Nov. 18, 1958 E. F. HAMILTON 2,860,692

CHAIR

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Fig. 1.

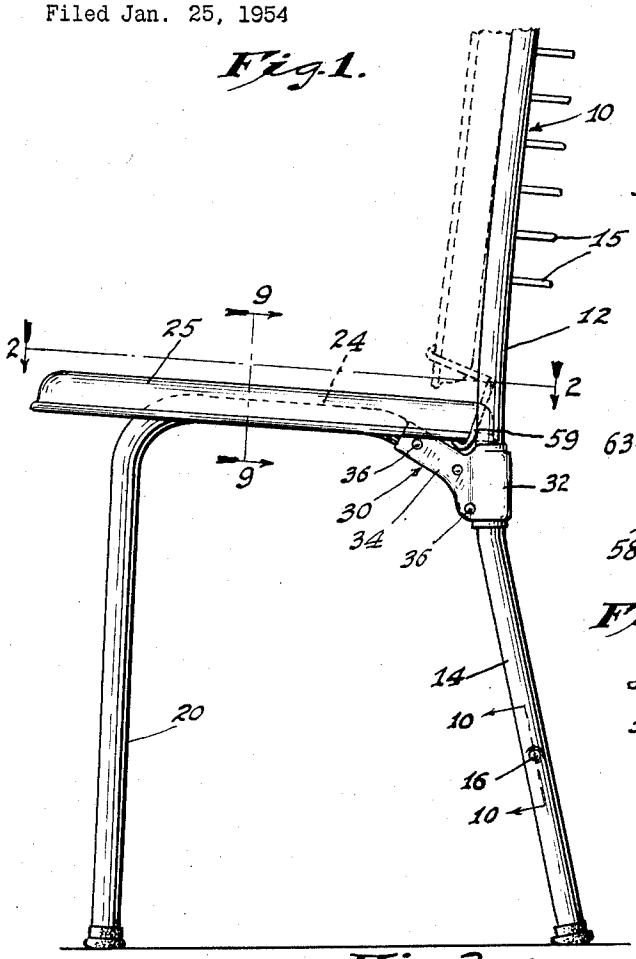


Fig. 2.

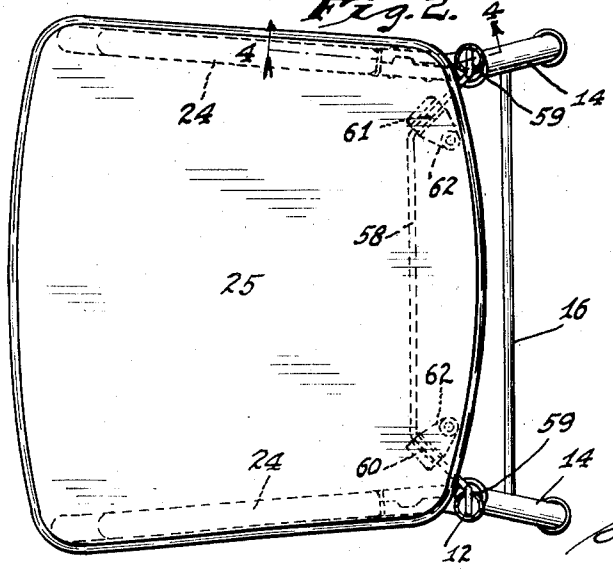


Fig. 7.

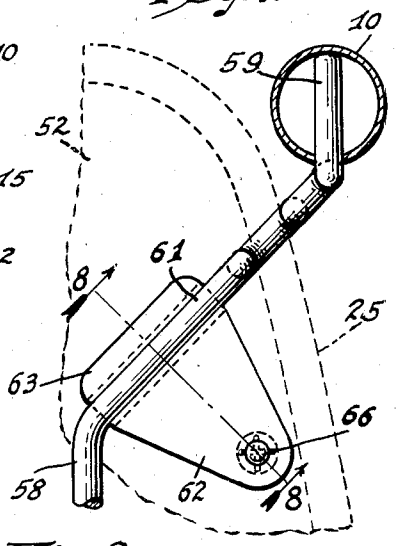


Fig. 8

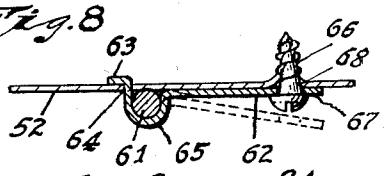


Fig. 9.

