United States Patent [19]

Goff, Jr. et al.

[11] **3,908,711**

[45] **Sept. 30, 1975**

[54] **NARROW ELASTIC WAISTBAND FABRIC AND METHOD OF MANUFACTURING THE SAME**

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[22] Filed: **May 1, 1974**

[21] Appl. No.: **465,776**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 435,060, Jan. 21, 1974.

[52] **U.S. Cl.** **139/419**; 139/421

[51] **Int. Cl.**[2] **D03D 19/00**

[58] **Field of Search** ..... 139/383, 419, 420 R, 421, 139/422, 423

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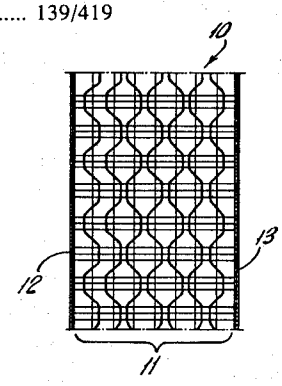
Primary Examiner—Henry S. Jaudon

[57] **ABSTRACT**

A lightweight, narrow, elastic, waistband fabric comprising two sets of warp yarns. The warp yarns of one set are elastic core covered and the warp yarns of the other set are non-covered. The warp yarns are woven in a reverse leno weave with each elastic core covered yarn leno woven with a doup yarn. Adjacent elastic yarns are on opposite faces of the fabric and the elastic yarns along the longitudinal edges of the leno weave are on the same face of the fabric and are woven in a reverse leno with respect to each other.

14 Claims, 4 Drawing Figures



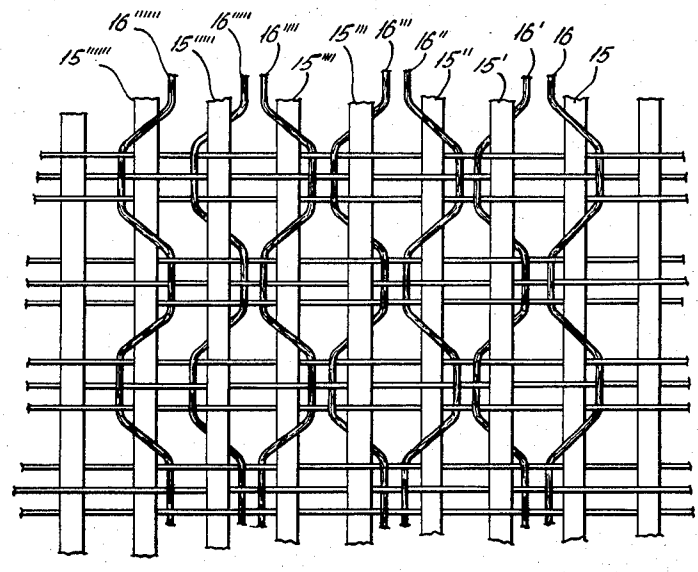


Fig.1.

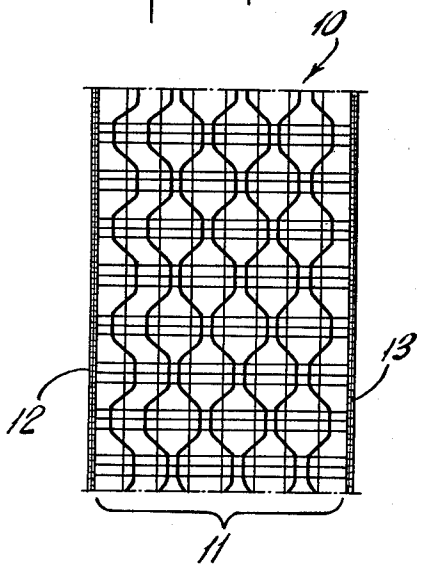


Fig.2.

