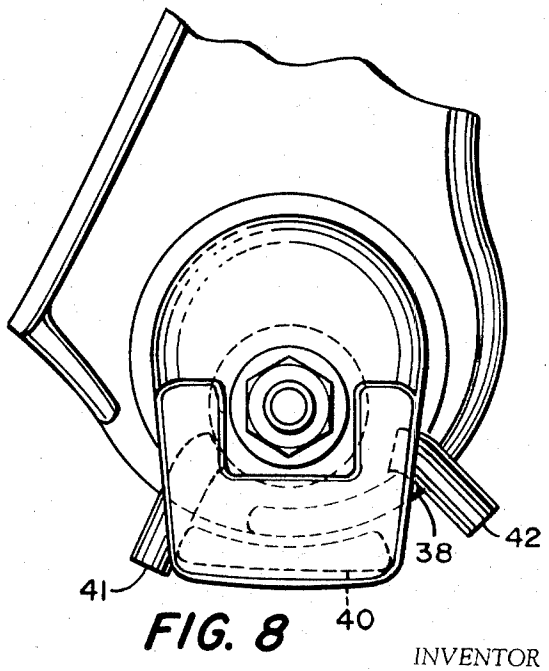


FIG. 8

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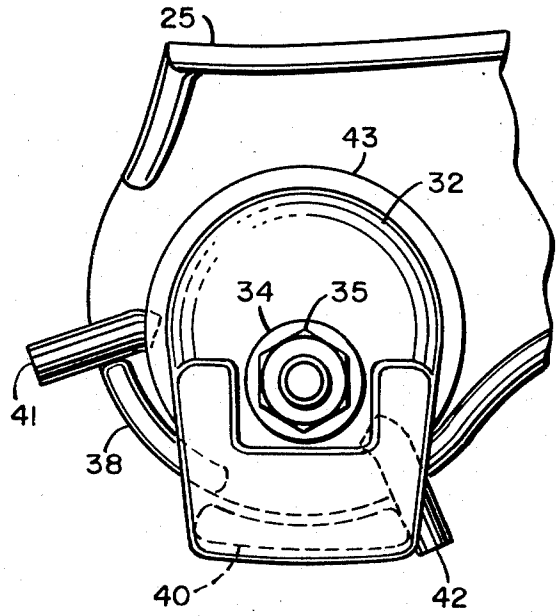


