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Lochner

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[54] **NON-WOVEN NEEDLED PILE FABRIC AND METHOD FOR ITS MANUFACTURE**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **161/62,** 28/72.2 R, 156/148, 161/63, 161/64, 161/80, 161/97, 161/154

[51] **Int. Cl.** **D04h 11/00**

[58] **Field of Search** ..... 161/62, 63, 64, 80, 161/154, 97, 67; 28/72.2 R; 156/148

[56] **References Cited**

UNITED STATES PATENTS

3,191,257	6/1965	Smith	161/154
2,132,530	10/1938	Greiser	28/72.2
2,158,533	5/1939	Cavey	28/72.2

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Assistant Examiner—M. E. McCamish
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[57] **ABSTRACT**

A needled, non-woven pile fabric comprises a non-woven backing fabric and a non-woven face fabric. The face fabric has its face side printed with an ornamental pattern of pigment color. The backing fabric and the face fabric are needled together so that the fibers of the backing fabric penetrate through the face fabric and mingle with the fibers of the face fabric to form a pile on the face side of the face fabric. The ornamental pattern is thereby imparted with a soft three-dimensional appearance.

A method is also disclosed for producing the non-woven pile fabric. According to the method, a web of a non-woven backing fabric is placed in face-to face relationship with a web of non-woven face fabric having a decorative pattern of pigment color printed on its face side, with the printed face side of the face fabric facing away from the backing fabric. The two webs are then needled from the free or uncovered side of the backing fabric in a direction towards the face side of the face fabric so that the fibers of the backing fabric penetrate through the face fabric and mingle with the fibers of the printed face fabric to form a pile layer on the printed face side. The backing fabric and the face fabric may be of a single color or of blended colors.

