Sept. 3, 1968 R. H. FARRELL 3,399,714

PERMANENTLY PLEATED DRAPERIES

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Fig. 1

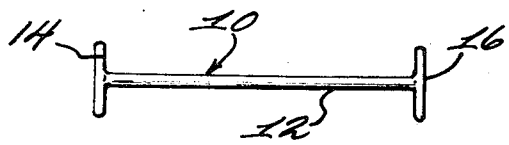


Fig. 2

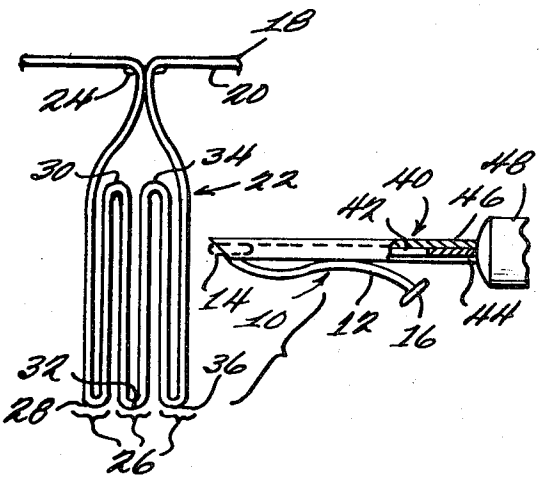


Fig. 3

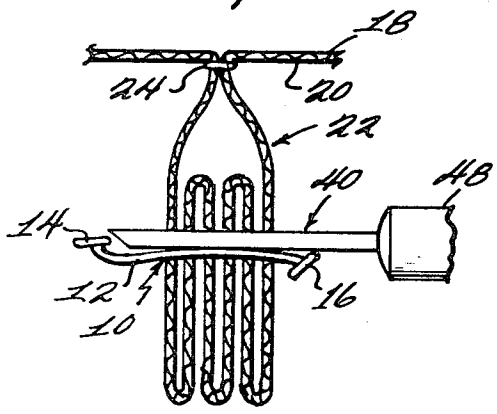


Fig. 4

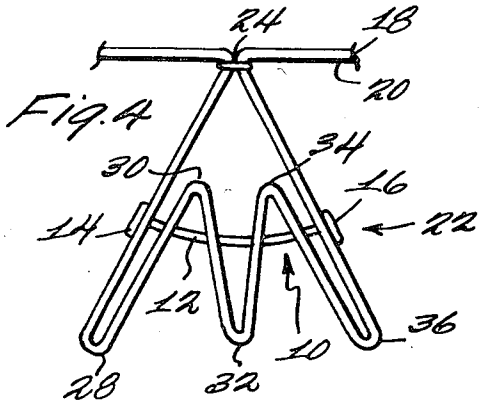


Fig. 5

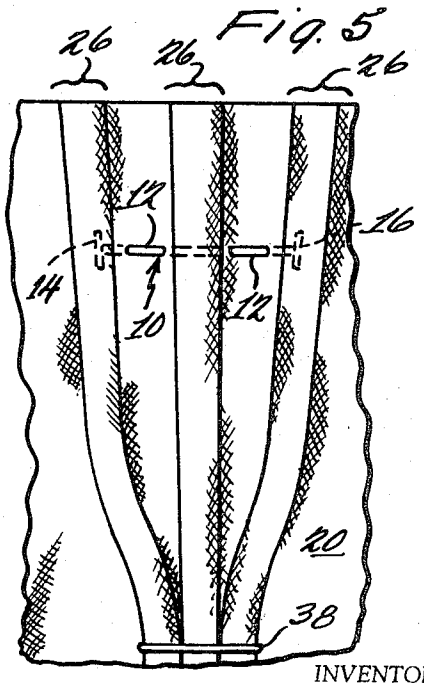
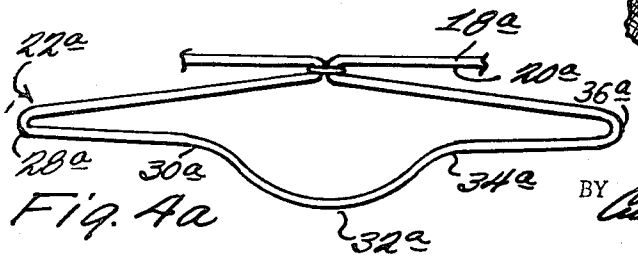


