June 21, 1949. A. DI RENZO 2,473,745

CHAIR

Filed Nov. 15, 1945 2 Sheets-Sheet 1

Fig. 1.

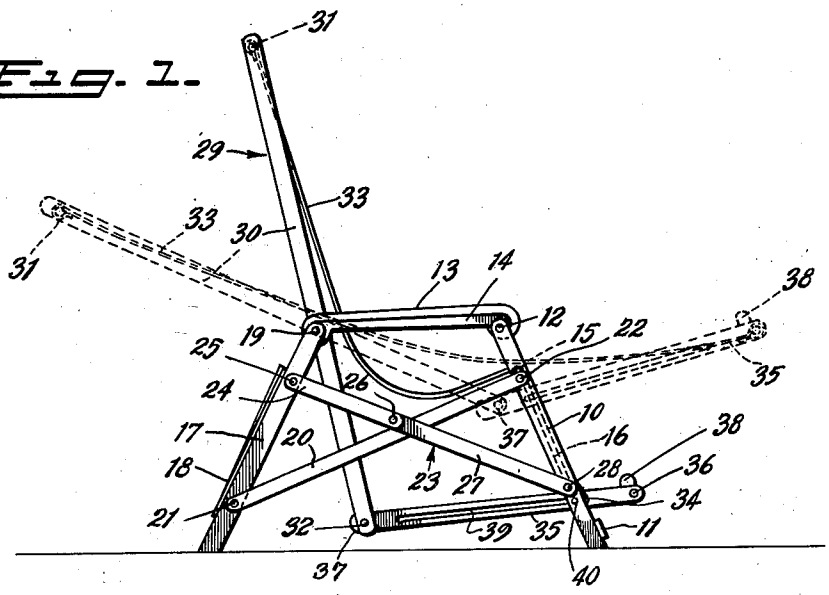
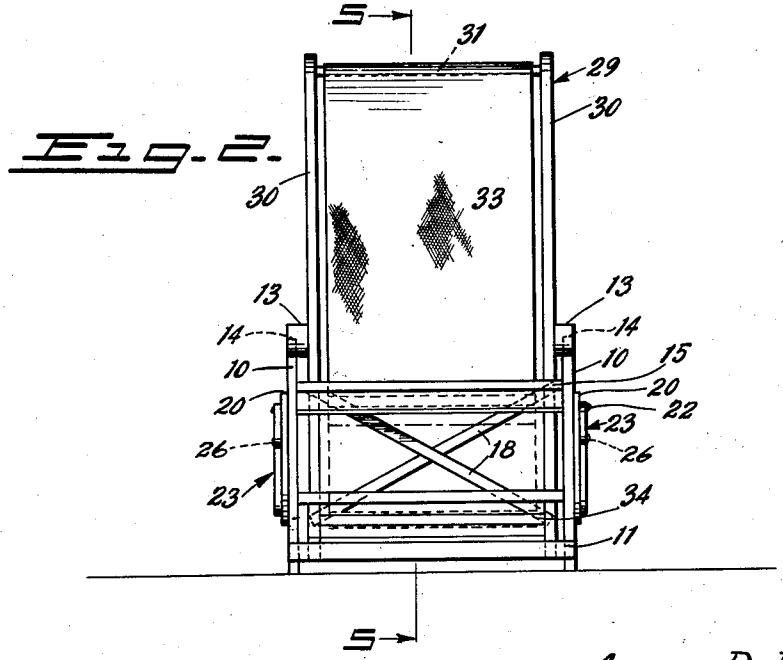


Fig. 2.



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Fig. 3.

