Aug. 31, 1954 J. K. PRASSAS 2,687,766

CONVERTIBLE CHAIR

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Fig. 1

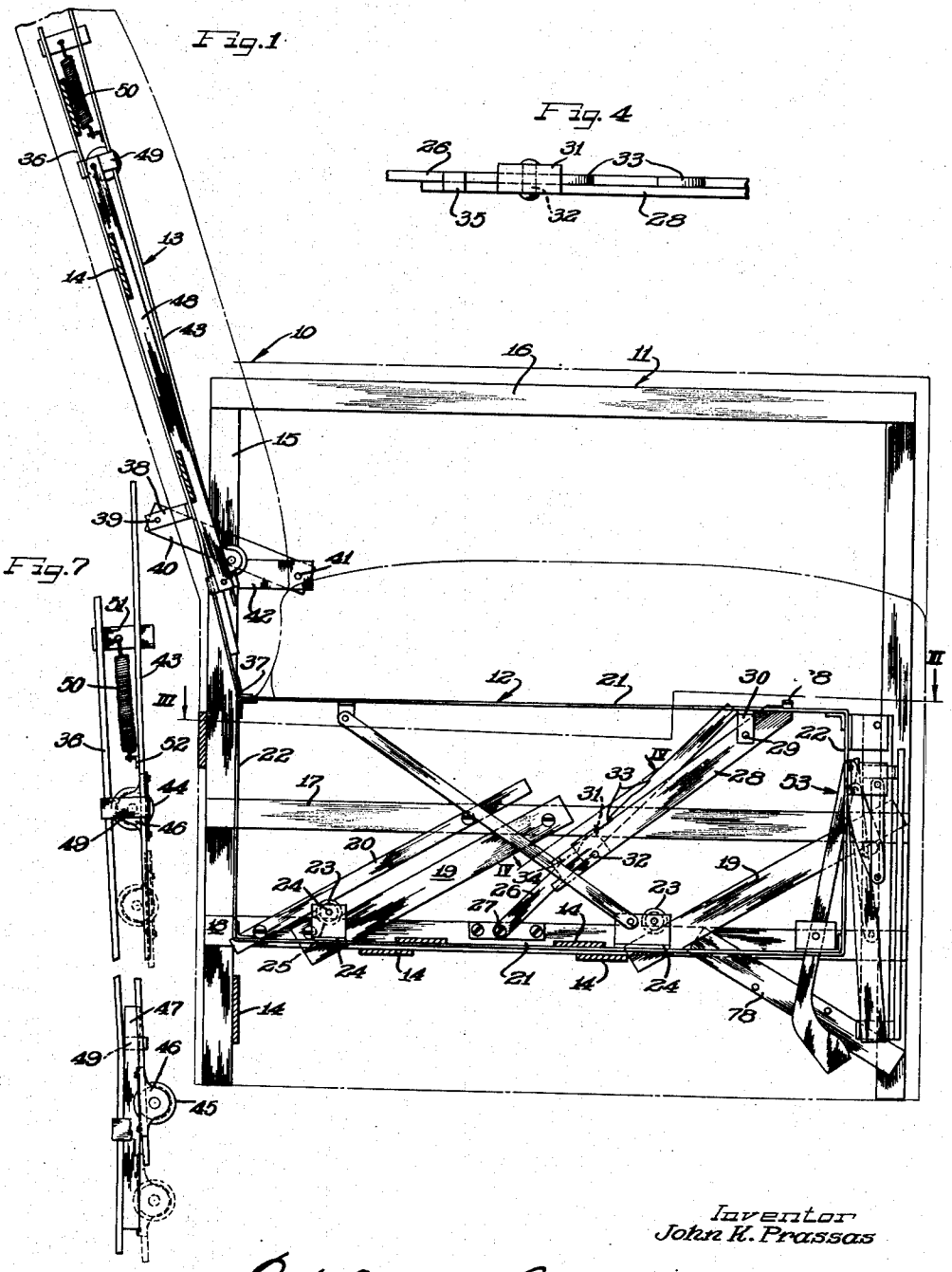


Fig. 4

