

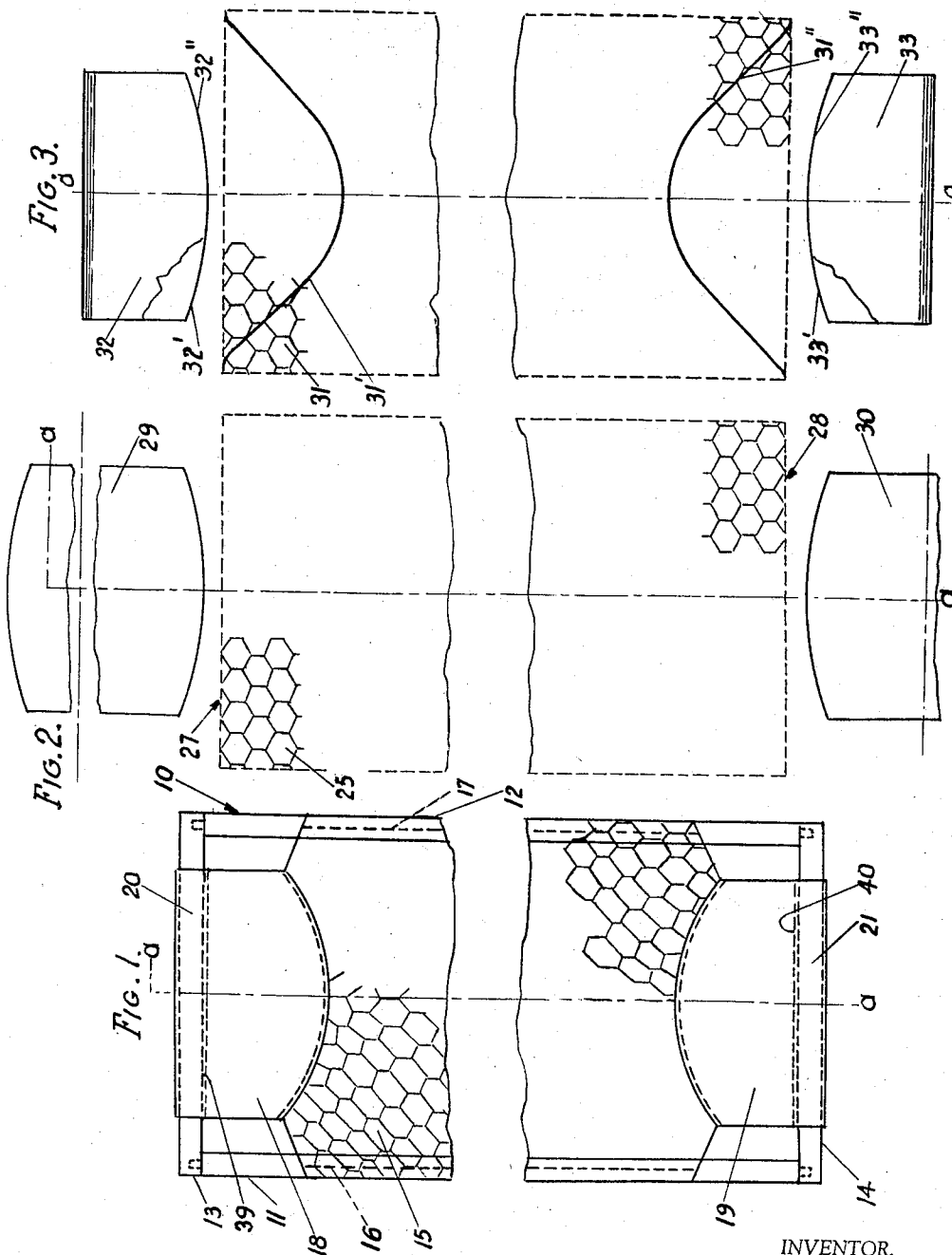
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J. E. LILIENTFELD
UPHOLSTERY ARTICLE

