March 12, 1963 J. C. GORDON 3,080,579

PLATFORM STRUCTURE FOR UPHOLSTERED ARTICLE AND METHOD OF MANUFACTURE

Filed June 22, 1960 2 Sheets-Sheet 1

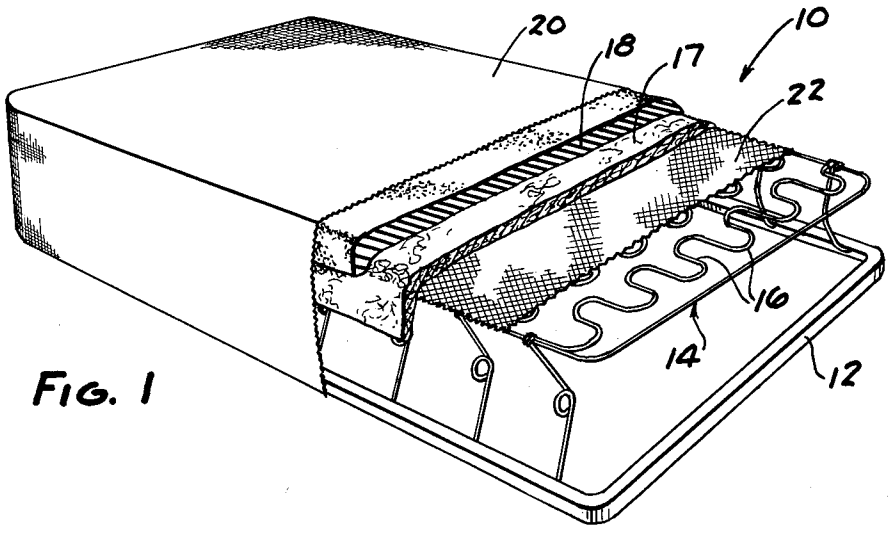


FIG. 1

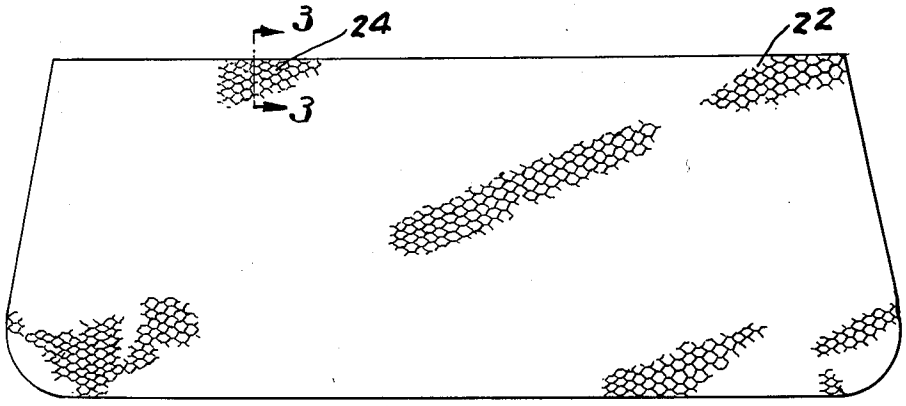


FIG. 2

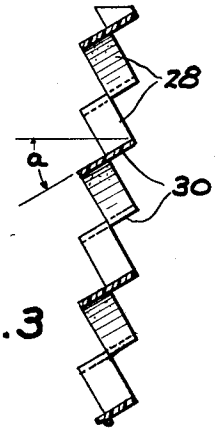


FIG. 3

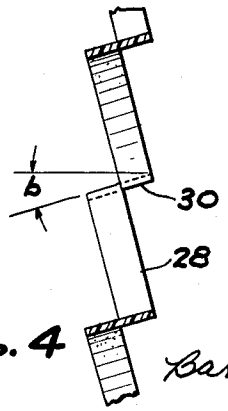


FIG. 4

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PLATFORM STRUCTURE FOR UPHOLSTERED ARTICLE AND METHOD OF MANUFACTURE

