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Duckworth

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[54] **PANTY HOSE GARMENT HAVING ANTISTATIC PROPERTIES**

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[51] **Int. Cl.** **D04b 1/24,** D04b 9/12

[58] **Field of Search** ..... 66/177, 176, 194, 66/198, 182, 191; 2/224 R, 224 A

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Primary Examiner—Wm. Carter Reynolds
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[57] **ABSTRACT**

An improved panty hose garment is prepared having a panty portion containing cotton yarn in non-consecutive courses and yarn of synthetic resin such as nylon in the intervening courses. The course of cotton yarn is formed so that loops of the cotton yarn protrude from the inner surface of the hosiery fabric. The presence of the cotton yarn eliminates or reduces static electricity and thereby prevents outer garments from clinging to the wearer.

10 Claims, 3 Drawing Figures

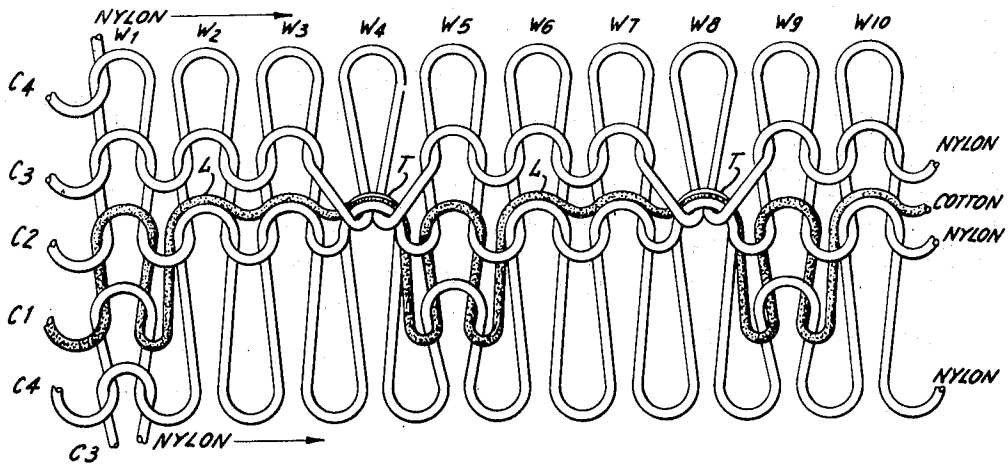
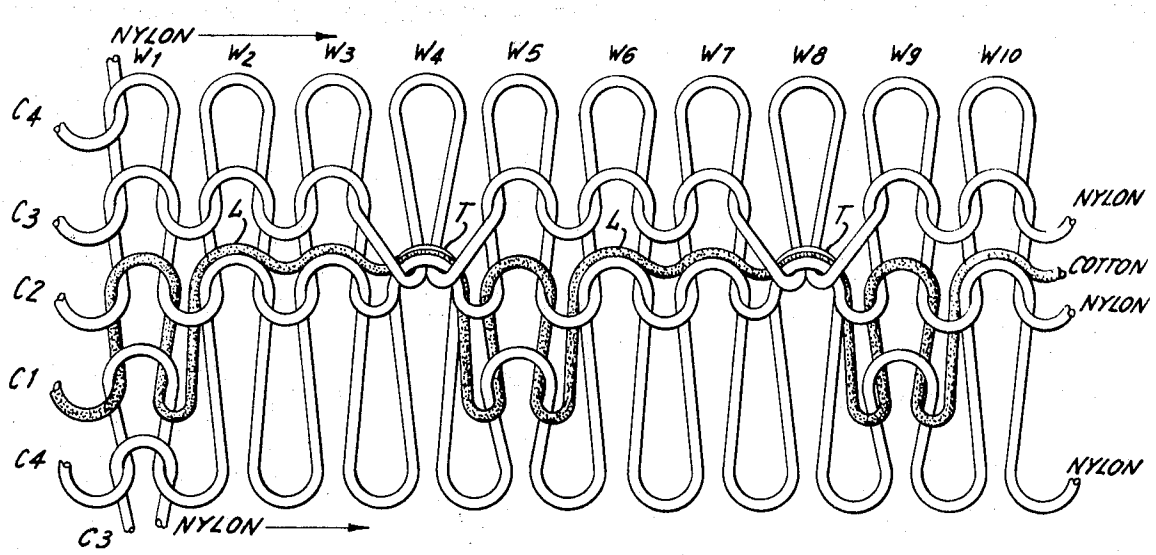


