Dec. 4, 1934. H. V. W. SCOTT 1,983,148

METHOD OF KNITTING RUNPROOF OR RUN RESISTANT KNITTED FABRIC AND THE RESULTING FABRIC

Original Filed Aug. 11, 1932 5 Sheets-Sheet 1

Fig. 1.

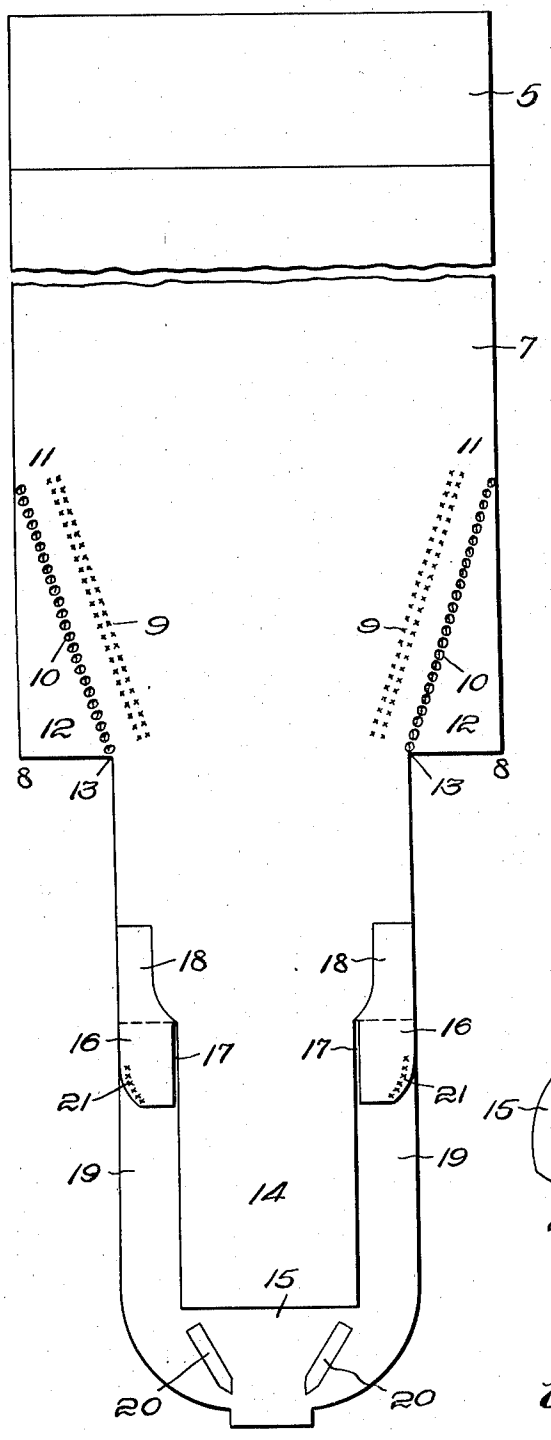
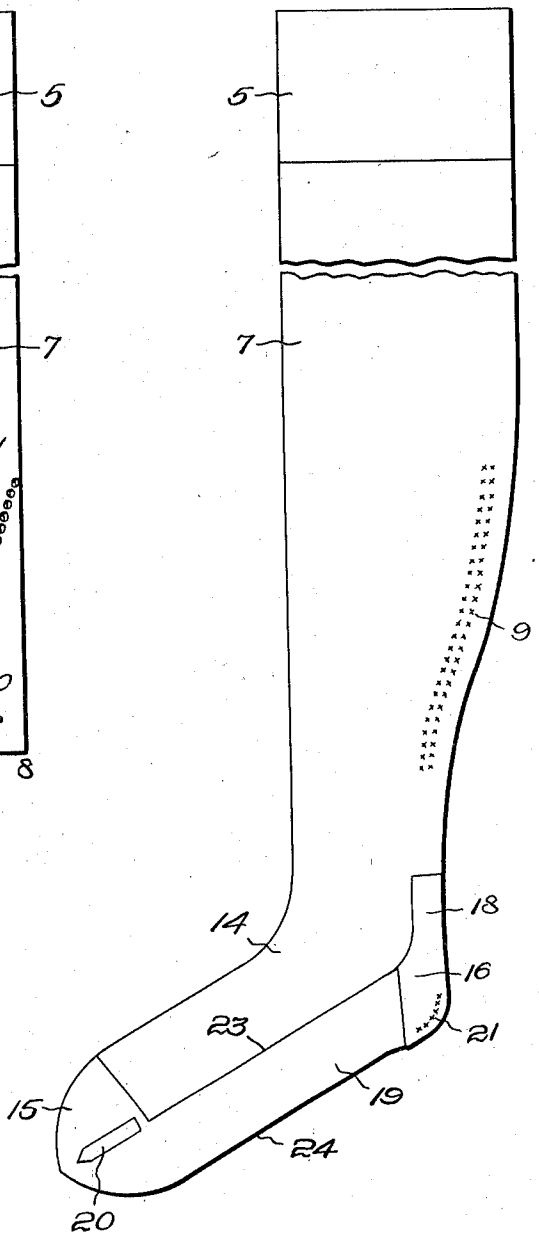


