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**[54] LAMINATED NONWOVEN FABRIC
UTILIZING A FOAM LAYER AND A
STITCHED FIBROUS LAYER**

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161/159-160, 76; 28/77; 66/85, 192; 2/1

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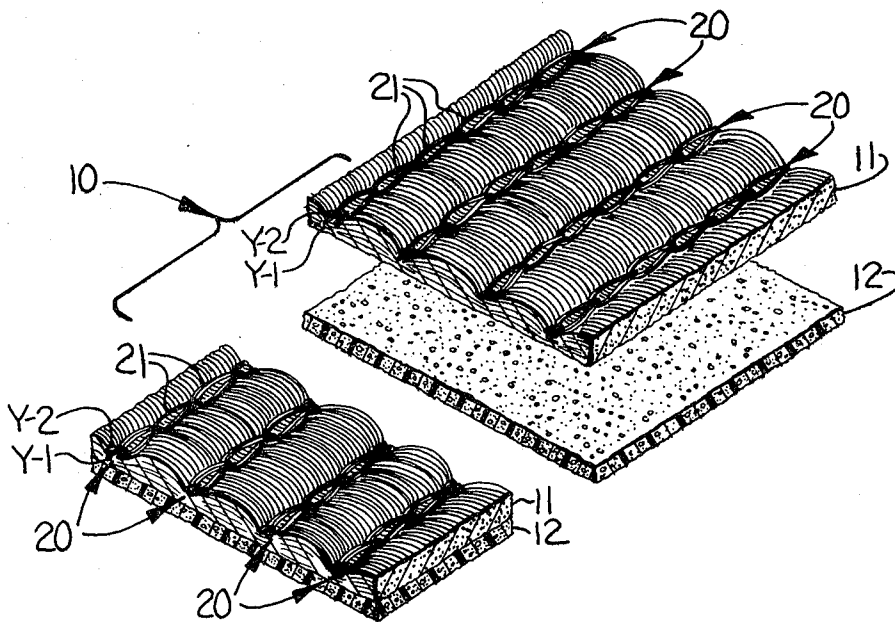
Primary Examiner—Philip Dier