Fig. 4a



INVENTOR
RHOMIE HOYLE FARRELL

BY Cushman, Darby & Cushman
ATTORNEYS

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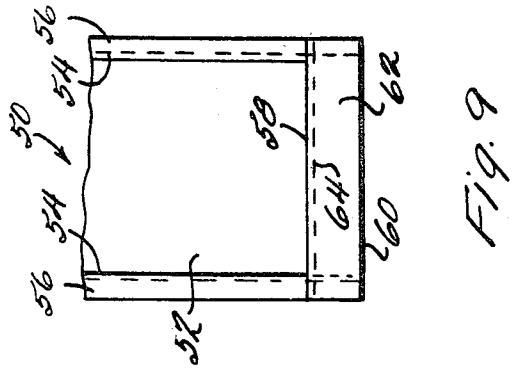


Fig. 9

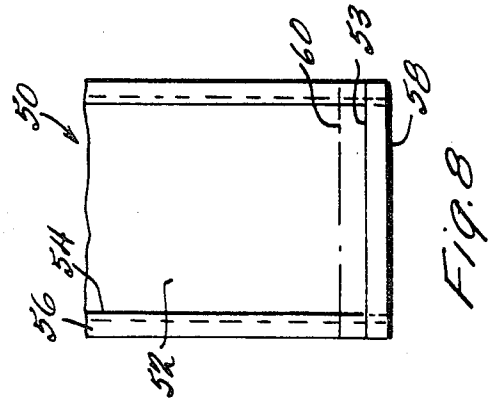


Fig. 8

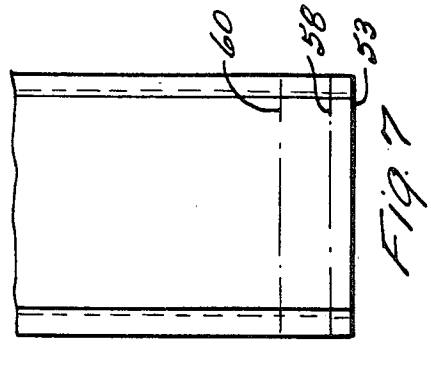


Fig. 7

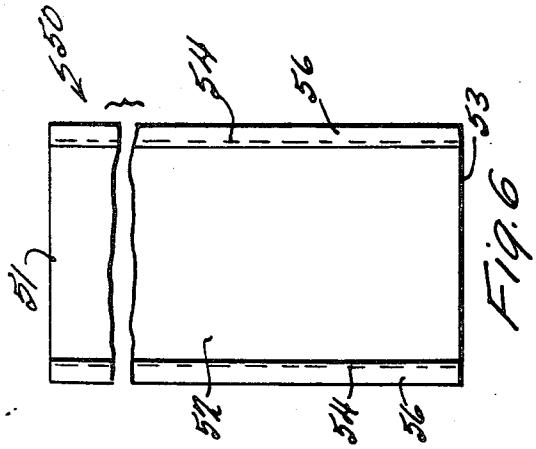


Fig. 6

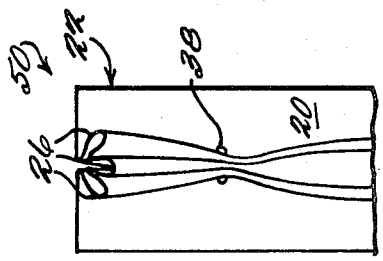


Fig. 13

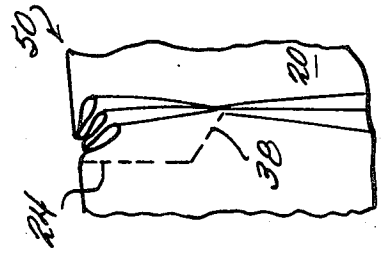


Fig. 12

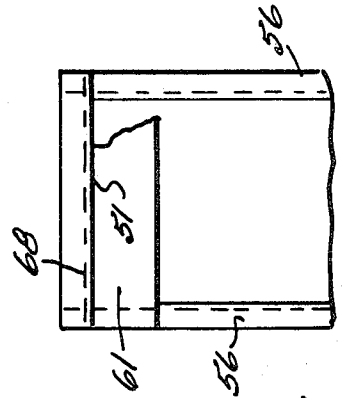


Fig. 11

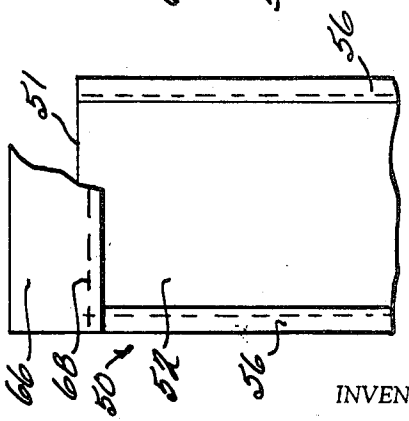


Fig. 10

INVENTOR

RHOMIE HOYLE FARRELL

BY Cushman, Darby & Cushman

ATTORNEYS

United States Patent Office

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PERMANENTLY PLEATED DRAPERIES

Rhomie Hoyle Farrell, Swepsonville, N.C., assignor to Burlington Industries, Inc., Greensboro, N.C., a corporation of Delaware

Filed Dec. 8, 1966, Ser. No. 600,193
8 Claims. (Cl. 160—348)

ABSTRACT OF THE DISCLOSURE

A permanently pleated drape in which the shape of each crimped-in pleat is permanently retained by a mechanical retainer extending through the folds of the pleat generally at a right angle thereto. The retainer permits some movement of the folds relative to each other but prevents complete opening and flattening of the folds. In the preferred embodiment the retainer is constructed of flexible plastic in the form of a narrow stem portion having slightly enlarged ends, the latter acting as barbs to prevent withdrawal of the retainer from the fabric. The retainer is initially inserted through the fabric with the aid of a hollow needle which is subsequently removed.

This invention relates to the permanent retention of pleats in drapes and in particular to the prevention of opening and flattening of the folds of the pleats during their wear life, especially following washing. The three folds which make up a pinch pleat in a drape are conventionally bound together at the bottom of the pleat by various sewing operations which prevent the folds from opening during handling. While it is possible to sew along the entire length of the pleat in a manner to retain the folds permanently sharp and permanently closed, or to sew in the pleat by some other technique, these techniques are not generally employed, because the resulting pleat is too tight to present the natural-looking folds desired in a drape.

Conventionally, the bottom portion of a drapery pinch pleat is sewed in, and the upper part of the pleat is left free of stitching. The folds in the upper part of the pleat are retained by virtue of the stiffness of a backing material which has been attached previously to the drapery fabric. It has been observed that, while this type of pleat initially has the desired natural appearance and shape, the upper part of the pleat tends to open, and the fold lines become rounded and distorted after prolonged use and particularly after repeated washing. This problem is accentuated in acrylic back goods and with crushed or pore type foam back goods.