Fig. 2.



Inventor:
Herbert V. W. Scott,
by Emery Booth Varney & Townsend
Attys

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Fig. 3.

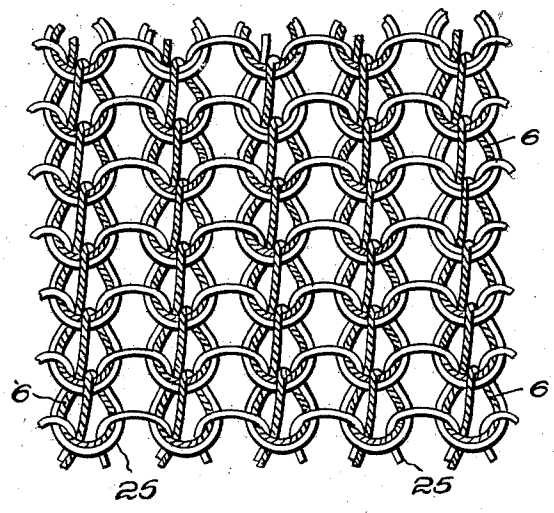
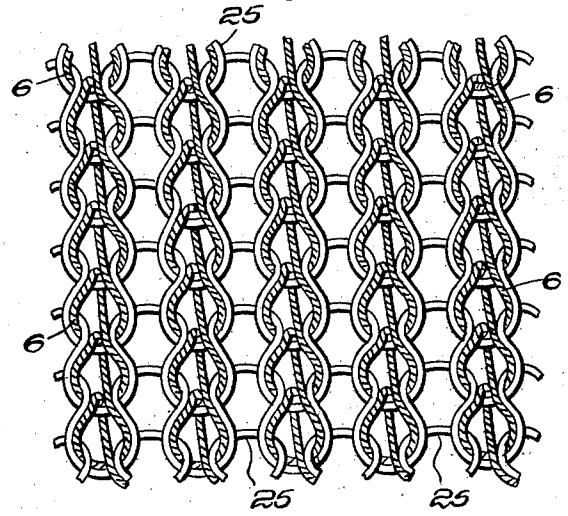


Fig. 4.



