

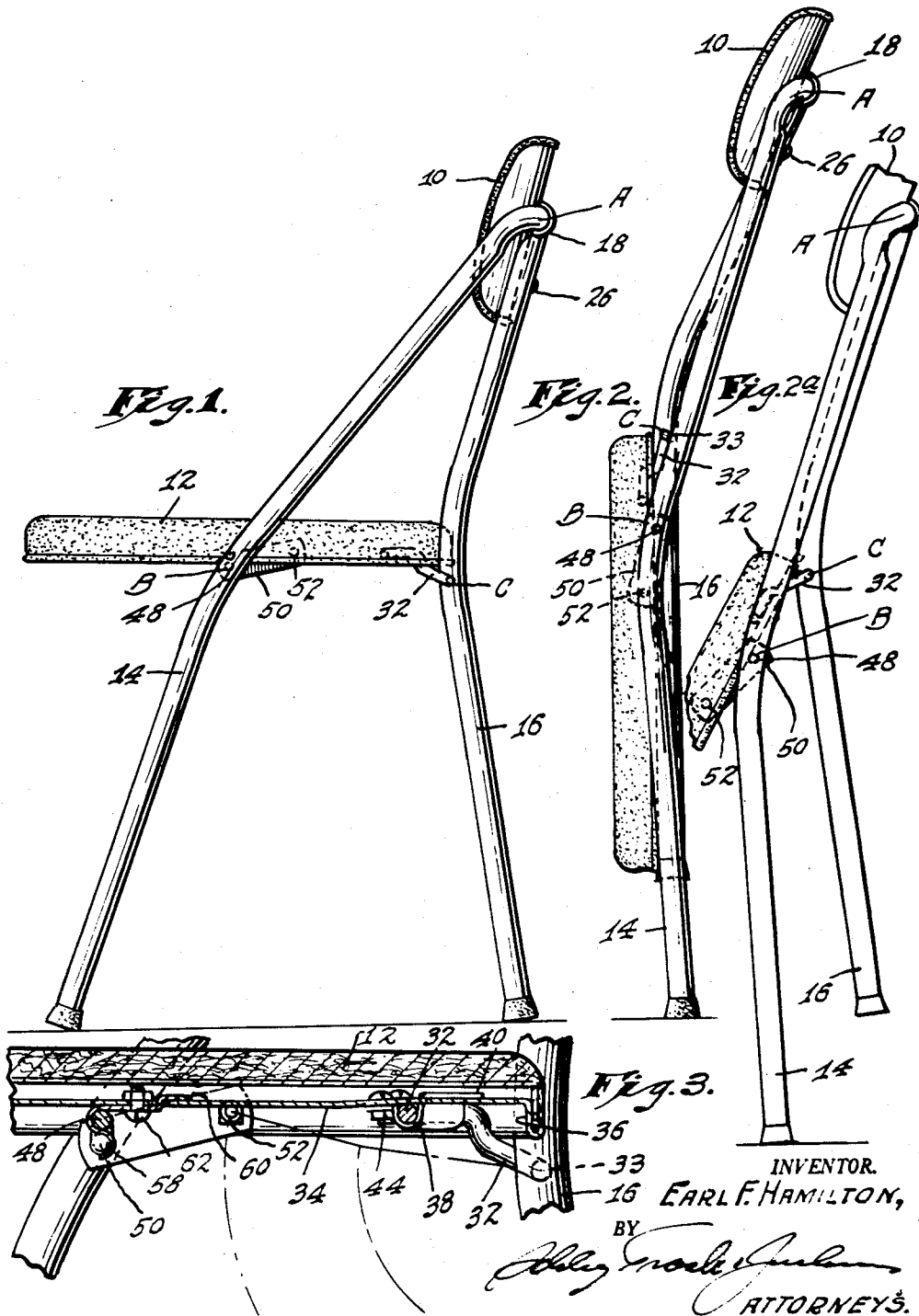
Aug. 9, 1960

E. F. HAMILTON
FOLDING CHAIR

2,948,332

Filed Sept. 6, 1957

2 Sheets-Sheet 1



Aug. 9, 1960

E. F. HAMILTON

2,948,332

FOLDING CHAIR

Filed Sept. 6, 1957

2 Sheets-Sheet 2

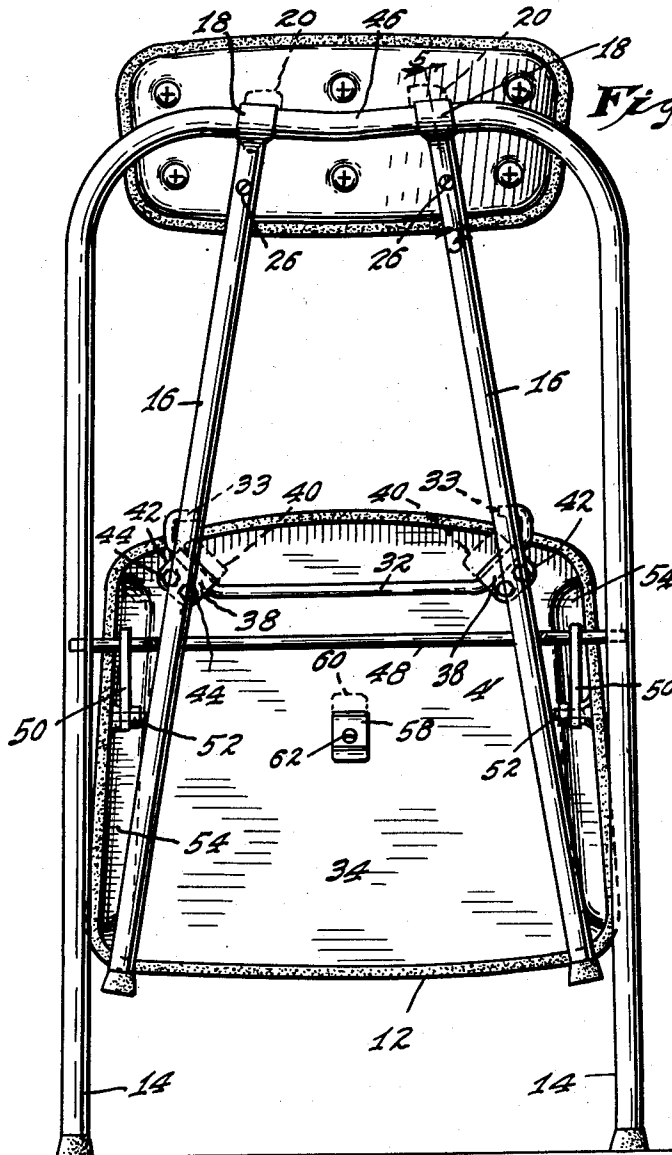


Fig. 4.

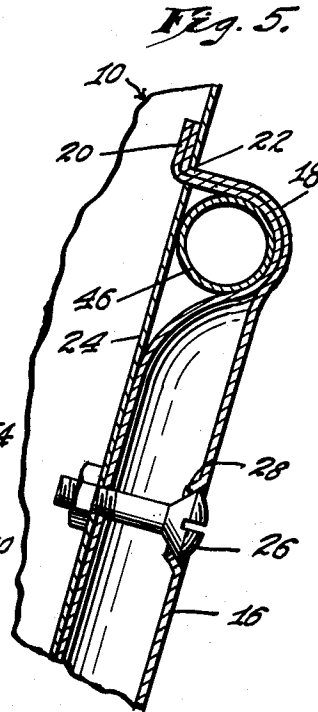


Fig. 5.

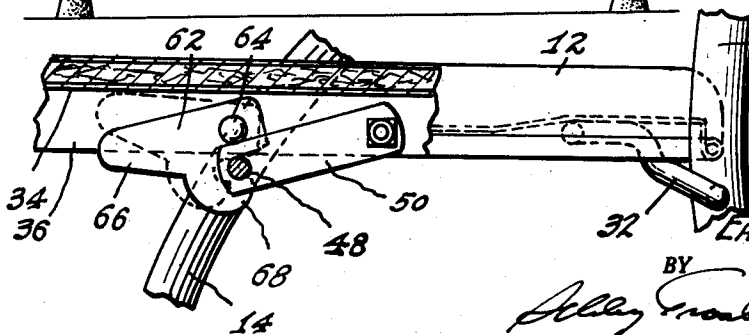


Fig. 6.

INVENTOR.
EARL F. HAMILTON,

BY

Alley, Frank, Jenkins
ATTORNEYS.

1

2,948,332

FOLDING CHAIR

Earl F. Hamilton, Columbus, Ind., assignor to Hamilton Cosco, Inc., a corporation of Indiana

Filed Sept. 6, 1957, Ser. No. 682,366

8 Claims. (Cl. 155—142)

This invention relates to furniture, and more particularly to collapsible chairs in which the front legs and chair seat are foldable from an operative position into a collapsed 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 improve the assembly of such articles. Another object is to provide a chair which when its parts are disposed in operative position will offer but little indication of its collapsibility. A further object is to provide a collapsible chair whose retraction and extension may be readily and easily effected, and which can be releasably locked in either of said collapsed or extended positions. A further object is to provide a collapsible chair which lends itself to manufacture largely from sturdy and economical metal tubing and sheet metal.

In carrying out my invention in its preferred form, I provide a pair of rear legs conveniently formed from metal tubing and rigidly secured to the chair back. A generally U-shaped frame is pivotally mounted to the chair back with the legs of said frame extending obliquely downward to form the front chair legs. The seat is pivoted to the rear legs near its rear edge and is connected to the front legs by links which are pivoted on a common axis to the seat at the sides thereof and extend, when the chair is in operative position, generally forwardly for pivotal connection on a second common axis to the front legs. The front-supporting legs are interconnected by a seat-supporting rod, which may serve as the pivot interconnecting the front legs and the links. If desired, a detent device may be employed to hold the seat releasably in contact with its supporting rod.

With this construction, chair collapse is readily effected by tilting the chair forwardly to lift the rear legs from the floor and simply raising and then lowering the forward portion of the chair seat, thereby causing the links to swing upwardly, forwardly, and finally downwardly and moving the seat and rear legs toward positions generally coplanar with the front legs. The parts as so far described are so constructed and arranged that as the aforesaid coplanar relationship is approached the seat comes into contact with the rod extending between the front legs, thus limiting further relative movement of the seat and links. The seat and rear legs then form, in effect, a toggle which can be forced through and beyond its position of greatest extension with accompanying introduction of stresses into the chair-parts; and such stresses thereafter serve to maintain the chair collapsed. To extend the chair, the front edge of the seat is forced forwardly or the rear legs rearwardly to break or open the toggle, whereupon the seat and rear legs may readily be moved to their operative positions.

The accompanying drawings illustrate one embodiment of my invention. In such drawings:

Fig. 1 is a side elevation of a chair embodying my invention, the chair being shown in an extended operative position;

2

Fig. 2 is a side elevation showing the chair of Fig. 1 in fully collapsed storage position;

Fig. 2a is a view similar to Fig. 2 showing the chair in partially collapsed condition;

Fig. 3 is a longitudinal detail section showing the pivotal seat construction;

Fig. 4 is a rear elevation of the chair shown in Fig. 2; Fig. 5 is a vertical section taken on the line 5—5 of Fig. 4; and

Fig. 6 is a view generally similar to Fig. 3 showing a modification.

The chair shown in the drawings comprises a back 10 and a seat 12 supported upon a pair of front legs 14 and a pair of rear legs 16. Conveniently, the rear legs 16 are identical in construction, each being formed from a length of metal tubing bent at its mid-portion to throw its lower end rearwardly. The upper end of each rear leg 16 is flattened and bent to form a hook 18 having a generally semicircular curvature terminating in an upwardly extending lip 20. As shown in Fig. 5, the rear-supporting legs 16 are mounted to the chair back 10 by inserting the lips 20 into slots 22 cut in the back frame 24 of a chair back 10 and then pivoting the legs downwardly against the back frame 24 with the lips 20 bearing against the inner face of the frame 24. Completion of the desired rigid connection between the legs 16 and back 10 is conveniently effected by means of bolts 26 which extend through countersunk openings 28 disposed adjacent the top of said legs and through suitable openings cut in the chair back frame 24. Desirably, the rear legs 16 diverge downwardly from the back 10 to the floor disposing their bottoms laterally outward to form a broad supporting base for the chair when it is in operative position.

The rear-supporting legs 16 are pivotally connected to the chair seat 12 by means of a rod 32 having its in-bent ends 33 rotatably received in suitable coaxial openings in the outer faces of the legs and defining the pivotal axis of the chair seat 12. The center portion of the rod 32 is offset laterally from the ends 33 and rigidly connected to the seat 12. As shown, the seat embodies a seat-pan 34 having a depending peripheral lip 36 and forming the basic structural support for the chair seat 12; and the rod is clamped to the pan 34 by a pair of clips 38 secured to the lower face of the seat pan 34 in a manner similar to the rear leg-chair back mounting. That is, one end of each of the clips 38 comprises a tab 40 insertable in a slot cut in the seat pan 34, and the opposite end comprises a tab 42 secured to the lower face of the pan 34 by means of a bolt 44.

The front legs 14 are conveniently the generally parallel stretches of a tubular U-shaped frame the intermediate or right portion 46 of which is rotatably received between the chair back frame 24 and the rear leg hooks 18, thereby permitting the front legs 14 to swing vertically about the axis of the horizontal right portion 46 during extension and retraction of the chair.

The front-supporting legs 14 are interconnected and cross-braced by a seat-supporting rod 48 having its ends received in suitable aligned openings along the inner faces of the legs 14. Connecting the front legs 14 to the chair seat 12 is a pair of toggle links 50 each of which is pivotally connected to the inner face of the seat-pan flange 36 on each lateral side of the seat by any suitable means, such as a bolt 52. The opposite end of each of the toggle links 50 is provided with an opening adapted to receive the transversely extending seat-supporting rod 48. Conveniently, the metal of the seat pan 34 is offset upwardly at the sides thereof to form recesses 54 receiving the toggle links 50 when the chair is in a collapsed storage position.

Centered on the lower face of the seat pan 34, I have

3

shown in Fig. 3 an S-shaped clip 58 rigidly secured thereto in a manner similar to the clips 38, wherein the clip 58 is provided with a lip 60 which is inserted into a slot cut in the seat pan 34 and held against the upper face of the pan 34 by means of a bolt 62 interconnecting the clip and seat pan. Upon extension of the chair into an operative position, the seat-supporting rod 48 engages the rearwardly open loop of the clip 58 and is yieldably retained therein for releasably locking the chair in extended position.

Conveniently, both the front and rear legs 14 and 16 are bent rearwardly at their mid-portions so that with the chair in extended position the front legs 14 intersect the plane of the seat 12 at its mid-point and dispose the seat-supporting rod 48 forwardly of the center of the ground-engaging base formed by the extended front and rear legs. Thus, the seat 12 is supported both forwardly and rearwardly of the center of the base by the rods 48 and 32 respectively to equalize weight distribution and give the chair added stability. Further, by positioning the upper portion of the front legs well forward of the upper portions of the rear legs when the chair is in extended position the legs and seat form a bucket-type seat as shown in Fig. 1.

Collapse of the chair from extended condition is most easily effected by tilting it forwardly to lift the rear legs 16 from the floor and by then applying an upward effort to the front of the seat to release the detent clip 58 from the rod 48. Further upward and forward effort applied to the front of the seat causes the links 50 to swing over center and then downwardly in a counterclockwise direction about the rod 48 with the rear legs 16 swinging forwardly toward the front legs.

I have referred above to a toggle-like action which serves to hold the chair in fully collapsed condition. To facilitate explanation of that action, I have applied the reference letter A to the axis of pivotal connection between the front and rear legs, the letter B to the axis of pivotal connection between the front legs and the links 50, and the letter C to the axis of pivotal connection between the seat and the rear legs.

The chair is so designed that as the axis C, in collapse of the chair, approaches the common plane of axes A and B the peripheral lip 36 of the seat re-engages the rod 48. When this condition (illustrated in Fig. 2a) occurs, the links 50 can no longer swing relative to the seat, and the links and seat form in effect a unitary element cooperating with the upper portions of the rear legs to form a toggle not quite completely extended. The chair-parts, and particularly the rods 32 and 48, however, are sufficiently resilient to permit further collapse of the chair. In this further collapse, the axis C passes through the plane of the axes A and B, and thereafter the resilience of the stressed parts urges the rear legs forwardly. Forward swinging of the rear legs under such urging is limited by their engagement with the seat on the rod 48, the center portion of which may be offset forwardly to avoid premature interference with collapse of the rear legs.

The chair is firmly held in the collapsed position by the resilience of the parts which were stressed in the operation of collapsing the chair from the condition shown in Fig. 2a to that shown in Fig. 2. To extend the chair from completely collapsed condition, the lower edge of the seat is moved forwardly, or the rear legs rearwardly, to force the axis C through the plane of axes A and B, whereupon the seat may easily be swung into horizontal position. As a final operation in extension of the chair, the seat is forced downwardly to engage the detent 58 with the rod 48.

In Fig. 6 I have shown a different form of means for releasably holding the chair in extended position. In that structure, the spring detent 58 is eliminated and replaced by a latch 62 pivoted to the seat-lip 36 at one side of the seat, as by means of a rivet 64. Below the

4

rivet 64, the latch is provided with a rearwardly opening notch adapted to receive the rod 48. The latch extends forwardly of the rivet 64 to provide a finger piece 66 the weight of which serves, when the seat 14 is raised, to bias the latch for counterclockwise swinging about the rivet 64. Such swinging of the latch is limited by engagement of its rear end with the lower surface of the seat pan 34, whereby, as the seat is lowered to horizontal position, the rod 48 will be engaged by a cam-like nose 68 on the latch and the latch swung into the dotted-line position shown in Fig. 6. When the seat reaches its final horizontal position, the notch of the latch will have come opposite the rod 48, and the latch will swing under the influence of gravity to cause the notch to embrace the rod. The rivet 64 is so located and the notch so shaped that after the latch is engaged reaction of the rod 48 on the lower notch-wall will not cause the latch to swing in the releasing direction. When it is desired to collapse the chair, the finger piece 66 can be raised to the dotted-line position, thus freeing the notch from engagement with the rod 48 and permitting the front edge of the seat to be raised.

I claim as my invention:

1. A collapsible chair having a back and seat, comprising rear legs mounted to said back and engageable with the floor or other supporting surface, said rear legs being secured to the rear face of said back and terminating at their upper ends in hook-like portions facing the back and cooperating therewith to define a bearing, pivotal means interconnecting said legs and the chair seat, a front-supporting frame having a transverse section pivotally received in said bearing and interconnecting a pair of front legs vertically swinging between a retracted position generally coplanar with said rear legs and an operative position in which the front legs are disposed well forwardly of the rear legs, and a seat-supporting rod interconnecting said front legs and adapted to support the seat in operative position.

2. A collapsible chair having a back and a downwardly collapsible seat, comprising rear legs mounted to said back and engageable with the floor or other supporting surface, means pivotally interconnecting the chair seat to said rear legs on a fixed pivotal axis, a U-shaped front-supporting member comprising a transverse section pivotally supported across the chair back and a pair of generally parallel front legs movable about said pivotal support between a retracted position generally coplanar with the rear legs and an operative position in which the lower stretches of said legs are disposed well forwardly of the rear legs, said front legs intersecting the plane of said seat at its mid-portion in operative position, a seat-supporting rod interconnecting said front legs and adapted to support the seat in an operative position, link means extending between said rod and a pivotal axis on the seat and forming a toggle linkage fixing the relative positions of said front and rear legs, said seat upon chair collapse being swingable upwardly about said first means to carry the rear ends of said link means upwardly, said upward movement breaking the toggle linkage and allowing the front legs to swing rearwardly through said pivot axis and the seat to swing downwardly into its collapsed position.

