

Feb. 13, 1951

J. A. CHRISTENSEN

2,541,036

FOLDING CHAIR

Filed April 18, 1946

4 Sheets-Sheet 1

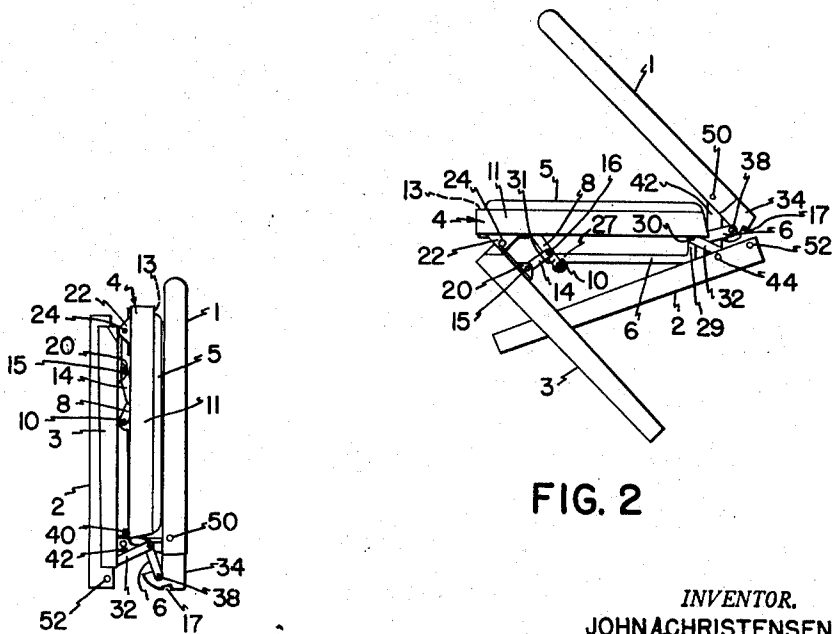
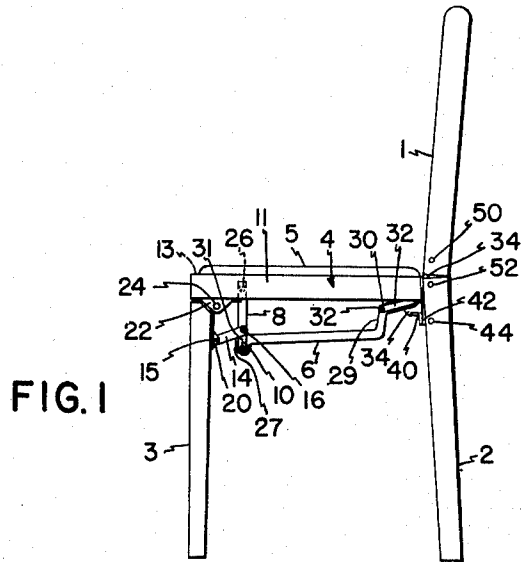