Fig. 7

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CONVERTIBLE CHAIR

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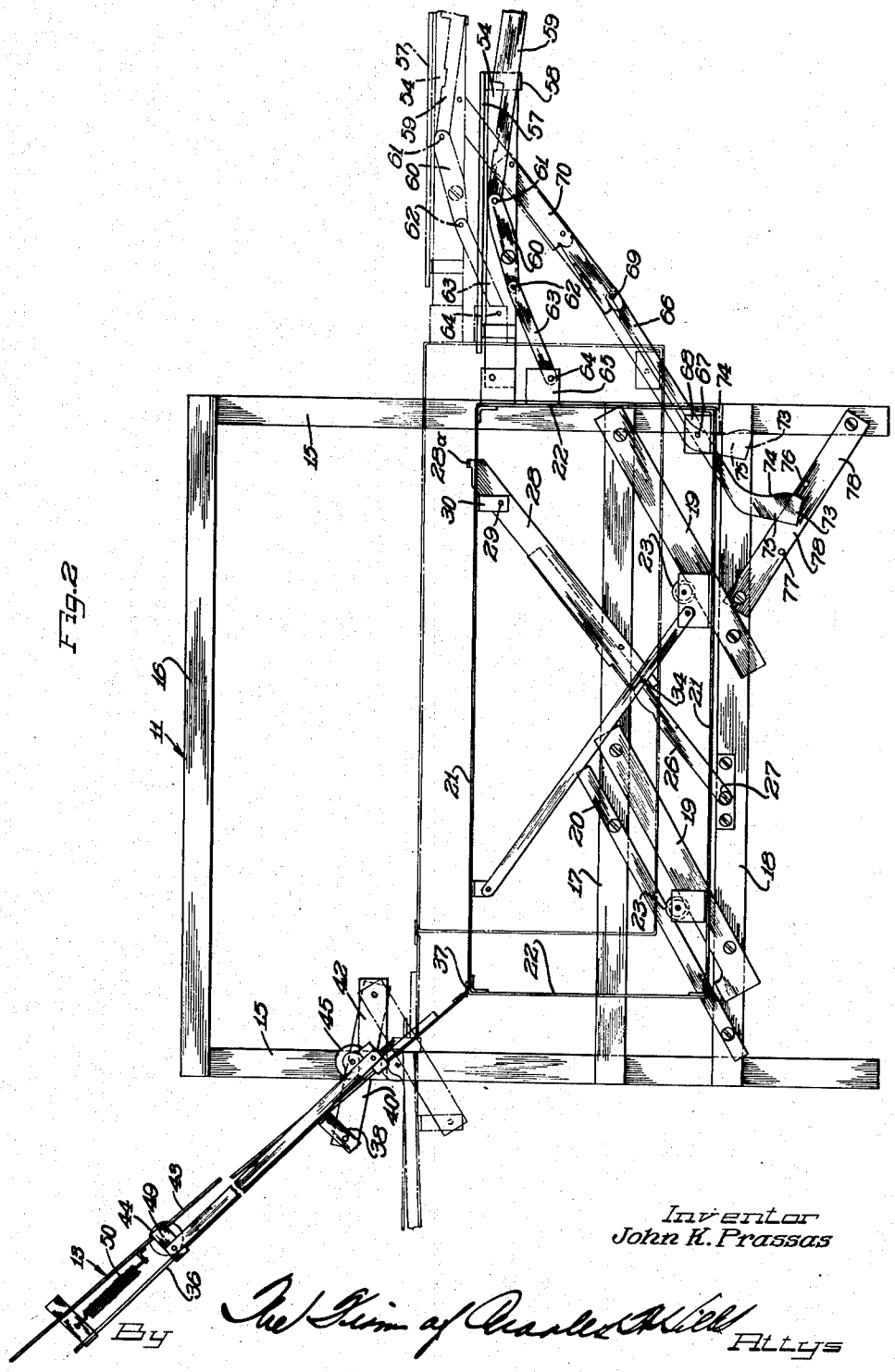