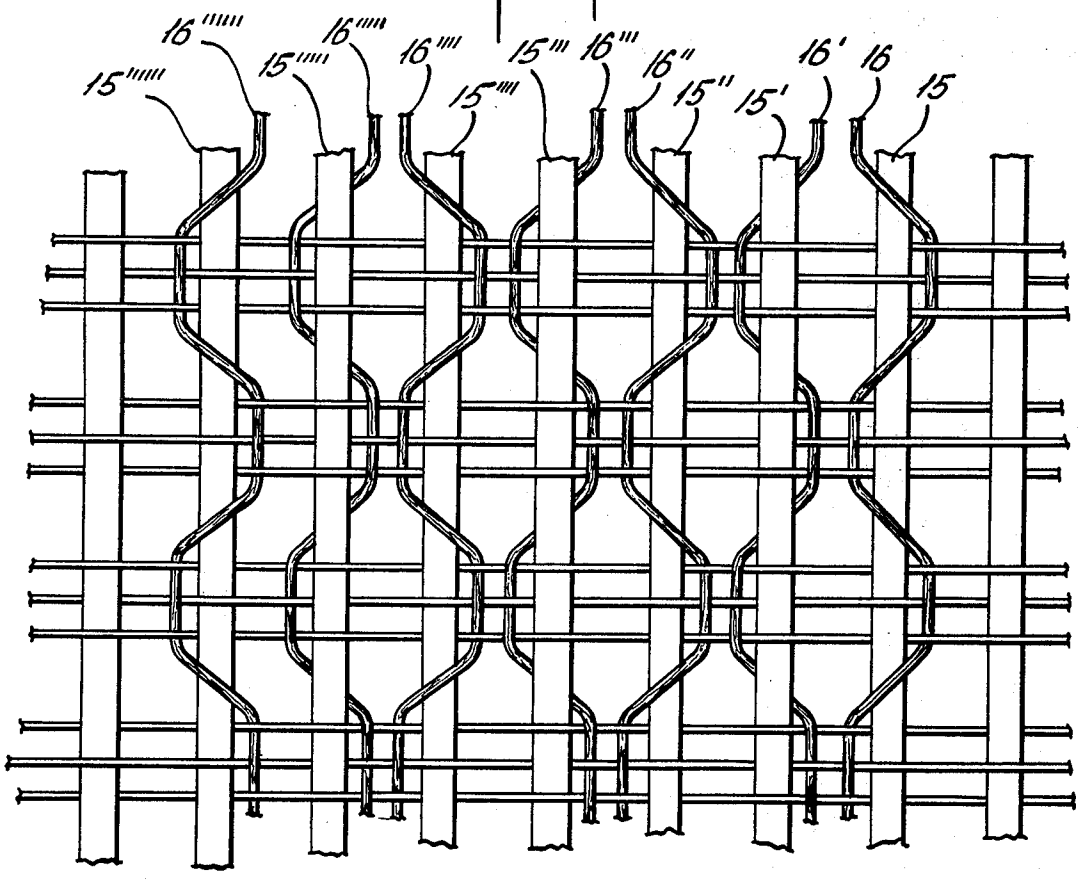


Fig. 3.

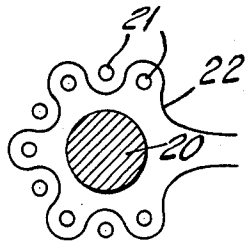
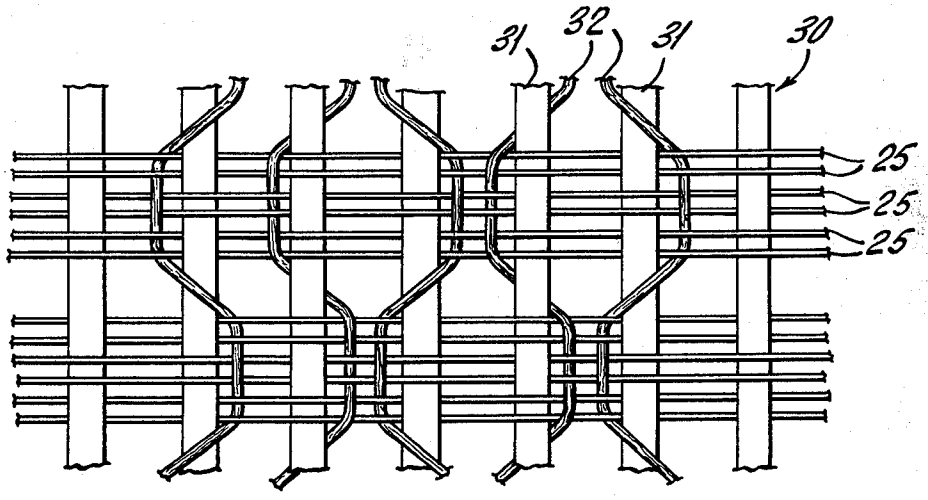