5 Claims, 4 Drawing Figures

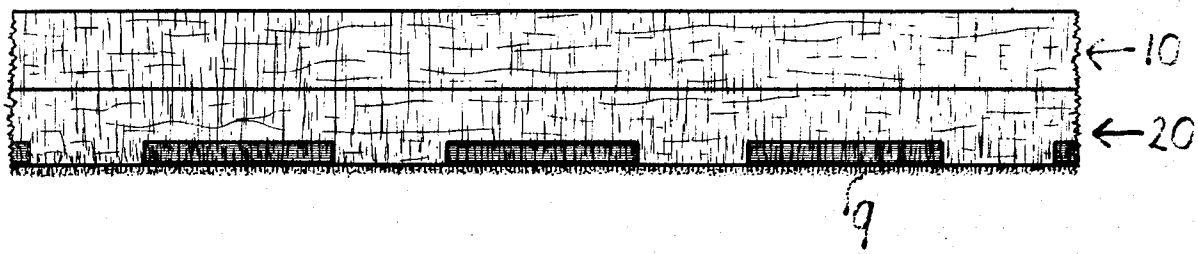

Fig 4

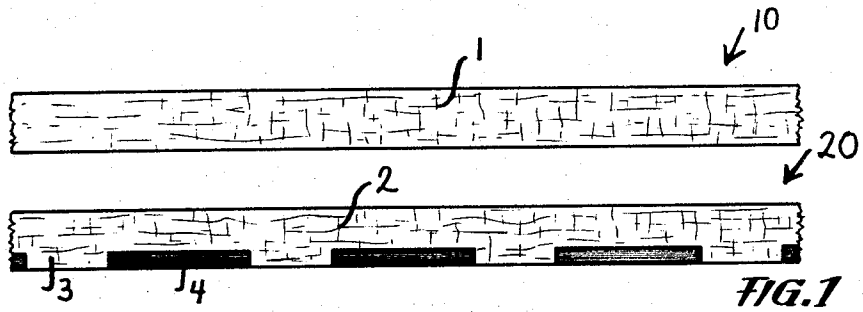

FIG. 1

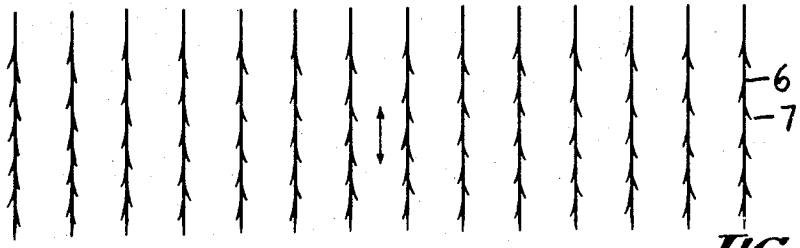

FIG. 2

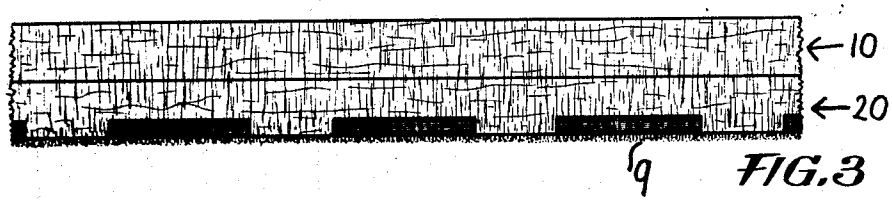

FIG. 3

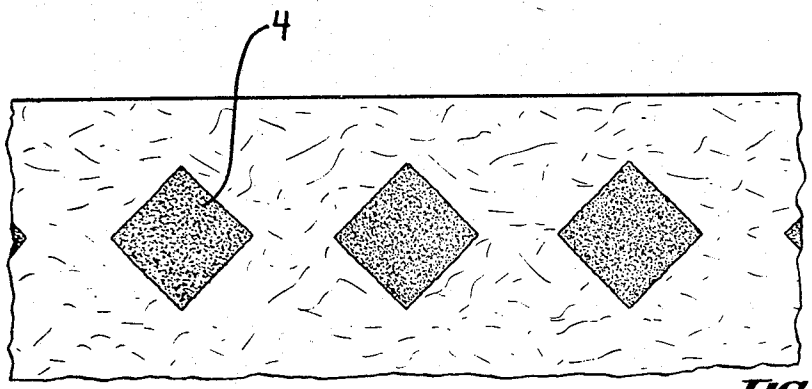

FIG. 4

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NON-WOVEN NEEDLED PILE FABRIC AND METHOD FOR ITS MANUFACTURE

FIELD OF THE INVENTION

The invention relates to needled and decoratively patterned non-woven fabrics which are composed of at least two non-woven fabric webs, stabilized or reinforced by needling.

BACKGROUND INFORMATION AND PRIOR ART

Needled, non-woven fabrics are produced from non-woven fabric webs which are manufactured by carding or aero-dynamically. The webs are mechanically stabilized by needling with needle machines having barbed needles. The needled fabric webs are subsequently additionally reinforced or stabilized by means of suitable binders with which the webs are impregnated. A number of chemical binders has been proposed for this purpose, such as, for example, cross-linked polyacrylic acid esters, butadiene acrylicnitrile, butadiene styrene and similar compounds.

Such needled, non-woven fabrics are primarily used as floor coverings and are either single-colored or, — in the event that the fabric is made from a mixture of fibers of different colors, and this mixture is supplied to the web producing machine — of blended color. This blended type of non-woven fabric is more popular and has found wide acceptance. It is also feasible to print such needled, non-woven fabrics over their entire surface and throughout. This, however, requires considerably expenditure in machinery and costs. In practice, it has been suggested to accomplish the printing by means of pigment dyes or by generally soluble dyestuffs. Soluble dyes are preferred to pigment dyes since the former do not substantially affect the surface structure and appearance of the non-woven fabric in respect to its textile character. Thus, if the printing is effected with soluble dyes, the surface characteristics of the non-woven fabric retain their textile character after the printing. If soluble dyes are used, the printing is customarily carried out after the mechanical stabilization by needling but prior to the subsequent stabilization by means of binders, to wit, prior to the impregnation of the fabric. In this still relatively unstable condition of the non-woven fabric web, the web is subjected to a washing treatment. This, however, entails considerable technical difficulties, particularly in respect to webs of relatively great width since the washing treatment causes substantial distortions, both in the longitudinal and the transverse direction. In addition, of course, the washing step entails additional expenditure and requires a subsequent drying procedure, which again increases the costs.