Fig. 2

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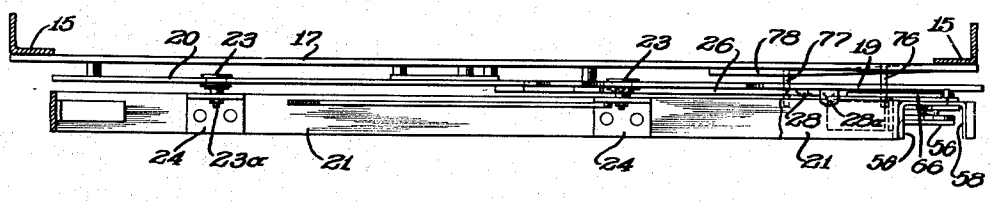
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CONVERTIBLE CHAIR

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Fig. 3



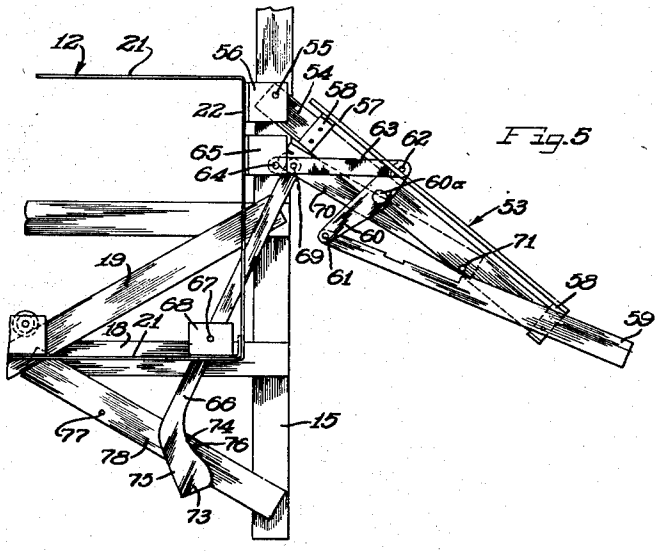


Fig. 5

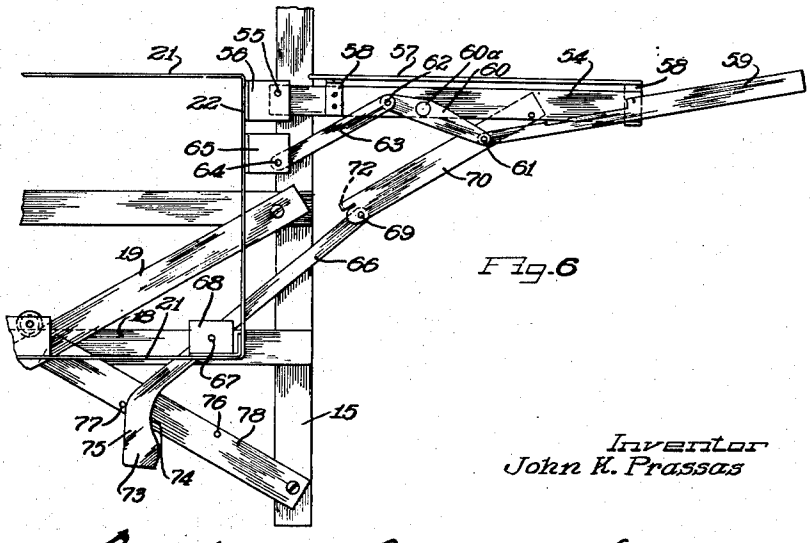


Fig. 6

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Patented Aug. 31, 1954

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UNITED STATES PATENT OFFICE

2,687,766

CONVERTIBLE CHAIR

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Application January 27, 1949, Serial No. 73,023

11 Claims. (Cl. 155—106)

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The present invention relates to a convertible chair and more particularly to a chair which may readily be converted to a reclining chair or a bed upon a mere shifting of the weight of a person sitting in the chair.

Chairs which are convertible into a reclining position or into a bed are well known in the art and many various mechanical movements and other expedients have been proposed for use with such chairs. However, the expedients of the prior art have proved to be expensive in manufacture and complicated in operation.

The present invention now provides an improved mechanical chair which is extremely simple in construction and operation. Simple, readily manufactured mechanical linkages are employed for causing relative movements of the various parts of the chair to convert the same into a reclining chair or a bed upon a mere shifting of the weight of a person seated in the chair.