Fig. 4.



NARROW ELASTIC WAISTBAND FABRIC AND METHOD OF MANUFACTURING THE SAME

This is a continuation-in-part application of our copending application Ser. No. 435,060 filed Jan. 21, 1974.

This invention relates to a new lightweight, leno woven, narrow, elastic fabric suitable for use in the waist encircling portions of articles of apparel.

BACKGROUND OF THE INVENTION

In recent years narrow elastic fabrics have gained considerable acceptance as waistbands in articles of apparel. This is especially true if the apparel is made from knit and/or stretch type fabrics as is so prevalent today. Waistbands should have the characteristics of preventing rollover of the edge of the apparel, they should be resilient, have desired washing and dry cleaning properties as well as the necessary stretch characteristics. Furthermore, it is desirable that they have aesthetic qualities and when used in summer-weight wear or in many women's garments, childern's garments and the like, they should be lightweight.

In the past it has been extremely difficult if not impossible to produce a narrow elastic waistband fabric which has the necessary stretch and shrinkage characteristics, prevents rollover, yet is lightweight and remains stable throughout its use.

SUMMARY OF THE PRESENT INVENTION

We have discovered an improved narrow elastic fabric which is suitable for use in the band encircling portions of articles of apparel, especially summer-weight clothing and women's or children's wear. Our new fabric has all the desirable characteristics of washability and dry cleanability, resilience, and prevents rollover of the edge of the garment. Furthermore, our new fabric is very open and has a pleasing appearance yet is stable throughout its intended use.

In the body or center portion of our new elastic waistband fabric there are two sets of warp yarns. One set of warp yarns comprises elastic yarns which are either covered rubber core yarns or covered spandex core yarns. The other set of warp yarns comprise yarns other than the elastic yarns mentioned above; that is, they may be texturized yarns, monofilament yarns, multifilament yarns, spun yarns and the like. The warp yarns are woven in a reverse leno weave with each elastic yarn being leno woven with a doup yarn of said other set. Adjacent elastic yarns are disposed on opposite faces of the fabric and the outermost or edge leno woven elastic yarns are disposed on the same face of the fabric and are woven in a reverse leno weave with respect to each other. Preferably monofilament filling yarns are used in the fabric of the present invention and an odd number of filling yarns are woven between each leno crossing of the warp yarns.

When monofilament filling yarns are used it is preferred that the outer edges of the fabric be woven with texturized yarns to produce smooth, soft outer edges. This may be accomplished by using one or more elastic warp yarns and a plurality of texturized yarns along the outer edges of the fabric. These warp yarns are woven with the filling yarns in a three-by-one weave to produce a rounded edge with the edge completely covered by the texturized yarns.

In one embodiment of the waistband fabric of the present invention synthetic texturized yarns are included in the warp set. These texturized yarns are woven so as to float on one surface of the waistband to produce a plush, smooth and soft surface.

