April 4, 1972 A. BIELER 3,654,051

CARPET TILE

Filed July 16, 1969

Fig. 1

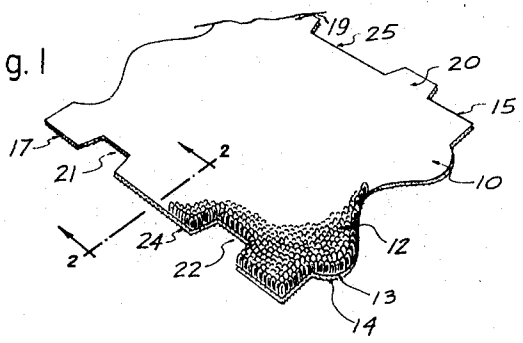


Fig. 2

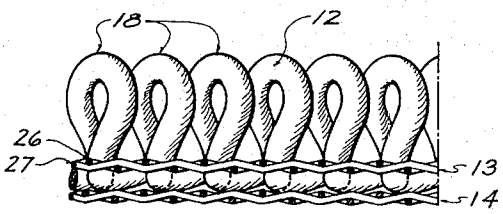


Fig. 3

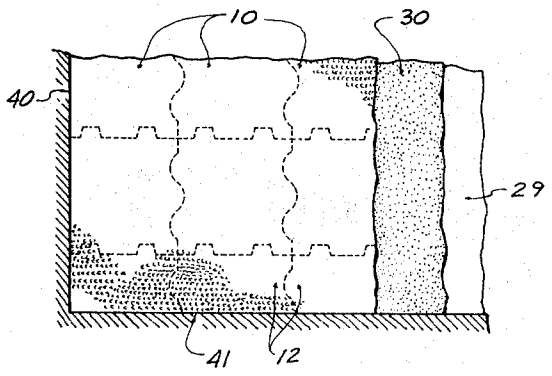


Fig. 4

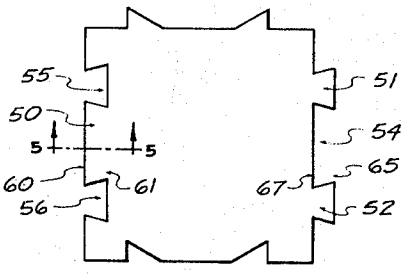
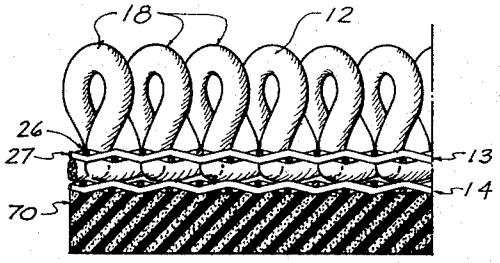


Fig. 5



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STRUCTURES FABRICATED FROM A PLURALITY OF SIMILAR STRUCTURAL ELEMENTS ARRAYED IN A REPETITIVE PATTERN

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FIG. 7

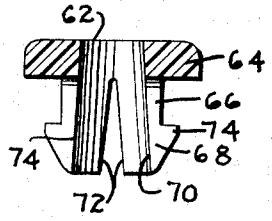


FIG. 5

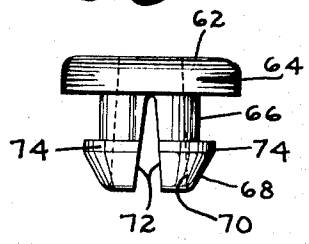
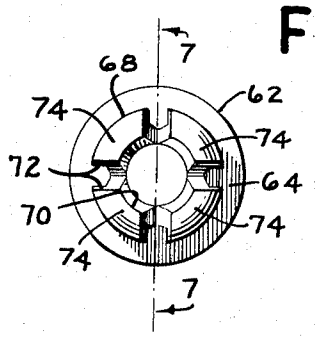