FIG. 3

INVENTOR.
JOHN A. CHRISTENSEN

BY *David Rines*
ATTORNEY

Feb. 13, 1951

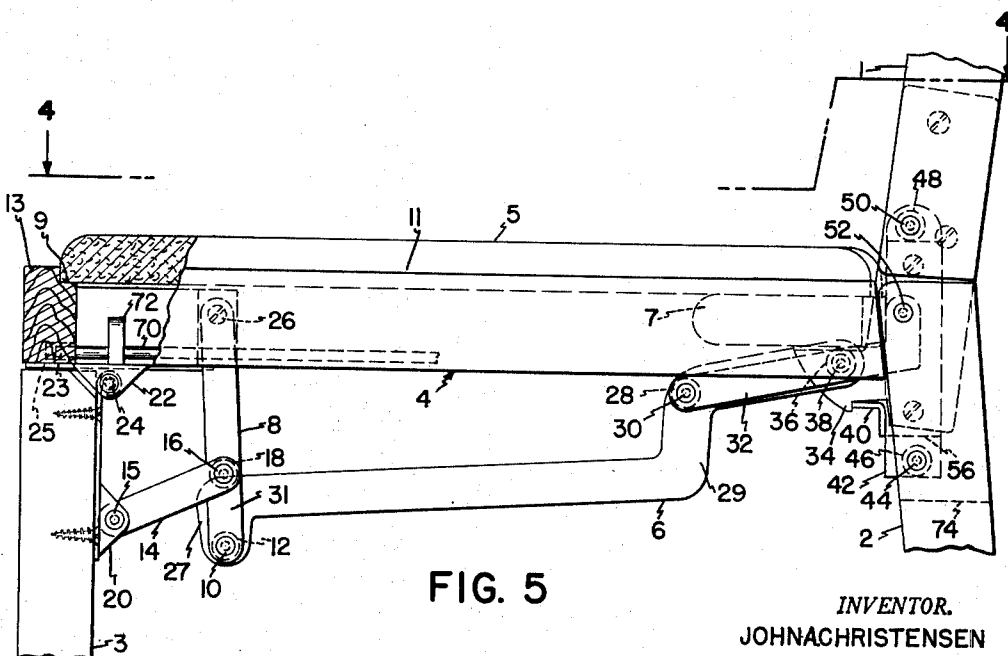
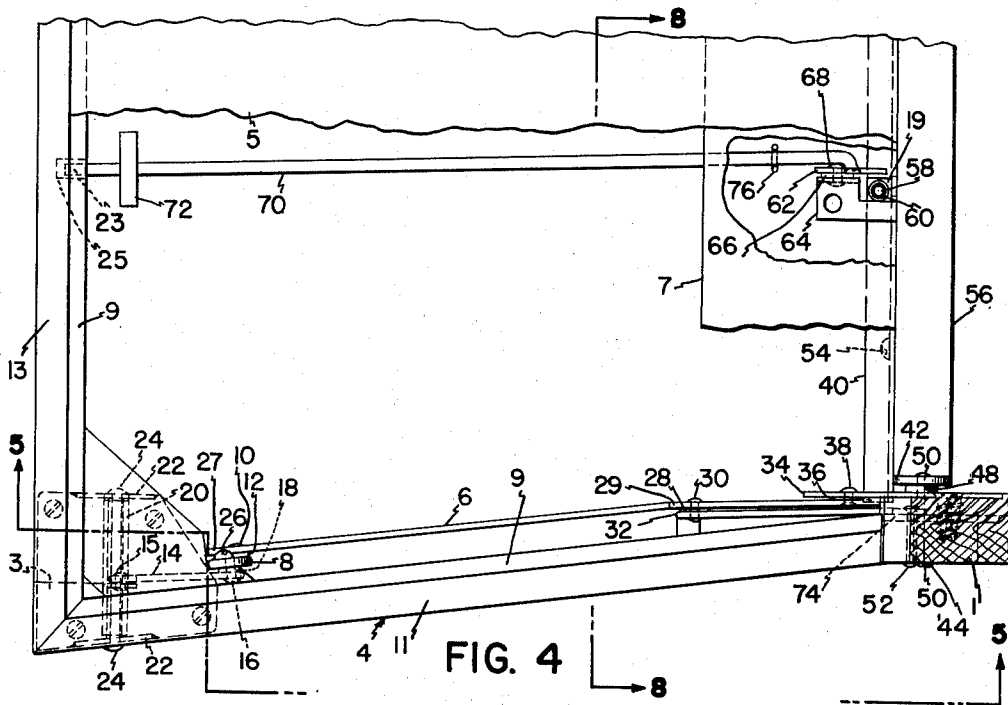
J. A. CHRISTENSEN

