Oct. 28, 1941. E. E. CARLSON 2,260,362

RUNPROOF OR RUN-RESISTANT FLAT-KNIT STOCKING AND BLANK THEREFOR, AND METHOD OF MAKING SAME

Original Filed Oct. 26, 1939 3 Sheets-Sheet 1

Fig. 1.

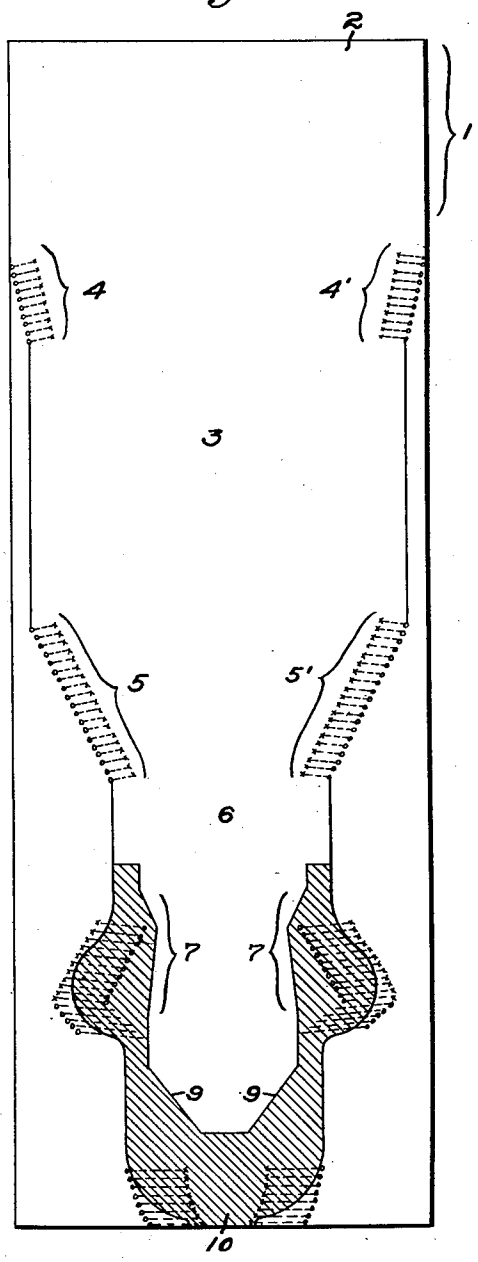
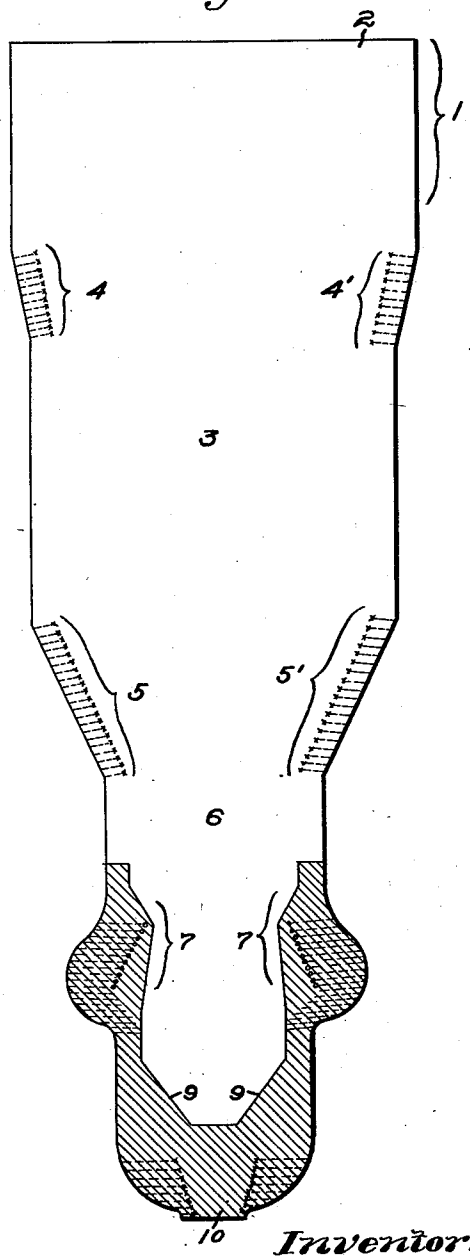


Fig. 2.



