Feb. 16, 1960 J. I. WINICK 2,925,122

RECLINING CHAIRS

Filed Sept. 28, 1956 2 Sheets-Sheet 1

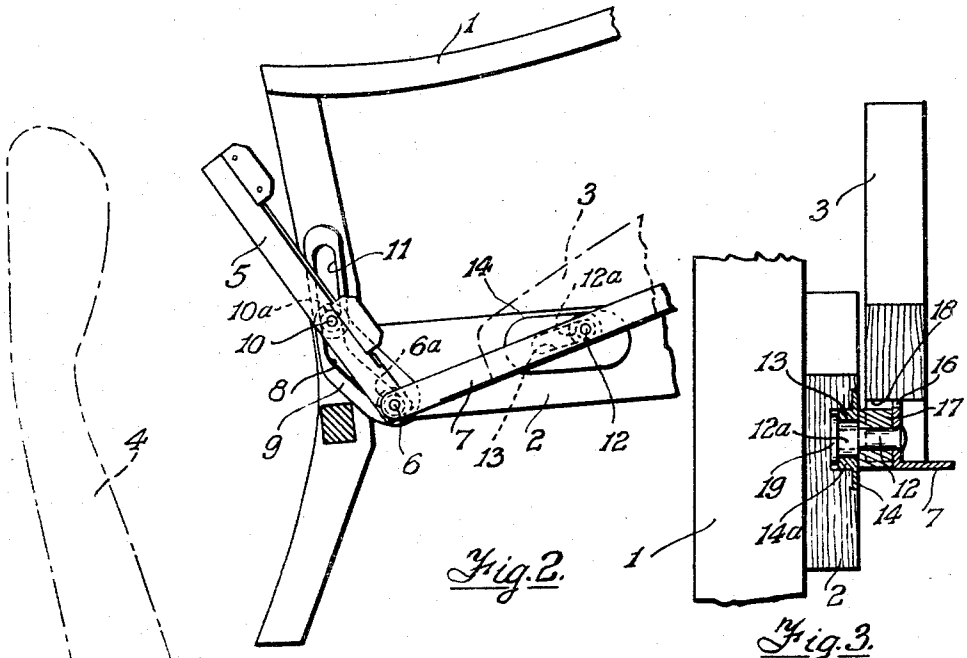


Fig. 2.

Fig. 3.

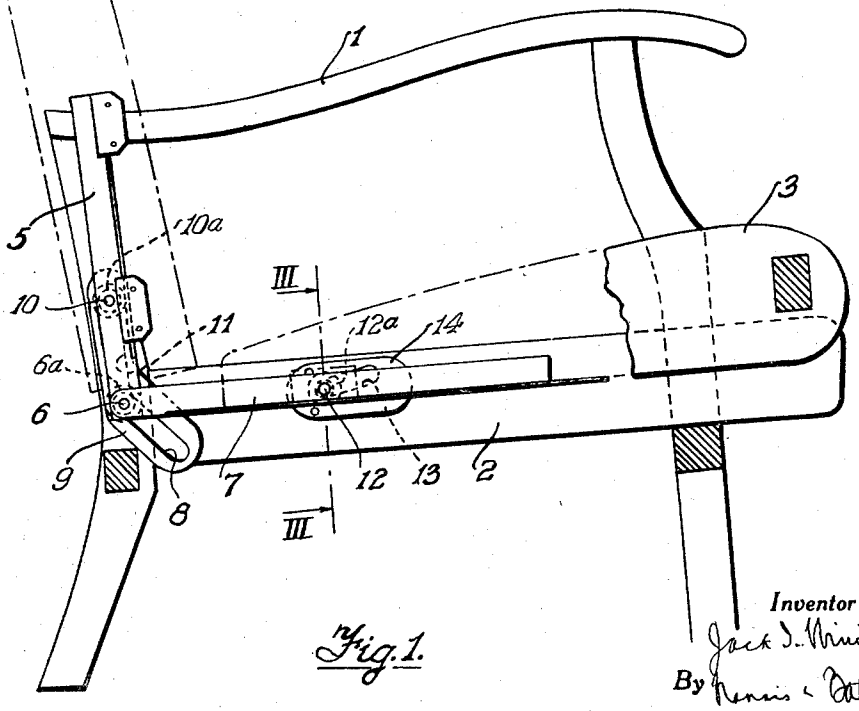


Fig. 1.