2,907,376

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3 Sheets-Sheet 1



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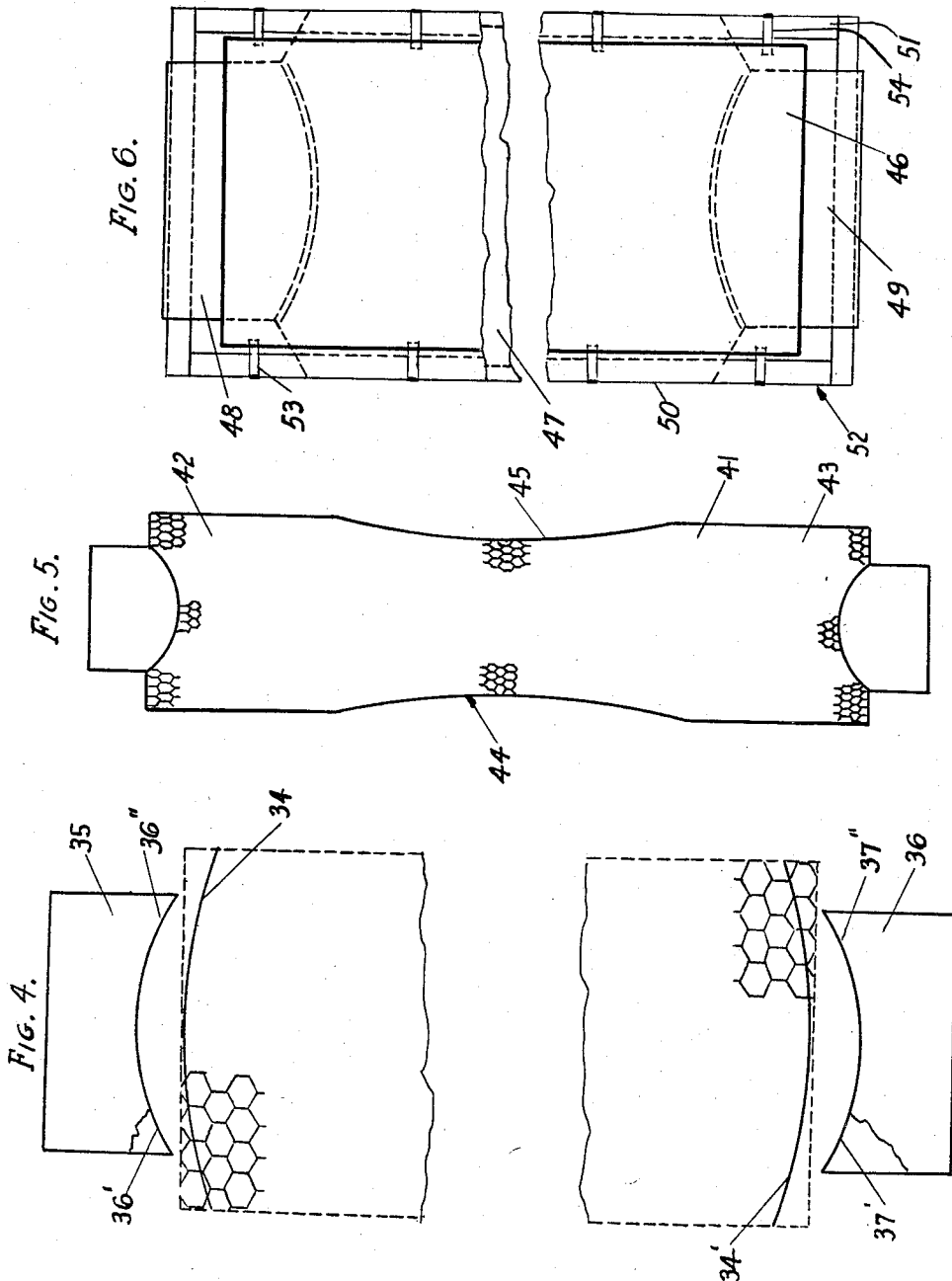
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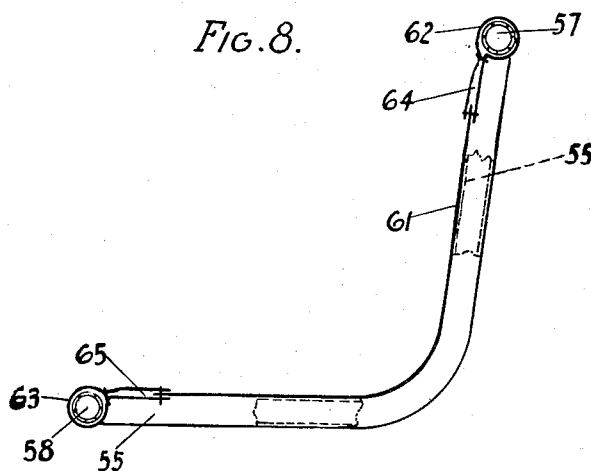
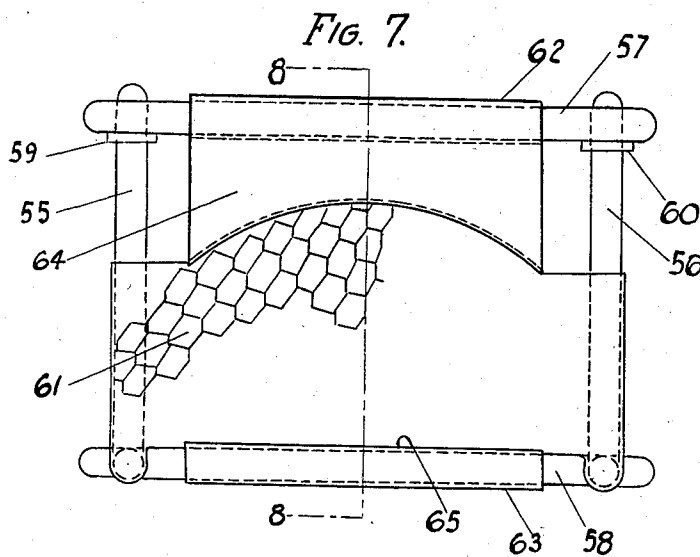
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2,907,376

