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(54) **Flooring article**

(57) A flooring article (100) is provided, having a rubber or polymeric backing layer (80) and a textile upper surface, whose pile is comprised of combination yarns (40) in which a monofilament yarn (10) is intertwined with other fibers (12) before being incorporated with a plurality

of other yarn plies (22). The monofilaments (10) provide scraping functionality to the flooring article (100) and are secured within the mat structure by being entwined with other fibers (12) before twisting with other yarn plies (22). Preferably, the fibers (12) that are not monofilaments are made of cotton for improved absorbency.

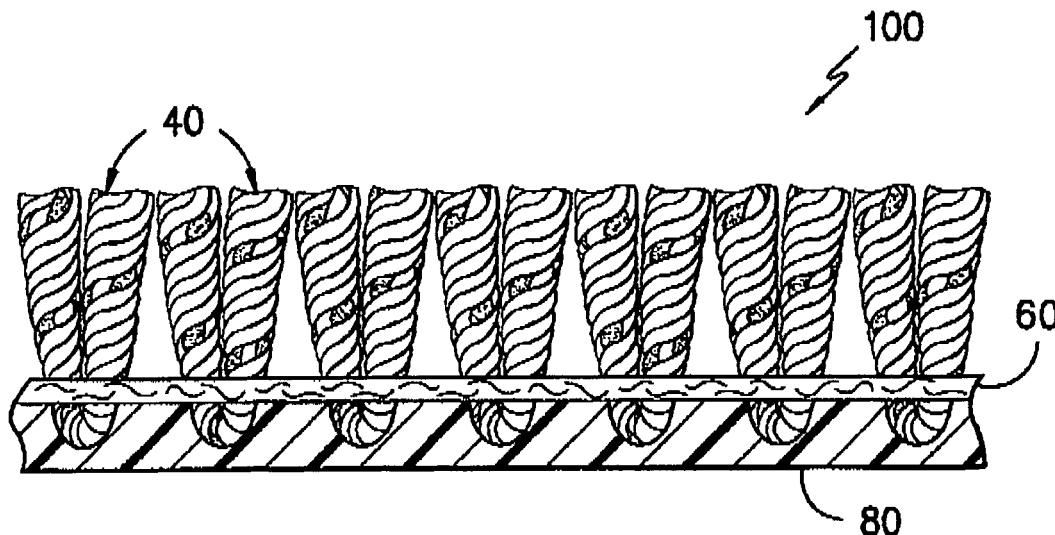


FIG. -3-

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a flooring article. In particular but not exclusively it relates to a mat, for example a dust control mat of the type normally placed at the entrances of buildings to remove dirt and moisture from the feet of pedestrians, and having a textile pile surface containing multi-fiber yarns, where at least one component is a monofilament, and a rubber or polymeric backing material. The primary function of the multi-fiber yarns, especially when made of cotton, is to provide absorbency, while the monofilament components provide scraping functionality.

[0002] A problem with mats of this general kind is that the monofilament fibers tend to pull out of the backing during use or laundering, thus reducing the deaning efficiency of the mat and spoiling its appearance. It is an object of the present invention to provide a flooring article that mitigates this problem and/or that provides other advantages over existing flooring articles.

[0003] According to a preferred embodiment of the invention, the monofilament is intertwined by spinning with another fiber to form a mixed yarn ply before being twisted with a plurality of other yarn plies to form a combined yarn. When such combined yarn is tufted into a substrate and backed with a backing material the monofilament yarn is not pulled out of the flooring article during use or laundering.

DEFINITIONS

[0004] For the sake of clarity, we define a filament as a continuous single strand such as a monofilament. A fiber is a disorganized staple fibre, which is suitable for spinning into a yarn or yarn ply (a component of a yarn). Spinning is organising and transforming fibre into yarn or a yarn ply. A monofilament is a single filament, which is usually relatively coarse. Finished yarn is the combined bundle of yarn plies and filament(s), which are usually combined by twisting. The finished yarn may contain a multitude of yarn plies.

BACKGROUND

[0005] The present product is an improvement to a class of flooring articles having a pile upper surface and a durable, resilient backing, typically made of rubber or a polymeric material. Previously, others have included monofilaments as part, or all, of the pile upper surface of a flooring article, as described in the patent literature summarized below.

[0006] US Patents 4,820,566 and 5,055,333, both to Heine et al., describe a tufted carpet having a pattern made of alternating areas of fine denier fibers and coarse denier fibers. Preferred patterns are checkerboards and stripes. The coarse denier fibers are effective at removing

and storing dirt and other particles from the bottoms of shoes. However, these constructions are not entirely satisfactory, because the coarse denier fibers tend to slip out of the tufting substrate during use and laundering and because the mats have a harsh feel underfoot due to the repeated areas of coarse fibers.