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Fig. 3.

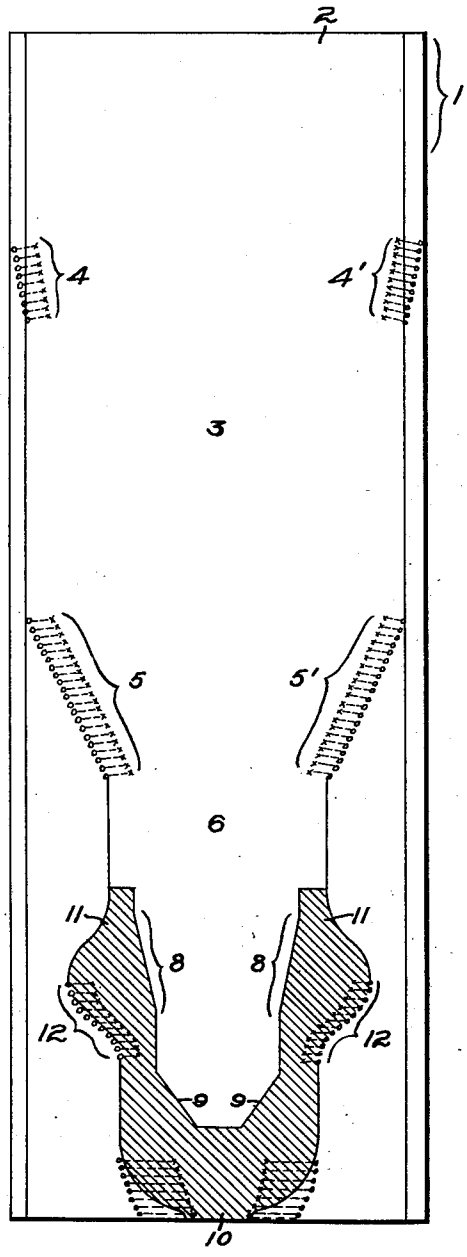
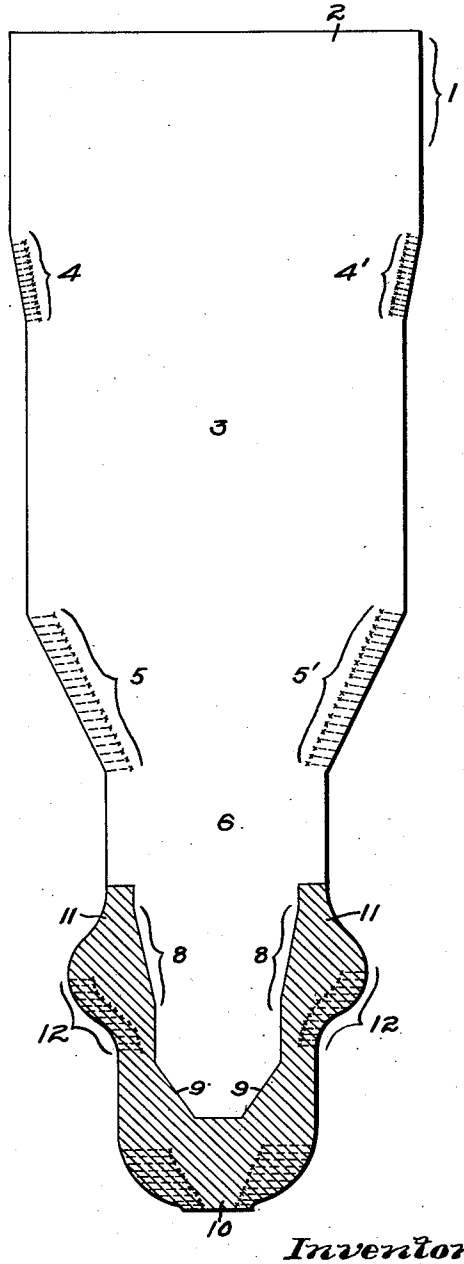


Fig. 4.



