Oct. 30, 1951 B. VALE 2,573,073

RECLINING CHAIR

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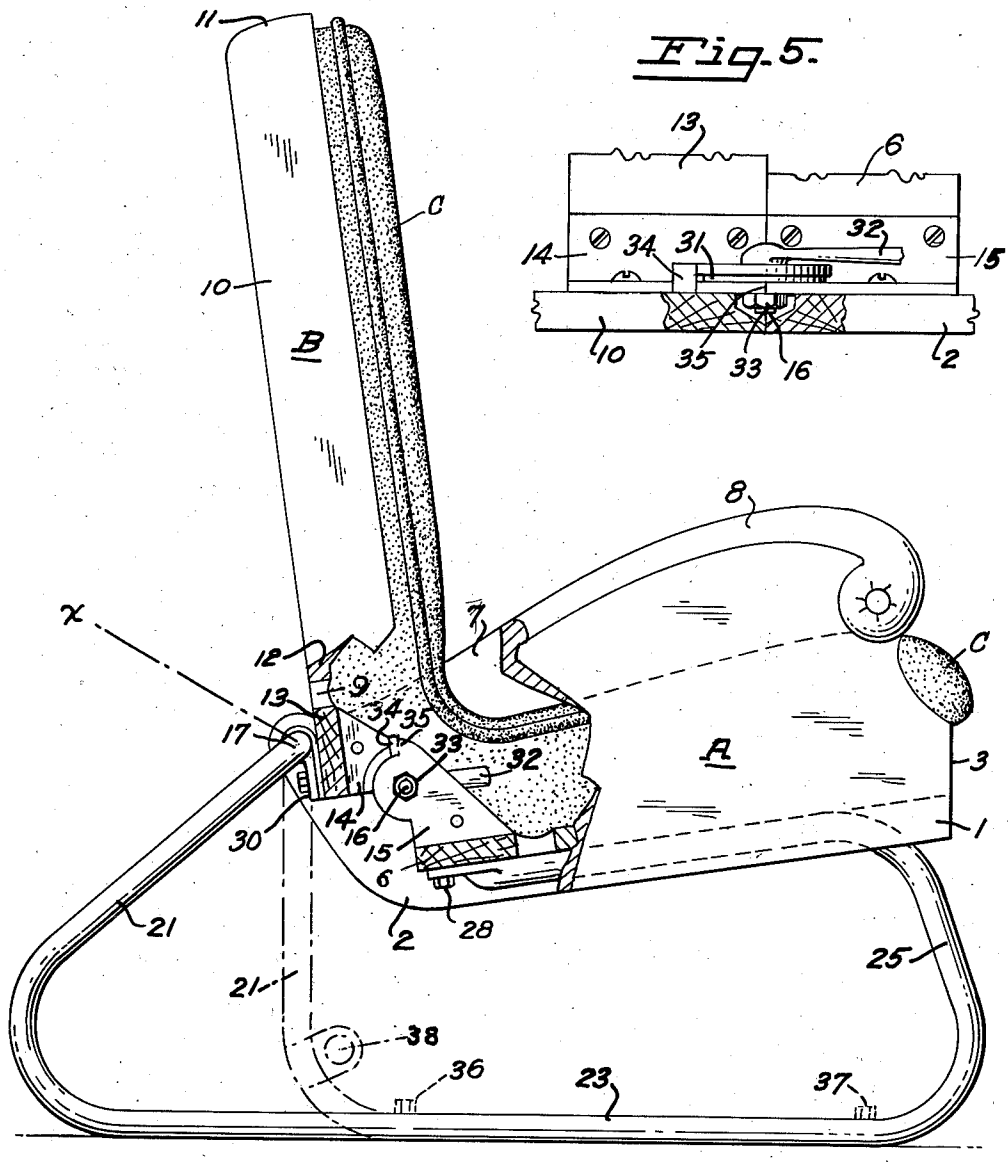


Fig. 5.

Fig. 1.

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Fig. 2.

