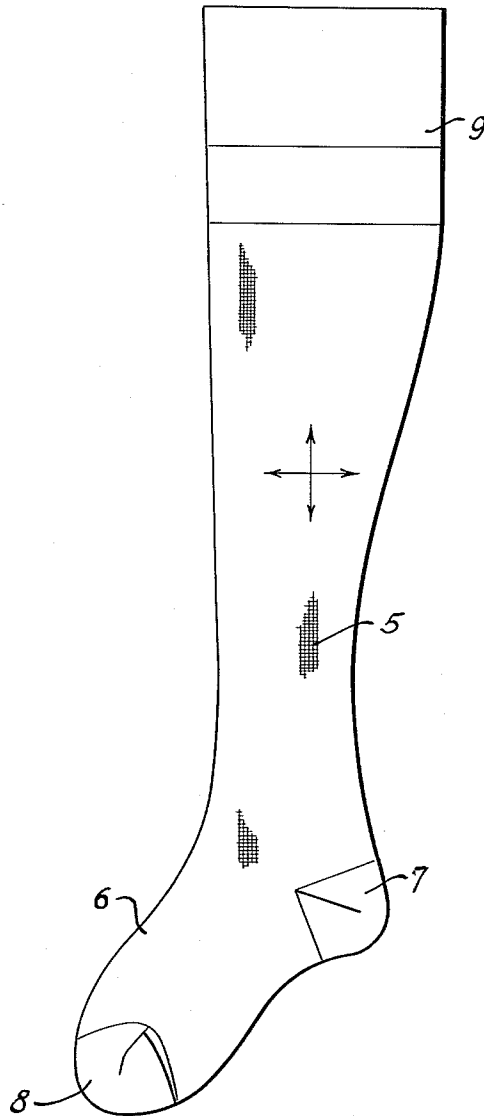


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STRETCHABLE HOSIERY AND THE LIKE

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STRETCHABLE HOSIERY AND THE LIKE
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This invention relates to stretchable and retractable hosiery, and especially to ladies' stretchable stockings.

In such hosiery it is important that a stocking be provided which is adaptable to a wide variety of leg sizes, and preferably also to a wide variety of leg and foot sizes, and it is also important that the hosiery have a high degree of softness, strength, and durability. It is also important in many instances that the hosiery have a high degree of sheerness. Hosiery formed from lively monofilament yarns is lacking in a desired degree of softness, strength, and durability, but hosiery formed of such yarns is still widely used because of the belief that plied plural-filament high-stretch yarns of similar deniers could be rendered knittable, if at all, only by the use of so many filaments that desired stretch and/or sheerness characteristics had to be sacrificed.

I have found, however, that low-denier three-filament yarn can have a high degree of two-way stretch imparted thereto without sacrifice of knitability, and that highly satisfactory hosiery may be formed therefrom, and the present invention contemplates the formation of low-denier high-stretch yarn wherein three (or in certain instances two or four) filaments are twisted together, and the production of hosiery therefrom and particularly of the production of hosiery having a leg-portion composed of alternating courses of oppositely-twisted yarn of such character, and, preferably, also the formation of other parts of the hosiery of particularly desirable types of yarn and/or in particularly desirable manners.

The invention accordingly comprises the features of construction, combinations of elements and arrangement of parts, all of which will be exemplified hereinafter and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

The figure is a side view of one type of stocking embodying the invention.

An exemplification of one from of process of forming a stocking embodying the invention is the imparting to three-filament 15-denier nylon yarn (which has had a $\frac{1}{4}$ turn per inch imparted thereto between the spinnerette and the pirn) 140 twists per inch (as on a "false twister") in one direction (e.g. an S-twist) and suitably setting the yarn (as by passing the yarn rapidly thru a short zone in which a temperature of 400° F. is present), and thereafter imparting to it 140 twists per inch in the opposite direction (e.g. a Z-twist) so that upon relaxation it will have a residual tendency to twist in the direction (e.g. an S-twist) in which the twist was set into the yarn, this residual twist being a high twist, and imparting to other similar yarn 140 twists per inch in said opposite direction (e.g. a Z-twist) and suitably setting the other yarn, and thereafter imparting to it 140 twists per inch in said one direction (e.g. an S-twist) so that upon relaxation it will have a residual high twist in said opposite direction (e.g. a Z-twist), and so knitting the stocking that the respective yarns so formed will appear in alternate rows of the leg portion 5 thereof. This may be readily accomplished by a two-feed full-fashioned hosiery machine or a two-feed seamless hosiery machine by delivering one yarn at

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one feed and the other yarn at the other feed. Stockings so formed can be longitudinally stretched from 200% to 275% or more of their length and will return to their original condition. This very high stretch is available for transformation into the necessary transverse and longitudinal stretch required in use. Desirably also, the foot portion 6 of the stocking (except for the heel and toe portions) is similarly knitted.

