

[54] NARROW ELASTIC FABRIC

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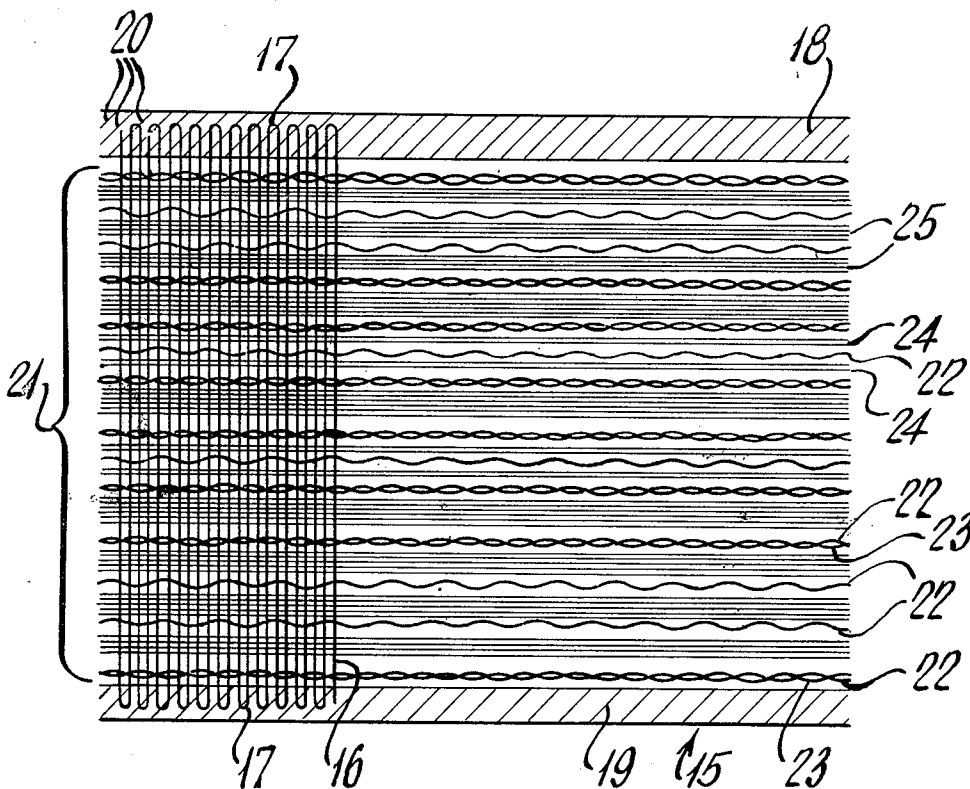
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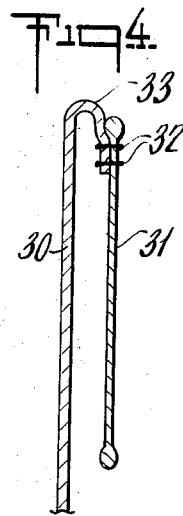
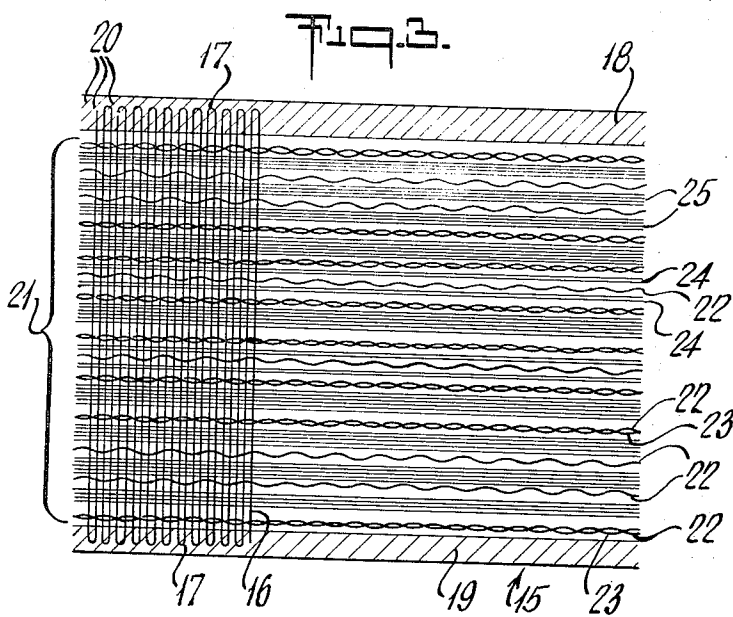
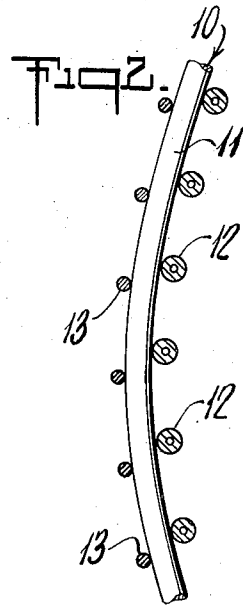
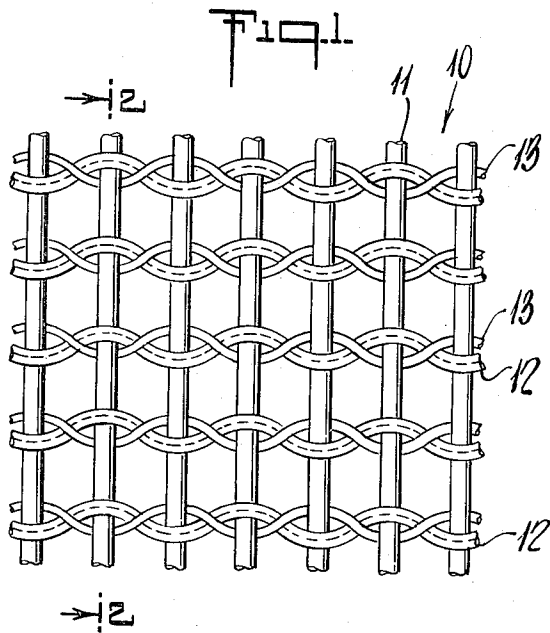
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[57] **ABSTRACT**

