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CARPET YARN AND METHOD OF MAKING SAME

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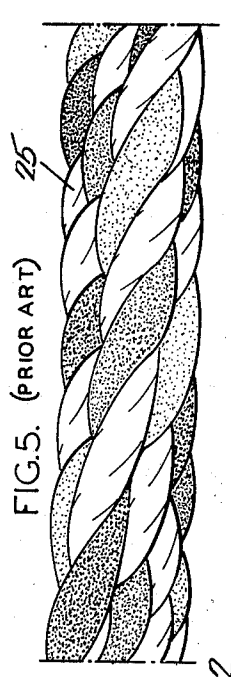

FIG. 5. (PRIOR ART)

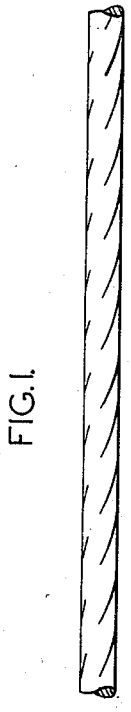

FIG. 1.

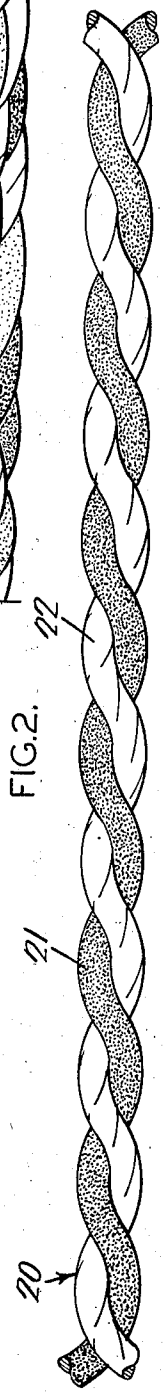

FIG. 2.

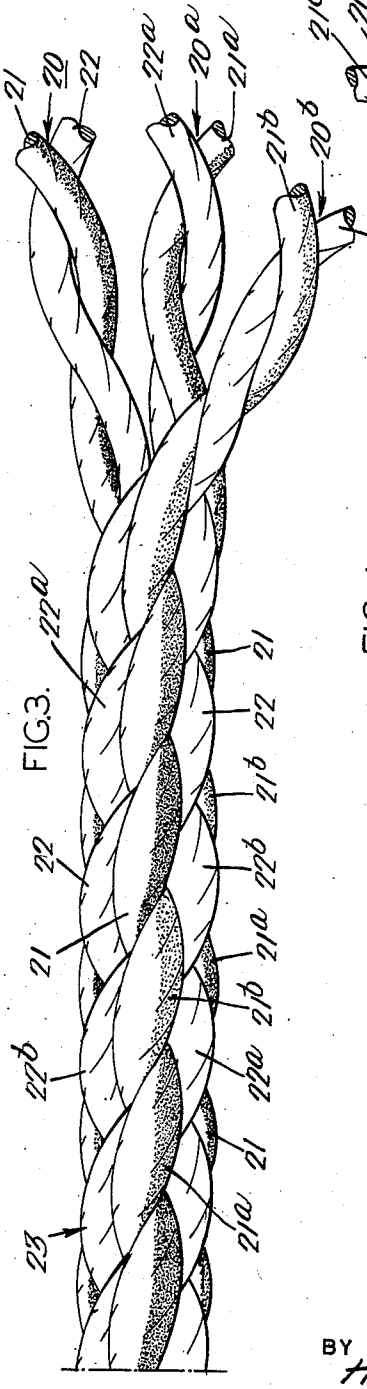

FIG. 3.

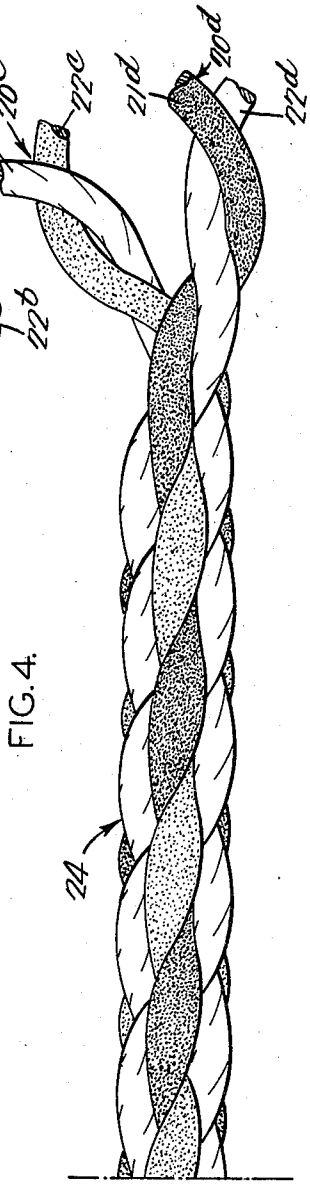

FIG. 4.