FIG. 6



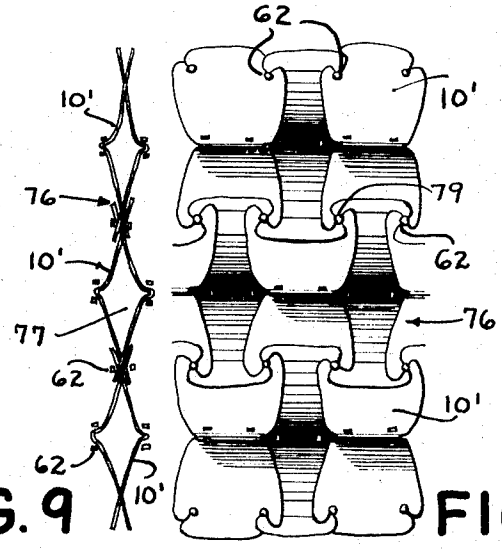


FIG. 9

FIG 8

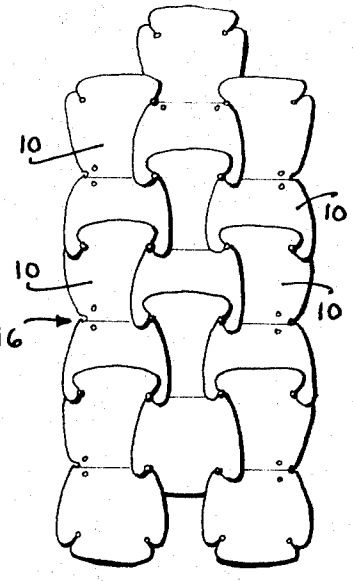


FIG. 18

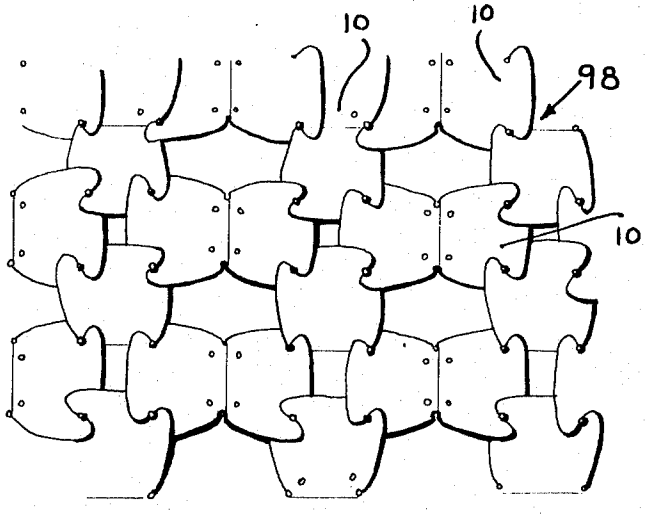


FIG. 19

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STRUCTURES FABRICATED FROM A PLURALITY OF SIMILAR STRUCTURAL ELEMENTS ARRAYED IN A REPETITIVE PATTERN

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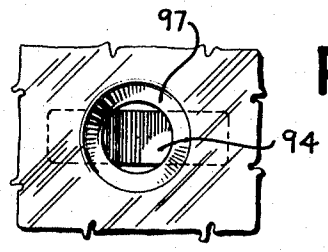
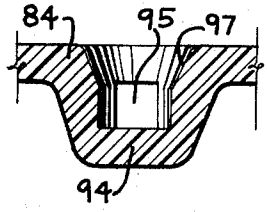


