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Europäisches Patentamt

European Patent Office

Office européen des brevets

⑪ Publication number:

0 046 353
A2

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EUROPEAN PATENT APPLICATION

⑰ Application number: **81303587.0**

⑥ Int. Cl.³: **D 05 C 17/02, D 04 H 13/00,**
D 02 G 3/44, H 01 B 1/00

⑱ Date of filing: **05.08.81**

⑳ Priority: **14.08.80 US 177902**

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㉓ Date of publication of application: **24.02.82**
Bulletin 82/8

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㉔ Designated Contracting States: **AT BE CH DE FR GB IT**
LI LU NL

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㉖ **Antistatic fibre-lock-weave primary carpet backing.**

㉗ Primary carpet backing comprising a woven tape backing with staple fiber fleece needlebonded thereto wherein conductive yarns are woven into the backing in superposed or piggy-back relationship to warped yarns, 2 to 8 ends per inch (0.79 to 31 ends/cm) of the conductive yarn being used. The product serves as a primary backing for carpets, the pile yarn being tufted therein. Good anti-static properties are obtained.

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ANTI-STATIC FLW
PRIMARY CARPET BACKING

TITLE MODIFIED
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BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to anti-static primary carpet backing.

Prior Art

5 A large amount of primary carpet backing currently in use is prepared by weaving flat ribbon or tape yarns to produce a backing such as that disclosed in Rhodes 3,110,905 (1963). To provide a backing which has a coloured or dyeable surface, a fiber fleece is needle punched thereinto, this being shown by
10 Kimmel et al. in Patent 3,605,666. This product is known as fiber lock weave or FLW primary backing in the trade.

In recent years, there has been increased interest in the production of anti-static carpets and a number of solutions have been suggested. Patents which disclose conductive fibers or yarns
15 in the pile of a carpet include Schare 3,900,624 (1975) and McCune 3,639,807 (1972). Another approach has been to use conductive fibers in the fleece layer of FLW primary backing, this being suggested by Brinkhoff et al. 3,806,401 (1974) and Sands 3,955,022 (1976).

20 While the use of the conductive fibers in the fleece layer has achieved commercial success, a problem has arisen because it is necessary to manufacture and stock an increasing number of primary backing styles for the wide variety of carpets which are now made with anti-static properties. This has meant an increasing
25 number of conductive fiber blends to produce the fleece for these different styles even though the same substrate is used for most of them.

An object of the invention is to produce a conductive primary carpet backing of the FLW type.

30 A further object of the invention is to provide anti-static

primary backing containing the conductive fiber in the substrate thereby reducing the number of FLW styles used in this type of carpet.

A further object of the invention is to provide improved
5 quality control in the product of anti-static FLW by providing a system of more accurately controlling spacing of conductive fibers.

Other objects and advantages of the present invention will be apparent to one skilled in the art upon reading the
10 present disclosure.

SUMMARY OF THE INVENTION

Broadly, the invention resides in a primary carpet backing comprising a fabric woven of essentially flat warp and weft yarns in a construction having 10 x 10 to 40 x 40 ends per inch (3.9 x
15 3.9 to 15.7 x 15.7 ends/cm), and a nonconductive staple fiber fleece needlebonded thereto, wherein the improvement comprises providing 2 to 8 ends per inch (0.79 to 3.1 ends/cm) of a conductive yarn having an electrical resistance of not more than 10^{10} ohms/cm., each said end of conductive yarn and a flat warp yarn being woven
20 into said backing in superposed or piggyback relationship.

Tests have shown that this primary carpet backing is just as effective as current FLW backing containing the conductive element blended into the fleece or face layer. Any of the yarns currently being sold for use in conductive pile yarn can be used in
25 the production of the backing of this invention.

Use of this invention provides improved quality control over that product according to the system shown by Sands 3,955,022, supra since it is easier to determine if the correct amount of conductive element is in a woven fabric than it is with a fiber
30 blend. This is particularly true with a dark colored blend. It is also easier to obtain even spacing of the conductive element in a woven substrate than it is in a fiber blend. Finally, there is no color change in the face fiber when the conductive element is used in the substrate, this being particularly important with regard
35 to light colored FLW primary backing.

The fleece layers suitable for use in this invention are those normally used in the art. Where a dyeable layer is desired, the layer normally contains at least a substantial proportion of nylon fiber. For colored coatings, pigmented polypropylene is
5 generally used.

