

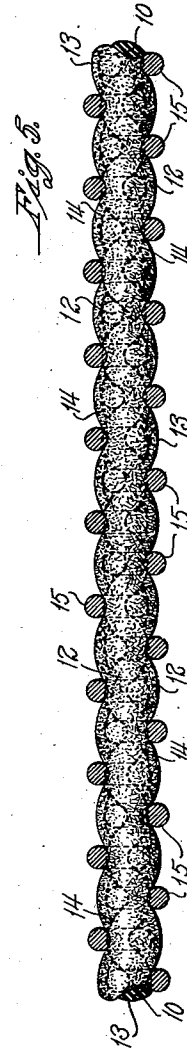
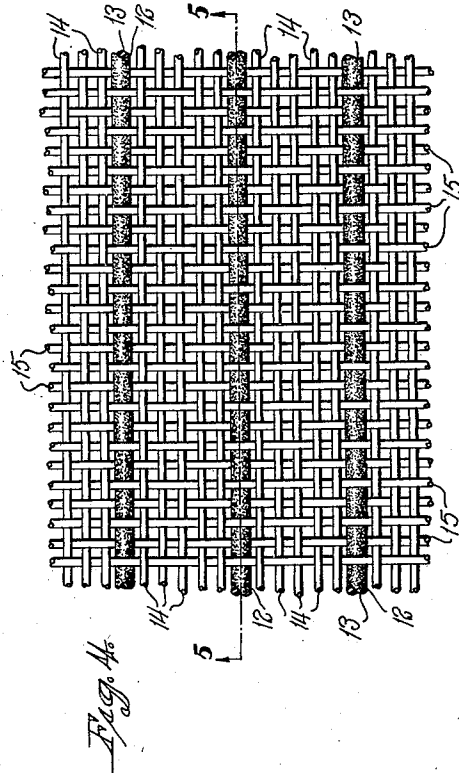
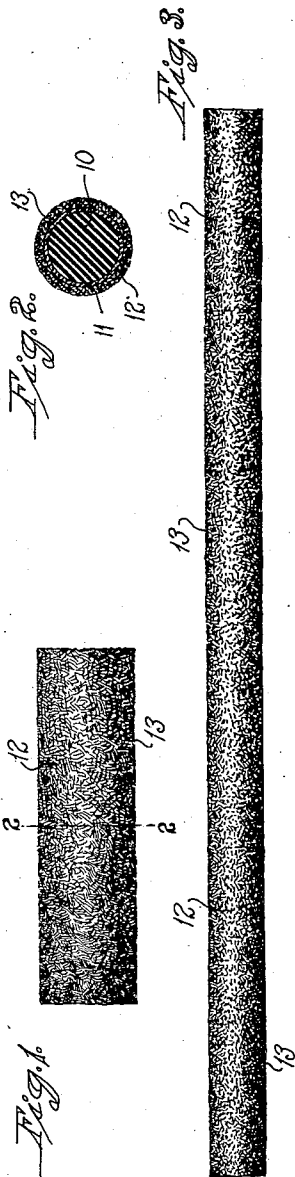
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COVERED ELASTIC STRAND AND FABRIC

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COVERED ELASTIC STRAND AND FABRIC

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9 Claims. (Cl. 28—1)

This invention relates to improvement in covered elastic strands and fabrics incorporating the same, and constitutes an improvement upon the elastic strands and fabric disclosed in my co-pending application, filed December 23, 1933, Serial No. 703,795.

The present invention contemplates an improved elastic strand adapted to be woven, knitted or otherwise incorporated into fabrics, and comprising an inherently-short-stretch (not more than about 300%) elastic core of rubber or equivalent material and a covering of fibrous flock.

One of the objects of the present invention is to provide a superior low-cost and durable covered elastic strand, comprising an inherently-short-stretch elastic core and a covering of flock, i. e., amorphically-disposed fibers secured to the surface thereof.

A still further object is to provide a superior elastic strand comprising an elastic core of rubber or equivalent material and a covering of fibrous flock cemented thereto, and in which the elastic core is of the short-stretch character referred to and which core will minimize the possibility of a rupture occurring in the bond between the covering and the core.

Another object is to provide a superior flock-covered elastic strand characterized by the rapid build-up of tension therein when stretched to as little as three hundred per cent.

Still another object of the present invention is to provide a covered elastic strand which may be woven into a fabric with superior convenience and facility.