FIG. 9

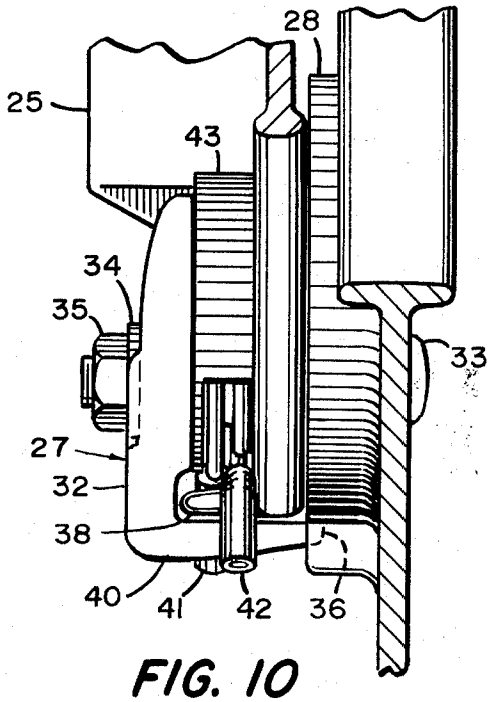


FIG. 10

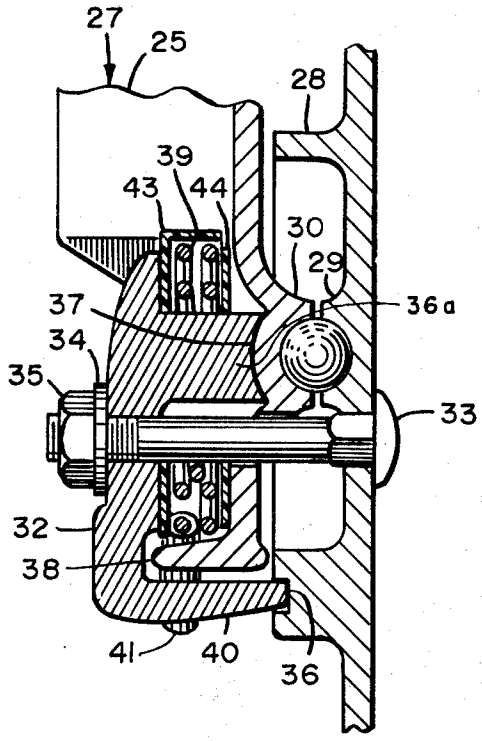


FIG. 11

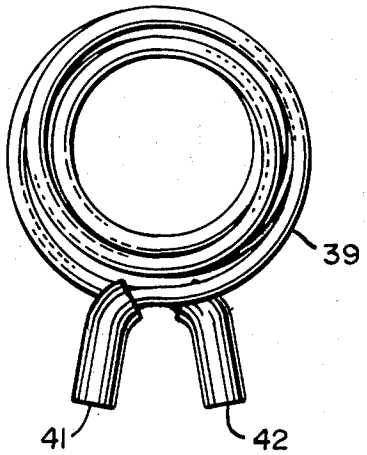


FIG. 12

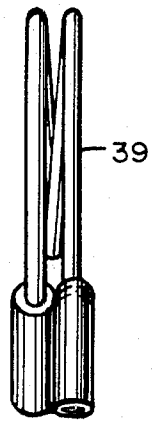


FIG. 13

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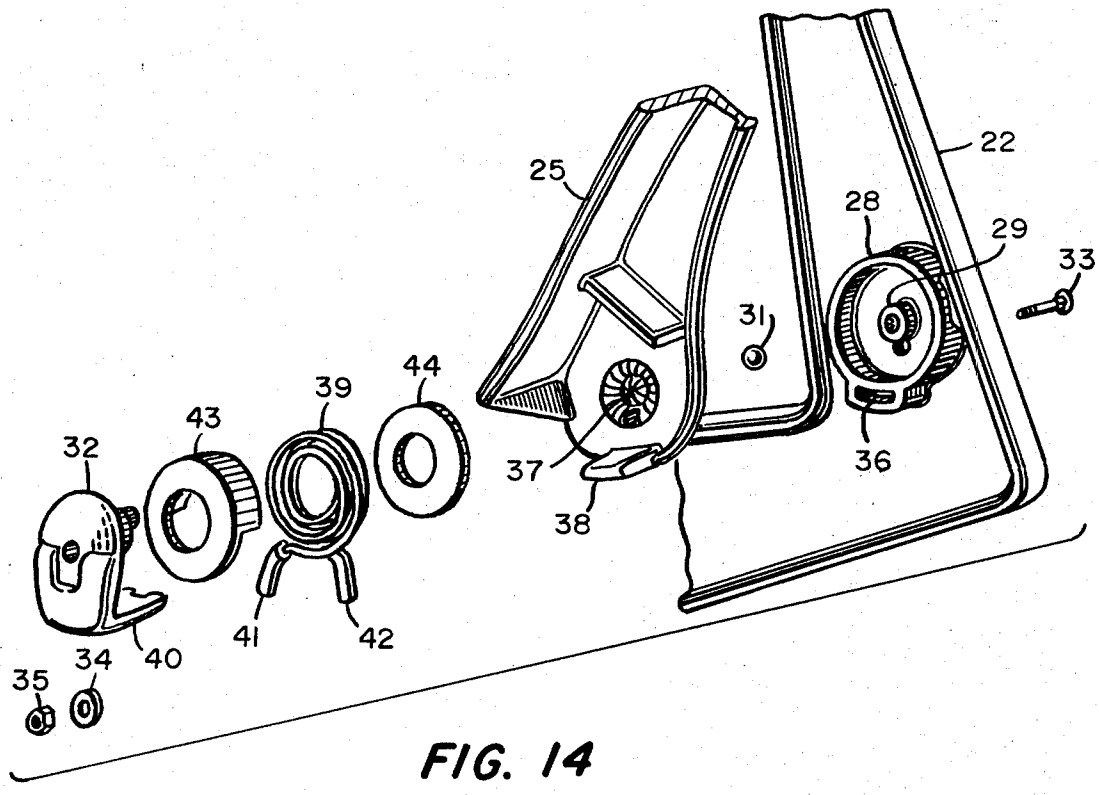


FIG. 14

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THREE-QUARTER FOLD CHAIR

BACKGROUND AND SUMMARY

Self-rising seats for stadium, theater and other uses normally swing upwardly to a generally vertical position and downwardly to a horizontal sitting position. Such a structure, however, is unsatisfactory in several respects in that the seat has a tendency to stay up, requiring the occupant to exert special effort in lowering the seat in order to sit down. A third position, which is about a three-quarter fold raised position, is highly desirable because the occupant can readily sit down without the special effort above mentioned, and further when a full folding is desired, the occupant can raise the seat to this full fold point simply by leaning against it. Then, as he steps forward to sit down, the seat instantly assumes the three-quarter fold position so that no effort is required in moving the seat to the sitting position.

