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MASATOSHI SAKAMOTO ET AL

3,520,762

PILE FABRIC

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FIG. 1

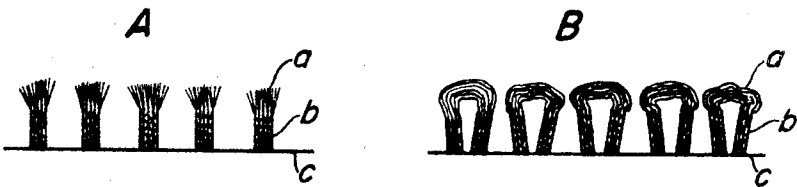


FIG. 2

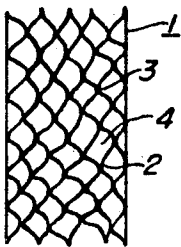
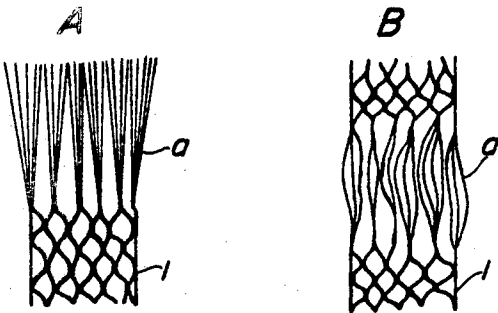


FIG. 3



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PILE FABRIC

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3 Claims

ABSTRACT OF THE DISCLOSURE

Pile fabric comprising split fiber reticulate yarns as pile yarns in which single filaments in the split fiber reticulate yarns are unknotted by fraying the upper portions of the extreme points of the pile yarns while retaining reticulate structure of the split fibers at the parts near the roots thereof. This pile fabric is suitable for use in carpets, rugs and pile cloths for their having good foot touch, which is rich in feeling and is excellent in stiffness as well as compressible characteristic.

This invention relates to a pile fabric having novel piles, in which split fiber reticulate yarns are used as pile yarns. Pile fabrics of this invention have good compressible characteristic by which piles can be maintained effectively even under several conditions for use for a long period of time. Furthermore, they are the improved pile fabrics which are also excellent in feeling of the surface thereof and have good foot touch as a whole.

Such pile fabrics are suitable for such uses as in carpet, rug and chair sheet having cut or loop piles. Needless to say, pile fabrics of this invention can be prepared by applying thereto the same weaving process as in common pile fabrics or tufting process as in base fabrics, however, they are woven using split fiber reticulate yarns and are characterized in that they have unique shape and form of piles in the pile sheet.

In imparting stiffness and good compressible characteristic to piles of woven pile fabrics, an attempt has heretofore been known to conduct weaving or tufting by use of twisted multi-filaments or spun yarns and to subject only the extreme points of loops or cut piles to fraying using a brush roller or the like while retaining twists at the bottom portions of piles, thereby to provide bends and curves at the bottom portions of piles. In a process of fraying the extreme points of the multi-filaments or spun yarns, however, fraying effect thereof is extended over up to the bottom portions of said multi-filaments or spun yarns, whereby sufficiently satisfactory results cannot be obtained due to loosening of the convergencies planned by means of twists.

Accordingly, in spite of such attempt, pile fabrics improved in their compressible characteristic have hitherto not been obtained.

An object of this invention is to improve the properties such as stiffness, compressible elasticity and the others by strengthening convergencies of the bottom portions of piles.

A further object of this invention is to provide pile fabrics by using split fiber reticulate yarns, which have piles having durability and are excellent in foot-touch feeling and surface feeling.

A still further object of this invention is to provide inexpensive pile fabrics having piles of from less than about 20 mm. to several mm. in general, of which the properties as manufactured goods such as carpets, rugs, chair cloths and the like have been improved as identified above.

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The essence of this invention resides in the point that the split fiber reticulate yarns having knots between the individual monofilaments thereof as pile yarns. The pile fabric of this invention is characterized by the fact that the individual filaments of the extreme point of the pile portions are splitted, and moreover the individual monofilaments of the pile yarns have mutually a reticulate structure formed by knots between them. The characteristics of the pile fabric of the present invention are illustrated concretely below with reference to the accompanying drawings.