FIG. 15



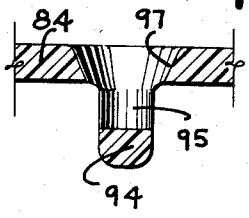


FIG. 17

FIG. 16

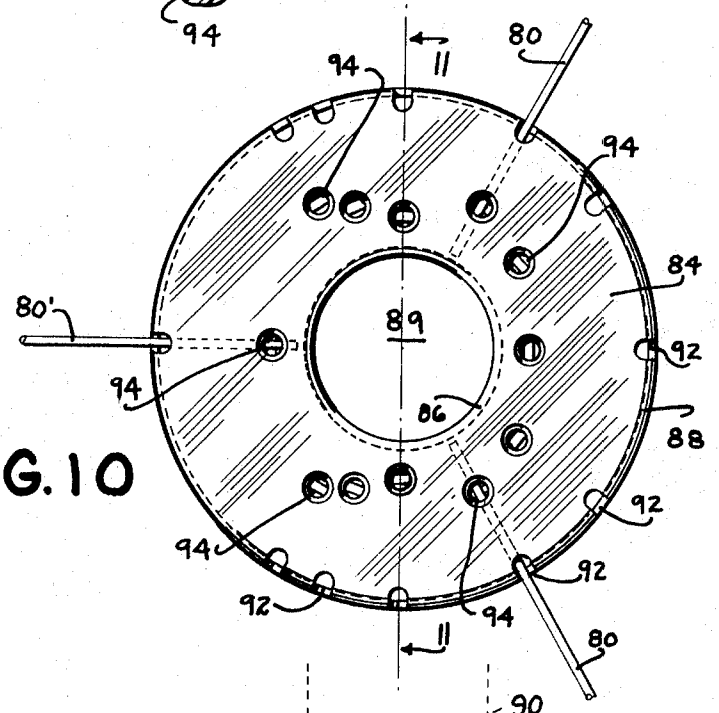
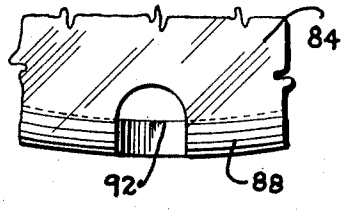


FIG. 10

FIG. 12



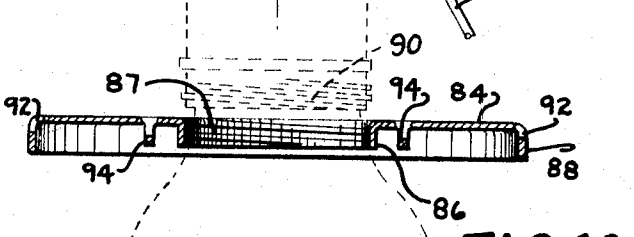


FIG. 11

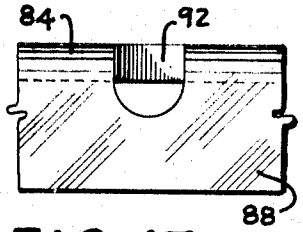


FIG. 13

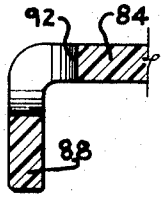


FIG. 14

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3,654,052

STRUCTURES FABRICATED FROM A PLURALITY OF SIMILAR STRUCTURAL ELEMENTS ARRAYED IN A REPETITIVE PATTERN

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Int. Cl. B32b 3/06, 3/10
U.S. Cl. 161—37 5 Claims

ABSTRACT OF THE DISCLOSURE

A symmetrical and generally four-sided structural element of sheet material has ears formed at its two ends and four tabs formed on its sides, said ears and tabs being dovetailed to define four corner engaging slits extending inwardly to terminate at four corner fastening means receiving apertures. The side tabs of the element preferably slope inwardly toward central fastening means receiving apertures provided in alignment with the corner fastening receiving apertures to define central engaging nips so that a plurality of the structural elements may be interlocked in partially overlapped relationship at their corners and/or at their sides. The preferred fastening means for the elements is a grommet formed with prongs adapted to spring back after insertion through the fastening means receiving apertures. A lamp shade spider is also provided for use in the preferred structure formed from the invention, which spider is designed to detachably receive a variable number of supporting spokes in preferably equiangular relationship so as to afford maximum versatility in the selection of lamp shade size and configuration.