A narrow elastic fabric suitable for use in the band encircling portions of articles of apparel. The fabric has monofilament yarns in the transverse direction of the fabric and elastic yarns in the longitudinal direction of the fabric. The elastic yarns are woven under tension in a leno weave with longitudinally extending non-elastic yarns. The leno woven elastic yarns are on one surface of the fabric and the leno woven non-elastic yarns are on the opposite surface to provide the fabric with a transverse concave configuration.

9 Claims, 4 Drawing Figures





NARROW ELASTIC FABRIC

This invention relates to the narrow elastic fabrics and more particularly to a narrow elastic fabric suitable for use in articles of wearing apparel.

BACKGROUND OF THE INVENTION

The narrow elastic fabric of the present invention may be used in the band encircling portions of various types of articles of apparel; such as, the leg encircling or waist encircling portion of a girdle or the waist encircling portion of a pair of trousers and the like. The type of garment and the place in the garment where the narrow elastic fabric is to be used will determine the amount of stretch and the modulus of elasticity required in the elastic fabric. The amount of stretch and the modulus of elasticity of an elastic fabric for use in a girdle will be different from that desired for use in trousers. Also the amount of elasticity and modulus of elasticity required in the leg encircling portion of a garment may be different from that required in the waist encircling portion of a garment.

The present invention will be described in its preferred use as a waistband in trousers; however, as is well known in the art, the amount of elasticity and the modulus of elasticity may be varied. Also the weave pattern may be varied if decorative effects are desired in the final fabric.

Waistbands and especially trouser waistbands often suffer from what is termed unsightly "rollover"; that is, the band of the trouser or other garment will turn over on itself during wear or afterwards. There have been a number of techniques for reducing or eliminating this rollover problem. One such technique is to place a curvilinear or concave cross section in the waistband. This may be done by using a thermoplastic yarn in the filling direction of the band and setting this thermoplastic yarn in a concave configuration. Fabrics and waistbands of this type are described in U.S. Pat. Nos. 3,129,434 and 3,155,986.