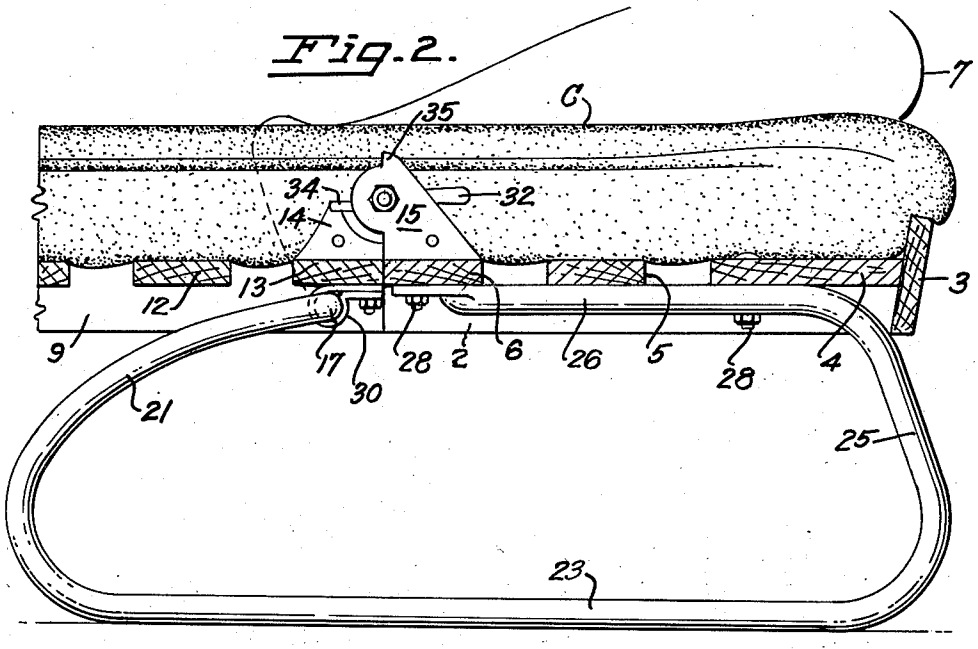


Fig. 3.

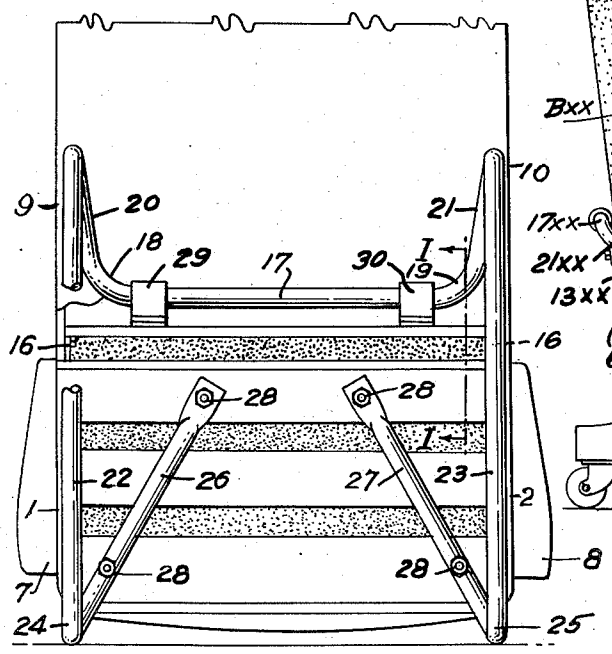
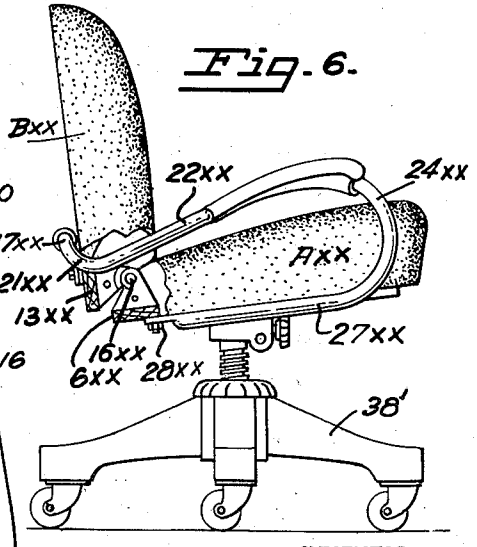


Fig. 6.