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4 Sheets-Sheet 2



INVENTOR.
JOHN A. CHRISTENSEN
BY *David Rines*
ATTORNEY

Feb. 13, 1951

J. A. CHRISTENSEN

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4 Sheets-Sheet 3

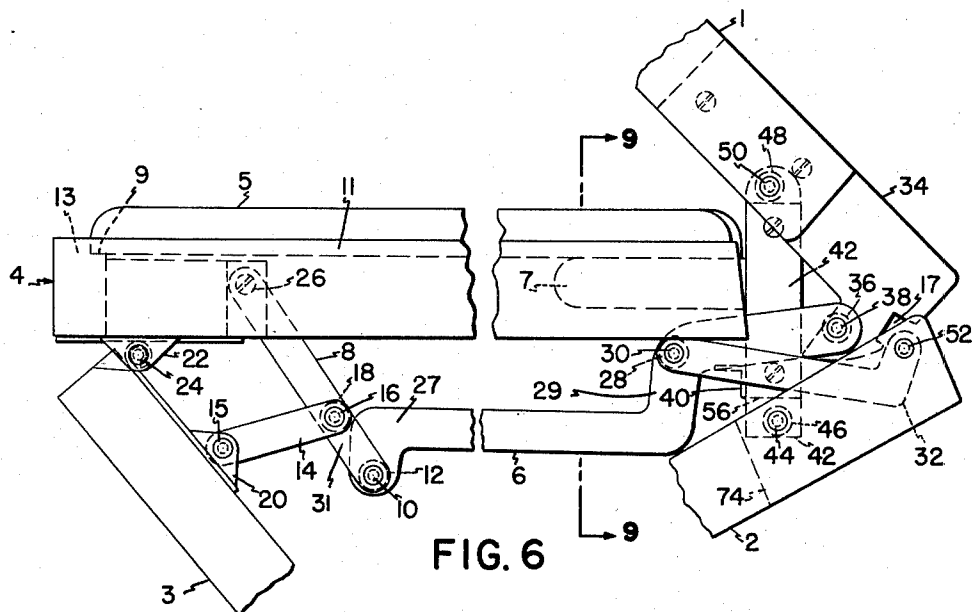


FIG. 6

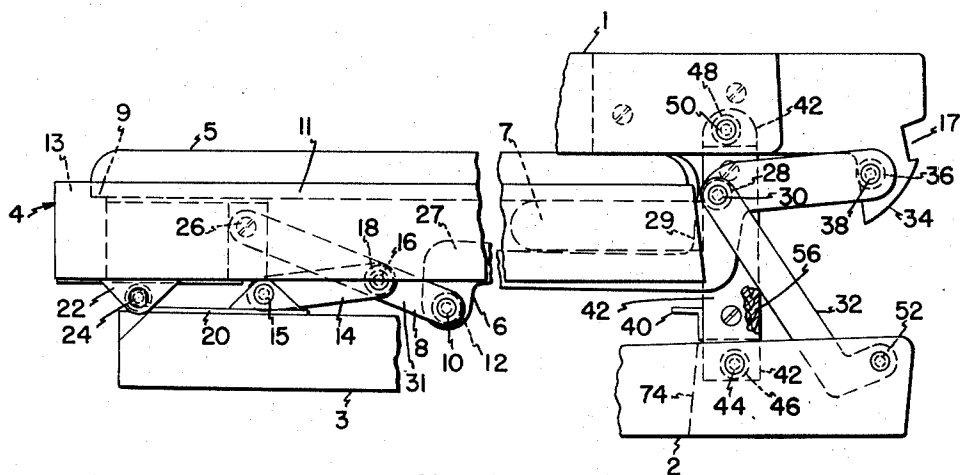


FIG. 7

INVENTOR.

