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M. N. HOLMES

2,949,023

HOSIERY

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Fig. 1.

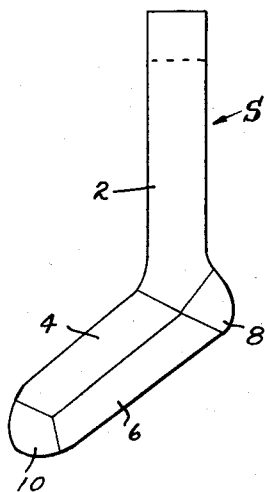


Fig. 2.

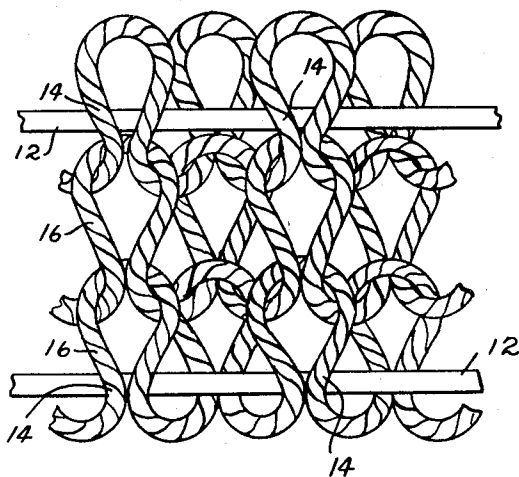
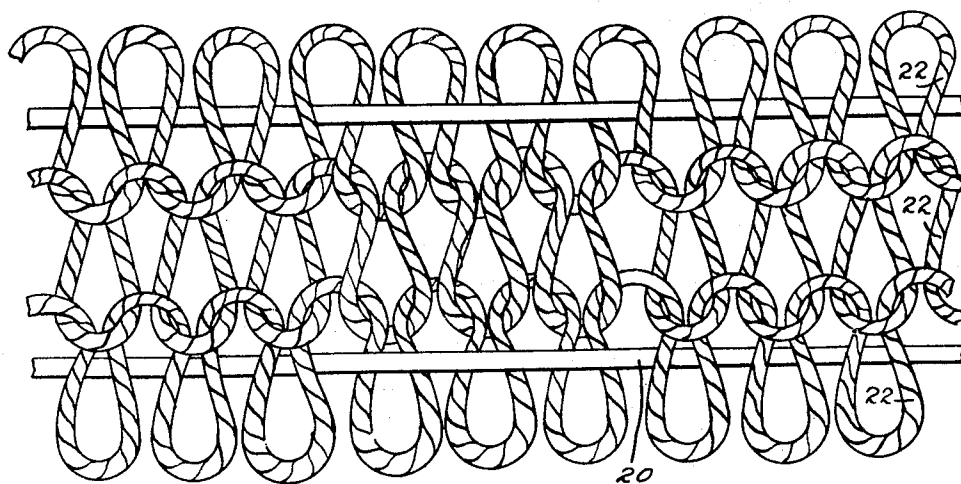


Fig. 3.



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2,949,023

HOSIERY

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1 Claim. (Cl. 66—178)

The present invention relates to certain improvements in hosiery. More particularly, the invention is concerned with the provision of a combination semi-surgical and dress stocking especially useful for men. This application is a continuation-in-part application of Serial No. 749,394, filed July 18, 1958, now abandoned.

There has been a long felt need in the hosiery industry for an intermediate support hose, i.e. a semi-surgical sock, for men which would not only have an effective compressive or binding force on the leg so as to offer adequate support for muscles and veins but would also have desirable styling features. This combination of support and style has been achieved to some extent in women's hose by the use of multiple torqued mono-filament yarns. However, this technique is not practical for men because the resulting fabric is much too sheer. An attempt has been made to satisfy the need by making knee-high hose for men using the so-called "elasticized" or "Helanca" type nylon yarn. However, while hose of this type offer a mild degree of support for leg muscles, they have the disadvantage of fabric fatigue after several wearings and the desired muscular support is soon lost.

As a rule, it has been considered necessary in the past to revert to the use of socks or sleeves knit from rubber yarn entirely in order to obtain adequate support for leg muscles and veins. These products are known as surgical socks and they have high elastic properties with a very binding effect. Generally speaking, these surgical socks are used only on serious cases of varicose veins. In many cases, where there is only some minor vein breakdown and/or tired muscles, this type of support is not needed. Additionally, these surgical socks are rather unsightly and, as a result, are normally covered with some other fabric designed to conceal the appearance of the surgical fabric.

