Dec. 17, 1940. J. KOVATS 2,225,306

FOLDING CHAIR

Filed Jan. 29, 1938 3 Sheets-Sheet 1

Fig. 1

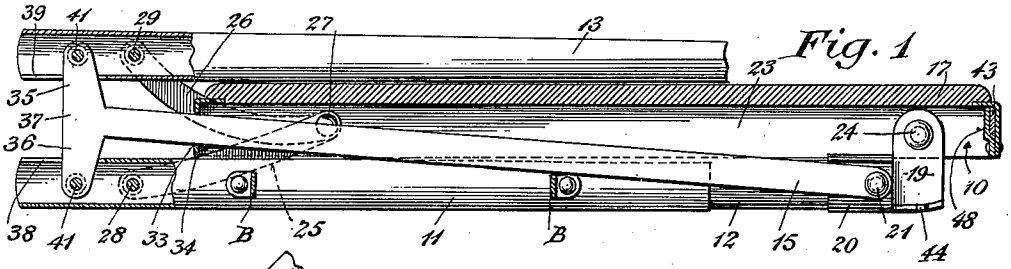


Fig. 2

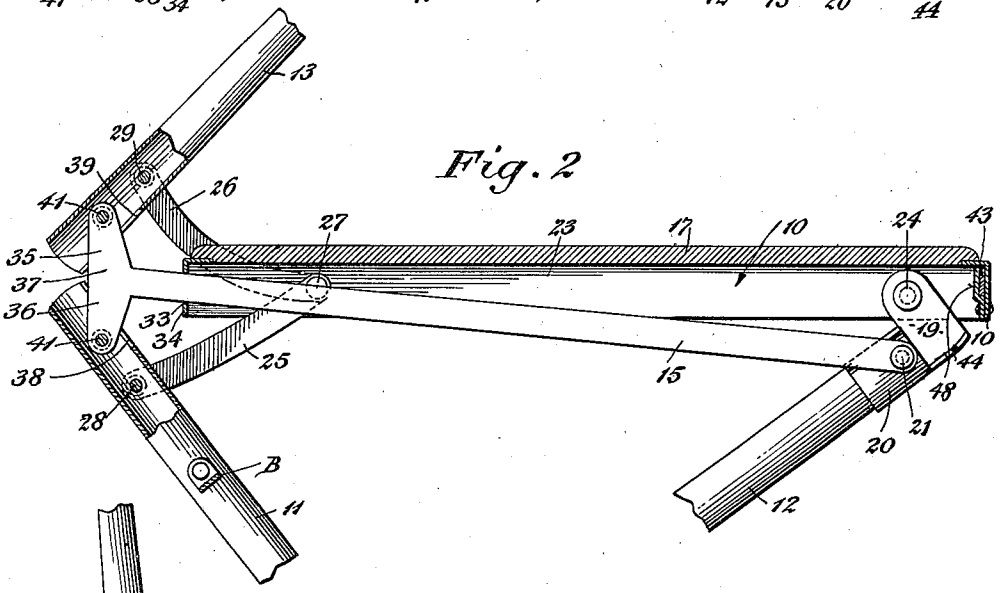
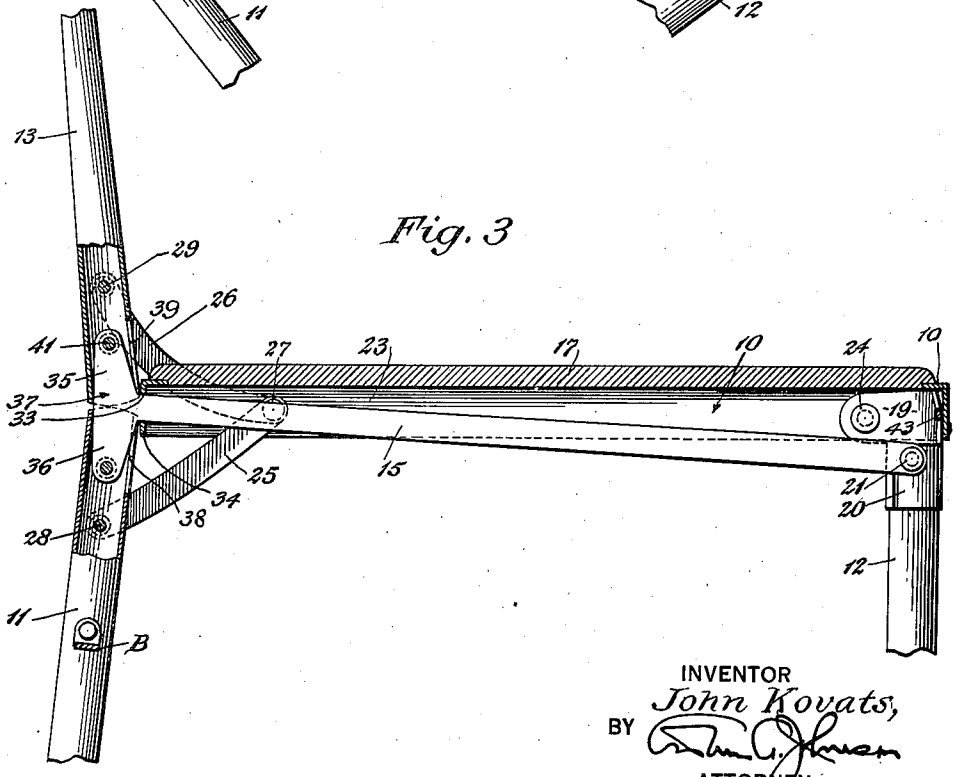


