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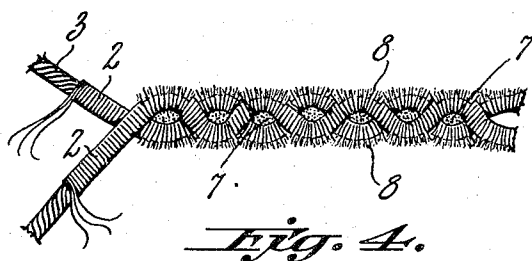
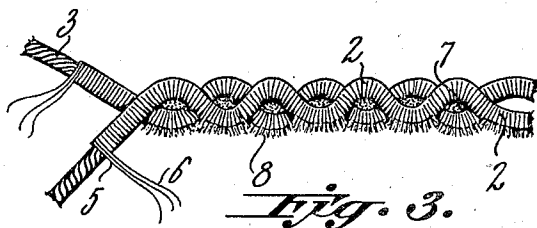
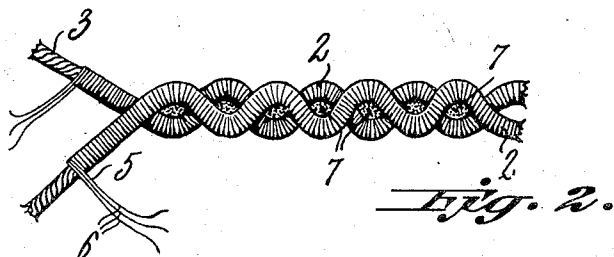
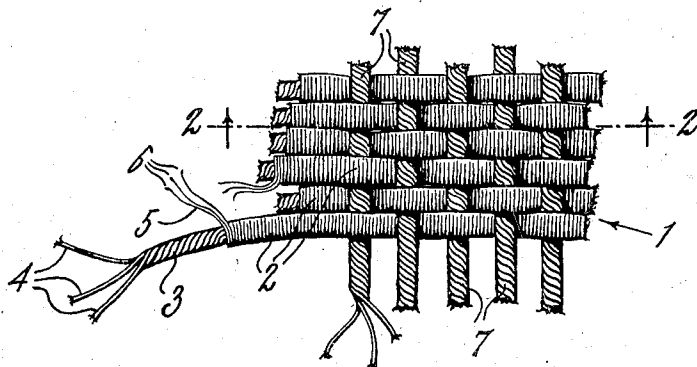
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FABRIC CONSTRUCTION AND METHOD OF MAKING

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Fig. 1.



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FABRIC CONSTRUCTION AND METHOD OF MAKING

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10 Claims. (Cl. 28—1)

This invention relates to a fabric construction and the method of making the same, more particularly to a fabric construction of increased wearing qualities.

5 In the usual types of textile fabrics ordinary wear or abrasion must be borne by those projecting portions of the yarns composing them which are exposed or appear at the fabric surface. Hence in such fabrics the same yarns, whether
10 singles, plied or cabled, must serve the double function of providing tensile strength for the fabric and resisting abrasive wear, with the result that as the fibers are worn through, the yarns become weakened and the strength of the fabric
15 itself suffers.

An object of the present invention is to provide a textile fabric with improved wearing qualities.

Another object is to provide such a fabric in which yarn embodied therein is protected against
20 wear by a long-wearing covering.

Another object is to provide a woven fabric in which one or both of the warp and weft are protected against wear by a textile covering having outwardly directed fiber ends.

25 Still another object is to provide a method for producing the fabric.

Other objects will appear from the appended specification and drawing, in which latter:

30 Figure 1 is a broken away plan view, on an enlarged scale, of a fabric embodying the invention;

Figure 2 is a section on the line 2—2 of Fig. 1;

Figure 3 is a similar section to Fig. 2 but showing the fabric at a later stage; and

35 Figure 4 is a view similar to Fig. 3, but slightly modified.

In carrying out the invention a core yarn is provided, which may be of the size ordinarily used in making fabrics of the character desired, or it
40 may be of slightly smaller gauge,—and in either case being of substantial body and strength. This core yarn is then closely helically wrapped with a relatively firmly twisted covering yarn, which yarn preferably is of smaller gauge. The
45 covering yarn may consist of a single end, but for speed and economy there may be used instead a plurality of ends wound on in parallel.

