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Kent

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[54] **METHOD OF MAKING A NON-WOVEN NEEDLED FABRIC HAVING A RANDOM LINEAR STREAKED DESIGN**

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[52] **U.S. Cl.** ..... **156/148,** 156/166, 156/176, 156/180, 156/181, 28/72.2 R

[51] **Int. Cl.** **B32b 23/02**

[58] **Field of Search** ..... 156/72, 148, 62.2, 62.4, 156/63, 166, 176, 178, 180, 181, 91, 93; 28/4, 72.2 R, 72 NW; 112/401, 410, 415, 429; 161/50, 55, 60, 61, 62, 67, 80, 81

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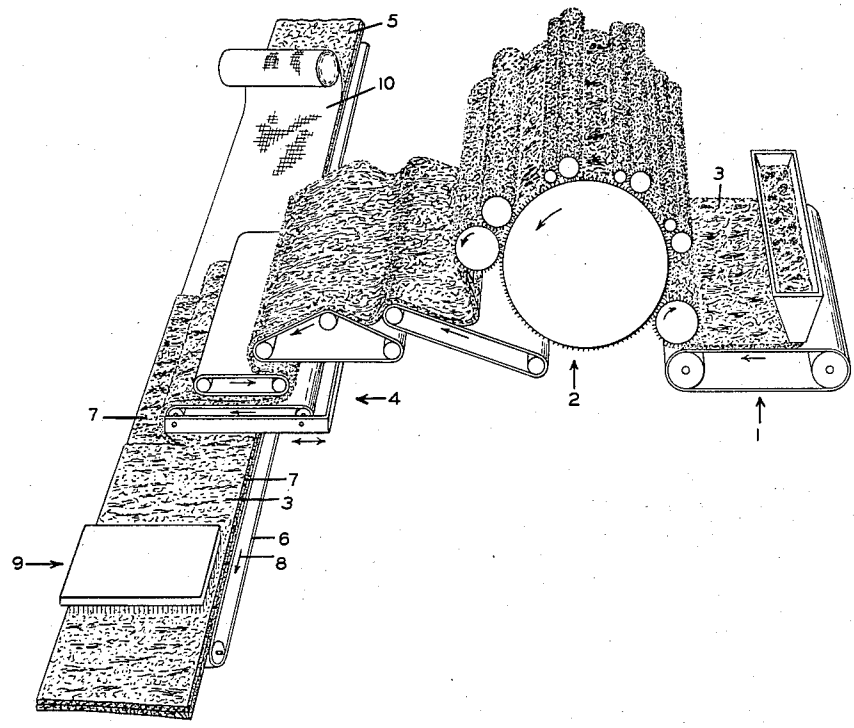
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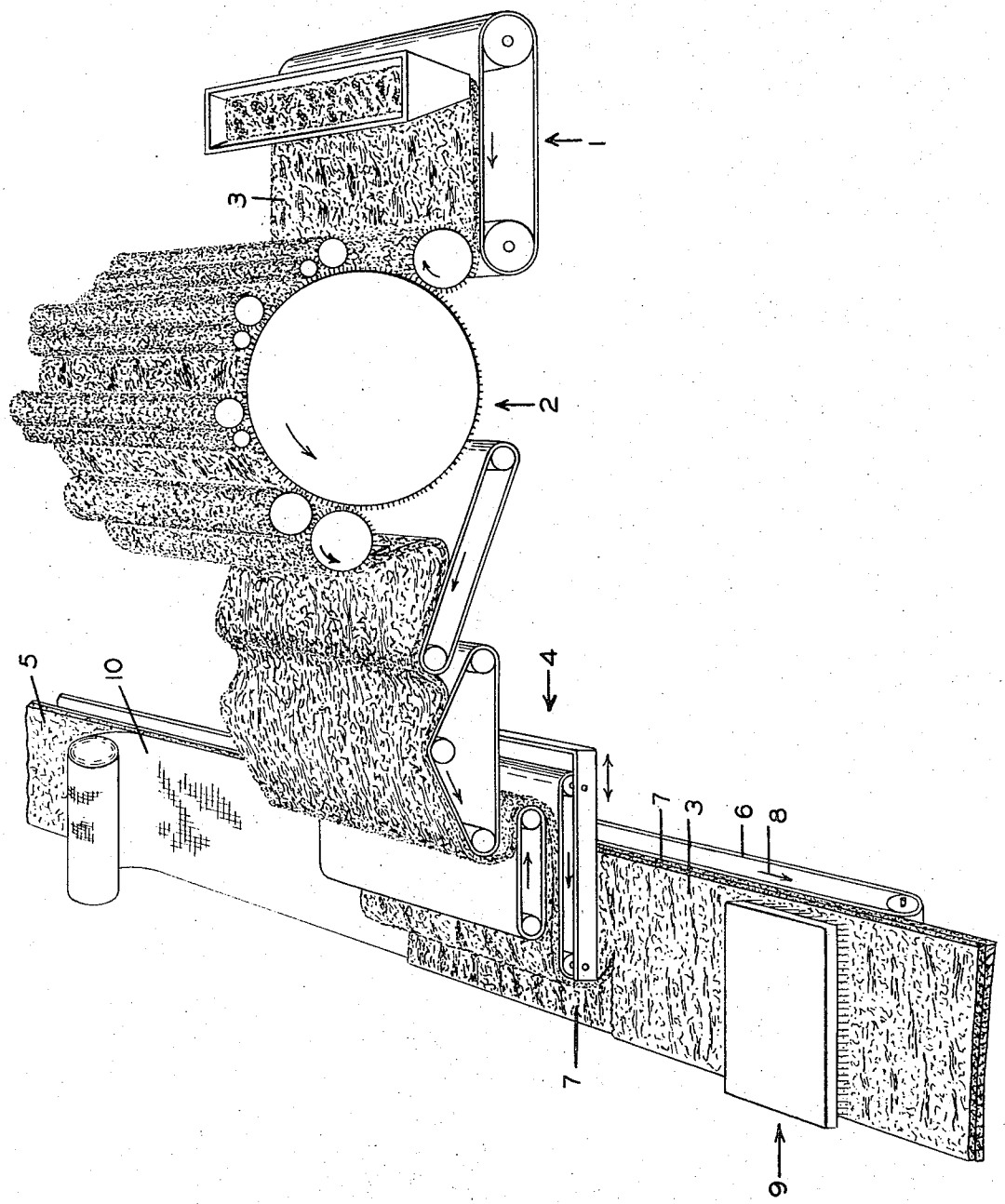
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[57] **ABSTRACT**