The chair is provided with means for defining at least three distinct and separate relatively adjusted positions of the chair back with respect to the chair seat. In the first of the adjusted positions the chair back extends substantially normal to the chair seat, so that a person sitting in the chair would be in what is hereinafter termed an "upright" position. In the second relatively adjusted position the back and the seat define an obtuse angle, with the person seated in the chair occupying a "reclining" position. During movement of the chair back to this reclining position a mechanical linkage is actuated to move a leg and foot support which is pivotally connected to the chair seat opposite the chair back, so that the legs of the sitter may be extended into a comfortable position. The third chair position is one in which the chair seat, chair back, and leg and foot support extend in substantially a horizontal plane so that a person seated thereon may recline at full length, as in a bed. It should be appreciated that more than one reclining position may be provided, since the angle between the chair back and seat may be varied to suit the desires of a person seated therein.

The adjustment of the chair to the various reclining positions and to the bed position may be carried out by the mere shifting of weight of a person seated in the chair, although preferably a catch assembly is provided to prevent undue movement of the chair.

For example, to move the chair from an upright position to a reclining position it is only necessary that a person seated in the chair exert extra pressure backwards against the chair back.

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This pressure against the back actuates the chair mechanism to cause the seat to slide forwardly and upwardly and the back downwardly and backwardly. Forward movement of the chair seat actuates the leg and foot rest linkage to pivot the foot and leg rest into position in alignment with the chair seat. Further backward pressure against the chair back causes the seat mechanism to move forwardly to a greater extent with the chair back being lowered until, in the final, or bed position, the chair back, the chair seat and the foot and leg rest are in a single horizontal plane. The various reclining and bed positions may be suitably defined by an overbalanced catch mechanism to prevent the accidental shifting of weight, as by a person changing his position in the chair, from causing unwanted movement of the chair.

The chair actuating linkage and construction is so arranged that upon the removal of pressure or weight from the chair back, the chair is returned to its initial upright position automatically, so that it is unnecessary to return the chair manually to its normal position.

The simple, readily operable chair reclining mechanism is entirely carried by a pair of stationary side chair frames, with the chair seat and back being suspended therebetween. Further, the mechanism for shifting the position of the back and the chair seat employs no springs or other complicated mechanisms, thus greatly reducing the cost of the device and also maintenance expense. Also, a sliding back supporting structure is provided so that there may be no uncomfortable relative movement between the sitter's back and the back of the chair during shifting of the chair position.

From the foregoing general description of the chair the advantages residing in my improved construction will readily be appreciated by those skilled in the art, both in the inexpensive, easily manufactured construction of the chair and the ease of operation, together with the automatic return of the chair to an upright position upon the removal of pressure from the chair back.

It is therefore an important object of the present invention to provide a convertible chair of simple and economical construction, the chair being capable of movement into a plurality of relatively adjusted positions upon a person in the chair merely shifting his weight.

It is a further important object of the present invention to provide a convertible chair having a plurality of adjustable parts connected by means of mechanical linkages to form a chair

seat. a chair back and a foot and leg rest capable of relative movement to an upright, a reclining and a bed position upon a mere shifting of pressure applied to one or more of the component parts of the chair, with the chair being automatically returned to its initial position in the absence of such pressure.

Another important object of the present invention is to provide an improved convertible chair construction having a seat, a back and a foot and leg rest mechanically linked together for relative movement, the seat being moved upwardly and forwardly upon the exertion of pressure upon the back, the seat and back being moved to relatively adjusted position upon such movement of the seat and the foot and leg rest being moved into alignment with the seat upon the relative movement of the back and seat.

Yet another important object of the present invention is to provide an improved convertible chair construction including a seat, a back and a foot and leg rest linked together for coincidental movement between a pair of spaced chair sides, the entire weight of the chair being carried by the chair sides with the back, seat and leg rest being capable of relative movement into a plurality of adjusted positions therebetween upon the shifting of weight of a person seated in the chair.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

On the drawings:

Figure 1 is a side elevational view of the frame of a chair of the present invention, the operating parts of the chair being positioned in upright position;

Figure 2 is a view similar to Figure 1, illustrating in full outline the position of the operating parts of the chair in reclining position, and in dotted outline the position of the chair in the bed position;

Figure 3 is a cross-sectional view taken in the plane III—III of Figure 1;

Figure 4 is a fragmentary cross-sectional view taken along the plane IV—IV of Figure 1;

Figure 5 is a fragmentary view of the foot and leg rest showing movement of the rest to its extended position;

Figure 6 is a view similar to Figure 5, showing the position of the foot and leg rest during its folding movement from its extended position; and

Figure 7 is a broken, fragmentary view of a chair back frame member.