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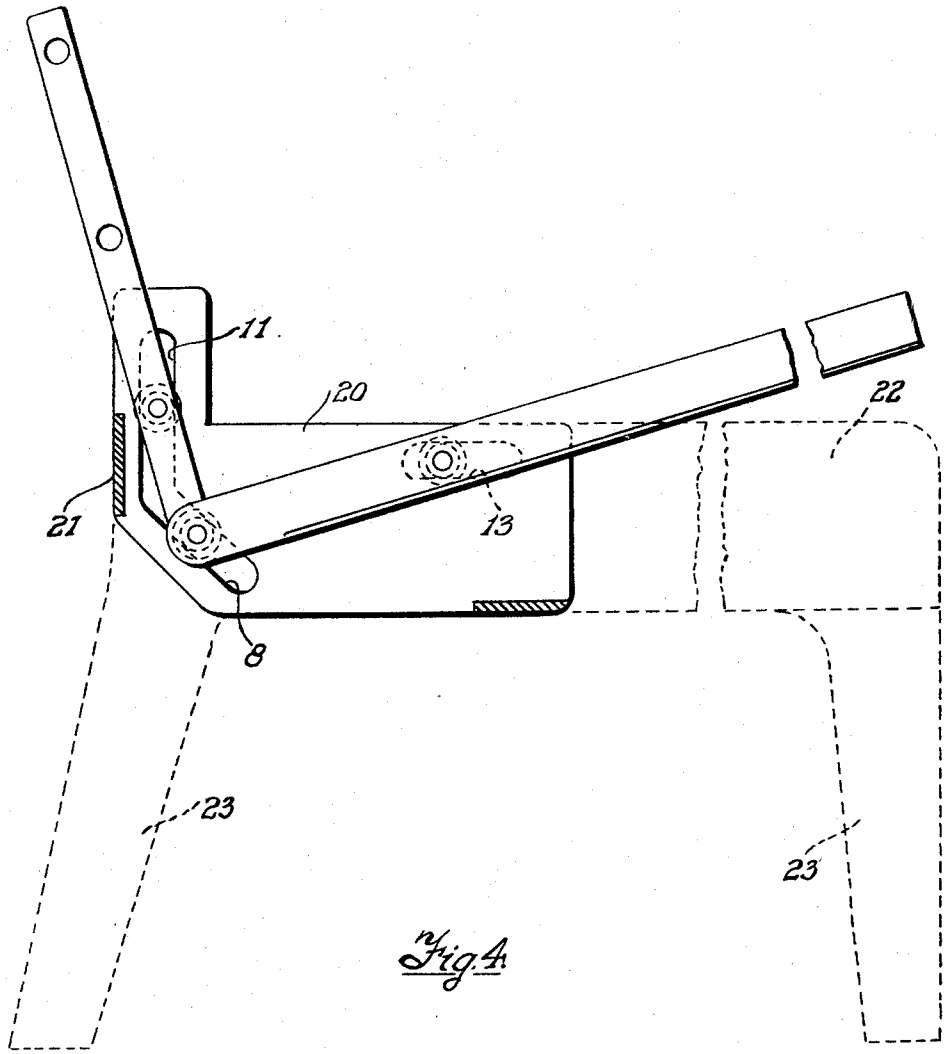


Fig. 4

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RECLINING CHAIRS

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2 Claims. (Cl. 155—116)

This invention relates to reclining chairs embodying a tilting back and a tilting seat interconnected in a manner such that the front end of the seat rises automatically as the back is tilted rearwardly, and in which the said seat and back can be caused to stay in any desired intermediate position of adjustment within the limits of the tilting mechanism.

Heretofore, in chairs of this kind, relatively complicated linkage has been used to secure the required relative movement of the seat and back, which linkage was not only relatively costly but when applied to fireside or like open chairs was usually visible beneath the seat and was thus detrimental to the appearance of the chair. The object of the present invention is to provide an improved and simplified action or mechanism which dispenses with the use of linkages and avoids the shortcomings above mentioned, and which can be construced to provide any desired relationship between the tilting movements of the seat and the back.

In accordance with an illustrative embodiment demonstrating features of the present invention a reclining chair is provided which comprises a frame, a back, and a seat pivotally mounted at its rear end on the back adjacent the lower end thereof. The back and seat are adapted to move from a sitting position to a reclining position and means are provided for mounting the back and seat on a frame for reclining and inclining movement respectively. The mounting means include upper and lower pins on the back, with the upper pin being spaced from the lower pin. Means provide a substantially vertical slot and a downwardly and forwardly extending inclined slot, with the pins being guidingly engaged in and movable along the slots. The length of the slots and the spacing of the pins are selected relative to each other such that the upper pin is at the upper end of the vertical slot and the lower pin is at the upper end of the inclined slot in the sitting position and such that the upper pin is at the lower end of the vertical slot and the lower pin is at the lower end of the inclined slot in the reclining position. The pins and slots cooperate to provide a forward and downward movement of both the back and the rear end of the seat in response to reclining movement of the back. Seat control means are provided between a portion of the seat spaced from the rear end and the frame for guiding the seat in response to the forward and downward movement of the back. The seat control means includes a seat guiding slot and a pin engaged therein, with the slot and pin providing a guiding interconnection between said portion of the seat and frame. The pin is disposed at the rearward end of the slot in the sitting position and moves toward the forward end thereof as the seat and back move into the reclining position, with the forward end of the slot being no lower than the rearward end thereof such that the conjoint effect of the forward and downward movement of the rear end of the seat and the guiding of said

portion of the seat is to impart a prescribed inclining movement to the seat.

