June 29, 1954 S. C. LILLEY 2,682,283

ELASTIC ANTISLIP WOVEN FABRIC

Filed June 24, 1952

FIG. 1

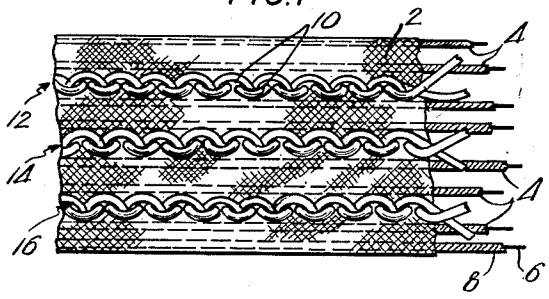


FIG. 2

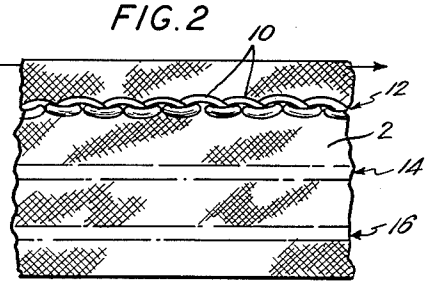


FIG. 3

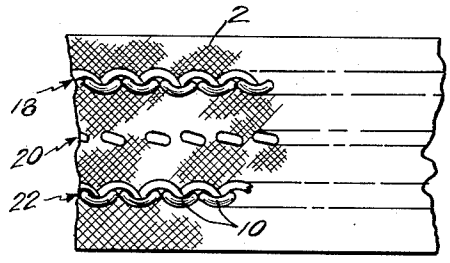


FIG. 4

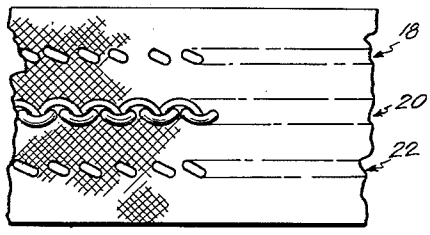


FIG. 5

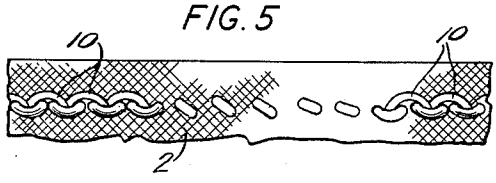


FIG. 6

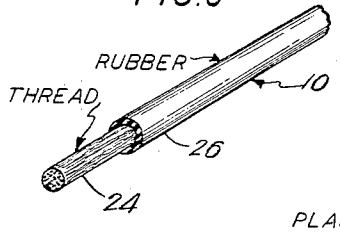
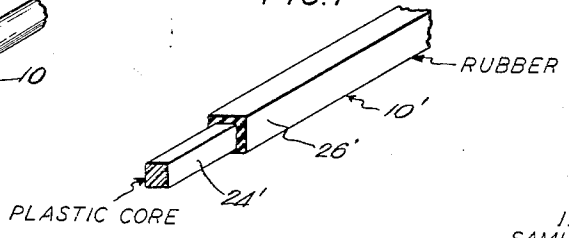


FIG. 7



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ELASTIC ANTISLIP WOVEN FABRIC

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3 Claims. (Cl. 139—421)

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The present invention relates to an elastic woven fabric having anti-slipping properties, and more particularly to such a fabric in which the anti-slip characteristics are provided by raised areas on the surface of the fabric.

An object of the invention is to provide a construction of elastic anti-slip fabric which can be woven with less difficulty than known types of elastic anti-slipping fabrics. A further object of the invention is to provide a method of weaving elastic anti-slipping fabrics which is less subject to weaving difficulties than prior methods.