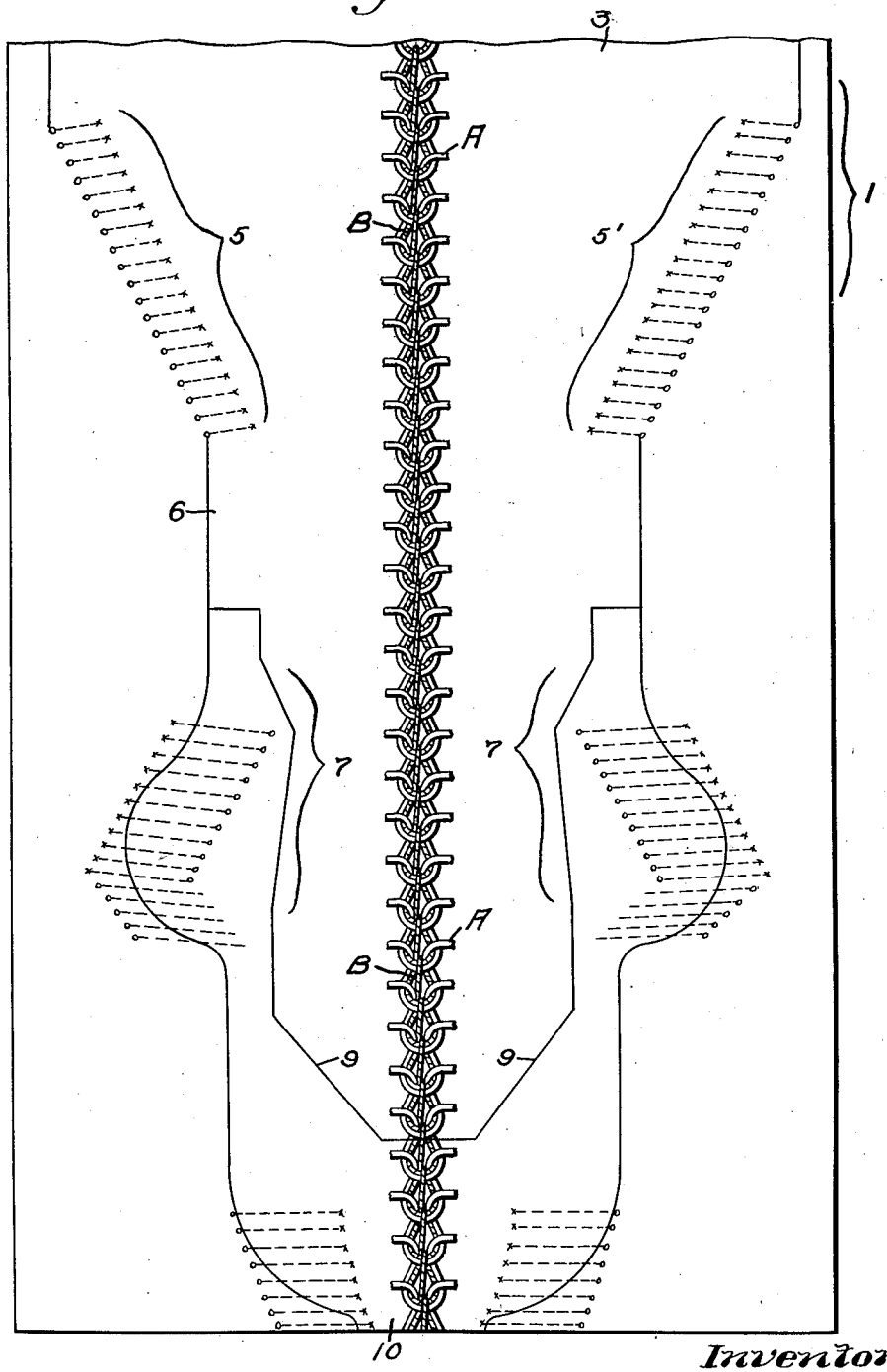
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Fig. 5.