As shown on the drawings:

In Figure 1 the reference numeral **10** refers generally to a chair of the present invention comprising a pair of spaced parallel upright side frame members **11**, a pair of longitudinally disposed parallel seat side frames **12** supported between upright side frames **11**, and a pair of parallel back frame members **13** hingedly connected to the seat frame members **12** and to the side frame members **11**.

It will be readily understood, although only one of each of the members **11**, **12** and **13** are shown in Figure 1, that two such members are provided, together with the requisite cross bracing members to maintain the relative position of the frame members when assembled. The cross bracing members may be placed in such position that they do not interfere with the operation of the chair, as, for example, the members **14** shown in Figure 1. It is also understood that the mechanism of the chair is such that the chair may be padded or upholstered by conventional means to the general outline indicated in dotted lines in Figure 1. The seat upholstery and seat springs are carried by the seat **12**, as will be evident to those skilled in the art, while the side frames **11** provide padded chair arms.

Each of the side frames **11**, as illustrated in Figure 1, is formed of a pair of parallel upright side bracing members **15**, an upper longitudinally extending bracing member **16** joining the members **15**, an intermediate bracing member **17** parallel to member **16** and secured to member **15**, and a lower bracing member **18** also connecting the members **15**. An inclined guideway or slot is provided by parallel inclined guide members **19** extending between members **17** and **18**, a second inclined member **20** being provided in closely spaced relation to one of the members **19** to provide an additional second parallel guiding surface for a purpose to be hereinafter more fully described.

The seat side frames **12** are guided for movement between the side frames **11** by means of the inclined members **19** and **20**. The seat side frame **12** comprises upper and lower parallel frame members **21** joined by upright side frame members **22** secured to each of the members **21**. The generally rectangular frame member thus defined is mounted for movement between side frames **11** by means of peripherally grooved rollers **23** mounted on the lower frame members **21** by angular mounting flanges **24** secured to the frame members **21**, the rollers **23** being rotatably supported upon the flanges **24** by means of axles **23***a* extending through the flanges. The rollers **23** are so mounted that their grooved periphery contacts one of the inclined members **19** in rolling engagement therewith. As shown in Figure 1, either one or both of the rollers **23** may be mounted between closely spaced members **19** and **20**, so that the roller is guided at diametrically opposed points throughout the entire length of that member **19**. Preferably, one of the members **19** is provided with a curved stop surface **25** to stop further movement of roller **23**.

From the foregoing description it may be seen that seat **12** is journaled through rollers **23** for both vertical and horizontal movement relative to the side frame members **11**. This movement may preferably be controlled by means of a catch mechanism illustrated in Figures 1, 3 and 4, the catch mechanism comprising a pair of overbalanced lever arms, including an arm **26** pivoted, as by a screw **27**, to horizontal bracing members **18** of the side frame **11**, and a second lever arm **28** pivoted as at **29** to a depending flange **30** secured to upper horizontal frame member **21**. The lever arm **26** extends upwardly through a strap **31** carried by arm **28** and loosely enclosing a portion of the arm **26**. The arm **26** bears against the pin **32** extending between the strap **31** and the arm **28**. The lever arms **26** and **28** are thus capable of relative movement upon movement of seat **12** relative to the side frames **11**. The upper surface of arm **26** is notched at a plurality of spaced points, as at **33**, while the freely extending edge **34** of arm **28** is provided with an integral inturned flange **35** overlying arm **26** and adapted to engage the notch **33** upon relative movement of the arms **26** and **28**. A button **28***a* is provided on the upper end of arm **28**, depression of this button **28***a* causing a lifting of flange **35** from a notch **33** within which it might

be seated, to allow further relative movement of seat 12 and side frames 11.