Elastic fabrics having on their surface raised areas providing anti-slipping properties are known in the art. The raised anti-slipping areas are formed by interweaving with the ground fabric an elastic warp such as a warp of cut rubber thread. But such fabrics must be woven with these elastic, highly stretchable, warps under relatively low tension. The high stretchability of these warps, as is well known and will be apparent to one familiar with the weaving art, introduces serious weaving difficulties. Other objects and advantages of my invention will become apparent from the following description.

In accordance with the invention I provide a fabric constructon having a plurality of adjacent threads raised above the general surface level of the fabric which raised threads are inelastic, that is relatively unstretchable, but is provided with a surface having a relatively high coefficient of friction to impart anti-slipping qualities to the fabric. The ground of the fabric is constructed, in a conventional manner, to be elastic and stretchable, by incorporation of elastic warps woven therein under tension.

In my method of weaving, the elastic warps of the ground fabric are held under such tension during the weaving operation that they are stretched and the inelastic warps likewise are under tension, which may be a normal warp tension to facilitate the weaving operation, but they are not stretched any appreciable amount. The result of this relationship is that when the fabric is relieved of the weaving tension it contracts, under the influence of the previously-stretched elastic warps, causing the inelastic warps to bow outwardly so that they lie above the general surface level of the fabric, where they are exposed and will impart, by means of their frictional surface, anti-slipping qualities to the fabric. Preferably the inelastic frictional warps are formed from a substantially inelastic core having thereon a surface coating of a material having a high coefficient of friction.

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Referring to the drawing, wherein are shown presently preferred embodiments of my invention:

Fig. 1 is a plan view of one face of the fabric in its normal, relaxed, condition;

Fig. 2 is a similar plan view of the fabric but in stretched condition, under tension in the direction indicated by the arrows;

Fig. 3 is a plan view of a modification;

Fig. 4 is a plan view of the opposite face of the fabric of Fig. 3;

Fig. 5 is a plan view, partly broken away, of a further modification;

Fig. 6 is a perspective view of an inelastic warp forming part of the fabric; and

Fig. 7 is a perspective view of a modified form of inelastic warp.

The fabric consists of a fabric ground 2 which is an elastic fabric, that is, it is stretchable in at least one direction. Stretchability is provided by the incorporation of elastic warps 4 which, in the modification shown, comprise a rubber core 6 having a covering 8 provided by a wrapping of fine cotton or other thread. The elastic warps are held in place by being interwoven with wefts, not shown in detail, in any desired relation, as is well known in the elastic fabric art.

The desired anti-slipping qualities are imparted to my fabric by a plurality of warp strands 10 which are exposed as shown on the face of the fabric by being bowed outwardly above the general surface level of the elastic warps 4 and the wefts. Preferably the inelastic frictional warps 10 are arranged in sets distributed weftwise of the fabric as is indicated at 12, 14 and 16 in Fig. 1.

As is well known in the art, the ground fabric 2 is woven with the elastic warps 4 in stretched condition. The inelastic warps 10 are woven into the fabric under normal loom tension, but not substantially stretched, and are bound into the ground fabric by being caught at spaced intervals under wefts. Preferably adjacent inelastic warps 10 pass under different wefts so that they are raised above the fabric in alternation. Preferably also each warp 10 is raised above at least two or more successive picks of weft and passes below only a single weft where it is bound into the fabric, so that the total length of the portions exposed and floated above the surface of the fabric is greater than that of the portions within or on the other side of the body of the fabric. When the fabric is relieved of the warp tensions present during weaving the elastic ground warps 4 contract, whereas the inelastic face warps 10 do not contract and consequently are bowed by

the shortening of the ground fabric so that they project above the surface of the fabric so that their frictional surfaces are exposed to impart to the fabric anti-slipping qualities. Thus in the relaxed completed fabric the inelastic warps **10** are longer than the other warps of the fabric, thereby permitting normal stretching of the ground fabric by lengthening and flattening of the upwardly raised loops of the warps **10** as appears in Fig. 2. Even when the fabric is stretched, the warps at **10** in Fig. 2 still lie above the general surface level of the fabric so that they will engage and prevent slipping of the fabric on surfaces against which it bears.