JOHN A. CHRISTENSEN

BY

David P. Rues

ATTORNEY

Feb. 13, 1951

J. A. CHRISTENSEN

2,541,036

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4 Sheets-Sheet 4

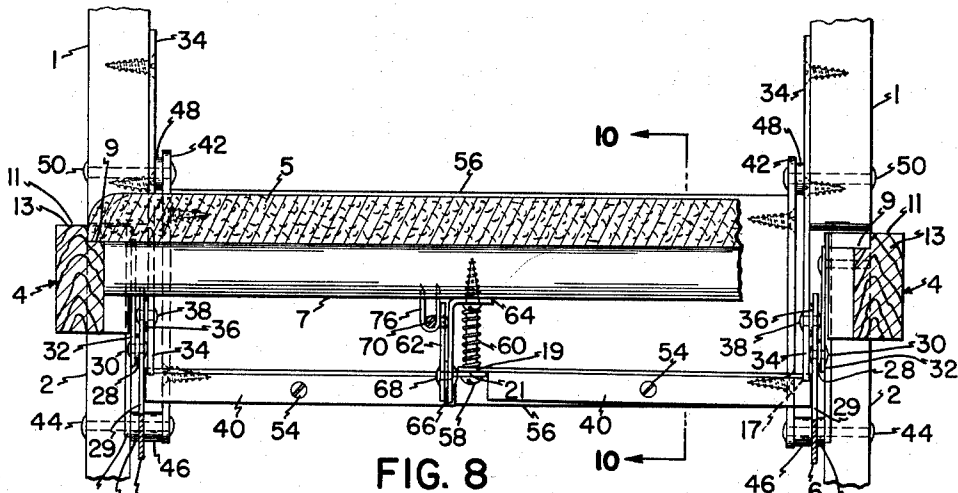


FIG. 8

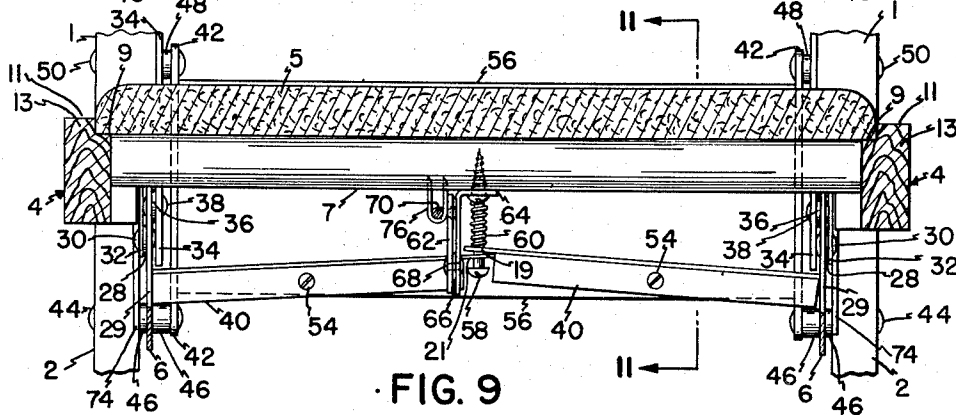


FIG. 9

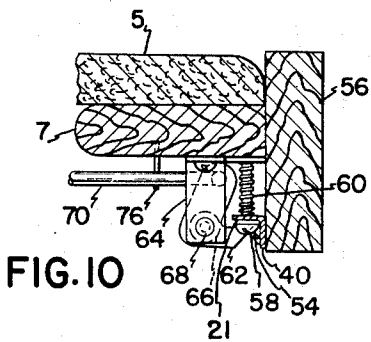


FIG. 10

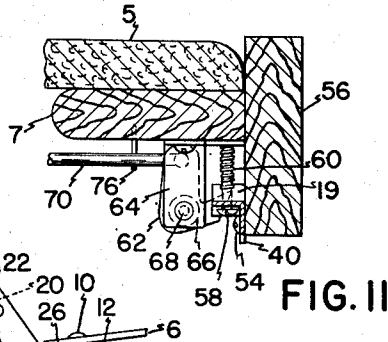


FIG. 11

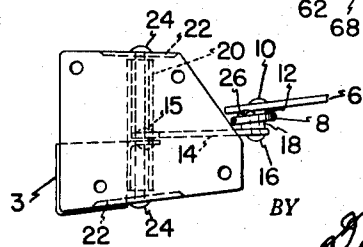


FIG. 12

INVENTOR.
JOHN A. CHRISTENSEN

BY *David R. Rieck*
ATTORNEY

UNITED STATES PATENT OFFICE

2,541,036

FOLDING CHAIR

John A. Christensen, Worcester, Mass., assignor
to Bridge Tables & Novelties, Inc., Lowell,
Mass., a corporation of Massachusetts

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5 Claims. (Cl. 155-148)

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The present invention relates to folding chairs, and more particularly to chairs of the type in which the front and rear legs and the back member are simultaneously foldable with respect to the seat member into collapsed or closed and extended or open positions, so as to permit of collapsing the chair into very small compass when not in use.

An object of the invention is to improve upon folding chairs of the above-described character, with the end in view of simplifying their construction, so as to reduce the number of parts employed and the labor of assembly, and consequently reducing their cost of manufacture, but without detracting in the slightest from the sturdiness and ruggedness of the chair when extended or its compactness when collapsed.

Other and further objects will be explained hereinafter, and will be particularly pointed out in the appended claims.