The object of the present invention is to provide permanently pleated draperies having natural-looking folds which are retained throughout the life of the draperies even after repeated washing. This is accomplished by passing a mechanical retaining device through the upper part of all the folds of each pleat, the retaining device being of special construction which permits some independent pivotal movement of each fold relative to the other folds and which at the same time limits unfolding of the pleat. The retaining device is constructed of a filament-like body having slightly enlarged ends which function in the manner of barbs to prevent withdrawal of the retainer from the folds of fabric. The body is of sufficient length to permit the fabric layers to pivot about the various fold lines thereby allowing the folds to separate slightly from each other to give a natural, attractive appearance. However, the body of the retainer is not so long that any of the folds can completely flatten out. The result is that the pleat retains its initial shape and does not tend to become distorted and/or flattened by washing and cleaning.

In the preferred arrangement the retaining device is an integrally formed flexible unit molded from plastic material in the form of an elongated filament having a barb or other enlargement at each end. The enlargement at one end is so shaped as to be well-adapted for easy and rapid insertion through the weave of a fabric with the aid of a hollow, longitudinally slotted needle. The bore of the needle carries the enlargement, which is preferably a short bar extending transversely of the filament, and the filament projects through the slot to the outside of the needle. The needle is first passed through the weave of the fabric thereby carrying the filiment through the fabric. Next, a plunger in the bore is moved forward to eject the bar from the end of the needle, the filament sliding along and out the end of the slot. Then the needle is withdrawn from the fabric leaving the bar on the far side of the fabric and the filament projecting through the fabric to the front side.

It is preferred, also, to construct the pleat retainers of translucent plastic or of colored plastic matching or approximating the color of the drapery fabric in the heading so that in use the retainers will be as inconspicuous as possible.

