July 15, 1969 F. LIE 3,455,601

SUPPORT UNIT FOR CHAIR

Filed Nov. 2, 1966

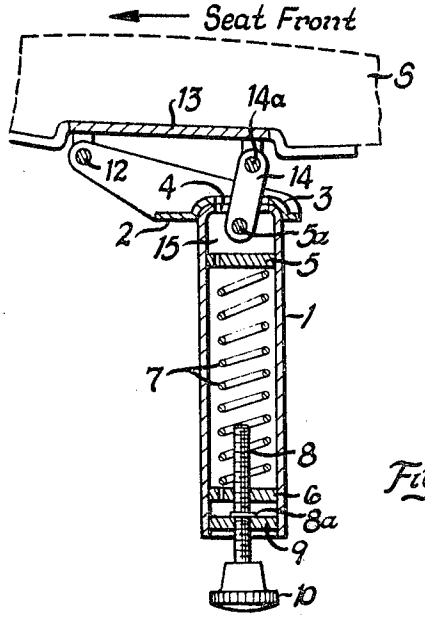


Fig. 1

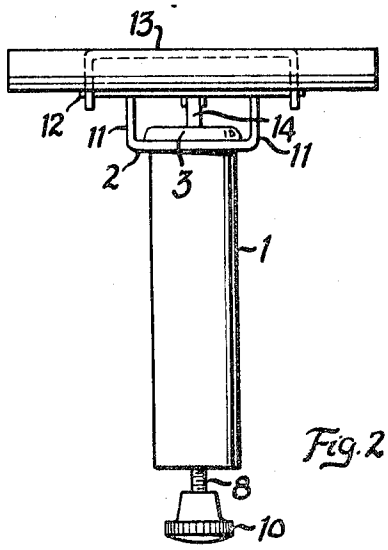


Fig. 2

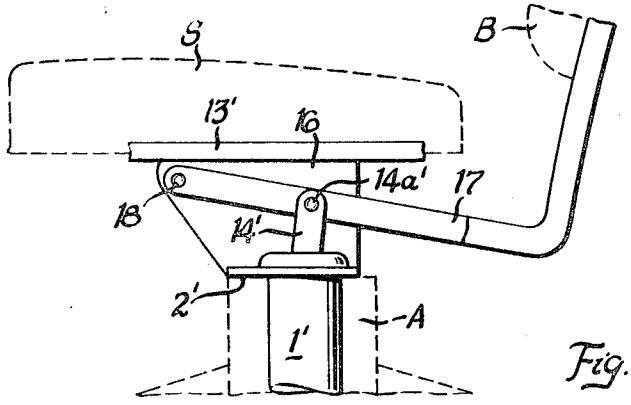


Fig. 3

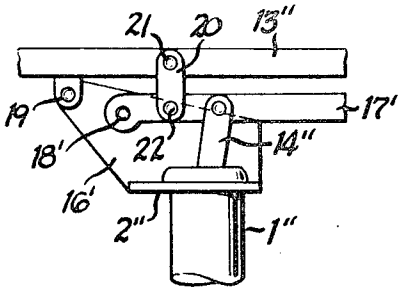


Fig. 4

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United States Patent Office 3,455,601 Patented July 15, 1969

3,455,601

SUPPORT UNIT FOR CHAIR

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Filed Nov. 2, 1966, Ser. No. 591,566
Int. Cl. B60n 1/02; A47c 3/00
U.S. Cl. 297—301 3 Claims

ABSTRACT OF THE DISCLOSURE

A tilting chair seat and/or back support unit. A vertically disposed hollow tubular spring-containing sleeve is adapted for mounting upon a chair base and carries forwardly projecting arms at its upper end. The seat and/or back are mounted upon the forward end of the arms for tilting movement about a horizontal axis and a link pivotally connects the supported element to a plunger supported upon the sleeve contained spring, which acts in compression to resist rearward tilting of the supported element.

It is an object of the present invention to provide a support frame assembly of compact construction which is readily adaptable for use in a wide variety of tilting chair constructions.

It is another object of the invention to provide a support frame unit in accordance with the foregoing object wherein a relatively small spring element may be employed to resiliently resist tilting movement over a wide range of adjustments.