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UNITED STATES PATENT OFFICE

2,260,362

RUNPROOF OR RUN-RESISTANT FLAT-KNIT STOCKING AND BLANK THEREFOR, AND METHOD OF MAKING SAME

Ellsworth E. Carlson, Saratoga Springs, N. Y., assignor to Van Raalte Company, New York, N. Y., a corporation of New York

Original application October 26, 1939, Serial No. 301,446. Divided and this application March 21, 1940, Serial No. 325,166

3 Claims. (Cl. 66—178)

This application is a division of my co-pending application Ser. No. 301,446, filed October 26, 1939, now Patent No. 2,237,290, dated April 8, 1941.

This invention relates to run-proof or run-resistant flat-knit stockings of increased elasticity, and blanks therefor, and to the method of making the same.

In order that the principle of the invention may be readily understood, I have disclosed a single embodiment thereof in the accompanying drawings, wherein

Fig. 1 is a plan view of a non-run or strongly run-resistant blank knitted of full width throughout with loop-transferred heel portions and disclosing one embodiment only of my invention;

Fig. 2 is a similar view showing the blank after the trimming thereof;

Fig. 3 is a view similar to Fig. 1, but having only loop-transferred heel portions;

Fig. 4 is a view similar to Fig. 3 of the blank after the trimming thereof; and

Fig. 5 is a plan view of a stocking blank similar to Fig. 1, but indicating the structure of the stitches, each consisting of a weft or body thread and a warp thread.

My invention as to product and method is in certain aspects thereof closely related to the invention disclosed in my Patents Nos. 2,114,955 and 2,114,956, dated April 19, 1938.

Said patents themselves refer to a number of my earlier patents, including Patents 1,978,408 and 1,978,409, as containing the same basic invention. All of said patents disclose the lateral inward transfer of stitches in knitting the leg, as at the flare and in the calf. It is fully disclosed therein that stitches are actually laterally transferred inward in groups just as in full-fashioned knitting. Such inward transfer of stitches effects the inward transfer of needle wales to adjacent needle wales for the same purpose as in full-fashioned knitting. The only difference in my blank as it comes from the machine over a full-fashioned stocking blank is that in the knitting of my blank, I (notwithstanding the inward transfer of stitches at the calf, etc.) actually carry the weft knitting thread the full width of the fabric from end to end of the blank. This is done in order to avoid disturbing the warp threads along the longitudinal margins of the blank. After the blanks are delivered from the machine and are separated one from another, they are trimmed along the outer edge or edges of the transferred areas and the longitudinal edges of the blank are then seamed just as in full-fashioned work. Whatever changes of structure exist in a full-fashioned stocking because of the lateral inward transfer of stitches at the flare, the calf, etc., exist in my stocking.

In the making of the stocking or stocking blank herein shown, I preferably employ knitting mechanism of the single-unit single-head type of flat-knit hosiery mechanism, but the invention may be practised on other types of knitting machines.