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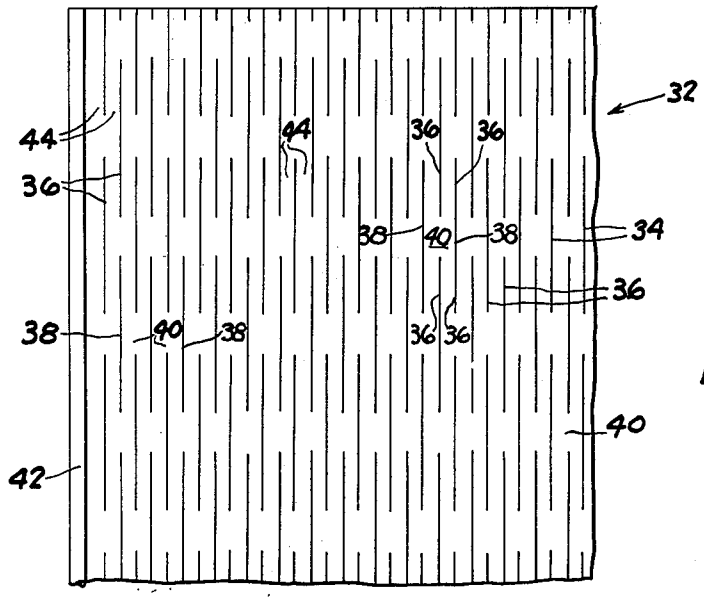
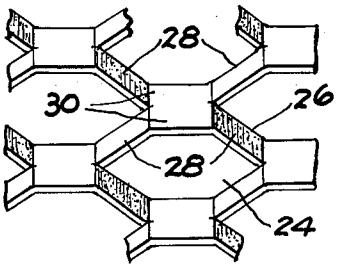


FIG. 6

FIG 5



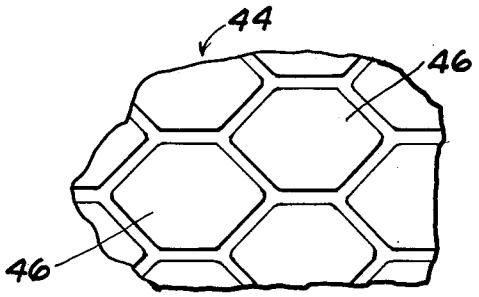


FIG. 7

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PLATFORM STRUCTURE FOR UPHOLSTERED ARTICLE AND METHOD OF MANUFACTURE

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5 Claims. (Cl. 5—354)

This invention relates to the structure of upholstered articles, such as seat cushions, mattresses and the like, and more particularly to a platform which is interposed between an underlying spring structure and an overlying layer of relatively soft padding for protecting the padding from damage by the spring structure through abrading, scuffing or cutting and supporting the padding in the interspaces between elements of the spring structure.

Earlier types of platforms have used sheets of woven cloth or flexible plastic material reinforced by elastic plastic filaments as shown, for example, in U.S. Patents 2,638,154, 2,789,628, and 2,789,629 to A. H. Dewees. These platforms are made conventionally by drawing the sheet material and filaments from rolls and adhering or fastening the filaments to the sheet material. The filaments are conventionally formed of a plastic, such as a vinyl plastic, which tends to curl as a result of having been rolled up before lamination to the sheet material so that the completed platform will not lie flat.

Consequently, the platform material cannot be cut to pre-determined shapes at the time of lamination for later assembly in an upholstered article but must be rolled up for storage and handling and then drawn from the roll and cut to size and shape as needed in the course of making the upholstered articles. Further, the platform must be anchored by tying or the like to the underlying spring structure or other relatively rigid part of the upholstered article. These characteristics add to the cost of handling and the cost of manufacture of the upholstered article.

These earlier platforms have not provided completely adequate support for preventing sagging of the overlying padding into the spaces between the underlying spring elements. Moreover, they have not been capable of resilient stretching to a degree which is completely satisfactory in upholstered articles, particularly in bottom seat cushions and the like which carry relatively heavy loads.

