United States Patent

[11] 3,603,641

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[73] Assignee **La-Z-Boy Chair Company**

[54] **OFFICE-TYPE CHAIR**
9 Claims, 6 Drawing Figs.

[52] U.S. Cl. 297/300, 297/DIG. 7, 297/85
[51] Int. Cl. A47c 3/00
[50] Field of Search ..... 297/301, 300, 303, 326, 264, 85, 89, DIG. 7; 248/188.7

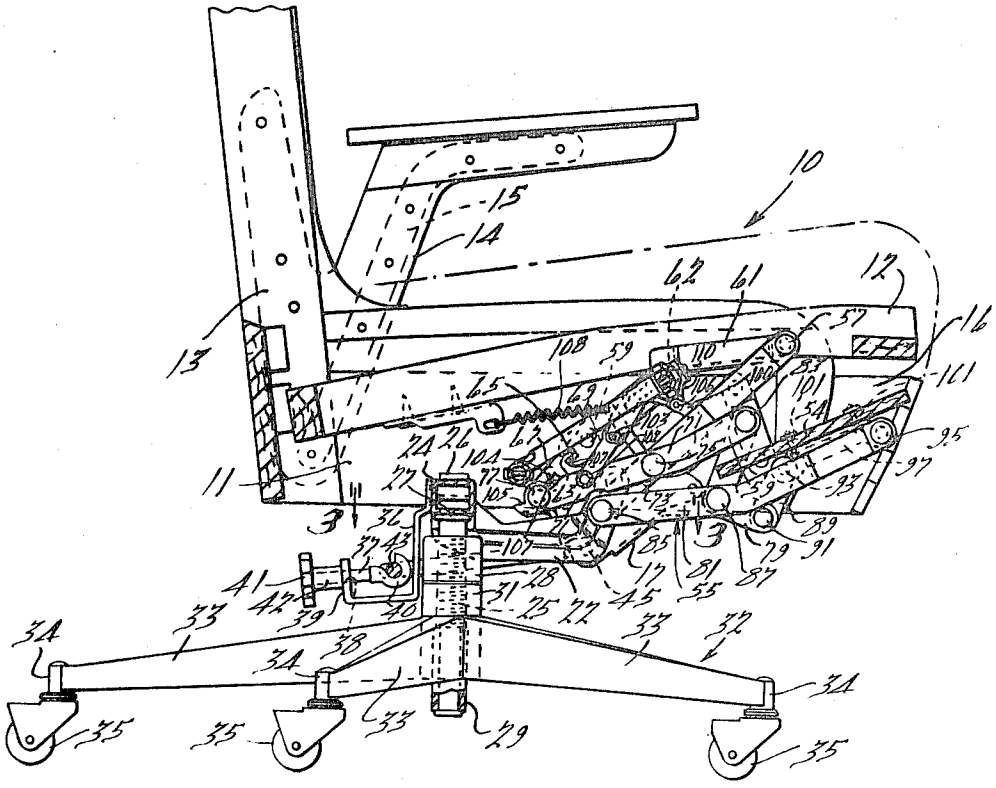
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ABSTRACT: The base frame of the chair is pivoted to arms on a crossmember having a central downwardly extending stud with a nut thereon. The lower end of the stud has a sleeve of nylon which forms a bearing with a hub of the base which has supporting feet extending therefrom on the ends of which casters are provided. The base frame has a bracket on each side to which the ends of a U-shaped bar is pivotally secured for forward movement when the base frame is tilted with the seat and back frames fixed or movable relative thereto. The central part of the bar is secured in a hook having a hand nut thereon by which tension is provided to the bar to have it preloaded to conform to the weight of the person occupying the chair. Upon the backward tilting of the base frame the bar will bend from the center to thereby resist the tilting movement. A leg rest and mechanism therefor is secured to the fixed or movable seat frame in position to have the leg rest extend forwardly thereof when in use.