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CARPET YARN AND METHOD OF MAKING SAME

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11 Claims. (Cl. 57—139)

The present invention relates to the production of novel pile yarns and the like having a braided or plaited appearance and more particularly to the production of such yarns on a standard type of twisting machine instead of on the usual braiding machine.

Pile fabrics, such as carpets, employing yarns of the so-called "Moresque" type in the pile face are well known and popular. These yarns are normally made by plying together individual strands of different colors or color tones to produce a mottled or stippled effect in the pile fabrics made therefrom.

Past experience in the use of "Moresque" type yarns has indicated that there exists at least one serious problem tending to offset the value thereof in the production of pile fabrics. It has been found that often the plying operation in the production of "Moresque" type yarns, one colored strand may back off from the other and result in solid runs of the various colors in the yarn and subsequently in the resulting fabrics made therefrom. Such color runs are, of course, detrimental to the appearance of the finished fabrics, and should be eliminated.

The most positive method of eliminating the back-off of single strands requires braiding the strands to interlock them in the finished yarn in a position providing more uniform distribution of the colors. A pile fabric made from braided yarns would naturally have a substantially uniform distribution of colors and the desired mottled or stippled effect would be carried throughout, thus increasing the amount of commercially saleable fabric which could be obtained from a given amount of yarn. Braiding, however, is an expensive operation and requires a special type of machine and therefore is prohibitive from an economical point of view. Braiding also requires more stranded yarn than a twisting operation to produce the same length of finished yarn.

A primary object of the present invention is to produce a yarn of the "Moresque" type having the appearance of a braided yarn by twisting rather than braiding.

A further object of the present invention is to produce a yarn of the "Moresque" type wherein the strands are plied so as to substantially eliminate objectionable color runs in the finished yarn.

A still further object of the present invention is to produce a "Moresque" type yarn having a braided appearance and effect with a minimum quantity of yarn.

A still further object of the invention is to provide a plied or twisted yarn having a braided appearance.

These and other objects of the invention and the various features and details of the yarn and method for producing the same are more fully set forth hereinafter with reference to the accompanying drawing in which:

Fig. 1 is an elevation of a strand of singles yarn employed in the present invention;

Fig. 2 is an elevational view of a yarn formed as the result of an intermediate step in the process;

Fig. 3 is an elevational view of a yarn employing six singles made in accordance with the present invention;

Fig. 4 is a view similar to Fig. 3 showing a yarn made up of four singles in accordance with the present invention; and,

Fig. 5 is an elevation of the prior art yarn showing the undesirable effects which are eliminated by the present invention.

The present invention produces a yarn which has an appearance closely approximating the appearance of a braided yarn. The yarn is produced on a conventional twisting machine, and consists of a plurality of multi-ply yarns having a twist in one direction which are cabled or twisted together in the opposite direction.

In the illustrated embodiment of the invention, the individual strands or singles which make up the plied yarn are Z-twisted a suitable number of turns per inch to produce a stable strand, as indicated in Fig. 1. In the preferred form of the invention, two singles of this nature are plied together to form a two-ply yarn having an S-twist. When making a two-color yarn, each two-ply yarn is formed of a singles of one color, and a singles of another color. In Fig. 2, the singles of the one color are indicated by the reference character **21** and the singles of the other color is indicated by the reference character **22**. In the final step of the method, the two-ply yarn **20**, composed of the singles **21** and **22** respectively, is twisted with at least one other similar strand.

In Fig. 3, three two-ply strands are twisted together with a Z-twist. These strands are indicated at **20**, **20***a*, and **20***b*, the individual singles of the two-ply strands being identified by corresponding designations. With reference to the body portion of the yarn shown in Fig. 3, it should be noted that the strands **21***a*, **21***b* and **21** appear to be in substantial longitudinal alignment. It also appears that the strand **22** at the top of the figure is a continuation of the strand **22***a* below and to the left of the portion of the strand **22** at the top of the figure. Similarly, the strand **22***a* appears to be a continuation of the strand **22***b* at the left and below the intermediate strand **21**. This appearance lends a braided appearance to the twisted strand **23** composed of the plied yarns **20**, **20***a*, and **20***b*, although in actuality the yarn **23** is simply a twisted strand.