The invention will now be more fully described in connection with the accompanying drawings, in which Fig. 1 is an elevation of a chair embodying the invention in preferred form, shown in fully open or extended position; Fig. 2 is a similar view, showing the chair partly collapsed; Fig. 3 is still another similar view, showing the chair fully folded or collapsed; Fig. 4 is a horizontal section taken upon the line 4-4 of Fig. 5, looking downward in the direction of the arrows, with parts broken away for clearness; Fig. 5 is an elevation corresponding to Fig. 1, but upon a larger scale, and partly in section upon the line 5-5 of Fig. 4, looking in the direction of the arrows; Figs. 6 and 7 are similarly enlarged views, with parts broken away, respectively corresponding similarly to Figs. 2 and 3; Fig. 8 is a vertical section taken upon the line 8-8 of Fig. 4, looking in the direction of the arrows, showing the latching mechanism occupying the latched position; Fig. 9 is a vertical section similar to Fig. 8, but with the latching mechanism unlatched; Figs. 10 and 11 are vertical sections taken, respectively, upon the lines 10-10 and 11-11 of Figs. 8 and 9, looking in the direction of the arrows; and Fig. 12 is a fragmentary view corresponding to Fig. 4, but with some of the parts omitted for clearness.

The folding chair of the present invention is of the type in which a back member 1 folds forward into collapsing relation to the upper face of a seat member 4, and in which, simultaneously therewith, two rear legs 2 and two front legs 3 fold respectively forward and rearward toward each other into collapsing relation to the under

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face of the seat member 4. The back member 1 may be constituted of the customary two wood side bars rigidly connected together to fold as a unit by wood cross bars, not shown. The two wood rear legs 2 may be similarly connected together rigidly by the customary wood cross bars, not shown, so as similarly to move as a unit, and the same for the wood front legs 3. As illustrated more particularly in Figs. 4 and 5, the seat member 4 may be constituted of a four-sided open frame having a wood rear bar or cleat 7, wood side bars or cleats 11 and a wood front bar or cleat 13. The bars 11 and 13 may be secured together in any desired manner, as by means of glue, nails, screws, and the like. The front bar 13 is shown in Fig. 4 wider than the rear bar 7. As the legs are positioned at the corners of the four-sided frame of the seat 4, this enables the front legs 3 to be spaced farther apart than the rear legs 2, in order to permit the rear legs 2 to fold compactly between the front legs 3. The side bars 11 and the front bar 13 are rabbeted, as shown at 9, to provide an L-shaped recess for the support of a seating portion 5.

A wood cross-bar support 56 is secured to the rear of the bar 7 in any desired manner, as by means of nails or screws. The bar 7 and the cross bar 56 thus constitute, in effect, a unitary support member disposed at the rear of the seat member 4 for pivotally supporting the back member 1 and the rear legs 2. According to the preferred embodiment of the invention that is illustrated and described herein, this pivoting is effected through the medium of two metal plates 42 respectively secured to the ends of the cross bar 56 in any desired manner, as by means of screws, two angle-shaped metal plate members 34 similarly secured to the inner faces of the side bars of the back member 1 and two metal plates 74 similarly secured to the inner faces of the rear legs 2. The back member 1 is shown pivoted at 50 to the rear of and above the seat member 4 by means of the plates 34, pivoted to the upper ends of the plates 42. The rear legs 2 are shown pivoted at 44 to the rear of and below the seat member 4 by means of the plates 74, pivoted to the lower ends of the metal plates 42. Each pivot 44 is shown in Figs. 4 and 8 as constituted of a pintle extending through the wood of a rear leg 2 and the corresponding metal plates 74 and 42, as well as through a washer 46 interposed between these plates 74 and 42. Each pivot 50 is similarly shown constituted of a pintle extending through the wood of a side

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bar of the back member 1 and the corresponding metal plates 34 and 42, as well as through a washer 48 interposed between these plates 34 and 42.

The preferred mechanism will now be described for pivoting the front legs 3 at the front of the seat member 4. Metal plates 20 are secured, in any desired manner, to the upper ends of the front legs 3, on their faces opposite to the rear legs 2. The upper ends of the plates 20 are shown provided with eyes through which extend pintles 24 for pivoting the front legs 3 below the seat member 4 between the arms of U shaped plates 22 secured to the under face of the seat member, near the corner junction of the side bars 11 and the front bar 13.