The covered core yarn is then incorporated in the desired fabric in such manner as to dispose
50 its covering yarn on one or both surfaces of the fabric, that is, so that the covering yarn will take the wear or abrasion caused by ordinary use. As the exposed surface of the covering yarn is subjected to wear or use, the fibers of the yarn
55 are worn or rubbed through at their sides until

ultimately the covering yarn is severed, and when this occurs the severed ends of the covering yarn untwist and straighten so that the severed fiber ends extend in a generally outward direction while the bights of the severed fibers remain anchored in the fabric, thus producing on the face of the fabric a short pile effect. Wear on the fabric as a whole will thereafter be applied only to the ends of the severed fibers, and the core yarn will be protected, remaining intact. It follows that the fabric produced is possessed of greatly improved long-wearing qualities.

15 Instead of depending upon wear in use to cause severing and fraying of the covering yarn, the fabric may be at once superficially treated in such a manner as to cause severing and fraying of the covering yarn, as by running the fabric over a revolving sand roll, or through a napping or shearing machine.

20 In either case it is seen that abrasive wear upon the surface results in no decrease in the strength of the fabric, since the tensile stress-resisting core yarns remain intact.

25 Either the core yarn or the yarn used for wrapping the core, or both, can be single, plied or cable twisted or any combination thereof. Either the core or its wrapping yarns can be made of any suitable textile materials, such as cotton, wool, silk, rayon, asbestos, glass, or any of the bast fibers such as flax, jute, hemp, ramie, sisal, etc.
30 The covered yarn may be applied to the making of any of the usual textile fabrics where it is desired to have an increased wear surface, such as knitted or woven fabrics. In the case of woven fabrics, the covered yarn may be used in either
35 the warp or weft or in both warp and weft.

In the case where the fabric is not firmly woven, it will be necessary to use an adhesive to prevent displacement or removal of the fibers of the covering yarn, after such yarn has been severed
40 either by use or by an abrading or tearing treatment. Any suitable material, such as rubber latex, aqueous dispersions of rubber, glue, starch, gums, resin, etc., may be used as the adhesive.
45 In the case where the fabric is to be provided with the wear resisting surface on one side only, the fibers may be held in place by applying the adhesive to the other side or back of the fabric. Instead of applying the adhesive to the back, it
50 may be applied to the core yarn either at the time of applying the covering yarn or previously thereto, and it will be necessary to use this latter method of applying the adhesive to the core of the covered yarn in cases where the wear resist-
55

ing surface is to be provided on both sides of the fabric.

Referring to the accompanying drawing, illustrating as one embodiment the application of the invention to a woven fabric, the numeral 1 designates the fabric generally, the warp yarn is designated 2, and its core 3, the latter consisting of three yarns 4. In the embodiment shown, the helical covering 5 consists of three ends 6 of relatively finer gauge yarn, which should be firmly twisted, and the covering should be closely and compactly applied, that is, with a short pitch. At 7 there is shown the weft or filling yarn, which in the present case is of smaller gauge, so that the crimps of the covered warp yarn will be exposed at both surfaces of the fabric.

In Fig. 2 there is shown a section of the fabric after weaving, and as before pointed out, this fabric may then be applied to various purposes, and in use wear or abrasion will in time sever the fibers and yarns of the covering yarn so that the severed yarn ends will untwist and spring away from the core yarn and form small tufts of fibers, the ends of which fibers project generally outwardly from the fabric surface. In this manner the fiber ends will take the ordinary wear or abrasion and thus greatly prolong the life of the fabric. As before pointed out, the severing and untwisting of the yarns of the covering may be produced by sanding or by otherwise abrading the fabric surface. In Fig. 3 there is shown a fabric with cover yarn frayed on one side, while Fig. 4 shows a slightly modified form in which ordinary wear or intentional abrasion has severed and frayed out the yarn ends of the covering on both sides of the fabric.

The following are specific examples of the application of the invention:

EXAMPLE I

Covered yarn—all cotton

Core.....	16's/3 (17.9 "S" or left-hand twist).
Wrapping yarn.....	3 ends of 36's single.
Wrappings per inch.....	32.6 ("Z" or right-hand wind).
Length of wrapping yarn to cover 1 yd. of core yarn.....	86.5 inches.
Weight distribution:	
Core.....	48.5%.
Cover.....	51.5%.

Fabric construction—all cotton

Ends per inch (covered yarn).....	39.
Picks per inch.....	20.5.
Warp yarn.....	16/3 core, covered with 3—36's/1.
Filling yarn.....	21/3 (16.2 "S" or left-hand twist).
Gauge fabric.....	.0375 inch.
Weight, ozs./sq. yd.....	14.1.
Strength—warp (1" x 3" grab test).....	183 lbs.
Strength—filling (1" x 3" grab test).....	76 lbs.