The invention will be further understood from the following detailed description taken with the drawings in which:

FIGURE 1 is a plan view of a plastic pleat retainer for use in carrying out the present invention;

FIGURES 2 and 3 are schematic views illustrating the insertion of the pleat retainer through the folds of a pleat;

FIGURE 4 is a schematic end view of a pleat incorporating the retainer and showing the folds in their normal positions;

FIGURE 4*a* is a schematic end view of a conventional pleat which has become flattened by washing and drying;

FIGURE 5 is a front view of a portion of a pleated drape showing the folds and the retainer in their normal positions; and

FIGURES 6 through 13 are schematic views illustrating the preferred manner of making a drape for subsequent use with the retainer shown in FIGURES 1 through 5.

In FIGURE 1 there is shown a pleat retainer **10** suitable for use in carrying out the present invention. The retainer **10** is an integral structure having an elongated body defined by a single filament **12** and enlarged ends defined by short bars **14** and **16** extending transversely of the filament **12**. The retainer **10** is made of flexible material such as nylon, and the filament **12** is made as thin as possible consistent with the strength of the material employed. While both enlarged ends **14** and **16** are constructed as bars, one end may be of any other shape which will prevent the retainer **10** from being withdrawn after having been passed through the folds of a pleat. The other end should be bar-shaped or otherwise shaped to fit the bore of a hollow needle, as will be described in connection with FIGURES 2 and 3.

In FIGURES 2 and 3 there is illustrated a piece of fabric **18** defining drapery panel **20** and having a typical pinch pleat **22** therein. This type of pleat is formed by first folding a single wide pleat in the fabric **18**, stitching the fabric together at **24** to secure the pleat and subsequently dividing the pleat into three smaller sub-pleats **26** by pressing or otherwise creasing the fabric **18** along five fold lines **28**, **30**, **32**, **34** and **36**. The sub-pleats **26** are gathered together at the bottom of the pleat **22** and secured together as by stitching **38** (FIGURE 5). It will be understood that in practice the fabric **18** in the area of the pleats will consist of the actual drapery fabric together with a strip of stiffening material secured to the

rear face of the drapery fabric and, in some cases, a drapery liner, these layers being superimposed on each other in the pleat area, or heading of the drape. In the interest of clarity, however, the fabric **18** in FIGURES 2 and 3 is shown merely as a single layer, it being understood that the fabric **18** represents both the drapery fabric and the stiffening material and the lining, if the latter is present. Typically, the stiffening material is a four-inch wide strip of buckram stitched to the rear face of the top edge portion of the drapery fabric.

Also shown in FIGURES 2 and 3 is a hollow needle **40** having a bore **42** and a longitudinal slot **44** extending the length of the bore **42**. The bar **14** of the retainer **10** is initially carried in the bore **42** with the filament **12** extending out through the slot **44** and thence rearwardly along the needle **40**, as seen in FIGURE 2. In order to pass the retainer **10** through the folds of fabric **18**, the sub-pleats **26** are first gathered together so that the layers of the fabric **18** are generally parallel to each other. Next, the hollow needle **40** is passed more or less straight through all the sub-pleats **26** in a plane parallel to the drapery panel **20** and at a location intermediate the stitching **38** (FIGURE 5) and the upper ends of the sub-pleats **26**. The exact location at which the needle **40** is inserted is not significant. Then the bar **14** of the retainer is ejected from the end of the hollow needle **40** by moving a plunger **46** through the bore **42** of the needle **40** from right to left. The plunger **46** is actuated from within a head **48** either automatically or manually. FIGURE 3 shows the position of the parts just after the bar **14** has been ejected. Subsequently, the needle **40** is withdrawn from the sub-pleats **26**, leaving the filament **12** projecting through the latter with the bar **14** disposed on one side and the other enlarged end **16** disposed on the other side.

A fuller description of a hollow-needle type apparatus suitable for inserting the retainers **10** may be found in Bone Patent No. 3,103,666, issued Sept. 17, 1963.