In the manufacture of the stocking blank shown in Figs. 1 and 2 of my said Patent No. 2,114,955, the stocking whereof was originally known as the TW stocking but now as the TV stocking, the large and small blocks of stitch transfer points at each end of the set of needles were separated by the distance of one needle during the toe stitch transfers in order to form the so-called diamond point in the toe. In other words, each large and small block of stitch transfer points were separated on one movement and brought together on the succeeding movement in making the toe stitch transfers. During the other stitch transfer operations, each pair of large and small blocks of points were kept locked together. This necessitates the lifting of loops composed of the body thread or warp threads at each end of the set of needles, equalling the total number of transfer points of both a small and a large block, and this in turn caused the warp threads pertaining to the uplifted loops to become slack, so that it was necessary to use additional beam weight in order to keep the unlifted warp threads taut. This tautness in turn made the knitted fabric tighter and thereby reduced its elasticity, and particularly its transverse elasticity. This in turn increased the likelihood of transverse knee breakage in the stocking under severe strain. It is highly desirable to retain to some extent the stitch transfers at the flare and the calf of the leg not only because the consequent transfer marks are the same as those in all full-fashioned stockings but because the loop-transferrings actually provide for a better seaming edge.

I have in the course of my experimentation found that the amount of warp beam tension varies directly with the number of stitch transfer points used, and that by substantially reducing the number of such stitch transfer places used during the flare and leg stitch transferrings (while nevertheless employing some stitch transferring at such points), I can reduce the warp

beam tension proportionately and increase the elasticity of the stocking, and particularly in a transverse direction. Moreover the lessened warp beam tension reduced the liability of warp thread breakage during heel stitch transferrings.

In knitting the stocking blank shown, for example, in Fig. 1, I desirably employ sixty-two stitch transfer points in the knitting of the heel and of the toe. This represents the total number of stitch transfer points in the large and the small blocks at both ends of the set of needles. But by separating each large block from the companion small block and using only the small block of points during the flare and the leg stitch transferrings, I reduce the number of points used in knitting the flare and the leg to sixteen. I thus reduce the warp beam tension by about one half. These figures are representative merely, and my invention is not limited thereto.

In the operation, when the large and small blocks of points are racked or otherwise moved out to the two sides of the knitting machine at the completion of the stocking blank, I provide for racking or otherwise moving in only the two small blocks of stitch transfer points to make the flare and leg stitch transferrings, the two larger blocks of points still remaining at the sides of the machine. After the flare and leg stitch transferrings are completed, the said small blocks of points are, in accordance with my invention, racked or otherwise moved back outwardly to the respective large blocks, and they (i. e. each large and each small block) are then mechanically connected so as to operate together. Subsequently, each large block and the companion small block of points mechanically connected thereto are racked or otherwise moved inward for the stitch transferrings of the heel, the sole and the toe.

Having described in a general way certain mechanism desirably employed in the making of the stocking blanks and stockings herein claimed and in the practice of the method of my invention herein claimed, I will refer specifically to two types or forms of blanks which are representative merely of my invention and are selected as the preferred examples thereof. It is to be understood that the actual number of groups of stitch transferring marks is not exactly represented in the drawings.

The stockings preferably are made with a single welt finished off on a sewing machine instead of a double turned welt, but if desired a turned welt may be made.

Preferably the entire stocking blank from the commencement of the welt through the toe is knitted upon a single-unit single-head machine, and the warp threads which render the stocking of a non-run or strongly run-resistant character extend continuously throughout each stocking blank from the commencement of the welt through the toe.

The stocking blanks may be knitted upon a single-unit single-head type of machine, such as the Wildman machine disclosed in the patent to Howie and Krieble, No. 1,982,991, December 4, 1934, but my invention may be practised upon other types of mechanism. Reference is also made to my Patent No. 2,114,955 for an understanding of the principles of operation employed in the knitting of a non-run or strongly run-resistant stocking.

Desirably I employ natural silk threads in the manufacture of the stocking, but my invention is not limited to the use of any particular material. Preferably, however, I do employ natural silk and the body thread or threads may be of such character as to result in chiffon hosiery, but my invention is not so limited. I may employ in the manufacture of chiffon hosiery two threads or more, and the warp threads are also preferably of silk of like character so that the resultant stocking blank is made of silk throughout, preferably in the gray, and subsequently dyed, but my invention may also be employed in the manufacture of ingrain stockings.