In the drawings, FIG. 1 is a schematic view, wherein A shows cut-piles and B shows loop-piles.

FIG. 2 is a view showing schematically the split fiber reticulate yarn used as a pile yarn in this invention, particularly showing the reticulate structure of the split fiber reticulate yarns when spread out at right angles with the yarn axis.

FIG. 3 shows the partly frayed split fiber reticulate yarns, wherein A and B schematically show the examples of said yarns frayed at the extreme point and intermediate point thereof, respectively.

The split fiber reticulate yarns used in this invention may suitably be prepared even using any of known macromolecular materials. Without any limitation, splitting process of said yarns may be any of the processes providing a reticulate structure thereon, however, a splitting method by which split length can carefully be controlled is most advantageously applied thereto (Seni Kogyo, vol. 23, No. 15 (1967)).

That is, such split fiber reticulate yarn 1 as exemplified in FIG. 2 is a preferred example. In said figure, 2 is a monofilament constituting the split fiber yarn, 3 is a knotted point, and 4 is a mesh of net. Furthermore, a distance between a knotted point and adjacent knotted point thereto is a split length. In this invention, a split length of the pile fabric to be manufactured is preferably shorter than its pile length. As shown in A and B of FIG. 1, a split length has need to be less than a length of the portion of the pile projected from the base cloth. This is clearly understood in view of the object to impart compressible characteristic to the pile by retaining a reticulate structure in the lower portion of said pile.

Manufacturing of the pile fabric of this invention is conducted by the process comprising the steps of preparing cut or loop-pile fabric, in which the aforesaid split fiber reticulate yarns are used as pile yarns, according to weaving or tufting process or the others, and subsequently beating or combining only the upper portion of the piles according to well-known method by brushing or analogous one, whereby the fibers are frayed by rupturing the reticulate structure thereof.

The pile fabric thus manufactured has loops formed on woven material or base cloth *c* as shown in FIG. 1 of which the extreme points are frayed as shown by *a* and the portion near the root of the pile *b* has a reticulate structure. The structure of the portions extreme point and near the root of the cut pile and loop pile of this invention are shown, as enlarged views, in A and B of FIG. 3, respectively. In this invention, length of the frayed portions of the extreme points of the piles is suitably less than 10 mm., preferably less than 5 mm. In practice, however, the above length has need to be selected arbitrarily according to pile density, pile length and desired feeling of the pile fabric to be manufactured. When a length of the portion near the root of the pile is less than one half of the pile length, stiffness, of the pile thereby obtained is ineffective in improving compressible elasticity. On the one hand, as regards surface feeling and foot-touch feeling, the above length is determined within the aforesaid range taking such properties as feeling and covering.

Such woven pile fabric as mentioned above has a soft

surface feeling with enhanced bulkiness, which is a pile fabric excellent in stiffness due to reticulate knots in the portions near the roots of the piles and in foot-touch feeling as well as in compression recovery. Furthermore, because of reticulate knots present in the portions near the roots of the piles, besides the aforesaid properties, the above pile fabric is extremely less in shedding of pile fluffs and has an improved anti-pilling property, which is found to be a pile fabric excellent in durability as a whole. The split fiber reticulate yarns used in this invention may be of any of those subjected to crimp processing, and such yarns rather provide further better bulkiness and compression recovery.

EXAMPLE 1

Cut-pile carpet having pile length of 9 mm. was prepared by weaving by use of high density polyethylene split fiber reticulate yarns having the total deniers of 1400, average monofilaments denier of 30 and split length of 5 mm. As pile yarns, and of base cloth in which cotton yarns are used. In finishing process step, only the individual portions of 4 mm. of the pile yarns from the upper end thereof were beaten and combed with a blushing machine equipped with a brush roller made of steel wires to obtain a woven pile fabric having knots in the portions near the roots of the piles. Compressible characteristic, a part of the properties of the pile carpet thus obtained is shown in the following table.

