May 29, 1951 C. EAMES 2,554,490

FURNITURE CONSTRUCTION

Filed March 1, 1947 2 Sheets-Sheet 1

FIG. 1.

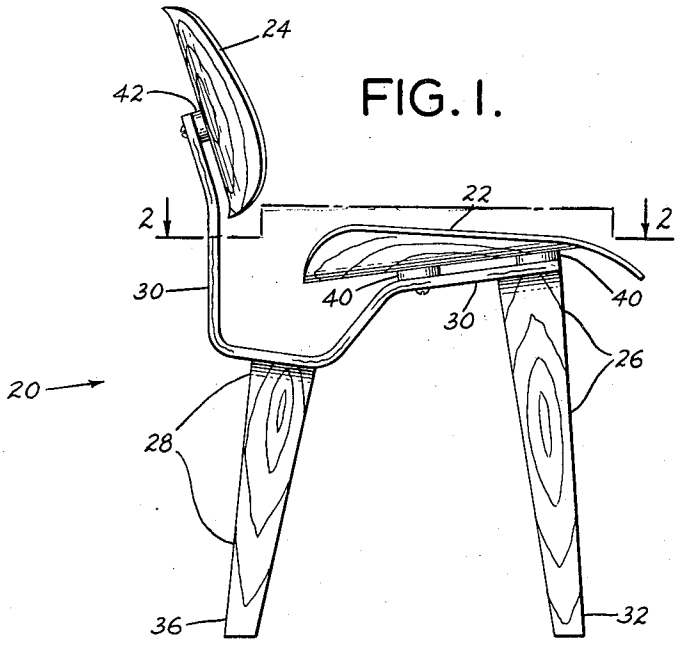


FIG. 2.

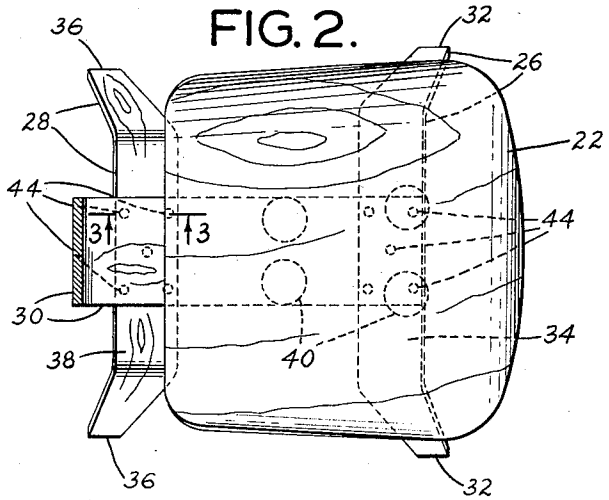
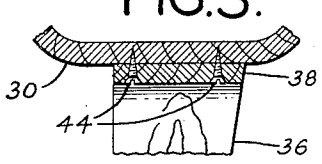


FIG. 3.



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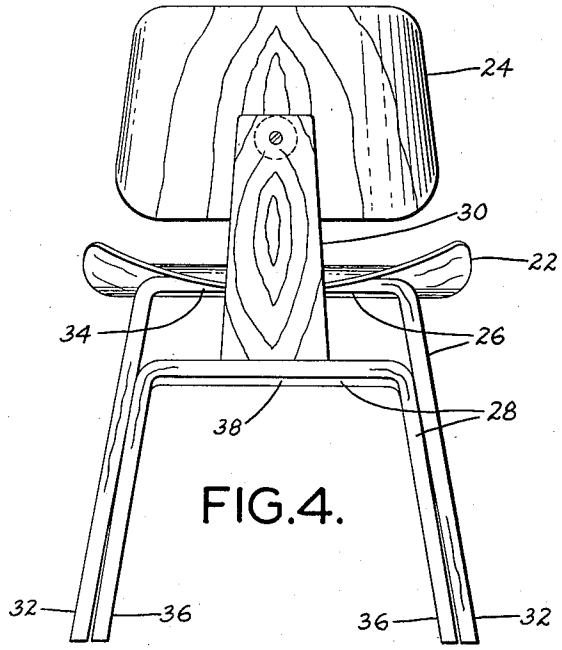


FIG.4.