It will be understood that I provide a stocking or blank therefor wherein is a series of warp threads, one for substantially each needle wale of the fabric, and collectively knitted into substantially all the stitches of the needle wales, so that substantially each stitch of the main thread or threads of the fabric has a stitch of a warp thread, to render the said fabric of a non-run or strongly run-resistant character, said stocking blank having stitches laterally transferred, as will be stated in detail.

The stocking blank is preferably knitted upon a machine capable of knitting the entire foot and the toe thereof as well as the leg. Thus, there is provided a flat-knit run-proof or strongly run-resistant stocking blank shown generally at **1** in the figures, at the upper end of which is desirably a single welt, to be finished off on a sewing machine. This constitutes the very upper part **2** of the blank and may be of any desired depth. The said blank **1** also includes a leg portion **3**, and the flares of the leg and calf are indicated at **4**, **4'**, **5**, **5'** respectively in Figs. 1, 3 and 5. Said blank **1** also includes an instep portion **6**, heel portions **7**, **7**, in Figs. 1, 2 and 5, and **8**, **8**, in Figs. 3 and 4. The said blank **1** also includes a foot-sole portion **9**, **9**, in the figures, and a toe portion **10**. The said blank **1** is knitted from a main or body thread or threads A (indicated in Fig. 5) knitted into all the wales of the said blank from edge to edge thereof and into all the courses of the said blank, and of a series of warp threads B (indicated in Fig. 5) extending integrally, without any severance thereof being required by the steps of stocking manufacture, lengthwise the fabric of the blank throughout the said leg portion, instep, heel, foot-sole and the toe. Thus the said stocking or blank, when knitted on the TW or TV type of full-fashioned machine, has as a part thereof formed integrally therewith and without necessary thread severance, an instep portion with initially integral lateral extensions, such as **9**, **9**, which, when seamed together in the manner referred to in my Patent No. 2,114,955, constitutes the bottom of the foot. The said blank **1** has the toe **10** constituting an integral extension or part of the blank, and the warp threads extend without necessary thread severance throughout the entire longitudinal extent of the heel portion, the instep portion, the foot-bottom portion and the toe. After the blanks shown in Figs. 1, 3 and 5 are knitted of full width throughout, they are subsequently trimmed as indicated in Figs. 2 and 4. The seam in this type of stocking extends along the bottom of the foot and up the back of the leg.

The blanks are suitably reinforced in the high splice, the heel, the foot-sole portions and the toe.

In the knitting of the blank shown in Figs. 1, 2 and 5, groups of stitches are inwardly transferred at the flare and at the calf of the leg, but in the knitting of the heel portions groups of stitches are first laterally transferred outward as indi-

cated by the first ten or so groups of stitch-transferring marks in each heel portion, and the further knitting groups of stitches are laterally transferred inward, as indicated. This is done through the proper manipulation of the blocks of stitch transferring points, both large and small blocks, by transferring laterally outward stitches each composed of the weft or body thread and one of the warp threads, and then similarly constituted loops of the weft thread and warp thread are laterally transferred inward. This produces the shape of heel portions shown in Figs. 1, 2 and 5.

However, in knitting the heel portions of the blank 1, shown in Figs. 3 and 4, there is no actual outward transferring of stitches in courses widening of the heel portions, but instead I resort to a suitable trimming, as indicated at 11, 11' in Figs. 3 and 4, which may be along the outer contour of the reinforced portion of the upper part of the heel and the high splice. The lower parts of the said heel portions 8, 8 of Figs. 3 and 4 have, however, loops transferred inwardly in many repeated courses, as indicated at 12, 12. The heel portions are subsequently trimmed as indicated in Fig. 4, so that heel portions are provided of the proper shape, though they do not include actual outward transfer of stitches.

