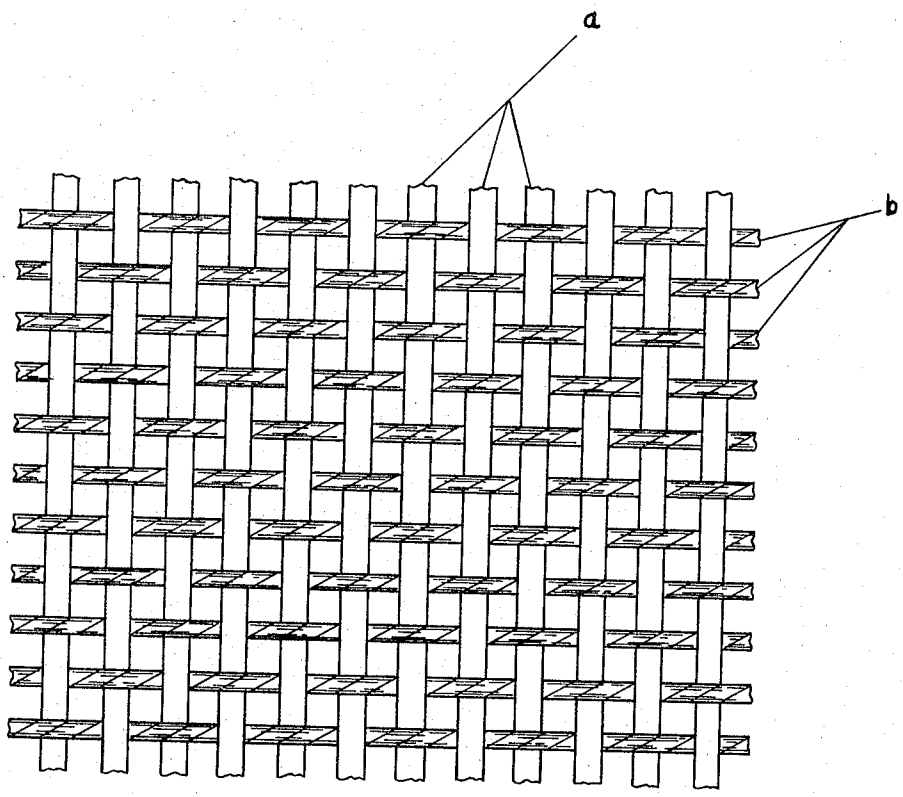
May 2, 1967 V. J. DIONNE 3,317,366

WOVEN POLYESTER CARPET BACKING AND TUFTED CARPET INCORPORATING THE SAME

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WOVEN POLYESTER CARPET BACKING AND TUFTED CARPET INCORPORATING THE SAME

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8 Claims. (Cl. 161—66)

This invention relates to textile fabrics and it is especially concerned with woven fabrics which are suitable for use as primary backing fabrics for tufted carpets.

Heretofore, the principal primary fabric for tufted carpets has been woven jute which is inexpensive and adds body thereto. Several problems arise when such backing material is tufted to form a carpet. Jute fiber is coarse, non-uniform in cross section, and relatively inflexible. Thus tufting needles which strike the jute yarn are frequently deflected. Needle deflection frequently results in damage to the needle and irregularities in the surface of the pile. In addition, jute is subject to shrinkage through exposure to moisture during processing, viz., washing and dyeing, and after being laid. It is frequently necessary to stretch jute backed carpets after they have been in use in order to restore their original dimensions. This is especially a problem with wall-to-wall installation where slight shrinkage is unsightly.

Furthermore, jute backing does not accept the dyes normally used in dyeing the carpet pile. As a result, there are noticeable differences in shade between the pile and the backing material. Since the backing material is somewhat visible through the pile, a noticeable difference in shade between the backing fabric and the pile detracts from the appearance of the carpet. This noticeable appearance of the backing through the pile is known as "grinning" in the trade.

It is the principal object of this invention to provide a backing fabric for tufted carpets which is substantially dimensionally stable to moisture and heat.

It is also an object of this invention to provide a tufted carpet backing fabric which substantially reduces needle deflections.

It is another object of this invention to provide a tufted carpet primary fabric which can be easily dyed to substantially the same shade as the pile of the carpet in order to prevent grinning thereof.

Other objects and advantages of the invention will become apparent to those skilled in the art from the following description and drawing.

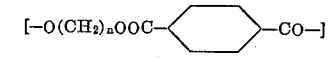
Unexpectedly, I have found that the aforesaid objects can be attained by using as tufted carpet backing a woven fabric comprised of substantially flat polyester monofilaments in the warp and polyester multifilament yarn in the weft, as illustrated in the appended drawing in which (a) depicts the warp monofilament and (b) depicts the weft yarn of the fabric.

The use of smooth, slippery polyester monofilaments in the warp virtually eliminates needle deflection since they are able to shift easily with little resistance when the needle strikes near the edge; or, if struck in the center, a monofilament is easily pierced without deflection of the needle. By virtue of its greater strength, fewer strands of the polyester monofilament are required to cover the same area without sacrifice of strength. For instance, I have found that about ten strands of polyester monofilament will replace twenty-four strands of jute.

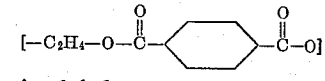
The polyester backing fabric and the pile may be dyed to substantially the same shade in a single or double bath dyeing operation, depending on the fiber or fibers used in the pile. In addition, spun dyed polyester fibers and monofilaments of the desired shade may be used.