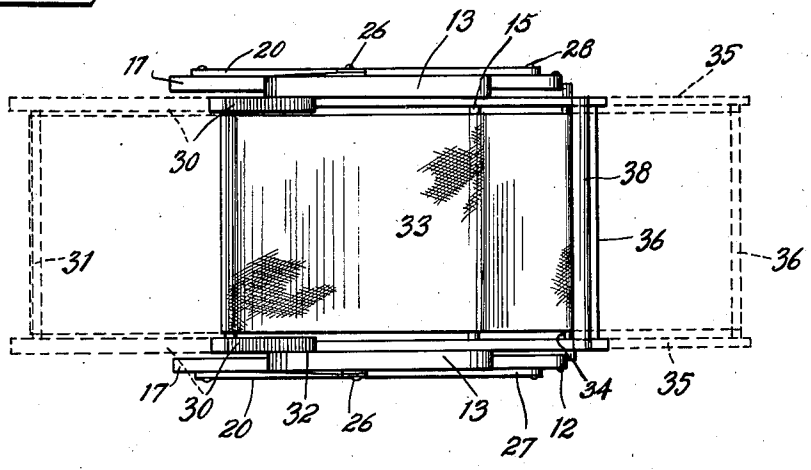


Fig. 4

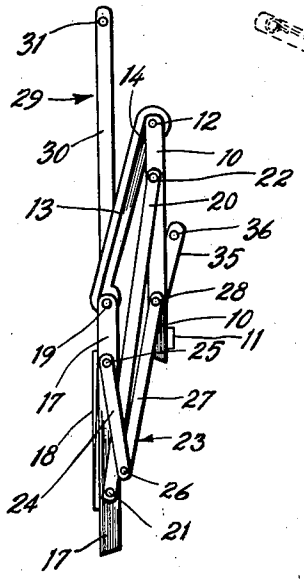
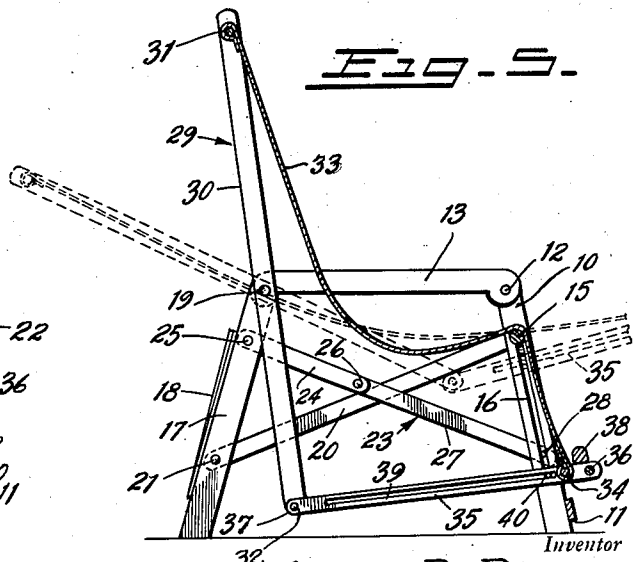


Fig. 5.



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CHAIR

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12 Claims. (Cl. 155—106)

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This invention relates to chairs, and more particularly to one adapted to support the occupant either in a sitting position or in a reclining position.

It is the purpose of the invention to provide an improved novel and simple chair which is adjustable from one position to another, that is, from a sitting position to a reclining position or from a reclining position to a sitting position by a mere shifting of the weight of the body of a person in the chair.

It is also an object of the invention to provide a chair which is more easy to adjust than a conventional beach chair and need not be handled extraneously when it is desired to adjust the same from one position to another, that is, it is not necessary to get out of the chair in order to adjust it to its different positions.

Another object of the invention is the provision of a chair suitable for invalids, convalescents and others who may wish to change from one position of the chair to another without leaving the chair, and without summoning help in order to effect the change.

Another object of the invention is the provision of a chair which can be economically manufactured, is relatively strong and easy to move into sitting or reclining positions as well as capable of being compactly folded for storage when not in use and, therefore, cheaply transported in large numbers.

Other objects reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevation of a chair constructed in accordance with the invention, the same being shown in a sitting position in full lines and in a reclining position in dotted lines.