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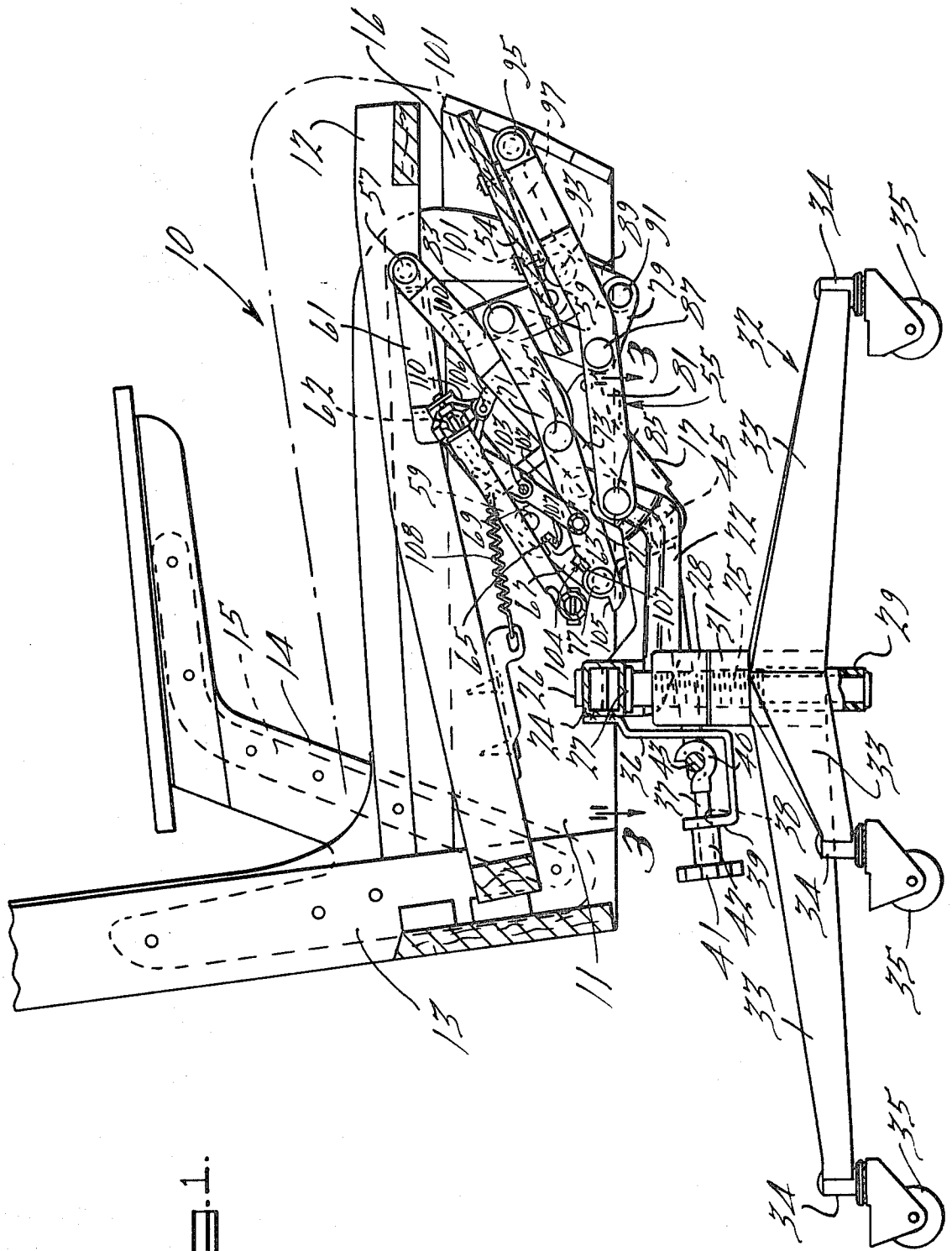


Fig. 1.