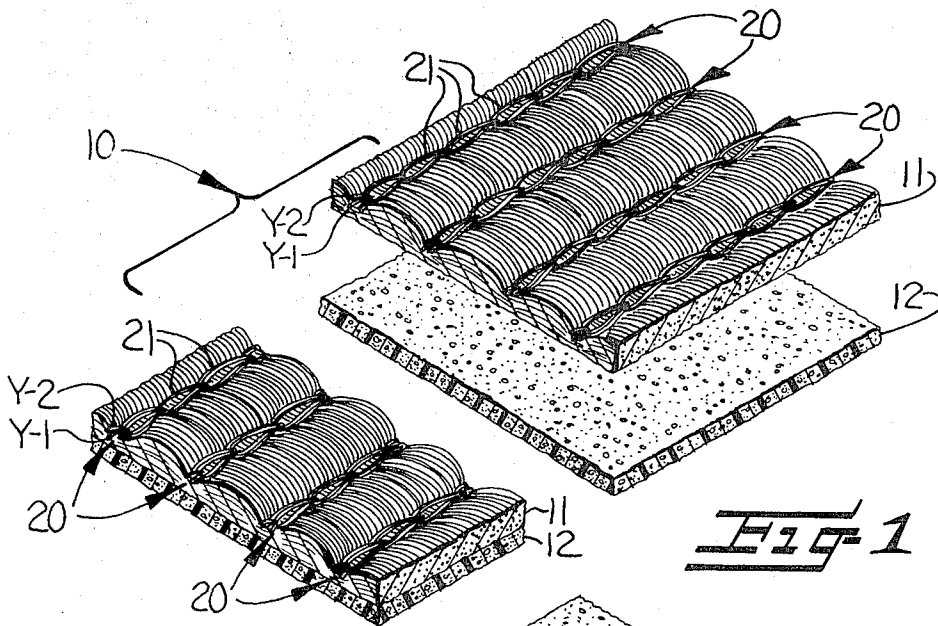
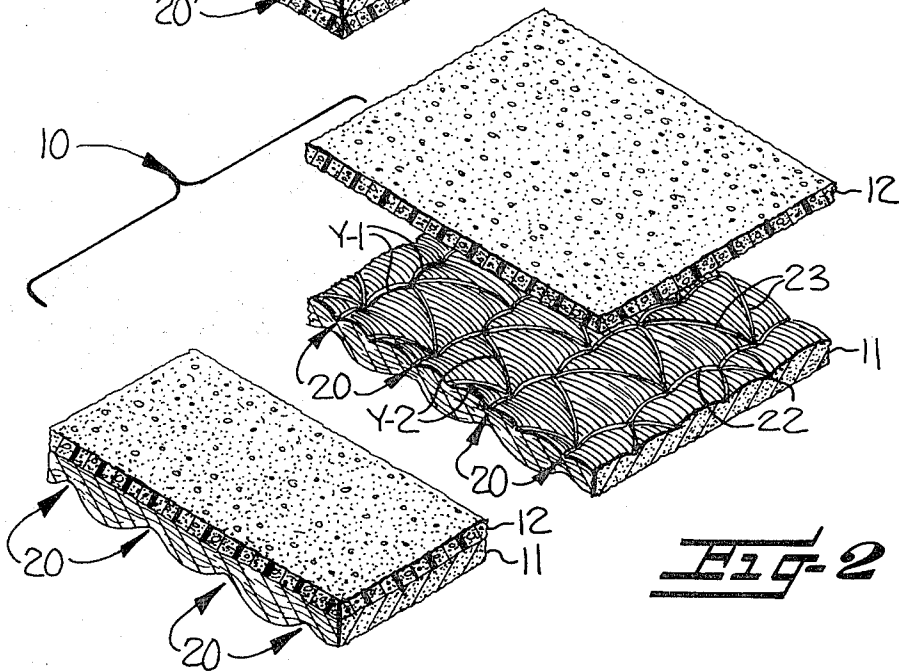
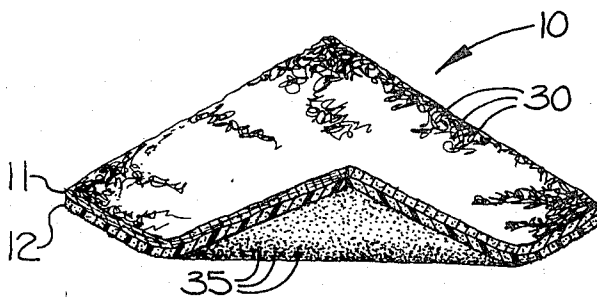
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[57] **ABSTRACT**

A laminated, multilayer, nonwoven fabric adaptable for use as bed coverings, garments and the like and characterized by providing different outer surface characteristics. The fabric comprises a first layer of nonwoven textile fibers oriented in the widthwise direction of the fabric and forming one outer face of the fabric for providing textile fiber characteristics, elongate, spaced-apart rows of stitches penetrating the first layer for stitch-bonding together the individual fibers thereof and extending in the lengthwise direction of the fabric, and a second layer of a compressible, resilient foam material superimposed on, contiguous with and laminated to the first layer and forming the other outer face of the fabric for providing foam characteristics thereto. The laminated, multilayer, nonwoven fabric may include outer treated surfaces for providing desired surface finishes thereon.