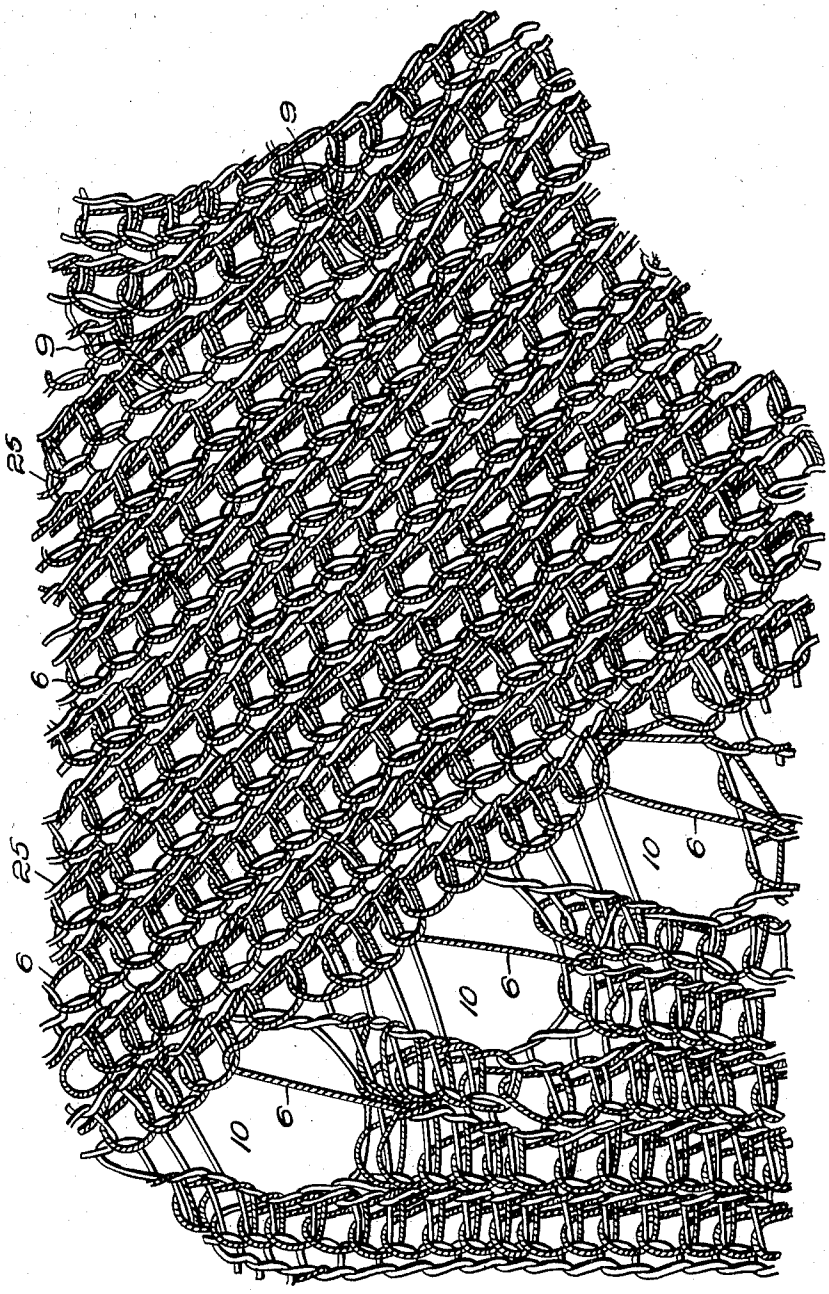
Inventor:
Herbert V. W. Scott.
by Emery Booth Varney & Townsend
Attys.

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Fig. 5.



Inventor:
Herbert V. W. Scott,
By Emery Booth Vaney & Townsend
Attys

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METHOD OF KNITTING RUNPROOF OR RUN RESISTANT KNITTED FABRIC AND THE RESULTING FABRIC