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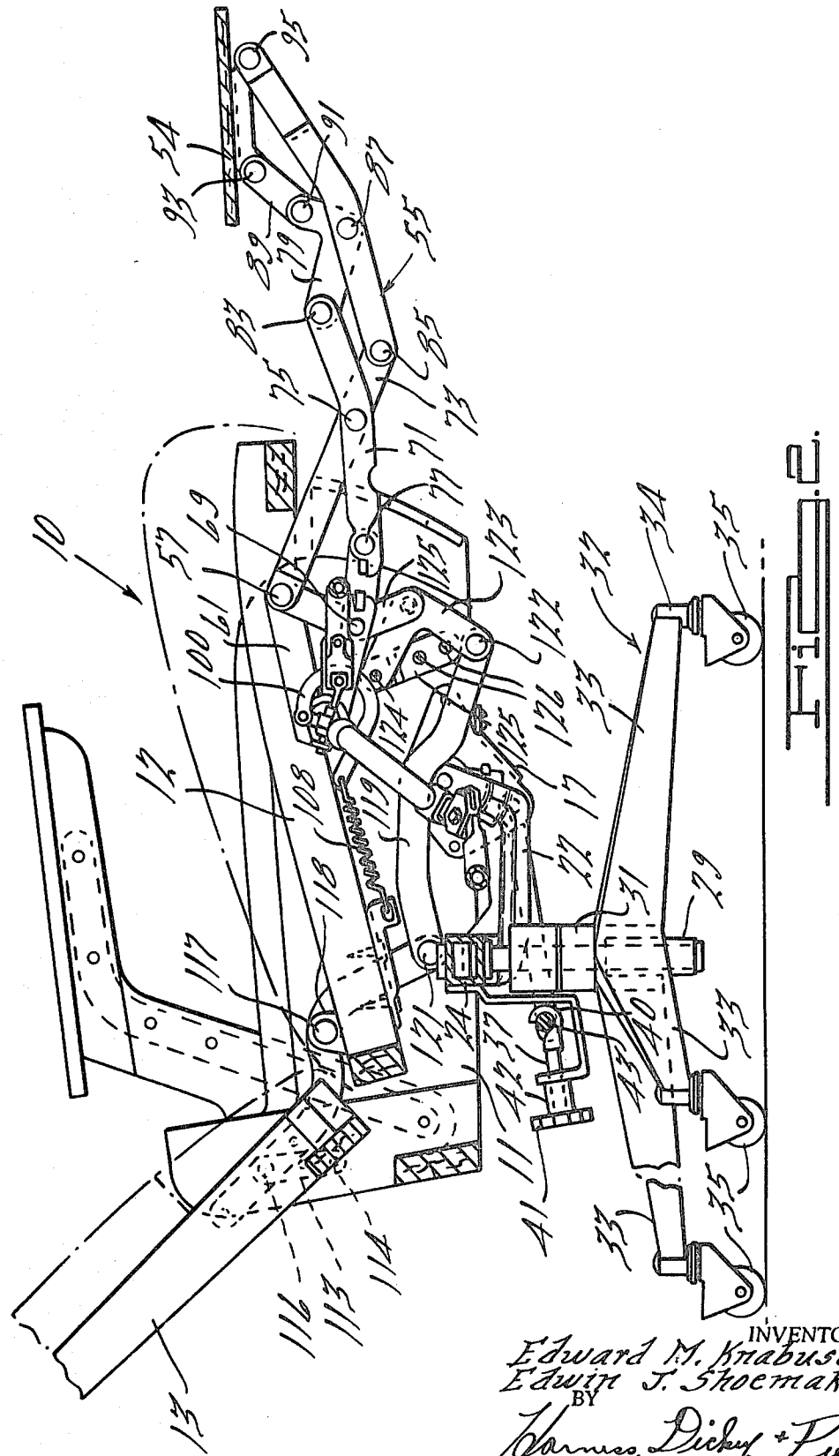