Fig. 3



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Dec. 17, 1940. J. KOVATS 2,225,306

FOLDING CHAIR

Filed Jan. 29, 1938 3 Sheets-Sheet 2

Fig. 4

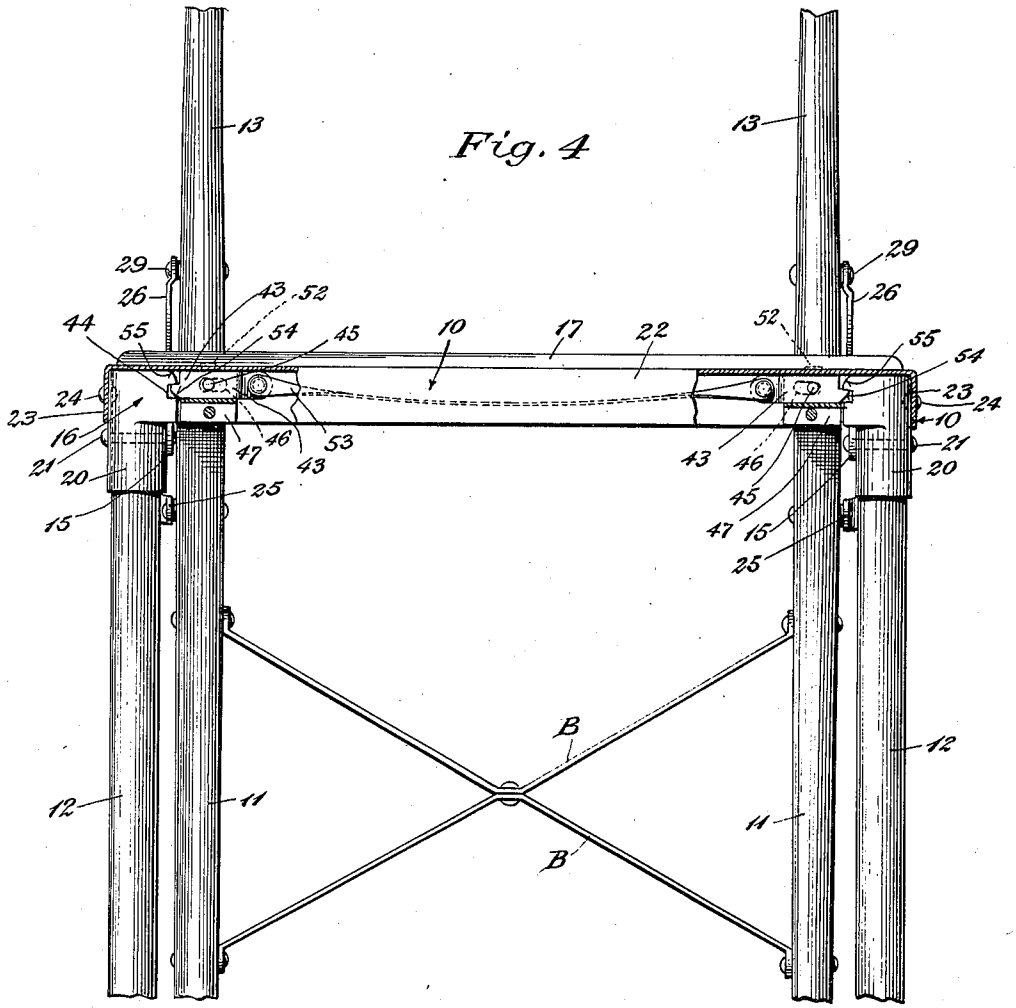
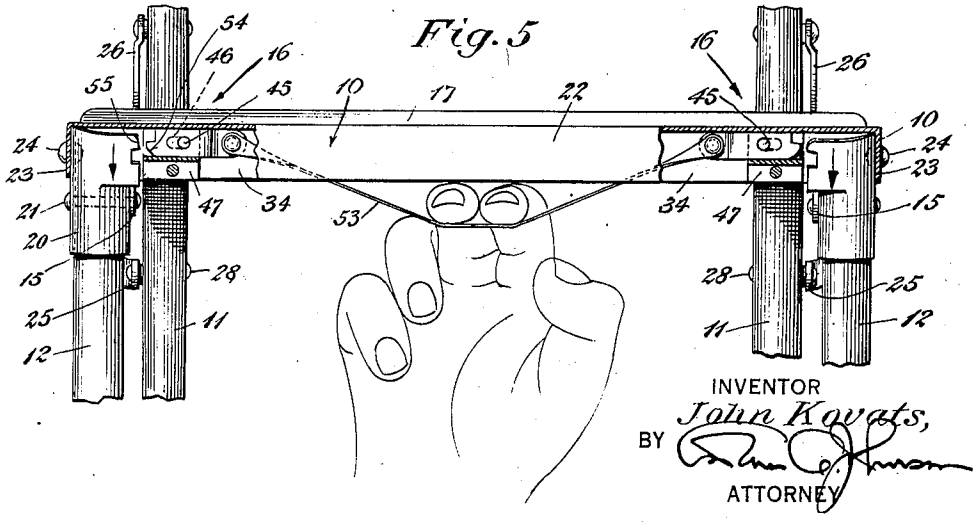