FIGURE 4 shows the shape of the pleat **22** and the retainer **10** after the needle **40** has been withdrawn and after the sub-pleats **26** have been released from whatever restraining means was employed to gather them together prior to entry of the needle **40**. The sub-pleats **26** open partially due to the resiliency of the creased sheet of stiffening material (not shown) which forms part of the fabric **18**. This pivotal movement of the outer sub-pleats away from the center sub-pleat causes the filament **12** of the pleat retainer **10** to become arched so that its ends point generally toward the drapery panel **20**. In a newly made drape the stiffening material maintains the desired shaped of the sub-pleats **26**, and the pleat retainer **10** has little effect. However, any pleat-deforming forces, such as will occur during sample testing in quality control and especially during home washing and drying, are resisted. It will be noted that the length of the filament **12** between the enlarged ends **14** and **16** together with the latter, do not permit the two outer sub-pleats **26** to unfold to the extent that they would lie flat against the drapery panel **20**. Additionally the filament **12**, in passing through the inner sub-pleat **26**, prevents the latter from being pulled out. That is, the filament **12** prevents the fold lines **30** and **34** from becoming flattened or rounded. The retainer **10** also preserves the shape of the pleat by preventing the sheet of stiffening material (not shown) from working out of the sub-pleats **26**. Obviously the latter occurrence allows the sub-pleats **26** to become highly distorted.

FIGURE 4*a* shows a conventional pinch pleat **22***a* which has been flattened and rendered unsightly by repeated washing and drying. It will be understood that the shape is merely illustrative of many shapes which a distorted pleat may take. Most typical distortions, however, include folding of the outer sub-pleats toward the drapery panel and/or pulling out of the center sub-pleat. Both of these effects are shown in FIGURE 4*a* wherein it is seen that the fold lines **28***a* and **36***a* have moved toward the panel **20***a* and that the fold lines **30***a*, **32***a* and **34***a* have been almost obliterated. As previously described both these movements are prevented by the pleat retainer **10** of the present invention.

Referring again to FIGURE 5 it will be seen that the pleat retainer **10** is almost completely hidden from an observer when the pleat **22** is viewed from the front. When viewed from the side, one of the enlarged ends **14** or **16** will be visible. While the presence of the retainer **10** does not detract from the appearance of the pleat **22**, it is desirable to have the retainer **10** as inconspicuous as possible. To this end, the plastic material of which the retainer is made is clear or at least translucent or is colored to match or approximate the color of the drapery fabric.

FIGURES 6 through 13 illustrate a preferred commercial method of making a pinch pleated drape for use with the previously described pleat retainer **10**. Where applicable, the same reference numerals as previously employed are employed in these figures. Initially, a continuous length of finished drapery fabric is taken from its roll or other package and is continuously sewed with a hem, first along one side edge and then along the other side edge, or along both side edges simultaneously. The hemmed length is then cut transversely into shorter lengths, each of which will be subsequently converted into a drapery panel. The cutting operation may be performed automatically as the fabric is run out of the hemming operation, or it may be performed subsequently on a batch basis. FIGURE 6 shows the bottom portion of such a cut length **50** of drapery fabric **52**, the length **50** being viewed from the back side. The upper edge of the length is seen at **51** and the lower edge at **53**. The side edges of the length **50** have been folded over and stitched at **54** to form side hems **56**. In the interest of clarity, the width of the hems **56** has been exaggerated. The longitudinal dimension of the length **50** is, of course, somewhat greater than the longitudinal dimension of the completed drape so as to allow for top and bottom seams. One inch additional at the top and six inches additional at the bottom are appropriate.

Next, and referring to FIGURE 7, the lower edge portion of the length **50** is accurately creased so as to form two transverse fold lines **58** and **60** preparatory to forming a bottom hem. In the illustrated embodiment the fold line **58** is made two inches above the edge **53**, and the fold line **60** is made four inches above the edge **53**. The creasing operation is carried out by suitable equipment adapted to perform this function. The direction of the folds along the lines **58** and **60** is such that the fabric below each line tends to move out of the plane of the length **50** toward the viewer.

FIGURES 8 and 9 illustrate the formation of a bottom hem **62** by first folding the lower edge **53** of the length **50** upwardly along the fold line **58** (FIGURE 8) and then folding the resulting layers upwardly along the fold line **60** (FIGURE 9). Then, the resulting hem **62** is transversely machine stitched at **64**. The previous creasing operation facilitates the folding steps so that the hem **62** can be formed rapidly and accurately.