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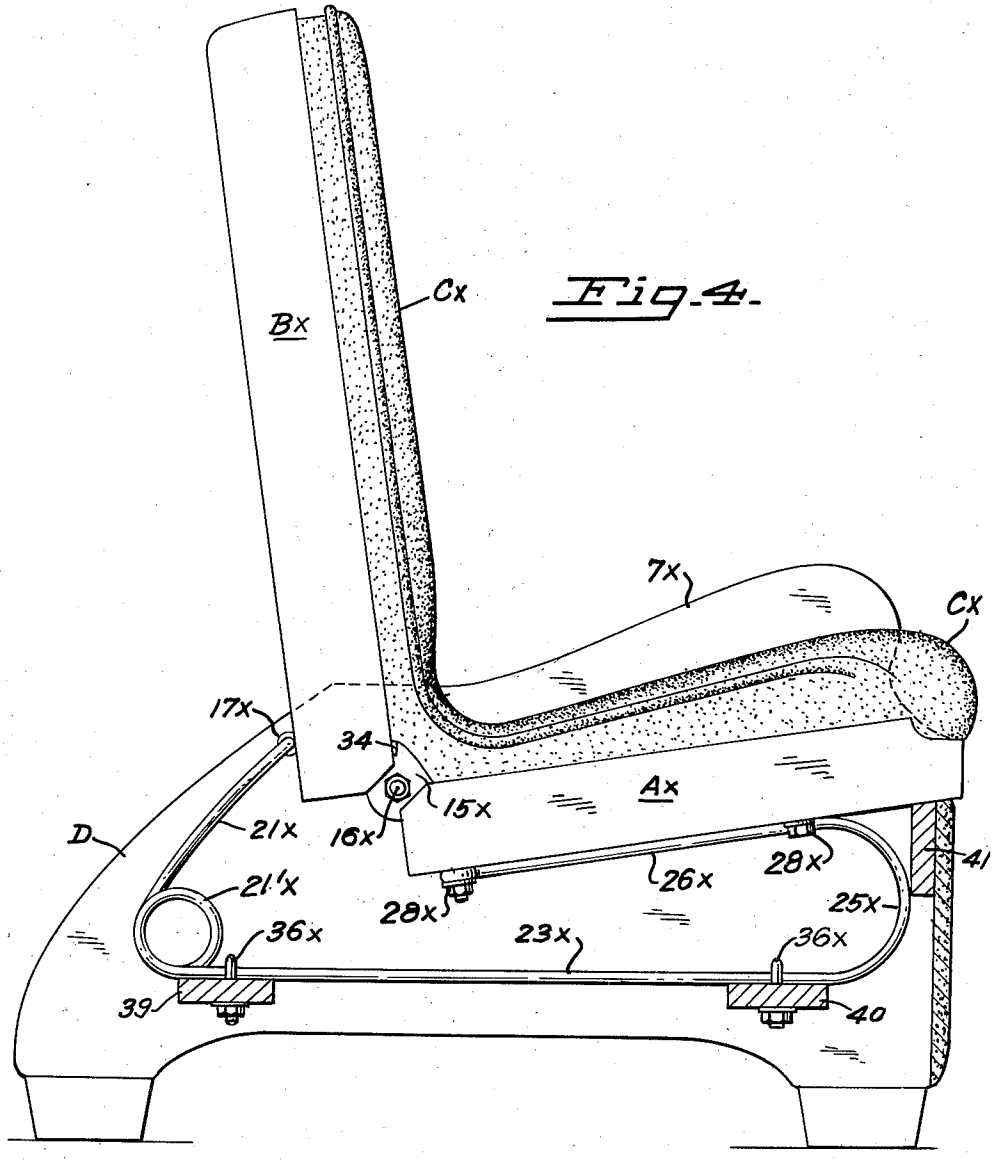


Fig. 4.

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RECLINING CHAIR

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9 Claims. (Cl. 155—116)

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Among the objects of the invention is the provision of a reclining chair capable of following the changing posture of the occupant from the sitting position to a full horizontal reclining position.