DESCRIPTION OF THE DRAWINGS

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

FIG. 1 is a view in perspective of a portion of a narrow elastic fabric waistband of the present invention;

FIG. 2 is an enlarged plan view showing the leno weave of the narrow elastic fabric of the present invention;

FIG. 3 is a cross-sectional view of the outer edge of an embodiment of the narrow elastic fabric waistband; and

FIG. 4 is an enlarged plan view of another embodiment of the leno weave of a narrow fabric waistband of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings, in FIG. 1 there is shown in perspective a narrow elastic fabric waistband **10** of the present invention. The waistband comprises a center portion **11** running in the longitudinal direction of the fabric and it is this center portion which contains the new and improved structure of the present invention. The fabric also has two edge portions **12** and **13** and these outer edge portions may be constructed differently depending on the desired characteristics of the edge portions.

Referring more specifically to FIG. 2 the center portion comprises two sets of warp yarns. One of the sets of warp yarns contains elastic yarns **15, 15', 15''** . . . ; that is, either a rubber yarn or a spandex yarn. These elastic yarns are covered with other yarns such as nylon, polyester, etc. to give the elastic yarn desired fabric properties.

The other set of warp yarns or the doup yarns comprises any of the standard yarns **16, 16', 16''** . . . other than the elastic yarns described above. This set of warp yarns may be texturized or stretch yarns, miltifilament yarns, monofilament yarns, spun yarns and the like. The yarns may be made from nylon, polyester, rayon, cotton, etc.

The two sets of warp yarns are woven in a reverse leno weave with each elastic yarn **15, 15'** . . . leno woven with a doup yarn **16, 16'** . . . . The twisting thread in the leno weave or the doup yarn is the nonelastic yarn. As seen in the drawings starting on the right hand side of the drawing the first leno woven elastic yarn **15** has the doup yarn **16** crossing over from the left to the right hand side of the yarn and then back from the right to the left hand side of the elastic yarn. The next elastic yarn **15'** has the doup yarn **16'** passing beneath the elastic yarn and going from the right to the left hand side and from the left back to the right hand side so that the twisting yarns or doup yarns **16** are in a reverse position or a reverse leno weave. The first elastic yarn **15** is on the back surface of the fabric as seen in the drawing and the next elastic yarn **15'** is on the top surface of the fabric as seen in the drawings. The reverse leno woven structure is continued across the width of the fabric with adjacent elastic yarns being woven so as to be on opposite faces of the fabric. The

reverse leno weave is continued across the fabric to the other edge and the last leno woven elastic yarn **15''''''** is woven so that it is on the same face as the first leno woven elastic yarn **15** but is in a reverse leno weave with respect to the first leno woven elastic yarn.

The above described structure is critical to the present invention in order to produce an open lightweight fabric which is completely balanced and stable. Without this structure one edge of the fabric will contract more than the other edge of the fabric and the fabric will be curvilinear. Also without this structure the yarns will not be stable with respect to each other and will shift when the fabric is washed or dry cleaned. In our new fabric there is an odd number of leno woven elastic warp yarns with adjacent yarns being on opposite surfaces of the fabric and with adjacent elastic yarns woven in a reverse leno weave. The outermost leno woven yarns are on the same surface of the fabric and woven in a reverse leno weave with respect to each other.

The leno woven warp yarns are woven with filling yarns. It is preferred that the filling yarns be monofilament yarns to provide the necessary stiffness in the widthwise direction of the fabric so that the fabric will be suitable as a waistband and will prevent rollover about the outer edge of the garment to which it is attached. The monofilament yarns may be nylon, polyporpylene or any of the other well-known monofilament yarns. The monofilament filling yarns are woven with the warp yarns in a plain one-by-one weave with an odd number of filling yarns (in this embodiment three), between each reverse or twist of the leno yarns.

