United States Patent [19]

Campbell et al.

[11] **3,858,622**

[45] **Jan. 7, 1975**

[54] **NARROW ELASTIC FABRIC FOR APPAREL WAISTBANDS**

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[73] Assignee: **Johnson & Johnson**, New Brunswick, N.J.

[22] Filed: **June 14, 1973**

[21] Appl. No.: **370,103**

[52] **U.S. Cl.** **139/421**, 2/237

[51] **Int. Cl.** **D03d 15/08**, A41d 1/06

[58] **Field of Search** 139/421-423; 2/237, 236, 221; 161/77

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Primary Examiner—James Kee Chi

[57] **ABSTRACT**

A narrow elastic fabric suitable for use in the band encircling portion of articles of apparel. The fabric comprises a set of filling yarns running in the transverse direction of the fabric and a set of warp yarns running in the longitudinal direction of the fabric. The warp yarns comprise elastic yarns, stretch synthetic yarns and nonelastic yarns. There are twice as many stretch synthetic yarns as there are elastic yarns and three times as many nonelastic yarns as there are stretch yarns in the warp set. The nonelastic yarns are woven with the filling yarns in a twill weave whereas the remaining warp yarns are woven with the filling yarns in a plain weave so that the face surface of the fabric is primarily composed of nonelastic yarns.

7 Claims, 14 Drawing Figures

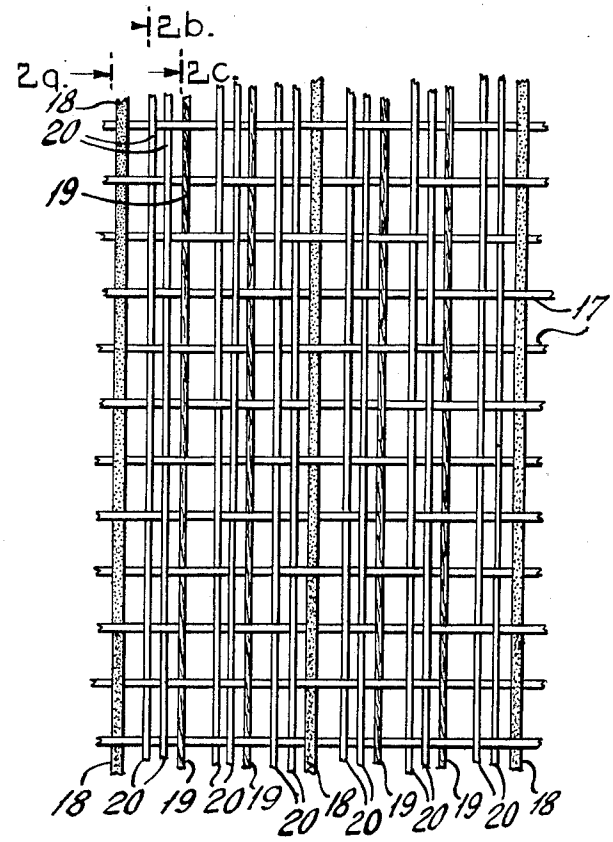


Fig. 1.

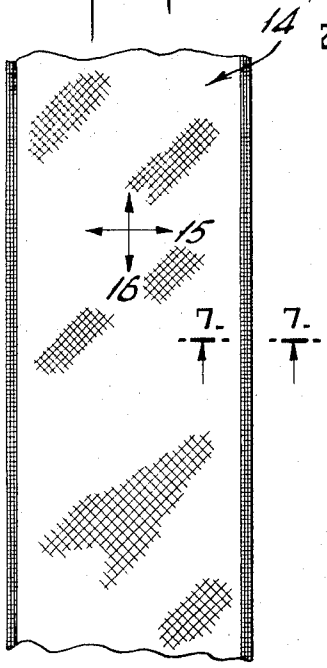


Fig. 2.