FIG. 1



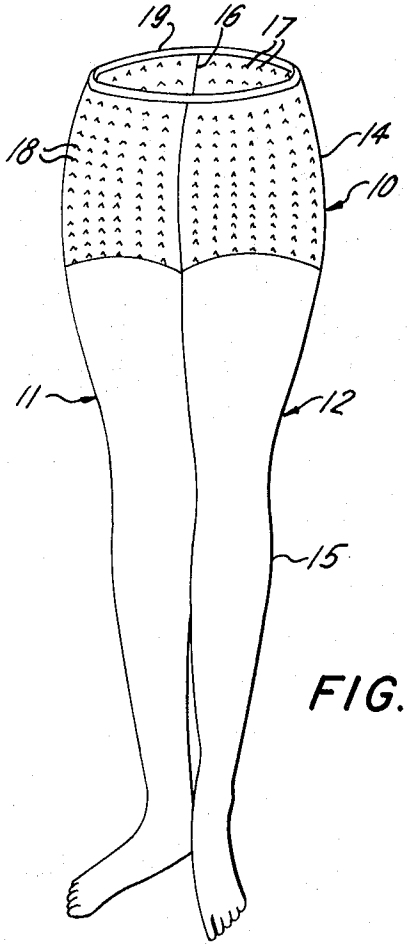
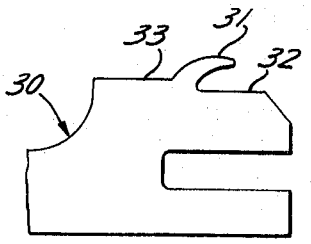


FIG. 2

FIG. 3



PANTY HOSE GARMENT HAVING ANTISTATIC PROPERTIES

This invention relates to a panty hose garment having cotton yarn knitted in non-consecutive courses of the panty portion so as to eliminate or reduce static electricity and thus prevent clothing worn over the panty hose from clinging to the wearer.

Heretofore panty hose garments have been prepared by sewing together the upper portions of two elongated nylon stockings. In typical procedures such as disclosed in U.S. Pat. No. Re. 25,360, issued Mar. 26, 1963 and U.S. Pat. No. 3,449,932, issued June 17, 1969, a pair of elongated stockings having upper tubular sections knitted as a continuation of the regular stocking part are knitted on a circular knitting machine; slits are made in the upper tubular section and the slit areas are sewn together to form a panty portion. A problem which has arisen with panty hose produced to date is that static electric charges build up as the wearer moves about, causing garments such as slips or skirts, which are worn over the panty hose, to cling to and ride up on the wearer.

In accordance with the present invention, panty hose garments are prepared which eliminate or reduce the build up of static electricity by incorporating cotton yarn into the panty portion so that cotton loops protrude from its inner surface and the stretch and strength of the panty portion is not adversely affected. The panty hose garment is made by combining in a known manner two elongated stockings having upper tubular sections containing non-consecutive courses of cotton. Preferably, these upper tubular sections comprise non-consecutive courses of cotton yarn which are knitted in selected spaced wales and floated across a plurality of intervening wales, excess cotton being present in the floated portions so that loops of cotton are formed on the inside of the fabric and at least one course of synthetic resin yarn following each course of cotton yarn. In a particularly preferred embodiment, the course of synthetic resin yarn immediately following each course of cotton yarn is formed with tuck loops in spaced wales and into knitted stitches in the intervening wales with the tuck loops serving to tie the floating cotton yarn into the fabric.

The invention will be more readily understood when the following detailed description is read in conjunction with the accompanying drawings.

FIG. 1 is a fragmentary schematic view of a cotton yarn containing fabric used in the present invention;

FIG. 2 is a front perspective view of a panty hose garment embodying the principles of the present invention; and

FIG. 3 is a fragmentary view in side elevation showing the construction of a form of sinker used to knit the fabric of FIG. 1.