Reference will now be made to the accompanying drawings which illustrate several embodiments of the invention and wherein:

Fig. 1 is a sectional view of one embodiment of the chair structure prior to upholstering and showing the seat in the fully lowered position,

Fig. 2 is a fragmentary view showing the roller and slot mechanism when the seat is in the raised position,

Fig. 3 is a cross section on the line III—III of Fig. 1, and

Fig. 4 is a sectional view showing various modifications which can be made to the structure shown in Figs. 1–3.

It is to be understood that the mechanism shown in the drawings is in practice duplicated, one set being provided at each side of the chair, but as the two mechanisms are similar only one set will need to be described and illustrated. Referring first to Figs. 1–3, the side frame structure of the chair is indicated generally at **1** and includes a fixed side rail **2**, the side rail of the seat structure being indicated at **3** and the side frame member of the movable chair back at **4**. As shown, attached to the back frame member **4** adjacent its lower end is a metal strip **5**, preferably of angle section, said strip being hingedly connected at its lower end by a pivot pin **6** to the rear end of a second metal strip **7** secured to the seat side rail **3**. The pivot pin **6** projects laterally and rides in an inclined slot **8** formed in a metal plate **9** secured to the fixed chair frame. At a point spaced from the pin **6**, the strip **5** carries a second pin **10** which rides in a vertical slot **11** also formed in the plate **9** and preferably continuous with the slot **8**. With the chair back in the erect position and the seat fully lowered, the pins are located at the upper ends of the respective slots as shown in Fig. 1 and thus, when the back is tilted rearwardly, it pivots around the pin **10** but, due to the inclination of the slot **8**, there is also produced a downward movement of the chair back, the pins riding down their slots towards the position shown in Fig. 2. By reason of the hinged connection, therefore, there is also produced a downward and forward movement of the rear end of the chair seat and, to secure the desired tilting movement of the seat, means are provided which utilise this forward movement to effect a raising of the front end of the seat. One such means consists of a further pin **12** carried by the metal strip **7** and riding in an inclined slot **13** formed in a plate **14** secured to the fixed side rail **2**.

It will be seen that with the arrangement described, the relative angular movements of the back and the seat are dependent upon the spacing of the pins **6** and **10** and of the pins **6** and **12** and also upon the angle of inclination of the slot **8**, and by appropriate selection of these factors it is possible to secure any desired relative movement of the seat and back. In practice, very satisfactory results have been obtained where the pins **6** and **10** are spaced approximately 3 inches apart, the pins **6** and **12** are spaced approximately 6½ inches apart and the slot **8** is inclined at about 45° to the horizontal. The degree of lift at the front end of the seat is also determined by the angle of the slot **13**.

It will be observed that when the chair is in a reclining position, the weight of an occupant causes the pins **6** and **10** to exert a thrust against the rear walls of their respective slots **8**, **11** and, where the pin and slot device **12**, **14** is used, the pin **12** exerts a similar thrust against the lower wall of the associated slot **14**. Thus

there is created by the weight of the occupant a considerable frictional resistance to movement of the seat and back and this frictional resistance is sufficient to retain the seat and back in any desired intermediate position of tilt thus obviating the need for special frictional or other locking devices. Where, however, the frictional resistance of the pin to movement is excessive such as to necessitate undue effort to adjust the seat and back, rollers may be fitted over the pins 6, 10 and 12 as indicated at 6*a*, 10*a* and 12*a* to reduce the friction.

It will be seen from the drawings that substantially the whole of the tilt control mechanism is contained within the depth of the seat member and the thickness of the back member thus leaving the space clear beneath the seat. As a further aid to hiding the mechanism, the chair seat is of such width as to have a relatively close fit between the fixed side rails and to permit this the following method of mounting the seat and the roller and slot mechanism 12, 13, 14 is employed. The strip 7 is of angle section and one web thereof is received and secured within a longitudinal groove 16 cut in the under edge of the seat rail 3 whilst the other web bears against said under edge. The plate 14 is relatively thin or it may be recessed into the fixed side rail 2 as shown and is formed with a flange or wall 14*a* defining the slot 13 and providing an enlarged bearing surface for the roller 12*a*. A spacer 17 is interposed between the roller and the strip 7, the rail 3 being cut away locally as indicated at 18 to clear the pin 12 and the spacer 17, whilst a head 19 on the free end of the pin retains the roller against displacement. Thus the roller and slot mechanism does not necessitate any additional clearance between the seat and the chair frame. The method of constructing and mounting the plate 9 may be similar to that of the plate 14 is desired.

