

July 11, 1950

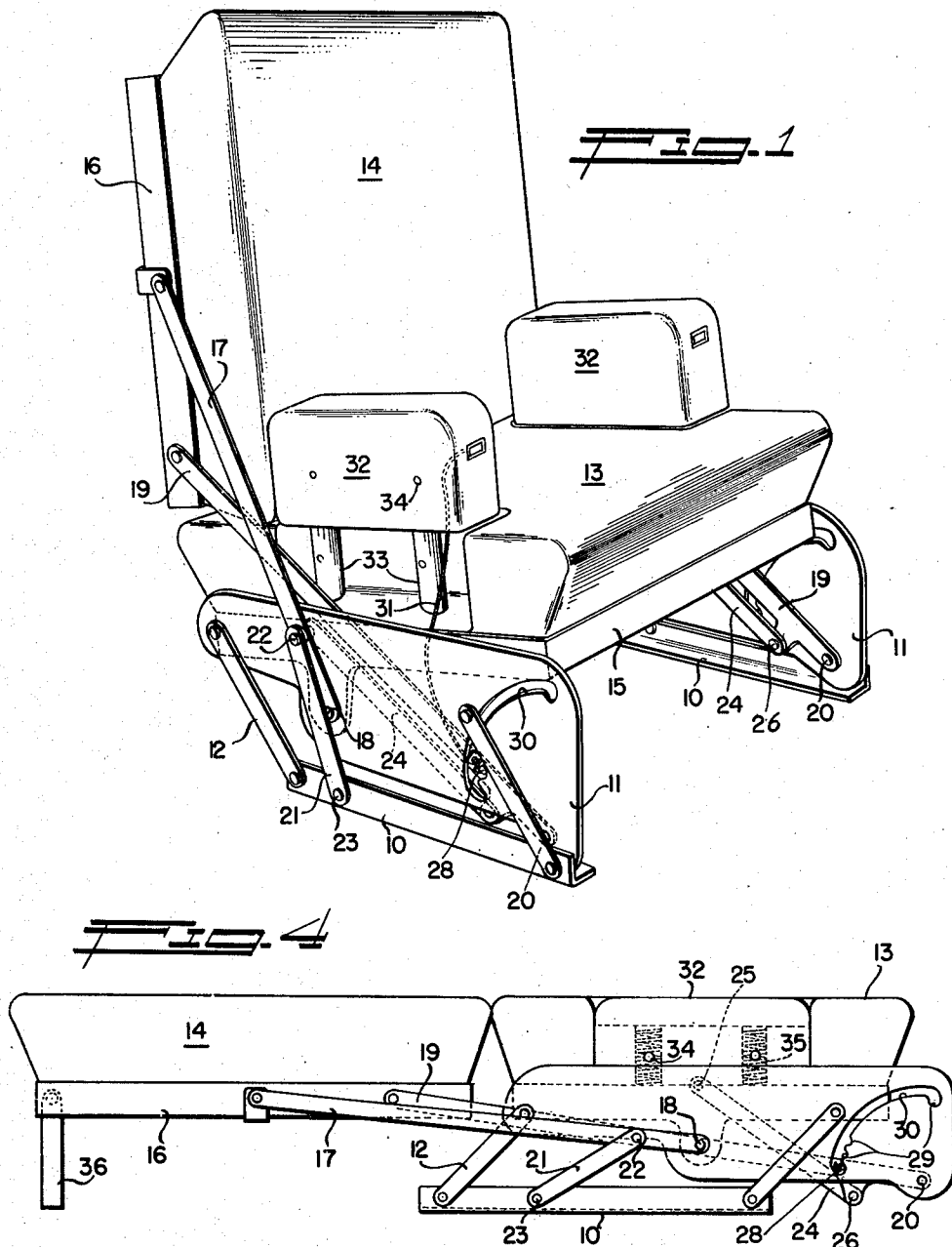
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2,514,798