The principal object of the present invention is to satisfy the need for an intermediate support or semi-surgical sock which also has a dress appearance. More specifically, it is an object of the invention to provide a dress sock which exerts a compressive action on the leg of the wearer for therapeutic purposes, the sock being characterized by its support features for leg muscles, veins, and the like coupled with styling that can be worn with the advantages of non-surgical appearance. Other objects will be apparent from the more detailed description of the invention as set forth below.

Broadly described, the sock of the invention comprises an essentially knee length sock having a top or leg portion knit throughout with elasticized or stretch yarn, preferably rib knit, and having an elastomer yarn, e.g. a rubber yarn or other elastic type core yarn, laid into spaced courses throughout the leg portion.

It is important to the success of the invention that the rubber yarn or the like be laid into the leg courses rather than knit-in. In this way, it has been found that the elasticized yarn supports the rubber yarn and this makes possible the desired support for muscles and veins. If the rubber yarn is actually used to knit the stitches, as in

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the case of conventional rubber surgical socks, tension and binding power are increased more than is normally necessary for supporting leg muscles and veins.

As indicated heretofore, the leg portion of the sock is preferably rib knit, using, for example, a 2 x 2 or 3 x 3 rib knit, wherein the rubber or other elastomer yarn is laid behind 2 wales or 3 wales, respectively. A 1 x 1 rib knit is particularly desirable because, with such a knit, the rubber yarn is less noticeable between the ribs when the sock is worn.

In spacing the elastomer yarn, it is preferred that this yarn be laid into alternate courses. However, if desired, the yarn may be spaced two or more courses throughout the leg. The spacing should not, however, exceed 8 leg courses if optimum support is to be obtained. It is preferable, but not necessary, that the elastomer yarn be spaced uniformly throughout the leg.

While desirable results are obtained if the elastomer yarn is used only in the leg portion of the sock, this yarn may also be effectively continued in the foot portion. The rib knit of stretch yarn may be maintained in the top part of the foot and, if desired, suitable reinforcing yarn (e.g. cotton) may be added to complete the sole. The heel and toe sections may be completed in conventional manner using either stretch or non-stretch type yarns.

Any conventional stretch type yarn may be utilized for knitting the top portion of the sock described herein. Typically suitable yarns comprise the synthetic linear thermoplastic polyamides and like polymers such as nylon, acrilan, Dacron (polyethylene terephthalate). Commercially available forms of stretch yarns suitable for use herein include yarns identified as "Helanca," "Agilon," "Superloft" and "Banlon." Procedures for preparing stretch nylon yarn are described in U.S. Patents 2,564,245 and 2,019,183. These stretch yarns may be used in varying deniers, typically 20 to 300 denier.

Rubber yarn or other types of elastomer yarn, e.g. synthetic elastomer yarns, of varying sizes may be used for the purposes described herein. Preferably, if rubber yarn is used, it is covered or wrapped with nylon or the like so that, after dyeing, the rubber yarn and the rest of the sock may have essentially uniform coloring. If desired, the rubber yarn may be covered by a fiber which permits cross-dyeing for pattern effect. Generally speaking, the denier of the elastomer yarn used herein is at least equal to that of the yarn used in knitting the sock and may be as much as 20 times greater than the knitting yarn denier. However, it will be appreciated that elastomer yarn deniers outside this range may also be used.

An especially desirable synthetic elastomer yarn for use herein is that sold by the Du Pont Company under the identifying name "Fiber K." It is understood that "Fiber K" is a polyurethane fiber. This yarn is characterized by its high degree of extensibility and exceptional dyeability. The yarn is also more impervious to oils and soap than natural rubber and, therefore, has a much longer life. Because of its lightness and strength, much finer deniers of "Fiber K" can be effectively used for the purposes described herein than with natural rubber yarn. Typically, 50-, 70-, or 140-denier "Fiber K" yarn may be mentioned as being especially useful herein although other deniers within the ranges indicated hereto are satisfactory. As in the case of natural rubber yarn used herein, the "Fiber K" yarn may be uncovered or, if desired, covered with, for example, nylon, cotton, rayon, Orlon acrylic fiber or the like. Other available synthetic elastomer yarns of the polyurethane type, or otherwise, which may be used herein as the elastomer yarn include the elastomer known as "Vyrene," a product of the U.S. Rubber Company.

The invention is further described in connection with the accompanying drawings wherein:

Figure 1 is a diagrammatic view of one form of combination semi-surgical and dress sock of the invention;

Figure 2 is a view of the fabric constituting at least the leg portion of said sock; and

Figure 3 is a view of another form of fabric for the leg portion of a sock according to the invention.