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Fig. 7

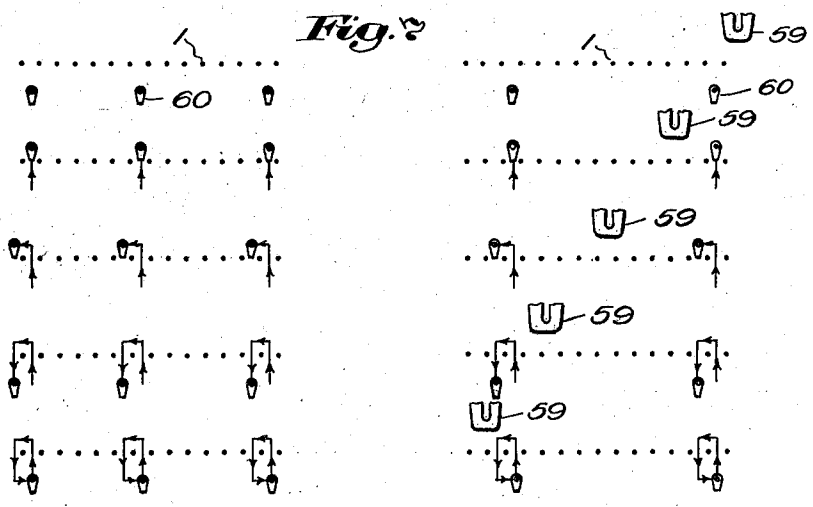
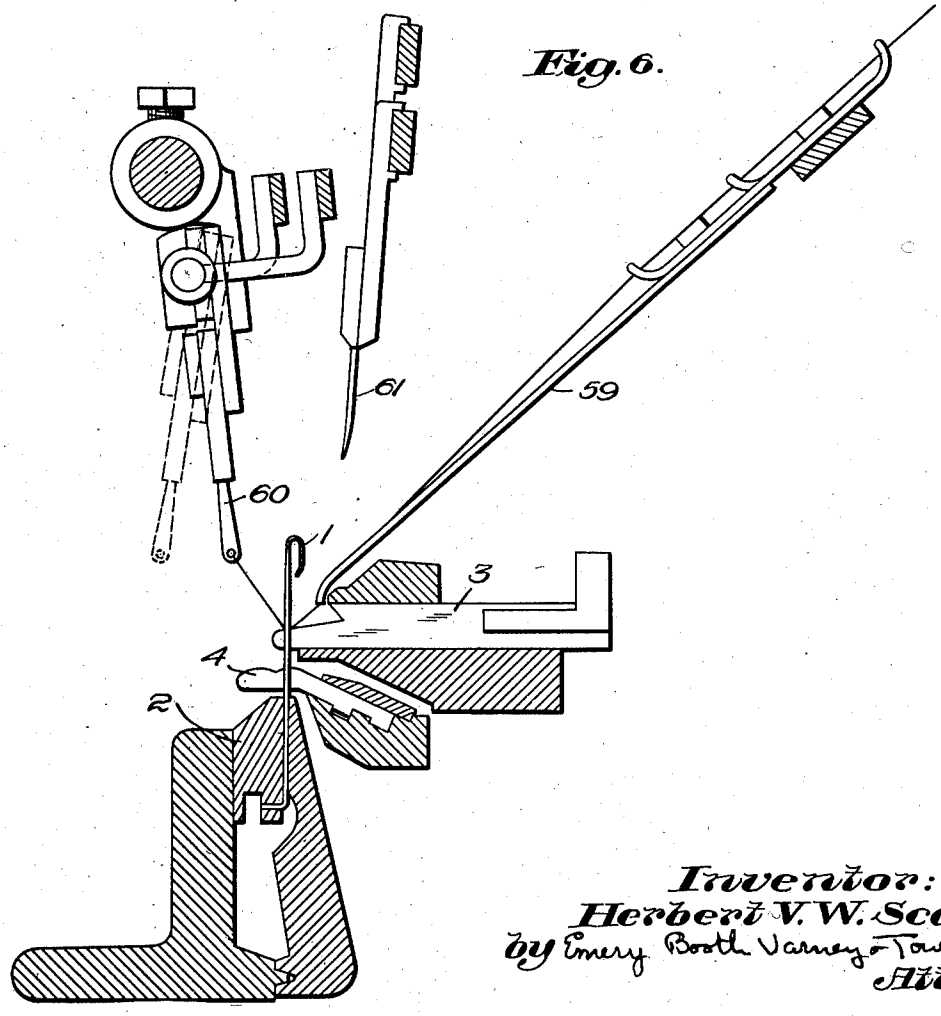


Fig. 6.



Inventor:
Herbert V. W. Scott,
by Emery Booth Varney & Townsend
Attys.

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METHOD OF KNITTING RUNPROOF OR RUN RESISTANT KNITTED FABRIC AND THE RESULTING FABRIC

