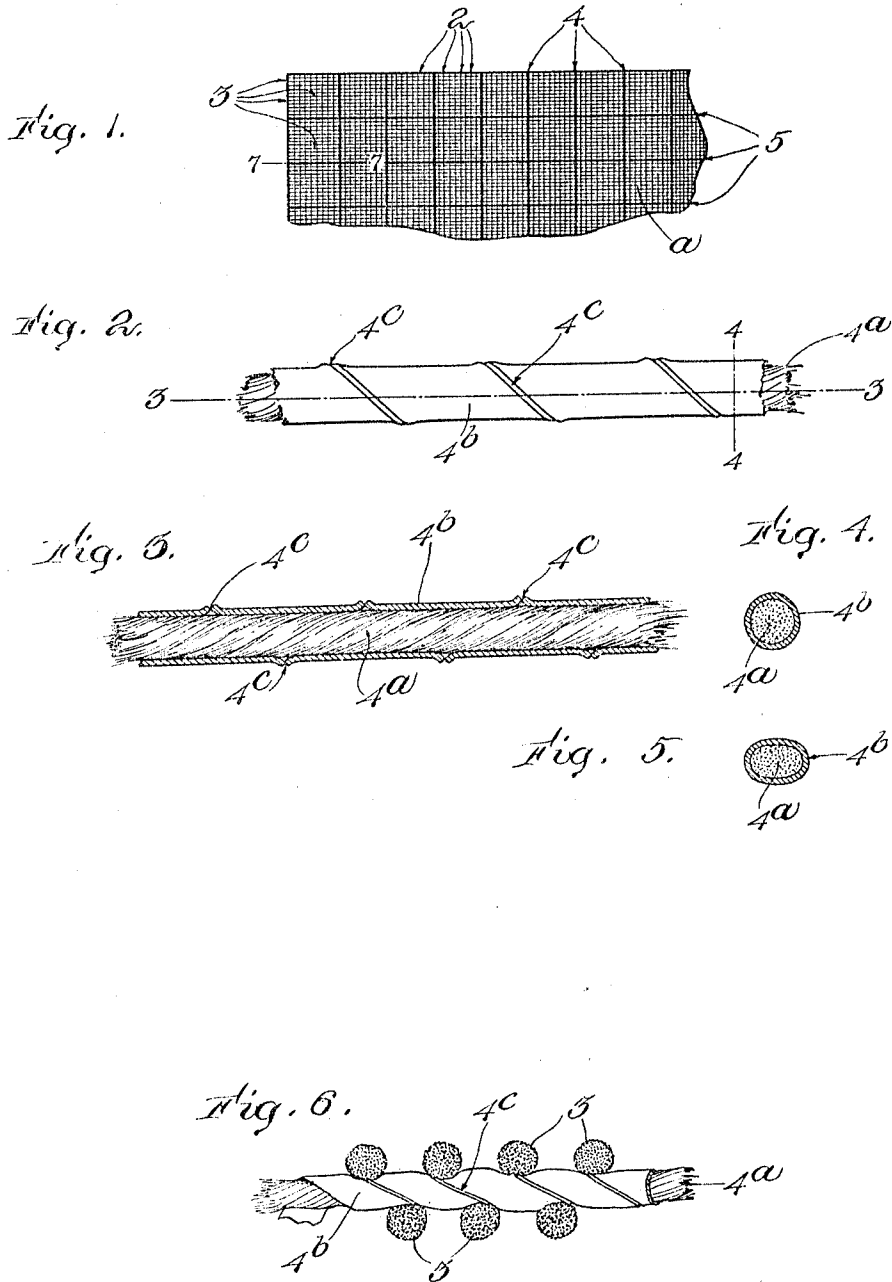


Z. S. BLACKADAR.
 REINFORCED TEXTILE FABRIC.
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1,004,622.

Patented Oct. 3, 1911.



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UNITED STATES PATENT OFFICE.

ZEBINA S. BLACKADAR, OF WHITMAN, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE EMERSON FABRIC COMPANY, OF ROCKLAND, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

REINFORCED TEXTILE FABRIC.

1,004,622.

Specification of Letters Patent.