DETAILED DESCRIPTION OF THE INVENTION

From the above description, it will be apparent that the present invention involves the use of the fabric of Rhodes having fleece needlebonded thereto as disclosed by Kimmel et al. and
10 constitutes an improvement over the conductive FLW product such as shown by Sands. The woven tape is produced on Sulzer or equivalent looms in widths ranging up to 12 to 15 yards (10 to 13.7 m). The conductive fibers known in the art are fed along with the warp ends from the beam wherein they are superposed or piggybacked upon the
15 desired warp ends. Generally 2 to 8 conductive ends per inch (0.79 to 3.1 ends/cm) are used, the selection of the number of ends depending upon a variety of factors including the electrical resistance of the conductive fiber, the desired conductivity of the backing, etc.

The preferred conductive yarns are those containing a carbon
20 layer deposited on a nylon filament, such materials being shown in Sanders 3,823,035 (1974). One such supported yarn is identified as F931 yarn sold by Dow. This is a 180 denier (20 tex) yarn consisting of a 160 denier (17.7 tex) continuous filament polypropylene carrier with a 20 denier (2.2 tex) conductive coated nylon monofilament wound
25 thereon. Such yarns have a resistivity of less than 10^{10} , generally 10^4 to 10^9 ohms/cm.

Another commercial product which can be used are "X-Static" yarns sold by Sequoit Industries, a silver coated nylon product. This material has a resistivity of 10^3 or 10^4 ohms/cm. With this
30 increased conductivity, such yarns can be used in the lower end of the range set forth.

Other available products include copper and stainless steel wires which can be piggybacked onto the warp ends.

The primary backing material now being used is substantially
35 all polypropylene yarn, but the invention can find equal applicability

to other backing materials such as polyethylene, nylon, polyvinyl-chloride, etc.

The determination of the amount of voltage generated in the carpet is determined by test method No. 134 of the American
5 Association of Textile Colorists and Chemists.

Any pile yarn can be used with the primary backing of this invention. Usually, conductive pile yarns are used. An example is DuPont Antron III pile yarn which is a blend of conductive and nonconductive nylon fibers.

10 The following examples disclose specific embodiments of the invention, but they should not be considered unduly limiting.

EXAMPLE 1

A preferred embodiment of the invention comprises a polypropylene tape fabric having 24 ends per inch (9.4 per cm) of
15 500 denier (55 tex) tape in the warp and 13 picks per inch (5.1 per cm) of 1125 denier (125 tex) tape in the fill. This was made on a Sulzer loom. Dow F931 fiber was used in the warp direction using 6 ends per inch (2.4 ends per cm). The conductive yarn piggybacked on a warp yarn with both yarns on the same heddle.
20 Following production of this backing material, nylon staple fleece was needled into the backing in an amount of 1-1/2 ozs. per square yard (50 g/sq m) of backing. This backing was then tufted with Antron III pile fibers in an amount of 30 ozs. of pile plush yarn per square yard (1017 g/sq m). Static tests on a number of samples
25 showed a voltage of 2.5 to 3.0 KV with an average voltage of 2.8 KV.

EXAMPLE 2

The process of Example 1 was repeated with the exception that "X-Static" yarn was substituted for the F931 in an amount of 2 ends per inch (0.79 ends per cm). The test results showed a range of
30 static charge of 2.8 to 3.2 with an average voltage of 3.0 KV.

While we have described and illustrated certain specific embodiments of the invention, it will be apparent to those familiar in the art that considerable variation can be made within the broad scope of the invention.

CLAIMS

1. In a primary carpet backing comprising a fabric woven of essentially flat warp and weft yarns in a construction having 10 x 10 to 40 x 40 ends per inch (3.9 x 3.9 to 15.7 x 15.7 ends/cm), and a nonconductive staple fiber fleece needlebonded thereto, the improvement comprising providing 2 to 8 ends per inch (0.79 to 3.1 ends/cm) of a conductive yarn having an electrical resistance of not more than 10^{10} ohms/cm., each said end of conductive yarn and a flat warp yarn being woven into said backing in superposed or piggy-back relationship.
2. The carpet backing of Claim 1 wherein the warp and weft yarns are polypropylene ribbons or tape.
3. The carpet backing of Claim 1 or Claim 2 wherein the conductive yarn is a carbon coated nylon supported on a polypropylene monofilament.
4. The backing of Claim 3 wherein the carbon coated nylon has a denier in the range of 10 to 40 (1.1 to 4.4 tex) and the polypropylene monofilament carrier has a denier in the range of 150 to 400 (16.6 to 44.4 tex).
5. The carpet backing of Claim 1 or Claim 2 wherein the conductive yarn is a silver coated nylon fiber.
6. The carpet backing of Claim 5 wherein the electrical resistance of the conductive yarn is 10^3 to 10^4 ohms per centimeter.