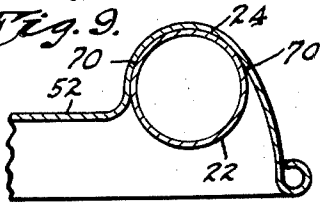
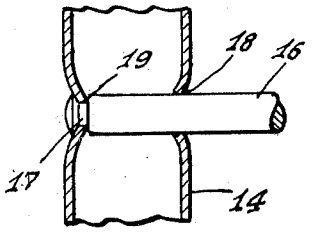


Fig. 10.



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Fig. 4.

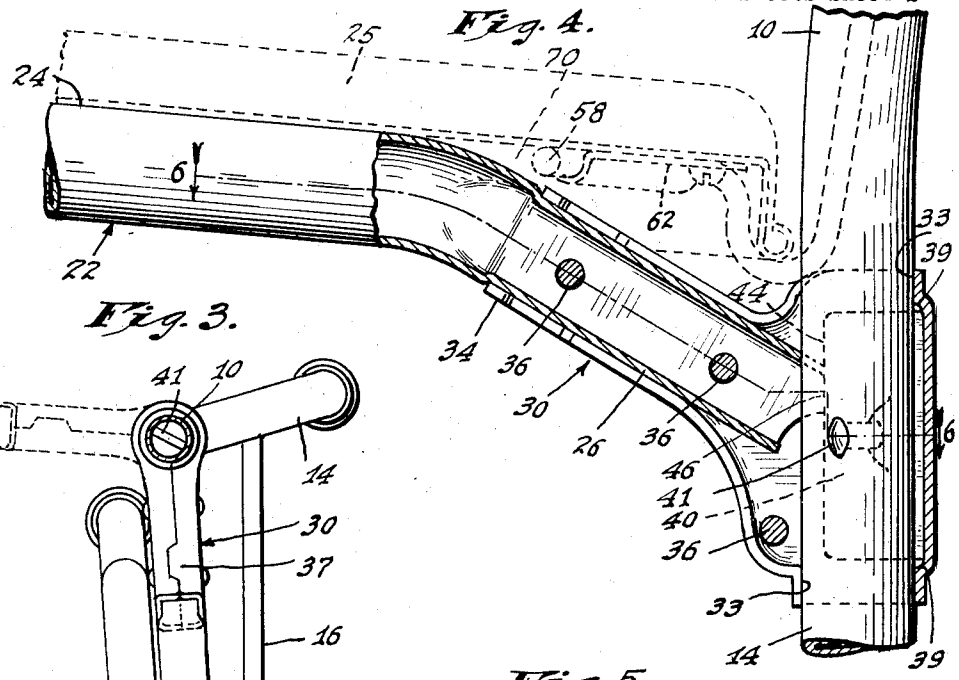


Fig. 3.