Finally, it should be mentioned that the printing of non-woven fabrics results in relatively sharply defined pattern contours, an observation which applies to the printing of textile goods in general. These relatively sharp contours cause an undesired flat image or appearance, particularly with relatively voluminous textile structures, as for example, carpets. This flat image or appearance is in contrast to woven fabrics. The flat appearance is undesired because with a carpet the character of the carpet structure is largely determined by the three-dimentional structure of the coloration.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide for a needled, non-woven fabric structure which overcomes the disadvantages of the prior art and which has a decoratively patterned face side of a soft and three-dimensional appearance.

Another object of the invention is to provide for a method of producing needled non-woven pile fabrics having decorative patterns of three-dimensional appearance which is exceedingly simple to carry out and which results in pile fabrics of superior quality and appearance.

Generally it is an object of the invention to improve on the art of non-woven needled fabric structures as presently practiced.

It is also an object of the invention to provide a method for the production of needled, decoratively patterned non-woven fabrics, composed of at least two non-woven fabric webs, stabilized or reinforced by needling in which, in spite of the printing for the decorative pattern, a three-dimensional color effect is obtained.

A still further object of the invention is to provide a method of the indicated kind which renders an intermediate washing treatment, as required in the prior art procedures, unnecessary.

Finally, it is an object of the invention to provide a method of the indicated kind which is exceedingly economical.

Briefly, and in accordance with the invention, a needled, non-woven pile fabric comprises a first web of non-woven fabric which is of the nature of a backing fabric, and a second web of non-woven fabric which is in the nature of a face fabric. The face fabric has its face side printed with an ornamental pattern, the printing being effected with pigment color or colors. The two webs are placed in face-to-face relationship with the printed face side of the face fabric facing away from the backing fabric. The backing fabric and the face fabric are needled together with the fibers of the backing fabric penetrating through the face fabric, the fibers of the backing fabric being mingled with the fibers of the printed face fabric and forming a pile on the face side of the face fabric. In this manner, the ornamental pattern is imparted with a soft, three-dimensional appearance. The backing fabric may be of a single color or it may consist of fibers of different colors so that a blended color results for the backing fabric. The same applies to the face fabric which, however, on its face side is printed with the pigment colors. A decorative pattern of one pigment color or of several pigment colors may be chosen.

In accordance with the inventive method, the backing fabric web and the face fabric web, which latter is printed on its face side with pigment color or colors to form a decorative pattern, are placed in face-to-face relationship so that the printed face side of the face fabric faces away from the backing fabric. The two fabrics are then needled, the barbed needles being pushed through the structure from the free or uncovered rear side of the backing fabric through the face fabric. The needling causes fibers of the backing fabric to penetrate the face fabric so that the penetrating backing fabric fibers mingle with the fibers of the printed face fabric and form a pile layer on the printed face side of the face fabric. In this manner the originally flat printed decorative pattern on the face side of the face fabric is transformed into a soft three-dimensional pattern.

The mixing of the fibers of the printed non-woven face fabric with the fibers of the unprinted backing fab-

ric, resulting in the formation of a pile on the face side of the face fabric, largely eliminates the originally flat appearance of the printed patterns so that the desired three-dimensional textile effect is achieved.

The consumption of dyes is considerably reduced in the inventive procedure, as compared to the dye consumption in prior art procedures. Assuming that about half of the face side of the fabric is printed, only about one fourth of the dye stuff consumption of the prior art procedures is required. Further, since in accordance with the invention, pigment dyes are to be used, the subsequent washing treatment, as referred to above, is eliminated. In this manner the disadvantages of the washing treatment resulting in considerably longitudinal and transverse distortions and drafts are entirely obviated. The number of dyes or dye stuff to be used in the inventive procedure is unlimited.

The invention will now be described by an example, it being understood, however, that this example is given by way of illustration and not by way of limitation, and that many changes may be effected without affecting in anyway the scope and spirit of the invention as recited in the appended claims.