10 Claims, 6 Drawing Figures

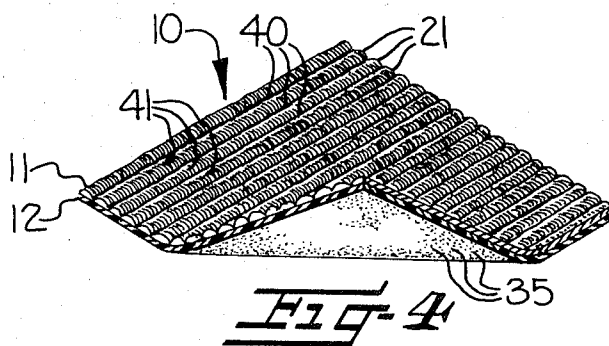
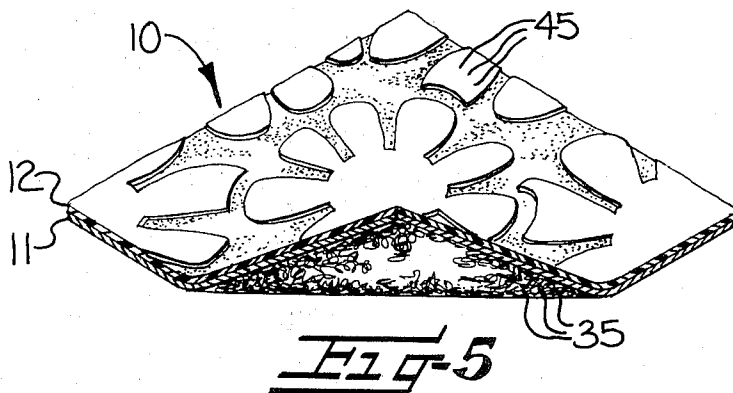
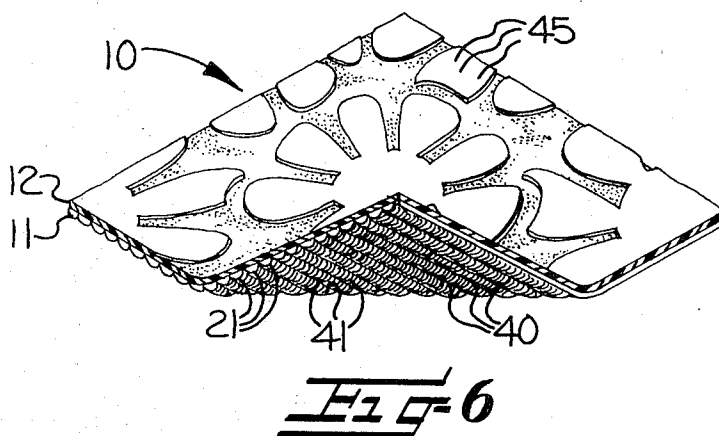




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LAMINATED NONWOVEN FABRIC UTILIZING A FOAM LAYER AND A STITCHED FIBROUS LAYER

This invention relates to a laminated, multilayer, nonwoven fabric.

It is the object of this invention to provide such a fabric which is particularly adaptable for use as bed coverings, garments and the like and which is characterized by providing different outer surface characteristics.

By this invention, it has been found that the above object may be accomplished by providing a fabric comprising a first layer of a three-dimensional, self-sustaining batt of nonwoven textile fibers. The fibers of the first layer are oriented in the widthwise direction of the fabric and form one outer face of the fabric. The fabric further comprises elongate, spaced-apart rows of stitches penetrating the first layer for stitch-bonding together the individual fibers thereof. The rows of stitches extend in the lengthwise direction throughout the length of the fabric. The fabric further comprises a second layer of a three-dimensional, compressible, resilient foam material having an integral network extending in random directions throughout the second layer to define a multiplicity of cells. The second layer is superimposed on, contiguous with and laminated to the first layer and forms the other outer face of the fabric.

Preferably, the rows of stitches utilized in the first layer are formed from at least two continuous yarns and have chainstitch loop portions on one side of the layer and interconnected diagonally extending and straight-line stitch components on the other side of the layer. The chainstitch loop components are formed from both of the yarns and the diagonally extending stitch components are formed from one of the yarns and the straight-line stitch components are formed from the other of the yarns. This type of stitch construction, in addition to providing added strength to the fabric, will provide an interlocked stitch construction which will not ravel or dislocate itself during use of the fabric for its intended purpose.

The above novel laminated, multilayer, nonwoven fabric is adaptable for use as bed coverings, garments and the like and may include desirable surface treatments on one or both faces thereof to adapt the same for such uses. While specific combinations of surface treatments are illustrated in the drawings and will be described specifically hereinafter, it is to be understood that this invention is intended to cover various surface treatments of the novel nonwoven fabric defined herein.