Referring now to FIG. 2, there is shown a panty hose garment 10 in which elongated stockings 11 and 12 are united in their upper portions to form a panty portion 14. To knit the elongated stockings 11 and 12 there is employed a conventional multifeed circular knitting machine having a set of latch needles and sinkers and cams to control the movements of the needles and sinkers. The elongated stockings 11 and 12 are individually knit so as to have a lower portion 15 which is substantially similar to a conventional stocking and is designed to fit the leg and foot of the wearer, and an upper tubular section knit as a continuation of said lower portions and which is used in forming the panty portion 14. To form the panty portion 14 the upper tubular sections of the stockings are slit and then joined together by a seam 16. A waistband 19 is then attached to the top of the panty hose garment.

The upper tubular sections of the elongated stockings are preferably formed by feeding cotton yarn in one or more feeds, but never adjacent feeds, of a multifeed circular knitting machine, i.e., incorporating the cotton yarn into non-consecutive courses, and knitting the cotton yarn in spaced wales while floating the yarn across a plurality of intervening wales. An excess of cotton yarn is drawn into the floated portions so that loops 17 of cotton protrude from the inside surface of the stockings and a design is formed on the outside surface by the knitted stitches of cotton 18. The cotton is floated across at least two wales and up to eight or more wales. A suitable procedure for incorporating the cotton yarn is to feed the yarn to the needles with the needles which are to knit being raised to "clear level," i.e., the needle is raised to a level which clears the yarn of the previous course from its latch, and the needles which are to form the floating portions being raised to "tuck level," i.e., the needle is raised to take yarn while retaining a loop of yarn on its latch. Cotton yarn is then drawn on all needles with the loops of yarn drawn by the adjacent needles raised to tuck level merging into a large tuck loop which floats on the inside of the fabric.

At the remaining feeds of the knitting machine, synthetic resin yarn is fed so that the upper elongated portion of the stocking is formed with at least one course of synthetic resin yarn intervening the non-consecutive courses of cotton yarn. The synthetic resin yarn can be a conventional yarn used in the manufacture of panty hose garments. It is preferably made of nylon, but other synthetic resins such as polyethylene terephthalate, spandex and copolymers of vinyl chloride and acrylonitrile can be used, as well as combinations of two or more of the synthetic resin yarns. The denier and number of filaments of the yarn are selected in accordance with the appearance and physical properties desired and can vary over a wide range. The synthetic resin yarn can be modified by conventional procedures to impart desired properties to the panty hose, such as false twisted to impart stretchability.

The lower portion 15 of the elongated stocking is usually made entirely of a synthetic resin yarn such as conventional nylon hosiery yarn. Generally, a more sheer appearance is desired in the lower portion 15 of the stocking than in the panty portion, and it is usually formed from a lower denier yarn. The cotton loops of the panty portion create a pleasing decorative appearance and if desired the same type of knitting construction can be used in all or part of the lower portion 15. In a typical panty hose garment made in accordance with the present invention with a sheer appearance in the leg covering portion and a fabric of the construction illustrated in FIG. 1 in the panty portion, the lower portion 15 was formed of 21 denier, 3 filament nylon yarn with alternate rows of yarn being false twisted in opposite directions and the panty portion 14 was formed of a repeating pattern in which the first course was 60 denier cotton yarn and the following three courses were 40 denier, 13 filament nylon yarn, with the nylon yarn of the middle course being false twisted

in the S direction and the two other nylon yarns being false twisted in the Z direction.

When cotton yarn is floated across a plurality of wales, as previously described, the resulting loose cotton yarn sometimes fouls the operation of the needle latches. To overcome this problem, in a preferred embodiment of the present invention the course of synthetic resin yarn immediately following each course of cotton yarn is not formed completely of knitted stitches but is formed with tuck loops in spaced wales which tie a segment of the floated lengths of cotton yarn into the hosiery fabric.