Next, and referring to FIGURE 10, a strip **66** of stiffening material such as buckram is secured to the top edge **51** of the length. This is accomplished by first placing the lower edge portion of the strip **66** over the upper edge portion of the length **50** and stitching the two layers together, as at **68**. If a lining is to be used, this is placed on top of the strip **66** and sewn to the length **50** with the same stitching **68**. In the case of acrylic back drapery fabric, foam back drapery fabric, or crushed foam back drapery fabric, no lining is used. As seen in FIGURE 11, the strip **66** is then folded along its lower edge toward the viewer so as to place the previously exposed surface of the strip **66** against the drapery fabric **52**.

The length **50** is then turned over, and the two-layer heading, defined by the stiffening strip **66** and a portion of the drapery fabric **52**, is pinch pleated in any conven-

ient manner. Commercially, this may be done by first feeding the heading into an automatic pleat crimping apparatus which presses a plurality of spaced-apart, three-fold pleats into the heading. The operator manually takes the three folds, which correspond to the three previously described sub-pleats **26**, and sews down the back and then out to the front, as illustrated at **24** and **38** in FIGURE 12. The folds of the now-finished pleat **22** are not sewed, inasmuch as this would flatten the sub-pleats **26** and render them immobile. Style and fashion demand a folded but not a flattened appearance.

The finished pleat, as shown in FIGURES 12 and 13, is then rendered permanent by inserting a pleat retainer **10**, as described in connection with FIGURES 1 through 4.

While preferred embodiments of the present invention have been described, further modifications may be made without departing from the scope of the invention. Therefore, it is to be understood that the details set forth or shown in the drawings are to be interpreted in an illustrative, and not in a limiting sense, except as they appear in the appended claims.

What is claimed is:

1. In a permanently pleated drape formed of a fabric panel having a heading, said heading being defined by a strip of stiffening material secured to the back surface of said fabric along the upper edge portion thereof, said heading having a plurality of horizontally spaced apart pleats, each pleat being formed by a plurality of sub-pleats in the fabric of said panel and in said stiffening material, all the folds of each sub-pleat being gathered together and permanently bound to each other at the lower end of the respective pleat, the improvement which comprises a mechanical retainer for retaining the shape of the folds in the upper part of each pleat and for preventing opening of the folds and rounding of the fold lines, said retainer including an elongated filament-like body of reduced transverse cross section passing through all the folds of each sub-pleat at a location out of the plane of said panel and intermediate the lower end of said pleat and the upper edge of said heading, said retainer further including enlarged end portions on said body for preventing withdrawal of said retainer from said folds, said body being of such length that said folds are capable of independent pivotal movement relative to each other and are prevented by said end portions from opening fully, whereby said retainer holds said folds in substantially their original shape during the wear life of said drape.

2. A pleated drape as in claim **1** wherein the body of each retainer is generally arcuate in shape, the center portion of said body being spaced from said panel a greater distance than the remainder of said body.

3. A pleated drape as in claim **1** wherein said retainers are constructed of flexible plastic material, the body and enlarged end portions of each retainer being integral with each other.

4. A pleated drape as in claim **3** wherein said plastic retainers are translucent.

5. A pleated drape as in claim **3** wherein said plastic retainers are of generally the same color as said fabric.

6. A method of making a permanently pleated drape from a panel of fabric which comprises: forming a plurality of spaced-apart pinch pleats along the upper edge portion of said panel of fabric, each of said pinch pleats being formed by crimping said fabric so as to produce at least three sub-pleats projecting away from the plane of said panel, each sub-pleat being defined by two layers of said fabric; securing all the layers of fabric together at one point to retain the general shape of the pinch pleat; and preserving the shape of the individual sub-pleats by passing a tough filament having enlarged ends transversely through all the sub-pleats of each pinch pleat at a location near the upper edge of said panel so that the filament remains in the fabric with the enlarged ends disposed to the outside of the outer sub-pleats, said filament having a length which permits relative pivotal movement among said sub-pleats and which prevents said sub-pleats from opening fully.

7. A method as in claim **6** including the step of temporarily forcing said sub-pleats together to render the fabric layers generally parallel and wherein said filament is passed through said sub-pleats in a straight line direction parallel to the plane of said fabric panel.

8. A method as in claim **7** wherein said step of passing said filament through said sub-pleats includes the steps of inserting one of said enlarged ends in a hollow, longitudinally slotted needle so that said filament extends through the slot, passing said needle through said sub-pleats, ejecting said one enlarged end from the end of said needle and withdrawing said needle from said sub-pleats.

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DAVID J. WILLIAMOWSKY, *Primary Examiner.*

P. C. KANNAN, *Assistant Examiner.*