Figure 2 is front elevation with the upper and lower attaching portions of the canvas bottom forming the back and seat portions of the chair in solid and dotted lines, respectively.

Figure 3 is a top plan view of the chair as shown in Figure 1.

Figure 4 is a side view of the chair in folded condition, and

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

Referring to the drawings in detail, the chair is shown as comprising a lower cradle or supporting portion adapted to be folded or extended in open position. It consists of a frame of substantially trapezoidal form consisting of front corner legs 10 inclined forwardly in spaced parallel relation and connected near their lower ends by a cross strip or rung 11 and at their upper ends pivotally as at 12 to the forward ends of arms 13. These arms or arm rests are recessed at the bottom and outer sides as at 14 for this purpose, in order that the top rest portions of the arms may be relatively wide or thick, while the lower portions to which the pivotal connections 12 are made, may be much thinner, but the recessing may be omitted. The front legs 10 are also connected by a cross member 15 and are also provided with central longitudinal grooves 16 at the inside terminating a considerable distance from each end thereof.

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The cradle also comprises rear corner legs 17 diverging downwardly from the front legs 10 and thus inclined rearwardly from the top. The legs 17 are rigidly connected by cross braces 18 or otherwise. The upper ends of the legs 17 are also pivotally connected to the rear ends of the arms or arm rests 13 as indicated at 19 in the same manner as the upper ends of the front legs 10 are pivotally connected thereto as at 12, thus forming two trapezoidal side frames or portions for the chair. However, the pivots 12 and 19 do not extend across the width of the chair but merely through the parts which they connect, except at the back, as will be later described. The front and rear legs 10 and 17, at each side, are connected by a rearwardly inclined strut 20 pivoted at 21 at points low on the rear legs 17 but spaced from the lower ends thereof and at 22, are pivotally connected to the front legs 10 at points high on said front legs, but considerably spaced from the upper ends thereof, the same as the pivot points 21 are spaced from the lower ends of the legs 17. The struts 20 therefore form braces connecting the front and rear legs and extending diagonally therebetween. That is, the braces 20 extend diagonally upwardly from the lower portions of the rear legs 17 to the upper portions of the front legs 10 with the pivot connection 22 located beneath the cross member 15 connecting the front legs 10 transversely at points spaced from the upper ends thereof and the pivotal connections 12 with the forward ends of the arms 13. Tie members 23 of articulated sections or jointed struts also connect the front and rear legs 10 and 17 at each side in crossed relation to the struts 20 so as to extend diagonally upward from the front legs. These struts or braces 23 consist of upper sections 24 pivoted at 25 high on the rear legs 17 at points spaced from

the upper ends thereof and the pivotal connections 19 of the upper ends of said legs with the rear ends of the arms 13. The lower ends of sections 24 terminate at points immediately above the intermediate portions of the struts 20 where their lower ends are pivotally connected at 26 to the upper rear ends of lower sections 27 which are longer than the sections 24 and are pivotally connected at their lower ends to points low on the legs 10 but spaced from the lower ends thereof, as indicated at 28. In this manner, the cradle or supporting portion of the chair is adapted to be extended into supporting position upon a floor with the front legs extending forwardly from the top to bottom and the rear legs extending rearwardly from the top to bottom, or to be folded in the manner shown in Figure 4 of the drawings with the tie members 23 of articulated sections breaking and moving downwardly at the connection 26 between the sections 24 and 27 and the struts 23 swinging upwardly with the front legs 10 and the arms 13 with the sections 24 and 27 folding upwardly toward each other while the section 25 swings downwardly and the section 27 swings upwardly.