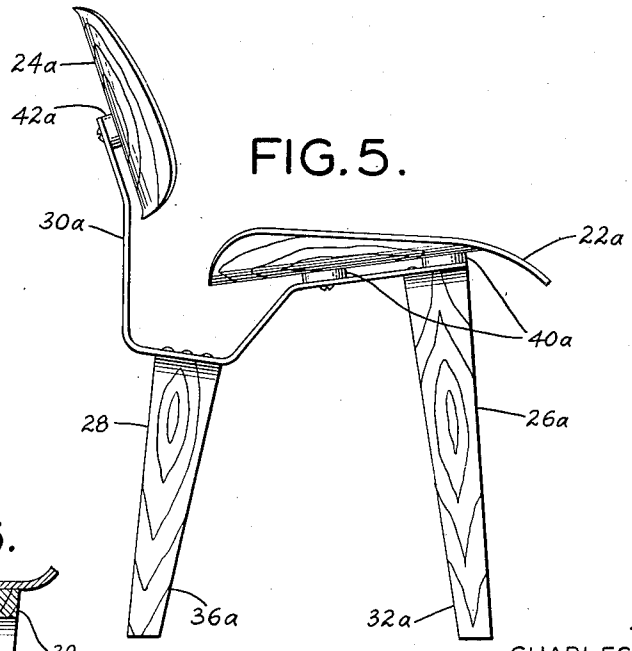


FIG.5.

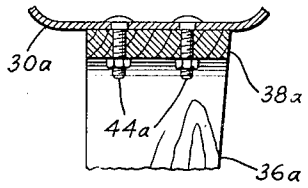


FIG.6.

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UNITED STATES PATENT OFFICE

2,554,490

FURNITURE CONSTRUCTION

Charles Eames, West Los Angeles, Calif., assignor, by mesne assignments, to Herman Miller Furniture Company, Zeeland, Mich., a corporation of Michigan

Application March 1, 1947, Serial No. 731,821

5 Claims. (Cl. 155—194)

1

This invention relates to furniture constructions. More particularly it pertains to a novel assembly of supporting parts for contour-conforming, individually mounted back and seat panels. With this construction the panels are disposed in a slightly yieldable way so that a chair, for example, embodying the invention remains restful and comfortable over long periods of use and yet may be inexpensively manufactured by mass production methods.

In my copending applications filed herewith I have disclosed and claimed several inventions for utilizing decorative plywood and other sheet-like materials in certain novel furniture combinations. In working with these inventions I have discovered, among other things, that the various known seat and back panel supporting structures, conventional and otherwise, leave much to be desired insofar as are concerned ease of manufacture and effectiveness in performing the intended functions.

It is an object of my present invention to provide a device of the character described having to a notable extent the characteristics and capabilities set forth. A further objective resides in the provision of a bench, chair, or like construction which overcomes certain disadvantages inherent in superficially similar structures existing in the prior art. A further objective resides in the provision of a unitary furniture spine member adapted to be supported, as upon legs, and itself constituted yieldably to support a back and a seat. Other objects will be in part pointed out as the description proceeds and will in part become apparent therefrom.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts and methods of operations as will be exemplified in the structures and sequences and series of steps to be hereinafter indicated and the scope of the application of which will be set forth in the claims.

In this specification and the accompanying drawings, I have shown and described a preferred embodiment of my invention and suggested various modifications thereof; but it is to be understood that these are not intended to be exhaustive nor limiting of the invention, but on the contrary are given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify and adapt it in various forms, each as may be best suited to the conditions of a particular use.

2

In the drawings:

Figure 1 is a side elevation of a chair embodying my invention;

Figure 2 is a plan view of the chair taken along the section line 2—2 of Figure 1 and looking in the direction of the arrows;

Figure 3 is a fragmentary sectional detail taken on an enlarged scale along the line 3—3 of Figure 2;

Figure 4 is a rear elevation of the chair;

Figure 5 is a view similar to that of Figure 1 but showing a modification; and

Figure 6 is a view similar to that of Figure 3 but illustrating the modified chair of Figure 5.