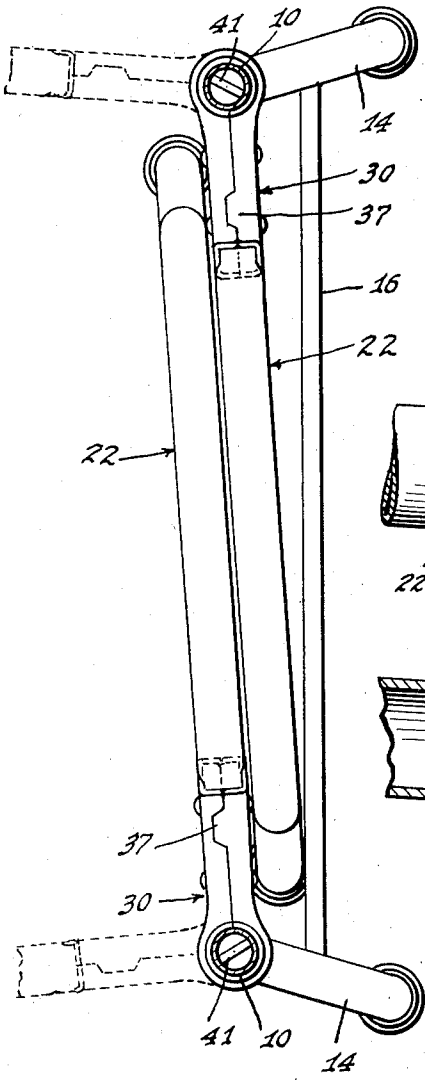


Fig. 5.

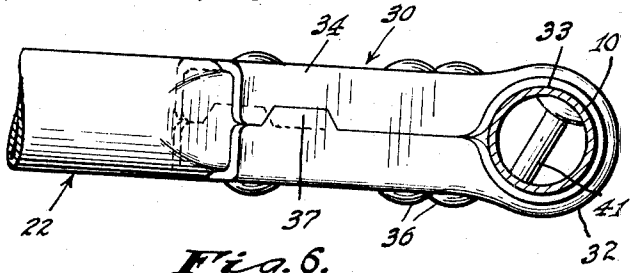
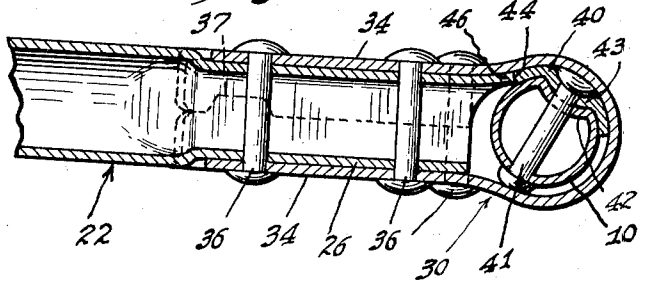


Fig. 6.



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CHAIR

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Application January 25, 1954, Serial No. 405,787

19 Claims. (Cl. 155—139)

This invention relates to furniture, with particular application to collapsible chairs in which the front legs and chair seat are foldable from a chair-operative position into a storage position in which they are disposed substantially in the plane of the chair back.

The present invention relates primarily to the type of chair just indicated, and has for an object thereof to simplify and generally improve the construction and lessen the cost of manufacture and assembly of such articles. Another object is to provide a chair which when its parts are disposed in chair-forming position will offer but little indication of its collapsibility. A further object is to provide a chair whose collapsibility and extension from collapsed position may be very readily and easily effected. A still further object is to produce a collapsible chair which lends itself to manufacture largely from sturdy and economical metal tubing and sheet metal.

In carrying out my invention in a preferred form to achieve these and other objects, I provide from metal tubing a generally U-shaped back-member the bight portion of which frames the chair back and the legs of which form the rear supporting legs for the chair. Pivotally extending from each such leg is a generally L-shaped side-member, the horizontal stretch of which forms a seat-support and the vertical stretch of which forms a front leg of the chair; and each such side-member is horizontally swingable from a collapsed position generally co-planar with the chair back to an operative position generally perpendicular thereto. Means are provided for controlling such swinging to properly position the side-members. A chair seat is provided, and means are provided for pivotally connecting it to the chair back on a horizontal, transverse axis to permit the seat to swing between an upright, retracted position in which it lies against the chair back, to a seat-forming position in which it rests on the seat-supporting stretches of the side-members. With such construction, chair collapse is readily effected by a simple upward swing of the chair seat followed by a simple inward swing of each side-member; reversal of such steps effects an easy extension of the chair from storage condition to chair-operative condition. Other features will be apparent from the more detailed description following, in which:

Fig. 1 is a side elevation of a chair of my invention, the seat being shown in full lines in seat-operative position and in dotted lines in retracted position;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged horizontal section similar to Fig. 2, and showing the legs in retracted position;

Fig. 4 is a fragmental detail taken generally on the line 4—4 of Fig. 2;

Fig. 5 is a plan view of the detail shown in Fig. 4;

Fig. 6 is a horizontal section taken along the line 6—6 of Fig. 4;

Fig. 7 is an enlarged detail of a portion of Fig. 2, with the seat shown in phantom outline.