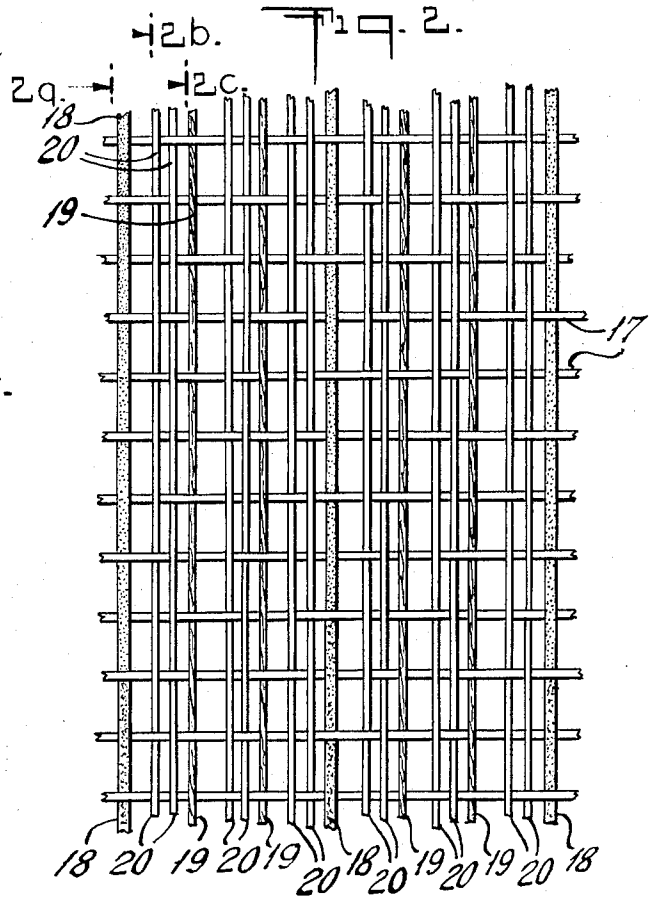


Fig. 2a.

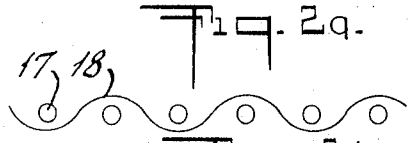


Fig. 2b.

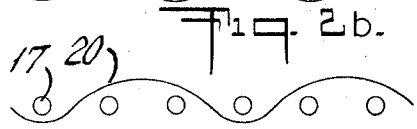


Fig. 2c.

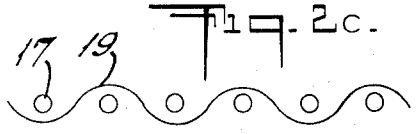


Fig. 3.

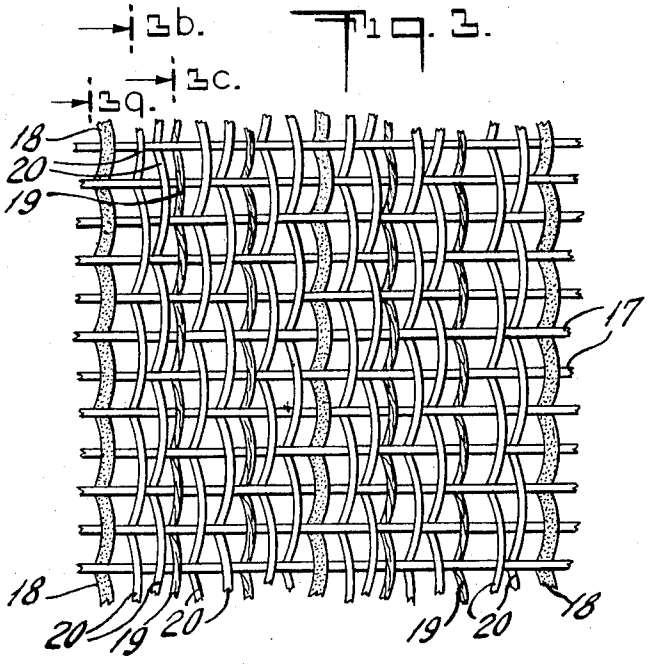


Fig. 3a.

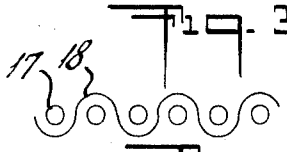


Fig. 3b.

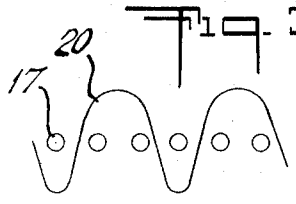


Fig. 3c.

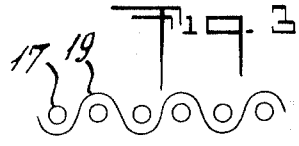


Fig. 4.

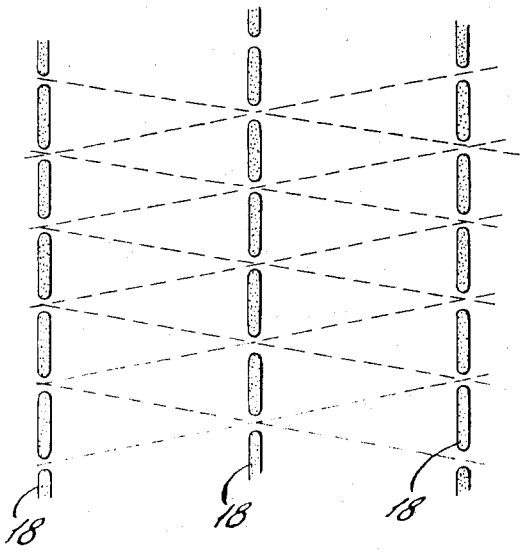


Fig. 5.