The foregoing, and other objects, are achieved in a support unit in which a support frame of relatively small size is provided with a horizontal pivot adjacent its forward end and a vertically extending hollow tubular sleeve adjacent its rearward end. A compression spring is enclosed in the sleeve and resiliently biases a plunger upwardly within the sleeve. The compression of the spring is readily adjusted by an adjustment screw bearing against the lower end of the spring. A support link is pivotally mounted upon the plunger and projects upwardly from the upper end of the sleeve. The upper end of the support link is pivotally connected to the tilting member of the chair which is also connected to the pivot at the forward end of the frame element. The biasing action of the spring is thus applied to the tilting member of the chair at a point on the tilting member rearwardly of the axis about which the member tilts. By this arrangement, elevation of the front of the seat during tilting is minimized, the tilting motion is transmitted to the resisting spring by an extremely simple mechanism, and several variations or combinations of tilting seat-tilting back permutations can be accomplished with substantially the same support frame unit construction. The tubular sleeve may be employed as the supporting shaft in swivel chair arrangements, if desired.

Other objects and features will become apparent by reference to the following specification and to the drawings.

In the drawings:

FIGURE 1 is a detailed cross sectional view, taken on a central vertical plane, of one embodiment of the invention;

FIGURE 2 is a front elevational view of the structure of FIGURE 1;

FIGURE 3 is a partial side elevational view, with certain parts broken away or shown in broken line of a second embodiment of the invention; and

FIGURE 4 is a partial side elevational view similar to FIGURE 3, of still another form of the invention.

The basic support unit is shown in detail in FIGURES 1 and 2 as including a vertically extending hollow tubular

sleeve **1** having a frame element **2** fixedly secured, as by welding, at its upper end. Frame element **2** is recessed as at **3** to fit over the top end of sleeve **1** and is formed with a slot-like aperture **4** which provides clearance for a support link **14**. Link **14** is pivotally coupled at its lower end to a plunger **5** which is slidably mounted within the interior of sleeve **1**, plunger **5** being slotted as at **15** to receive the lower end of link **14**, the lower pivot pin **5***a* being mounted in the plunger and passing laterally across the slot **15** through the lower end of link **14**. A coil spring **7** is mounted within the interior of sleeve **1** and engaged in compression between the underside of plunger **5** and a sliding nut **6** within which is threadably received an adjustment screw **8**. Adjustment screw **8** is formed with a flange **8***a* which rests on the interior side of a plug member **9** fixedly mounted in the lower end of sleeve **1**. Screw **8** is freely rotatable within plug **1** and is provided with a knob **10** at its lower end for convenience in rotating the screw, to thereby run nut **6** axially up and down within sleeve **1** to vary the compressive force of spring **7**.

Because, in many installations, sleeve **1** is employed as the seat supporting post where a chair seat is mounted for swivel movement upon a base, sleeve **1** is cylindrical. To prevent rotation of nut **6** within the sleeve, the opposite ends of spring **7** are seated within bores in plunger **5** and nut **6** so that the torsional force of spring **7** resists rotation of the nut within the sleeve.

Frame element **2** is formed with a pair of forwardly projecting arms **11** which, at their forward ends cooperatively support a pivot pin **12**. A chair seat supporting frame **13** is pivotally supported upon pivot **12** and is also pivotally coupled, at a location rearwardly of pivot **12** to the upper end of support link **14** as by pivot pin **14***a*.

The basic unit of FIGURES 1 and 2 shows a structure which is adapted to support a chair seat indicated at S for pivotal movement about the horizontal axis established by pivot pin **12**. The support unit may, if desired, be supported upon a chair base A (FIGURE 3) so that sleeve **1** acts as a vertical shaft upon which the chair seat may be swiveled relative to the base A. Alternatively, the support unit may be fixedly mounted upon chair bases of various construction by suitable adaptor units whose structure will be adapted to the construction of the particular base employed.