As best shown in Figures 1 and 6 of the drawings, the chair back construction comprises a pair of parallel side frame supporting members 36 (only one of which is shown), hingedly connected to the upper horizontal seat frame members 21 by means of a hinge 37. The member 36 carries an arm 38 secured thereto and extending normal to the member 36, the arm 38 being pivoted by a pin 39 to a link arm 40 which, in turn, is pivoted about pin 41 to an arm 42 carried by upright support member 15 adjacent the back side frame member 36. The pivoted linkage provided by the stationary arms 38 and 42 and the link arm 40 serves to guide the back frame members 36 upon their hinged movement relative to the seat frames 12, and additionally serves to strengthen the back members 36 throughout their entire movement to the relatievly adjusted reclining and bed positions. Each of the back side frame members 36 also serves to carry a sliding back member 43 supported in spaced relation to member 36 by a pair of rollers 44 and 45 journaled in side mounting flanges 46 carried by the member 43. Roller 44 contacts one surface of member 38 while roller 45 contacts a guiding rib 47 carried by the same surface of member 36. Movement of member 43 upon rotation of rollers 44 and 45 is guided by a side flange 48 carried by member 36 and by additional flanges 49 secured to member 36 and extending over member 43. A spring 50 is carried by a flange 51 secured to the member 36 and a second flange 52 secured to member 43, so that the members 43 and 36 are urged to their respective relative positions, as shown in Figures 1 and 7, by the spring 50.

A foot rest, generally indicated at 53 in Figures 1, 2, 5 and 6, is carried by the seat 12. As best shown in Figures 4 and 5, the foot rest 53 includes an elongated member 54 having one end pivoted, as by pin 55, to a flange 56 carried by upright seat member 22 opposite the point of attachment of the back 13 to the seat 12. The member 54 is provided with an upper supporting surface 57 secured thereto through flanges 58.

An extension member 59 is linked through the seat member 22 through a first link arm 60 pivoted about a pin 60a to the member 54, by a pin 61 linking one extremity of arm 60 to the extension 59 and a second pin 62 linking the opposite extremity of arm 60 to a second link arm 63 pivotally connected by a pin 64 to a flange 65 secured to the member 22 beneath flange 56. The arm 54 proper is linked to a camming arm 66, pivotally connected to the lower seat side frame member 21 about pin 67 carried by flange 68 secured to the member 21. Cam arm 66 is pivoted through pin 69 to a link arm 70, the arm 70 being pivoted to member 54 as by pin 71.

Arm 70 is provided with an integrally formed flange 72 (Figure 6) overlying the adjacent end of cam arm 66. That end of cam arm 66 opposite pin 69 is formed into a dependent leg portion 73 having opposed camming surfaces 74 and 75. A pair of pins 76 and 77 are carried by member 78 extending between side frame upright member 15 and an adjacent portion of horizontally extending side frame supporting member 18.

The operation of the convertible chair of the present invention will be apparent to those skilled in the art from the foregoing description. It will readily be seen that the back 13, hinged to the seat 12 by hinge 37, will serve as a lever to effect movement of the seat when pressure is exerted upon the back. Thus, when the chair

is in normal position and pressure is exerted upon the back, such pressure will be transmitted by the back about its attachment to the side frame member 15 as a fulcrum to cause movement of the seat 12. Movement of seat 12 is guided by the rollers 23 contacting their respective inclined guiding surfaces so that generally forward and upward movement of the seat is effected while the back is moved downwardly and forwardly. During this operation the forward rollers 23 bear against the corresponding guide 19, while the rear rollers 23 bear upwardly against the upper guide 20 to cause the seat to remain horizontal in its upward movement. The flange 35 of arm 28 engaging the notches 33 of arm 26 will cause movement of the seat to cease upon this engagement, so that the chair remains in a reclined position. Further movement of the seat may be caused by pressing button 28a to pivot member 28, lifting flange 35 from the notch 33 so that further depression of the back may cause further movement of the seat. Also, it will readily be seen that upon the removal of weight from the back, the seat moves downwardly and backwardly with the rollers engaging their respective guiding surfaces to return the chair to its normal upright position with the stop surface 25 preventing further movement of the seat from this upright position. In the downward movement of the seat, the rear rollers 23 bear against the lower guide 19 with the forward rollers 23 bearing against forward guide 19.