A random linear streaked design is achieved in a non-woven needled fabric structure particularly adapted for carpets by: laying up a web comprised of dyed staple fiber bundles, individual bundles being of one of a plurality of colors, by opening the bundles and blending the bundles forming the web to a controlled degree such that individual bundles in the web retain their distinct coloration; garnetting the web to orient the fibers at a speed whereby further blending is minimized; cross-lapping said web onto a preformed backing web positioned on a stationary apron to form a plurality of layers in which the garnetted fibers are substantially parallel to cross-machine direction; and transporting said backing web and overlying layers to a needling operation and needling the web and overlying layers to form an integral, unitary, needled fabric in which the slightly opened commingled fibers form colorful streaks having a random linear design comprised of the plurality of colors forming the original staple fiber bundles.

6 Claims, 1 Drawing Figure




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METHOD OF MAKING A NON-WOVEN NEEDLED FABRIC HAVING A RANDOM LINEAR STREAKED DESIGN

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to non-woven, needle-bonded carpet structures, more particularly, carpet structures designed for application to wall surfaces for decorative and acoustical effects.

2. Description of the Prior Art

A means and method for the manufacture of decorative needle fabrics from different colors of dyed fibers, which fabrics are characterized by mottling or hit-and-miss arrangement of the colors employed, is described in U.S. Pat. No. 2,158,533. U.S. Pat No. 3,250,655 discloses the manufacture of fabrics, particularly non-woven fabrics, from contiguous, continuous lengths of unidirectional, oriented, filamentary material and states that by using differently colored filamentary materials or specially prepared or textured filamentary materials a very great variety of patterned and textured non-woven fabrics can be produced.

SUMMARY OF THE INVENTION

This invention relates to a method of manufacturing a non-woven, needled fabric having a random linear pattern and, more particularly, a non-woven, needled carpet structure adapted for acoustical applications to wall surfaces. In the method of this invention, staple fiber bundles of a plurality of colors are opened and blended to a controlled degree such that each of the bundles retains its distinct coloration while blending to form a web of a plurality of such colors. This web is then garnetted to orient the fibers but at a speed whereby further color blending is minimized. The garnetted web is then cross-lapped onto a backing web positioned on a stationary apron thus forming a plurality of layers in which the fibers are oriented parallel to cross-machine direction. The plurality of layers and backing web are then transported to a needling operation and the layers needled to the backing web to form an integral, unitary, needled fabric or carpet structure in which the slightly opened, commingled fibers at the surface form colorful streaks creating a random linear pattern of the plurality of colors of the original staple fiber bundles. At the needling operation a scrim may be interposed between the decorative surface layers and backing web prior to needling or the decorative surface layers and backing web may be integrated with a backing scrim which is placed beneath the backing web just prior to the needling operation to provide a dimensionally stable carpet structure.

DESCRIPTION OF THE DRAWING

The FIGURE of the drawing is a diagrammatic perspective view of the apparatus and process steps used in carrying out the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Stock dyed fibers (about 2 inches to 4 inches staple) having deniers of from approximately 3 to about 8 are initially formed into opened bundles of a single color, the size of the bundle determining the width and length of the particular colored streak in the final carpet structure. As shown in the drawing, opened bundles of a plurality of colors are blended and fed as indicated at 1 to a garnett 2 to align the direction of fibers in the web 3, regulating the feed so as to form a web of the fiber bundles while minimizing any additional color blending within the web itself. The ¼ to 1 ounce web thus formed is thereafter lapped using a conventional cross-lapper 4 onto a preformed backing web 5 carried by a stationary apron 6, successive layers 7 being sufficiently built up to completely hide the backing web. This usually requires about six to 10 layers of lapped web. Since the apron is stationary, the cross-lapper feeds the web in a single direction parallel to the cross-machine direction of the fabric. Direction of cross-lapped web travel is indicated by arrows.