Referring more specifically to the drawings, the sock S of Figure 1 is a knee-length men's sock which comprises a ribbed top or leg portion 2 including top, leg and ankle sections, foot portion 4, sole 6 and heel and toe sections 8 and 10, respectively. Preferably, leg portion 2 is rib knit in the manner shown in Figure 2 using a 1 x 1 rib stitch with the rubber yarn 12 laid behind alternative wales 14 in every other course 16 thereby leaving alternate courses free of rubber yarn. Alternatively, the 3 x 3 rib stitch of Figure 3 may be used with one end of rubber yarn 20 laid in every other course 22.

Foot portion 4 is also desirably rib knit in the manner indicated and the rubber yarn used in the leg courses may be continued through the foot. The sole 6 and toe 8 and heel 10 of the sock may be knit in conventional manner although, if desired, the rubber yarn may also be included therein.

The following represents one way of preparing a sock according to the invention:

A knee-length sock was knit on a Komet knitting machine having 200 needles, set up on a 2 x 2 rib pattern, with a two feed yarn system, plaiting attachment and rubber laying-in mechanism. One end of 2 ply 80 denier stretch nylon yarn (Helanca type) was used in each feed. The entire top portion of the sock down to and including the ankle (designated by the numeral 2 in Figure 1) was knit with the 2 ply 80 denier stretch yarn and on every other course, a nylon covered rubber yarn of a size which has approximately 4,000 yards to the pound was laid in for one course. Knitting was continued, laying in the rubber on every other course, until the heel was ready to be knit, at which time the rubber and both ends of the body yarn were withdrawn and heel yarn inserted, the heel yarn in this instance being 2 ply 80 denier stretch nylon yarn. When the heel was completed, one feed of the nylon body yarn was inserted and the foot was knitted. At the same time, one end of 70's single cotton was plaited over the nylon in the sole portion of the sock. Knitting was continued in this manner until the foot was completed, after which the toe was knit, using the same yarn as used in the heel. The resulting sock may be dyed and otherwise finished in conventional fashion to give a highly desirable product suitable for both dress and support of tired leg muscles. Excellent results were also obtained using a 6 x 3 rib pattern, 5 x 2 pattern and especially a 1 x 1 or 2 x 2 rib pattern. Highly desirable results were also obtained by replacing the natural rubber yarn utilized above with a "Fiber K" yarn of 70 or 140 denier.

In another embodiment, a sock was knit on a Komet knitting machine having 220 needles, set up on a 3 x 3 rib pattern, with two feed yarn system, plaiting attachment, and rubber laying-in mechanism. One end of 2 ply 70 denier stretch nylon yarn was used in each feed. The top portion of the sock was knit with 2 ply 70 denier stretch yarn and on every other course, a nylon covered rubber yarn of a size which has approximately 4,000 yards to the pound was laid in for one course. Knitting was continued, laying in the rubber on every other course, until the heel was ready to be knit, at which time the rubber and both ends of the body yarn were withdrawn and heel yarn inserted, the heel yarn being 2 ply, 70 denier stretch nylon yarn. When the heel was completed, one feed of body yarn was inserted and the foot knitted. At the same time, one end of 70's single cotton was plaited over the nylon yarn in the sole portion of the sock. Knitting was continued in this manner until the foot was completed, after which the toe was knit, using the same yarn as used in the heel.

While the invention has been specifically described above in connection with men's hosiery, it should be noted that the invention may also be practiced with women's hosiery of the circular knit or full fashioned type using finer deniers than in the case of men's hose. As in the case of men's hosiery, the women's hosiery may be knit with the elastomer yarn laid in either throughout the entire stocking or in just the leg portion. Additionally, while the foregoing description is mainly directed to rib knit hosiery, which represents a preferred embodiment as indicated heretofore, the invention is also applicable to non-ribbed hosiery such as argyles, etc.

It will be appreciated that various modifications may be made in the invention described herein without deviating from the scope and intent thereof as set forth in the appended claim wherein I claim:

A circularly knit, combination semi-surgical and dress stocking knit throughout with a synthetic thermoplastic polymer multiply stretch yarn, and having an elastomeric yarn laid into spaced courses throughout the leg portion, said elastomeric yarn being covered with yarn of the same composition as said stretch yarn and the heel and toe portions of said stocking being free from said elastomeric yarn.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,949,023

August 16, 1960

Mark N. Holmes

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, lines 32 and 33, strike out "or "Helanca" type";
column 3, line 32, strike out "(Helanca type)".

Signed and sealed this 7th day of December 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents