March 30, 1965 V. TCHERNIAVSKY 3,175,860

CONVERTIBLE CHAIR

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FIG.1

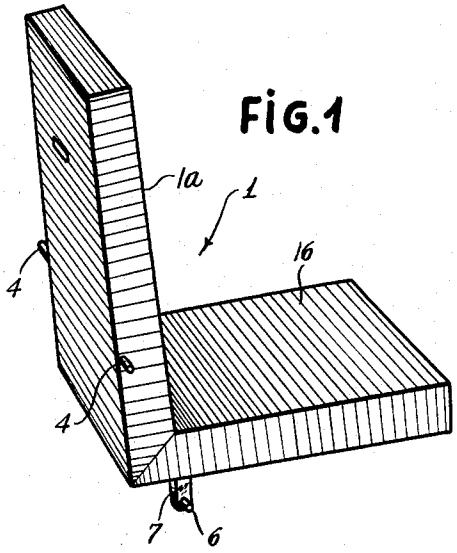


FIG.2

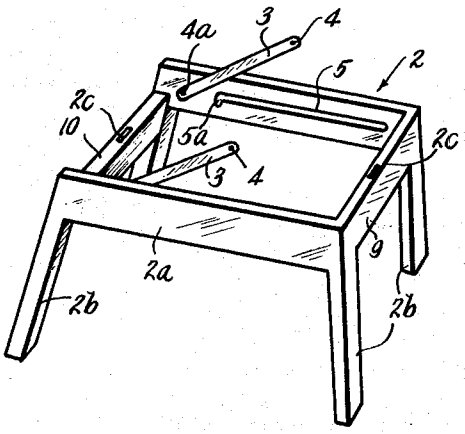


FIG.3

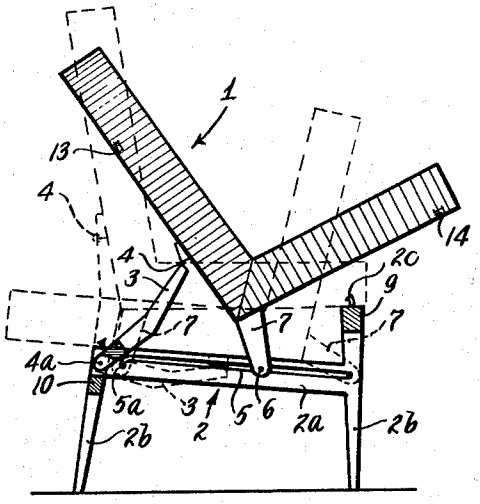
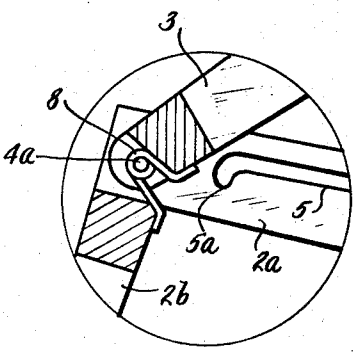


FIG.4



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CONVERTIBLE CHAIR

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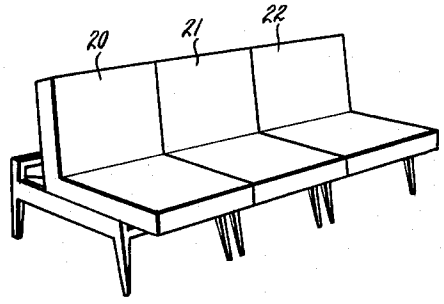
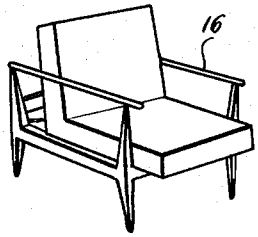


FIG. 6

FIG. 5



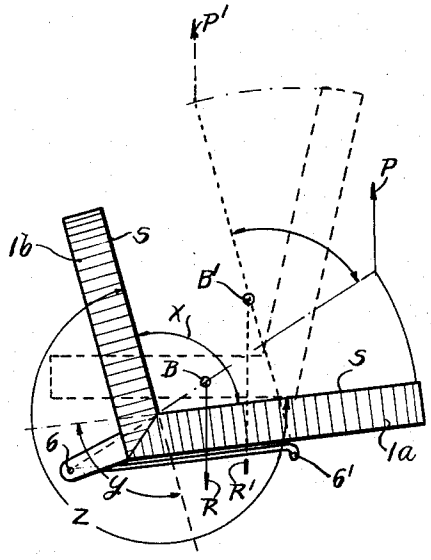


FIG. 7

United States Patent Office 3,175,860 Patented Mar. 30, 1965

3,175,860

CONVERTIBLE CHAIR

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3 Claims. (Cl. 297—93)

This application is a continuation-in-part of my application Serial Number 126,838, filed July 18, 1961, now abandoned.

This invention relates to a new and useful improvement in chairs and more particularly to a chair which is readily convertible from an easy chair into a dining room chair and vice versa. Additionally a plurality of chairs constructed in accordance with this invention, may be arranged side by side to form a composite sofa.

Present day housing presents a great need for convertible or multi-purpose furniture. In modern housing, and especially housing of the apartment type, space is at a premium and often one room must serve the purposes of two or more different types of rooms. For example, in an efficiency apartment a single room serves as a living room, as a bed room and as a kitchen. Obviously furniture which is satisfactory in one type of room is less than satisfactory when used in another type of room. Attempts have been made to solve this problem, but to date no eminently satisfactory solution has been found, particularly in the field of chairs. As long as this problem is not entirely solved the conversion of a sitting room into a dining room is practically impossible.

Dining room chairs in general have a higher and less deep seat than easy chairs, and easy chairs have a deeper and lower seat than dining room chairs. These characteristic requirements are met in the chair constructed in accordance with the present invention.

It is consequently an important object of my invention to provide a chair which has a substantially horizontal seat at a level suitable for use as a dining room chair, and which is convertible into a chair having longer and inclined seat suitable for use as a living room easy chair.

It is a further object of my invention to provide a chair which may be easily converted from one type to the other without the use of tools.

It is a further object of my invention to provide a convertible chair in which no part of the chair supporting linkage protrudes above and ahead of the surface of the seating and back sustaining portions, thereby to enable several such chairs to be placed closely side by side to produce a sofa.

Another object of the invention is to provide a convertible chair so constructed that, in either condition, it may be readily moved as a whole from one place to another, the relatively movable parts being rigidly interconnectable.

A further object of my invention is to provide a convertible chair which is structurally rugged, simple in design, inexpensive to manufacture and capable of conversion with relative ease.

Other and further objects and advantages will be apparent from the following more detailed description and by reference to the accompanying drawings.

FIG. 1 is a perspective view of a combined seat-back unit,

FIG. 2 is a perspective view of a support structure for the seat-back unit,

FIG. 3 is a side view in section showing the seat-back unit on the support structure at a point midway between its two extreme positions,

FIG. 4 is a detail view of the biasing spring and its mounting on the connecting rod,

FIG. 5 is a view of an easy chair provided with arm rests,

FIG. 6 is a perspective view showing a plurality of chairs arranged to form a sofa, and

FIG. 7 is a view illustrating diagrammatically the geometric orientation of parts and the forces involved.

Referring first to FIGS. 1 and 2 which show generally the two components which form the chair of this invention, there is seat-back unit **1** and a supporting structure. The seat-back unit is formed of two wing sections **1***a* and **1***b*, rigidly interconnected, and disposed at an angle to one another. Wing section **1***a* is longer than wing **1***b* for a purpose to be later described. Mounted on wing section **1***a* are laterally extending pivot pins **4**. Extending downwardly from wing section **1***b* are a pair of brackets **7** (one only being shown) which carry pivot pins **6**.

The stationary support structure **2**, shown in FIG. 2, is comprised of forwardly and rearwardly spaced pairs of legs **2***b*, connected by stringers **2***a* and by cross pieces **9** and **10**. Swinging links **3** are pivoted at one end to the support structure at **4***a* and carry pivots **4** at their other end. The stringers **2***a* are provided with longitudinally extending slots or channels **5** which, at one end, are notched as shown at **5***a*. Channels **5** are adapted to receive pivot members **6** of the seat-back unit for longitudinal sliding movement therein. Cross member **9** is positioned at a greater height from the ground level than cross member **10**. Each of the cross members is provided with a latch element shown diagrammatically at **2***c*.

Referring now to FIGS. 3 and 4 which illustrate the chair structure in a specific embodiment, there is shown a seat-back unit **1** mounted on a supporting structure **2**. The seat-back unit is illustrated in full lines in the position it would occupy at a point intermediate the two limit or extreme use positions (which are shown in broken lines). As shown in FIG. 3 the seat-back unit **1** carries a bracket **7** at a point adjacent the juncture of the two wing sections **1***a*, **1***b*. Pivot pin **6** carried by the bracket is shown positioned in slot **5**. Link **7** is pivoted at one end to the support structure at **4***a*, and is pivoted to the section **1***a* at **4**. Pivot **4** is positioned behind the wing section **1***a*. Slot or channel **5** is notched at one end **5***a* to receive pivot pin **6** in one extreme position of the pin. Latch elements **2***c* mounted on the cross members **9** and **10** are positioned to be received in openings **13** and **14** in wing sections **1***a*, **1***b*, respectively.