[0007] US Patent 5,010,723 to Wilen teaches a combination yarn made of two or more twisted cellulosic fibers, which are wound around a thermoplastic filament core.

[0008] The thermoplastic core is then melted to bind the yarn together and prevent untwisting. Wilen suggests that such a yarn would be useful for dust mops or floor mats. Thus, because the yarn nature of thermoplastic core is destroyed (by melting), the Wilen yarn does not provide the scraping functionality of the monofilament in the present yarn.

[0009] European Patent 0 804 898 teaches a door mat made of yarns having a stiffening core surrounded by polypropylene threads. The stiffening core is made of a nylon monofilament, which is used to provide resilience and wear resistance characteristics to the mat. Unlike the present yarn, which is produced by spinning the monofilament with other fibers, the yarn in the '898 Patent is produced by twisting the other (polypropylene) fibers around the core (nylon) monofilament. As a result, the monofilament yarn is not secured within the yarn and is susceptible to being pulled out. The present yarn overcomes this problem as will be described herein.

[0010] US Patent 6,468,622 to Combs et al. teaches a dust control mat whose yarns are made of fine and coarse denier fibers that are twisted together. The coarse denier fibers are twisted with a fine denier fiber to produce a yarn, which is then tufted into a substrate to form a pile surface. Even with this construction where the coarse fiber is entwined with the fine fiber, the coarse fiber tends to shift and slip during use and/or laundering.

[0011] European Patent 0 863 241 teaches a mat in which temporary twist yarns are formed by twisting a number of single yarns (for example, 68) and a single monofilament, first separately and then together. The temporary twist yarn is twisted individually and then in conjunction with a second temporary twist yarn.

[0012] These repeated twisting steps increase the manufacturing complexity and costs associated with producing a combination yarn in which the monofilament component is secured.

[0013] As has been described, various approaches to providing a flooring article with abrasive characteristics have been tried. None of these efforts, however, have successfully created a flooring article in which the monofilament is durably secured throughout use and laundering. The present disclosure overcomes this shortcoming.

SUMMARY

[0014] According to a preferred embodiment of the invention, a flooring article is provided, having a rubber or

polymeric backing layer and a textile upper surface, whose pile is comprised of combination yarns in which a monofilament is intertwined by spinning with one or more fibers to create a mixed yarn ply before being twisted with a plurality of other yarn plies to form a finished yarn. The monofilaments provide scraping functionality to the flooring article and are secured within the mat structure by being entwined with other fibers into a mixed yarn ply before combining by twisting with other yarn plies. Preferably, at least some of the fibers that are not monofilaments are made of cotton for improved absorbency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a mixed yarn ply as used in a flooring article according to the invention;

Figure 2 illustrates a combination yarn as used in a flooring article according to the invention, and

Figure 3 is a sectional side view of a flooring article according to the invention.

DETAILED DESCRIPTION

[0016] As illustrated in figure 1, a monofilament 10 is entwined by spinning with one or more other fibers 12 to create a mixed yarn ply 20. In the illustrated embodiment, the monofilament 10 is entwined with just one other fiber 12 to create the mixed yarn ply 20. Alternatively, the monofilament 10 may be entwined with a plurality of other fibers 12 to create the mixed yarn ply 20.

[0017] As illustrated in figure 2, the mixed yarn ply 20 is then combined by twisting with a plurality of other yarn plies 22 to produce a combination yarn 40. In the illustrated embodiment, the mixed yarn ply 20 is combined by twisting with five other yarn plies 22 to produce the combination yarn 40. Alternatively, the mixed yarn ply 20 may be combined with more or fewer other yarn plies 22, preferably with between two and eight other yarn plies. In another alternative, more than one mixed yarn ply 20 may be combined with a plurality of other yarn plies 22 to produce the combination yarn 40.

[0018] As illustrated in figure 3, the combination yarn 40 is tufted into a tufting substrate 60, which is secured to a backing material 80 to form a flooring article 100. The tufting substrate 60 may for example be a non-woven fabric and the backing material 80 may for example be rubber or a suitable polymer material.

[0019] The present exemplary disclosure is thus directed to a rubber- or polymer-backed flooring article 100 having a pile upper surface. The pile surface is comprised of a plurality of combination yarns 40, in which at least one component of the yarn is a monofilament 10. The

monofilament 10 is entwined by spinning with one or more fibers 12 to create a mixed yarn ply 20. This mixed yarn ply 20 is then combined by twisting with a plurality of other yarn plies 22 to produce a finished combination yarn 40. The combination yarn 40 is then tufted into a tufting substrate 60, thereby creating a pile surface, which is secured to a backing material 80.