A modified form of the invention is shown in FIGURE 3 in which the unit is employed to support a seat S in a stationary horizontal position while accommodating rearward tilting movement of the chair back B. Parts in FIGURE 3 which correspond to parts in FIGURE 1 have been identified by reference numerals which are primed. In the embodiment of FIGURE 3, the support frame element **2'** is constructed with a modified form of side portions **16** which are fixedly secured to the seat support link **13'** which acts as a platform upon which the chair seat S is fixedly mounted. The chair back, partially indicated at B is mounted upon a back link having a forwardly projecting link portion **17** which is pivotally mounted at its forward end upon frame **2'** by a pivot pin **18** which establishes the horizontal axis about which the chair back B can tilt relative to the stationary elements of the support unit. As in the previous case, a support link **14'** is pivotally connected at its upper end by a pin **14***a'* to back link **17** at a location spaced rearwardly from pivot **18**. A support sleeve **1'** is fixedly secured to frame element **2'** as in the previous embodiment and is provided with the same spring and adjusting mechanism as the embodiment of FIGURES 1 and 2 described above.

In FIGURE 4, there is disclosed another form of the invention in which both the chair seat and chair back are mounted for coordinated pivotal movement relative

to the fixed parts of the support unit. The frame **2''** of the FIGURE 4 embodiment is formed with a slightly modified version of side portion **16'**. A back link **17'** of the same form as that of FIGURE 3 is pivotally supported upon the frame **2''** by a pivot **18'** and is pivotally coupled to support link **14''** as in the previous case. A modified form of seat supporting link **13''** is pivotally supported upon a pivot **19** at the extreme forward end of frame element **2''** and a second support link **20** is pivotally coupled at one end to seat link **13''** and to back link **17'** by pivots **21** and **22** respectively.

The net result of the FIGURE 4 arrangement is a four-bar linkage whose four corners are defined by the pivots **18'**, **19**, **21** and **22** with the stationary link being located between pivots **18'** and **19**.

As in the previous cases a tubular sleeve **1''** is fixed upon frame element **2'** and provided with the adjustable spring mechanism described in detail in connection with FIGURE 1. In the FIGURE 4 embodiment, the same adjustable spring resiliently resists tilting movement of the seat and back of the chair, the tilting movement of the seat and back being coordinated and constrained by the four bar linkage mounted by pivots **18'**, **19**, **21** and **22**.

While various embodiments of the invention have been described, it will be apparent to those skilled in the art that the described embodiments may be modified. Therefore, the foregoing description is to be considered exemplary rather than limiting, and the true scope of the invention is that defined in the following claims.

I claim:

1. In a chair having a base, and seat and back members; a support unit for supporting at least one of said members upon said base for tilting movement about a horizontal axis comprising a support unit adapted to be mounted upon said base, a vertically disposed hollow tubular sleeve adapted to be mounted in said base, a frame element fixedly mounted upon the upper end of said sleeve and having elongate arm means projecting forwardly from said sleeve, pivot means mounted upon the forward end of said arm means for pivotally supporting said one of said members for tilting movement about a horizontal axis spaced forwardly of said chair from said tubular member, a plunger slidably mounted in the upper end of said tubular sleeve, spring means mounted in said sleeve resiliently biasing said plunger upwardly

within said sleeve, a spring adjustment screw rotatably mounted in the lower end of said tubular member and projecting axially downwardly therefrom, said screw having a knob on the lower end thereof, a nut threaded on said screw within said tubular member and engaged with the lower end of said spring, and a support link pivotally connected at its lower end to said plunger and pivotally connected at its upper end to said one of said members at a location spaced rearwardly from said pivot means, said one of said members being the back member of said chair, the back member including a back link projecting forwardly from said back member and pivotally supported at its forward end upon said pivot means, said support link being pivotally connected at its upper end to said back link at a location spaced rearwardly on said back link from said pivot means.

2. The invention as defined in claim **1** wherein said seat member is fixedly mounted upon said support unit in spaced overlying relationship to said back link.

3. The invention as defined in claim **1** further comprising a seat link adapted to support the seat member of said chair, second pivot means pivotally mounting said seat link upon said support unit adjacent the forward end of said support unit for pivotal movement about a second horizontal axis, and a second support link pivotally connected at one end to said seat link at a location spaced rearwardly from said second horizontal axis and pivotally connected at its opposite end to said back link at a location spaced rearwardly from said pivot means.

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U.S. Cl. X.R.

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