The front legs 3 may be actuated about their pivots 24 into and out of collapsed or closed position simultaneously with the actuation of the back member 1 by means of connecting links 6. A single connecting link 6 and associated mechanism would theoretically be effective, thus to fold and extend the front legs 3 rearwardly and forwardly as a unit, but it is preferred to employ two connecting links 6, one at each side of the chair, connected in the same way to the respective front legs 3 and the corresponding side bars of the back member 1. For brevity, one only of these connecting links 6 and its associated mechanism will be described.

The rear end of the connecting link 6 is shown pivoted at 38, below the pivot 50, to an angularly disposed forwardly projecting portion of the back-member metal plate 34, with an interposed washer 36. The point 38 of pivotal connection of the connecting link 6 to the metal plate 34 is below the seating portion 5 of the seat member 4, as illustrated in Fig. 5, at a time when the chair is in extended or open position, but it becomes raised to the level of the seating portion 5, as shown in Figs. 3 and 7, when the chair is collapsed. The front end of the connecting link 6 is shown pivoted to the under side of a link 8 at 10, with an interposed washer 12. The upper end of the link 8 is pivoted at 26 to one side bar 11. The rear end of a link 14 is pivoted at 16 to an intermediate point of the link 8 with an interposed washer 18, and its front end is pivoted at 15 to the lower end of the front plate 20. The links 8 and 14 thus constitute a toggle.

Movement of the back member 1 from the open or extended position of Figs. 1, 4 and 5, through the partly collapsed position of Figs. 2 and 6, toward the fully collapsed position of Figs. 3 and 7, therefore, will result in the connecting link 6 being actuated backward toward the right, thereby carrying with it the pivotal point 10. The link 8 will therefore be caused to swing toward the right, about its upper pivot 26, forcing collapse of the front leg 3 through the link 14. Movement of the back member 1 in the opposite direction, from the collapsed position of Figs. 3 and 7, toward the extended position of Figs. 1, 4 and 5, will effect reversal of these collapsing movements, thus effecting actuation of the front legs 3 toward the open or extended position of the chair.

The toggle links 8 and 14 are never in alignment, not even in the open or uncollapsed position of the chair. On the contrary, they are shown in Figs. 1 and 5 disposed at a substantial angle, larger than 90°. The angle between the links 8 and 14 should preferably be such as theoretically to align the pivots 15, 16 and 38 substantially when the chair occupies the uncollapsed or extended position shown in Figs. 1, 4

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and 5. Accidental collapse of the back member 1 of the chair, as will hereinafter appear, is prevented by a novel latch mechanism. The back member 1 being thus securely held in place by the latch mechanism, it is enabled to exert a maximum thrusting force upon the front legs 3, through the substantially aligned pivots 15, 16 and 36 of the links 6 and 14, for keeping the front legs also firmly in open position. The thrusting force is increased through the leverage afforded by providing the link 6 with a downward projection for pivoting it at 10 to a portion 31 of the toggle link 8 that extends below the common pivot 16 of the links 8 and 14 when the chair occupies the extended or uncollapsed position.

It is not practicable, however, to take full advantage of the theoretical alinement of the pivots 15 and 16 of the link 14 with the pivotal connection 38 of the connecting link 6 to the back member 1, since the pivots would then occupy a dead-center position, which might make collapse of the chair difficult. The pivot 16 is therefore shown disposed slightly above the straight line of the pivots 15 and 38 when the chair occupies its fully unopened position. The connecting link 6 could, of course, be similarly pivoted to the toggle link 14 instead of to the toggle link 8.