It is preferred that the outer edges **12** and **13** of the narrow elastic fabric of the present invention comprise one or more elastic yarns of the same type as are used in the center portion of the fabric, and a plurality of texturized yarns. The texturized yarns and the elastic yarns run in the longitudinal or warp direction of the fabric and the texturized yarns are disposed about the greater portion of the periphery of the outermost elastic yarns. The elastic yarns and texturized yarns are woven with the filling yarns in any suitable weave that will hold the filling yarns in place such as a three-by-one weave or the like. The texturized yarns produce a soft, smooth outer edge and cover and bend areas of the monofilament filling yarns which are quite harsh. In FIG. **3** there is shown a cross-sectional view of such a desired outer edge with the center yarn **20** being the elastic yarn and the outer yarns **21** being texturized yarns woven alternately with the monofilament filling yarn **22.**

Generally the number of warp yarns per inch in the body of the fabric will be from about **10** to **30** warp yarns per inch with half of these being elastic yarns and the other half being nonelastic yarns. The number and size of warp yarns used and how many filling yarns are woven between each twist will control the openness and appearance of the final fabric.

The preferred filling yarns are monofilament yarns from about 400 to 1200 denier usually around the 850 denier range for narrow width fabric of one inch or less and 1100 denier for fabrics having a width of one inch or more. The lower denier yarn does not offer the desired stability and too high a denier yarn is very difficult to bend to make the edge of the fabric and will cause many loom breakdowns. Low denier filling yarns may be used if the fabric is made on a needle loom as opposed to a standard weaving loom. The difference being that in the needle loom two fillings weave as one filling yarn. As seen in FIG. **4** there are six filling yarns **25** between each leno twist with a pair of filling yarns weaving in exactly the same manner. When producing such a fabric deniers as low as 300 denier of 8 mil or even lower may be used. The needle loom fabric **30** shown in FIG. **4** comprises elastic yarns **31** which are reverse leno woven with doup yarns **32.** Adjacent elastic yarns are disposed on opposite faces of the fabric and the outermost leno woven elastic yarns are disposed on the same face of the fabric but are woven in a reverse leno weave with respect to each other.

The narrow elastic fabric utilizing the critical essence of the present invention wherein elastic yarns are reverse leno woven with nonelastic yarns and adjacent elastic yarns are on opposite faces of the fabric and the outermost leno woven elastic yarns are on the same face of the fabric but are reverse leno woven with respect to each other has excellent stability even though it is very open and light-weight. The resultant fabric will not rope, is resilient, has stiffness in the widthwise direction and produces an excellent waistband especially for lighterweight garments.

In various types of apparel such as bathing suits and the like the waistband may contact the skin of the wearer. When such is the case it is desired that the waistband have a plush, smooth and soft surface to reduce irritation and be more confortable. Our new waistbnad may be provided with a plush surface by incorporating synthetic texturized yarns in the center portion of the fabric. The texturized yarns are warp yarns and from one to four or more texturized yarns may be disposed between adjacent leno woven warp yarns. The texturized warp yarns are floated on one surface of the waist-band by weaving these yarns with the filling yarns in a satin weave and floating these yarns over from four to nine adjacent filling yarns and preferably from five to seven adjacent filling yarns. If the texturized yarns are floated over less than four adjacent filling yarns they do not produce a plush and soft surface. If the texturized yarns are floated over more than nine adjacent filling yarns they will snag, get caught and possible break in use. Any of the synthetic texturized yarns may be used to produce the plush surface, such as texturized nylon yarns, texturized polyester yarns, and the like.

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

EXAMPLE

Two warp sets are made to weave a narrow elastic fabric in accordance with the present invention. The fabric is to have a width of approximately 1½ inches and one of the warp sets comprises 15 elastic yarns with each yarn having a spandex core of approximately 1680 denier which has been initially wrapped with 100 denier multifilament nylon yarn and top covered with one end of 20's polyester yarn. The other warp set or doup yarns comprises fifteen 200 denier nylon multifilament yarns. The filling yarns used are 850 denier monofilament nylon yarns. The two warp sets and the filling yarns are woven as shown and described in conjunction with FIG. **2** to form the center portion of the fabric. Along each outer edge of the center portion of the fabric there are woven two elastic warp yarns simi-

lar to the yarns used in the center portion and eight texturized nylon warp yarns. The two elastic yarns and the eight texturized nylon yarns are woven with the filling yarns in a three-by-one weave with the texturized nylon yarns disposed about the periphery of the elastic yarns. The resultant fabric is open and lightweight. It is very stable and the yarns do not shift or move with respect to one another. The fabric is stiff and resilient in the widthwise direction and makes an excellent waistband.