These surface treatments may include an outer surface on the one face of the fabric formed by the first layer of nonwoven fibers. This outer treated surface may comprise raised, napped fibers extending from the first layer and being of sufficient height and density to cover the rows of stitches on the one face of the fabric.

The fabric may also include an outer treated surface on the one face of the fabric formed by the first layer of nonwoven fibers which is formed by the rows of stitches comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions on the one face of the fabric and compressing the one face of the fabric along the rows to form corresponding depressed areas therealong. The portions of the face of the fabric between the rows of chainstitch loop portions are substantially uncompressed and define spaced, parallel, raised ribs so that a ribbed surface with exposed rows of chainstitch loop portions therebetween is provided on the one face of the fabric.

The surface treatments may include an outer treated surface on the other face of the fabric formed by the second layer of foam material. This outer treated surface may comprise upstanding, flocked fibers secured to the foam material and being of sufficient height and density to cover the rows of stitches on the other face of the fabric. Alternatively, this outer treated surface on the other face of the fabric formed by the second layer of foam material may comprise upstanding, flocked fibers secured to the foam material and being disposed in a patterned arrangement thereon.

The above-described various outer treated surfaces on both faces of the fabric may be used alone or in different combinations, as will be more fully described below in connection with the various illustrations in the drawings.

It may be seen, from the above general description and from the more specific description to follow, that the laminated, multilayer, nonwoven fabric of this invention utilizes the inherent features and advantages of a first layer of nonwoven fibers oriented in the widthwise direction of the fabric and forming one face of the fabric for providing textile fiber characteristics to the one face of the fabric and for providing strength and stability in the widthwise direction to the fabric. Moreover, the laminated fabric utilizes a second layer of compressible, resilient foam material which forms the other face of the fabric and provides improved hand, drapability, compressibility, resilience, washability, bulk and insulating qualities to the fabric and provides foam characteristics to the other face of the fabric. Additionally, the rows of stitches formed in the first layer utilizes the advantages of a stitch construction which stitch-bonds together the individual fibers of the first layer and are disposed in a lengthwise direction of the fabric for providing strength and stability to the fabric in the lengthwise direction.

Some of the features and objects of this invention having been stated, other objects and features will appear as the description proceeds, when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is an enlarged, fragmentary, partially exploded, broken away, perspective view of the obverse side of the laminated, nonwoven fabric of this invention illustrating the fabric in the two basic stages of its construction;

FIG. 2 is an enlarged, fragmentary, partially exploded, broken away, perspective view of the reverse side of the laminated, nonwoven fabric of FIG. 1 illustrating the fabric in the two basic stages of its construction;

FIG. 3 is a reduced, perspective view with one corner turned up of the nonwoven fabric of FIGS. 1 and 2 having a particular surface treatment on both faces of the fabric;

FIG. 4 is a view, like FIG. 3, illustrating different surface treatments on the faces of the fabric;

FIG. 5 is a view, like FIGS. 3 and 4, illustrating different surface treatments on the faces of the fabric; and

FIG. 6 is a view, like FIGS. 3-5, illustrating yet further surface treatments on the faces of the fabric.

Referring now to the drawings, there is illustrated in FIGS. 1 and 2 the obverse and reverse sides of the laminated, nonwoven fabric constructed according to this invention and generally indicated by the reference numeral 10. FIGS. 1 and 2, as described above, are broken away and include generally exploded portions illustrating the two layers of the composite fabric and portions illustrating the obverse and reverse sides of the two layers of the composite fabric after same have been laminated together.

The laminated, nonwoven fabric 10 comprises a first layer 11 of a three-dimensional, self-sustaining batt of nonwoven, textile fibers which forms one face of the fabric 10 for providing textile fiber characteristics to the one face. The individual fibers of the first layer 11 are oriented in the widthwise direction of the fabric to provide strength and stability to the fabric in the widthwise direction. The nonwoven fibers utilized in the first layer 11 may be any suitable synthetic fibers including viscose, acrylic, polyester and polyamide fibers, or natural fibers including cotton and wool, or other textile fibers, or blends thereof.