With the construction as above described it is possible to co-relate the movements of the chair back and chair seat in such manner as to secure a balanced distribution of the weight thereon in all positions, the frictional loading of the pin, or roller, and slot devices being sufficient to hold the seat and back in any desired intermediate position. Movement of the seat and back is limited by abutment of one or more of the pins 6, 10, 12 with the ends of the respective slots 8, 11, 13 thus obviating the need for stops in the chair frame structure whereby the mechanism forms a complete entity which functions without the co-operation of any other chair components.

The basic structure as above described is capable of several modifications as will now be described with reference to Fig. 4. As shown, the slots 8, 11 and 13 may be formed in a common plate 20 and, if desired, the slotted plates at opposite sides of the chair may be rigidly interconnected, for example, by cross webs 21 secured to or formed integral with the plates, thereby forming a one-piece unit which facilitates installation in a chair frame.

The invention is also applicable to all-metal chairs or chairs having a metal frame. In these instances, the plate 20 may constitute part of the metal side frame indicated in broken lines at 22, that is, the slots 8, 11 and 13 are formed directly in the side frame member, which member embodies or is provided with legs 23 or equivalent supporting means.

A latitude of modification, substitution and change is intended in the foregoing disclosure, and in some instances, some features of the invention will be used without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the disclosure herein.

I claim:

1. A reclining chair comprising a frame, a back, a seat pivotally mounted at its rear end on said back adjacent the lower end thereof, said back and seat being adapted to move from a sitting position to a reclining position, and means for mounting said back and seat on said frame for reclining and inclining movement respectively, the mounting means including upper and lower pins on said back with said upper pin spaced from said lower pin, means providing a substantially vertical slot and a downwardly and forwardly extending inclined slot, said pins being guidingly engaged in said slots and being movable along said slots, the length of said slots and the spacing of said pins being selected relative to each other such that said upper pin is at the upper end of said vertical slot and said lower pin is at the upper end of said inclined slot in said sitting position and such that said upper pin is at the lower end of said vertical slot and said lower pin in at the lower end of said inclined slot in said reclining position, said pins and slots cooperating to provide a forward and downward movement of both said back and said rear end of said seat in response to reclining movement of said back, and seat control means between a front portion of said seat and said frame for guiding said seat in response to said forward and downward movement of said back, said seat control means including a seat guiding slot and a pin engaged therein with said seat guiding slot and said pin providing a guiding interconnection between said front portion of said seat and said frame, said pin being disposed at the rearward end of said seat guiding slot in said sitting position and moving toward the forward end thereof as said seat and back move into said reclining position, said forward end of said seat guiding slot being no lower than the rearward end thereof such that the conjoint effect of said forward and downward movement of said rear end of said seat and the guiding of said front portion of said seat is to impart a prescribed inclining movement to said seat.

2. A reclining chair comprising a frame, a back, a seat pivotally mounted at its rear end on said back adjacent the lower end thereof, said back and seat being adapted to move from a sitting position to a reclining position, and means for mounting said back and seat on said frame for reclining and inclining movement respectively, the mounting means including upper and lower pins on said back with said upper pin spaced from said lower pin, means providing a substantially vertical slot and a downwardly and forwardly extending inclined slot, said pins being guidingly engaged in said slots and being movable along said slots, the length of said slots and the spacing of said pins being selected relative to each other such that said upper pin is at the upper end of said vertical slot and said lower pin is at the upper end of said inclined slot in said sitting position and such that said upper pin is at the lower end of said vertical slot and said lower pin is at the lower end of said inclined slot in said reclining position, said pins and slots cooperating to provide a forward and downward movement of both said back and said rear end of said seat in response to reclining movement of said back, and seat control means between a front portion of said seat and said frame for guiding said seat in response to said forward and downward movement of said back, said seat control means including a seat guiding slot and a pin engaged therein with said seat guiding slot and pin providing a guiding interconnection between said front portion of said seat and said frame, said pin being disposed at the rearward end of said seat guiding slot in said sitting position and moving toward the forward end thereof as said seat and back move into said reclining position, said forward end of said seat guiding slot being no lower than the rearward end thereof such that the conjoint effect of said forward and downward movement of said rear end of said seat and the guiding of said front portion of said seat is to impart a prescribed inclining movement to said seat, said pins on said back normally bearing against the rear walls of the respective slots whereby, under the imposed weight of an occupant of the chair, a frictional resistance is created between said pins and said rear walls tending to hold said seat and back in any position of adjustment established by the occupant of the chair.

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