This invention generally relates to structures fabricated from a plurality of similar structural elements arrayed in a repetitive pattern. More particularly, it is concerned with a novel structural element of this type, a fastening grommet particularly useful with such elements, and a spider preferred for use when the structural elements form a lamp shade.

In accordance with the invention, a generally four-sided structural element is formed from a sheet of flexible material such as paper, plastic and the like to be symmetrical about a center line. Two fan-shaped ears are provided at the ends of the element, while each side of the unit is formed with two tabs positioned on either side of the center line. Fastening means receiving apertures are punched or otherwise provided at each corner of the element to define two equisized rectangles having the center line as a common side. The ears and tabs dovetail at each corner to define four corner engaging slits which extend inwardly from the periphery to terminate at the respective corner fastening apertures. Moreover, two central fastening apertures are preferably formed on the center line at the common corners of the equisized rectangles, and the side tabs sloped inwardly toward the central fastening apertures to form central engaging nips on each side of the element. The center line is preferably scored and crimping means receiving apertures provided on either side of and proximate the center line to enable the element to be centrally crimped for fabrication in this form, if desired.

A plurality of the units may be interlocked in partially overlapping relationship at their corners or sides in a variety of repetitive patterns by engaging the corner slits and/or central nips until the desired fastening apertures are aligned. Fastening means may then be inserted through the aligned apertures to complete the assembly. The preferred fastening and crimping means is a grommet having a plurality of flexible prongs which are shaped to spring back after insertion so that no separate spreading operation of the prongs is required.

The preferred fabrication for the elements is to interlock the corners of a number of crimped units to form a screen or lamp shade which has excellent light diffusing properties while presenting a pleasing overall appearance. Numerous other structural patterns may also be fabricated from the elements, however, including parallel but staggered patterns and right angle open networks. The elements may be inexpensively manufactured on conventional sheet cutting and prepunching equipment for shipment in compact bundles for assembly at their point of destination. The assembly thereof is greatly simplified by the shape of the elements and the preferred grommet fastening means provided.

When fabricated into a lamp shade, moreover, the invention also provides a novel lamp spider which may detachably receive various numbers of supporting spokes, preferably in equiangular relationship, to mount a lamp centrally within lamp shades of numerous configurations and sizes.

The objects, features and advantages of the invention will become more apparent as the following detailed description proceeds with continued reference to the drawings wherein:

FIG. 1 is a perspective view of a lamp shade construed in accordance with the invention;

FIG. 2 is a plan view of a preferred embodiment of the element of the invention;

FIG. 3 is a side elevation of the element shown in FIG. 2;

FIG. 4 is a sectional view showing the structural element centrally crimped into a generally V-shaped configuration;

FIG. 5 is a side elevation of the preferred fastening grommet of the invention;

FIG. 6 is a bottom plan view of the grommet shown in FIG. 5;

FIG. 7 is a sectional view taken along line 7—7 of FIG. 6;

FIG. 8 is a side elevation of a screen formed from a plurality of interlocked, crimped elements;

FIG. 9 is an end elevation of the screen shown in FIG. 8;

FIG. 10 is a plan view of a lamp securing spider for use in the lamp shade shown in FIG. 1;

FIG. 11 is a sectional view of the spider taken along line 11—11 of FIG. 10 with a lamp secured therein shown in dotted lines;

FIGS. 12, 13 and 14 are enlarged detailed views of the outer spoke receiving apertures of the spider;

FIGS. 15, 16 and 17 are enlarged detailed views of the spoke receiving loops of the spider;

FIG. 18 is an elevation of a screen constructed in accordance with the invention with the elements interlocked in staggered, parallel relationship; and

FIG. 19 is an elevation of an open network screen fabricated with the elements interlocked at right angles to each other.