With the advent of the use of stretch materials such as double knit fabrics in trousers some stretch fabrics have been developed for use in waistbands of these garments to provide the desired stiffness and stretch. One such material comprises monofilament yarns, running in the direction of the width of the fabric, woven with textured, synthetic stretch yarns in the direction of the length of the fabric. The woven fabric is coated with a latex composition. The monofilaments provide stiffness in the widthwise direction and the textured yarns and latex provide stretch in the lengthwise direction.

The prior art waistbands generally suffer from one or more of the following deficiencies; poor washability, poor dry-cleanability, lack of shrinkage control, lack of stiffness, lack of body, failure to prevent rollover of the trousers, insufficient elongation for use in stretch trousers, complicated manufacturing techniques in the material itself or of the waistband; that is, it must be used with other fabrics to give all of the desired characteristics in the final garment waistband.

SUMMARY OF THE INVENTION

We have discovered an improved narrow elastic fabric which is suitable for use in the band encircling portions of articles of clothing to prevent unsightly rollover. Our new fabric comprises a plurality of monofilament yarns in the transverse direction of the fabric. Our new fabric has elastic yarns in the longitudinal direc-

tion of the fabric. The elastic yarns are woven under tension and at least some of these elastic yarns are leno woven with non-elastic yarns in the longitudinal direction of the fabric. The leno woven elastic yarns are maintained on one surface of the filament yarns while the leno woven non-elastic yarns are maintained on the opposite surface. The resultant fabric has a transverse concave configuration with the elastic yarns on the inner surface of the concave configuration and the non-elastic yarns on the back or outer surface of the concave configuration.

A preferred embodiment of the new elastic fabric of the present invention, which is suitable for use as the waistband in trousers, comprises monofilament yarns, having a denier of about 400 to 2000 in the transverse direction of the fabric. The monofilament filling yarns are woven with a set of warp yarns. The set of warp yarns has a center portion and two edge portions. A plurality of elastic yarns having a spandex core and wrapped with a yarn that is set in the wrapped configuration are disposed in said center portion. Some of these elastic yarns are leno woven with non-elastic warp yarns. The center portion also preferably contains some non-elastic yarns woven in a plain weave with the filling yarns. The edge portions of the warp set contain synthetic, texturized yarns woven with the filling yarns. The resultant fabric has excellent stiffness in the transverse direction and soft and smooth longitudinal edge portions. The resultant fabric is stable and the individual yarns do not slip or slide with respect to each other. The new fabric has about 5 to 50 percent elongation in the longitudinal direction and a uniform modulus of elasticity. The modulus of elasticity will be from about 1 to 5 pounds per inch of width of the fabric at 15 percent elongation. The fabric has less than 3% shrinkage and is washable and drycleanable and may be used alone or in combination with other fabrics as the waistband for an article of wearing apparel.

DESCRIPTION OF THE DRAWINGS

The invention will be more fully described when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an enlarged plan view of a portion of a narrow elastic fabric of the present invention;

FIG. 2 is a cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is an enlarged plan view of a specific embodiment of the new narrow elastic fabric of the present invention which is suitable for use as a waistband for trousers; and

FIG. 4 is a cross-sectional view of the fabric of FIG. 3 as it would appear in one type of sewing in the waist portion of a pair of trousers.

DETAILED DESCRIPTION OF THE DRAWINGS

With respect to the drawings there is shown in FIG. 1 and enlarged plan view of a portion of the new narrow elastic fabric 10 of the present invention. It should be noted that the view shows only a portion of the fabric both across the width of the fabric and along its length. Furthermore the view only shows certain specific yarns used in the fabric which make up the essence of the present invention. Other yarns may be disposed and woven in and among the yarns shown and described in conjunction with FIG. 1 to provide body, cover, or other properties in the fabric.