Fig. 5



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Dec. 17, 1940. J. KOVATS 2,225,306

FOLDING CHAIR

Filed Jan. 29, 1938 3 Sheets-Sheet 3

Fig. 6

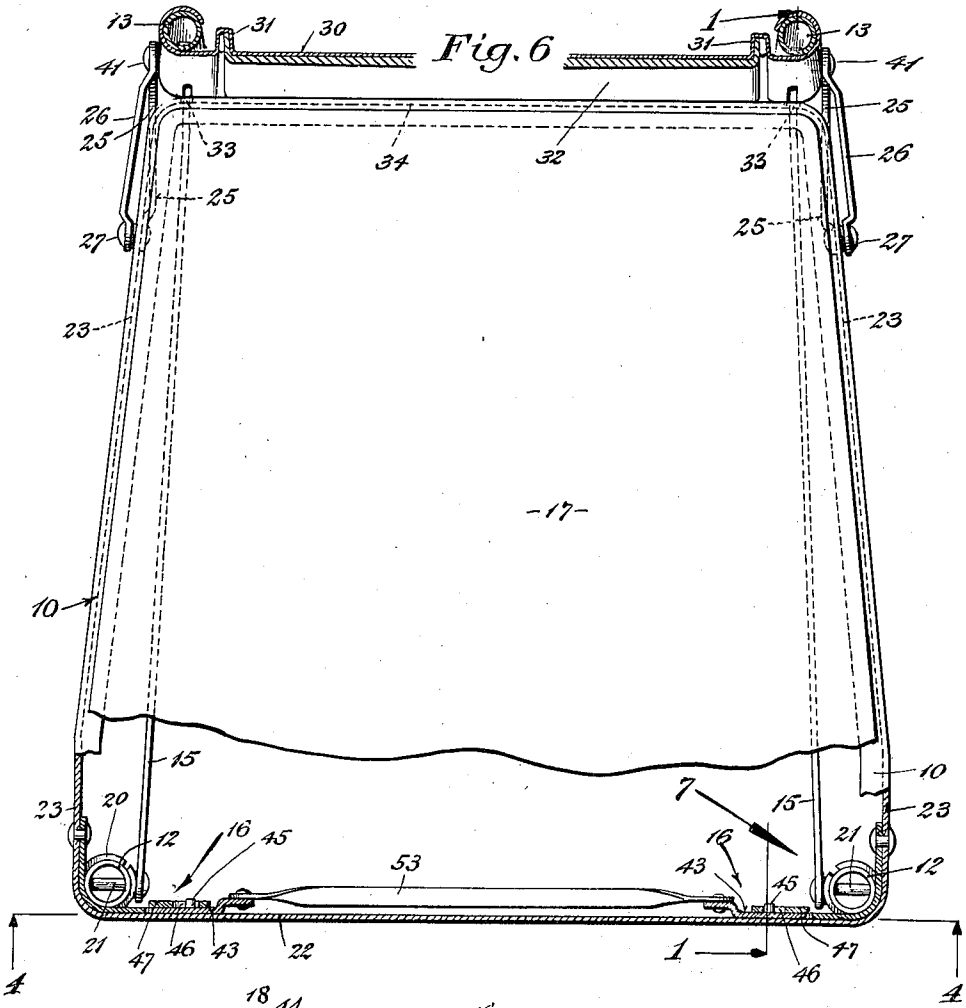
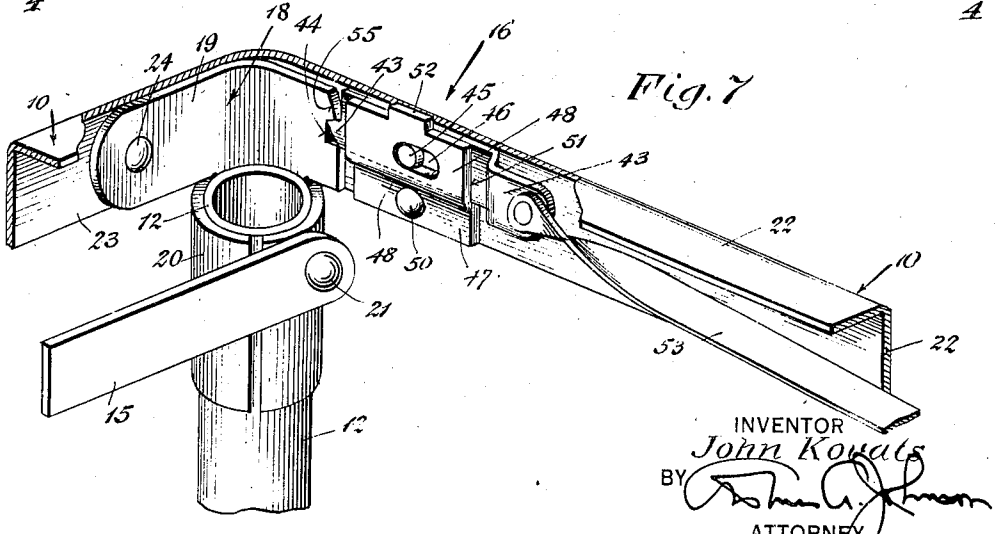