TABLE		
	Example 1	Control
Compression rate (percent)-----	58	64
Compressible elasticity (percent)-----	94	89

The control denoted in the above table was a pile carpet obtained using the same material as in Example 1 except that the full length of the piles were beaten and combed in such a manner that reticulate structure may not be retained in the portions near the roots of the piles. The compression rate as denoted in the table is to show an extent of the piles compressed as measured on the basis of the original height of the piles, and compressible elasticity is a value to show an extent of recovery of elasticity of the piles as measured on the basis of the amount of compressed piles. Load of compression is 250 g./cm.².

As is seen in the above table, the present example shows low compression rate and high compressible elasticity as compared with the control, and therefore it is indicated that the present example provides a carpet having stiffness with good compression recovery. In fact, the carpet obtained according to the present example was found to be a carpet rich in bulkiness and excellent in feelings with good compression recovery as well as with stiffness.

EXAMPLE 2

Split fiber reticulate yarns subjected to stuffer box crimping processing were prepared from film uniaxially drawn using polypropylene as a raw material, which have the total deniers of 2,500, average monofilaments denier of 30 and split length of 5 mm. The thus obtained split fiber reticulate yarns were tufted as pile yarns on a twilled jute foundation cloth of 9 oz./yd.². Tufting was conducted with the conditions of gauge of 3/32 in. and stitch of 7 times/in. to obtain a loop pile fabric having piles of 13 mm. in height and of 450 g./m.² in amount. The individual portions of 5 mm. from the upper end of the piles of the thus obtained pile fabrics were splitted by brushing so as to retain a reticulate structure in the respective portions near to the roots of the piles to obtain a pile fabric in accordance with the present invention. On the other hand, a control was prepared by brushing the piles up to the portions near to the roots of said piles. The same manner

as in Example 1 was repeated in the measurement of compressible characteristic using compression load of 500 g./cm.² to obtain the following result.

	Pile cloth of this invention	Pile cloth having piles splitted up to roots	Pile cloth without being splitted
Compression rate (percent)-----	48	55	46
Compressible elasticity (percent)---	58	51	60

The pile fabric of this invention obtained in the present example was verified to have good compressible characteristic as well as very good durability in the experiments thereof in practical uses. Furthermore, the surface feeling, covering property and foot-touch feeling of the pile fabric of this invention were found to be satisfactory. In contradistinction thereto, the pile fabric in which the whole portions of pile were frayed was found to be inferior in compressible characteristic, and the pile fabric in which the piles were not frayed was found to be satisfactory in compressible characteristic, but was found to have bad covering property and poor feeling as well as foot-touch feeling.

EXAMPLE 3

Tuftings were repeated using the same split fiber reticulate yarns and the same conditions as in Example 2 except that height of the individual piles was 20 mm. to obtain loop-pile fabrics. The portions of 5 mm., 10 mm., and 15 mm. from the upper end portions of the piles of the thus obtained pile fabrics were frayed respectively by brushing to compare surface feeling, stiffness, foot-touch feeling and appearance thereof with one another. Those having fraying of 5 mm. and 10 mm. were found respectively to be excellent in stiffness, foot-touch feeling as well as appearance, which were all verified to have excellent recovery in the tests of practical uses. On the other hand, that having frayed length of 15 mm. was found to be good in feeling and bulkiness, but to be poor in stiffness and recovery of elasticity with considerable changes in appearance according to the tests of practical uses.

What we claim is:

- 1. A pile fabric comprising pile portions constituted by split fiber reticulate yarns, reticulate structures in the individual portions of the end points of said piles being ruptured and frayed, and having structures of reticulate knots of the aforesaid split fiber reticulate yarns in the individual portions near the roots of the piles.
- 2. A pile fabric according to claim 1, wherein the pile fabric comprises piles selected from the group consisting of loop and cut-piles, and has said piles of from 5 to 20 mm. in length.
- 3. A pile fabric according to claim 1, wherein the frayed portions of the piles are at most less than one half of the original loop length.

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