Fig. 2

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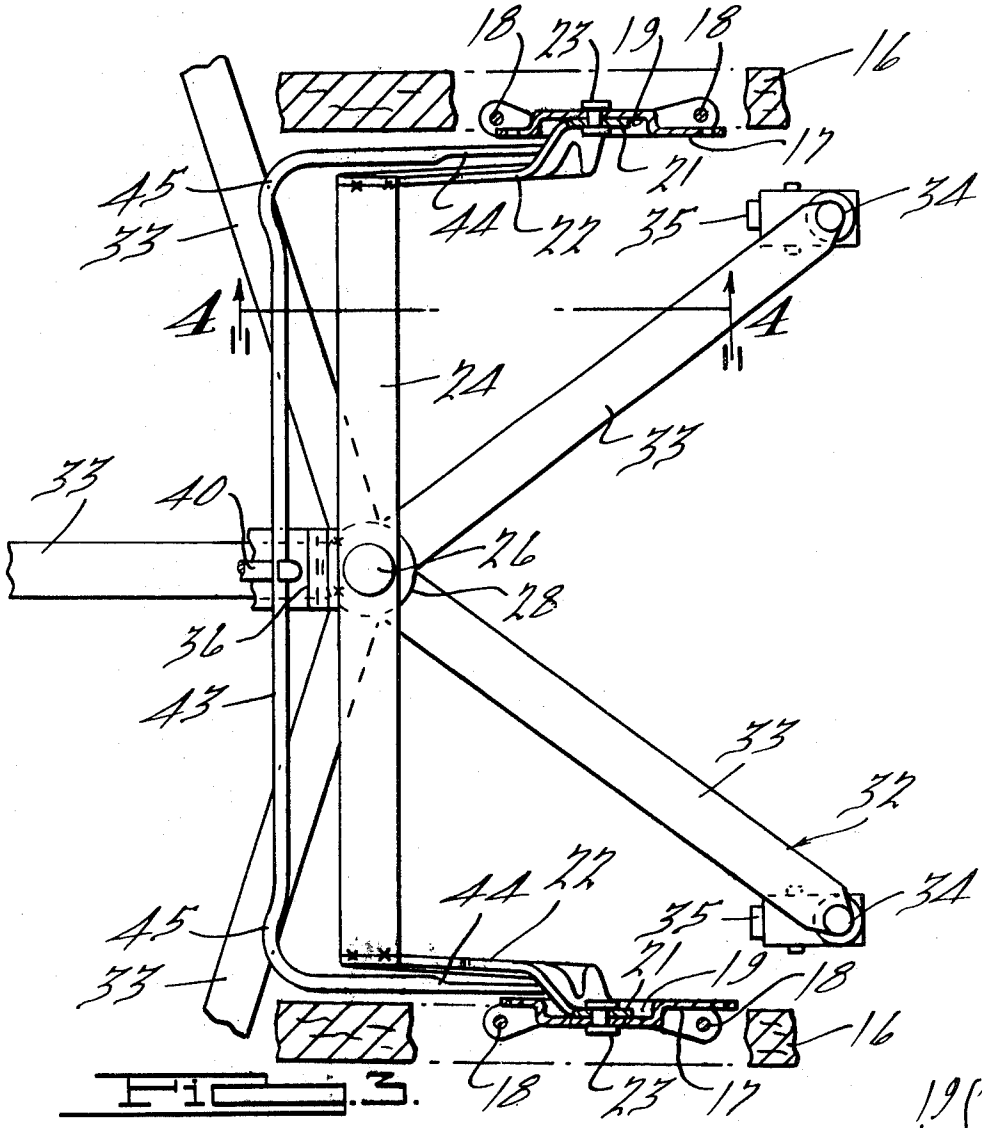


Fig. 3.



Fig. 4.

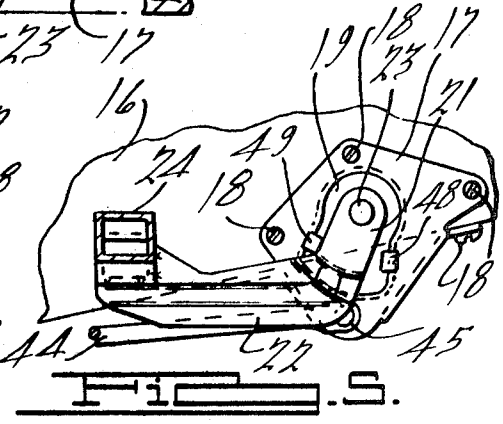


Fig. 5.

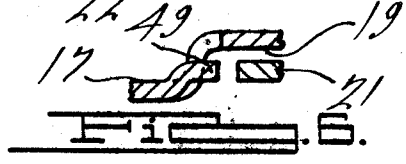


Fig. 6.

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OFFICE-TYPE CHAIR

BACKGROUND OF THE INVENTION

There is no known art which employs a bar crosswise of the seat which is connected thereto in such a manner as to resist the rearward tilting of the base frame of a chair.