Fig. 7



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2,225,306

FOLDING CHAIR

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Application January 29, 1938, Serial No. 187,642

12 Claims. (Cl. 155—148)

This invention relates to folding chairs and other similar articles of furniture.

Folding chairs have heretofore been proposed in which simultaneous movement of the back rest and legs to folded and extended position is effected. These chairs, however, included complicated linkage mechanisms which present a plurality of pivotally connected links. These pivotal connectors required many stamping and assembling operations which increase the cost of production. To avoid these complications, the back rest and legs are, according to the present invention, interconnected by a pair of single elements, one on each side of the chair, and these elements are so connected to the front legs, the rear legs and the back rest that they all move together in opening and closing operations of the chair.

In manufacturing metal chairs of the folding type, in which the back rest and legs move to a compact folded relation and which are securely locked in the extended relation, it has not been possible to construct such chairs entirely from easily stamped or otherwise formed metal members so as to be economically produced in mass production. Accordingly, in the herein preferred form of the invention, the chair is made up of metal elements that can be readily stamped, rolled and/or drawn in such shapes that they can be produced in quantities at low cost.

In keeping with one of the objects of this invention, which is to reduce the cost and facilitate the manufacture of metal chairs, the chair of the present invention is so formed and the mechanism is so organized that most of the parts for the right hand side and left hand side of the chair are identical.

In the form of the invention herein disclosed, the linkage mechanisms connecting the front legs, back legs and back rest and located at opposite sides of the chair, are exactly alike.

By the elimination of lefts and rights, the number of tools required to manufacture the chair is reduced to half, the increased cost and the maintenance of separation of lefts and rights, and the confusion which results from their use, is completely obviated.

The means for securely locking the chair in the extended position, according to the invention herein disposed, comprises a latch means stamped from sheet metal adapted to automatically engage keeper means formed in the front leg structure of the chair. When the legs are moved to extended position, and due to the interconnection of the legs and back rest frame, the latch means holds all of the elements of the chair in rigid extended position.

In order to present a very pleasing appearance, substantially all of the fixtures of the chair are mounted on or held to the underneath side of the seat member so as to be hidden from view and inconspicuous.

Other features and advantages of the invention will appear from the specification when taken in connection with the drawings, in which:

Figure 1 is a view taken along line 1—1 of Fig. 6 partially in elevation showing the chair in folded position, the end portion of the back rest frame being broken away.

Fig. 2 is a view similar to Fig. 1, showing the chair partly extended.

Fig. 3 is another view similar to Fig. 1, showing the chair in fully extended position with the free ends of the legs and back rest frame broken away.