Another object is the provision of a chair having its seat and back portions hinged together for relative movement from an acute angle to full horizontal alinement.

Another object is the provision of a spring chair support for the seat and back portions that will provide an inherent flexing tension which will restore the seat and back portions to the normal angular relation to each other when not occupied.

Another object is the provision of such a chair that will counterbalance the weight of the occupant on the seat when he reclines against the back portion, on a floating fulcrum integral with the supporting base frame.

A further object is the provision of a reclining chair comprising a seat and back hinged together in the form of a toggle and supported upon a bowspring having its forward end attached to said seat and its rearward end pivoted to said back to form a fulcrum, so that weight applied to said seat and pressure applied to said back will be held in equilibrium by said bowspring and toggle.

A particular advantage of the present structure and mode of operation, is the elimination of springs, levers, pivots and combinative assemblies interposed between the seat and back and the supporting base.

In the specification and the accompanying drawings the invention is disclosed in its preferred form. But it is to be understood that it is not limited to this form because it may be embodied in modifications within the spirit of the invention as defined in the claims following the description.

In the three sheets of drawings:

Fig. 1 is a side elevation of a reclining chair constructed in accordance with this invention, in the "sitting" position, partially broken away in vertical section on the line I—I, Fig. 3.

Fig. 2 is a similar view of the same with the seat and back portions in horizontal alinement, in the "reclining" position.

Fig. 3 is a rear elevation from beneath the chair.

Fig. 4 shows the invention applied to an upholstered type of chair base, with the near side arm structure omitted.

Fig. 5 is an enlarged detail in plan view from above of the plate hinge assembly as operating in Fig. 2.

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Fig. 6 is a modified application of the bowspring frame structure functioning in reverse position as the arms of the chair.

In detail, the structure shown in Fig. 1, comprises the seat A and the back B in the normal "sitting" position. The seat is a box-like structure having the sides 1, 2, joined to the front board 3, and having the transverse slats such as 4, 5, 6 forming the bottom of the seat. The sides 1, 2, extend upwardly and form the side arms 7, 8, extending laterally beyond the width of the seat.

The back structure B is similar, having the sides 9, 10 joined by the top board 11, and having transverse slats, such as 12, 13. The seat and back structure may be in any conventional form to meet special conditions, such as upholstered parlor chairs, or in metal fabrication for garden chairs. The seat A and back B are pivoted together at their lower ends by plate hinges. These hinges comprise plates such as 14, 15, pivoted together at 16, and attached to the slats 6 and 13 on the opposite sides of the seat and back, and to the sides 1, 2, of the seat and the sides 9, 10 of the back. The pivots such as 16, extend above the plane of the slats 6, 13, to substantially the height of these sides.

The box-like structure of the seat and back, A, B, are adapted to receive and hold the integral pad C extending across the depth of the seat and upwardly the height of the back B. This pad may be similar to an inner-spring mattress, foamite, or any of the available pad fillers, or the seat and back may be separately upholstered.

The resilient supporting frame is composed of seamless steel tubing, in the present instance, but it may be made of spring steel flats for garden furniture or laminated plywood strips, where the more modernistic chrome plated tubing is inconsistent with home furnishings.

The tubular frame is preferably one integral length as in Fig. 3, with the straight central portion 17 between the bends 18, 19, the rear bows 20, 21, the base lengths 22, 23, the upward front bows 24, 25, and the end extensions 26, 27, which are attached to the seat slats 4—6 by the bolts such as 28. The center portion acts as the fulcrum at 17, and is pivotally attached to the rear side of the back slat 13, by the straps 29, 30. The seat and back may be locked in the horizontal position shown in Fig. 2, by the friction disc 31, interposed between the opposed heads of the hinge plates surrounding the axis pivot 16. This disc is compressed by the handle 32 on the pivot 16, threaded into the nut 33, welded to the hinge plate

16. This forms in effect a friction clutch by means of which the relative angles of the seat and back may be maintained in any selected position.