Still another object is to provide a superior fabric incorporating elastic strands of the character referred to.

With the above and other objects in view, as will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawing and appended claims, the present invention includes all features disclosed therein which are novel over the prior art.

In the accompanying drawing:

Fig. 1 is an enlarged-scale elevational view of one form which a flocked elastic strand may assume in accordance with the present invention;

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in side elevation of the strand when stretched to substantially the limit of its extensibility;

Fig. 4 is a schematic view illustrating a fabric incorporating the improved elastic strands; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

The elastic strand of the present invention includes a strand-like core 10 of rubber or equivalent elastic material, which may be of rectangular, round or other cross-sectional form, and which is characterized by a very rapid build-up of its tension inasmuch as it has an elastic limit not substantially in excess of three hundred per cent (300%), that is to say, for instance, a one-inch length of elastic core which would reach its elastic limit when extended to approximately four inches.

The elastic core 10 is provided with a coating 11 of elastic adhesive which may be applied in any approved manner, such, for instance, as by passing the strand-like core through a bath of elastic adhesive.

After the coating 11 of elastic adhesive has been applied to the strand and before the said adhesive is dried or completely cured, a coating or skin 12 of flock or amorphically-arranged fibers is applied in any approved manner, such, for instance, as by blowing the fibrous flock against the now tacky or sticky strand. The fibrous material or flock employed may vary widely in character, depending upon the requirements, and may, for instance, be rayon flock, cotton flock, wool flock, mixtures of such flock, etc.

Both the fibrous material and the elastic cement or adhesive may be suitably colored before application to the core 10 or, if desired, the entire strand may be colored after it has been coated.

The flocked strand comprising the core 10, elastic cement or adhesive 11 and flock 12, may now be dried or cured in any one of a variety of manners, such, for instance, as by passing the same through a heated chamber.

The above-described process for producing the improved inherently-short-stretch elastic strands is a preferable one, though it will be obvious that, if desired, the fibrous flock may be applied to the tacky surface of an elastic core prior to its curing or vulcanization and while its surface is still sufficiently tacky to receive and hold the fibrous flock-coating. If desired, an elastic core may have its surface rendered tacky by heat or by a light application of solvents prior to the application of the fibrous flock. Under the modes of manufacture, just referred to, while no separate coating of adhesive material is applied to the short-stretch elastic core, nevertheless the fibrous coating is cemented or secured in place.

Although the elastic core may be composed of

a wide variety of materials, the following compound, after being cured at 260° F. for about forty-five minutes, has been found to produce a highly satisfactory elastic core having an elastic limit of about two hundred fifty per cent (250%) and a tensile strength in the neighborhood of forty-two hundred (4200) pounds per square inch of cross-sectional area, the cross-sectional area referred to being based upon the relaxed core:

	Parts by weight
Rubber	100
Mercaptobenzothiazole	1
Sulphur	3
Zinc oxide	5
Stearic acid	1
Symmetrical di-beta-naphthyl-para-phenylenediamine	1
Carbon black	50

By reducing the amount of carbon black in the above formula, an elastic core may be produced having an elongation of approximately three hundred per cent (300%) before the breaking point or the point of permanent distortion is reached.

By altering the above-given formula so as to include therein 150 parts by weight of carbon black rather than the 50 parts specified, a rubber core may be produced having an elongation of about one hundred per cent (100%) before the breaking point is reached, and having a tensile strength of about three thousand (3,000) pounds. Similarly, by altering the carbon black constituent so that it constitutes 200 parts of the mixture by weight, elastic cores having an elastic limit of about fifty per cent (50%) may be produced with a tensile strength of about two thousand (2,000) pounds per square inch of cross-sectional area. Cores of this latter degree of elongation represent about the minimum contemplated.

An almost limitless variety of elastic cores of the short-stretch character with which this invention is concerned may be produced by suitably compounding the materials from which the elastic cores are made. Inasmuch as such varieties of short-stretch rubber cores are too numerous to set forth in detail therein, it is sufficient for the present purpose to say that, should it be desired to produce elastic cores having other specific degrees of extensibility than those specifically referred to above, the proportion of carbon black or equivalent material may be varied accordingly, in a manner as may be readily deduced from the foregoing specific examples.