Fig. 4 is a front elevation of the chair partly broken away to illustrate the latch means in operative position.

Fig. 5 is a view similar to Fig. 4, showing the position of the latch means when rendered inoperative and the relative position of the parts after the initial movement of the front legs toward folded position.

Fig. 6 is a plan view of the seat portion partially in cross section and partially broken away.

Fig. 7 is a perspective view looking in the direction of the arrow 7 of Fig. 6.

The preferred form of the invention, herein disclosed, comprises an all metal folding chair having a seat frame 10 to which is secured a seat cushion, which is adapted to be supported by pairs of pivotally mounted rear and front legs 11 and 12. A back rest frame 13, having a suitable back support, is pivotally associated with said seat frame and an improved link means 15 on each side of the chair pivotally interconnects the legs 11 and 12 and back rest frame 13 for movement as a unit about the seat frame 10. A releasable latch means 16, carried by the seat frame and automatically operable when the chair is extended for use, prevents accidental collapse thereof, and securely holds the chair in the extended position.

The seat frame 10 preferably consists of a single strip of suitable angle iron bent so as to provide a frame having an upper face with a depending skirt portion extending about the marginal edges thereof. The strip of angle iron used is of such length that after being bent to the shape desired to form the frame, the ends will

meet or closely approach each other and can be permanently connected together as by spot welding so that the strip forms a rigid metallic frame. The seat frame may be of any desired shape but in its present preferred embodiment, as shown in Fig. 6, is slightly oblong and flared towards the front so that the front legs will be spaced somewhat further apart than the rear legs. With this construction, the rear legs will nest between the front legs when the chair is in the folded position.

A seat cushion 17 conforming to the desired shape of the seat frame 10 can be formed from a single piece of suitable material and can be secured to the upper face of the seat frame by any conventional means.

The legs 11, 12 and back rest frame 13, for economy and convenience of manufacture, may be formed from suitable stampings of sheet metal which have been rolled to form the desired tubular shape. The abutting edges of the rolled stampings may then be permanently secured together as by welding to increase the rigidity of these members. A seamless construction may be had if the legs and back rest frame are drawn and then rolled to form the desired shape.

The legs and back rest frame preferably, as herein shown, are adapted to be pivotally interconnected to the seat frame 10 by two groups of elements, one group being the counterpart of the other and each being suitably arranged for installation respectively on the right and left hand sides of the chair. The elements are preferably stamped from sheet metal, and, with few exceptions, are interchangeable so that they can be used in connection with either group. This greatly reduces the number of stamping operations and results in a greater economy of manufacture. As the two groups comprise identical members, one only will be described in detail, and the second group will be hereinafter mentioned only where it appears necessary to clearly describe the operation of the chair or where a member of one group performs a function in conjunction with the counterpart of its other group.

Referring now to Fig. 7, it will be seen that the front legs 12 of the chair, in the present construction, are pivoted to the seat frame 10 adjacent the front edge thereof by hinge members 18. The hinge members 18 are preferably stamped from sheet metal and, in the construction shown, comprise hinge plates 19 having depending tubular sockets 20 formed therewith. Each socket may be conveniently formed integral with the hinge plate as shown, as the plate, during the stamping operation, may be slit inwardly from each side so as to provide a partially separated lower segment which may then be rolled to form the tubular socket.

The front legs 12 are secured within the sockets 20 by means of suitable pins 21 adapted to be received in aligned apertures formed in the sockets and front legs. The hinge plate 19 preferably, as herein shown, is formed substantially L-shaped and is so disposed so as to engage contiguous portions of the front and side skirt members 22 and 23, respectively, of the seat frame 10. The portion of the hinge plate 19, engaging the side skirt member 23 of the seat frame, is connected thereto by a suitable pivot pin 24. The opposite end of the hinge plate is free to move about the pivot pin 24 and is formed during the stamping operation so as to be slightly arcuate in cross section to permit that portion of the plate to clear the front skirt member 22 as the leg 12 and socket 20 pivot about the pin 24.

The rear legs 11 and the back rest of the chair are adapted to be pivotally connected to the seat frame 10. In the preferred form of the invention, this is accomplished by means of a pair of link members 25 and 26 connected to the rear legs and back member, respectively. One of the ends of each of the link members 25 and 26 is secured to the side skirt member 23 of the seat frame 10 by a suitable pin or bolt 27. To prevent binding or interference between the link members 25 and 26 during movement thereof, the link members preferably are connected to the seat frame on opposite sides of the skirt member. As clearly shown in Fig. 6, the link members 25 and 26 are connected to the inner and outer sides, respectively, of the skirt member 23. The pins, although firmly securing the ends of the link members to the skirt to prevent any lateral movement with respect to the seat, permit pivotal movement about the pins 27. The other ends of the links 25—26 are connected to the rear legs and back member, respectively, by means of pivot pins 28 and 29. The connections to the rear legs and back member are made at a point intermediate the ends thereof and permit pivotal movement of the legs and back rest with respect to the link members as well as pivotal movement about the pin 27. With this construction, the legs and back rest are pivotally mounted so as to have a compound pivotal movement whereby they can be folded in parallel relation by means of the control means as will be later described.