The invention operates substantially as follows: When the occupant sits down on the seat A, his weight flexes the rear and front bows 21, 22, and 24, 25, as the end extensions 26, 27 descend under the weight. As the occupant leans backward against the back B, the back swings on the fulcrum 17, and lifts the hinge pivot 16 and the weight on the seat, so that the weight of the occupant is counterbalanced on the fulcrum 17 in any chosen posture. The fulcrum 17 being in substantial alinement with the center of gravity of the occupant, his weight is balanced in the chosen posture with no effort on his part, except in the act of changing posture by more or less muscular pressure against the back B. In the full horizontal position, as in Fig. 2, the abutment of the slats 6 and 13 blocks the hinges against further descent of the back B and rise of the seat A. In this position the end extensions 26, 27, have risen to the horizontal position by the leverage action of the back B on the fulcrum 17, which pushes this fulcrum downward into horizontal alinement with the lengths of the end extensions 26, 27. The stress thus generated in the rear and front bows 21, 22, and 24, 25, added to the muscular effort initiated by the occupant in overcoming his inertia, enables him to assume a sitting posture with any degree of angulation at his hip joint, with the minimum of effort. When the occupant rises to the sitting posture, Fig. 1, the stress in the supporting frame swings the back B upward, until the lug 34 on the plate 14 abuts the stop 35 on the plate 15.

This invention is especially adaptable to airplanes and other passenger vehicle seating equipment. In this instance the rear bows 20, 21 are preferably vertical, as indicated in dot-dash lines in Fig. 1. This prevents the downward flexing of these bows, and the lowering of the fulcrum 17, thus limiting the descending angle of the back B, so that it does not too far overhang the seat located behind it and inconvenience the passenger therein. This angle of inclination indicated by the line X, may be determined by the height of the fulcrum 17, relative to the floor level and the pivot 16, or by the modified hinge shown in Fig. 6. In such equipment the base lengths 22, 23, of the frame are bolted to the floor as at 36, 37, to prevent the chair from upsetting backward. The foot rest 38 extending between the rear bows is provided for the comfort of the passenger in the rear seat.

This resilient mounting of the chair adds to the comfort and safety of the occupant in airplane landings and take off, and on sea craft, because the flexing stress stored in the base mounting maintains a substantially uniform support of the occupant during variation of the floor level, he literally "floats" on the chair.

The structure is equally adaptable to davenports and auxiliary beds of sufficient length, so that the combined width of the seat and back, A, B, is sufficient. The seat and back may be locked in horizontal alinement by the friction clutch 31, 32, previously described.

With appropriate reduction in dimensions, the invention is equally adaptable to fully upholstered furniture, as in Fig. 4. Such chairs have box-like bases with interspaced sides such as D, extending from the floor and terminating in the upper arms, such as 7x, with cross braces, such as 39, 40, 41. In this instance the resilient support for the seat Ax and the back Bx, pivoted together at 16x, being concealed, need not be ornamental, as in Figs. 1, 2, 6. It comprises a length of spring steel rod bent back upon itself in the form of a bow with the fulcrum 17x pivoted to the back Bx, and continuing downward in the rear bows such as 21x, the base lengths 23x, the forward bows 25x, and the end extensions 26x, attached to the under slats of the seat as at 28x, 28x. The mode of operation and the functioning of the various parts is the same as previously described and shown in Figs. 1, 2. Because of the shortening of the rear bows such as 21x, they may be augmented in flexibility by spiral coils, such as 21'x.

In the modification shown in Fig. 6, the mode of operation is the same, except that the bowspring frame element is shown in reverse position relative to the seat where it functions as side arms for a swivel chair. The chair comprises a conventional swivel chair base 38', with the seat AXx mounted thereon. The back BXx is pivoted to the seat by hinges such as 16Xx, interposed between the ends of the seat and back as previously described.

The bowspring comprises the tube having the center fulcrum 17Xx, the rear bow 21Xx, the arm lengths, such as 22Xx, the front bows, such as 24Xx, and the end extensions, such as 27Xx, fixed to the underside of the seat AXx. When the occupant leans against the back B, the arm structure 21Xx—24Xx yields so that the back will assume the desired angle from vertical. In such a chair the horizontal position is not desirable and has been prevented by the proximity of the slats 6Xx, 13Xx. This same angular limitation of the back B, is also desirable in the vehicle seat above described, and may be also accomplished by the form of hinge shown in Fig. 6.