The preferred form of a basic structural element according to the invention is shown in FIGS. 2 and 3. The element 10 is formed from a generally four-sided sheet of a flexible material such as paper, plastic and the like, and is symmetrical about a center line indicated at 12. Four fastening means receiving apertures 14, 16, 18 and 20 are punched or otherwise formed at the corners of the element 10 at points equidistant from the center line 12 so as to define two inner rectangles 22 and 24 of equal size each having the center line 12 at a common side. The ends of the element 10 have two fan-shaped ears 26

and 28 disposed adjacent the sides of the rectangles 22 and 24, respectively, remote from the center line 12, while the sides of the element 10 have four tabs 30, 32, 34 and 36 formed along the sides of the rectangles 22 and 24 normal to the center line 12. The ears and tabs dovetail at the four corners of the element 10 to define four corner engaging slits 38, 40, 42 and 44, each of the latter extending inwardly from the periphery of the element 10 and terminating at one of the corner fastening means engaging apertures. To facilitate optimum joinder of the plurality of the elements 10 in the various modes hereinafter described, it is preferred that each of the engaging slits be disposed at a 45 degree angle to the center line 12.

In order to stagger the joinder of the elements 10, two central fastening means apertures 46 and 48 are prefrably punched at the center line 12 at the common corners of the rectangles 22 and 24, and the tabs 30, 32, 34 and 36 are cut to slope convexly toward the central apertures 46 and 48 to form two generally V-shaped central engaging nips indicated at 50 and 52.

The center line 12 is preferably scored and one or more pairs of crimping means receiving apertures 54, 56 and 58, 60 punched proximate the center line to enable the element 10 to be crimped into the generally V-shaped configuration shown in FIG. 4 and designated at 10'. The crimped configuration 10' is achieved by folding the element 10 along the center line 12 and passing fastening means such as grommets 62 through the crimping apertures.

The details of the preferred form of grommet 62 are shown in FIGS. 5, 6 and 7 wherein a relatively large diameter base 64 is formed with a depending reduced diameter shank 66 having an enlarged barb 68 formed on its outer end. A tapered bore 70 is formed centrally within the grommet 62 with the larger diameter portion of the bore 70 extending through the barb 68. The grommet 62 is made of conventional flexible material such as metal or plastic and a plurality of V-shaped or tapered axial grooves 72 are formed in the barb and shank 66 extending from the outer ends of the barb and tapering toward the base 64 to define a plurality of preferably equisized flexible prongs 74. To secure two or more pieces of sheet material together, pressure may be applied to the base 64 to force the grommet through aligned sheet apertures having diameters intermediate that of the barb 68 and shank 66. It should be appreciated that the prongs 74 will flex inwardly as the barb 68 passes through the holes, and will then snap back to firmly fasten the sheets together. The combination of the tapered bore 70 and tapered grooves 72 thus obviate the need for spreading the prongs 74 after the grommet 62 has been inserted. It is for this reason that the grommet 62 shown is the preferred fastening means and crimping means for use with the elements 10.

The discussion will now focus on FIGS. 8 and 9 wherein a plurality of crimped elements 10' are fabricated in an interlocking repetitive pattern in which the crimped elements 10' are horizontally and vertically parallel to form a screen 76 which is particularly useful for light diffusion, say as the wall of a lamp shade. The screen 76 is formed by first passing grommets 62 through the crimping aperture pairs 54, 56 and 58, 60 of each unit 10 to form the crimped elements 10'. Thereafter, the elements 10' are horizontally engaged at their corners by sliding the upper left engaging slit 38 (as seen in FIG. 2) of one element 10' into the upper right engaging slit 44 of the element 10' on its immediate left until the respective fastening apertures 14 and 20 are aligned. The lower corners are similarly mated by engaging the lower left engaging slit 40 of the first element with the lower right engaging slit 42 of the left hand element to align the respective fastening apertures 16 and 18. To extend the screen 76 vertically, the upper left slit 38 of the element 10' is also engaged with the lower left slit 40 of the

element 10' immediately above it and their respective upper right slit 44 and lower right slit 42 are engaged so as to align the apertures 14 and 20 of the lower element with apertures 16 and 18 of the upper element. This process may be continued until a screen 76 of any desired size has been constructed. The elements 10' should of course be disposed so that the camber of any adjacent elements 10' is opposed to form diamond shaped interspaces indicated at 77 in FIG. 9.