Patented Oct. 3, 1911.

Application filed April 20, 1910. Serial No. 556,597.

To all whom it may concern:

Be it known that I, ZEBINA S. BLACKADAR, of Whitman, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Reinforced Textile Fabrics, of which the following is a specification.

This invention has for its object to provide a woven fabric which is practically inextensible both in the direction of length of its warp threads and of its weft threads, the fabric of my invention being adapted for various purposes requiring a considerable degree of textile strength, and among others for use as a backing for leather parts or pieces of boot and shoe uppers, the piece of fabric being cemented to one side of a piece of leather and by reason of its inextensibility preventing extension or stretching of the leather.

Among the important advantages of making leather inextensible in the manner indicated, is the freedom of the outer surface of the leather from liability to crack when said surface is glossy as in ordinary patent or enameled leathers.

In Letters Patent of the United States, No. 891,454 dated June 23, 1908, an improved reinforced leather is set forth and claimed, the same consisting of a sheet or piece of leather having a finished outer face and a woven reinforcing layer attached to its inner face, said reinforcing layer being thin and flexible and comprising metallic warp and weft strands alternating with non-metallic warp and weft strands or threads, whereby the reinforcing layer and the leather piece are rendered inextensible.

The present invention has for its object to provide a woven fabric adapted for various purposes when practical inextensibility of the fabric is required, the fabric of my invention being adapted for use as the above-mentioned reinforcing layer and for other purposes.

The invention consists in a woven fabric composed of a relative large number of ordinary fibrous non-metallic warp and weft threads, which are hereinafter referred to as plain threads, and a suitable number of composite warp and weft threads alternating with groups of the plain threads, each composite thread comprising a core of fibrous material, closely twisted, and a wrapper wound helically on the core and imparting

to the composite thread a screw-head formation which enables it to interlock with the adjacent plain threads extending beside and across it and with the composite threads which extend across it, the wrapper being also interlocked by said screw formation with the fibrous core so that the wrapper and core together constitute a reinforcing strand which reduces the extensibility of the fabric to the minimum, by reason of the interlocking of the outer surface of the wrapper with threads contacting with it, and of the interlocking of the inner surface of the wrapper with the core. The wrapper is preferably formed by a flat sided metal ribbon, wound helically on the core and having the edges of its convolutions deflected and forming helical ribs or ridges which so indent and are interlocked with the plain threads, the core, and other composite threads, that elongation of the fabric by longitudinal strain on the warp and weft threads is prevented, the composite threads imparting to the fabric practically the same degree of inextensibility that it would possess if they were entirely of metal. At the same time, the structure of each composite thread is such that, unlike an all metal thread, it can be flattened by compression without forming a ridge on the surface of the fabric. The last mentioned characteristic of the composite reinforcing threads is especially advantageous when the fabric is used to reinforce leather, because the pressure employed in cementing the layers of leather and fabric together does not cause the reinforcing threads to bulge the leather layers outwardly and thus form ridges thereon.

Of the accompanying drawings which form a part of this specification—Figure 1 represents a side view of a piece or fragment of fabric embodying my invention. Fig. 2 represents a magnified side view of a portion of one of the composite reinforcing threads or strands. Fig. 3 represents a section on line 3—3 of Fig. 2. Fig. 4 represents a section on line 4—4 of Fig. 2. Fig. 5 represents a view similar to Fig. 4, showing the reinforcing thread flattened. Fig. 6 represents a magnified section on line 7—7 of Fig. 1.

Similar reference characters indicate the same or similar parts in all the figures.

In the drawings, *a* represents a piece of woven fabric composed of plain warp and

weft threads suitably interwoven, said threads being of any suitable fibrous material such as cotton, the fibers or filaments of which are closely twisted to form a firm fabric. The said plain warp and weft threads are represented somewhat conventionally in Fig. 1 where the lighter parallel lines 2 represent the warp threads, and the lighter parallel lines 3 represent the weft threads. The said plain warp and weft threads constitute the greater part of the area of the fabric.