In Figure 1 a chair is generally indicated at 20 comprising a contour-conforming seat 22 and back 24. A front leg frame 26 and rear leg frame 28 together support a spine 30. Seat 22 and back 24 are mounted upon and carried by spine 30.

Front leg frame 26 includes a pair of legs 22 and an integral, intermediate, horizontally disposed (see Figure 4) cross piece 34. Correspondingly, rear leg frame 28 includes a pair of rear legs 36 and a cross piece 38. It will be observed that the height from the floor of cross piece 38 is substantially less than the height from the floor of cross piece 34. As shown in Figure 2 the central portion of seat 22 is mounted upon the forward portion of spine 30 by means of seat mounts 40. These mounts advantageously may be of the type described and claimed in one of my applications filed herewith. As there described, the mounts are made of rubber or some other suitable elastomer and are permanently bonded to the undersurface of the seat. For the purposes of the present invention such mounts may or may not be resilient except that there is advantage in having them sufficiently resilient that they are not subject to excessive forces which result from differential expansion between seat and mount. Such differential expansion may occur because of temperature changes, changes in moisture content of the bonded pieces, or for other known reasons. For ease of transportation and storage the seat should be removable from spine 30 so that the major parts may be disassembled. Back 24 correspondingly is carried upon the upper portion of spine 30 by means of a back mount 42.

Figure 3 shows the manner by which rear cross piece 38 is secured to spine 30. In the present embodiment the spine consists of a length of molded plywood of width and thickness such that the spine has an inherently yieldable character both to forces of bending and of torsion; here

the spine is joined to the cross pieces by suitable wood screws 44.

I have discovered that a comfort promoting resilience may seemingly be built into the entire chair if the resilient spine is properly shaped, if the connections between spine supported and supporting members are correctly disposed, and if the spine is of the proper degree of yieldability. The optimum degree of yieldability will differ among the various useful applications of the invention; in general I find it rare that any portion of seat or back should be displaced, under the weight of an average person, by a matter of more than an inch or so. But with the spine embodying my invention the entire construction assumes a responsiveness to the eccentricities of the seated individual even though the other parts of the construction are relatively rigid and inert.

As shown in Figure 1 the spine extends rearwardly from a point under the central forward portion of the seat, thence downwardly and rearwardly to engagement upon the rear cross piece and finally upwardly substantially vertically to a point behind a central portion of the back. The forward portion of the spine has its bottom face secured to and carried by cross piece 34 while the upper face of the forwardmost spine portion carries the seat. The intermediate spine portion which extends nearest to the floor is solidly mounted upon cross piece 38. Between cross pieces 34 and 38 there is an unsupported spine portion and the slight yieldability of the spine permits a limited degree of flexing and twisting in this portion independently of movements of the back which affords a feeling of softness and yieldability in the seat. The vertically extending spine portion which forms the supporting column for the back acts throughout its length as a spring member substantially independently of the seat and affords a flexible disposition to the back. It is to be observed that the point where the spine is secured to rear cross piece 38 is substantially below the level of the seat so that the rear column portion of the spine is relatively long; that is, somewhat longer than the distance from the level of the seat to the point of attachment of the spine to the back. Thus, yieldable movements of the back are about a relatively long lever arm so that the angle of the plane normally determined by the back does not shift greatly as the back is moved forwardly and rearwardly by the pressure of a person leaning against it. This relatively long column permits a limited degree of twisting and yielding to body pressures. It is further to be observed that both the seat and back panels are secured to the spine only at the central area portions of these panels. Hence, because the spine is slightly yieldable to forces of bending and torsion, the peripheral panel portions, such as the unsupported marginal extremities of the seat as shown in Figure 4, remain relatively movable with respect to the legs even though the seat and its mountings may be very nearly inflexible. And so the marginal portions of both the seat and the back are free for movements resulting from the torsional flexure possible in the spine, in addition to movements of translation which are possible in either the seat or the back through the bendability of the spine.