Fabric of the preferred embodiment can be knitted using a sinker such as sinker **30** shown in FIG. **3.** In addition to the usual neb **31** and sinking ledge **32** located in front of the neb, sinker **30** has a sinking ledge **33** located behind the neb. The course of cotton yarn is drawn on the sinking ledge **32** located in front of the neb **31** by all needles with non-adjacent needles being raised to "clear level" and the intervening needles being raised to "tuck level." The course of synthetic yarn immediately following the course of cotton yarn is drawn on all needles on the sinking ledge **33** located behind the neb **31** with tuck loops being formed in the spaced wales, these spaced wales being other than the wales in which knitted stitches were formed in the preceding course of cotton yarn. The tuck loops thus formed serve to tie a segment of the floated lengths of cotton yarn into the fabric.

FIG. **1** illustrates a particularly outstanding cotton-containing hosiery fabric construction prepared in accordance with the present invention. Nylon is shown as the synthetic resin yarn but, of course, other synthetic resin yarns can be used if desired. The fabric is knitted on a four-feed circular knitting machine such as the "Reading" Mark IV made by the Textile Machine Works Division of North American Rockwell Corporation, equipped with sinkers of the type shown in FIG. **3** and programmed so as to have a repeating four-course pattern. Cotton yarn is fed at the first feed to form course **C1** and nylon yarn at the other three feeds to form courses **C2, C3** and **C4.** The cotton yarn is drawn on all needles on the sinking ledge **32** located in front of the neb **31** and is knitted in every fourth wale beginning with wale **1,** i.e., in wales **W1, W5, W9, W13,** etc., (needles forming knitted stitches are raised to "clearing level" and other needles to "tuck level"). Loops of cotton L are formed which protrude from the inside surface of the hosiery fabric. The nylon yarn in the course immediately following the cotton yarn (course **C2**) is drawn on sinking ledge **33** on all needles in a three by one tuck pattern so that it is formed into tuck loops T in every fourth wale beginning with wale **4,** i.e., wales **W4, W8, W12, W16,** etc., and into knitted stitches in all other wales the tuck loops T serving to tie a segment of the cotton loops L into the fabric leaving a floating portion of loops L which extends across two wales. The nylon yarn of course **C3** is drawn on sinking ledge **32** located in front of the neb **31** and is knitted in every wale while the nylon yarn of course **C4** is drawn on sinking ledge **33** located behind neb **31** and is knitted in every wale. If desired, the tuck loops of course **C2** can be formed in wales **W2, W6, W10, W14,** etc. A variation which combines excellent results with a very pleasing appearance is to alternate the tuck loops of the nylon yarn immediately following the cotton yarn course so as to obtain the following eight-course repeating pattern:

a. A first course of cotton which is knitted in wales **1, 5, 9, 13,** etc.,

b. A second course of nylon formed into tuck loops in wales **4, 8, 12, 16,** etc.,

c. Third and fourth courses of nylon knitted in every wale,

d. A fifth course of cotton which is knitted in wales **1, 5, 9, 13,** etc.,

e. A sixth course of nylon formed into tuck loops in wales **2, 6, 10, 14,** etc., and

f. Seventh and eighth courses of nylon knitted in every wale.

Hosiery fabrics having a construction similar to that shown in FIG. **1,** but possessing increased stretchability have been prepared by replacing one or more of the nylon yarns with spandex yarn.

As a result of the presence of cotton loops on the surface of the panty portion, the panty hose garment of the present invention exhibits little or no tendency to build up static electricity. Additionally, the cotton-containing construction makes the panty hose garment softer, cooler and more water absorbent.

When the course of synthetic resin yarn immediately following the course of cotton yarn is formed into tuck loops in non-consecutive wales to tie in the floating lengths of cotton yarn, it is possible to omit the formation of knitted stitches of cotton yarn and simply float the entire course of cotton yarn. This is preferably accomplished by drawing cotton yarn with all needles raised to "tuck level." In the resulting structure the cotton yarn is entirely on the inside of the hosiery fabric. Good antistatic properties are obtained, but other properties, such as coolness and moisture transmission are not as good as obtained when the cotton yarn is knitted in non-consecutive wales.

It will be apparent that many modifications and variations can be effected without departing from the scope of the novel concepts of the present invention, and the illustrative details disclosed are not to be construed as imposing unnecessary limitations on the invention.