The link members 25 are of sufficient length to permit the legs 11 to extend rearwardly and downwardly at a suitable angle so as to provide a rigid support for the chair, when in an extended position. To further augment the rigidity of the chair in the extended position, the rear legs preferably, as illustrated in Fig. 4, are rigidly interconnected intermediate the ends thereof by means of suitable brace rods B.

A suitable back support 30 may be secured to the frame 13 to increase the comfort of the chair while in use. The back support may be formed in a single operation from suitable sheet material and preferably, as herein shown, consists of a suitable shaped member 30 having the vertical edges thereof rolled to conform with the back rest frame so that it may be conveniently secured thereto. Channels 31 may be formed adjacent the securing edges thereof and are adapted to receive the marginal edges of some suitable covering material 32. To securely retain the covering material to the back support, a cord preferably is positioned in the channels 31 and forced to a tight fit therein.

It will be seen, referring to Fig. 3, that the adjacent ends of the rear leg 11 and back rest frame 13 are in engagement when the chair is in the extended position. In this position, the end of the back frame rests upon the rear leg which increases the rigidity of the chair in use. To facilitate the relative movement of these members, when the chair is collapsed or unfolded, the abutting ends of the same are suitably curved so that a rolling-contact is permitted therebetween during the folding and unfolding operations.

For the purpose of controlling the movement of the legs and back rest member as well as for bracing the same in the extended position, they preferably, as herein shown, are interconnected by the pair of elongated link members 15, each

disposed on opposite sides of the chair. The links are preferably formed in a single stamping operation and are of such shape as to directly interconnect the legs and back rest frame. The employment of a single connecting link on each side of the chair for controlling the movement of the legs and back member obviates a plurality of connectors and reduces the cost of manufacture.

The link members 15 are concealed from view by the skirt portions 23 of the seat frame, and are, therefore, inconspicuous and prevented from causing damage to the clothing of a person using the chair. The rear skirt portion 34 of the seat frame adjacent the rear legs is provided with apertures or slots 33 which are adapted to receive and guide the links 15 during movement thereof. The front end of each link is pivotally connected to a front leg 12 by means of the pin 21 which secures the front leg in the socket 20. The pin 21 may have the ends thereof peened over to form retaining head members. The links 15, at the opposite ends thereof, are provided with a pair of laterally extending projections 35—36 forming a T-head 37 adapted to be received within elongated apertures 38—39 formed in the rear leg 11 and back rest frame 13, respectively, in the adjacent ends thereof. The opposite ends of the T-head 37 are suitably secured to the interior wall of the rear leg 11 and back rest frame 13 by means of rivets or pins 41, in such a manner as to allow a pivotal movement of the two about their respective rivets or pins. The link members 15 so connect the legs 11—12 and back rest frame 13, as will be now understood, that movement of one pivotal member is transmitted to the remaining members and they are thereby capable of concerted movement as a unit. The movement of the various members of the chair into the extended position shown in Fig. 3, is limited by the T-head 37 of the links 15, engaging the rear skirt member 34 of the seat frame 10 as the links slide forward in the slot 33. It will also be seen that the elongated link members, in addition to their operative function, serve as brace members and further augment the rigidity of the chair in the extended position.

To prevent the chair from accidentally collapsing while in use, the latch means 16 has been provided operative when the chair is in the extended position to securely hold the same in such position. As best shown in Fig. 4 and Fig. 7, the means may consist of oppositely extending detents 43 supported on the front skirt portion 22 of the seat frame and adapted to engage with suitable notches or keepers 44 formed in the free ends of the hinge plates 19 of the front leg structure when the chair is in the extended position. The detents 43 are tapered and are adapted to engage the notches or keepers 44 of the hinge plates 19 so that a wedging action takes place during the engagement thereof. This securely locks the detents 43 in the keepers and also forces the front leg structure into its proper position when the chair is in the extended position. The detents are preferably formed with laterally projecting studs 45 adapted to be received in elongated apertures 46 formed in guide means 47 secured to the inner surface of the front skirt member 23 of the seat frame 10. The guide means 47 comprise suitable plates 48 having the bottommost portions secured to the skirt member by rivets 50. The plates are laterally offset intermediate the top and bottom edges to provide horizontal guide passages 51 for the detents 43. In order to prevent movement of the plates 48 about the rivets and to rigidly secure the plates to the seat frame, the plates are provided with upwardly projecting tab-like portions 52 received in apertures, not shown, formed in the upper surface of the seat frame 10.