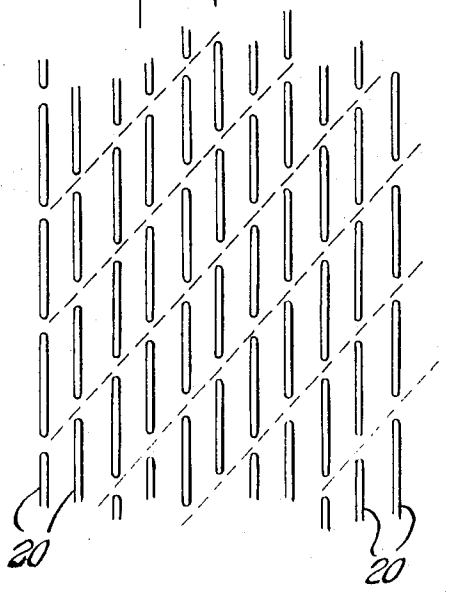


Fig. 6.

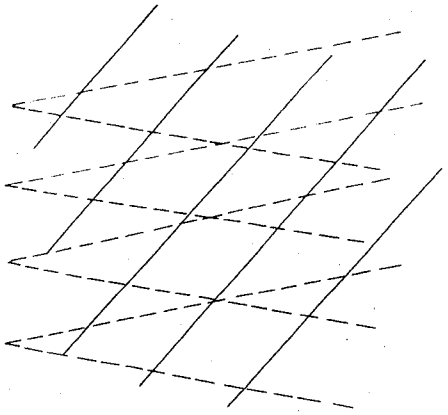
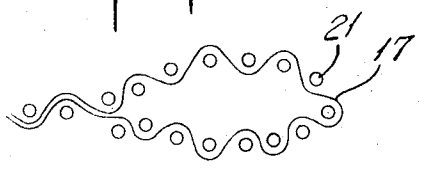


Fig. 7.



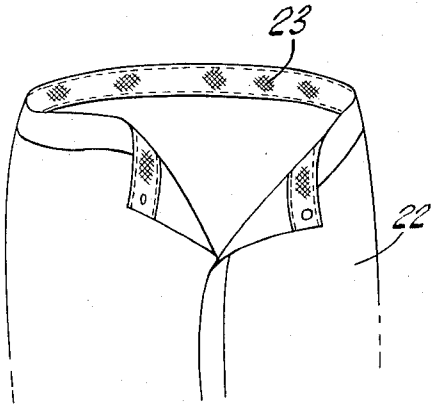


Fig. 8.

NARROW ELASTIC FABRIC FOR APPAREL WAISTBANDS

This invention relates to 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 modulous of elasticity required in the elastic fabric. The amount of stretch and the modulous of elasticity of an elastic fabric for use in a girdle will be different than that desired for use in trousers. Also the amount of elasticity and modulous of elasticity required in the leg encircling portion of a garment may be different than 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 modulous of elasticity may be varied.

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. One such technique is to place a curvilinear or concave cross-section in the waistband.

With the advent of the use of such materials as double knit fabrics in trousers some stretch fabrics have been developed for use in the waistbands of these garments to provide the required stiffness and stretch. Some of these stretch fabrics have been developed to correct the rollover problem; however, the prior art products are heavy, have considerable thickness and are difficult to incorporate in the trouser so as to present a nice appearance. This is especially true in the lighter weight or summer weight trousers.

SUMMARY OF THE INVENTION

We have discovered an improved narrow elastic fabric which is suitable for use in the band encircling portion of articles of clothing to prevent unsightly rollover. Our new fabric is very thin, almost see-through, and lightweight. It has excellent wall stability to prevent the rollover and excellent resiliency or snapback when creased or bent. Our new waistband has good washability and minimum shrinkage.

Though monofilament filling yarns are used in the transverse direction of the fabric to provide the desired wall stability and prevent rollover our new fabric has excellent coverage of these monofilament yarns and unexpectedly has excellent resiliency even though monofilament yarns are used. Also our new fabric has a satin appearing surface to allow it to be used by itself in the article of wearing apparel.