The object of this invention is to provide a simple, inexpensive platform structure which provides improved protection and support for the padding material, improved resilient yielding characteristics when a person's weight is imposed on the upholstered article, and which will lie flat so that it can be handled and stored when cut to pre-determined shapes and can be assembled between a spring and padding without anchoring or fastening to adjacent members in the assembly.

The invention generally contemplates a platform comprising a sheet of plastic material which has been slitted and expanded to a mesh condition and then cured or treated so that the mesh form is retained. The slits are arranged so that when the sheet is expanded, the interjacent strips twist to an edgewise position relative to the general plane of the sheet to give the sheet unusual beam strength when it is cured. When the cured flexible sheet is tensioned under the weight of a person on the upholstered article, the strips defining the mesh openings both flex in the general plane of the sheet and twist in torsion. The strips flex and twist resiliently to their original condition when the tension is relieved. The sheet resiliently tends to retain its flat condition.

Selected for illustration of the invention is an automobile seat cushion. In the drawings:

FIG. 1 is a perspective view of a cushion utilizing a platform according to the present invention.

FIG. 2 is a partly diagrammatic plan view of the platform.

FIG. 3 is an enlarged sectional view on line 3—3 of FIG. 2.

FIG. 4 is a view similar to FIG. 3 but further enlarged and showing the platform in tensioned condition.

FIG. 5 is an enlarged fragmentary perspective view illustrating structural details of the expanded mesh platform.

FIG. 6 is a diagrammatic plan view illustrating a slitted sheet from which the platform is made.

FIG. 7 is a diagrammatic illustration of a roller over which the slitted sheet may be passed as one step in making the platform.

The cushion 10 shown in FIG. 1 includes a frame 12 on which a wire spring structure 14 is mounted. The spring illustrated has zig-zag wire spring elements 16 but the specific type of springs used is not material to the present invention. Coil springs or other types of springs could also be used. The cushion padding is illustrated as including a layer of a relatively soft material such as felted jute or cotton 17 surmounted by a layer of foam rubber 18. A layer of cover material 20 overlies the padding layers and is secured by suitable means to frame 12. A platform 22 constructed according to the present invention is interposed between the spring structure 14 and padding layer 17. The platform may be assembled in direct contact with the springs as illustrated.

In accordance with the invention, platform 22 comprises a sheet of a plastic material which in its cured or set form is flexible and resiliently distortable. Polyethylene, vinyl chloride and polypropylene materials are examples of suitable plastics. Platform 22 has the form of a mesh or screen whose openings 24 are small as compared to the spacing between the support elements 16 of the wire spring. As best seen in FIG. 5, the mesh may be viewed as comprising a plurality of flat strips 26 which extend sinuously along the length of the sheet and which have alternate runs 28 and crests 30.

The crest portions of adjacent strips are attached to each other and successive crests of each strip 26 are secured to the crests of alternately adjacent strips. Also, alternately opposite side edges of the strips are secured to the adjacent strips at successive crest regions and successive runs 26 extend angularly alternately toward opposite side faces of the platform sheet. With this construction, the sheet has a thickness determined by the combined widths of strips 26 and the angle of the interconnected crests 30 to the general plane of the sheet; when the platform is placed under tension, the strips flex resiliently in the general plane of the sheet and the strips also twist relative to their individual longitudinal extents. For convenience, this resilient twisting action is referred to herein as a torsional twisting or distortion.

By way of example, platform 22 is made of an extruded sheet of polyethylene 32 and before the sheet is cured or set it is slitted intermittently along parallel lines as represented in FIG. 6, with the slits 34 in adjacent lines being longitudinally staggered. The end portions 36 of adjacent slits overlap and extend adjacent each other and the central portions 38 longitudinally span the interjacent land 40 or unslit portion left by the intermittent slitting.