UPHOLSTERY ARTICLE

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Application January 22, 1958, Serial No. 710,555

4 Claims. (Cl. 155—178)

The invention relates to a novel article of upholstery and to the combination of fabric of retiform type with frames and the like to form supporting surfaces of a resilient nature adaptable to the shape of the load to be supported, more especially supporting surfaces of the nature set forth in my copending application for U.S. Letters Patent, Serial No. 643,410. While it is described herein specifically in connection with the application of such fabric to the upholstery of furniture frames, it is to be understood that the invention is not restricted to this art.

The invention has for an object to adapt to the aforesaid purposes the inherent property of a retiform fabric—the mesh pattern of which is constituted of substantially inextensible filaments—to become distorted under stress and exhibit elastic properties while conforming to the shape of the load; also, to introduce certain novel features, effecting the distortion of the fabric, in the construction of an upholstery article as well as in the assembly of such article with the supporting frame of, for example, cots, bunks, lounges, beds, stretchers, chairs, etc.

Another object of the invention is to provide an article and a construction which will admit of expeditious assembly of furniture, in that the use of standard tools only and standard operations, such as sewing, stapling, interlacing etc. and with which the trade is familiar, are required. Still another object of the invention is to improve the appearance of the completed furniture. A further object of the invention is to provide an article of upholstery which produces the sensation of an antispastic softness of support and “a posturizing” effect.