SUMMARY OF THE INVENTION

The invention pertains to a base having a central hub and a plurality of equally spaced outwardly extending arms on the ends of which casters are mounted. The central aperture of the hub receives a stud having a nut thereon by which the height of the chair may be adjusted. The lower end of the stud has a nylon sleeve thereon which forms a bearing with the inner surface of the hub permitting the stud to rotate therein when the seat is pivoted sidewardly. The stud supports a transverse bar in the nature of a rectangular sleeve which has its center rigidly secured to the top end of the stud and which slopes slightly downwardly therefrom. Arms are welded or otherwise secured to the ends of the bar, the forwardly upwardly extending ends being pivoted to brackets secured at each side of the base frame. The lower end of the brackets is pivoted to the forwardly extending ends of a U-shaped bendable bar which moves forward when the base frame is tilted backwardly. The transverse section of the U-shaped bendable bar has its center engaged by a hook bolt, the stud end of which passes through an aperture in a U-shaped bracket and is engaged by a nut having a handle by which the nut is turned to move the hook inwardly and outwardly to change the tension on the bar for presetting the load thereon which conforms to the weight of the person occupying the chair. When the base frame is tilted backwardly, the ends of the bar are pulled forwardly to tension the transverse portion thereof and balance the weight of the occupant so that the base frame can be tilted a desired amount between a pair of stop elements. Linkage is provided at each side of the seat frame for supporting a leg rest which is actuated by a handle on the outside of the base frame for extending the leg rest forwardly of a chair having fixed seat and back frames or seat and back frames which are movable to a reclining position relative to the tiltable base frame.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a chair of the office type embodying features of the present invention;

FIG. 2 is a broken view of a chair having back and seat frames which are movable relative to a tiltable base frame;

FIG. 3 is a sectional view of the structure illustrated in FIG. 1, taken on the line 3—3 thereof;

FIG. 4 is a broken sectional view of the structure illustrated in FIG. 3, taken on the line 4—4 thereof, with the base frame in normal position;

FIG. 5 is a view of the structure illustrated in FIG. 4, with the base frame in rearward tilted position, and

FIG. 6 is an enlarged broken sectional view of the structure illustrated in FIG. 4, taken on the line 6—6 thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The chair 10 is made from a base frame 11, a seat frame 12 and a back frame 13. In the embodiment illustrated in FIG. 1, the three frames are secured in fixed relation to each other. In the embodiment illustrated in FIG. 2, the seat frame 12 and the back frame 13 are pivoted relative to each other and to the base frame 11. In either of the arrangements, a pair of armrests 14 are secured to the sides of the base frame 11 reinforced by L-shaped metal straps 15. The frames are upholstered in the conventional manner.

Each side rail 16 of the base frame 11 has a bracket 17 secured thereto by a plurality of screws 18. The central part of the bracket 17 has a recessed area 19 for receiving an end 21 of an arm 22 to which it is secured by a pivot 23. Stop elements 48 and 49 are lanced out of the bracket 17 aligned with the end 21 of the arm 22 for limiting the forward and rearward tilt of the base frame 11. The arms 22 are welded to the ends of a crossmember 24 which is a tubular element of rectangular cross section sloping downwardly from the central portion which is secured to the top end of a stud 25 between a head 26 and a collar 27. A nut 28 is adjustably threaded on the stud 25 for raising the cross member 24, and the base frame 11 to a desired elevation. The lower end of the stud has a sleeve 29 of low-friction material such as nylon thereon which engages the inner surface of a hub 31 of a base 32 from which a plurality of arms 33 extend. The arms and the hub are a unit casting, the one herein illustrated being cast from a white metal which is polished. The outer ends of the arms are provided with bosses 34 for supporting casters 35 on which the chair is rollable.

A U-shaped bracket 36 is secured to the center of the crossmember 24 having an aperture 38 in the free arm 39 through which a bolt 37 having a hook 40 on one end extends. A knob 41 on a threaded nut 42 is screwed upon the threaded end of the bolt 37 for adjusting the position of the hook 40 within the bracket 36. A U-shaped bendable bar 43 has the forwardly extending arms 44 secured by a pivot 45 to the bracket 17. The center of the bar 43 is secured within the hook 40 of the bolt 37 for adjusting the pressure exerted by the bar upon the turning of the knob 41. The forwardly extending arms 44 are joined to the straight central portion by arcuate corner sections 45 to provide more flexibility thereat. It is to be understood that a straight bar could be employed with the forward extending portions being separate links which pivot on the end of the bar and on the brackets 17. After a predetermined tension has been applied to the U-shaped bar 43, a person leaning backward in the chair 10 will cause the base frame 11 to tilt backwardly on the pivots 23 thereby moving the pivots 45 forwardly and stressing the transverse portion of the U-shaped bar 43. This will resist the backward tilting of the base frame 11 with a pressure which is regulated by he turning of the knob 41 to adjust the preset load on the U-shaped bar. The forward pull on the bar to tilt the base frame forwardly is limited by a stop element 48 on the bracket 17 while the backward movement of the base frame is limited by a stop element 49. The spacing between the stop elements 48 and 49 is selected to conform to the forward position of the base frame and to the degree of rearward tilt thereof which is limited thereby.