A suitable spring 53 is secured to the inner ends of the detents 43 and normally urges the detents in oppositely extending directions. This movement of the detents 43 is guided and limited by the studs 45 formed integral with the detents sliding in the elongated apertures 46 of the guide plates 48. When the chair is in the extended position, the detents 43 will be moved by the spring 53 into engagement with the notches or keepers 44 of the hinge plates 19, thereby preventing accidental collapse of the chair.

To permit the detents 43 to be automatically moved to their operative position when the chair is unfolded, the detents 43 and the hinge plates 19 are preferably formed so that a camming action takes place therebetween and the detents are thrust inwardly or retracted until the chair is completely extended. The detents 43 are then moved by the action of the spring 53 to their operative position in engagement with the keepers 44. As shown in Figs. 4 and 7 of the drawings, the detents are provided with angular or camming shoulders 54 adapted to engage similar shoulders 55 of the hinge plates 19 during the unfolding movement. The hinge plates 19, as they are moved about the pivots 21 during this movement, due to the camming action of the two shoulders, retracts or moves the detents 43 to an inward position permitting the hinge plates to assume their position when the chair is fully extended. The detents 43 are then free to move, by action of the spring 53, into engagement with the keepers 44 and thereby latch or hold the chair in the extended position for use against accidental collapse.

In use, it will be seen that the chair is extremely rigid and capable of withstanding the hard usage to which chairs of this type are constantly subject. The legs, back rest and seat member, as will now be understood, are so interconnected that the various link members employed in addition to their operating function also give the chair a very desirable stability in the extended position. Although the chair is extremely stable when extended, it can be easily folded to a compact shape, as clearly shown by Fig. 1 of the drawings.

When it is desired to fold the chair for the purpose of storage or transportation, the spring member 53 may be grasped intermediate the ends thereof and by a downward pull thereon, clearly illustrated in Fig. 5, the detents 43 can be simultaneously moved from their operative position thereby causing disengagement of the same from the keepers 44 of the hinge plates 20. The chair may then be easily folded by grasping the back rest member 13 and moving it to its folded position overlying the seat member 10. This forward movement of the back rest member 13 is transmitted by the link members 15 simultaneously to the legs of the chair which are then caused to be moved about their respective pivots to their folded position underlying the seat member.

As the frame has a greater width across the forward edge than the rear, the rear legs, when the chair is in folded position, nest between the front legs, and it will be seen, as shown by Fig. 1,

that the internested legs and back rest member are in substantial parallelism with the seat member so that the chair occupies but a minimum of storage space.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a folding chair, the combination of a seat member; rear legs; a back rest; link means pivotally connecting said rear legs and back rest to said seat member; front legs pivotally connected to said seat member; and means for directly interconnecting the legs and back rest for simultaneous movement about the seat member.

2. In a folding chair, the combination of a seat member; rear legs; a back rest; link means pivotally connecting said rear legs and back rest to said seat member; front legs pivotally connected to said seat member; and a pair of link means, one on each side of the chair pivotally interconnecting the legs and back rest for simultaneous folding movement about the seat member.

3. In a folding chair, the combination of a seat member; rear legs; a back rest; link means pivotally connecting said rear legs and back rest to said seat member; front legs pivotally connected to said seat member; and means including a T-shaped link member on each side of said chair pivotally interconnecting the legs and back rest for simultaneous folding movement about the seat member.

4. A folding chair comprising a seat frame; a seat cushion secured thereto; rear legs; means for pivotally interconnecting said frame and rear legs; a back rest frame having a back support thereon; means for pivotally securing said back rest frame to said seat frame; front legs; hinge plates having sockets thereon receiving said front legs, said hinge plates having a direct pivotal connection to the seat frame; and a pair of link members one on each side of the chair interconnecting said legs and back rest frame for simultaneous folding movement about the seat frame.

5. A folding chair comprising a seat frame; rear legs; link means pivotally interconnecting said frame and rear legs; a back rest frame having a back support thereon; link means pivotally securing said back rest frame to said seat frame; front legs; hinge plates having sockets thereon receiving said front legs, said hinge plates pivotally connected to the seat frame and having keepers formed thereon; means for interconnecting said legs and back rest frame for simultaneous folding movement about the seat frame; and detents carried by the seat frame for locking engagement with said keepers when the chair is in extended position whereby accidental collapse of the chair is prevented.