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 lightweight narrow elastic waist-band fabric comprising two sets of warp yarns, the yarns of one of said warp yarns being elastic yarns selected from the group consisting of rubber core yarns and spandex core yarns, the yarns of the other of said warp set being doup yarns selected from the group consisting of stretch or texturized yarns, filament yarns and spun yarns, a plurality of said warp yarns woven in a reverse leno weave with each elastic yarn leno woven with a doup yarn, adjacent elastic yarns being leno woven alternately under and over the doup yarns so as to be disposed on opposite faces of the fabric and the outermost leno woven elastic yarns being disposed on the same face of the fabric and woven in a reverse leno weave with respect to each other.

2. A lightweight narrow elastic waistband fabric having a center portion and two longitudinal edge portions, the center portion comprising two sets of warp yarns, the yarns of one of said warp sets being elastic yarns selected from the group consisting of rubber core yarns and spandex core yarns, the yarns of the other of said warp sets being doup yarns selected from the group consisting of stretch or texturized yarns, filament yarns and spun yarns, said warp yarns of the center portion woven in a reverse leno weave with each elastic yarn leno woven with a doup yarn, adjacent elastic yarns being leno woven alternately under and over the doup yarns so as to be disposed on opposite faces of the fabric, the outermost leno woven elastic yarns of the center portion being disposed on the same face of the fabric and woven in a reverse leno weave with respect to each other, each edge portion of the fabric comprising at least one elastic warp yarn and a plurality of texturized warp yarns, and a set of filling yarns woven with the two warp sets of the center portion and with the warp yarns in both outer edges of the fabric.

3. A narrow elastic fabric according to claim **2** wherein the elastic warp yarns have a spandex core wrapped with nylon multifilament yarns.

4. A narrow elastic fabric according to claim **2** wherein the filling yarns are monofilament nylon yarns.

5. A narrow elastic fabric according to claim **2** wherein three filling yarns are woven between each twist of the leno weave.

6. A narrow elastic fabric according to claim **2** wherein six filling yarns are woven between each twist of the leno weave with the filling yarns weaving as three pairs of yarns.

7. A narrow elastic fabric according to claim **2** wherein from five to 20 warp yarns per inch are used in each warp set in the center portion of the fabric.

8. A narrow elastic fabric according to claim **2** wherein the elastic warp yarns have a spandex core wrapped with nylon multifilament yarns, the doup yarns are multifilament nylon yarns and the filling yarns are monofilament nylon yarns.

9. A narrow elastic fabric according to claim **8** wherein there are three filling yarns between each twist of the leno woven warp yarns.

10. A narrow elastic fabric according to claim **2** wherein the elastic yarns are spandex core yarns wrapped with nylon multifilament yarns, the filling yarns are monofilament nylon yarns, each warp set in the center portion of the fabric contains from five to 20 warp yarns per inch, and three filling yarns are woven with the warp yarns in the center portion of the fabric between each twist of the leno woven warp yarns.

11. A narrow elastic fabric according to claim **2** wherein the monofilament filling yarns have a denier of from 400 to 1200.

12. A narrow elastic fabric according to claim **2** wherein synthetic texturized yarns are incorporated in the center portion of the fabric in the warp direction and the texturized yarns are woven with the filling yarns in a satin weave and float over from four to nine adjacent filling yarns.

13. A narrow elastic fabric according to claim **12** wherein the synthetic texturized yarns are nylon yarns.

14. A narrow elastic fabric according to claim **12** wherein from one to four synthetic texturized yarns are disposed between adjacent pairs of leno woven yarns.

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