The chair also comprises a chair back and seat forming portions, which latter form the back and seat portions of the chair, or bottom when used in a reclining position or when used as a bed or cot. The chair frame or body rest comprises a substantially rectangular chair back or frame 29 consisting of side bars 30 connected at the top by a cross bar or end bar 31, and at the bottom by a cross bar 32 so as to maintain the side bars 30 in parallelism. The side bars 30 of the frame 29 are also connected substantially midway of their lengths, but preferably slightly below the centers of lengths thereof to the rear ends of the arms 13 at the pivotal connections 19 of the arms with the upper ends of the rear legs 17, so as to swing to upper positions slightly inclined rearwardly or downwardly to inclined positions slightly above horizontal for use in a reclining position in connection with the body rest consisting of a suitable length of textile sheeting or canvas, or this may be of knitted or netted material and is indicated at 33. This flexible textile sheeting or strip or canvas of the like, is fastened around the upper cross bar 31 and extends loosely downwardly and forwardly over the cross bar 15 adjacent pivots 22 forming the pivotal connections of the struts 20 with the front legs 10 and then downwardly at the front of the chair between the front legs 10 where it is connected around a cross bar 34 at the lower portion of the front of the chair in front of the legs 10 spaced from the lower ends thereof. This cross bar 34 rigidly connects the side members 35 of an articulated front section of the chair frame 29 to brace the latter in a sitting position and constitute the forward portion of the frame when used in a reclining position or as a cot. The side members or bars 35 are also connected at their forward ends by a cross bar 36 within the struts 20 and 23 and at their rear ends 37 in a slightly rearwardly inclined position, to each other and the lower ends of the side bars 30 of the frame 29 by the cross bar 32, thereby maintaining the side bars 30 and 35 in parallelism and effectively bracing the hinged or pivotally connected frames thus provided. The cross bar 15 forms a knee bar which also supports the textile sheet in a reclining position but in a sitting position, said textile sheet or strip of canvas 33, extends over said cross bar

at the front portion of the chair as shown in Figure 5 of the drawings at the central portion of the front leg frame and between the cross bars 15 and 34. Immediately in front thereof on the frame at the projecting portions of the side bars or members 35, the latter may be provided with a connecting cross bar 38 above the side members 35, which forms a foot rest spaced from the front legs 10.

The side members or bars 35 are further provided with longitudinal slots 39 extending from points spaced from the rear ends 37 thereof or cross bar 32 pivotally connecting said side members 35 with the side bars 30 of the frame 29 to a point inside of the front legs 10, at which point a cross bar or rod 40, preferably of steel, connects the side members 35 and has its ends extending through the slots 39 and into the grooves 16 in the inner surfaces of the front legs 10, as previously described, to slide up and down therein as the parts assume the sitting and reclining positions. The sitting position is shown in full lines in Figures 1, 3 and 5, from which it will be noted that the side members 35 are moved rearwardly, with the frame 29 substantially upright but slightly inclined forwardly and the cross rod 40 at the lower ends of the grooves or guideways 16 provided at the inner sides of the legs 10 and at the forward ends of the slots 39 in the side members 35. In this position, the cross bar 34 will limit the rearward sliding movement or displacement of the side members 35 by engagement with the front edges of the legs 10 as seen in Figures 1 and 5. In this position, a person reposed upon the chair with the sheet or strip 33 forming the back and seat bottom, can rest his feet on the foot rest formed by the cross bar 38 on the forwardly extending ends of the side members 35 which may be said to form in connection with its cross members and pivotal connection with the lower end of the frame 29, a lower front or horizontal frame constituting a section of the body rest so that the latter is made in two articulated or hinged sections for movement from a lower position when a person is seated in the chair. When in such position, and it is desired to assume a reclining position, the movement of the chair is accomplished by shifting the body weight above the hips, causing the chair back or frame 29 to move rearwardly to the dotted line position shown in Figures 1, 3 and 5 and the lower frame portion of the frame 29 and side bars 30, to push forwardly on the connected bottom frame and side bars 35 upwardly with the rod or bar 40 riding in the slots 39 until the rear ends of said slots reach the bar 40. These parts together with the rod 40, will then move upwardly in the guideways or grooves 16 along the inside of the legs 10 to the dotted line position shown in Figures 1, 3 and 5 of the drawings with the textile sheet or strip 33 supporting the occupant in a reclining position retained at the ends thereof upon the cross rods or braces 31 and 34 and cross bar 15. The pivots 19 may also be in the form of a cross bar to additionally support the bottom sheet forming the back and bottom of the chair or the bottom as of a cot when in use in a reclining position. When it is again desired to assume a sitting position, the weight is shifted from the back to the legs and feet, to exert pressure upon the foot rest 38 to cause the latter to assume its original position while also raising the body to an upright position, when the lower portion of the frame 29 will swing downwardly and rear-

