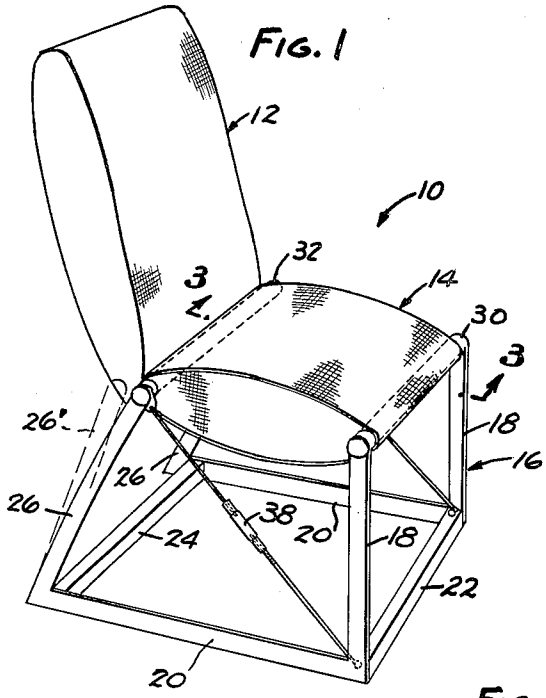
Sept. 19, 1961 J. M. CLARK 3,000,670

SEAT CONSTRUCTION

Filed Aug. 26, 1957

FIG. 1



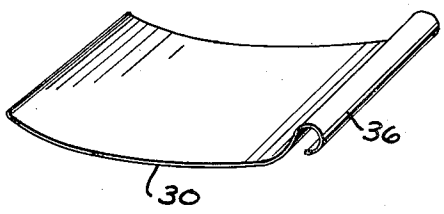


FIG. 2

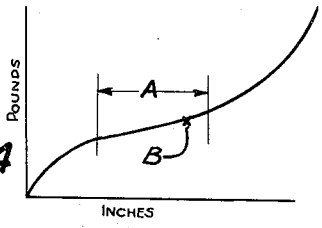


FIG. 4

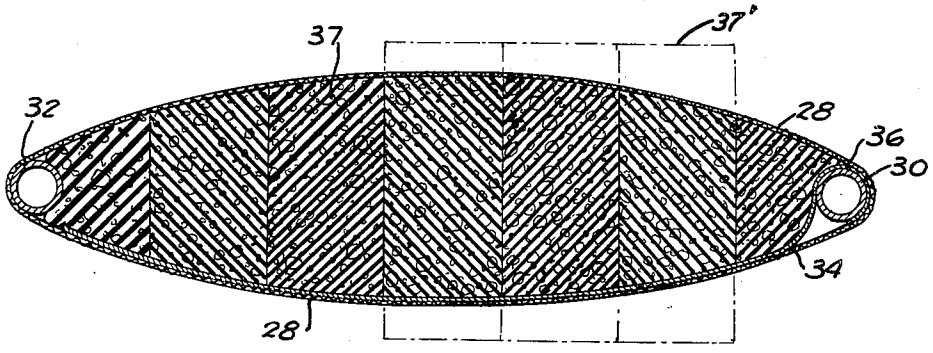


FIG. 3

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SEAT CONSTRUCTION

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The present application relates to seat cushion construction and particularly to such a structure having means for varying the spring rate of the cushion.

The use of synthetic foams for seat cushions has been limited by their inherent characteristic of a non-linear spring rate. Specifically, synthetic foams such as those made from polyether and polyester resins have the characteristic whereby the application of an increasing load will cause the foam to take an increasing deformation until it reaches a point where deformation will continue with very little increase in load until another point is reached at which it is necessary to increase the load at a greater rate to maintain proportionate deformation.

This is an undesirable characteristic in a seat cushion in that the cushion will deform to a great extent without giving the desirable support to the user.

In view of the foregoing state of the art, it is an object of the present invention to provide in a chair having a synthetic foam cushion, means for preloading the foam in order to obtain an improved deformation characteristic.

It is a further object of the present application to provide a seat cushion construction which can be varied in order that the user may obtain any desired cushioning affect.

These and further objects of the present application will become apparent from the following description and the accompanying drawings in which:

FIGURE 1 is a perspective view of a chair incorporating the present invention,

FIGURE 2 is a perspective view of a cushion member,

FIGURE 3 is a sectional view taken along section lines 3—3 of FIGURE 1, and

FIGURE 4 is a typical deformation curve for a synthetic foam.

Referring now to the drawings for a more detailed description of this invention, wherein like reference numerals identify like parts, a chair incorporating the present invention is indicated generally by the reference numeral **10** composed essentially of a back-rest **12**, a seat cushion **14**, and a base frame **16**. The seat cushion **14** incorporates the principles of the present invention and the back-rest **12** is of conventional construction. For purposes of simplicity the present invention is described in connection with only the seat cushion, however, it could also be constructed in accordance with the teachings of this disclosure.

The seat cushion **10** is supported by a base frame **16** having vertical legs and horizontal runners **20**. The runners **20** are tied together for rigidity by cross members **22** and **24**. The front and rear of the cushion **14** is supported by legs **18** and **26** respectively.