In Figures 5 and 6 I have shown a modified form of chair wherein corresponding parts of the chair are identified by reference characters similar to those already used but with the addition of an "*a*". In this embodiment spine 30*a* is formed from a length of spring steel and is secured (see Figure 6) to the cross pieces of the leg frames by carriage bolts and nuts as indicated at 44*a*. It will thus be appreciated that the essence of the present invention centers around the inherently yieldable spine and the relationships among the spine and the relatively inert associated members which make up the chair.

From the foregoing it will be observed that apparatus and methods embodying my invention are well adapted to attain the ends and objects hereinbefore set forth and to be economically manufactured and practiced, since the separate features are well suited to common production methods and are subject to a variety of modifications as may be desirable in adapting the invention to different applications.

Since many embodiments of the invention are possible and since many changes might be made in the embodiments set forth, protection is not to be limited to anything described or presented in the above specification and drawings but only to the scope of the hereinafter attached claims.

I claim:

1. A spine for a furniture construction of the character described, said spine, when in its normal position of use, including a forward seat supporting portion and extending rearwardly therefrom thence downwardly and rearwardly and finally upwardly substantially vertically to and including a back supporting portion, said seat supporting portion including a rubber-like block adapted to cooperate with a front leg frame, and the lowermost rear portion of the spine including an attachment means adapted to cooperate with a rear leg frame; said spine being slightly resiliently yieldable for flexures of bending and of torsion.

2. A spine for a furniture construction of the character described, said spine, when in its normal position of use, including a forward seat supporting portion and extending rearwardly therefrom thence downwardly and rearwardly and finally upwardly substantially vertically to and including a back supporting portion, said seat supporting portion including a rubber-like block adapted to cooperate with a front leg frame, and said back supporting portion including a rubber-like block adapted to cooperate with a back support; said spine being slightly resiliently yieldable for flexures of bending and of torsion.

3. A furniture construction of the character described having a body-contour-conforming, independently mounted back and seat, said construction including a spine extending rearwardly from a point under the central forward portion of the seat thence downwardly and rearwardly and finally upwardly substantially vertically to a point behind the central portion of the back; said seat and said back each being mounted upon and carried by the spine and the spine being slightly resiliently yieldable both in torsion and in bending, whereby the dispositions of the seat and back are rendered slightly yieldable thus to accommodate themselves to a seated person; the forward portion of the spine being supported by a front leg frame and the lowermost rear portion of the spine adjacent where it turns vertically upwardly to carry the back being supported by a rear leg frame.

4. A furniture construction of the character described having a body-contour-conforming, independently mounted back and seat, said construction including a spine extending rearwardly

from a point under the central forward portion of the seat thence downwardly and rearwardly and finally upwardly substantially vertically to a point behind the central portion of the back; said seat and said back each being mounted upon and carried by the spine and the spine being slightly resiliently yieldable both in torsion and in bending, whereby the dispositions of the seat and back are rendered slightly yieldable thus to accommodate themselves to a seated person; the forward portion of the spine being supported by a front leg frame and the lowermost rear portion of the spine adjacent where it turns vertically upwardly to carry the back being supported by a rear leg frame, the point of attachment between rear leg frame and spine being intermediate and substantially spaced from the points of attachment of the seat and back to the spine and being substantially lower than the point of attachment between the spine and front leg frame.

5. A spine for a furniture construction of the character described, said spine, when in its normal position of use, including a forward seat supporting portion and extending rearwardly therefrom and thence downwardly and rearwardly and finally upwardly substantially vertically to and including a back supporting portion, said seat supporting portion including an attachment assembly embodying a rubber-like block adapted to cooperate with a front leg frame, the lowermost rear portion of the spine including an attachment means adapted to cooperate with a rear leg frame, and said back supporting portion including an attachment assembly embodying a rubber-like block adapted to cooperate with a back support; the intermediate portion of said spine between said seat supporting portion and said lowermost rear portion being slightly resiliently yieldable for flexures of bending and of torsion, and the intermediate portion of said spine between said lowermost rear portion and said back supporting portion being slightly resiliently yieldable for flexures of bending and of torsion independently of flexure or torsion in said first-mentioned intermediate portion.

CHARLES EAMES.

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The following references are of record in the file of this patent:

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OTHER REFERENCES

New York Times Magazine, section 6, Apr. 7, 1946, pp. 38, 39, chair in lowermost line of illustration.