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METHOD OF MAKING MINIATURE STOCKINGS

Original Filed Oct. 28, 1966

Fig-1

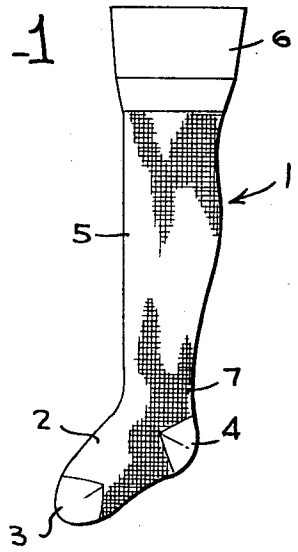
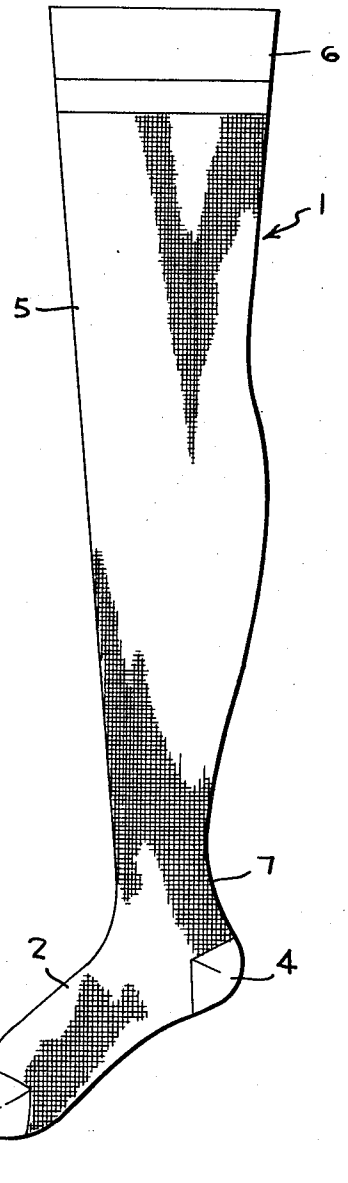


Fig-2



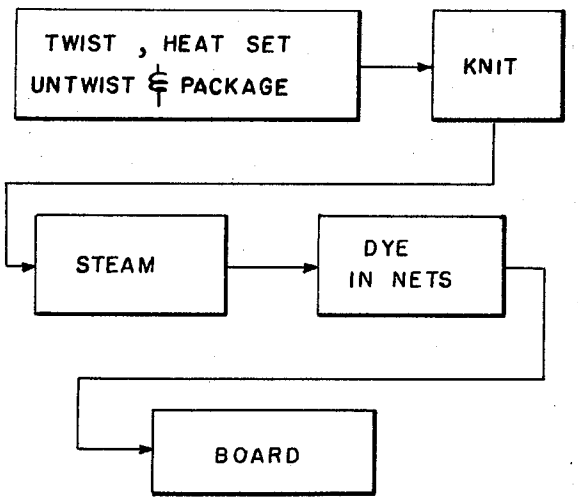


Fig-3

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METHOD OF MAKING MINIATURE STOCKINGS

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Int. Cl. D04b *11/28*

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ABSTRACT OF THE DISCLOSURE

A method of producing a miniature stocking which will stretch to fit average size legs wherein a stocking having a conventional number of courses is knit and relaxed by steaming over an extended period, then dyed while loose in a net, and boarded on a miniature board. The stocking is then left unrestrained over an extended period for further relaxing. The stocking in relaxed condition has a foot of from 4 to 6 inches and a leg of from 12 to 16 inches.

This invention relates to ladies' miniature full-length stretch stockings and to a method for producing stretch stockings of this type.

This application is a division of co-pending application Ser. No. 590,402, filed Oct. 28, 1966.

In the past, prior to the introduction of stretch yarns, it was customary to produce ladies' stockings in a plurality of sizes, so as to be able to fit the normal range of foot sizes and leg lengths. With the advent of stretch yarns, attempts have been made to reduce the number of sizes required to cover foot sizes in the range of from 8½ to 11. While some success has been achieved in this direction, it has not been possible to reduce the number of sizes materially and still obtain that degree of fit and appearance which is demanded by the trade.

The general object of the present invention is to provide a stretch stocking which is of extremely small size in its finished state, but has sufficient stretch to fit a number of normal foot sizes.