Fig. 8 is a vertical section taken on the line 8—8 of Fig. 7;

Fig. 9 is a section taken on the line 9—9 of Fig. 1; and

Fig. 10 is a section taken on the line 10—10 of Fig. 1.

The chair shown in the drawings comprises a back-member 10 fashioned from metal tubing into a generally inverted U-shape and positioned in a transverse plane to provide that the bight-portion 12 of such member frames the back of the chair and the legs 14 of such member serve as the rear supporting legs for the chair. Means such as the transverse bars 15 extend across the bight 12 of the back-member to serve as a back-support, and those bars and a transverse stretcher 16 interconnecting the rear legs 14 near their lower, free ends add rigidity to the back-member 10. The stretcher 16 desirably is made from a length of metal rod, of a diameter less than that of the rear chair legs 14, and necked to provide each of its ends with an integral, axially extending portion 17 of a diameter smaller than that of the body of the stretcher. An opening 18 is provided in the inner wall of each tubular leg 14, and such opening 18 is of a size to snugly accommodate the insertion therethrough of the full diameter of the stretcher; and an opening 19 is provided in the outer wall of each leg 14 of a size to snugly accommodate the smaller-diameter extension 17. After the stretcher is assembled in the back-frame, with the full-diameter portion at each end of the stretcher extending through its opening 18 and clear through the interior of the tubular leg 14, with the shoulder of the stretcher abutting the interior surface of the outer wall of such leg 14 and the extension 17 protruding through the outer-wall opening 19, the portion of extension 17 so protruding is staked or otherwise headed over to hold stretcher 16 and rear legs 14 rigidly assembled.

Each front leg 20 of the chair is formed as a vertical stretch of a generally L-shaped side-member 22 pivotally connected to the associated rear chair leg for horizontal swinging thereabout between a retracted position generally co-planar with the chair back and a chair-operative position generally perpendicular thereto to position the front leg 20 well forwardly of the back-member. An integral stretch of each rear leg 14 serves as the hinge-pin-means for each such pivotal connection. The horizontal stretch of the side-member 22 forms a seat-support 24 upon which a chair-seat 25 may rest when the side-members are disposed in chair-operative position. Desirably the side members 22 are formed of metal tubing of circular cross-section, but the stretch 26 thereof at the rear end of each seat-support 24 is deformed into rectangular or other non-circular section, for a purpose hereinafter apparent.

Fixed to such rear end-stretch 26 of each seat-support 24 in a bracket 30 conveniently of heavy sheet-metal formed into a general U-shape to provide intermediate its ends a vertically disposed socket-member 32 which has spaced upper and lower annular faces 33 loosely embracing a rear chair-leg 14; and from both ends of the socket-forming portion the metal of such bracket extends forwardly to provide opposed channel-like jaws 34 between which the rear stretch 26 of the seat support 24 is firmly held. For holding together the opposed jaws 34 and seat-support-stretch 26, they are interconnected by tension pins 36 extending between the jaws 34 and through the seat-support end-stretches 26. Those pins 36, together with the non-circular embrace of the seat-support by the jaws 34, prevent relative twisting thereof. Relative sliding of the jaws, which would of course tend to unwrap the socket-portion 32, is further prevented by tabs 37 extending from the edges of one jaw to interfit

in recesses provided in the adjacent walls of the opposite jaws.

Intermediate the upper and lower annular faces 33, the socket-member 32 is enlarged through shoulders 39 to a larger diameter portion to accommodate a boss formed as a plate 40 of heavy sheet metal shaped as a cylindrical segment adapted to lie along the outer surface of the rear chair-leg 14. A rivet 41, whose head is countersunk into the plane of the plate 40, extends through the plate 40 and the chair leg to hold the plate onto the leg. As shown, the tubing of the leg is provided with an inwardly directed offset 42 into which nests an inwardly directed offset 43 of the plate 40. This arrangement facilitates locating the plate properly on the leg; and the recessed outer surface of the plate-offset 43 permits the head of rivet 41 to lie in countersunk fashion in that plate. Only one rivet need be provided for each plate, as a single one prevents vertical and horizontal sliding, and the cylindrical mating of the plate 40 and chair leg 14 prevents twisting.