Fig. 4 illustrates a yarn **24** composed of four singles in the form of two two-ply yarns **20***c* and **20***d*. The yarns **20***c* and **20***d* are composed similarly to the yarn **20** and the singles of the yarns are indicated at **21***c* and **21***d* and **22***c* and **22***d*. The yarn **24** in Fig. 4 produces an appearance similar to the yarn **23** in Fig. 3.

It should be noted that in each of the yarns shown in Figs. 3 and 4, the singles of one color are in longitudinal alignment, but are spaced apart laterally of the yarn by the singles of the other color. Thus, at any given point along the length of the yarn, the colors of both the yarns **21** and **22** will be equally predominant. This is in contrast to the prior art yarn such as shown in Fig. 5, wherein the yarn **25** is composed of three two-ply yarns similar to the yarn **20**. These yarns are twisted together with a Z-twist, but as pointed out more fully hereinafter, does not fall within the range of the invention. The yarn **25** has contrasting singles yarn which are twisted in such a manner that the singles of one color produce transverse stripes by reason of the transverse alignment of correspondingly colored singles. Thus, at a given point along the length of the yarn, one color predominates in one portion of the yarn whereas another color predominates in the adjacent portion. When yarn such as shown in Fig. 5 is woven into a carpet or similar pile fabric, the yarn may expose only that portion which exhibits the color of one of the singles. If the adjacent yarns exhibit contrasting colors, the carpet produces the desired mottled or stippled effect. However, when the adjacent yarns exhibit the same color characteristics, the

fabric appears to have a solid run of color at the points where the two colors run together.

The present invention provides uniform distribution of the color by reason of the braided appearance in the yarn. To provide the braided appearance, it is necessary to maintain the ratio between the twist of the two-ply yarn and the twist of the final yarn below a certain minimum. In this respect it is noted that the value of twist given throughout is the number of turns inserted by the twisting machine without regard to the effect of untwisting when the yarn is plied or cabled in the opposite direction. It has been found that this minimum ratio is approximately 2 to 1. The preferred ratio is 2.25 to 1, although it has been found that the braided appearance is present when the ratio is as high as 11 to 1. The 2.25 ratio provides a yarn having sufficient strength and compactness, at the same time providing the equal dispersion of the color throughout.

The yarn shown in Fig. 3 of the drawing is composed of six strands of singles having 110 yards to the ounce with a 4.5 T. P. I. Z-twist. Pairs of the singles were twisted or plied together to form a two-ply yarn having a 5.5 T. P. I. S-twist. Three two-ply yarns of this character were then cabled together with a 2.5 T. P. I. Z-twist. Thus, the ratio of the plying twist to the cable twist is approximately 2.25 to 1 (5.5/2.5).

Substantially, the same effect is derived from other combinations, for example those listed below:

	Example 1	Example 2	Example 3
Singles	4.3 Z-twist	4.3 Z-twist	4.3 Z-twist.
Two-ply	3.0 S-twist	5.5 S-twist	9.0 S-twist.
Cable	1.3 Z-twist	2.4 Z-twist	4.0 Z-twist.

It is noted that each of the above ratios between the plying twist and the cabling twist is approximately 2.25. Other ratios produce an appearance similar to the braided effect shown in Fig. 3, but when the ratio falls below 2.0, the braided appearance disappears.

Fig. 4 shows a yarn made in accordance with the present invention in which two two-ply yarns are cabled together. The singles employed in this yarn were 110 yards to the ounce with a 4.5 Z-twist. Two such singles were plied together with a Z-twist of 5.5 turns per inch. Finally, the two-ply yarns were cabled together with a twist of two turns per inch. Thus, the ratio of the plying twist to the cabling twist is 2.25 (5.5/2.4). When this ratio is increased substantially, the braided effect is present but is less pronounced, whereas when this ratio is decreased substantially below 2.0, the braided effect disappears. Thus, the same relationship holds true for yarns composed of both two and three two-ply yarns cabled together.