In carrying out the invention, a novel construction of a composite piece of upholstery is provided, the same consisting in part of retiform material and in part of sheets or strips of inextensible flexible material which are of lesser width than the retiform portion of the upholstery piece—a sheet or strip of the inextensible material being firmly joined to one or both end portions of the retiform supporting material and along a predetermined trace outlined thereon. The attachment is such that a differently spaced trace—outlined on the retiform material—is made to coincide while spread out flatly in a plane point by point with said predetermined trace; and the supporting material end sheets of inextensible flexible material are then secured firmly in their positions along the traces prior to attachment to the frame ends of the novel upholstered furniture thus provided.

In enforcing the indicated coincidence, the mesh pattern of the retiform component of the novel upholstery article becomes subjected to a distortion similar to that set forth in the aforesaid pending application. To this end, both traces are outlined symmetrically to the length axis of the upholstery in process and in such a manner as to curve the trace on the retiform fabric more sharply than that on the inextensible material—if both traces are convex as seen from the center of the retiform material and which is the preferred arrangement. It is, however, possible to turn the curves the other way to appear concave

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in which case the retiform fabric receives a less sharply curved trace than that provided on the inextensible material. In either case a distortion of the mesh is produced to the effect that the area of active support becomes extended and elastic reaction becomes available for the desired support of the load.

The retiform fabric is made up of a material, the fibers of which are only insignificantly extensible under the loads to be applied to the support surface provided, and exhibiting insignificant elastic reaction to torsion and bending. As a result, the shape of the fabric mesh will distort over its active area under applied loads and thus afford a “posturing” effect by the upholstery. I have found that if the retiform fabric is knitted of an artificial fiber, e.g. nylon, it will indefinitely remain under constant tension once it is attached to an adequately solid frame.

The novel observation that resilient performance is obtained with a fabric of substantially inextensible, inelastic filaments is of practical importance—not only because such filaments are by far the most stable ones in all respects—but, just as important, because in the absence of significant elongation of the filament, the response of the fabric to the stressing is strictly defined and may be so adjusted as to support the load in proper shape. It may be added that this resilient performance of a fabric, made of inextensible filaments, is a consequence of the individual strict definition of the distortion of its inherent response to the size and shape of the load. If the latter changes, the configuration of the mesh pattern of the fabric changes; and the transition from configuration to configuration is accomplished by a change of the energy level of the total assembly, which fact involves a resilient performance.

The novel article of upholstery may be applied to beds, cots, bunks, stretchers, chairs etc., and may be used with or without an additional covering piece of goods or finish cloth of convenient weight and porosity. In the case of beds, etc., the conventional combination of springs and mattress is advantageously and inexpensively replaced by the novel article; and in the case of chairs, springs and padding are made superfluous.

The advantage over the customary upholstery resides in the conformity of the support with the shape of the body load, hence in a relaxing, posturing, antispastic action. It is also an advantage that the retiform fabric pattern does not impede the circulation of air at the body in contact with it; and in absence of an additional covering, it admits, of course, of full ventilation. When a covering is provided for the fabric, the desired amount of air circulation may be obtained by properly choosing weight and porosity of the covering goods. Thus, an adequate adjustment of air circulation may be assured, in absence of which discomfort and skin affections might easily develop.

In this connection, it may also be noted that in contradistinction to conventional furniture the novel upholstery introduces no inaccessible surfaces likely to accumulate dust and uncleanness; and may be thoroughly cleaned and/or disinfected. Its exceptionally small volume makes it suitable, also, for folding and transformation purposes; and its exceptionally small weight offers advantages in the transportation field for seats, bunks etc.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a cot equipped with the novel upholstery article.

Figs. 2 and 3 are plan views illustrating the manner of assembling the article; and Fig. 4 is a similar view illustrating a modification therein.

Fig. 5 is a plan view of the article of upholstery before being mounted and having tension applied thereto.

Fig. 6 is a view similar to Fig. 1 and shows a covering applied over the article.

Fig. 7 is a front elevation illustrating the application of the upholstery article to a chair "cradle"; and Fig. 8 is a vertical section taken on the line 8-8 thereof.