The downwardly- and upwardly-facing walls of shoulders 39 formed adjacent the upper and lower annular faces 33 of the socket-member fix the socket along the chair leg by their engagement with the upper and lower end walls of the plate 40; and since the plate 40 is in the form of a segment which extends circumferentially around the chair leg 14 only a limited arcuate distance, its side wall 44 offers itself as an abutment surface adapted to be engaged by portions of the seat-support or bracket to limit swing of the associated side-member. Desirably, and as shown, I employ the extreme end edge of the seat-support 24 to serve as a nose 46 to so engage the plate side-wall. The location of the plate 40 is in the rear, outer quadrant of the chair leg 14; whereby outward swing of the seat-support 24 is limited to the desired generally fore-and-aft position by the nose 46 abuttingly engaging with the plate side-wall during swinging of the side-member into chair-operative position.

The seat 25 is pivotally mounted to the chair back on a transverse axis to permit it to be swung between an upright storage position lying against the chair back, and a seat-operative position in which it rests on the seat-supporting stretch 24 of each side-member 22. Desirably, such pivotal connection of the seat to the chair back is made by fastening to the seat 25 a generally U-shaped yoke 58 of metal rod, of circular cross-section, the ends of which are turned outwardly to provide transversely extending, aligned fingers 59 pivotally received in horizontally extending openings provided in the back member 10. Intermediate the fingers 59, the yoke-rod is bent to provide non-aligned stretches 60 and 61 lying along a frame-plate 52 of the seat but extending transverse to the axis of the fingers 59. Along those non-aligned, transverse stretches 60—61, the yoke 58 is clamped to the seat-plate 52, desirably by the clamping structures shown. Each clamping structure comprises a clamp-plate 62 having a tongue 63 insertable through an opening 64 provided in the seat-plate 52, with the clamp-plate 62 underlying the one of the yoke-stretches 60—61. The clamp plate 62 is provided with an upwardly-open channel 65, formed by integrally offsetting the metal of the plate 62, to embrace the associated stretch 60—61. A screw 66 extends through an opening 67 in the clamp plate 62 at an end thereof opposite the tongue 63, and into holding relation with an opening 68 provided in the seat-plate. The arrangement is such that with the lower surface of tongue 63 bearing against the upper surface of the seat-plate 52, and with the intermediate portion of the clamp-plate 62 bearing upwardly against the yoke-stretch 60—61, the clamp-plate portion containing opening 67 is not in engagement with the seat-plate 52. Thus, in drawing the screw 66 tight to force such engagement, there occurs a resilient deformation of the seat-plate 52 or clamp-plate 62, or both. As a result, the yoke-stretches 60—61 are held firmly to the seat, and the existing stressed condition of the members imposes forces resisting any tendency of any of the elements to work loose.

Desirably, portions of the metal of the seat-plate 52 are pressed upwardly to provide laterally-spaced fore-and-aft grooves 70 which not only stiffen that plate but receive between their walls the seat-supports 24 when the seat 25 is in chair-forming position, to prevent collapsing of the chair legs except when the seat is raised. The sloping walls of each groove 70 cooperate with the circularly cross-sectioned seat-support 24 to smoothly cam the side-member 22 into proper angular relation with respect to the back even though the unfolding of the side-member is slightly erroneous, as due to inaccurate size of the segment plate 40, failure of the user to swing the side-member to its limiting position, or other reasons.