REVERSIBLE OR BERTHABLE SEAT

Filed June 12, 1947

2 Sheets-Sheet 1



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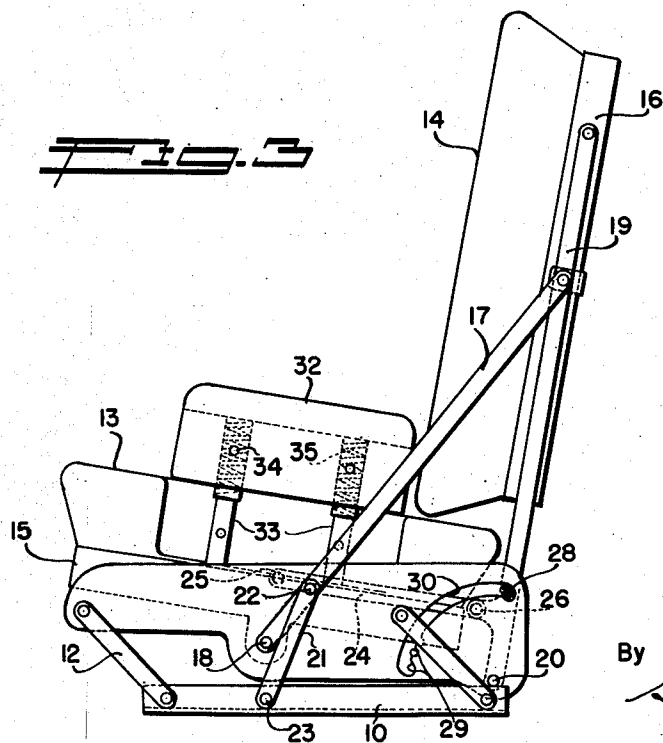
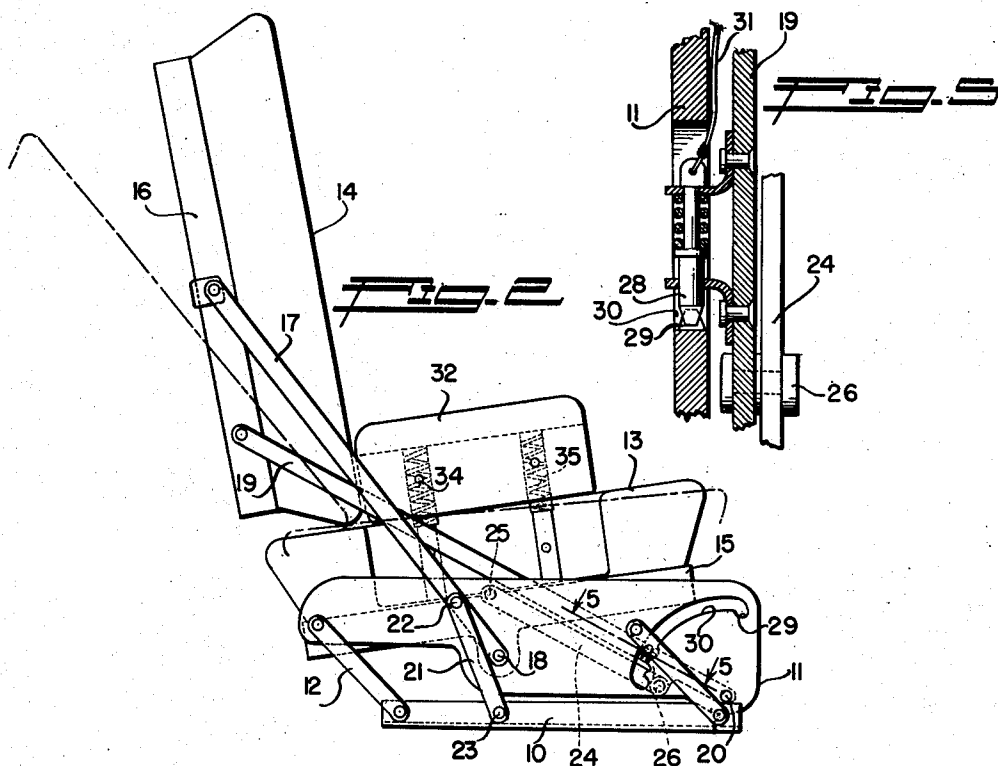
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2,514,798

REVERSIBLE OR BERTHABLE SEAT

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Application June 12, 1947, Serial No. 754,122

13 Claims. (Cl. 155—45)

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This invention relates to adjustable, reversible, and berthable seats for vehicles, including airplanes, wherein the individual passengers may desire to face forward or aft, recline, or have the seat converted into a berth for night travel.