[0020] The monofilament 10 is preferably made of nylon, although other synthetic materials may also be used. The monofilament 10 preferably has a size in the range of 100 decitex to 1000 decitex, more preferably in the range of 250 decitex to 350 decitex, with a most preferred size of about 330 decitex.

[0021] The other fibers used in the combination yarns 40 described herein are comprised of one or more of the following fiber types, which include cotton, polyester, nylon, polypropylene, wool, acrylic, and rayon. Preferably, as mentioned above, the monofilament 10 is entwined by spinning with a fiber of one of the above types. Most preferably, the monofilament 10 is entwined by spinning with a cotton fiber.

[0022] The mixed yarn ply 20 - that is, the monofilament 10 entwined by spinning with one or more other fibers 12 - is then combined with a plurality of other yarn plies 22 to produce a combination yarn 40. In a first embodiment, the fibers of the other yarn plies 22 are of the same type as those entwined by spinning with the monofilament 10 in the mixed yarn ply 20. In a second embodiment, the other yarn plies 22 are made of one or more fiber types that are different from those used in the mixed yarn ply 20.

[0023] At least one other yarn ply 22 is combined with the mixed yarn ply 20. Preferably, from two to eight other yarn plies 22 are combined with the mixed yarn ply 20. More preferably, five other yarn plies 22 are combined with the mixed yarn ply 20 to make a six ply combination yarn 40. Other constructions are also possible: for example, two mixed yarn plies 20 may be combined with four other yarn plies 22. The resulting weight of the combination yarn 40 is in the range of 3000 decitex to 7000 decitex, with a preferred weight in the range of 4800 to 5200 decitex, and most preferably a weight of about 5000 decitex. The combination yarn 40 has a twist level of approximately 100 twists per meter.

[0024] The combination yarn 40 is tufted into a synthetic substrate 60, typically a nonwoven fabric. Although the nonwoven substrate is usually made of polyester, it could also be made of other fiber types as are known in the art. The finished weight of the tufted textile is preferably between 400 grams per square meter and 1000 grams per square meter, depending on the desired pile density in the finished product.

[0025] The fibers and plies used in the combination yarns 40 may be solution dyed or pre-dyed before spinning or twisting. The combination yarns 40 used in the tufted textile may be package-dyed before tufting or may be dyed once tufted. Alternatively, the tufted textile may be printed to enhance the aesthetic features of the flooring article. Such printing may be accomplished by digit-

ally controlled patterning equipment, by transfer printing, or by other methods known to those of skill in the art. It may also be desirable to dye the substrate a dark color (e.g., black) to minimize its visibility between the tufts during use.

[0026] The combination yarns 40 may also be treated to enhance their performance within the flooring article. For example, the yarns 40 may be treated with flame retardant chemicals, soil release agents, antimicrobial agents, anti-fungal agents, mildewcides, antistatic agents, and the like.

[0027] The tufted textile is attached to a backing material 60 to produce a finished flooring article. Backing materials useful for this purpose include vulcanized rubber, rubber granulate, latex, polyvinyl chloride (PVC), and any other materials known for dust control mats. The method of attaching the tufted textile to the backing material is dependent upon the backing material selected, but may include vulcanization, adhesive, extrusion, and the like.

[0028] While the tufted textile having combination yarns has been described for use in floor mats, it should be understood that the present textile is equally useful as a component of carpet tiles, area rugs, and broadloom carpeting, provided an abrasive scraping surface is desired.

[0029] The particular advantage of the present approach, that being to entwine the monofilament with another fiber by spinning prior to combining with other yarn plies into a plied combination yarn, is that this process of entwinement serves to anchor the monofilament into the backing. The combination yarn described herein is held in place in the backing both during use and during laundering. This structure provides long-lasting durability to the flooring article. Thus, the present mat represents a useful advance over the prior art.