In collapsing a chair so constructed, the seat is retracted merely by applying an upward force to the seat to cause it to swing about the fingers 59 to an upright position in which it lies against the chair back. Then, successively, each front leg 20 with its associated seat-support 24 is swung as a unit inwardly about the axis of its socket 32; and when both such side-member units are so swung they are disposed generally parallel and generally coplanar with the chair back, as indicated in Fig. 3. To extend such a chair into chair-forming position, each side-member unit is swung outwardly to the limit permitted by engagement of nose 46 with the segment side-wall 44, and in such position lies in a general fore-and-aft plane. A simple forward pull to the seat 25 causes it to pivot downwardly about fingers 59 to come to rest on the seat-supports to position and hold the side-members in proper position as above described.

A folding chair constructed in the manner of my invention is very rigid and sturdy, and should remain so even after a long period of rough usage. The chair gives little, if any, indication of its collapsibility, either from the standpoint of appearance or of feel to the user.

Although I have shown and described a specific embodiment of my invention, I intend to cover all changes and modifications of the example herein chosen for purposes of disclosure, which do not constitute departure from the spirit and scope of the invention as set forth in the appended claims.

I claim as my invention:

1. In a chair, a frame, a means pivotally suspending a chair seat therefrom, said means comprising a generally U-shaped yoke of metal rod of circular cross-section having its ends turned outwardly to form transversely extending aligned fingers, said fingers being pivotally received in transversely extending openings provided in said frame, the intermediate stretch of said yoke formed to possess non-aligned stretches extending transverse to the axis of said fingers and along the bottom of said seat, and means acting on said stretches to hold said yoke to said seat.

2. The invention set forth in claim 1 wherein said holding means comprise plates of sheet-metal each having an integrally offset portion forming a channel the walls of which embrace said rod, and means holding said plates to said seat.

3. The invention set forth in claim 1 wherein said holding means comprises a clamp-plate for each of said stretches, each clamp-plate formed to have an intermediate portion underlying the associated stretch and having on one side of said intermediate portion a tongue, said seat being provided with an opening, said tongue being adapted to be inserted through said opening to downwardly engage said seat to fix, in co-operation with the engagement of said intermediate clamp-portion on said rod, the parts-unstressed spacing between said seat and the clamp-portion opposite said tongue, and means operative between the seat and said opposite clamp-portion for changing the spacing therebetween to impose

bending stress in said clamp-plate operative to firmly press said rod to said seat.

4. The invention set forth in claim 3 wherein in the parts-unstressed position said opposite clamp-portion is spaced from said seat, the spacing-changing means being operative to draw toward one another said opposite clamp-portion and said seat.

5. The invention set forth in claim 4 wherein said spacing-changing means comprises a single screw-means operative between said seat and said opposite clamp-portion to draw them toward one another.

6. In a collapsible chair, a back member comprising a continuous length of metal stock bent into the general shape of an inverted U, the bight portion of which frames a back for the chair and the legs of which provide rear supporting legs of the chair, a seat for said chair, a pair of seat-supporting structures each including a front leg, said structures being pivotally associated respectively with said rear supporting legs for horizontal swinging between retracted positions generally coplanar with said back member and seat-supporting positions in which the front legs are disposed well forwardly of said back member to provide front supporting legs for said chair, each of said seat-supporting structures being provided with a socket pivotally embracing the associated rear supporting leg, and means carried by each rear supporting leg and within said socket to limit swing of the seat-supporting structures to seat-supporting position with respect to said back member.

7. The invention set forth in claim 6, wherein said seat is swingable between a retracted position generally coplanar with said back member and a horizontal position extending forwardly of said back member and supported by said structures, means acting between each socket and the leg it embraces for limiting forward swinging of the seat-supporting structure, and means on said seat spaced from said back and engageable with said structures when said seat is in supported horizontal position to prevent swinging of the seat-supporting structures toward the back member.

8. A collapsible chair, comprising a back member providing rear supporting legs, a seat for said chair, a pair of seat-supporting structures each carrying a front leg and each pivotally associated with said back member for horizontal swinging between a retracted position generally coplanar with said back member and a seat-supporting position in which the front legs are disposed well forwardly of said back member to provide front supporting legs for said chair, said seat being movable from a retracted position generally coplanar with said back member to a generally horizontal position extending forwardly of said back member and supported by said seat-supporting structures, said seat having on its lower surface laterally-facing abutments operative to laterally engage said seat-supporting structures to prevent swinging thereof except when the seat is raised off said structures, said chair including a metal seat-plate forming a bottom of said seat, said seat abutments being the walls of downwardly opening grooves pressed into said seat-plate.