A more specific object of the invention is to provide an extremely small stretch stocking wherein the leg, ankle and foot portions will all be capable of over 100% stretch over the original size, thus making it possible to produce but two sizes to cover the conventional foot size range.

Another object is the production of such a stocking which will be extremely sheer when on a leg and the relaxed stitches are pulled upright.

A further object of the invention is to provide a stocking of this character which will be extremely dull in appearance, as compared to fabric made of monofilament stretch yarns, and the fabric will be soft and smooth, both in the hand and when worn.

Yet another object of the invention is the provision of a method for making stretch stockings which are extremely small in finished, unstretched state.

It is also an object of the invention to provide a method for making extremely small stretch stockings wherein the stockings have their final boarding on a form which is but a fraction of the size of the conventional boarding form.

Other objects of the invention will become apparent from the following disclosure of one practical embodiment thereof, when taken in conjunction with the drawings which accompany, and form part of, this specification.

In the drawings:

FIGURE 1 is a side elevation of the stocking of the present invention, shown in its relaxed, finished form;

FIGURE 2 is a side elevation of the same stocking stretched, and in place on a leg; and

FIGURE 3 is a diagrammatic view of the steps of a method for making the stockings shown in FIGURE 1.

In general, the invention is concerned with the production of a stretch stocking which, in its relaxed, finished condition, is approximately one-half the size of the leg it was designed to fit, thus permitting one stocking to fit a number of different foot sizes, and assuring perfect snug fit of all parts of the foot, ankle and leg of the wearer. The invention is also concerned with a method for producing stockings of this extremely small size.

It is believed that the stocking, its structure and characteristics can be better understood if the method for making it is first disclosed in detail.

Referring in detail to the drawings, and first to FIGURE 3, there is shown a diagram of the various steps of the method for making a miniature stretch stocking. The first step of the method is the preparation of the yarn from which the stocking is to be made. This yarn, when knit, must produce a desirable surface texture and have an extremely high degree of stretch and recovery. It should have properties of torque, and have filament coil. While a number of fine denier, multifilament, thermoplastic yarns can be used, the method will be described in connection with the use of a nylon yarn. By fine denier is meant a yarn in the range of 12 to 20 denier, and by multifilament a range of 2 to 5 filaments is implied. Extremely good results have been obtained with the use of 15 denier 3 filament nylon, and with 17 denier 2 filament nylon.

The yarn is prepared, or processed, on a false twist type machine, such as a Leesona Model 553 Superloft Machine, which has a number of positions, and at each position there is a hollow false twist spindle, a contact type heater plate, feed rolls above and below the heater plate and a take-up mechanism. The machine is designed so as to produce overfeed or underfeed in the heating zone (lower overfeed) for the purpose of tensioning the yarn on the spindle pin, and to produce overfeed in the take-up zone (upper overfeed) for the purpose of producing a package of the desired density. This is a conventional type of yarn processing machine for putting a false twist into the yarn, setting that twist, untwisting the yarn and winding it on the package under tension.

The specific details of one processing operation, using 15 denier, 3 filament, nylon type 6, 6, are as follows:

Twist [1], turns per inch (geared)	140
Lower overfeed, percent	+1
Upper overfeed, percent	+8
Heater temperature, ° F.	410
Spindle speed, r.p.m.	345,000

[1] The true twist is obtained by reducing the geared twist by the percent upper overfeed. The true twist in this case would be approximately 129 turns per inch.

While the true twist in the above example is 129 turns per inch, a desirable yarn can be obtained in a true twist range of 120 to 150 turns per inch. Similarly, it has been found that the heater temperature can range from 400° to 440° F. Equal amounts of yarns are produced in S and Z twists following this procedure, for use separately in the knitting of the stocking.

As the yarn produced by the above process is a very lively torque filament yarn, it may be necessary to oil or wax the yarn before coneing to help control snarling or twisting of the yarn during knitting.

The stockings may be knit on any conventional two feed knitting machine, wherein the S and Z yarns may be fed for alternate knitting. It has been found that the present stocking need be supplied in only two sizes, and the knitting is set up for one size as a normal stocking of 9½ standard size, and for the other as for a standard size 11. This means that for the smaller stocking the yarn is coursed in the range of 2300 to 2500 courses, and for

the larger stocking in the range of 2500 to 2800 courses. The welt, heel and toe can be knit of a heavier yarn, such as 20 denier two ply stretch nylon yarn.