I have discovered that a seat providing the above advantages can be prepared while employing a novel, sturdy and efficient hinge structure and a structure which will respond efficiently over a long period without adjustment or need for repair.

DRAWINGS

In the accompanying drawings,

FIG. 1 is a perspective view of a stadium chair with the seat in the three-quarter fold position and embodying my invention;

FIG. 2, a similar perspective view with the seat in the full fold position;

FIG. 3, a view similar to FIG. 1 but showing the chair in the down position;

FIG. 4, a fragmentary perspective view on an enlarged scale of the pivot area of the chair;

FIG. 5, a view similar to FIG. 4 with the seat in the full fold position, as in FIG. 2;

FIG. 6, a view similar to FIG. 5 but showing the seat arm in the down position, as in FIG. 3;

FIG. 7, a fragmentary side view of the seat pivot area with the seat arm in the three-quarter fold position, as in FIG. 4;

FIG. 8, a view similar to FIG. 7 but showing the seat arm in full fold position, as in FIG. 5;

FIG. 9, a view similar to FIG. 8 but showing the seat arm in down position;

FIG. 10, a fragmentary front view of the structure shown in FIG. 4 with the seat arm in the three-quarter fold position;

FIG. 11, a sectional detail view, the section being taken as indicated at line 11—11 of FIG. 7;

FIG. 12, a side view in elevation of the three-quarter fold spring;

FIG. 13, an end view of the spring shown in FIG. 12; and

FIG. 14, an exploded view of the seat pivot area showing the parts in separated relation.

DETAILED DESCRIPTION

In general, I have provided a stadium chair structure in which a base equipped with arm rests and a back is provided with a ball recess for receiving a ball within a portion of the recess and a seat having a lower portion provided with a recess receiving another portion of said ball to provide a pivot between the base and seat, the seat having a spring actuator arm extending below the ball bearing. A tail lock member provides a spring housing and receives said actuator, while also being provided at its bottom with a spacer arm. Bolt means are provided for anchoring the tail lock upon the base, and a coil spring within the housing has ends spaced by the spacer arm and the spring actuator. Through this structure, the spring actuator is normally held between the spring ends so as to maintain the seat at the desired three-quarter raised position, while at the same time the seat can be readily moved to full raised position, thereby tensioning the spring so that as the seat is released, it will return to three-quarter position Similarly, when the occupants sits upon the seat to move it to horizontal position, the spring is tensioned to bring the seat automatically to three-quarter position when the occupant rises. The seat may be provided with one or two springs as may be desired.

In the foregoing structure, I can employ a rather thin round spring wire so that little space is needed to house it in the spring mechanism, and the spring may be surrounded by a plastic housing and the ends of the spring may be covered with plastic tubes to prevent metal-to-metal contact. The plastic is preferably grease and oil resistant and retains the grease which may be placed within the housing at the time of installation. The plastic further acts as a protector against the soiling of clothing, any possibility of pinching fingers, etc.

In the illustration given, the stadium chair **20**, which is described herein as illustrative of the invention, has two standards **21** and **22** holding a back panel **23**. Seat arms **24** and **25** are mounted on the base of the chain **20** and support a seat panel **26**, each seat arm having a pivoting mechanism **27** allowing the seat to assume a three-quarter raised position as illustrated in FIGS. **1**, **4** and **7**, a full fold position as shown in FIGS. **2**, **5** and **8**, and a down position as shown in FIGS. **3**, **6** and **9**.

Referring to FIGS. **9–11**, the seat pivoting mechanism **27** has a pivot housing **28** which may be provided with up and down stops (not shown), the housing being molded as part of the standard **21** or **22**. It includes also a ball support **29** also on the standard, as well as a ball support **30** in the outside surface of the seat arm **24** or **25**. A pivot ball **31** is mounted in said supports which is held together with a tail lock **32** secured to the base by a bolt **33**, a washer **34** and a nut **35**.

The tail lock **32** has a lower portion resting within a recess or pocket **36** in the seat base and an outwardly extending upper arm **36***a* which creates leverage on the pivot joint by pressing against the outside of the seat arm ball support **37** when the bolt **33** is tightened.

To make the seat self rising, there is provided a spring actuator **38** depending from the seat arm **25** and adapted to engage the ends of a three-quarter fold spring **39**. The three-quarter fold position of the seat is the neutral position shown in FIG. **7** where the spring actuator **38** is held above the arm **40** of the tail lock **32** by the two ends **41** and **42** of spring **39**. The ends of the spring rest on the sides of the spacer arm **40** of the tail lock and keep the spring actuator **38** at rest between them.