The composite fabric 10 further includes elongate, spaced-apart rows of stitches 20 penetrating the first layer 11 for stitch-bonding together the individual fibers of the first layer 11. The rows of stitches 20 extend in the lengthwise direction throughout the length of the fabric for providing strength and stability to the fabric in the lengthwise direction.

The rows of stitches 20 are preferably spaced apart a distance less than the length of the individual fibers in the first layer 11 to insure the desired stitch-bonding of the fibers

therein and to provide strength and stability to the fabric 10. Each of the rows of stitches 20 are preferably formed from two continuous yarns Y-1 and Y-2 and have chainstitch loop components 21 on the obverse side of the first layer 11 and interconnected straight-line stitch components 22 and diagonally extending stitch components 23 on the reverse side of the first layer 11. The stitch loop components 21 are formed from both of the yarns Y-1 and Y-2 and the straight-line stitch components 22 are formed from one of the yarns Y-1 only and the diagonally extending stitch components 23 are formed from the other of the yarns Y-2 only. This arrangement of stitch components provides an interlocked stitch construction which will not ravel or dislocate itself from the stitched first layer 11 of nonwoven fibers. The yarns Y-1 and Y-2 utilized to form the rows of stitches 20 and the stitch components 21, 22 and 23 may be of various natural or synthetic fibers or blends, but continuous filament synthetic yarns are advantageous to obtain relatively high strength and to prevent breakage in the manufacturing operation and to also give good tensile strength to the finished fabric.

The laminated, nonwoven fabric 10 further includes a second layer 12 of a three-dimensional, compressible, resilient, cellular, resinous foam material having an integral network extending in random directions throughout to define a multiplicity of cells for providing strength and stability to the fabric in random directions. The foam material for this second layer 12 may be a polyurethane foam, an ester foam or any suitable type of foam material which provides the above-discussed desired characteristics in the fabric 10. The second layer of foam material is superimposed on, contiguous with and laminated to the first layer 11 and forms the other outer face of the fabric 10 for providing foam characteristics to the other outer face.

The lamination of the first and second layers may be accomplished by utilizing any suitable adhesive material, such as by applying a continuous layer of adhesive between the layers, or by flame-bonding the foam layer to the fibrous layer, etc. Such adhesive and flame-bonding laminating operations are well known to those with ordinary skill in the art and further detailed explanation herein is not deemed necessary.

For preparing the first layer of nonwoven fibers with the fibers thereof oriented in generally the widthwise direction, reference may be had to applicant's prior U.S. Pat. No. 3,329,552, issued July 4, 1967, wherein suitable carding or garmetting apparatus, cross lapping and conveying apparatus are illustrated. Also, for a disclosure of suitable apparatus for forming the rows of stitches 20 including the stitch components 21, 22 and 23, reference may be had to applicant's prior U.S. Pat. No. 3,365,918, issued Jan. 30, 1968 for a disclosure of same.

The thus formed laminated, nonwoven fabric may include suitable outer treated surfaces on the outer faces of the fabric 10 for providing desired characteristics adapting the fabric 10 for use as bed coverings, garments and the like. As illustrated in FIG. 3, a first outer treated surface is provided on the one face of the fabric 10 formed by the first layer 11 of nonwoven fibers. The first outer treated surface comprises raised, napped fibers 30 extending from the first layer 11 and being of sufficient height and density to cover the rows of stitches 20 and the chainstitch loop components 21 on the one face of the fabric. Additionally, a second outer treated surface is provided on the other face of the fabric formed by the second layer 12 of foam material. This second outer treated surface comprises upstanding, flocked fibers 35 secured to the foam material and being of sufficient height and density to cover the foam material.

The above-described first treated surface comprised of raised, napped fibers 30 may be formed by any suitable textile-napping machine which is commonly used in the industry. Also, the second outer treated surface comprising raised, flocked fibers 35 may be formed by any conventional flocking apparatus, including electrostatic flocking apparatus, and may be secured to the foam surface by any suitable adhesive or the

like. These operations are conventional in the textile industry and it is not believed that further explanation herein is required.