Movement of leg and foot rest 53 is accomplished upon movement of the chair seat 12. Any forward movement of the chair will bring camming surface 74 into contact with pin 76 as shown in Figure 5, causing pivoting movement of the cam arm 66 around pin 67, and extending arms 66 and 70 into the position shown in Figure 2. In this position the off-center construction of arms 66 and 70 causes the flange 72 to contact the adjacent surface of cam arm 66, the overbalanced arms 66 and 70 being forced into tighter engagement upon the placing of weight upon supporting surface 57. At the same time, the leg and foot rest is moved into position, the extension 59 is likewise pivoted into position to extend beyond the supporting surface 57 through the linking of arms 60, 62 and 63 through the extension 59. The foot and leg rest 53 is thus cammed into extended position upon the movement of the chair seat 12 and the chair back 13 into the first reclined position, and the camming portion 73 of cam arm 66 is spaced from the pin 76 upon further forward and upward movement of the seat to the bed position. Upon release of weight from the back, the chair seat and back are returned to upright position as hereinbefore described, and the camming surface 75 contacts pin 77 to cause reverse pivoting movement of the cam arm 66 away from flange 72, and the foot and leg rest is returned to its folded position as shown in Figure 1.

It will be seen that the side frame member 11 need not be provided with separate guide members 19 and 20 as shown in the drawings. Side frame members 11 may each be made from a single piece of material with inclined grooves providing guiding surfaces for the rollers 23. Similarly, the member 78 may be eliminated, with the pins 76 and 77 being carried by side frame members 11. Also, the seat side frames 12 may be formed from a single piece of material, the rollers 23 being journaled therein and the lever arm 28 being carried thereby.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A convertible chair comprising a pair of spaced, upstanding chair side frames, a chair seat carried by said chair frames for relative movement therebetween, interengaging means carried by said chair side frames and said chair seat for guiding movement of said seat relative to said side frames, a chair back hingedly secured to said seat and to said side frames for movement relative thereto, said seat and said back being movable to a plurality of relatively adjusted upright and reclining positions between said chair side frames, and a folding foot and leg rest pivotally connected to said seat and operatively linked to said side frames for extension into supporting position by movement of said seat and back into a reclining position.

2. A convertible chair comprising a pair of spaced, upright side frames, a chair seat journaled between said side frames for movement vertically and horizontally relative thereto while remaining with its load-receiving surface horizontal, and a foldable foot and leg rest pivoted to said chair seat and operatively associated with said side frames for movement into extended position automatically by upward and forward movement of said chair seat relative to said side frames.

3. A convertible chair comprising a pair of spaced, upright side frames, a seat journaled between said side frames for forward and backward movement relative thereto while remaining with its load-receiving surface horizontal, and an extensible foot and leg rest pivoted to said chair seat for extended movement upon movement of said chair seat relative to said side frames, said foot and leg rest comprising a first member linked to said chair seat for camming movement against said side frames into extended position upon forward movement of the chair seat and a second member pivoted to the chair seat and to said first member for movement into extended position beyond said first member upon movement of said chair seat.

4. A convertible chair comprising a pair of spaced, upright side frames, a chair seat journaled between said side frames for movement vertically and horizontally relative thereto while remaining with its load-receiving surface horizontal, a foot and leg rest pivoted to said chair seat and actuating cam means carried by said seat and by said foot and leg rest to move said rest into extended position by camming movement against said chair side frames upon upward and forward movement of said chair seat relative to said side frames.

5. In a convertible chair having spaced, upright side frames, a chair seat journaled between said side frames for movement relative thereto and a chair back hingedly connected to said side frames and to said seat for movement relative thereto, a foot and leg rest comprising a first member pivoted to said chair seat, a link arm pivoted to said member, a cam arm pivoted to said chair seat having a camming surface formed at one extremity for engaging said chair side frames and having its other extremity pivoted to said link arm, whereby movement of said chair seat relative to said side frames causes said cam arm to move relative to said link arm to extend said member beyond said chair seat and in alignment therewith to provide a foot and leg rest for a person seated in said chair.