It is preferable to form the bowspring frame of an integral length of material for greater stability and ease of assembly. But obviously the length may be divided at the fulcrum 17 into separate side portions for reduced cost of fabrication, if desired.

Having thus described this invention and its mode of operation, what is claimed and desired to secure by Letters Patent is:

1. A reclining chair comprising a seat and back hinged together in the form of a toggle; a supporting base in the form of a bowspring having its forward end fixed to said seat and its rearward end pivoted to said back to form a fulcrum, so that weight supported by said seat and pressure applied to said back will be held in substantial equilibrium by said bowspring and toggle, and when the back is forced to its extreme position it will be in substantial alignment with the seat.

2. A reclining chair comprising a seat and a back hinged together at their meeting ends; a supporting frame formed of spring material having a base portion with its opposite ends fixed to said seat and pivoted to said back respectively, so that said frame is flexed under stress when said seat and back swing on said hinge relatively to each other, and when flexed to extreme position the opposite ends of the frame will be in substantial alignment.

3. A reclining chair comprising a seat and a back hinged together at their meeting ends; a resilient supporting frame having a base portion; a forward bow extending upward from said base portion and fixed to said seat; and a rear bow extending upward from said base portion and

pivoted to said back, so that said forward bow is flexed upwardly and said rearward bow is flexed downwardly when said back is swung backwardly on its said pivot.

4. A reclining chair comprising a seat and a back hinged together at their meeting ends; a supporting frame composed of one continuous length of spring material having a central fulcrum pivotally attached to said back and extending downwardly to base portions separated substantially the width of said seat and extending upwardly with their opposite ends attached to said seat, so that said supporting frame is flexed under stress when said back is swung backwardly on said fulcrum, and when flexed to extreme position the central fulcrum and the ends will be in substantial alignment.

5. A reclining chair comprising a seat and a back hinged together at their meeting ends; a supporting frame formed of spring material having a base portion with a forward bow extending upwardly with its ends fixed to said seat and a rear bow extending upwardly and pivoted to said back above the axis of said hinge and forming a fulcrum for said back, so arranged that said forward bow will yield forwardly under stress and said rearward bow will yield downwardly under stress when said back is swung on said fulcrum pivot to lower said back and lift said seat.

6. A reclining chair comprising a seat and a back hinged together at their meeting ends, the axis of said hinge being located above the bottom plane of said seat and forward of the rear plane of said back when the seat and back are in the "sitting" position; a supporting frame formed of spring material having a base portion with its opposite ends fixed to said seat and pivoted to and forming a fulcrum for said back normally above the level of said hinge axis respectively, said frame being adapted to yield under stress when said back is swung on said fulcrum and swing said fulcrum beneath the level of said hinge axis when said seat and back are forced into the "reclining" position relatively to each other.

7. A reclining chair comprising a seat and a back; a hinge interposed between the meeting ends of said seat and back and having manually controlled means incorporated in said hinge for holding said seat and back in adjusted relative

positions; and a supporting frame comprising a length of spring material having a base portion with its opposite ends fixed to said seat and pivoted to said back respectively, so that movement of said seat and back on said hinge flexes and stresses said supporting frame.

8. A reclining chair comprising a seat and a back hinged together at their meeting ends; a supporting frame composed of a continuous length of spring material having a return bend in its central portion pivoted to said back and forming a fulcrum relative to said hinge and with downward rear bows and horizontal interspaced base portions with their ends forming front bows extending upward and terminating in end extensions fixed to said seat; whereby said supporting frame is flexed and stressed by the movement of said seat and back on said hinge and fulcrum.

9. A reclining chair comprising a seat and a back; a hinge interposed between the meeting ends of said seat and back with manually controlled elements in said hinge for holding said seat and back in adjusted positions; a supporting frame comprising an integral length of spring material having a return bend in its central portion forming a fulcrum pivoted to said back relative to said hinge and with downward rear bows and interspaced base portions with their ends forming front bows extending upward and terminating in end extensions fixed to said seat; whereby weight applied to said seat and fulcrum will flex and stress said frame when said back is swung backward on said fulcrum and lifts said seat.

BALDWIN VALE.

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