As shown in FIG. 4, the fabric 10 may include a first outer treated surface on the one face of the fabric 10 formed by the first layer 11 of nonwoven fibers. This first outer treated surface is formed by the rows of stitches 20 comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions 21 on the one face of the fabric for compressing the one face of the fabric along the rows to form corresponding depressed areas 40 therealong. The portions of the face of the fabric between the rows of chainstitch loop portions 21 are substantially uncompressed and define spaced, parallel, raised ribs 41 so that a ribbed surface with exposed rows of chainstitch loop portions therebetween is provided on the one face of the fabric 10. A second outer treated surface on the other face of the fabric formed by the second layer 12 of foam material is provided. This second outer treated surface is the same as the second outer treated surface of the fabric 10 of FIG. 3 and comprises flocked fibers 35 secured to the foam material and being of sufficient height and density to cover the foam material on the other face of the fabric 10.

As illustrated in FIG. 5, the fabric 10 therein includes a first outer treated surface on the one face of the fabric formed by the first layer 11 of nonwoven fibers. This first outer treated surface is the same as the first outer treated surface of the fabric of FIG. 3 and comprises raised, napped fibers 30 extending from the first layer and being of sufficient height and density to cover the rows of stitches 20 on the one face of the fabric. The fabric 10 of FIG. 5 further includes a second outer treated surface on the other face of the fabric formed by the second layer 12 of foam material. This second outer treated surface comprises upstanding, flocked fibers 45 secured to the foam material and being disposed in a patterned arrangement thereon. The particular flowered pattern illustrated in FIG. 5 is exemplary of a type of pattern which may be formed, and it is to be understood that any desired patterned arrangement is within the scope of this invention. Patterned flocking may be accomplished in any conventional manner and such is well understood by those with ordinary skill in the textile art. Accordingly, further explanation herein is not deemed necessary.

Referring now to FIG. 6, the laminated, nonwoven fabric 10 therein includes a first outer treated surface on the one face of the fabric formed by the first layer 11 of nonwoven fibers. This first outer treated surface is the same as the outer treated surface of the fabric of FIG. 4 and is formed by the rows of stitches 20 comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions 21 on the one face of the fabric for compressing the one face of the fabric along the rows to form corresponding depressed areas therealong. Likewise, the portions of the face of the fabric between the rows of chainstitch loop portions 21 are substantially uncompressed and define spaced, parallel, raised ribs so that a ribbed surface with exposed rows of chainstitch loop portions 21 therebetween is provided on the one face of the fabric. The fabric 10 of FIG. 6 further includes a second outer treated surface on the other face of the fabric formed by the second layer 12 of foam material. This second outer treated surface is of the same form as the second outer treated surface of the fabric 10 of FIG. 5 and comprises upstanding, flocked fibers 45 secured to the foam material and being disposed in a patterned arrangement thereon.

Thus, it may be seen that this invention has provided a novel and improved laminated, multilayer, nonwoven fabric adaptable for use as bed coverings, garments and the like and which provides different outer surface characteristics and which utilizes the individual characteristics and features of the two layers used therein and a stitch construction for stitch-bonding the individual fibers of the first layer. This improved fabric utilizes various combinations of surface treatments for providing desired finishes on the fabric.

In the drawings and specification, there have been set forth preferred embodiments of this invention and, although

specific terms are employed, they are used in a generic and descriptive sense only and not purposes of limitation.

What is claimed is:

1. A laminated, multilayer, nonwoven fabric adaptable for use as bed coverings, garments and the like and characterized by providing different outer surface characteristics, said fabric comprising:

a first layer comprising a three-dimensional, self-sustaining batt of nonwoven, textile fibers, said fibers of said first layer being oriented in the widthwise direction of said fabric to provide strength and stability to said fabric in the widthwise direction, said first layer forming one outer face of said fabric for providing textile fiber characteristics to said one outer face;

elongate, spaced-apart rows of stitches penetrating said first layer for stitch-bonding together the individual fibers thereof, said rows of stitches extending in the lengthwise direction throughout the length of said fabric for providing strength and stability to said fabric in the lengthwise direction;

a second layer comprising three-dimensional, compressible, resilient foam material having an integral network extending in random directions throughout said second layer to define a multiplicity of cells for providing improved hand, drapability, compressibility, resilience, washability, bulk, and insulating qualities to said fabric and for providing strength to said fabric in random directions, said second layer being superimposed on and being contiguous with said first layer and forming the other outer face of said fabric for providing foam characteristics to said other outer face; and

means laminating said first and second layers together to form a composite fabric.