3. A collapsible chair having a back and a downwardly collapsible seat, comprising rear legs mounted to said back and engageable with the floor or other supporting surface, means pivotally interconnecting the chair seat to said rear legs on a fixed pivotal axis, a U-shaped front-supporting member comprising a transverse section pivotally supported across the chair back and a pair of generally parallel front legs movable about said pivotal support between a retracted position generally coplanar with the rear legs and an operative position in which the lower stretches of said legs are disposed well forwardly of the rear legs, said front legs intersecting the plane of said

seat at its mid-portion in operative position, a seat-supporting rod interconnecting said front legs and adapted to support the seat in operative position, and a pair of links each having its opposite ends pivotally connected respectively to said seat-supporting rod and the seat for releasably locking said seat in collapsed and extended positions and forming toggle linkages fixing the relative positions of the front and rear legs, said links having a length shorter than the distance between the interconnections of the seat to the rear legs and said pair of links, said seat upon chair collapse being swingable upwardly about said means to carry the rear ends of said links upwardly, said upward movement breaking the toggle linkage and allowing the front legs to swing rearwardly and the seat to swing downwardly into its collapsed position in which it is generally coplanar with the lower stretches of the front and rear legs, said seat having on its lower surface laterally disposed recesses for nesting said toggle links when the seat is releasably locked in collapsed position.

4. A collapsible chair as set forth in claim 3 including a metal seat-pan forming a bottom of said seat, said recesses being downwardly open grooves pressed into said seat-pan.

5. A collapsible chair, comprising a seat, front legs and rear legs pivotally interconnected on a horizontal axis above said seat and swingable relatively about such axis between a collapsed condition in which they are approximately coplanar and an extended condition in which they diverge downwardly, means pivotally connecting said rear legs to said seat adjacent the rear edge thereof, a pair of links connecting said seat to said front legs, means carried by said front legs for supporting the seat in generally horizontal position when the front and rear legs are in extended condition, said links when the chair is extended extending generally rearwardly from a first common axis of pivotal connection to the front legs to a second common axis of pivotal connection to the seat and being swingable upwardly, forwardly, and then down-

wardly as the front and rear legs move toward each other in collapse of the chair to bring the seat with the legs toward a generally coplanar relationship, and means operative as the legs near collapsed condition for limiting swinging movement of the links relative to the seat to confine further movement of the seat to rotation about said first common axis and cause the seat, in cooperation with the upper portions of the rear legs, to form in effect an incompletely extended toggle, parts of the chair being elastically yieldable to permit such toggle to be forced through completely extended condition, the stresses introduced into such elastically yieldable parts serving to hold the legs and seat in substantially coplanar relationship.

6. A chair as described in claim 5 with the addition that said seat-supporting means comprises a rod extending between the front legs and through which said links are connected to the front legs.

7. A chair as described in claim 6 with the addition that said means for limiting swinging movement of the links comprises a portion of said seat engageable with said rod.

8. A collapsible chair as set forth in claim 4 with the addition of a latch member pivoted on said seat pan and releasably engageable with said seat-supporting rod.

References Cited in the file of this patent

UNITED STATES PATENTS

30	D. 175,994	Wagner	Nov. 1, 1955
	119,754	Gardner	Oct. 10, 1871
	1,638,879	Rastetter	Aug. 16, 1927
	2,238,817	Morgan et al.	Apr. 15, 1941
	2,666,478	Shwayder	Jan. 19, 1954
35	2,729,275	Morgan et al.	Jan. 3, 1956
	2,753,922	Grimlaud	July 10, 1956

FOREIGN PATENTS

40	226,891	Switzerland	Aug. 2, 1943
----	---------	-------------	--------------