6. A folding chair comprising a seat frame; rear legs; link means pivotally interconnecting said frame and rear legs; a back rest frame having a back support thereon; link means pivotally securing said back rest frame to said seat frame; front legs; hinge plates having sockets thereon receiving said front legs, said hinge plates pivotally connected to said seat frame; means for interconnecting said legs and back rest frame for simultaneous folding movement about said seat frame, said hinge plates having keepers formed thereon; detents carried by the seat frame for locking engagement with said keepers; and resilient means for urging said detents into locking engagement with the keepers when the chair is in extended position to hold said chair in such position.

7. In a folding chair, the combination of a seat member; rear and front legs supporting said seat member; a back rest member, said legs and back rest member pivotally secured to said seat member; means for interconnecting the pivotal members for simultaneous movement about the seat member; latch means rendered operative when the chair is in extended position to lock said chair in such position, said latch means including plates secured to said seat member adjacent the front legs and offset to form horizontally disposed guide passages, said plates having elongated apertures formed therein adjacent said guide passages; detents mounted for movement in said guide passages having laterally projecting studs adapted to slide in and be guided by said elongated apertures, said detents adapted to engage keepers formed in the front legs of said chair; and resilient means connected to and normally urging said detents into engagement with said keepers and providing means for simultaneously releasing said detents.

8. A folding chair comprising a seat frame; rear legs; means pivotally interconnecting said frame and rear legs; a back rest frame having a back support thereon; means pivotally securing said back rest frame to said seat frame; front legs; hinge plates having sockets formed thereon receiving said front legs and pivotally connected to the seat frame; means for interconnecting said legs and back rest frame for simultaneous movement about the seat frame; latch means rendered operative when the chair is in extended position to hold said chair in such position, said latch means including plates secured to said seat frame adjacent the front legs having horizontally disposed guide passages formed thereon, said plates having elongated apertures formed therein adjacent said guide passages; detents mounted for movement in said guide passages having laterally projecting studs adapted to slide in said elongated apertures and be guided thereby, said detents adapted to engage keepers formed in said hinge plates; and resilient means normally urging said detents into engagement with said keepers and providing means for simultaneously releasing said detents.

9. In a folding chair, the combination of a seat member; rear legs; a back rest; link means pivotally connecting said rear legs and back rest to said seat member; front legs pivotally connected to said seat member; and means including a link member on each side of said chair, each link having adjacent an end thereof integral means pivotally connected to the back rest and a rear leg respectively at points spaced from the pivotal connections of the back rest and rear leg with the first named link means, the opposite end of each second link being pivotally connected to a front leg at a point spaced from the pivotal connection of the latter to the seat member whereby the legs and back rest may be simultaneously folded about the seat member.

10. A folding chair comprising a seat frame; rear legs; link means pivotally interconnecting said seat frame and rear legs; a back rest frame having a back support thereon; link means pivotally securing said back rest frame to said seat frame; front legs; hinge plates having sockets formed thereon receiving said front legs and pivotally connected to the seat frame; a T-headed link on each side of said chair for interconnecting said legs and back rest frame for simultaneous folding movement about said seat frame; latch

means rendered operative by movement of said hinge plates to the extended position to hold said chair in such position for use; and means for releasing said latch means to permit the chair to be folded.

11. In a folding chair; the combination of a seat member; a pair of rear and front legs supporting said seat member; a back rest member; link members pivotally connecting said rear legs and back rest member to said seat member; and means for directly interconnecting the leg and back rest member for simultaneous folding movement about the seat member, said means including a T-headed link disposed on each side of the chair, each of said rear legs being pivotally connected to the cross head of its associated T-shaped link intermediate the end of each leg and its pivotal connection to one of said first-named links, the back rest member being pivotally connected at each side to the cross head of the adjacent T-shaped link intermediate the lower end of the back rest member and the point of connection with said first-named link members, and a front leg pivotally connected to the staff of each T-shaped link.

12. In a folding chair including a seat member; a pair of rear and front legs; and a back rest member; means for pivotally securing said rear legs and back rest member intermediate the ends thereof to said seat member, said front legs pivotally secured to said seat member; means for interconnecting the legs and back rest member for simultaneous folding movement about the seat member, said means including a T-headed link disposed on each side of the chair, one of the rear legs and one side of the back rest member being pivotally connected adjacent the ends thereof to a cross head of the associated link; and one of the front legs of said chair being pivotally connected to the staff of each link whereby the chair may be folded to a compact shape with the legs and back rest member in substantial parallelism with said seat member.

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