The same collapsing simultaneous movement of the back member 1 and the front legs 3 into the position of Figs. 3 and 7, and the same reverse movement of the back member 1 and the front legs into the fully unfolded position of Figs. 1, 4 and 5, results also in corresponding movement of the rear legs 2. This is attained through an exceedingly simple construction comprising only a single additional link 32 for linking the connecting link 6 to the rear legs 2. The front end of this fourth link 32 is pivoted at 30 to an intermediately disposed point of the connecting link 6, a washer 28 being interposed. The rear end of the link 32 is pivoted at 52 to the rear leg 2. The link 32 is shown L-shaped, in order that the rearwardly extending arm of the L may extend upward to position the pivot 52 above the pivot 44. The pivot 52 may be constituted of a pintle extending through the wood of the rear leg 2 and through the plate 74. Locating the pivot 52 above the pivot 44 and the pivot 38 below the pivot 50 facilitates collapsing the back member 1 forward at the same time that the rear legs 2 are similarly collapsed forward and the front legs 3 are collapsed backward. When the chair occupies its fully open position, illustrated in Figs. 1, 4 and 5, on the other hand, the lower ends of the side bars of the back member 1 may be caused to engage flat against the upper ends of the rear legs 2 to hold the back member 1 solid against the rear legs 2 and, as the leverage before described will hold without wobbling, no additional bracing is needed. A very sturdy and rugged chair is thus provided that nevertheless folds with extreme compactness to collapsed position.

In order to avoid accidental collapse of the chair, however, provision is made for positively locking it in fully open or extended position. To this end, the angularly disposed forwardly projecting portions of the plates 34 that carry the pivots 38 are provided with undercut latching recesses 17 for receiving latches 49, shown L-shaped in cross section. The recesses 17 are correspondingly shaped, to provide a horizontally disposed wall for engaging against the horizontally disposed side of the L, a vertically disposed wall for engaging the vertically disposed

side of the L, and an oppositely disposed vertically disposed wall for engaging the edge of the horizontally disposed side of the L. The latches 40 are respectively intermediately pivoted at 54 to the inner faces of the lower portions of the cross bar 56. Near the center of the cross bar 56, underneath the seating portion 5, the inner end of one of the latches 40 is provided with a projection 19 that is superposed over a corresponding projection 24 at the inner end of the other latch 40. A spring 60 is coiled around a screw 58 that is screwed into the under face of the member 7 and that extends through openings in the projections 19 and 24. The spring 60 engages against the projection 19 to force it downward against the projection 24, thus maintaining the projection 19 in engagement with the head of the screw 58. In this position of the latch members 40, their outer ends are forced upward by the spring 60 into the respective latch recesses 17. The latch members 40 are thus normally maintained in latching engagement with their respective latching recesses 17.

The latch members 40, when so engaged within the latch recesses 17, hold the plate members 34 and, therefore, the back member 1, firmly and rigidly in uncollapsed or fully open position. The thrust force exerted through the connecting link 6 and the toggle link 14, as before explained, is similarly sufficient to hold the front legs 3 firmly in open position. A further force is exerted from the metal plates 34 of the back member 1, through the connecting link 6 and the fourth link 32, firmly to hold the rear legs 2 similarly in fully open position. In order to provide additional leverage for augmenting this force, the pivotal connection 30 is shown positioned in a portion of the connecting link 6 that is offset at 29, away from the rear leg 3. The offset may be provided without preventing collapse of the chair, as it may be positioned just behind the rear edge of the seat member 4 in the collapsed position, as shown in Figs. 3 and 7. The portion of the link 6 between the projection 27 and the offset portion is shown horizontal, in order that it may lie under the seating portion 5 when the chair is collapsed. The portion of the link 6 between the offset portion 29 and the pivot 38 is shown nearly horizontal, but sloping downward slightly toward the left, in order not to interfere with the collapsing movement of the back member 1.

To collapse the chair, the fingers are straddled around a rod 70 that is disposed under the seating portion 5, more or less aligned with the side bars 11, and behind a projection 72 of the rod 70. Upon the exertion of pressure forward upon the member 72, the front end 23 of the rod 70 will be caused to slide forward in a groove 25 provided in the front bar 13. The groove 25 cooperates with a guide 76, shown as a U-shaped member depending from the member 7 to guide the sliding movement of the rod 70. The rear end of the rod 70 is pivoted to an arm of an angularly shaped metal member 62 that is intermediately pivoted at 63 upon a plate member 64, secured to the under side of the member 7, with a washer 66 interposed. The forward movement of the rod 70 effects pivotal movement of the angularly shaped member 62 counter-clockwise from the position of Fig. 10 to that of Fig. 11, causing its other arm to engage against the under face of the projection 21, thereby to force it upward, in opposition to the action of the spring 60; and, by engaging the projection 19, to force that up-

ward also. The latches 40 are thereupon caused to pivot about their pivots 54 from the position of Figs. 8 and 10 to that of Figs. 9 and 11, thus actuating them out of their latching recesses 17. The chair may now be collapsed by pressing the back member 1 and the seat member 4 toward each other.