The sheet is then stretched or expanded both longitudinally of slits 34 and laterally thereof to orient the plastic molecules two-directionally and during this stretching, the flat strips 44 formed by the slitting move away from each other so that the slits become openings 24 in the expanded mesh, strips 44 assume sinuous form as at

26, and land portions of the sheet twist torsionally to provide the interconnected crest portions 30 of the sinuous strips. The expanded sheet is subjected to heat and then cooled to stabilize or set it in its expanded form.

It is not necessary to slit sheet 32 in the exact pattern illustrated in FIG. 6. For example, the lengths of the slits, the spacing between them, and their relative attitudes and longitudinal positions may be varied. The important thing is to provide slitted portions and unslitted portions in alternate arrangement along lines transverse to the lines of slitting so that when the sheet is expanded, unslitted portions of the sheet will twist to a generally sidewise atitude to increase the effective thickness of the sheet and increase its beam strength when cured or stabilized.

In some situations it may be advantageous to provide platforms whose strips or land portions are very nearly perpendicular to the general plane of the sheet in unstressed condition. This may be done by passing the expanded sheet over a roll 44 while the sheet is still in softened condition, the roll having a series of male die portions with perpendicular sides which enter the openings 24 in the mesh and fashion the strips and lands to generally perpendicular attitudes. Then when the sheet is cured, the strips and lands will retain these attitudes when in unstressed condition.

As an example, plastic sheet 32 may have an initial thickness of about 20 mils with the slits being spaced laterally apart about .100". The sheet is stretched to about double its original length and double its original width to provide platform 22 having an area four times that of the original plastic sheet. During the stretching and consequent twisting of lands 40, the overall thickness of the sheet is increased to about 100 mils. This method of manufacture is very simple and inexpensive and utilizes relatively small quantities of the raw plastic material.

The expanded stabilized sheet material may be cut to pre-determined shapes such as cushion platform 22. The pre-cut sheets tend resiliently to resist distortion out of their flat condition and can therefore be handled and stored easily.

In assembling cushion 10, platform 22 is merely laid over the top of spring structure 14 and padding 17, 18 and cover material 20 are secured over the platform in the general relation shown in FIG. 1. It is not necessary to tie or otherwise anchor the platform to the supporting spring structure or the padding because the platform lies flat rather than tending to curl. Also, the edges of the strips 26 provide the platform faces with a rough character so that relative sliding movement of the platform and adjacent components is resisted. However, the platform could be tied in place by strings and in this case sheet 32 could be extruded with a bead 42 as shown in FIG. 6 around which the ties could be passed. The platform could be stitched to padding layer 17 or could be imbedded into a padding layer such as a layer of foam rubber.

The cured plastic material of platform 22 is relatively tough, openings 24 are small as compared to the spaces between spring wire elements 16 and the platform has an effective thickness generally approaching the combined widths of interconnected crests 30. Consequently, the platform has unusual beam strength for supporting portions of padding 17, 18 overlying the spaces between wire elements 16. This greatly reduces or eliminates the tendency of the padding to sag into these spaces so that cushion 10 retains its shape and effectiveness over an increased life span in use.

At the same time, platform 22 is bodily flexible so that it can follow the deflection of spring structure 14 under the weight of a person sitting on the cushion. Under his deflection, platform 22 is bodily stretched to a certain extent with strips 26 both flexing in the general direction of extent of the platform and distorting in a torsional direction as disclosed above. The first type of distortion is visibly manifested by a change in shape of openings 24 and the second type of distortion is manifested by a tilting of crest portions 30 as illustrated by a comparison of FIGS. 3 and 4. The angle between the crest portions and sheet direction in unstressed condition is illustrated at *a*, FIG. 3. When the sheet is stretched in a vertical direction as FIG. 2 is viewed, crest portions 30 tilt to a smaller angle *b* as represented in FIG. 4.

Thus it is apparent that the beam support provided by the platform for the overlying padding is as great in stressed condition of the platform as in unstressed condition. When a person's weight is removed from the cushion, the platform returns resiliently to its original unstressed condition along with recovery movement of the underlying spring structure. The platform insulates the padding material from load-bearing contact with the spring wire elements and thus protects the padding from being abraded, scuffed, or cut into by the spring wire elements.