Our new fabric has a face surface and a back surface and is woven from a set of filling yarns running in the transverse direction of the fabric and a set of warp yarns running in the longitudinal direction of the fabric The set of warp yarns comprise elastic yarns, stretch

synthetic yarns and nonelastic yarns. There are twice as many stretch synthetic yarns as there are elastic yarns in the warp set and there are three times as many nonelastic yarns as there are stretch synthetic yarns in the warp set. The nonelastic warp yarns are woven with the filling yarns in a twill weave preferably a two over one twill weave. This twill weave causes the face surface of the fabric to be primarily composed of the nonelastic yarns and provides this surface with a pleasing appearance. The stretch synthetic yarns are woven with the filling yarns in a plain one by one weave and the elastic yarns are woven with the filling yarns in a plain one by one weave. There are at least two stretch synthetic yarns used between elastic yarns. The above described weaving of the stretch synthetic yarns and the elastic yarns provides a complimentary diamond pattern to the pattern of the nonelastic yarns on the face surface to give a satin appearance to the fabric. The weave as described above provides the face surface with frictional characteristics which prevent slippage and give excellent coverage of the filling yarns so that they are not readily apparent in the final fabric. Furthermore the specific weave unexpectedly provides resiliency in the transverse direction of the fabric even though the fabric is thin and lightweight.

DESCRIPTION OF THE DRAWINGS

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

FIG. **1** is a plan view of a portion of a narrow elastic fabric of the present invention.

FIG. **2** is an enlarged plan view of a portion of the narrow elastic fabric of the present invention in the stretched state as woven.

FIG. **2***a* is a cross-sectional view taken at line **2***a* of FIG. **2**.

FIG. **2***b* is a cross-sectional view taken at line **2***b* of FIG. **2**.

FIG. **2***c* is a cross-sectional view taken at line **2***c* of FIG. **2**.

FIG. **3** is an enlarged plan view of a portion of the narrow elastic fabric of the present invention in the relaxed state.

FIG. **3***a* is a cross-sectional view taken at line **3***a* of FIG. **3**.

FIG. **3***b* is a cross-sectional view taken at line **3***b* of FIG. **3**.

FIG. **3***c* is a cross-sectional view taken at line **3***c* of FIG. **3**.

FIG. **4** is a schematic plan view showing the weave of the elastic yarns.

FIG. **5** is a schematic plan view showing the weave of the nonelastic yarns.

FIG. **6** is a schematic view showing the twill patterns formed by the elastic yarns and the nonelastic yarns.

FIG. **7** is an enlarged cross-sectional view of the edge portion of the narrow elastic fabric of the present invention taken along line **7—7** of FIG. **1**.

FIG. **8** shows a portion of a pair of trousers incorporating the narrow elastic fabric waistband of the present invention.

DETAILED DESCRIPTION OF DRAWINGS

Referring to the drawings in FIG. **1** there is shown a plan view of the narrow elastic fabric **14** of the present invention. The filling yarns run in the transverse direc-

tion **15** of the fabric and the warp yarns run in the longitudinal direction **16** of the fabric.

As is more clearly seen in FIG. **2** (stretched state) and FIG. **3** (relaxed state) the filling yarns **17** are monofilament yarns to provide the necessary wall stability in the transverse direction of the yarns. Monofilament yarns are preferred because they have the desired stiffness. Monofilament yarns approximately 13 mils or 850 denier are suitable to form the thin lightweight narrow elastic fabrics of the present invention. Nylon yarns are preferred though polyester or other synthetic monofilaments yarns may be used.

Woven with the filling yarns are the elastic warp yarns **18,** the stretch synthetic yarns **19,** and the nonelastic warp yarns **20.** The nonelastic warp yarns are woven so as to be on the face surface of the fabric. As is more clearly seen in the cross-sectional views FIGS. **2***a*, *b*, and *c* and FIGS. **3***a*, *b*, and *c* the elastic yarns **18** and the stretch yarns **19** contract when the fabric is relaxed. However, the nonelastic yarns **20** are bulked or raised when the fabric is allowed to relax.

Preferably the nonelastic yarns are bright nylon multifilament yarns and are woven with the monofilament filling yarns in a two by one twill weave; that is, with the warp yarn passing over two fillings then under one filling yarn as shown in FIGS. **2***b* and **3***b*, with every fourth nonelastic warp yarn being a repeat. This twill weave produces a very pleasing pattern on the face surface of the fabric as depicted in FIG. **5.**

It is preferred that the nonelastic warp yarns be a bright fiber to give a satiny appearance. Suitable yarns would be multifilament bright nylon yarns having ten twists per inch and being from about 100/20/10 to 100/65/10 . One hundred denier yarn having a denier per filament of 1.5 to 5 are satisfactory for forming the face surface of the fabric.