Thus, at any inner fastening point within the screen 76, such as at point 79, the respective corner engaging slits of the four elements surrounding that point will be engaged so as to interleave the ears and tabs of the elements, and a grommet 62 may be inserted through the aligned fastening apertures to secure the four elements 10' together. The screen 76 so produced has particular utility as a light diffusing device. The interleaving of the tabs and ears of adjacent units together with the interspacing 77 serve to diffuse light in a pleasing pattern, while the repetitive pattern of the units 10' produces an aesthetically pleasant appearance.

The lateral ends of the screen 76 may be joined to form a continuous cylinder and a lamp securing spider 78 secured to one end thereof with spokes 80 to produce the lamp shade 82 shown in FIG. 1. The spider 78 is best seen with reference to FIGS. 10–17 and generally comprises a body member shown as an annular disc 84 formed with a downwardly extending inner diameter depending flange 86 and a similar downwardly extending outer diameter depending flange 88. The inner diameter of the inner depending flange 86 is preferably threaded as indicated at 87 and defines an opening 89 to receive a conventional light bulb socket 90 as depicted in dotted lines in FIG. 11. A plurality of spoke receiving apertures 92 are formed in the periphery of the spider 78 so as to partially extend into the disc 84 and the outer flange 88 and to open radially outward from the opening 89 (see FIGS. 12–14), and a complementary set of inner spoke receiving loops 94 defining inner spoke receiving apertures 95 (see FIGS. 15–17) are formed on the bottom of the disc 84 radially inward from the spoke apertures 92. The number of spoke apertures 92 and loops 94 may be selected at will, but it is preferred to provide a sufficient number to detachably mount or receive a variable number of supporting spokes 80. For example, the spider 78 shown may be employed with from two to six equiangularly spaced radial spokes 80. This function is accomplished herein by disposing spoke receiving means 92, 94 about the lamp receiving opening 89 at angles of 60°, 72°, 90°, 120°, 144° and 180° around the disc 84 from the spoke receiving means 92, 94 receiving the spoke 80' shown at the left on FIG. 10. Obviously more spoke receiving means 92, 94 could be provided at appropriate angles to receive seven or more spokes in equiangular relationship if desired.

As shown in FIG. 1, the spokes 80 may be passed through the bores 70 of the appropriate grommets 62 at the upper edge of the screen 76 into the appropriate spoke receiving apertures 92 and loops 94 to interconnect the spider 78 and screen 76 to form the lamp shade 82, which may form a free standing unit or be hung in a conventional manner. Since each spoke 80 is received and grasped at two points along its length by the complementary receiving means 92, 94 the spokes 80 firmly mount the spider 78 within the lamp shade 82. Of course the same result would be obtained if a continuous bore or other holding means were provided to similarly detachably grasp the spokes 80 along a portion of their length to prevent rotation of the spokes 80 relative to the spider 78.

When contrasted to conventional spiders to which a predetermined number of spokes are normally fixedly secured, the spider 78 of this invention provides considerable advantages from the standpoint of design flexibility. To illustrate, by providing a plurality of spoke receiv-

ing means **92, 94** which may detachably receive different numbers of radial spokes in preferably equiangular spaced relationship, the spider **78** may be employed to mount a lamp centrally within lamp shades of widely differing sizes and shapes, which shades may require different numbers and perhaps lengths of spokes **80** to achieve adequate structural strength.

A further feature of the spider **78** is that it may be inexpensively manufactured from plastic, metal or similar malleable material with relatively simple dies. From this standpoint, the annular shape of the disc **84** formed with depending flanges **86** and **88**, outer spoke receiving apertures **92** extending partially into both the disc **84** and the outer flange **88**, and the inner loops **94** formed beneath die punched holes **97** provides the optimum configuration for die casting or punching, and hence is shown as the preferred embodiment.