I claim:

1. In an upholstered article having an underlying spring structure which is resiliently distortable under force of a general magnitude imposed by the weight of a person resting thereon, an overlying layer of relatively soft padding material, and an interposed platform to support said padding material and to protect said padding material from damage by said spring structure, an improved platform comprising,

an expanded open mesh sheet of resiliently distortable plastic material such as oriented and stabilized polyethylene,

the elements defining the openings in said sheet extending alternately toward opposite faces of the sheet and having alternately opposite side portions connected to adjacent elements,

said elements being resiliently distortable both in the general direction of extent of said sheet and laterally thereof and being resiliently twistable in torsion responsive to tension on said sheet imposed by force of said general magnitude, so that said sheet can flex bodily and extend resiliently in its own general direction of extent,

said openings being small with relation to the distance between the elements of said spring structure.

2. In an upholstered article having an underlying spring structure which is resiliently distortable under force of a general magnitude imposed by the weight of a person resting thereon, an overlying layer of relatively soft padding material, and an interposed platform to support said padding material and to protect said padding material from damage by said spring structure, an improved platform comprising,

a flexible sheet formed of a plurality of strips of resiliently distortable plastic material such as oriented and stabilized polyethylene,

said strips being interconnected to form an open mesh in which the openings are small as compared to the spaces between the elements forming said spring structure,

the interconnected portions of said strips being disposed between opposite faces of said sheet, and the intermediate portions of said strips extending alternately between said opposite faces,

said sheet having a thickness at said interconnected portions which is greater than the width of said intermediate portions of said strips,

said strips being resiliently distortable both in the general direction of extent of said sheet and laterally thereof and being resiliently twistable in torsion responsive to tension on said sheet imposed by force of said general magnitude, so that said sheet can flex bodily and extend resiliently in its own general direction of extent.

3. In an upholstered article having an underlying spring structure which is resiliently distortable under force of a

general magnitude imposed by the weight of a person resting thereon, an overlying layer of relatively soft padding material, and an interposed platform to support said padding material and to protect said padding material from damage by said spring structure, an improved platform comprising,

a flexible sheet formed of a plurality of adjacent strips of flexible resiliently distortable plastic material such as oriented and stabilized polyethylene,

said strips extending sinuously lengthwise of the sheet with every other crest portion of each strip being secured to the top of a crest portion of one adjacent strip and each alternate crest portion of each strip being secured to the bottom of a crest portion of the other adjacent strip, so that said sheet has an effective thickness determined by the combined widths of the interconnected crest portions,

said strips being resiliently distortable both in the general direction of extent of said sheet and laterally thereof and being resiliently twistable in torsion responsive to tension on said sheet caused by force thereon of said general magnitude, so that said sheet can flex bodily and extend resiliently in its own general direction of extent.

4. In an upholstered article having an underlying spring structure which is resiliently distortable under force of a general magnitude imposed by the weight of a person resting thereon, an overlying layer of relatively soft padding material, and an interposed platform to support said padding material and to protect said padding material from damage by said spring structure, an improved platform comprising,

a flexible sheet formed of a plurality of strips of resiliently distortable plastic material such as oriented and stabilized polyethylene,

said strips being interconnected to form an open mesh in which the openings are small as compared to the spaces between the elements forming said spring structure,

said strips having a relatively small thickness and a relatively greater width, said strips being disposed so that their widths extend in directions transverse to the general direction of extent of said sheet to provide increased beam strength for supporting the portions of said padding material overlying the spaces between said spring elements,

said strips being resiliently distortable both in the general direction of extent of said sheet and laterally thereof and being resiliently twistable in torsion responsive to tension on said sheet caused by force of said general magnitude, so that said sheet can flex bodily and extend resiliently in its own general direction of extent.

5. The combination defined in claim 4 wherein said plastic material comprises two-directionally oriented polyethylene which is stabilized in said open mesh form.

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