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Fig. 8

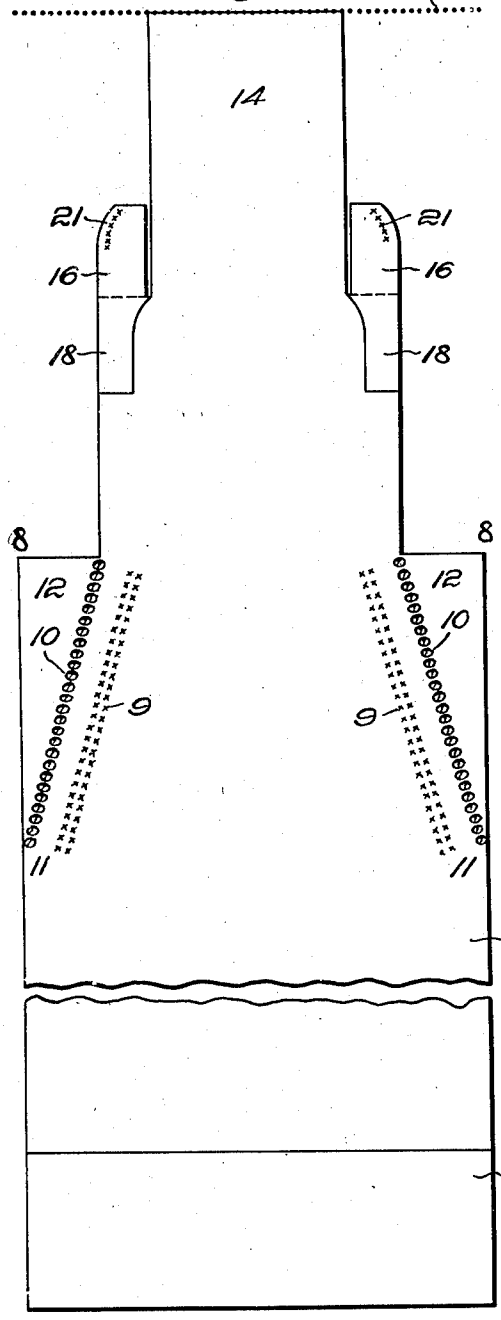


Fig. 9.

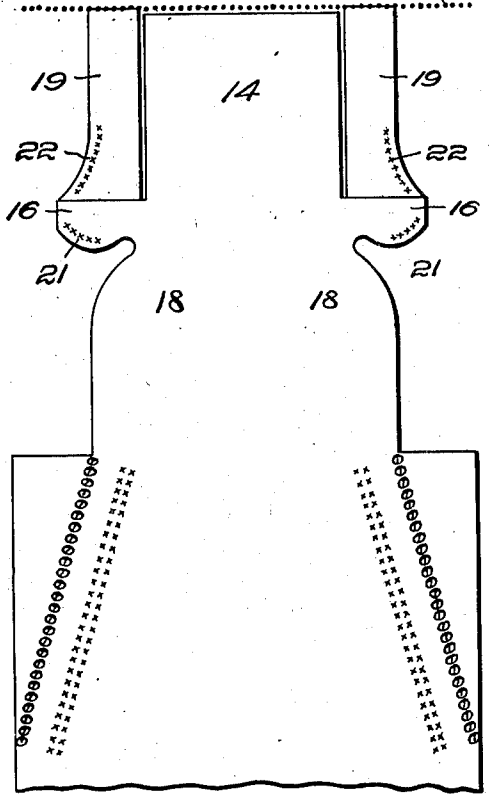
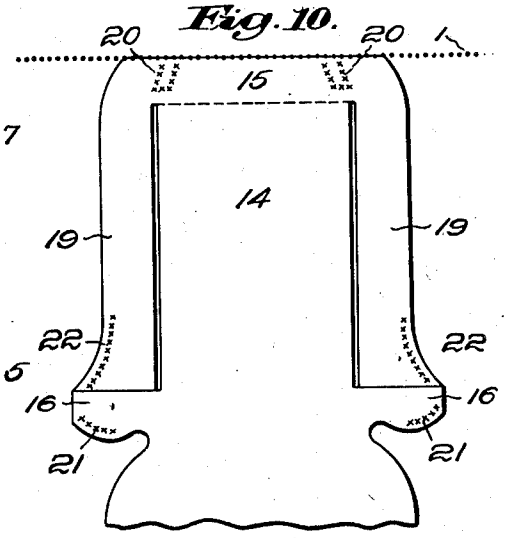


Fig. 10.



Inventor:
Herbert V. W. Scott,
by Emery Booth Varney & Townsend
Attys.

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UNITED STATES PATENT OFFICE

1,983,148

METHOD OF KNITTING RUNPROOF OR RUN-RESISTANT KNITTED FABRIC AND THE RESULTING FABRIC

Herbert V. W. Scott, Glen Ridge, N. J., assignor to Van Raalte Company, New York, N. Y., a corporation of New York

Original application August 11, 1932, Serial No. 628,391, now Patent No. 1,978,410, dated October 30, 1934. Divided and this application December 5, 1932, Serial No. 645,722

7 Claims. (Cl. 66—172)

This application is a division of my co-pending application, Serial No. 628,391, filed August 11, 1932.

This invention relates to the method of knitting run-proof or run-resistant knitted fabric and particularly full-fashioned hosiery, as well as to said fabric or hosiery.