The cushion **14** has a continuous covering **28** made from a strong flexible material such as canvas that encircles two horizontal rods **30** and **32** which are disposed at the front and rear edge of the cushion **14**. A rigid member **34** made of sheet metal, or the like, lies along the interior surface of the bottom half of the fabric **28**. Member **34** is formed so that one of its ends **36** has a semicylindrical shape which fits about the front rod **30**. Thus member **34** is pivotally supported at one end and rests on the fabric **28** through its length.

The interior of the cushion **14** is made up of several blocks of synthetic foam **37** such as that made from polyether or polyester resins. However, natural or latex rubber foams would also function satisfactorily. The

continuous fabric covering **28** may be fabricated from a strip of material which has its ends zippered or laced together. Such a detachable connection would assist in assembly of the cushion **14**.

In the case of synthetic foams such as polyesters, the deformation curve of pounds versus inches has a peculiar plateau which is undesirable for seat cushion construction. A typical curve of such material is disclosed in FIGURE 4 wherein the plateau portion A indicates that after an initial load, the foam will continue to deform with little additional load. In order to employ this material for seating purposes, it is desirable to preload it so that the plateau effect can be by-passed. With the present invention it is possible to preload the foam in varying amounts, for example, up to point B on the graph of FIGURE 4 where the plateau has been substantially by-passed.

To achieve preloading of the cushion the rear legs **26** of the chair **10** and the runners **20** are of integral construction and are formed from high alloy steel having a high modulus of elasticity. In their natural state, legs **18** and **26** are nearly parallel so that when the cushion **14** and rods **30** and **32** are assembled to the frame **16**, fabric **28** is placed in tension by the spring action between the legs **26** and runners **20**. Reference numeral **26'** indicates the unrestrained position of leg **26**.

The tensioning of the fabric **28** causes the blocks of foam **37** encircled therein to be compressed between the upper and lower halves of the fabric **28** which are forced together by the separating force of rods **30** and **32** resulting from the aforementioned spring action. This preloading of blocks **37** is indicated by dotted line **37'** which discloses the unrestrained shape of the foam. This action preloads the foam **37** in the cushion **14** causing it to assume a deformation characteristic past the plateau on the deformation curve. The pan **34** provides support to the structure without interferring with its flexibility or cushioning ability.

The firmness of cushion **14** is related to the amount of preload given to the foam and to the nature of the foam itself. Both of these aspects are controllable under the construction of the present application.

By locating turnbuckles **38** diagonally between the outer ends of rod **32** and the runner **20**, the amount of tension which is placed upon the fabric **28** can be controlled. By tensioning the turnbuckle **38**, the spring load of legs **26** is taken up in the turnbuckle rather than the fabric **28** and foam blocks **37**. Thus the amount of preload given to the foam blocks **37** can be decreased by increasing the tension of turnbuckle **38**.

The characteristics of the cushion **14** can also be controlled by the application of blocks of foam of selected density and spring rate. In the center of the cushion where the greater load is to be carried, blocks having greater density and a stiffer spring rate are used, whereas, the blocks next to rods **30** and **32** which carry little load will have a softer spring rate. To assure proper deflection and load distribution, and for purposes of replacement, the blocks are merely trapped in position rather than cemented together.

It is also to be appreciated that additional comfort will be experienced by the user of this seat cushion due to the flexibility of the legs **26**.

While the present application has been described in particular detail, this is done for purposes of illustration rather than limitation. It is obvious that variations in construction may occur to those skilled in the art which will still be within the scope and spirit of this invention as defined in the appended claims.

I claim:

1. A chair structure having a seat cushion portion and a base frame portion, said frame comprising parallel

horizontal support elements secured to front and rear chair legs, said cushion portion including a pan member disposed between said support elements and pivotally secured to one of said elements, blocks of elastomeric foam positioned on said pan member, a continuous fabric band encircling said supports, blocks, and pan.

2. The combination of claim 1 wherein said legs yieldably urge said support elements apart.

3. A chair having a seat cushion portion and a frame portion, said frame portion comprising a pair of horizontal support elements, said cushion portion including a pan member disposed between said support elements and pivotally secured to one of said elements, elastomeric material positioned on said pan member, a continuous flexible covering encircling said supports, material, and pan, and means for forcing said support elements apart so as to cause tensioning of said flexible covering tight about said material whereby said material is compressed.

4. A chair structure having a seat cushion and a base frame, said cushion comprising blocks of elastomeric foam resting on a rigid pan of sheet material, a pair of horizontal support elements disposed at both ends of said blocks, said pan member being pivotally supported by one of said support elements, a continuous flexible covering encircling said blocks, support elements, and pan, leg members supporting said support elements, said leg members being yieldably constructed so as to place said fabric in tension.

5. A cushion, comprising: a plurality of individual elongated elastomeric blocks of varying density disposed transversely and in side-by-side contiguous relation, said blocks of greater density being disposed in positions of greater load bearing exposure, a member upon which said blocks are received and against which said blocks are compressible, a flexible covering received over said blocks and about said block receptive member, and means for tensioning said covering to preload at least some of said blocks past the plateau of the deformation curves thereof.

6. The cushion of claim 5 wherein said elastomeric blocks are alternately of a more and less compressible density.

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