What is claimed is:

1. A panty hose garment of circularly knit fabric comprising a pair of knitted stocking parts having leg and foot portions and a panty portion, there being present substantially throughout said panty portion a cotton-containing circularly knit fabric having non-consecutive courses of cotton yarn in which said cotton yarn is floated across at least one-half of the wales of said courses as floating portions, which extend across at least two wales, of large tuck loops, the cotton yarn in said floating portions forming loops which protrude from the inner surface of the knitted fabric and at least one course of synthetic resin yarn following each course of cotton yarn.

2. A panty hose garment of circularly knit fabric comprising a pair of knitted stocking parts having leg and foot portions and a panty portion, there being present substantially throughout said panty portion a cotton-containing circularly knit fabric having non-consecutive courses of cotton yarn in which said cotton yarn is knitted in selected spaced wales and floated across a plurality of intervening wales as floating portions, which extend across at least two wales, of large tuck loops, the cotton yarn in said floating portions forming loops which protrude from the inner surface of

the knitted fabric and at least one course of synthetic resin yarn following each course of cotton yarn.

3. A panty hose garment as claimed in claim **2** wherein the course of synthetic yarn immediately following each course of cotton yarn is formed of tuck loops in spaced wales, said tuck loops of synthetic resin yarn serving to tie a segment of said large tuck loops of cotton yarn into said circularly knit fabric.

4. A panty hose garment as claimed in claim **2** wherein said cotton-containing circularly knit fabric has the following repeating pattern:

a. A first course of cotton yarn which is formed into knitted stitches every fourth wale in wales **1, 5, 9, 13,** etc. and formed into large tuck loops which extend across the intervening wales and include a floating portion extending across two wales, the cotton yarn in said floating portions forming loops which protrude from the inner surface of the knit fabric;

b. A second course of synthetic resin yarn which is formed into tuck loops in every fourth wale in either wales **2, 6, 10, 14,** etc., or **4, 8, 12, 16,** etc., and into knitted stitches in the intervening wales, said tuck loops of synthetic resin yarn serving to tie a segment of said large tuck loops of cotton yarn into said circularly knit fabric and;

c. Third and fourth courses of synthetic resin yarn knitted in every wale.

5. A panty hose garment as claimed in claim **2** wherein said cotton-containing circularly knit fabric has the following repeating pattern:

a. A course of cotton yarn which is formed into knitted stitches every fourth wale in wales, **1, 5, 9, 13,** etc., and formed into large tuck loops which extend across the intervening wales, and include a a floating portion extending across two wales, the cotton yarn in said floating portions forming loops which protrude from the inner surface of the knit fabric;

b. A course of synthetic resin yarn which is formed into tuck loops in every fourth wale in wales **4, 8, 12, 16,** etc., and into knitted stitches in the intervening wales, said tuck loops of synthetic resin yarn serving to tie a segment of said large tuck loops of cotton yarn into said circularly knit fabric;

c. Two courses of synthetic resin yarn knitted in every wale;

d. A course of cotton yarn which is formed into knitted stitches every fourth wale in wales, **1, 5, 9, 13,** etc., and formed into large tuck loops which extend across the intervening wales and include a floating portion extending across two wales, the cotton yarn in said floating portions forming loops which protrude from the inner surface of the knit fabric;

e. A course of synthetic resin yarn which is formed into tuck loops in every fourth wale in wales **2, 6, 10, 14,** etc., and into knitted stitches in the intervening wales, said tuck loops of synthetic resin yarn serving to tie a segment of said large tuck loops of cotton yarn into said circularly knit fabric; and

f. Two courses of synthetic resin yarn knitted in every wale.

6. A panty hose garment as claimed in claim **2** where said synthetic resin yarn is nylon yarn.

7. A panty hose garment as claimed in claim **2** wherein said cotton yarn is knitted in every fourth wale, in wales **1, 5, 9, 13,** etc.

8. A panty hose garment as claimed in claim **7** wherein said courses of synthetic resin yarn immediately following said courses of cotton yarn are formed into tuck loops in every fourth wale either in wales **2, 6, 10, 14,** etc. or in wales **4, 8, 12, 16,** etc.

9. A panty hose garment as claimed in claim **4** wherein said synthetic resin yarns are made of nylon or spandex.

10. A panty hose garment as claimed in claim **2** wherein said leg and foot portions are comprised of said cotton-containing circularly knit fabric.

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