After knitting and looping, the stockings are steamed in a steam box at temperatures of from 200° F. to 225° F. for from forty to fifty minutes, to relax the lively yarn as much as possible before the stockings are finished. Very good results have been obtained by steaming the stockings at 210° F. for forty-five minutes. At this point of the operation the yarn has relaxed to such an extent that the stocking measures approximately twelve inches in length.

The goods are then placed in dye nets, several dozen to the net, with no crowding, so that the stockings can relax even further during the dying operation. After removal from the dye bath, the stockings can be dried in the usual manner.

As a final treatment step, the stockings are boarded. It is important that the shaping of the stocking during boarding be done with a minimum of distortion of the fabric from its very small relaxed state. To this end, miniature boarding forms are used, and the stockings are gradually worked onto the form, without jerking or stretching, until the foot and heel are in place. The welt is then pulled down only far enough on the form to take the wrinkles out of the leg fabric. After placement on the forms, the stockings are set in conventional retorts using an approximate forty-five second steam cycle and a three minute drying cycle. Steam pressure in the retort is so adjusted that the goods are subjected to a temperature above 245° F. for no longer than fifteen seconds. The maximum temperature should not exceed 250° F.

It has been found that after setting, the finished stockings should be removed from the forms and allowed to relax in flat form for approximately twenty-four hours before pairing. This will allow the stockings to achieve fully relaxed condition, so that when paired, the two stockings will have the same length and there will be no further relaxation of the fabric to cause one stocking to reduce in size more than the other.

A stocking manufactured in accordance with the preceding method will have the appearance of the stocking **1** shown in relaxed condition in FIGURE 1, and as stretched on the leg in FIGURE 2. The stocking will have the uusal foot **2**, with toe **3** and heel **4**, and a leg **5** topped by the usual welt **6**. As the welt is made of heavier yarn, it will not contract as much as the other portions of the stocking, so that it has a wider tapered appearance in the finished stocking. It will be noted particularly, that the finished stocking has a very small ankle **7**.

The finished stocking will have a foot length of from four inches to six inches, and leg length from twelve inches to sixteen inches. The leg length will be measured from the heel to the top of the stocking. Due to the characteristics of the yarn, and the extreme relaxed condition of the fabric, the foot will have a stretch of approximately 120% over its original length, the ankle can stretch to 150% of its original size, and the leg can stretch to 220% of its original length. This will assure proper fit for all leg sizes if the new stocking is supplied in but two sizes within the length ranges set out above. The smaller size will fit foot sizes 8½, 9 and 9½, while the larger size will fit foot sizes 10, 10½ and 11. Despite

the small size of the stockings, the foot, ankle and leg portions will expand to provide sufficient volume for feet and legs within the range for which the stocking was designed. It will be noted that the stocking is of such small size that it must be stretched to be put on even the smallest foot and leg. Therefore, a perfect fit for all parts of the foot, ankle and leg is assured. The stocking has good retractive powers, and will cling tightly to the leg and will return to substantially its original size and shape when removed from the leg.

The stocking has a somewhat dull finish, and is quite soft both in the hand and when worn. Although the fabric is somewhat crepe-like in appearance in its relaxed state, it becomes quite sheer when stretched on the leg and the relaxed stitches are pulled upright. Even though it is necessary to stretch the stocking an unusual amount in putting it on and conforming it to the leg size, there will be sufficient residual stretch so that the stocking will not bind the leg, and the stocking will stretch with movement of the leg.

What is claimed is:

1. The method for producing a ladies miniature full-length stretch stocking comprising the steps of, knitting a stocking having approximately the number of courses of a selected conventional stocking size from fine denier multiple filament torque stretch yarn, relaxing the yarn of the knit stocking by steaming in a steam box at temperatures of 200° F. to 225° F. for a period of 40 to 50 minutes, to greatly reduce the stocking size, by relaxing the loops of the knit fabric, dyeing the stocking while loose in a net to allow further relaxing, boarding the stocking by gradually putting the stocking on a miniature form board without jerking or stretching until the foot and heel are in place and then pulling the welt downwardly only far enough to take the wrinkles out of the leg wherein the miniature form board is of such size as to receive the relaxed and reduced size stocking without appreciable stretching, subjecting the stocking on the form to temperatures of from 245° F. to 250° F. for about 15 seconds in a retort, and allowing the stocking to assume an unrestrained condition over an extended period for further relaxing before pairing.

2. A method for producing a ladies miniature full-length stretch stocking as claimed in claim **1** wherein, the extended period of unrestrained relaxation prior to pairing is approximately 24 hours.

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