Having thus described the preferred lamp shade construction based on the invention, two alternate interlocking patterns will now be described employing flat or uncrimped elements **10**. FIG. 18 discloses a screen **96** with the elements **10** fastened together in parallel but staggered relationship. To achieve this design, the corner engaging slits of each interior element **10** are engaged with the opposite hand central engaging nip **50** or **52** of the element **10** each side of it while also being engaged with the lower corner slits **40** and **42** of the unit immediately above it and with the upper corner slits **38** and **44** of the unit **10** immediately below it. In this manner a substantially flat, continuous screen is produced.

A further interlocking repetitive pattern which may be achieved in accordance with the invention is shown in FIG. 19 with the flat units **10** disposed at right angles to each other to form an open network screen **98**. Assuming that the right end of the horizontal elements **10** correspond to the upper end of the vertical elements, the screen **98** is assembled by interlocking the upper left slit **38** of each interior vertical element **10** with the upper right slit **44** of the horizontal element **10** on its upper left, its upper right engaging slit **44** with the lower right engaging slit **42** of the horizontal element on its upper right, its lower right engaging slit **42** with the lower left engaging slit **40** of the horizontal element to its lower right, and its lower left engaging slit **40** with the upper left engaging slit of the horizontal element on its lower left.

In light of the various structures just described, it should be apparent that the elements **10, 10'**, in either flat or crimped form, may be fabricated in many other patterns which are limited only by the imagination of the builder. The fabrication of the elements in whatever form selected is greatly facilitated by the form of the basic element **10** or **10'** and the grommets **62**. It should be appreciated that various other fastening means may be used with the elements, however, such as for example conventional grommets and double pronged metal rivets which must be spread after insertion. The grommets **62** are preferred because no spreading of their prongs is required. When the invention is employed to construct a lamp shade, the described spider **78** is the preferred means for mounting a lamp therein because of the design flexibility it affords, although other spiders may also be employed.

It is my intention to cover all equivalents and modifications of my invention which do not depart from the spirit and scope of the appended claims.

What I claim is:

1. A structural element capable of being interlocked with similar elements in partially overlapping relationship to form a repetitive structural pattern, said element comprising:

a generally four-sided sheet of flexible material, the periphery of said sheet being symmetrical about a center line and being formed to define ears at its two ends and two tabs on each of its two sides; said sheet having four corner fastening means receiving apertures positioned at the junctions of said tabs and ears and defining two equisized rectangles having said center line as a common side; and said ears and tabs being dovetailed to define four corner engaging slits, each of said corner engaging slits extending inward from said periphery to terminate at its inner end at one of said corner fastening apertures.

2. The element of claim **1** which further includes two central fastening means receiving apertures formed on said center line at the common corners of said two equisized rectangles and wherein the periphery of said tabs slopes convexly toward said central fastening apertures to define central engaging nips on each side of said element.

3. The element of claim **1** in which said center line is scored to facilitate folding of said element along said center line and which further includes crimping means receiving apertures positioned within said two equisized rectangles on either side of and proximate said center line.

4. The element of claim **3** which further comprises crimping means inserted through said crimping means receiving apertures to hold said element in a generally V-shaped crimped configuration.

5. The element of claim **4** wherein said crimping means comprises at least one grommet formed of flexible material of the type having a base, a reduced diameter shank depending from said base and an enlarged barb formed on the outer end of said shank; said grommet being formed with a tapered axial bore extending through said base, shank and barb with the larger end of said tapered bore being within said barb; and said shank and barb being formed with a plurality of V-shaped axial grooves extending from the outer end of said barb and tapering toward said base to define a plurality of flexible prongs.

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PHILIP DIER, Primary Examiner

U.S. Cl. X.R.

24—208; 46—31; 161—48, 54, 114; 240—108