In the modification of Fig. 3, three longitudinal sets of inelastic frictional warps are present, as in the modification of Figs. 1 and 2, but the middle set **20** corresponding to the middle set **14** of Figs. 1 and 2 is so woven that its loops are exposed on the back of the fabric, as is shown in Fig. 4, while the sets **18** and **20** have their exposed loops on the face of the fabric.

In the modification of Fig. 5 a set of warp strands **10** is so woven into the fabric as to be exposed first on the face of the fabric, then on the back of the fabric, and again on the face of the fabric, so that each group of frictional warps imparts frictional qualities to both the back and the front of the fabric.

Referring to Fig. 6, I prefer to form the inelastic warps **10** by coating a relatively inelastic core **24** with a material having a high co-efficient of friction. The core **24** may be a textile strand of any conventional construction and material, such as a spun yarn of cotton, rayon, nylon, etc. The coating **26** may be of rubber or any other flexible, elastic or inelastic, material having a relatively high coefficient of friction, such as certain of the synthetic rubbers, synthetic resins, etc. The coating may be applied by deposition from an aqueous dispersion of latex in the case of rubber, or from a dispersion of other polymers, in any appropriate manner, all of which is known in the art.

The raised inelastic warps **10** preferably are somewhat larger in cross-sectional area than the strands forming the fabric ground.

Certain advantages are obtained by the use of frictional warps which are not round in cross-section but are of square or other section providing corners or edges. For this purpose I may form the frictional inelastic warps **10** on a core of non-circular cross-section, such as a square cross-section. Suitable cores of this shape can be provided by slitting a sheet of thin, relatively inextensible but flexible material, such as regenerated cellulose, cellulose acetate and similar materials. Referring to Fig. 7 a square core **24'** so obtained is then provided with a frictional coating **26'** in the same manner as in the case of the circular core **24** of Fig. 6.

My improved fabric finds particular utility for use as a material for the fabrication of girdles, hosiery, garters and other articles of apparel wherein anti-slipping qualities are desired, over their entire extent or in selected areas. The modifications of Figs. 3, 4 and 5 provide fabrics

exhibiting anti-slipping qualities on both of their opposite faces, which is highly advantageous for uses in which the article of apparel will lie between two adjacent layers of fabric which it is desired to maintain in the same relative position. For example, when employed as webbing for the tops of men's trunks, my fabric will tend not only to hold down the undershirt but also the outer shirt, thus maintaining all three garments in the desired relative positions.

I have used the term "frictional surface" and similar terms herein to designate a surface which has a relatively high coefficient of friction as contrasted with the surfaces of the usual textile fabrics, for example, a coefficient of friction comparable with that provided by latex-deposited or milled natural rubber. The term "elastic" is used, in the sense in which it is normally used in the textile arts, to designate a strand or fabric markedly more stretchable than the usual textile materials and capable of returning to its original shape upon removal of the stretching force. Likewise, the term "inelastic" is used to designate textile strands which are normal as to elasticity, and this term is not intended to mean a material free from elasticity but only normally free from stretch, for example, as is a cotton yarn as contrasted with a rubber thread.

I claim:

1. An elastic fabric having raised surface areas having a relatively high coefficient of friction to impart anti-slipping qualities to the fabric, including an elastic ground fabric comprising elastic warps interwoven with wefts, and, interwoven with said ground fabric, relatively non-stretchable, inelastic warps of greater length than said elastic warps of said ground fabric, said inelastic warps having an inelastic core having thereon a continuous coating of a material providing a frictional surface of higher coefficient of friction than the ground fabric, said inelastic warps being bowed outwardly to extend above the general surface level of the fabric formed by the elastic warps and the wefts.

2. An elastic fabric according to claim 1 wherein said inelastic warps are substantially square in cross-section.

3. An elastic fabric according to claim 1 wherein said inelastic warps are arranged in a plurality of rows spaced weftwise of the fabric.

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