The fabric 10 contains monofilament filling yarns 11 in the transverse direction. Woven with these monofilament filling yarns are two types of warp yarns. One of the Warp yarns is an elastomeric yarn 12 and the other yarn is a non-elastic yarn 13. Each elastic warp yarn is leno woven with a non-elastic yarn so that all of the elastic yarns are disposed on one face of the fabric and all of the non-elastic yarns are disposed on the opposite face of the fabric. This will be more clearly shown in the cross-sectional view shown in FIG. 2. All of the elastic yarns 12 are disposed on the concave inner surface of the monofilaments 11 and all non-elastic yarns 13 are disposed on the convex outer surface of the monofilaments. Weaving the elastic and non-elastic yarns in this manner unexpectedly produces a concave configuration in the monofilament filling yarn as shown in FIG. 2. This transverse concave configuration has great advantage in the waistband of trousers or when used in other encircling portions of garments. By sewing the outer or garment fabric to the convex surface so that the concave surface is disposed toward the body of the wearer of the garment rollover of the upper edge of the waistband is prevented.

The filament yarns used in the narrow elastic fabric of the present invention may be any of the synthetic, monofilament yarns. Monofilament yarns are used because they have the desired stiffness and because being a single integral unit when they take the concave curvature they take this configuration in a smooth and even manner along their entire length. A preferred monofilament yarn is a nylon monofilament yarn having a denier of about 400 to 2,000. Other monofilament yarns such as polyester filaments or the polyolefin filaments may also be used.

The elastic yarns in the warp direction may be any of the standard elastic yarns used in producing stretch fabric; such as, spandex core yarns, rubber yarns, or the like. The non-elastic yarns which are disposed in the warp direction and which are leno woven with the elastic yarns may be any of the standard non-elastic yarns such as nylon yarns, cotton yarns or the like. The non-elastic yarns may be spun yarns or multifilament yarns as desired. By using the leno woven yarns in my new narrow elastic fabric is described above a transverse concave configuration is placed in the final fabric. As in the weaving of standard narrow elastic fabrics the elastic yarns are woven under tension and when the final fabric is produced and allowed to relax, it is automatically shaped and maintains the above described transverse concave configuration. This has a great advantage in that no further processing is required in order to place the desired transverse configuration in the fabric which reduces the manufacturing costs of the fabric.

As previously mentioned other yarns may be woven between the leno woven elastic yarns. These other yarns may be woven in a plain weave or other weave as desired. Virtually any yarns can be used and generally they are used to provide cover, body or other desired properties in the final fabric. The yarns that are used to fill in the leno woven elastic yarns should be of such a nature that they do not overpower the transverse filament yarns which are used to provide the desired resiliency and stiffness in the final fabric. Example of yarns which might be used between the leno woven elastic yarns would be the texturized stretch yarns, such as tex-

turized nylon, standard cotton or rayon yarns, plain woven elastic yarns and the like.

When my new elastic fabric is to be used as the waistband of trousers it should be woven in such a manner that a minimal number of warp yarns are used so as not to overpower the desired characteristics of the monofilament filling yarns. However, the warp yarns should be tied in place so that they do not slip up and down along the monofilament filling yarns and still produce the desired degree of elongation and modulus of elasticity in the final fabric. The warp yarns should be relatively loosely woven to provide a fast drying fabric having good drycleanability and washability.

A narrow elastic fabric 15 according to the present invention, suitable for use as the waistband in trousers, is shown in FIG. 3. The fabric contains synthetic, monofilament, filling yarns 16. When using monofilament filling yarns, at each end 17 of the filling, where the yarn turns back on itself, because of the stiffness of the monofilament, a very sharp edge is formed. This sharp edge is uncomfortable to the wearer and creates wearing problems and rough edges in the final product.

Woven with the monofilament yarns along the edges of the fabric; that is, the two edge portions 18 and 19 of the fabric, are texturized yarns 20. Because of the very low stretch required in a trousers waistband texturized yarns are used at these edges to cover the rough bent ends of the filling yarns and provide a smooth soft long-wearing edge both when the fabric is relaxed and when it is stretched. Generally from about 20 to 30 texturized yarns are woven along each edge portion of the fabric to provide a narrow soft band along each edge of the fabric. More texturized yarns may be woven along one edge than along the other edge depending on the tension in the loom and to compensate for this tension and produce a straight web as is well known in the narrow weaving industry.