To open the chair again, all that is necessary is to move the back member 1 and the seat member 4 in the opposite direction. Upon the chair reassuming its fully open position, the spring 60 will restore the latches 40 in their respective recesses 17, relocking the chair open.

In accordance with the present invention, therefore, a very effective chair is provided that may be rapidly folded into either collapsed or open position, and that is held rigidly when open. The chair embodies a very small number of parts comprising, in addition to the back member 1, the seat member 4, and the legs 2 and 3, merely the plate members 34 and 74 with the aid of which to pivot the back 1 to the rear legs 3, the metal members 20 and 22 for pivoting the front legs 3 to the seat member 4, the front-leg links 8 and 14, the connecting link 6 and the rear-leg link 32. The latching mechanism is also simple and very effective. Modifications will occur to persons skilled in the art, and all such are considered to fall within the spirit and the scope of the invention, as defined in the appended claims.

What is claimed is:

1. A folding chair comprising a seat member, a back member pivoted at the rear of the seat member in order that the back member may fold forward toward the seat member, rear legs pivoted at the rear of the seat member in order that the rear legs may fold as a unit forward toward the seat member, front legs pivoted at the front of the seat member in order that the front legs may fold as a unit rearward toward the seat member, a toggle comprising two links pivoted to each other and respectively pivoted to the seat member and to one of the front legs, a third link pivoted to the back member and to one of the toggle links, and a fourth link pivoted to one of the rear legs and to an intermediately disposed point of the third link.

2. A folding chair comprising a seat member, a back member pivoted at the rear of the seat member in order that the back member may fold forward toward the seat member, rear legs pivoted at the rear of the seat member in order that the rear legs may fold as a unit forward toward the seat member, front legs pivoted at the front of the seat member in order that the front legs may fold as a unit rearward toward the seat member, a toggle comprising two links pivoted to each other and respectively pivoted to the seat member and to one of the front legs, a third link pivoted to the back member and to the toggle link that is pivoted to the seat member, and a fourth link pivoted to one of the rear legs and to an intermediately disposed point of the third link, the pivots of the other toggle link being substantially aligned with the pivotal connection of the third link to the back member when the chair occupies its fully unfolded position.

3. A folding chair comprising a seat member, a back member pivoted at the rear of the seat member in order that the back member may fold forward toward the seat member, rear legs pivoted at the rear of the seat member in order that the rear legs may fold as a unit forward toward the seat member, front legs pivoted at

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the front of the seat member in order that the front legs may fold as a unit rearward toward the seat member, means comprising a link pivoted to the back member and to one of the front legs, a link pivoted to the rear legs and to an intermediate part of the first-named link, the back member being provided with a latching recess, a latch, and means for forcing the latch into the latching recess when the chair occupies its fully unfolded position.

4. A folding chair comprising a seat member constituted of a frame having side bars, a front bar and a rear bar, a back member to which are secured metal plates pivoted at the rear of the seat member, the plates being provided with latching recesses, latches intermediately pivoted on the rear bar, means acting on one side of the pivot of one of the latches to force the said one latch into its recess when the chair occupies its fully unfolded position, and means controlled by the forcing means and acting on one side of the pivot of the other latch for thereupon forcing the said other latch into its recess.

5. A folding chair comprising a wood seat member provided with forwardly disposed and rearwardly disposed metal plates, a wood back member provided with metal plates respectively pivoted to the rearwardly disposed metal plates in order that the back member may fold toward the seat member, rear wood legs provided with metal plates respectively pivoted to the rearwardly disposed metal plates in order that the rear legs may fold as a unit forward toward the

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seat member, front wood legs provided with metal plates respectively pivoted to the forwardly disposed metal plates in order that the front legs may fold as a unit rearwardly toward the seat member, the back member being provided with a further metal plate having a latching recess, a link pivoted to the further metal plate and to one of the front legs, a link pivoted to the metal plate of one of the rear legs and to an intermediate part of the first-named link, a latch, and means for forcing the latch into the latching recess when the chair occupies its fully unfolded position.

JOHN A. CHRISTENSEN.

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