Instead of 15-denier three-filament yarn there may be used in certain instances, for example, 6-denier to 10-denier two-filament yarn, 7-denier to 15-denier three-filament yarn, and 12-denier to 20-denier four-filament yarn. The individual filaments in any case should not be substantially larger than 5-denier, and the individual filaments in any yarn should, of course, be of substantially equal size.

Instead of 140 twists to the inch in each direction a twist selected from a range of 100 twists to the inch to 150 twists to the inch may be used for twisting the yarn in the first direction (in which it is set) and for the twisting of the yarn in the opposite direction.

After the yarns have been transversely twisted, they are, as in common practice, put on a cone and are fed to the knitting machine under low tension and without taking out the residual stretch.

Further pursuant to the invention in its more specific aspects, the heel portion 7 and/or the toe portion 8 may be formed of yarn plied at a low twist (e.g. 5 turns per inch) from yarns similar to the aforesaid. For example, a yarn set with 140 S-twists to the inch and then Z-twisted 140 to the inch and a yarn set with 140-Z-twists to the inch and then S-twisted 140 to the inch may be plied together into a single yarn by a twist (e.g. five turns per inch in either direction) lower than the residual twist in either yarn. Here, again, a high twist selected from a range of 100 twists per inch thru 150 twists per inch may be used instead of 140 twists per inch. The resulting yarn is knitted in course after course, as at a single feed, or at each of both feeds of a two-feed machine.

The welt portion yarn may be formed in any of a number of suitable manners, but, as exemplified, is formed of two-ply 20-denier seven-filament lively yarn.

Since certain changes may be made in the constructions set forth and in carrying out the above process, and different embodiments of the invention may be provided without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A garment comprising at least one leg portion having interknitted rows, respectively, of a plural filament lively yarn of not over 20-denier which has been subjected to an S-twist of from 100 to 150 twists per inch and heat set and thereafter subjected to a Z-twist of from 100 to 150 twists per inch, and of a plural filament lively yarn of not over 20-denier which has been subjected to a Z-twist of from 100 to 150 twists per inch and heat set and thereafter subjected to an S-twist of from 100 to 150 twists per inch.

2. A garment as in claim 1 wherein the leg portion has a longitudinal stretch of at least 200%.

3. Hosiery comprising a leg portion having in alternating rows, respectively, three-filament lively yarn of not over 15-denier and having a residual S-twist and three-filament lively yarn of not over 15-denier and having a residual Z-twist, wherein the first-mentioned yarn was subjected to a high S-twist selected from a range of 100 to 150 twists per inch and set and thereafter subjected to a high Z-twist selected from a range of 100 to 150 twists per inch and the second-mentioned yarn was

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subjected to a high Z-twist selected from a range of 100 to 150 twists per inch and set and thereafter subjected to a high S-twist selected from a range of 100 to 150 twists per inch.

4. A garment as in claim 1 wherein the individual filaments in each of said yarns are of equal size not exceeding 5-denier.

5. Hosiery comprising a leg portion having in alternating rows, respectively, plural-filament lively yarn of 15-denier size and having a residual S-twist remaining from imparting thereto an S-twist of 140 twists per inch and setting and thereafter imparting thereto a Z-twist of 140 twists per inch and plural-filament lively yarn of 15-denier size and having a residual Z-twist remaining from imparting thereto a Z-twist of 140 twists per inch and setting and thereafter imparting thereto an S-twist of 140 twists per inch.

6. Hosiery as in claim 5 wherein said plural-filament yarns are each composed of, at most, four filaments per yarn.

7. Hosiery as in claim 5 comprising also heel and toe portions each having successive rows of yarn which is formed by plying together with a twist of less than said residual twists a yarn similar to the first-mentioned yarn and a yarn similar to the second-mentioned yarn.

8. Hosiery as in claim 3 comprising also toe and heel portions each having successive rows of yarn formed by plying together three-filament lively yarn having an S-twist and three-filament lively yarn having a Z-twist.

9. Hosiery as in claim 8 comprising also a welt por-

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tion knitted from yarn formed by plying together two seven-filament lively yarns.

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