Disposed in the center portion 21 of the fabric are a plurality of elastic yarns 22. Some of these elastic yarns are leno woven with nonelastic yarns 23 as described in regard to FIG. 1 so that the elastic yarns are disposed on one face of the fabric. Other of the elastic yarns are woven in a standard plain weave. The number and type of elastic yarns used will depend on the degree of elongation and the modulus of elasticity desired in the final product. Whenever an elastic yarn is not leno woven but is woven in a plain weave, it is held down by a plurality of nonelastic binder yarns 24 on each side of that elastic yarn. With the combination of the leno woven elastic yarns and the other elastic yarns being tied in by binder yarns all of the elastic yarns are disposed in a very stable manner in the final fabric and the yarns will not shift nor move when the fabric is in use as the waistband of a trouser. If desired, interspersed between the leno woven elastic yarns are synthetic, texturized yarns 25 such as texturized nylon yarns. These yarns provide cover in the final fabric as well as giving the final fabric a smooth feel and a pleasing hand and appearance.

The monofilament yarns used in producing our new trouser waistband fabric have a denier of about 400 to 2,000 and preferably they have a denier of about 800 to 1,600. Any of the synthetic, monofilament yarns may be used, however, it is preferred that nylon monofilaments be used because of the washability and drycleanability characteristics of these yarns.

The texturized yarns in the edge portions of the fabric may be nylon or polyester yarns or other synthetic

texturized yarns which produce a smooth, even edge in the fabric.

The elastic yarns used in producing the new trouser waistband fabric described above have a core of a spandex yarn. The initial wrap on this spandex core is with a settable yarn such as a polyester or nylon yarn. To produce the desired shrinkage characteristics and drycleanability in the final product it is important that a spandex core and not a rubber core be used. Also the setting or initial wrapping of a rubber core will tend to cut the rubber and produce free ends which are abrasive and unsightly. The initially wrapped spandex core may then be wrapped with any desired yarn to produce the desired hand and appearance in the final fabric. Cotton or rayon spun yarns are suitable yarns for the final wrap. It is very important that the yarn used to initially wrap the spandex core be settable and it is usually set in its wrapped configuration during the finishing of the fabric through a separate heating step could be used to accomplish the set of the yarns. The setting of the initially wrapped yarn prevents undue shrinkage of these yarns in the final fabric and also allows the elastic yarns to withstand washing and drycleaning operations.

Spandex cores having a denier of from about 800 to 2,240, initially wrapped with a settable yarn having a denier of from about 75 to 200 or more, and finally covered with a cotton spun yarn produce satisfactory elastic yarns for use in producing the trouser waistbands of the present invention.

The binder yarns used to tie down the plain woven elastic yarns may be any of the spun, multifilament, or monofilament yarns. The criteria for determining the type of binder yarns used are cost, cover and decorative effects desired in the final product. With the exception of the leno woven yarns, fabric may be woven in any balanced type of weave. Preferably the edges of the fabric where the texturized yarns are used, are woven in a twill weave and also preferably the binder yarns are woven in a plain weave.

Referring to FIG. 4 there is shown a cross-sectional view of the fabric depicted in FIG. 3 as it would appear when sewn to an outer apparel fabric. The outer fabric 30 is folded over along its upper edge and the waistband 31 is directly sewn 32 to the folded edge 33 to form the waistband of the garment. Other techniques may also be used for securing our improved waistband to the outer fabric; for example, the outer fabric may be folded a plurality of times and the waistband secured to the inside portion of the fold. Also the bottom portion of the waistband may be tacked to the pants portion or other lining portions of the final trousers.

The stretch or elasticity in the final product and the modulus or power required to stretch the final product will depend upon a number of things. These are: (a) the amount or number of elastic yarns used in the warpwise direction and their distribution, (b) the degree of stretch in these elastic yarns; that is, the tension they are wrapped under, (c) the type of weave used, and (d) the number of filling yarns per inch used in the fabric.

The following is an illustrative example of an elastic waistband fabric according to the present invention.

EXAMPLE

The warp yarns are set up to weave a narrow elastic fabric in accordance with the present invention. The final fabric is to have a width of about 2½ inches and approximately 250 warp yarns are used. Starting from

one side of the fabric and moving across to the other side of the fabric the warp yarns are as follows: approximately 24 ends of 100 denier stretch nylon yarns woven in a tubular twill weave to provide a smooth soft edge in the final fabric. Then an elastic yarn, having a spandex core of approximately 1,680 denier which has been initially wrapped with a 100 denier multifilament nylon yarn (set in its wrapped configuration) and top covered with three ends of 20's cotton yarns, is leno woven with two ends of 200 denier nylon multifilament yarns. The spandex core is wrapped while the core is stretched to substantially its maximum elongation.