Referring to the drawings, more particularly to Fig. 1 thereof, the invention is illustrated as embodied, for example, in a conventional rectangular frame cot 10 of the well known folding type construction consisting of side frame members 11, 12 and separable end frame members or cross bars 13, 14 which are adapted to lock the frame together as is well understood. In so doing and in accordance with the invention, the desired stress is developed and causes a distortion of the mesh pattern in a shape-conforming upholstery retiform fabric strip 15, constituting the support surface. By the term "retiform" as applied to the fabric, the latter is to be understood as being made up by repeating a mesh pattern of which the corners are fixed—nonslipping.

The said fabric which is, for example, of hexagonal pattern, to this end is to be attached along its sides to the corresponding side frame members 11, 12 to lie flat, as by interlacing the edge portions thereon with a cord 16 and a cord 17 respectively and stapling said cords to the frame.

The respective ends of the novel composite article of upholstery embody a flexible, inextensible securing portion 18 and a like portion 19 which are provided at their outer ends with a corresponding loop or sleeve 20, 21 designed to receive the separable cross bars 13, 14 respectively. The latter, when locked over the corresponding ends of said frame members 11, 12 in the conventional manner in erecting a cot, will then stress the retiform fabric longitudinally, and symmetrically with respect to the length axis $a-a$, the length of said securing portions being proportioned accordingly.

This will secure the desired longitudinal distortion of the material of the fabric to develop therein elastic reaction by the composite support under load, the fabric, however, being fixed to the side frame members with little initial stress as compared with that of the finished assembly.

In determining the proper active width of this fabric to be attached (prior to tensioning of the same longitudinally) it may be noted that this is conveniently defined by counting the number of meshes (hexagons) in one row across the frame. Thus, in the case of a frame of 33 inches width and with hexagons of $\frac{1}{2}$ inch width (inscribed within a 1 inch circle), there would be required 37 of undistorted hexagons between frame sides; exclusive of the material needed for attachment of the fabric to the said side frame members. The said number of hexagons, however, fail to produce the needed prestress and in the actual case only 33 hexagons would be counted at the end portions of the fabric, gradually reducing in number toward the transverse center line to 28. The length of the composite upholstery article will be determined by the degree of tension desired.

The said composite design of the upholstery is conveniently attained, reference being had to Figs. 2 and 3 of the drawings, by the following procedure. As is indicated, a length of strip 25 of the retiform fabric is provided to conform with the dimensions of the frame to which it is to be applied, as aforesaid. At its opposite ends 27, 28 there is to be fixedly attached to the strip corresponding securing sheets 29, 30 which are of flexible but inextensible material such as nylon, and generally of lesser width than the width of the intermediate strip 25 of retiform fabric.

In assembling the fabric and securing sheets into a composite upholstery article for use in upholstering various types of furniture such as cots, bunks, lounges, stretchers, beds, chairs, etc. therewith, reference being had to Fig. 3 of the drawings, there is outlined or suitably marked upon a strip 31 of retiform fabric, and

symmetrically with respect to its longitudinal axis $a-a$, at its respective ends curved traces 31', 31'' with their convexities facing each other. Similarly, each securing sheet 32, 33 has outlined or marked thereon a pair of convex traces 32', 32'' and 33', 33'' respectively, the sharpness of the convexities of which traces are designed to be less than those of the fabric traces with which they are to be associated.

Or, as is shown in Fig. 4, the curvature of the traces 34, 34' marked on the fabric ends may be reversed, as well as on the respective securing sheets 35, 36 their respective traces 36', 36'' and 37', 37''. In such case, however, the curvature on said sheets is steeper than that on the fabric.

The attachment of a securing sheet to its end of the fabric strip is conveniently effected, Figs. 1 to 3, by doubling a sheet 18, 19 upon itself, as is more particularly indicated in Fig. 3 with respect to the sheets 32, 33. The outer ends of such folded-over portions are then secured at their free edges over a corresponding end of the fabric to which it is to be secured, for example, by stitching.