6. In a convertible chair having a pair of upright side frames, a seat journaled between said side frames for movement relative thereto and a back pivoted to said chair seat and to said side frames for movement relative thereto, a foot and leg extension pivoted to said chair seat comprising a first member pivoted to said chair seat, a link arm having one end pivoted to said first member and its other end extending freely therebeyond, a cam arm pivoted intermediate its length to said chair seat and having one extremity provided with camming surfaces for contacting said chair frame and its other extremity secured to the freely extending end of said link arm, and a second member slidably carried by said first member and pivotally linked to said chair seat, whereby movement of said chair seat relative to said side frames causes camming movement between said cam arm and said side frames to move said link arm into position extending said first member beyond said seat with said second member pivotally linked to said seat being simultaneously moved to extend beyond said first member, said first and second members when extended lying in substantially the same plane as said seat and serving as a foot and leg rest for a person seated in said chair seat.

7. A convertible chair comprising a pair of spaced, upright chair side frames held in parallel relation, inclined guideways provided on facing portions of said side frames, a chair seat, rollers rotatably carried by said seat for rolling engagement with said guideways to guide said chair for movement between said side frames, a chair back hinged to said seat and pivoted to said side frames for movement relative to said seat and said frames, a member carried by said back for bearing the weight of a person seated in said chair, said member being slidably movable relative to said back, resilient means urging said member into adjusted position relative to said back, an elongated member pivoted to said seat at a point opposite the chair back and adapted to serve as a foot and leg rest, and camming means pivoted to said elongated member and to said seat and movable into bearing engagement with said side frames upon movement of said chair seat relative to said side frames to pivot said elongated member into extended position in alignment with seat, said chair seat and back being movable into a plurality of relatively adjusted positions by the shifting of weight of a person seated in the chair against said member carried by said back with said member being movable relative to said back to prevent uncomfortable movement of said person's back relative to the chair back.

8. A convertbile chair comprising a pair of spaced, upright chair side frames providing a pair of inclined guiding surfaces, a chair seat, anti-friction bearing means carried by said chair seat and engageable with said inclined guiding surfaces for mounting said chair seat between said side frames for movement relative thereto, a chair back hingedly secured to said side frames and to said seat for movement relative thereto, with movement of said back causing a corresponding movement of said chair seat into relatively adjusted upright and reclining positions, means for maintaining said chair seat in a selected reclining position, a back cushion mem-

ber anti-frictionally supported on said back for sliding movement relative thereto when said chair seat and side frame are moved relative to each other whereby said back may be adjusted without moving the back cushion relative to the body of the occupant of the chair.

9. A convertible chair comprising a pair of spaced fixedly mounted, upright side frames, a seat movably mounted between said side frames for movement relative thereto, a chair back hingedly secured to said seat and to said chair side frames for movement relative thereto into a plurality of adjusted positions upon the application of pressure to the chair back, and back cushion means slidably carried by said chair back for free sliding movement relative to said back when supporting the back of a user to prevent movement between said back cushion and the back of the user upon adjustment of the chair.

10. In a convertible chair having spaced, upright side frames, a seat journaled between said side frames for movement relative thereto, and a chair back pivotally connected to the side frames of the chair seat, means for preventing relative movement between the back of a person seated in the chair and the chair back upon movement of the back comprising a member carried by said chair back, roller means carried by said member for contacting said chair back, and resilient means interposed between said chair back and said member resisting relative movement between said member and said chair back, whereby said member is free for movement relative to said back against the action of said resilient means to prevent relative movement between said back and the back of a person seated in the chair and bearing against said member.

11. A convertible chair comprising a pair of fixed spaced, upstanding chair side frames, a chair seat adapted for relative movement between said chair side frames, means mounting said seat between said side frames for movement relative thereto, a back positioned between said chair side frames, first hinge means securing said back to said chair seat, second hinge means connecting said back to said chair side frames for movement relative thereto, a back cushion member slidably mounted on said back and freely movable relative thereto, movement of said back upon pressure thereto by the occupant of the chair causing relative tilting movement between said chair seat and said back, said sliding back cushion allowing movement between the back and the back cushion member without causing relative movement between the back cushion member and the back of the occupant.

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