EXAMPLE II

Covered yarn (cotton core, worsted covering)

Core yarn.....	18's/3 cotton (11 "S" twist).
Wrapping yarn.....	3 ends of 1/45's worsted.
Wrappings per inch.....	29.4 ("S").
Length of wrapping yarn to cover 1 yd. of core yarn.....	86.5 inches.
Weight distribution:	
Core.....	44.3%.
Cover.....	55.7%.

Fabric

Ends per inch (covered yarn).....	43.
Picks per inch.....	22.
Warp yarn.....	Worsted-covered cotton as described above.
Filling yarn.....	22's/3 (18 "S" twist).
Gauge.....	.036 inch.
Weight, ozs./sq. yd.....	13.6.
Strength—warp (1" x 3" grab test).....	180 lbs.
Strength—filling (1" x 3" grab test).....	83 lbs.

It will be seen that by the invention a greatly improved wearing property can be imparted to

fabrics of varied construction and materials. These fabrics may be of a character suitable for use as sheetings, table cloths, shirtings, suitings, ducks, etc. As an example, one suitable application is for the making of fabric uppers of fabric and rubber footwear, such as tennis or outing shoes. In such footwear, difficulty has been had in obtaining a balanced construction, i. e., one in which the fabric upper will have a longer life more closely approximating that of the rubber sole. The fabric of the present invention is a considerable advance in attaining the above desired end. The invention may also be applied in the making of coarser fabrics such as for use as rugs, carpets, mats, etc.

While a specific embodiment of the invention has been shown and described, it is obvious that modifications may be made therein, and it is not desired to limit the invention otherwise than as set forth in the appended claims and as required by the prior art.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The method of making a textile fabric which comprises covering a textile core yarn with a firmly twisted yarn arranged in closely helically disposed turns of low pitch, incorporating said covered yarn in a textile fabric with its cover exposed to surface wear, and breaking the fibers of said yarn covering and outwardly directing the broken fiber ends.

2. The method of making a textile fabric which comprises covering a textile core yarn with a finer gauge firmly twisted yarn arranged in closely helically disposed turns of low pitch, incorporating said covered yarn in at least one of the warp or weft of a woven fabric with its cover exposed to surface wear, and severing fibers of said yarn covering and outwardly directing the severed fiber ends.

3. The method of making a textile fabric which comprises covering a textile core yarn of at least moderate twist and substantial strength with a plurality of ends of a finer gauge firmly twisted yarn arranged in closely helically disposed turns of low pitch, incorporating said covered yarn in at least one of the warp or weft of a woven fabric with its cover exposed to surface wear, and superficially treating said fabric to dispose loosened fiber ends of said covering yarn outwardly of the fabric surface.

4. The method of making a textile fabric which comprises covering a textile core yarn with a twisted yarn arranged in closely helically disposed turns of low pitch, incorporating said covered yarn in a textile fabric with its cover exposed to surface wear, loosening and outwardly directing fiber ends of said covering yarn to thereby form a wear resisting layer on the fabric, and anchoring the fibers of said layer in the body of the fabric by an adhesive.

5. The method of making a textile fabric which comprises covering a textile core yarn with a twisted yarn arranged in closely helically disposed turns and uniting said yarns by an adhesive, incorporating said covered yarn in a textile fabric with its cover exposed to surface wear, and loosening and outwardly directing fiber ends of said covering yarn on each side of the fabric.

6. A textile fabric having incorporated therein a yarn having a textile core and a closely helically wrapped covering of firmly twisted textile fibers exposed on the fabric surface, portions of which covering fibers have severed free ends directed outwardly from the fabric surface.

7. A textile fabric having incorporated therein a yarn having a twisted textile core and a closely helically wrapped covering of a plurality of ends of firmly twisted textile yarn of finer gauge ex-
5 posed on the fabric surface, a part of the fibers of said covering textile yarns having severed free ends directed outwardly from the fabric surface.

8. A textile fabric having incorporated therein a yarn having a twisted textile core and a closely
10 helically wrapped covering of twisted textile fibers exposed on the fabric surface, and an adhesive disposed interiorly of the fabric and securing said fibers against removal.

9. A textile fabric having incorporated therein
15 a yarn having a twisted textile core yarn and a

closely helically wrapped covering of firmly twisted textile fibers, and an interposed adhesive securing said fibers to said core, a part of the fibers of said covering having free ends directed
5 outwardly from the fabric surface.

10. A woven textile fabric including in at least one of its warp or weft a yarn having a twisted textile core and a closely helically wrapped covering of firmly twisted textile fibers, and an ad-
10 hesive securing said fibers against removal, a part of the fibers of said covering having free ends directed outwardly from each surface of the fabric.

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