Berthable and reversible seats as heretofore constructed have required considerable manhandling or the removal or attachment of parts, and have been awkward and difficult to manage due to guides or slots and rollers which develop looseness and lack of alignment in service. It is, accordingly, an object of this invention to provide such a reversible and berthable chair having positive pin or pivot linkage connections that smoothly and accurately control both the seat and back angles for either the erect, reclining or berthing positions.

The berthable and reversible seats of this invention are intended to be disposed in one or more longitudinal rows wherein at least every other chair in each row will embody the seats of this invention. To put it in another way, two tandem seats are required to provide enough length for a full size berth, but only one of the seat-backs need be lowered to form part of the berth. Accordingly, this invention primarily relates to such convertible and reversible seats, although all the seats in a longitudinal row may be identical for convenience. It will be understood that as many longitudinal rows as desired may be disposed side-by-side, on either or both sides of a longitudinal aisle, whether the passenger space is divided up into Pullman-like sections, or is an unobstructed cabin, as most commonly used in aircraft. It is, accordingly, an object of this invention to provide a pair of tandem seats so arranged that when one is reversed, the seats face each other with adequate leg room therebetween, whereby two rows of such tandem seats can be adjusted to provide Pullman-like sections wherein four passengers can conveniently converse as a group, or play cards, or the like; and that such a group of four chairs can readily be converted to either twin or double berths by the conversion of one pair of side by side seats into berths, utilizing the seats of the other pair of side by side seats to complete a full length berth.

It is also an object of this invention to provide an improved and simplified chair of the character described wherein the seat and back are interconnected by pivoted links which accurately and rigidly support and control and interrelate the relative movements of the seat and back as the chair is adjusted, reversed, or converted into a berth.

It is a further object of this invention to provide an improved and simplified chair of the character described wherein the seat and back are interconnected by pivots and links to each other and to carriage members and the carriage mem-

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bers are in turn supported by links from base members attached to the floor whereby the carriage members are adapted to shift longitudinally under the control of the seat and back linkages to shift the seat longitudinally to provide room for the back when lowered into the berthing position.

It is another object of this invention to provide an improved and simplified seat of the character described wherein the back is adjustable and reversible and the seat is linked thereto in such a way as to alter its position and angle in cooperation with the back to adjust itself to the most comfortable position and angle relative to the back.

Other objects and features of the invention will be readily understood from the following detailed description of a typical preferred form of the invention wherein reference will be made to the accompanying drawings in which:

Figure 1 is a perspective view of a chair embodying the features of this invention in its basic and erect position;

Figure 2 is a side view corresponding to Figure 1 with the reclined position shown in dotted lines;

Figure 3 is a side view of the chair of this invention in its reversed position;

Figure 4 is a side view of the chair of this invention in its berthed position; and

Figure 5 is an enlarged fragmentary detail on the line 5—5 of Figure 2 showing a form of latch for locking the chair in any of its several positions.

As shown in the drawings:

Figures 1 and 2 show the normal or basic position, facing to the right on the drawing, which may, for convenience, be called the forward facing position. Accordingly, when the chair back is turned over into the position of Figure 3 it will be facing to the rear in a position facing the next tandem chair which would face forward. If a longitudinally aligned double row of such chairs alternately faced forward and to the rear, the effect of an open section Pullman-railroad car would be obtained.

The chair construction of this invention comprises side base members 10, which may be attached to the floor, side carriage members 11 supported therefrom by parallel pivoted links 12, and seat 13 and back 14 cushions carried by seat and back frames 15 and 16 respectively. The back frame 16 is supported by links 17 pivoted to the side carriage members 11 at 18 and by links 19 pivoted to the carriage members 11 at 20. Considering the back alone for the moment, the two links 17 and 19 cross at about their mid points with the back in its forward facing position of Figure 2, and the back is tilted up and over into the position of Figure 3 for chair reversal.