Another compound which may be mentioned as being suitable for the production of elastic cores in accordance with this invention, when cured for about forty-five (45) minutes at approximately 260° F., is as follows:

	Parts by weight
Rubber	100
Sulphur	3 3/4
Stearic acid	1
Symmetrical di-beta-naphthyl-para-phenylenediamine	1
Zinc sulphide	5
Phenylhydrazine	1/2
90% zinc salt of mercaptobenzothiazole	1
10% di-ortho-tolylguanidine	1
Zinc oxide	5
Methylacrylic ester	20

Returning now to the subject of the adhesives (preferably elastic) for securing or adhering the

coating or skin 12 of flock in place to the core, it has been found that rubber latex, water-dispersed rubber, natural rubber solutions, synthetic rubber solutions, etc., are suitable and may be used with or without vulcanizing material, vulcanizing accelerators, fillers, pigments, coloring matter, etc. By way of example, an elastic adhesive solution which has been found very satisfactory consists of approximately twenty per cent (20%) by weight of rubber, twenty per cent (20%) filler, pigment and vulcanizing materials, and the balance of volatile rubber solvents.

The strand as now supplied with an anti-creep coating or skin 12 of amorphically-arranged fibers, is suitable for incorporation into woven, knitted or other fabrics. Woven, as well as other elastic fabrics into which the flocked elastic strand of the present invention may be incorporated may assume an almost infinite variety of patterns. In the elastic fabric shown in Figs. 4 and 5, a plurality of the flocked elastic strands 13 are arranged parallel and spaced from each other. Parallel with the elastic strands 13 are a plurality of warp strands 14 formed of cotton, rayon, silk or other suitable textile material. Intermeshed with the strands 13 and 14, just described, are a crosswise series of weft or filler picks 15. It has been found desirable under some conditions to interweave the high-tension short-stretch flocked elastic strands 13 with the warp strands 14 and the weft picks 15, while the said elastic strands are in a substantially-relaxed condition.

Owing to the very rapid build-up of the tension in the elastic core of my improved elastic strands (the maximum tension being reached at about 300% extensibility), any tendency for a rupture to occur in the bond between the said core and the fibrous flock-coating is so minimized as to be negligible despite the repeated and continuous stretching and relaxing of such strands.

Furthermore, it has been found that owing to the rapid build-up in tension, above referred to, the strands lend themselves particularly well to being incorporated into fabrics, inasmuch as they may be tautened to a degree sufficient to render them stable without the necessity of unduly stretching the strands during a weaving or similar operation.

It has also been found that when the short-stretch flock-covered elastic strands of the present invention are incorporated into fabrics while the said strands are substantially relaxed, the tendency of such fabrics to shrink when subjected to the usual finishing operations, or when subjected to subsequent washings, is minimized.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock secured to the surface of the said core around the perimeter thereof, the said short-

stretch elastic core including sufficient stretch resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of three hundred per cent of its normal relaxed length.

2. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock elastically secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of three hundred per cent of its normal relaxed length.

3. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of two hundred per cent of its normal relaxed length.

4. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock elastically secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of two hundred per cent of its normal relaxed length.

5. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock secured to the surface of the said

core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of one hundred per cent of its normal relaxed length.

6. An inherently-short-stretch covered elastic strand characterized by the rapid build-up of its tension when stretched and adapted to be incorporated into fabrics, the said covered elastic strand comprising a short-stretch elastic core of rubber-like material and a protective coating of fibrous flock elastically secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have its maximum tension when extended to a degree not materially in excess of one hundred per cent of its normal relaxed length.

7. An elastic fabric having incorporated therein a plurality of inherently-short-stretch elastic strands, each comprising a short-stretch elastic core of rubber-like material and a coating of fibrous flock secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have an extensibility not materially in excess of three hundred per cent of its normal relaxed length.

8. An elastic fabric having incorporated therein a plurality of inherently-short-stretch elastic strands, each comprising a short-stretch elastic core of rubber-like material and a coating of fibrous flock secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have an extensibility not materially in excess of two hundred per cent of its normal relaxed length.

9. An elastic fabric having incorporated therein a plurality of inherently-short-stretch elastic strands, each comprising a short-stretch elastic core of rubber-like material and a coating of fibrous flock secured to the surface of the said core around the perimeter thereof, the said short-stretch elastic core including sufficient stretch-resisting material to cause said core to have an extensibility not materially in excess of one hundred per cent of its normal relaxed length.

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