Thermal stability is necessary since a rubber latex or other heat-vulcanizable adhesive must be applied to the back surface of the primary fabric after tufting in order to lock the tufts in place. Polyamide and polyolefin fibers, for example, shrink at the curing (vulcanizing) temperature of the rubber latices which are generally used in the carpet trade (about 260° F. or more). Although the so-called "cold curing" latices which cure at much lower temperatures could be used, they are more expensive and the curing time is too long for economical operation. The curing period for a given latex is a time-temperature relationship, thus it is preferable to cure for a shorter period of time at a high temperature.

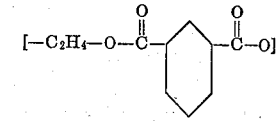
The polyesters and co-polyesters used in practicing the invention comprise fiber forming polycondensation products of one or more aromatic dicarboxylic acids with one or more aliphatic, alicyclic or aromatic glycols having melting points about 260° F. Suitable polyesters which may be used in practicing the invention are the polyalkylene terephthalates produced in accordance with U.S. Patent No. 2,465,319 to Whinfield et al. of Mar. 22, 1949. These polymeric linear terephthalic esters are composed of recurring structural units of the formula:



wherein n represents an integer within the range of 2 to 10. Copolyesters composed of linear molecules of high average molecular weight in which two kinds of repeating units, ethylene terephthalate:



and ethylene isophthalate



are distributed at random along the polymer chain, as disclosed in U.S. Patent No. 2,965,613 to Millone et al. of Dec. 20, 1960 may be applied to the invention.

Another co-polyester which may be used in practicing the invention is a blend of 30/70 cis-trans poly (1,4-cyclohexylenedimethylene terephthalate) which is sold by Eastman Kodak Co. under the trademark "Kodel."

The polyester yarns and monofilaments are spun, drawn and heat set by the conventional processes disclosed in the prior art.

The size of the monofilaments used in the warp of the fabric may be varied according to the pile which is to be applied. Likewise, construction of the weft yarn as to denier, twist, and ply and cable construction may be varied. Although continuous multifilament polyester yarn may be used in the weft, a less slippery spun polyester yarn is preferred in order to better maintain the shape of the fabric before and during tufting. The weft yarn preferably may be formed by plying together several polyester strands. The optimum size and construction of the monofilaments and weft yarns may be determined readily by simple experimentation. Obviously, the looseness of the weave may be varied according to the gauge of the tuft.

The following example is given by way of illustration without limitation as to the scope of the invention.

A backing fabric was woven comprised of 3 x 60 mm. polyethylene terephthalate polyester monofilaments in the warp and weft yarns consisting of three plies of conventionally spun polyester yarn having a cotton count of 10 in the single plies, and twists of 11 turns per inch Z in the singles and 9½ turns per inch S in the plied yarn. The polyester of the weft yarn was a copolyester of 85/15

polyethylene terephthalate and isophthalate units distributed at random along the polymer chain. The backing fabric was tufted with 1½ run 8 gauge wool pile to form a carpet. Rubber latex was applied to the back of the carpet, and it was cured at 260° F. The resulting carpet was substantially stable to aqueous and thermal treatment.

It will be understood that the term "spun" yarn includes yarn produced from fibers by a combination of drawing or drafting and twisting applied to prepared fiber masses such as rovings, or the formation of a yarn from filaments by the combination of cutting or breaking together with drafting and twisting. In carrying out the present invention it is more practical to use spun polyester yarn produced by the conventional method of spinning, since spun yarn produced by the direct spinning method results in yarn which is subject to excessive shrinkage. However, when direct spun yarn is subjected to subsequent heat stabilization, it may also be used in the carpet backing.

The term "yarn" is understood to include continuous strands of textile fibers or filaments in a form suitable for weaving which may include a number of fibers twisted together, a number of filaments laid together without twist, or a number of filaments laid together with more or less twist.

Modifications of this invention will be apparent to those skilled in the art, and it is intended to cover all modifications and variations coming within the scope of the appended claims.

I claim:

1. A tufted carpet consisting of a woven backing fabric having on one side a yarn pile tufted thereto and on the other side a coating of heat-cured latex, wherein the woven backing fabric is substantially dimensionally stable to moisture and to temperatures up to 260° F. and consists of a warp of substantially flat polyester monofilaments and a filling of multi-fiber polyester yarns, said polyesters being members of the group consisting of polyethylene terephthalate, a random copolymer of ethylene terephthalate and ethylene isophthalate, and poly(1,4-cyclohexylenedimethylene terephthalate).

2. The tufted carpet of claim **1** wherein at least one of the polyesters is polyethylene terephthalate.

3. The tufted carpet of claim **1** wherein at least one of the polyesters is a random copolymer of ethylene terephthalate and ethylene isophthalate.

4. The tufted carpet of claim **1** wherein at least one of the polyesters is poly(1,4-cyclohexylenedimethylene terephthalate).

5. A woven fabric backing for tufted carpets substantially dimensionally stable to moisture and to temperatures up to 260° F., said woven fabric consisting of a warp of substantially flat, saturated aromatic polyester monofilaments and a filling of multi-fiber saturated aromatic polyester yarns.

6. The woven fabric of claim **5** wherein at least one of the saturated aromatic polyesters is polyethylene terephthalate.

7. The woven fabric of claim **5** wherein at least one of the saturated aromatic polyesters is a random copolymer of ethylene terephthalate and ethylene isophthalate.

8. The woven fabric of claim **5** wherein at least one of the saturated aromatic polyesters is a poly(1,4-cyclohexylenedimethylene terephthalate).

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