In order that the principle of the invention may be readily understood, I have disclosed in the accompanying drawings the said fabric and sufficient of the mechanism to disclose the best mode known to me for practicing the method of my invention.

In said drawings,

Fig. 1 is a plan view of a blank of an English type of full-fashioned stocking having my invention applied thereto or incorporated therein, parts being broken away;

Fig. 2 is a side elevation of the complete stocking made in accordance with my invention but with an intermediate part broken away;

Figs. 3 and 4 are enlarged plan views of the fabric viewed respectively from the outside and from the inside;

Fig. 5 is a plan view of a portion of the fabric at the narrowings, said view corresponding exactly to a photograph of the fabric made by a microscopic camera;

Fig. 6 is a vertical section upon an enlarged scale taken through the knitting instrumentalities to show their relative positions and arrangement;

Fig. 7 is a diagram plan view of some of the needles of one section of the machine and indicating the relative positions of the main knitting thread guide or carrier, and several of the additional or warp thread fingers in the act of laying their additional or warp threads onto the appropriate needles;

Fig. 8 is a somewhat diagrammatic representation of a stocking blank as it comes from the knitting needles, said figure representing the knitting as having progressed into the top of the foot, the stocking blank therefore still being upon the legger;

Fig. 9 is a similar view but representing the stocking blank as now upon the footer; and

Fig. 10 is a similar view but representing the knitting as having progressed into the toe.

The full-fashioned hosiery to which my invention relates is run-proof or very strongly run-resistant in both directions throughout the entire extent of the hosiery. Such hosiery is knitted upon a full-fashioned machine which may be of the general structure of the well known Reading full-fashioned machine excepting as to those means whereby the fabric is rendered run-proof or strongly run-resistant.

Preferably the machine is provided with the usual number of sections upon each of which is knitted a stocking leg and the heel tabs and the instep of the foot, so as to make an English type of foot, but my invention is not restricted in this respect. Any suitable hosiery yarn or thread may be employed as the main knitting yarn or thread, as, for example, silk, artificial silk, rayon, cotton or wool, and I shall use the words "main thread" broadly to include any such type of thread or others that may be suitable. The main thread may be changed from time to time in knitting the stocking as may be necessary, as, for example, at the end of the welt and in the foot. It will be understood that reinforcing threads may be introduced at desired points, in accordance with practice, particularly in the high splice and in the heel tabs, as well as in the sole and at the toe.

The additional, secondary or warp threads may also be of any suitable material, but they are preferably of silk, and as an important purpose of my invention is to provide a run-stop or strongly run-resistant stocking, the stockings whereof, so far as the main thread is concerned, are of usual character, I preferably in each instance use additional threads which are of the same character as the main thread, thus giving a uniform structure and appearance to the resulting hosiery, and one which will not be objected to by those who prefer hosiery having the normal or usual stitch so far as the main thread is concerned.

It will be evident that inasmuch as both the main knitting thread and all the warp and additional threads are of the same character (as, for example, real silk), the necessary or inevitable slight difference in thickness of the main knitting thread at different parts of the length due to any cause, will be overcome or neutralized or very greatly minimized by reason of the presence of the said warp or additional threads in the respective needle wales of the main thread, inasmuch as the same inevitable inequalities would be present in the said warp and additional threads, and therefore the general effect will be more or less an equalization or distribution of the said inequalities so as to make them substantially non-observable.

It is highly important that the same tension be maintained upon all the additional or warp threads as upon the main knitting thread, and in said parent application I have disclosed means

for effecting this result so that the fabric is of uniform, even and equal tension throughout.

The needles are desirably spring beard needles and are represented as such at 1 in Fig. 6, where they are shown as mounted in a needle bar 2 of usual construction. Sinkers, dividers and knocking over bits are provided as usual, sinkers being represented at 3 and knocking over bits at 4. The parts function as in the Reading or similar full-fashioned hosiery machines.

Referring to Figs. 1 and 2, the top welt of the full-fashioned stocking is indicated at 5, and it will be understood that the additional or warp threads, as indicated at 6 in the various figures, may be introduced in the fabric from the very commencement thereof (that is, at the very commencement of the welt), or the welt may be made in the usual manner and turned or closed, and thereupon a lighter main knitting thread may be substituted. At the same time, the additional or warp threads 6 may be introduced and their feeding continued throughout the fabric, as will be described in detail.