As shown in detail in FIG. 4 there is a spring element mounted on pivot element **4***a*. The spring member is provided with a pair of arms, one of which reacts on link **3** and the other of which reacts on the supporting structure.

As shown in FIG. 3, the legs **2***b*, (at the left in FIG. 3), terminate at the juncture of the legs with the stringer **2***a*. The other legs **2***b* (at the right in FIG. 3) extend beyond and above the stringer and are connected thereabove by cross piece **9**. It is to be understood that the complete chair includes a pair of legs **2***b* and a stringer **2***a* at each side.

FIG. 5 illustrates a chair according to this invention which may, if desired, be provided with arm rests **16**.

FIG. 6 illustrates three chairs **20**, **21**, and **22**, constructed in accordance with this invention, and placed side by side to form a sofa.

In use the seat-back unit occupies one or the other of the positions illustrated in FIG. 3. When the chair is to be used as an easy chair the longer wing section **1***a*, serving as a seat, is nearly horizontal while the shorter wing section, serving as a back, **1***b* is substantially upright. When the chair is to be used for dining room purposes, the longer wing section, now serving as a back, is substantially upright while the shorter wing section now serving as a seat is horizontal and at a higher level.

In the dining chair position the seat rests on cross member **9**, and the parts are locked together by latch **2***c* in opening **14** and by the positioning of pivot member in notch **5***a*. In the easy chair position the seat portion rests on cross member **10** and is locked thereto by latch member entering opening **13**.

To convert the parts from one seat orientation to the other it is necessary only to release the respective latch, grasp the seat portion by hand and manually swing the seat-back unit to its other orientation. This is readily and easily accomplished because of the geometry of the various parts which will now be described.

Referring to FIG. 7 there is shown the geometric orientation of the parts and their relatioship to the various forces involved. It will be noted that the surfaces S of the seat-back wing sections form an angle X. Surfaces S extended form an angle Y which is equal and opposite to angle X. Brackets **7** with its associated pivot **6** is wholly located within angle Y. The center of gravity of the seat-back unit when in the full line position is at B and has a force component B. When power P is applied to the seat-back unit the unit will be rotated in a counter-clockwise direction along the arc **2** and pivot element **6** will slide in the channel from left to right. The amount of force P needed for the conversion movement will be a maximum at the beginning and will gradually decrease as pivot point **6** moving to the right approaches alignment with the center of gravity. Thereafter, to complete the conversion movement the amount of force P need only be enough to overcome the forces of friction which are relatively minor. As pivot **6** moves past the center of gravity the conversion force will be aided by the force of gravity. This arrangement of the parts consequently enables the conversion to be made with considerable ease.

Various modifications of the present invention will occur to those skilled in the art, and it should be understood that the invention is inclusive of all modifications and equivalents falling within the scope of the appended claims.

I claim:

1. In a convertible chair assembly, a seat-back unit comprising rigidly interconnected wing sections disposed at an angle to one another, one of said wing sections being longer than the other, supporting structure for said seat-back unit having spaced ground engaging legs connected by a stringer, there being a longitudinally extending channel in said stringer, one pair of said legs terminating at the stringer and the other pair of said legs extending above the stringer, a cross piece connecting said other pair of legs above the stringer, a link member pivoted at one end to the supporting structure and pivoted at its other end to the longer wing section, a bracket rigidly secured to said seat-back unit adjacent the juncture of said wing sections, a pivot carried by said bracket and slidably mounted within said channel, the location of the pivot with respect to the seat-back unit being such that the pivot passes beneath and from one side to the other of the center of gravity of the seat-back unit when the seat-back unit is moved from one extreme position to the other, a spring member mounted on the pivot of the link member on the supporting structure, a pair of arms on said spring member, one arm reacting on the link member and the other arm reacting on the supporting structure.

2. A convertible chair assembly as in claim 1 having a latch member on the cross piece engageable in an opening in the shorter wing section.

3. In a convertible chair assembly, a seat-back unit comprising rigidly interconnected wing sections disposed at an angle to one another, one of said wing sections being longer than the other, supporting structure for said seat-back unit having spaced ground engaging legs connected by a stringer, there being a longitudinally extending channel in said stringer, one pair of said legs terminating at the stringer and the other pair of said legs extending above the stringer, a cross piece connecting said other pair of legs above the stringer, a link member pivoted at one end to the supporting structure and pivoted at its other end to the longer wing section, a bracket rigidly secured to said seat-back unit adjacent the juncture of said wing sections, a pivot carried by said bracket and slidably mounted within said channel, the location of the pivot with respect to the seat-back unit being such that the pivot passes beneath and from one side to the other of the center of gravity of the seat-back unit when the seat-back unit is moved from one extreme position to the other, said channel having a notch in one end adapted to receive the pivot on the bracket.

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