The position of the carriage members 11 rela-

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tive to the base members 10 is determined by a short link 21 pivoted at 22 to the link 17 and at 23 to the base members 10. It will be noted that the short link 21 swings from one side of the link pivot 18 to the other as the back frame 16 moves from the position of Figure 2 to that of Figure 3 and this causes a temporary shift of the carriage as the pivot point 22 swings over the pivot point 18 of the link 17, although the carriage members return to approximately the same point when the back frame is in its erect position of either Figure 2 or Figure 3. If the back frame is further tilted to the reclined position shown in dotted lines in Figure 2, the carriage members are pushed forward or to the right by secondary pivoting of the link 17 about the pivot 22 of the short link 21. If the back is pivoted to the berthed position the carriage members 11 are moved to their extreme right hand position, as shown in Figure 4, then projecting into the normal leg room provided for the erect and reclining positions of the chair as a whole.

The seat frame 15 is also pivoted, approximately at its mid point, at the link pivot 18 on the carriage members. Thus the seat partakes of any fore and aft movement of the carriage members. Tilting of the seat about the pivot 18 is controlled by a short link 24 pivoted to the seat frame at 25 and to the back link 19 at 26. This short link 24 is parallel to the link 19 in Figure 2 to hold the forward edge of the seat tilted up, and is parallel to the seat frame 15 in Figure 3, to tilt the rear edge of the seat up. In both the forward reverse and berthable positions it adequately supports the seat in the required tilted or horizontal position respectively.

The chair may be selectively locked in any of its several positions by a spring urged latch 28 carried by the link 19 adjacent the pivot point 26 thereon, as shown in the detail of Figure 5. The latch operates to engage one of several notches 29 in a quadrant 30 formed in the carriage members 11. The opposite extreme latch positions in the quadrant correspond to Figures 3 and 4 respectively while other quadrant notches may be provided corresponding to the full and dotted line positions of Figure 2. The latch may be directly or remotely controlled, in the latter case a Bowden wire 31 may extend to retractable arm rests to be now described.

Arm rests 32 may conveniently be made removable or retractable into the body of the seat cushion for the berthable position of Figure 4. As shown, the arm rests may be mounted on telescoping posts 33 with latches 34 engaging the posts to hold the arm rests retracted against springs 35 tending to extend the arm rest when the latches are released.

In the operation of the chair from the erect position of Figure 2 to the inclined position of the same figure the occupant releases the latch 28 by pulling on the Bowden wire control 31, shown in Figure 1 but omitted from the other views for clearer presentation of the link movements. By leaning against the back, the occupant can then push against the upper end of the link 17 which in turn both pushes the carriage members slightly forward and also slightly elevates the lower pivot 18 and the seat due to the camming action of the short link 21, which causes the carriage members to pivot on the links 12. The slight forward movement of the carriage members 11 pulls on the link 19 to also increase the tilt of the seat back, but the angle of the chair seat flattens and the seat moves forward slightly,

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and therefore the occupant is not required to shift his position on the seat when leaning back. The slight interference between the seat and back cushions in the reclined position is obviated by the seat cushion compression caused by the passenger's weight.

The shift from Figure 2 to the berthed position of Figure 4 is merely a continuation of the reclining position just described, the carriage members moving to their extreme forward position. In this position of the back its left end may be supported adjacent the next seat cushion (not shown), as by folding legs 36.

In order to reverse the seating direction, as by changing from Figure 2 to Figure 3, or vice versa, the latch 28 is released as before and the chair back is swung up and end over end whereby the short link 21 and link 17 swing over center relative to the seat pivot 18, simultaneously reversing the angle of the seat cushion. While the carriage members 11 and the links 12 move during this shift they return to substantially the same position after the completion of the chair reversal. In the reversed position the latch 28 engages at the upper end of the quadrant 30 and the link 24 approaches a position parallel with the seat frame.

It will thus be seen that my invention provides an improved and simplified reversible, berthable and reclining chair construction wherein the seat and back frames are positively and pivotally linked to each other and to the supporting structure, and that the supporting structure includes movable carriage members adapted to bodily shift the seat and back member into proper relationship with other chairs preceding and following the berthable chair in the same longitudinal row.

Having thus described my invention and the present preferred embodiments thereof, I desire to emphasize the fact that many modifications may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim as my invention:

1. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and carriage members movably supported relative to said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members and movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to adjust the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

2. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members, means supporting said movable carriage members from said fixed members, a pair of crossed links on each side each pivotally

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connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members and movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

3. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members, parallel motion linkages supporting said movable carriage members from said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members and movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

4. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members supported from said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members, movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another, and means for locking said back relative to said carriage members in any of its preselected positions.

5. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and carriage members movable relative to said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and

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each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members at the pivot point thereon of one of said links, linkage means biasing the last mentioned pivot point and connected between the link pivoted thereat and the base members to control the movement of the carriage members as the back frame is shifted from one position to another, and movable means pivotally connecting said seat frame to the other of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

6. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members, means supporting said movable carriage members from said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members at the pivot point thereon of one of said links, linkage means biasing the last mentioned pivot point and connected between the link pivoted thereat and the base members to control the movement of the carriage members as the back frame is shifted from one position to another, and movable means pivotally connecting said seat frame to the other of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

7. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members, parallel motion linkages supporting said movable carriage members from said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members at the pivot point thereon of one of said links, linkage means biasing the last mentioned pivot point and connected between the link pivoted thereat and the fixed members to control the movement of the carriage members as the back frame is shifted from one position to another, and movable means pivotally connecting said seat frame to the other

of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another.

8. A reversible and berthable seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, said base members including fixed members and movable carriage members supported from said fixed members, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the carriage members, said links being so disposed that the back frame can be turned end over end or lowered to a horizontal position by pivotal movements of said links relative to the back frame and said carriage members, means pivotally supporting the seat frame at its mid portion to each of the carriage members at the pivot point thereon of one of said links, linkage means biasing the last mentioned pivot point and connected between the link pivoted thereat and the fixed members to control the movement of the carriage members as the back frame is shifted from one position to another, movable means pivotally connecting said seat frame to the other of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said fixed members as the back frame is shifted from one position to another, and means for locking said back relative to said carriage members in its preselected positions.

9. A reversible seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to one of the base members, said links being so disposed that the back frame can be turned end over end by pivotal movements of said links relative to the back frame and said base members, means pivotally supporting the seat frame at its mid portion to each of the base members and movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said base members as the back frame is shifted from one position to another.

10. A reversible seat structure comprising seat and back frames having suitable cushions thereon, base members disposed on either side of said seat and back frames, a pair of crossed links on each side each pivotally connected at one end to the back member in spaced relationship to each other and each being pivotally connected at its other end to the base member on the same side, said links being so disposed that the back frame can be turned end over end by pivotal movements of said links relative to the back frame and said base members, means pivotally supporting the seat frame at its mid portion on each side to the base members, movable means pivotally connecting said seat frame to one of said links, said last mentioned means being so constructed and arranged as to control the angle of said seat frame with respect to said base members as the

back frame is shifted from one position to another, and means for locking said back relative to said base members in its preselected positions.

11. An adjustable and reversible chair of the type described comprising seat and back members and supporting members on either side thereof, a pair of crossed links pivotally supporting the back member from said supporting member on each side of the chair, said links being so arranged as to permit adjustment of the reclining angle and end over end reversal of the back relative to the supporting members, means centrally pivotally supporting said seat member from said supporting members whereby to permit adjustment of the angle of said seat member with respect to said supporting members, and movable means pivotally connecting said seat member to one of said pairs of links at points remote from the central seat pivot means, said last mentioned means being so constructed and arranged as to alter the seat angle as the back is adjusted.

12. An adjustable and reversible chair of the type described comprising seat and back members and supporting members on either side thereof, a pair of crossed links pivotally supporting the back member from said supporting member on each side of the chair, said links being so arranged as to permit adjustment of the reclining angle and end over end reversal of the back relative to the supporting members, means centrally pivotally supporting said seat member from said supporting members whereby to permit adjustment of the angle of said seat member with respect to said supporting members, movable means pivotally connecting said seat member to one of said pairs of links at points remote from the central seat pivot means, said last mentioned means being so constructed and arranged as to alter the seat angle as the back is adjusted, and means engageable between one of said links and said supporting member for locking said back member in its adjusted position relative to said supporting member.

13. An adjustable chair of the type described comprising separate seat and back members and complementary supporting members at either side of said seat and back members, means associated with said supporting members adapted to permit fore and aft movement thereof, means pivotally connecting said back member to said supporting members, means separately pivotally supporting said seat member from both said back connecting means and said supporting member whereby adjustment of said back member also adjusts the seat member, and means interconnecting said means pivotally connecting said back member to said support members and to said means associated with said supporting members whereby to control the fore and aft movement of the supporting members as the back member is adjusted.

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