In Figs. 1 and 2, the leg of the stocking is represented at 7. The ankle or lower calf portion is shaped by fashioning. This is preferably done as follows, reference being made to Figs. 1 and 5.

I provide a warp thread finger 60 for each individual warp thread 6, so that each warp thread is introduced to one needle wale only, and at all times is restricted thereto. The warp thread fingers are desirably mounted as shown in the parent application above referred to, namely, preferably in certain blocks preferably five in number. In such case, there would be a long central block carrying those fingers which at all times remain in action, two shorter blocks at either side thereof carrying those fingers which during the course of the knitting introduce the warp threads into the heel tabs and which blocks would be at the proper time moved out of action, and two other blocks one at either end of the needle series, carrying those warp fingers that introduce the warp threads at the selvage portions of the fabric (that is to say, to so much of the sides of the fabric blank as may be comprehended within the fashionings or narrowings).

Upon reference to Fig. 1, it will be observed that the knitting of the fabric is continued of full width down to the transverse line 8—8 and that then the knitting is abruptly terminated upon certain of the needles. Those needles upon which the knitting is thus terminated are the needles whose warp fingers are carried by the outermost blocks, one at either end of the entire row or series of warp thread fingers. Nevertheless the stitches are transferred inward as indicated in Fig. 1 at 9—9 by means of narrowing points, which may be of the usual number at each side or edge of the blank. Each stitch is transferred inward to the extent of one or two needles, but desirably not more than two, but the traverse of the main thread carrier is continued for the full width of the fabric down to the line 8—8. Inasmuch as the warp threads 6 introduced by the fingers of the two end-most blocks, remain in action because the blocks are not as yet moved into non-functioning position, it will be evident that the warp threads continue to be supplied to the same identical needles as before although certain stitches are laterally shifted inward as indicated at 9. The result, however, is to provide an inclined line of small openings 10 along each side of the fabric from a transverse line 11—11 down to the transverse line 8—8. In Fig. 5, I have exactly represented this structure of the fabric and it will be observed that each of said openings 10 is traversed by at least one warp thread, such threads becoming at once incorporated in the further knitting of the fabric in the triangular portions 12—12 shown in Fig. 1. After the knitting of the entire blank has been completed I trim off each edge along the line of holes 10—10. This leaves entirely acceptable edges because of the non-run character of the fabric, and the two inclined edges are then seamed together in the customary manner and will show the two lines 9—9 of transferred stitches at each side of the seam.

I find that in practice it is desirable to narrow or fashion by transferring stitches to the extent of one needle only, because this lessens the distance that the warp threads are displaced from their normal position, to which normal position they at once return, as elsewhere set forth herein. It will be observed that in the right hand side of Fig. 5 appear several of the actual narrowings, the same being also indicated in Fig. 1.

When the knitting has progressed to the line 8—8, the traverse reciprocation of the main thread carrier is reduced in an automatic manner, not herein necessary to refer to, so that the traverse terminates at the points 13—13 of Fig. 1, and thereafter the fabric is knitted parallel sided excepting as will be described. At the termination of the heel tabs the traverse of the main thread carrier is further reduced by the same means.

It will be understood that the stocking blank will be seamed along all selvage edges, and also at usual points for an English type of foot, to which type my invention is not restricted.

The instep or top of the foot portion of the stocking is represented at 14, and it will be understood that my invention is of peculiar advantage with the so-called English type of foot, because the additional warp threads 6 continue without interruption from the top of the stocking down the leg and instep to the toe 15. The heel tabs are indicated at 16—16 and at their inner edges are separated from the instep fabric, as represented most clearly at 17—17, Fig. 1. The high splice portions are indicated at 18—18, and are provided by the usual additional traversing thread carriers for the reinforcing threads, and the movements of such additional thread carriers are controlled in usual manner. The sole portions of the stocking blank or foot are indicated at 19—19, and the toe portion 15 is provided with customary narrowings 20. Narrowings are also provided in the heel tabs as represented at 21 in Fig. 1, and in the sides of the foot adjacent to the heel tabs as represented at 22—22 in Fig. 9.

It will be understood that the stocking represented in said figures is seamed along both sides of the foot as indicated at 23 in Fig. 2 and also along the bottom of the foot as indicated at 24 in said figure.