Following the elastic yarn are four ends of 100 denier stretch nylon yarn and an elastic yarn having a spandex core and wrapped as described above. The combination of four ends of stretch nylon and the elastic yarn may be repeated a number of times. All of these yarns are woven in a standard plain 1/1 weave. Then another elastic yarn as described above is leno woven with two ends of nylon as described above.

After this six ends of 100 denier stretch nylon yarns are woven in a 2/2 plain weave and again a leno woven elastic yarn is used. The elastic yarn is followed by two ends of 36/2 bleached cotton binder yarns followed by an elastic yarn having a spandex core as described above followed again by two ends of 36 bleached cotton binder yarns and a leno woven elastic yarn as described above. This combination is repeated a number of times and all yarns other than the leno woven yarns are woven in a plain 1/1 or 2/2 weave.

The next portion of the fabric comprises a leno woven elastic yarn followed by five ends of 100 denier stretch nylon yarn and an elastic yarn woven in a plain 1/1 weave. This combination of plain woven nylon and elastic yarn is repeated a number of times. This portion of the fabric is completed with five further stretch nylon yarns and a leno woven elastic yarn. Finally the other edge of the fabric is woven with 27 ends of 100 denier stretch nylon yarn woven in a tubular twill weave to produce a smooth, soft edge. The filling yarns used are 1,100 denier nylon monofilaments and they are woven with about 28 picks to the inch during the weaving operation so that the finished fabric has about 38 to 39 filling yarns per inch.

The resultant fabric has less than 3 percent shrinkage and excellent washing and drycleaning characteristics. The fabric by itself, when sewn to the upper portion of a pair of trousers, makes an excellent waistband for a trouser made from stretch material.

The above detailed description has been given for clearness of understanding only. No unnecessary limitations should be understood therefrom as modifications will be obvious to those skilled in the art.

What is claimed is:

1. A narrow elastic fabric suitable for use as a waistband for an article of apparel comprising: transversely extending monofilament filling yarns having a denier of from 400 to 2,000 to provide stiffness in the transverse direction of the fabric, said filling yarns woven with a set of longitudinally extending warp yarns, said set of warp yarns having a longitudinally extending center portion and two longitudinally extending edge portions, said center portion having a plurality of elastic yarns having a spandex core wrapped with a yarn that is set in its wrapped configuration, at least some of said elastic yarns being leno woven with nonelastic warp yarns with the leno woven elastic yarns on the face surface

7

and the leno woven nonelastic yarns on the back surface of the fabric whereby the fabric has a transverse concave configuration, said center portion also having nonelastic yarns woven in a plain weave, said edge portions of said fabric comprising texturized yarns whereby the fabric has smooth and soft longitudinal edges, said fabric having from 5 percent to 50 percent elongation in the longitudinal direction, a uniform modulus of elasticity of from 1 to 5 pounds per inch of width at 15 percent elongation and having less than 3 percent shrinkage when washed or dry cleaned.

2. A fabric according to claim 1 wherein the monofilament yarns are nylon yarns.

3. A fabric according to claim 1 wherein the elastic yarns having a spandex core are initially wrapped with a nylon yarn and top wrapped with cotton yarn.

4. A fabric according to claim 1 wherein the non-

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elastic warp yarns are texturized nylon yarns.

5. A fabric according to claim 1 wherein the center portion includes elastic yarns woven in a plain weave.

6. A fabric according to claim 5 wherein the center portion includes non-elastic binder yarns.

7. A fabric according to claim 1 wherein the texturized yarns in the edge portions are nylon yarns.

8. A fabric according to claim 1 wherein the monofilament yarns are nylon yarns, the elastic yarns having a spandex core are initially wrapped with a nylon yarn and top wrapped with a cotton yarn and the texturized yarns in the edge portions are nylon yarns.

9. A fabric according to claim 8 wherein the center portion includes elastic yarns woven in a plain weave and non-elastic binder yarns.

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