While the chair may be furnished with or without the leg rest, the leg rest structure is herein illustrated in retracted position in FIG. 1 from which it may be moved to an extended position, as illustrated in FIG. 2. For a more detailed understanding of the construction, reference may be had to the patent to E. M. Knabusch et al. U.S. Pat. No. 3,357,739 issued Dec. 12, 1967 for "Lounge Chair." A linkage system 55 is provided at each side of the chair of right and left-hand construction, otherwise the two linkage systems are in all respects identical. Each linkage system includes a primary lever 59 connected at one end by a pivot 62 to a bracket 61 secured at the sides of the seat frame 12. The other end of the primary lever 59 is provided with a slot 63, the lateral edges of which loosely receive a tab 65 punched out of a secondary lever 67 connected to the primary lever 59 behind the slot 63 by a pivot 69. A pair of scissors links 71 and 73 are connected by a pivot 75. The link 71 is connected at one end to the secondary lever 67 by a pivot 77 while the link 73 has one end pivotally carried by the pivot 57 on a bracket 61 on the seat frame 16. The other end of the scissors links 71, 73 are connected to one end of a bellcrank 79 and one end of a lever 81 by pivots 83 and 85, respectively. The bellcrank 79 has its vertex connected to the lever 81 by a pivot 87 and its other end connected to one end of a short line 89 by a pivot 91. The outer ends of the short link 89 and lever 81 are connected by pivots 93 and 95 respectively, to a bracket 97 fixed to the leg rest panel 54 by screws 101.

In use, when the primary lever 59 of linkage 55 is turned in a counterclockwise direction about the pivot 62, identical turn-

ing movement is imparted to primary lever **59** of the linkage **55** by a generally U-shaped bar **102** fixed to the primary levers **59** by screws **103**. Both linkages **55** operate identically, therefore a description of one of the linkage **55** will suffice. Thus, the primary lever **59** transmits a similar turning motion to the secondary lever **67** through the pivot **69** and the tab **65**. This, in turn, swings the scissors link **71** in a forward or right-hand direction and the scissors link **73** turns in a counterclockwise direction about the pivot **57** as seen in the figure. The scissors action of the links **71** and **73** is transmitted to the lever **81**, the bellcrank **79** and the short line **89** to translate the bracket **97** on the leg rest panel **54** from the position shown in FIG. **1** to a generally horizontally extended position, as illustrated in FIG. **2**, disposed outwardly and forwardly therefrom where another tab **104** punched out of the secondary lever **67** engages an edge **105** on the scissors link **71**. During this action, the leg rest panel **54** does not turn to any great extent but remains nearly parallel to itself and a significantly small motivating force is needed to effect leg rest manipulation.

The edge of slot **63** is engaged with the tab **65** and the arrangement of the pivot **62** for the primary lever **59** and the pivot **75** is in an overtoggle relationship to the pivots **69** and **85** so as to lock the leg rest in this position. When the primary lever **59** is turned in a clockwise direction from the extended position, it pivots slightly with respect to the secondary lever **67** about the pivot **69** until the edge of the slot **63** engages the tab **65**. Continued turning movement of the primary lever **59** in this direction moves the secondary lever **67** and pivot **75** downwardly therewith and breaks the toggle relationship between the pivots **69** and **85** and thereafter the leg rest panel **54** is easily returned to the retracted position shown in the figure where the tab **104** on the secondary lever **67** engages another edge **107** on the scissors link **71**. Each of a pair of C-shaped links **100** has one end attached to a depending ear **110** on respective ones of the primary levers **59** by pivots **106**, the other end of each link **100** has one end of a tension spring **108** hooked thereto, the other end of which is anchored to a bracket on the chair. The tension in the spring **108** takes up any slack in the leg rest structure when in extended or retracted position. A handle **111** is connected to a drive shaft system **112** having three universal joints therein for simultaneously operating both of the link systems, that is to say, the one on the right and the one on the left-hand side of the chair simultaneously for moving the leg rest panel **54** between extended and retracted positions. The leg rest panel is substantially parallel in all of its positions so that it can be retracted inwardly between the side rails **16** of the chair completely out of sight.