The invention is not confined to the use of two-ply yarns in the cabled yarn, but other multi-ply yarns may be cabled together. For example when a three-ply yarn formed with a twist of 5.5 T. P. I. is cabled with a second three-ply yarn of the same twist, the cable twist being 2.4 T. P. I., the braided appearance is produced. It should be noted that the ratio in this instance is approximately 2.25 (5.5/2.4).

Although the invention has been particularly described with reference to yarns of contrasting colors, the braided effect is apparent when employing yarns of one color. Thus, the invention is not limited to the above illustrations, but changes and modifications may be made therein and thereto within the scope of the following claims.

I claim:

1. A cabled yarn comprising a plurality of substantially identical multi-ply yarns each having a twist of a given number of turns per inch in one direction, said multi-ply yarns being twisted together with a selected number of turns per inch in the opposite direction, until the exposed portions of the singles yarns are in substantial longitudinal alignment, thereby producing a braided appearance in the redoubled yarn.

2. The method of producing a yarn having the appearance of a braided yarn from yarn singles, comprising the steps of arranging said singles in groups, equally twisting a plurality of said groups of singles together to form a corresponding plurality of multi-ply yarns each having a given number of turns per inch in one direction, and equally twisting said plurality of multi-ply yarns together a given number of turns per inch in the opposite direction until a braided appearing cabled yarn is formed, the ratio of the turns of the multi-ply yarns to the turns of the cabled yarn being at least 2.0.

3. The method of producing a yarn having the appearance of a braided yarn from yarn singles each having a twist in one direction comprising the steps of pairing one of said singles with another of said singles having a contrasting color, twisting a plurality of said paired singles together to form a corresponding plurality of two-ply yarns having a given number of turns per inch in the opposite direction, and twisting said plurality of two-ply yarns together a given number of turns per inch in said one direction to form a cabled yarn, the ratio of the turns of the two-ply yarn to the turns of the cabled yarn being at least 2.0.

4. The method of producing a yarn having the appearance of a braided yarn from yarn singles each having a twist in one direction comprising the steps of pairing one of said singles with another of said singles having a contrasting color, twisting a plurality of said paired singles together to form a corresponding plurality of two-ply yarns having a given number of turns per inch in the opposite direction, and twisting said plurality of two-ply yarns together a given number of turns per inch in said one direction to form a cabled yarn, the ratio of the turns of the two-ply yarn to the turns of the cabled yarn being approximately 2.25.

5. A carpet yarn comprising a plurality of singles yarns each having a Z twist, a plurality of doubled yarns composed of substantially identical doubled yarns having an S twist said doubled yarns being formed from the said singles yarns, and a plurality of said doubled yarns being redoubled with a Z twist until the exposed portions of the singles yarns are in substantial longitudinal alignment with each other, thereby producing a braided appearance in the redoubled yarn.

6. A carpet yarn comprising a plurality of singles yarns each having a twist in one direction, a plurality of doubled yarns composed of substantially identical doubled yarns having a twist in the opposite direction said doubled yarns being formed from the said singles yarns, and a plurality of said doubled yarns being redoubled with a twist in the same direction as the singles yarns until the exposed portions of the singles yarns are in substantial longitudinal alignment with each other, thereby producing a braided appearance in the redoubled yarn.

7. A carpet yarn comprising a composite arrangement of uniform singles yarns in which the singles are given an equal and uniform twist in one and the same direction, at least two of these singles being doubled with an equal and uniform twist in the opposite direction, and at least two of said doubles being redoubled with an equal and uniform twist in the first direction, thereby forming a unitary twisted yarn with a braided appearance characterized by the absence of helical markings.

8. The method of producing a braided appearing carpet yarn comprising the steps of doubling two twisted singles yarns of substantially equal weight and twist in a direction opposite to the twist of the singles yarns, and redoubling at least two of the two-ply yarns with a twist in a direction opposite to that of the preceding twist until the exposed portions of the singles yarns appear as being substantially aligned longitudinally of the redoubled yarn.

9. The method of claim 8 in which each singles yarn has a Z twist, each doubles has an S twist, and the redoubled yarn has a Z twist.

10. The method of claim 8 in which the ratio of turns in the doubling step to the redoubling step is at least two.

11. The method of producing a yarn having the appearance of a braided yarn from yarn singles, comprising the steps of arranging said singles in groups, equally twisting a plurality of said groups of singles together to form a corresponding plurality of multi-ply yarns each having a given number of turns per inch in one direction, and equally twisting said plurality of multi-ply yarns together a given number of turns per inch in the opposite direction.

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