The elastic yarns **18** and the stretch synthetic yarns **19** are woven as shown in FIGS. **2** and **3** and form the back surface of the fabric. Twice as many stretch synthetic yarns are used as elastic yarns with at least two stretch synthetic yarns woven in between adjacent elastic yarns as shown in the drawings. The stretch synthetic yarns are preferably stretch nylon through stretch polyester yarns and the like may also be used. Suitable stretch nylon are 70's/2.

The elastic yarns used are Spandex core yarns about size 1680 wrapped with 70's/2 stretch nylon with both a top and a bottom wrap for good coverage of the Spandex core.

Both the elastic yarn and the stretch synthetic yarns are woven in a one by one plain weave; however, by placing two stretch synthetic yarns between adjacent elastic yarns a complimentary diamond pattern is formed by the elastic yarns also on the face surface of the narrow elastic fabric as schematically shown in FIG. **4.** The complimentary patterns shown in FIG. **6** give excellent coverage of the monofilament filling yarns and provide excellent support to the monofilament filling yarns which it is theorized unexpectedly improves the wall stability and the resiliency of the entire fabric.

In weaving our new elastic fabric approximately 34 picks or filling yarns per inch are woven into the fabric so that the finished fabric contains about 48 filling yarns per inch or maybe even more. The warp count of the fabric is generally in the ratio of 312 nonelastic multifilament warp yarns, 104 stretch synthetic warp yarns and **52** elastic yarns so that the ratio is about 6 : 2 : 1 respectively. These numbers are for 2½ inch wide fabric.

When using monofilament filling yarns they bend over themselves in forming the selveges of the fabric and become quite harsh and rough and can be uncomfortable to the wearer when the fabric is placed in the article of wearing apparel. To overcome this edge roughness in the narrow elastic fabric the edges are woven as is shown in FIG. **7.** Where the monofilament filling yarn **17** bends about itself to form the next filling, stretch synthetic yarns **21** such as stretch nylon, preferably 70/2 nylon, are woven in a tubular weave with this edge of the filling yarn. Generally anywhere from 10 to 20 stretch synthetic yarns are woven in each edge to produce desirable coverage in the edge and generally the weave is a three over one weave to give the desired coverage. More stretch yarns may be woven in one edge than in the other edge to give the desired balance during the weaving operation.

In FIG. **8** there is shown the waist encircling portion of a pair of trousers **22** with the narrow elastic fabric **23** in accordance with the present invention sewn to the inside waist portion of the trousers to form the final waistband of the trousers.

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

What is claimed is:

1. A thin, lightweight, narrow elastic fabric having a face surface and a back surface and suitable for use in the band encircling portion of an article of apparel, said fabric comprising a set of monofilament filling yarns running in the transverse direction of the fabric and a set of warp yarns running in the longitudinal direction of the fabric, said set of warp yarns comprising elastic yarns, stretch synthetic yarns, and nonelastic yarns, there being twice as many stretch synthetic yarns as there are elastic yarns in the warp set and three times as many nonelastic yarns as there are stretch yarns in the warp set, said nonelastic yarns being woven with said filling yarns in a twill weave to form the face surface of said fabric, said face surface being primarily composed of said nonelastic yarns to form a twill pattern on the face surface, said stretch synthetic yarns and said elastic yarns being woven with said filling yarns in a plain weave with at least two stretch synthetic yarns being disposed between adjacent elastic yarns to form the back surface of said fabric, said elastic yarns forming a complimentary diamond pattern on the face surface of said fabric whereby the monofilament filling yarns are covered and stabilized in the fabric.

2. A narrow elastic fabric according to claim **1** wherein the filling yarns are 13 mil monofilament nylon yarns.

3. A narrow elastic fabric according to claim **1** wherein the elastic yarns are 1680 Spandex yarns wrapped top and bottom with nylon yarns.

4. A narrow elastic fabric according to claim **1** wherein the stretch synthetic yarns are stretch nylon yarns.

5. A narrow elastic fabric according to claim **1** wherein the nonelastic yarns are multifilament nylon yarns.

6. A narrow elastic fabric according to claim 1 wherein the filling yarns are 13 mil monofilament nylon yarns, the elastic yarns are 1680 Spandex core yarns wrapped with stretch nylon yarns top and bottom, the stretch synthetic yarns are stretch nylon yarns and the nonelastic yarns are bright nylon multifilament yarns of 100 denier.

7. A narrow elastic fabric according to claim 1 wherein the set of warp yarns includes stretched nylon yarns along each edge of the warp set said yarns being woven with the filling yarns in a tubular weave to cover the sharp edges of the monofilament filling yarns.

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