The seat frame may be fixed to the base frame **11**, as illustrated in FIG. **1**, or may be movable relative thereto when pivoted to the back frame which is pivoted to the base frame in the embodiment illustrated in FIG. **2**. In both embodiments the base frame **11** tilts on the base **32** while the back and seat frames are movable to a reclined position relative to the tiltable base frame. The inner face of each side of the base frame **11** has a bracket **113** secured thereto by screws **114**. An S-shaped lever **115** is secured to the brackets **113** by a pivot **116**. The upper end of the lever **115** is secured to the sides of the back frame **13** directly or by clips on the back frame which slide over and lock to the ends of the lever to permit the back to be removed from the base frame as illustrated and described in the copending application, Ser. No. 746,058, **filed July** 19, 1968, for "Detachable Chair Back" and assigned to the assignee of the present invention.

The center of the lever **115** is secured by a pivot **117** to a bracket **118** at the rear side edges of the seat frame **12**. The lower end of the lever **115** is secured to a link **119** by a pivot **121**. The forward end of the link **119** is secured by a pivot **122** to the end of one arm of bellcrank **123**. The end of the other arm of the bellcrank is secured by a pivot **124** to the end of a bracket **125** which is secured to the sides of the base frame by screws **126**. A pivot **127** at the apex of the bellcrank **123** is secured to one end of a link **128**, the upper end being secured to the pivot **57** on brackets **61** attached to the sides of the seat frame **12**. The pivots **117** move the rear end of the seat frame forwardly and upwardly while the links **128** move the front end of the seat frame upwardly as it is moved forwardly to a degree depending upon the amount the back frame is tilted backwardly. With this arrangement, not only can the base frame **11** tilt relative to the base **32** but the seat and back frames can be moved to a reclining position relative thereto. The leg rest operates independently of the tiltable base, back and seat frames and is carried by the latter to move forwardly therewith when the back frame **13** is reclined relative to the tiltable base frame **11**.

We claim:

1. In a chair, a unit embodying a back frame, a seat frame and a base frame, a supporting base having a central hub for receiving a threaded stud, a crossmember supported by said stud having arms at the ends extending forwardly thereof adjacent to the sides of the base frame, brackets supported by the sides of the base frame, pivot means connecting the extending ends of the arms and the brackets, and resilient means connected to said brackets and to said crossmember for resisting the rearward tilting movement of the base frame.

2. In a chair as recited in claim **1**, wherein said back frame is pivoted to the base frame and wherein said seat frame is pivoted to said back frame, said frames being movable to a reclining position on said tiltable base frame.

3. In a chair as recited in claim **1**, wherein the resilient means is a U-shape spring element having a transverse portion and forwardly extending portions which are pivoted to said brackets, and means on said crossmember engaging the transverse portion of the spring element for providing a preload thereto.

4. In a chair as recited in claim **3**, wherein the means for preloading the spring element is a bracket secured to the central portion of said crossmember, a bolt having a hook on the end extending through said bracket with the hook engaging the center of the transverse portion of the spring element, and a nut on the bolt for preloading said element.

5. In a chair as recited in claim **4**, wherein a leg rest is supported on the seat frame, and means for actuating said linkage for extending said leg rest forwardly of the seat frame in any of its positions.

6. In a chair as recited in claim **4**, wherein said brackets on the base frame have stops extending outwardly thereof in the path of movement of said arms for limiting the forward and rearward tilting movement of the base frame.

7. In a chair as recited in claim **4**, wherein the upper portion of the stud is threaded and wherein a nut is provided on the threads which rests upon the top of the hub and permits adjustment of the height of the chair.

8. In a chair as recited in claim **7**, wherein the lower portion of the stud has a sleeve of low-friction material thereon for engaging the inner wall of the hub to eliminate wear and provide stability to the chair when rotated sidewardly on the hub.

9. In a chair as recited in claim **8**, wherein said base is a casting having a plurality of arms extending from the hub, and casters mounted on the ends of said arms.