wardly together with the frame formed by the side members 35 and their connections, causing the rod 40 to move downwardly in the grooves or guideways 16 to the lower ends thereof and the side bars 35 to move rearwardly thereover until the front ends of the slots 39 engage said guide rod 40. Thus, in addition to other persons, the chair is suitable for invalids, convalescents and others who may wish to change from one position of the chair to another without leaving the chair and without summoning help in order to effect the changes. Also, the chair may be readily folded or extended and when folded, as shown in Figure 4, will be relatively compact, thereby requiring but small storage space when not in use. A particular point of novelty, is the fact that the chair back frame 29 has its lower end connected by a lower frame including the side bars or links 35 at the rear ends of the latter and slidably connected to the legs 10 at the front so as to move up and down into sitting and reclining positions, thus providing two deformable parallelogrammoid quadrangles each with one side projecting to form the back of the chair and foot rest portions. The cross bar 15 forms a leg rest and middle cross bar to which the flexible sheet or strip 33 may also be connected if desired, with the sheet suspended between the end members and intermediately supported by the under knee bar.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the construction, operation and advantages of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes as herein described and the scope of the appended claims.

What is claimed is:

1. A chair comprising a supporting portion comprising spaced connected side frames, a back frame pivoted thereon and extending below the top of the supporting portion, a member pivoted to the lower portion of the back frame and slidably associated with the supporting portion to extend forwardly in a sitting position in a major extension below the supporting portion and adapted to move upwardly and forwardly toward a position tending to align with the back frame when the latter is swung rearwardly and downwardly to a reclining position, a cross bar between the upper portions of the side frames at the front, and a flexible supporting member extending between and anchored to the upper end of the back frame and near the forward end of the member pivoted to the lower portion of the back frame to rest on the cross bar.

2. A chair for use in a sitting or reclining position comprising a cradle and an articulated chair frame having a generally vertical upper portion and a generally horizontal portion pivoted thereto, said upper portion being pivotally suspended in the cradle for pivotal movement at the back of the cradle and having slidable connection with the front of the cradle for movement forwardly and backwardly at the lower portion thereof and upwardly and downwardly in the front portion of the cradle to different positions with the front of the lower portion projecting from the front of the cradle when at the bottom to form a foot rest, a flexible strip between

the ends of the chair frame adapted to form a chair back and seat extending downwardly at the front of the cradle in a sitting position and moved upwardly, when in a reclining position depressed in an arc intermediately and a cross bar between the sides of the chair frame on which the strip rests in sitting and reclining positions.

3. A chair comprising a cradle comprising connected sides, a back frame pivoted thereon, said back frame having portions extending below the top of the cradle, a member pivoted to the lower ends of said back frame and slidably associated with the front of the cradle for movement up and down and forwardly and rearwardly from a lower sitting position to an infinity of intermediate positions upwardly to a substantially horizontal position tending to be co-extensive with the back frame and vice versa, a cross bar between the sides of the cradle at the front and spaced from the top, and a flexible strip between the top of the back frame and the front end of the member over the cross bar.