Thus, sewing of the edge portions is effected along the juxtaposed pairs of traces, which are first to be properly aligned, and over the intermediate hexagons or like pattern elements, the threads of the attachment interlinking with the meshes. Surplus material, preferably, is to be trimmed away.

At the turned-over portion of a folded securing sheet the loops 20, 21 are formed by stitchings 39, 40 across the doubled material. A loop is then ready to receive an end cross bar of the frame for stressing of the novel composite support article, as hereinbefore set forth, and effecting thereby distortion of the mesh pattern of the fabric.

It will be understood, of course, that in so attaching a strip to its frame, the initial width thereof is to be sufficient to allow for marginal portions to be fixed to the side frame members, for example, and to cause the fabric to lie flat without substantial stress before the end members are fixed in position. If of the hexagonal pattern, as shown, this dimension may readily be determined in accordance with the dimensions of a hexagon, as hereinbefore set forth. It is to be noted, however, that the strip of fabric 41, Fig. 5, intermediate its ends 42, 43 is reduced in width along both sides, as is indicated at 44, 45, in conformity with the reduction of the number of hexagons as is hereinbefore set forth.

It may be desirable, also, reference being had to Fig. 6 of the drawings, to provide a suitable woven cloth cover or finish blanket 46 over the retiform fabric 47 and the inner portions of the securing strips 48, 49. Thus, the same may be fixed to the respective sides 50, 51 of the cot frame 52 by means of sets of elastic tabs or lashings 53, 54 respectively tying the cloth or blanket over the corresponding sides and/or loops or corners.

The novel construction is applicable to three-dimensional type supports, for example, to form a legless "sitting cradle" which may, if desired, then be fitted into a legged support (not shown). Such cradle is indicated in Figs. 7 and 8 of the drawings and comprises two side members 55, 56 which may be rods or tubes shaped to conform to the desired design; and, for attachment of the fabric, may be interlaced with the mesh thereof. Two cross members or yokes 57, 58, one at the upper end and the other at the lower end, unite the said side members; and they are designed as well to carry the support. To this end they are fitted over the respective free ends of the said side members engaging with limiting stops 59, 60 thereof. The supporting fabric 61 is mounted by said yokes which pass through corresponding sleeves 62, 63 of the securing portions 64, 65 attached to the fabric, as hereinbefore set forth, to afford the desired stress.

I claim:

1. In combination: a rigid frame having side and cross

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members; a length of retiform fabric, of substantially inextensible filaments, fixed along its sides to the corresponding sides of the frame; and a pair of flexible securing sheets of substantially inextensible material secured at their one end to the respective end portions of the retiform fabric length along respective traces directed convexly toward each other—the curved attachment components of the retiform fabric end being of sharper convexity than that of its juxtaposed securing sheet end but coinciding therewith—and at their other end to the corresponding cross members of the frame to establish an over-all, load-reacting distortion of the mesh pattern of the retiform fabric over the area located between said securing sheets.

2. The combination of claim 1, wherein the flexible securing sheets are each of lesser width than the width of the said strip of retiform fabric.

3. An article for use in upholstery, comprising a length of retiform fabric of substantially inextensible filaments of which the mesh pattern is outlined along the direc-

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tion of more than two vectors; and a pair of flexible securing sheets of substantially inextensible material secured at their one end to the respective end portions of the retiform fabric length along respective traces directed convexly toward each other—the curved attachment component of a retiform end being of sharper convexity than that of its juxtaposed securing sheet but coinciding therewith.

4. The article for use in upholstery according to claim 3, wherein the length of retiform fabric is reduced in width intermediate its ends.

References Cited in the file of this patent

UNITED STATES PATENTS

2,659,956 Lilienfeld ----- Nov. 24, 1953

FOREIGN PATENTS

197,129 Germany ----- Apr. 7, 1908
423,472 Great Britain ----- Feb. 1, 1935