The fabric includes a relatively small number of warp threads 4 and weft threads 5 of composite construction, the composite warp threads 4 alternating with groups of plain warp threads 2 while the composite weft threads 5 alternate with groups of plain weft threads 3. The composite warp and weft threads are all of the same construction, each being composed of a core 4^a composed of closely twisted non-metallic fibers of cotton or other suitable material and a wrapper, which, in the preferred embodiment of my invention, is composed of a flat-sided metallic ribbon 4^b wound helically on the core, the edges of the convolutions of said ribbon being in close proximity to each other and preferably abutted together. The metallic ribbon is preferably composed of a metal or alloy known as tinsel, its width being considerably in excess of its thickness as indicated in Fig. 3. The edges of the ribbon are deflected or bent outwardly by the operation of winding the ribbon around the core, and by the sinuities imparted to the composite thread by the weaving operation, and thus form helical ribs or ridges 4^c which indent the portions of the plain threads 2 and 3 with which they are in contact. For example, the ridges of each of the composite warp threads indent the adjacent plain warp threads extending beside it, and the plain weft threads extending across it, and the ridges of the composite weft threads similarly indenting the adjacent plain weft threads and the crossing plain warp threads. Moreover, the ridges of each series of composite warp threads are interlocked with the ridges of the composite weft threads at the points of intersection of the composite warp and weft threads. It will be seen, therefore, that in the completed fabric, the composite threads are practically inextensible and impart this quality to the entire fabric, the composite threads being the equivalent of the continuous metallic threads, shown in the above-mentioned Letters Patent. At the same time, the composite reinforcing threads are adapted to be flattened as indicated by Fig. 5 by pressure exerted on the sides of the fabric, so that they will not indent and form ridges on a piece of leather pressed against the fabric.

In practice the composite threads are of

substantially the same size as the plain threads, all the threads being of any size required to constitute a fabric of the desired strength and thickness. The fabric, when used for reinforcing leather parts of boot and shoe uppers, should be relatively thin and composed of relatively small or fine threads. For other purposes the fabric may be thicker and composed of coarser threads. The fabric is closely woven so that the threads of each series are in close contact with each other.

The term "plain threads" is intended to mean threads or strands which are wholly non-metallic, while the term "composite threads" is intended to mean threads composed of compressible non-metallic fibrous cores, and helically wound wrappings which may be either metallic or non-metallic.

From the foregoing it will be seen that the inextensibility of the fabric in the direction both of its warp and weft threads is due first, to the fact that the composite threads are of such construction that the plain threads in contact with the composite threads cannot slip on the latter; secondly, to the fact that the composite weft threads are interlocked with the composite warp threads at the points of intersection so that each series of composite threads prevents the slipping of the other composite threads, and lastly to the fact that the wrappings of the composite threads cannot slip on the cores thereof.

I claim:

1. A woven fabric composed of warp and weft threads suitably interwoven, each series including a relatively large number of closely twisted plain threads, and a smaller number of composite reinforcing threads, alternating with groups of said plain threads, and each composed of a closely twisted compressible fibrous core and a metallic wrapper formed by a flat-sided metal ribbon wound helically and closely on said core, with the edges of the convolutions in close proximity to each other, the external surfaces of the convolutions of the wrapper engaging both the plain threads and the wrappers of the composite threads in contact therewith, while the internal surfaces of said convolutions engage the core around which they are wrapped, whereby the fabric is practically inextensible both lengthwise and crosswise.

2. A woven fabric composed of warp and weft threads suitably interwoven, each series including a relatively large number of closely twisted plain threads and a smaller number of composite reinforcing threads alternating with groups of said plain threads, and each composed of a closely twisted fibrous core, and a metallic wrapper formed by a flat-sided metal ribbon wound helically on said core, with the edges

of the convolutions in close proximity to each other and abutted together, said edges being deflated and forming helical ribs which are interlocked with the plain threads 5 and with the composite threads in contact therewith, whereby elongation of the fabric by longitudinal strain on either its warp threads or its weft threads is prevented, the

cores of the composite threads being compressible.

In testimony whereof I have affixed my 10 signature, in presence of two witnesses,
ZEBINA S. BLACKADAR.

Witnesses:

C. F. BROWN,
P. W. PEZZETTI.