4. A chair comprising a cradle comprising connected sides, a back frame pivoted thereon, said back frame having portions extending below the top of the cradle, a member pivoted to the lower ends of said back frame and slidably connected with the front of the cradle for movement up and down and forwardly and rearwardly from a lower sitting position to an infinity of intermediate positions upwardly to a substantially horizontal position tending to be co-extensive with the back frame and vice versa, a cross member between the sides of the cradle at the front and spaced from the top, and a flexible strip between the top of the back frame and the front end of the member over the cross member said chair being adapted to assume and being adjustable to positions of varied inclinations within said cradle by the shifting of the weight of a person reposed in the chair, above or below the hips.

5. A folding chair comprising a cradle including connected side members, a chair frame having a generally vertical upper portion suspended between its ends between the side members near the back and top portion of the cradle for pivotal movement thereon and having a lower portion in articulated connection therewith and slidably connected to the front portion of the cradle for movement to a lower position with its forward end projecting forwardly from the cradle to form a foot rest, a flexible strip extending between the ends of the chair frame including the top of the upper portion and the front end of the articulated section and when in a reclining position, to move upwardly in the cradle with the top of the chair frame moving rearwardly and vice versa and a cross member between the side members at the front and underlying an intermediate portion of the flexible strip.

6. A folding chair comprising a cradle including connected side members, a chair frame having a generally vertical upper portion suspended between its ends near the back and top portion of the cradle for pivotal movement therein and having a substantially horizontal lower portion in articulated connection therewith and slidably connected to the front portion of the cradle for movement to a lower position with its forward end projecting forwardly from the cradle to form a foot rest, a knee bar at the front of the cradle below the top thereof, means to limit the forward projection of the articulated member, means to limit the rearward movement thereof, means to guide and limit the upward and downward move-

ments of the articulated member to sitting and reclining positions, and a flexible sheet between the upper end of the upper vertical chair frame portion and the articulated member near its forward end overlying a cross bar between the upper front portions of the side members to form a back portion, seat and front portion in angular relation when the chair is used in a sitting position and to move upwardly to a substantially horizontal position slightly bowed downwardly in a reclining position.

7. A folding chair comprising a cradle including connected side members, a chair frame having a generally vertical upper portion suspended between its ends near the back and top portion of the cradle for pivotal movement therein and having a substantially horizontal lower portion in articulated connection therewith and slidably connected to the front portion of the cradle for movement to a lower position with its forward end projecting forwardly from the cradle to form a foot rest, a knee bar at the front of the cradle below the top thereof, means to limit the forward projection of the articulated member, means to limit the rearward movement thereof, means to guide and limit the upward and downward movements of the articulated member to sitting and reclining positions, and a flexible sheet between the upper end of the upper vertical chair frame portion and the articulated member near its forward end overlying a cross bar between the upper front portions of the side members to form a back portion, seat and front portion in angular relation when the chair is used in a sitting position and to move upwardly to a substantially horizontal position in a reclining position, said chair adapted to assume sitting and reclining positions automatically by shfting the weight of the body of a person reposed in the chair above the hips to move the chair frame back to a reclining position and upon the legs and feet while raising the body above the hips to assume a sitting position.

8. A combination sitting and reclining chair comprising a cradle having transversely connected sides having front and rear legs and upper horizontal arm portions, a back frame pivoted at the back of the cradle and arm portions and extending below said pivot, links pivoted to the lower end of the back frame and slidably connected to the front legs and also slidably connected to move up and down lengthwise of the front legs to provide a front foot rest portion when disposed in a downward position and to swing upwardly when the back frame is swung rearwardly in a direction co-extensive therewith, and a flexible strip between the top of the back frame and the forward ends of the links above one of the connections between the sides of the cradle at the front thereof.

9. A combination sitting and reclining chair comprising a cradle having transversely connected sides having front and rear legs and upper horizontal arm portions, a back frame pivoted at the back of the cradle and arm portions and extending below said pivot, links pivoted to the lower end of the back frame and slidably connected to the front legs and also slidably connected to move up and down lengthwise of the front legs to provide a front foot rest portion when disposed in a downward position and to swing upwardly when the back frame is swung rearwardly in a direction co-extensive therewith, and a flexible strip between the top of the back frame and the links near the front ends thereof above the upper connection between the sides of the cradle at the front thereof, said slidable connection of the links with the front legs being limited to limit the forward and rearward movements of the links relative to the legs and the pivotal movement of the back frame, and the slidable connection of the links upwardly and downwardly in the front legs being limited in their upward and downward movements thereby.