In FIG. **8**, the seat is shown raised into the fully folded position with the seat arm pivoted so as to bring

the spring actuator **38** forward, thus winding up the spring **39** to give added strength for returning the spring actuator **38** to its neutral position as soon as the seat is released. The spring end **42** is shown pressing against the actuator **38**.

In FIG. **9**, the seat is shown lowered into its sitting position and the seat arm pivots so as to bring the spring actuator rearwardly, this action also winding up the spring to tension it for returning the spring actuator **38** to its neutral position as soon as the occupant rises. The spring **41** pushes against the side or edge of the spring actuator **38** trying to return it to its neutral position over the arm **40** of the tail lock **32**.

To make the spring action as quiet as possible, the spring is preferably housed in grease and oil resistant plastic after being well greased. This prevents metal-to-metal contact which might cause noise. Also, the ends **41** and **42** are covered with plastic sleeves so that there is no rubbing of metal against the tail lock arm **40** or the spring actuator **38**. The spring rests in a plastic container **43** with a lid-like piece of plastic **44** covering it from the other side.

As shown best in FIGS. **12** and **13**, the spring is a two-layer spring in which the inner loop spirals from upper to lower level in one 360° turn. In other words, the inner loop spirals to the outside. In order to get the necessary degrees of spring movement and hold down stress to reasonable limits, the spring has been uniquely wound. While only two coils thick or wide, the inside-out winding produces a spring with four and a fraction useful coils. If the spring were wound side by side in the usual manner, the space could not accommodate such a wide spring, but by the spiral winding with the inner loop spiralling to the outside, there is provided a spreading action distributed over four coils of spring.

While in the foregoing specification I have set out a specific structure in considerable detail for the purpose of illustrating an embodiment of the invention, it will be understood that such details may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. A chair comprising a base having a ball recess; a ball within a portion of said recess; a seat having a lower portion provided with a ball support defining a recess receiving another portion of said ball to provide a pivot between the base and seat, said lower portion of the seat having a spring actuator arm extending inwardly below said pivot ball; a tail lock member providing a spring housing and enclosing said actuator arm and provided at its bottom with an outwardly extending spacer arm located in a normal position directly beneath said spring actuator arm of said lower portion of said seat, said seat being in a three-quarters raised position when said actuator arm and said spacer arm are thus aligned, said spacer arm bearing against said seat base; bolt means securing said tail lock to said base; and a coil spring within said housing having first and second spring ends located respectively on either side of said spacer arm and said actuator; whereby said seat may be further raised to a fully raised position wherein said actuator arm is rotated in one direction to engage said first end of said spring and apply torsion thereto, said second end of said spring being restrained by said space arm of said tail lock, or said seat may be lowered to a horizontal position wherein said actuator arm is rotated in a direction opposite to said first direction to engage said second end of said spring and apply torsion thereto, said first end of said spring being restrained by said spacer arm; said seat assuming said three-quarters raised position when not otherwise urged.

2. The chair of claim **1** wherein said tail lock member further includes an outwardly extending upper arm bearing against the ball support of said seat; and wherein said bolt means creates leverage on said pivot ball by urging the upper arm of said tail lock member against said ball support of said seat, said spacer arm thereof reacting against the base of said seat.

3. The chair of claim **1** wherein said coil spring comprises at least four coils, two of said coils being located concentrically with two others of said coils and within them whereby said spring has a width of only two coils but has at least four useful coils.

4. A hinged structure for a chair base and a seat in which the seat and base are pivotally connected by a ball extending in recesses therebetween, said hinge structure adapted to hold said seat in a normal position raised three-quarters of the full raised position, comprising: a tail lock providing a spring housing and having at its bottom an outwardly extending spacer arm engaging and reacting against the base of said chair and at its top an outwardly extending upper arm; said seat having a spring actuator depending within said spring recess and normally located directly above the spacer arm of said tail lock when said seat is in said three-quarters raised position; bolt means securing said tail lock member to said base and urging said seat into engagement with said ball by forcing the upper arm of said tail lock against a portion of said seat above said spring actuator; and a coil spring in said recess having ends overlying respectively the edges of said spacer arm and said actuator arm; whereby said seat may be rotated in either direction, one end of said spring being engaged in either case by said actuator arm rotated with said seat, the other end of said spring being limited in rotational movement by said spacer arm of said tail lock member, said seat being urged continually toward said three-quarters raised position.

5. The structure of claim **4** further comprising plastic sheath means enclosing said spring and located between said seat and said tail lock member.

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