When sufficient layers of the web have been cross-lapped onto the backing web, the structure is transported the width of the cross-lapper and additional garnetted layers are cross-lapped onto the newly exposed backing web 5. The intermittent operations are continued with the backing web 5 and the overlying decorative layers 7 being fed as indicated by arrow 8 to a conventional needling operation 9 (needle loom) where the several layers and backing web are needled to form a unitary, non-woven, needled structure having a variable linear pattern in which the colors of the individual fiber bundles randomly repeat, giving a natural overall linear streaked effect to the surface or facing layer of the finished product.

Colored staple organic fibers such as fibers formed of poly (vinyl chloride), rayon, nylon, acrylics and wool may be readily utilized in the practice of this invention. It is generally preferred to utilize fire-resistant fibers in forming the streaked wear layer, particularly such fibers as the modacrylics, such as Eastman Kodak's Verel and Union Carbide's Dynel, so as to form a final carpet structure having a fire-resistant facing layer.

In order to form a more dimensionally stable carpet structure, it is preferable to either interpose a scrim 10 between the backing web 5 and the several layers 7 which form the surfacing web prior to the first needling operation or to position a scrim beneath the originally needled structure and, at a second needling station, to needle the fabric to the dimensionally stable scrim. Conventional methods may be utilized to apply the conventional latex backings to the needled, non-woven, carpet structure after the needling operations.

EXAMPLE

From stock dyed staple modacrylic fibers (Eastman Verel) supplied in a variety of colors, clumps of orange, yellow and red were opened up and formed into bundles having diameters ranging from about 2 to 6 inches. The individual staple fibers forming the bundles were approximately 3 inches in length and of 8 denier. Individual bundles of each of the three colors were blended in a weight ratio of 70 percent orange, 20 percent yellow and 10 percent red and fed into a garnett which is operated at a relatively slow speed to form an integral web of the several colors having the fibers substantially oriented while blending of the colors is minimized.

The web formed by the garnett is then fed to a cross-lapper and cross-lapped onto an apron carrying a preformed three ounce backing web formed of the same staple fibers which have previously been thoroughly blended together. The apron is moved intermittently during the fabric forming operation, remaining station-

ary while sufficient layers of web from the garnett are cross-lapped so as to form a facing layer completely hiding the backing web; in this instance eight layers are cross-lapped to form a three ounce facing layer in which the three colors are maintained as individual streaks running generally parallel to cross-machine direction, the dominant background color being formed from the orange bundles.

Upon formation of the necessary layers, the cross-lapper is stopped and the apron moved the width of the cross-lapper to expose the backing web and the operations repeated.

The backing web carrying the decorative streaked facing layer is then transported to a needle loom where the non-woven fabric is needled forming an integral, needled fabric in which the slightly open, commingled fibers in the facing layer form a random linear streaked pattern of the three colors.

A dimensionally stable glass fiber scrim is then positioned beneath the needled fabric and united thereto at a second needle loom. A conventional latex backing is applied and cured, forming a decorative streaked carpet structure having a fire-retardant surface. The carpet structure is particularly adaptable for use as a decorative wall surfacing material for acoustic applications.

What is claimed is:

1. A method of manufacturing a non-woven needled fabric having a random linear streaked design of a plurality of colors comprising:

a. forming a fibrous layer by opening and blending dyed staple organic fiber bundles to a controlled degree such that each of the bundles retains its distinct coloration, the individual bundles being of one of a plurality of colors;

b. garnetting said layer into a web whereby the fibers are oriented but at a speed whereby further fiber blending is minimized;

c. cross-lapping said web onto a backing web positioned on a stationary apron to build up sufficient layers to hide the backing;

d. transporting said backing web and plurality of surfacing layers to a needling station and needling the web and overlying layers to form an integral, unitary, needled fabric in which the commingled fibers form colorful streaks having a random linear pattern of the plurality of colors of the staple fiber bundles.

2. The method in accordance with claim **1** wherein the denier of the staple fibers is from about 3 to 8 and wherein the lengths of said fibers are from about 2 to 4 inches.

3. The method in accordance with claim **2** wherein the fibers are of a fire-retardant modacrylic composition.

4. The method in accordance with claim **2** wherein a dimensionally stable scrim is positioned over the backing web.

5. The method in accordance with claim **2** wherein a dimensionally stable scrim is united to the back of the needled fabric at a second needling station and a latex backing is thereafter secured to form a decorative streaked carpet structure.

6. The method in accordance with claim **3** wherein a dimensionally stable scrim is united to the back of the needled fabric at a second needling station and a latex backing thereafter applied to form a decorative carpet structure having a flame-retardant random linear streaked surface.

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