2. A nonwoven fabric, as set forth in claim 1, in which each of said rows of stitches is formed from at least two continuous yarns and has chainstitch loop components on one side of said first layer and interconnected diagonally extending and straight-line stitch components on the other side of said first layer and in which said chainstitch loop components are formed from both of said yarns and in which said diagonally extending stitch components are formed from one of said yarns and said straight-line stitch components are formed from the other of said yarns.

3. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes an outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said outer treated surface comprising raised, napped fibers extending from said first layer and being of sufficient height and density to cover said rows of stitches on said one face of said fabric.

4. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes an outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said outer treated surface being formed by said rows of stitches comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions on said one face of said fabric and compressing said one face of said fabric along said rows to form corresponding depressed areas therealong, the portions of said face of said fabric between said rows of chainstitch loop portions being substantially uncompressed and defining spaced, parallel, raised ribs so that a ribbed surface with exposed rows of chainstitch loop portions therebetween is provided on said one face of said fabric.

5. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes an outer treated surface on said other face of said fabric formed by said second layer of foam material, said outer treated surface comprising upstanding, flocked fibers secured to said foam material and being of sufficient

height and density to cover said foam material on said other face of said fabric.

6. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes an outer treated surface on said other face of said fabric formed by said second layer of foam material, said outer treated surface comprising upstanding, flocked fibers secured to said foam material and being disposed in a patterned arrangement thereon.

7. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes a first outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said first outer treated surface comprising raised, napped fibers extending from said first layer and being of sufficient height and density to cover said rows of stitches on said one face of said fabric; and a second outer treated surface on said other face of said fabric formed by said second layer of foam material, said second outer treated surface comprising upstanding, flocked fibers secured to said foam material and being of sufficient height and density to cover said foam material on said other face of said fabric.

8. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes a first outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said first outer treated surface being formed by said rows of stitches comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions on said one face of said fabric and compressing said one face of said fabric along said rows to form corresponding depressed areas therealong, the portions of said face of said fabric between said rows of chainstitch loop portions being substantially uncompressed and defining spaced, parallel, raised ribs so that a ribbed surface with exposed rows of chainstitch loop portions therebetween is provided on said one face of said fabric; and a second outer treated surface on said other face of said fabric formed by said second layer of foam material, said second outer treated surface comprising upstanding, flocked fibers secured to said foam material and being of sufficient height and density to cover said foam material on said other face of said fabric.

9. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes a first outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said first outer treated surface comprising raised, napped fibers extending from said first layer and being of sufficient height and density to cover said rows of stitches on said one face of said fabric; and a second outer treated surface on said other face of said fabric formed by said second layer of foam material, said second outer treated surface comprising upstanding, flocked fibers secured to said foam material and being disposed in a patterned arrangement thereon.

10. A nonwoven fabric, as set forth in claim 1, in which said fabric further includes a first outer treated surface on said one face of said fabric formed by said first layer of nonwoven fibers, said first outer treated surface being formed by said rows of stitches comprising closely spaced-apart, parallel, exposed rows of chainstitch loop portions on said one face of said fabric and compressing said one face of said fabric along said rows to form corresponding depressed areas therealong, the portions of said face of said fabric between said rows of chainstitch loop portions being substantially uncompressed and defining spaced, parallel, raised ribs so that a ribbed surface with exposed rows of chainstitch loop portions therebetween is provided on said one face of said fabric; and a second outer treated surface on said other face of said fabric formed by said second layer of foam material, said second outer treated surface comprising upstanding, flocked fibers secured to said foam material and being disposed in a patterned arrangement thereon.

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