10. A chair comprising a cradle and a chair back frame, said cradle comprising side portions including arms and front and rear legs pivoted thereto, said side portions further comprising struts pivotally mounted at points low on said rear legs and extending to points of pivotal connection with the front legs high thereon, foldable ties pivotally connecting points high on the rear legs with points low on the front legs, said chair back frame being pivoted between the arms adjacent the upper ends of the rear legs to pivotally suspend the same within the cradle and extending below said pivot points, a knee bar connecting the front legs spaced from the upper ends thereof, a lower frame pivotally connected to lower portion of the chair back frame and slidably connected to the front legs to move forwardly and upwardly at the inner sides of the front legs when the chair back frame is swung rearwardly to assume a reclining position and downwardly and rearwardly to a sitting position, and a flexible sheet stretched between the top of the chair back frame and the front portion of the lower frame, the knee bar underlying the intermediate portion of the flexible sheet.

11. A chair comprising a cradle and a chair back frame, said cradle comprising side portions including arms and front and rear legs pivoted thereto, said side portions further comprising struts pivotally mounted at points low on said rear legs and extending to points of pivotal connection with the front legs high thereon, foldable struts pivotally connecting points high on the rear legs with points low on the front legs, said chair back frame comprising connected side members pivoted between the rear portions of the arms and extending below the same, said foldable struts including upper and lower pivoted sections adjacent the first struts and adapted to break and fold downwardly and open upwardly, cross bars connecting the said front legs near the top and bottom thereof, a frame pivoted to the lower end of the chair back frame and extending substantially horizontally and forwardly of the front legs, said lower frame having slidable connections with said front legs and slidable connection for movement upwardly and downwardly along the length of the front legs, independent means to limit both of said movements to sitting and reclined positions, said upper cross bar between the front legs forming an under knee bar in a sitting position and a flexible strip connected at one end to the cross member at the top of the chair back frame back and at the other end to the front cross bar of the lower frame, and means to limit the rearward movement of the lower frame, said chair back frame and lower frame adapted to assume sitting and reclining positions by shifting the weight of the body above and below the hips while reposed in the chair.

12. A chair comprising a cradle and a chair frame, said cradle comprising side portions including arms and front and rear legs pivoted thereto, said side portions further comprising struts pivotally mounted at points low on said rear legs and extending to points of pivotal con-

nection with the front legs high thereon, upper half struts pivoted to and extending downward from points high on said rear legs to points adjacent the first struts intermediate the ends thereof, lower half struts pivotally connected to said upper half struts at their forward ends and extending downward therefrom to said front legs and pivotally connected thereto, cross bars connecting said rear legs, substantially horizontal cross bars connecting said front legs near the upper ends thereof and adjacent the lower ends thereof, said chair frame comprising a substantially rectangular chair back, said chair back comprising side bars and end bars, said side bars being pivotally connected substantially mid-way of their lengths to the rear ends of said arms, and a rectangular leg rest frame pivoted to the lower end of the chair back to form with the chair back, two deformable parallelogrammoid quadrangular frames each with one end projecting, and a body rest comprising a flexible member suspended between the top end bar of the chair back and the forward end of the leg rest frame, and extending over the knee bar when said chair

back is swung rearwardly and said leg rest frame is moved upwardly and forwardly, means to slidably connect the leg rest frame to the front legs for movement forwardly and upwardly along the inner sides of said legs, means to limit said movements independently, means to limit the downward and rearward movements of said leg rest frame to a sitting position, and a foot rest on the forwardly projecting ends of the leg rest frame.

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