Claims

1. A flooring article (100) comprising: a pile upper surface comprised of combination yarns (40) that are tufted through a tufting substrate (60) and a backing material (80) secured to said tufted substrate, wherein said combination yarns (40) comprise a mixed yarn ply (20) that is twisted with a plurality of other yarn plies (22), said mixed yarn plies (20) being made of a monofilament (10) that is entwined by spinning with another fiber (12).
2. The flooring article of Claim 1, wherein said monofilament (10) is made of nylon.
3. The flooring article of Claim 1 or Claim 2, wherein said plurality of other yarn plies (22) are made of fibers selected from the group consisting of cotton, polyester, nylon, polypropylene, wool, acrylic, and rayon.
4. The flooring article of any one of the preceding Claims, wherein said fiber (12) that is entwined with said monofilament (10) is selected from the group consisting of cotton, polyester, nylon, polypropylene, wool, acrylic, and rayon.
5. The flooring article of Claim 4, wherein said fiber (12) that is entwined with said monofilament (10) is a cotton fiber.
6. The flooring article of any one of the preceding Claims, wherein said backing material (80) is selected from the group consisting of vulcanized rubber, rubber granulate, latex, and polyvinyl chloride.
7. The flooring article of any one of the preceding Claims, wherein said combination yarn plies (40) have a weight in the range of from 3000 to 7000 decitex, preferably 4800 to 5200 decitex, and more preferably about 5000 decitex.
8. The flooring article of any one of the preceding Claims, wherein said combination yarn plies (40) have a twist level of about 100 twists per meter.
9. The flooring article of any one of the preceding Claims, wherein said tufted substrate (40,60) has a weight of between about 400 grams per square meter and about 1000 grams per square meter.
10. The flooring article of any one of the preceding Claims, wherein said fiber (12) that is entwined with said monofilament (10) and said plurality of other yarn plies (22) are of the same fiber type.
11. The flooring article of any one of the preceding Claims, wherein said monofilament (10) has a weight in the range of from 100 to 1000 decitex, preferably 250 to 350 decitex, and more preferably about 330 decitex.

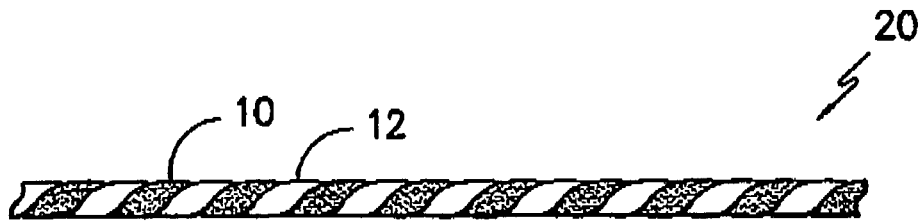


FIG. -1-

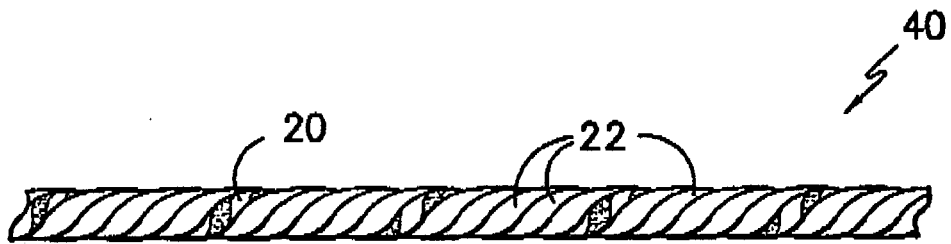


FIG. -2-

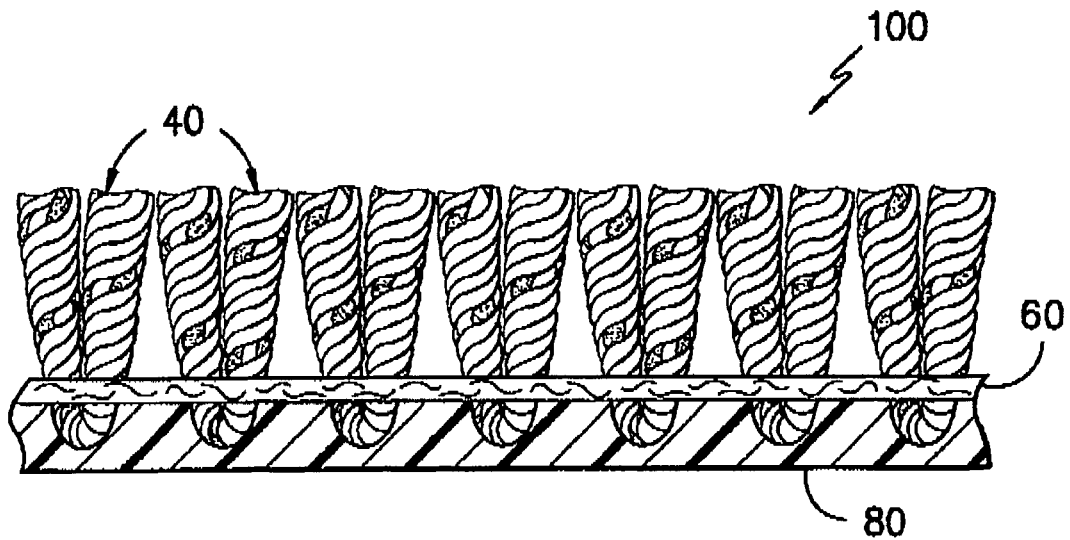


FIG. -3-

REFERENCES CITED IN THE DESCRIPTION

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