EXAMPLE

A non-woven backing fabric was produced in conventional manner from polypropylene fibers of a staple length of 90 mm and a detex value of 17. The fiber weight was 300 g/m². The polypropylene fibers were spun dyed with a red color. The face fabric was also of the non-woven kind and consisted of spun dyed polypropylene fibers of 90 mm length, a detex value of 17 and a m²-weight of 200 g/m². The color of the spun dyed fibers was also red. The face fabric was now printed according to the screen printing procedure so as to impart it with the desired decorative pattern. In the present example, the printing was effected with a black pigment dye. After the printing, the face fabric was dried and the pattern was fixed. The printing was effected on one side of the face fabric only, to wit, its face side. The two fabric webs were then placed in face-to-face relationship with the printed face side of the face fabric being lowermost, and the backing fabric placed on top of the unprinted face of the face fabric. The two webs were then subjected to needling, the needles passing through the web strucutre from the top so that they first penetrated the backing fabric and then the face fabric. Due to the needling, fibers of the backing fabric pass or penetrate through the face fabric and mingle, both at the printed areas and at the unprinted areas of the face fabric to form a color mixture while at the same time forming a pile on top of the face side of the face fabric. The mixing of the printed fibers of the face fabric with the spun dyed fibers of the backing fabric under simultaneous formation of a pile from the fibers of the backing fabric causes a substantial elimination of the originally flat printing image. In fact, the desired three-dimensional textile effect is obtained.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

IN THE DRAWINGS

FIG. 1 is an exploded view of the backing fabric and the face fabric in section;

FIG. 2 shows the backing fabric and the face fabric in face-to-face relationship with the needles of the needling machine being positioned above the structure;

FIG. 3 is a sectional view of the finished needled fabric structure; and

FIG. 4 shows a plan view of the structure of FIG. 3, the view being on the face side of the fabric.

Referring now to the drawings, reference numeral **10** generally indicates the backing fabric, while reference numeral **20** generally refers to the face fabric. Each fabric is of the non-woven kind and is composed of a multitude of fibers **1** and **2**, respectively. The face fabric has a face side **3** which is printed with a decorative pattern **4.** The decorative pattern is printed with pigment dyes and penetrates to some depth of the face fabric **20.** For producing the inventive fabric structure, the two fabrics **10** and **20,** shown in exploded view in FIG. **1,** are superimposed into the formation shown in FIG. **2** in which the face side **3** of the face fabric **20** points in a downward position. Needles **6** having barbs **7** are now passed through the structure formed by the two webs **10, 20,** the needles being mounted in a conventional needle machine not shown. Due to the needling, fibers **1** of the backing fabric **10** penetrate through the face fabric **20** and mingle with the printed and unprinted fibers **2** of the face fabric **20** to form a pile layer **9** on top of the face side **3** of the face fabric **20.** In this manner a soft three-dimensional appearance is obtained. In the embodiment here shown, the backing fabric **10** is of a single color. The same applies to the face fabric **20.** However, the two fabrics could as well be of blended colors.

The finished structure may primarily be used for floor coverings in which event, of course, the pile carrying face side will point upwardly.

What is claimed is:

1. A method of producing a needled, decoratively patterned non-woven pile fabric, which comprises: placing in face-to-face relationship a web of a non-woven backing fabric and a web of a non-woven face fabric having a decorative pattern of pigment color printed on its face side, with the printed side of the fabric facing away from said backing fabric, and needling said webs from the uncovered side of the backing fabric towards said face side of the face fabric so that fibers of the backing fabric penetrate through said face fabric, mingle with fibers of the printed face fabric, and said mingled fibers form a pile layer on the printed face side of the face fabric, whereby said printed ornamental pattern is imparted with a soft, three-dimensional appearance.

2. A method as claimed in claim **1,** wherein said web of non-woven backing fabric is of a single color or of blended colors.

3. A method as claimed in claim **1,** wherein said fabric is of a single color or of blended colors.

4. A method as claimed in claim **1,** wherein said pattern is printed with a single or with several pigment colors.

5. The product made by the process of claim **1.**

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