Having thus described certain stocking blanks and stockings constituting the desired embodiments of my invention and having explained the best method of making the same, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

I claim:

1. A knitted blank for a non-run or strongly run-resistant, flat-knit stocking consisting of knitted needle loops and sinker loops, all of said needle loops having the accurate measurement of full-fashioned knitting, said blank being knitted of a weft thread or threads knitted by accurate needle loop measurement into all the loops of each course of said blank and of a separate co-knitted warp thread in substantially each needle wale of said blank, so as thereby to render the resulting fabric non-run or strongly run-resistant, the said blank having foot, heel and toe portions knitted integrally therewith as a continuation of said blank and wherein the respective warp threads are also present in each needle loop, the said blank in the leg portion thereof, and also in the heel and toe portions, in each of a multiplicity of courses having needle loops containing both warp and weft threads transferred inwardly from points at and ranging inward from substantially the ultimate lateral, longitudinal edges of said blank, thereby resulting in the corresponding shifting or positioning of the thereafter-knitted portions of the needle wales wherein said transferred needle loops exist; the number of such laterally transferred needle loops comprising each course-group in the leg portion constituting a substantial multiplicity of transferred loops but being markedly less in number in each course-group than the number of the said laterally transferred loops comprising course-groups of stitch transferrings in the toe portions of the said blank, thereby increasing the elasticity of the resultant fabric and particularly the lateral elasticity thereof in the vicinity of the knee portion, as compared with an otherwise like-knitted stocking blank of equal dimensions and like material.

2. A non-run or strongly run-resistant, flat-knit, complete stocking consisting of knitted needle loops and sinker loops, all of said needle loops having the accurate stitch measurement characteristic of full-fashioned knitting, said stocking being knitted throughout of a weft thread or threads knitted by said accurate needle loop measurement into all the loops of each course of the stocking, and of a series of co-knitted warp threads respectively knitted in substantially each needle loop of the stocking, so as thereby to render the stocking non-run or strongly run-resistant, the said stocking having foot, heel and toe portions knitted integrally therewith as a continuation of the leg portion of the stocking, the said stocking in the leg portion thereof and also in the heel and toe portions thereof, in each of a multiplicity of courses, having course-groups of needle loops consisting of both warp and weft threads transferred inwardly at points ranging inward from substantially the ultimate lateral longitudinal edges of the blank from which the stocking is made, thus consequently effecting the corresponding inward shifting or positioning of the thereafter-knitted portions of those needle wales wherein said so transferred needle loops exist, the number of such laterally transferred needle loops comprising each such course-group in the leg portion constituting a substantial multiplicity of transferred loops, but being markedly less in number than the number of said laterally transferred loops comprising course-groups of stitch transferrings in the toe portions of the said stocking, the blank from which the stocking is made being cut along longitudinal lines at the outer ends of the course-groups of such stitch transferrings in the leg and heel portions and along lengthwise lines connecting said portions, and seamed along the said cut edges.

3. That method of knitting a non-run or strongly run-resistant, flat-knit stocking, consisting of knitting, from a weft thread or threads and a warp thread for substantially each needle wale, successive courses of needle loops and sinker loops, and in so doing accurately measuring said needle loops as in full-fashioned knitting, thereby rendering the resulting fabric non-run or strongly run-resistant; continuing the knitting throughout the leg, the heel, the foot and the toe as an integral fabric wherein each warp thread is continuous in the leg portion and in the heel, foot and toe portions; laterally transferring inward in course-groups the needle loops containing both warp and weft threads, ranging inward in such groups from points at substantially the ultimate lateral longitudinal edges of the blank from which the stocking is made, thus consequently effecting the corresponding inward shifting or positioning of the thereafter-knitted portions of the needle wales wherein transfer needle loops exist, but making the number of laterally transferred needle loops, comprising each course-group in the leg portion, markedly less in number (but nevertheless a substantial multiplicity) than the number of the said laterally transferred loops comprising course-groups of stitch transferrings in the toe portions, thereby increasing the elasticity of the stocking and particularly the lateral elasticity thereof in the vicinity of the knee portion, as compared with an otherwise like-knitted stocking of equal dimensions and like material.

ELLSWORTH E. CARLSON.