9. The invention set forth in claim 8 wherein each seat-supporting structure is a horizontal generally L-shaped member formed from a length of metal of arcuate cross-section adapted to be cammed by engagement with said groove-walls into predetermined angular position with respect to said back member.

10. The invention set forth in claim 9 wherein said side members are fashioned from lengths of metal tubing bent to provide the shape indicated.

11. A collapsible chair, comprising a back member providing rear supporting legs, a seat for said chair, a pair of seat-supporting structures each carrying a front leg and each pivotally associated with said back member for horizontal swinging between a retracted position generally coplanar with said back member and a seat-supporting position in which the front legs are disposed well forwardly of said back member to provide front supporting legs for said chair, said back member including a pair of spaced members each possessing a generally vertical stretch, each of said seat-supporting structures being provided with a socket pivotally embracing the generally vertical stretch of one such member to provide the said pivotal association of said structure and said back member, each said socket being provided with an intermediate portion of larger diameter than that of the associated generally vertical stretch embraced thereby to provide a longitudinally-extending annular groove between said generally vertical stretch and said socket member, and means located in said groove for positioning said socket along said generally vertical stretch but permitting swinging therearound.

12. The invention set forth in claim 11 wherein said socket is provided by the intermediate stretch of a sheet-metal bracket formed into a general U-shape the legs of which form jaws, said seat-supporting structure including a member received between said jaws, and pin means extending through both of said jaws and through said member to hold them assembled.

13. The invention set forth in claim 12 including a tab integrally extending from an edge of one of said jaws and interfitting with a recess provided in an edge of the other to restrain relative sliding of the two jaws.

14. The invention set forth in claim 12 wherein the bracket-legs and that portion of the member embraced thereby are of non-circular cross-section.

15. The invention set forth in claim 11 wherein said means comprises a boss provided on said generally vertical stretch, said boss having a laterally directed abutment, and means movable with said socket member for engaging said abutment to limit swing of the seat-supporting structure to its seat-supporting position.

16. The invention set forth in claim 15 wherein said boss comprises a piece of steet metal fashioned into a cylindrical segment, an edge of which serves as said laterally-directed abutment.

17. The invention set forth in claim 15 wherein each said seat-supporting structure comprises a piece of metal tubing a portion of the end of which provides a nose serving as said abutting means.

18. A collapsible chair, comprising a back member providing rear supporting legs, a seat for said chair, a pair of seat-supporting structures each carrying a front leg and each pivotally connected with said back member by means located at a level well above the lower end thereof for swinging movement about a generally vertical axis between a retracted position generally coplanar with said back member and a seat-supporting position in which the front legs are disposed well forwardly of said back member to provide front supporting legs for said chair, said rear supporting legs extending downwardly and rearwardly below said means to a point well rearwardly of the axes of swinging movement of the seat-supporting structures and a stretcher extending between the downwardly and rearwardly extending portions of said rear supporting legs and so located thereon as to permit one of said seat-supporting structures to swing rearwardly about its axis through the common plane of the axes of seat-supporting structures.

19. A collapsible chair, comprising a back member providing rear supporting legs, a seat for said chair, a pair of seat-supporting structures each carrying a front leg and each pivotally associated with said back member for horizontal swinging between a retracted position generally coplanar with said back member and a seat-supporting position in which the front legs are disposed well forwardly of said back member to provide front supporting legs for said chair, and means pivotally connecting said seat to said back member on a horizontal axis for swinging movement from a retracted position generally coplanar with said back member to a generally horizontal position extending forwardly of said back member

and supported by said seat-supporting structures, said seat and seat-supporting structures having cam surfaces interengageable upon movement of said seat into horizontal position to cam each seat-supporting structure to a predetermined angular position with respect to said back member.

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