In order that the method of knitting the foot and adjacent parts may be entirely clear, I have in Fig. 8 indicated the stocking blank as suspended from or coming from the needles 1. In Fig. 8, the knitting upon the legger has progressed to a point at, or approximately at, the end of the instep, the fabric being upon the needles and above the knocking-over bits in the usual knitting position. The heel tabs 16—16 have been completed and are no longer upon the needles.

The fabric is now transferred from the legger to the footer. The heel tabs 16 are turned out-

wardly as represented in Fig. 9 and are positioned in customary manner upon the needles and thereupon the sides 19—19 of the foot are knitted. The knitting continues upon the footer to complete the sides 19 and the toe 15.

It will be understood that the warp threads 6 may and preferably do continue throughout the heel tabs 16 and may be provided in the side portions 19 of the foot.

Referring to the structure of the fabric which is diagrammatically illustrated in Figs. 3 and 4 and is precisely represented in Fig. 5, it will be understood that the additional or warp threads 6 are interknitted as shown in said figures. The main knitting thread is indicated at 25. Each warp thread 6 is introduced to all the loops of its own needle wale only, with the exception only of the structure represented most accurately in Fig. 5 and which has been already explained. Each warp thread 6 lies in parallelism with the loop of the main knitting thread 25 inside such loop and is so uniformly positioned with respect thereto because of the equality of the tension of the main knitting thread and the additional or warp threads, that the fabric and its constituent threads all lie in an even, uniform and equal tension. Therefore, the fabric is as readily laterally expansible as any knitted fabric and is as expansible longitudinally as any knitted fabric is longitudinally expansible. In other words, the incorporation of the additional or warp threads 6, needle wale for needle wale, does not decrease the expansibility of the fabric nor are the additional threads observable except by a microscopic or similar examination, especially when the main knitting thread 25 and the additional or warp threads 6 are of the same texture, color and character as is desirable. The warp threads 6 do not enter into or become incorporated in the sinker wales, and their presence in the needle wales prevents a run in those needle wales, inasmuch as the additional or warp threads extend lengthwise the wales, whereas the main knitting thread extends transversely of the wales.

It will be understood that the fabric is knitted as rapidly as a fabric with plain loops is knitted of only a main thread.

In Fig. 7 I have diagrammatically indicated the traverse of the main thread carrier 59 along the bank of needles 1. I have also indicated certain of the warp thread fingers 60 and the rectangular movement of said warp thread fingers each about its own needle. It will be understood that the traverse of the main thread carrier across the bank of needles starts substantially simultaneously with the commencement of the thread laying operation of the warp threads 6. It will also be understood that each warp thread 6 is laid once about its needle for each course of the main knitting thread, whether that course starts from the right or from the left end of the bank of needles. The knitting needles commence their descent immediately after each course of the main knitting thread is laid. Each warp thread 6 may be wrapped about its needle in the direction indicated by the arrow heads in Fig. 7, or in the opposite direction. For convenience, I prefer to thread the warp threads through the fingers 60 from the right, but they may be threaded from the right or the left. While the said warp threads are being wrapped about their respective needles 1, said needles are at their highest position.

I desire it to be understood that the feature of my invention which involves the transfer of stitches inward by the narrowing points 61 is not limited to use only in making the precise form or shape of stocking blank disclosed in the drawings, inasmuch as my invention is not limited to the making of only the shape of stocking blank shown, and the portion of the fabric that is to be trimmed away may be varied from that shown in Fig. 1.

Preferably I introduce a separate warp thread, one to each needle wale and confined thereto. In accordance with my invention, all or substantially all the needle wales of the fabric are supplied with said separate warp threads.

Having thus described one illustrative embodiment of the fabric of my invention, and set forth the preferred manner of practicing the 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 the purposes of limitation, the scope of the invention being set forth in the following claims.

I claim.

1. A run-proof or run-resistant, plain knit, full-fashioned or flat-knit stocking consisting of a main or body thread knitted of the full width of the blank only to the termination of the calf narrowings, and a series of knitted in warp threads or yarns one for each needle wale, said stocking having stitches of the main thread laterally shifted or transferred at the leg narrowings, said laterally transferred or shifted stitches containing stitches of the warp threads, which are transferred with them, said stocking having heel, foot and toe portions.

2. A blank for a full-fashioned or blast-knit stocking consisting of a main or body yarn knitted course after course, and a series of warp threads one for substantially each needle wale knitted into and extending lengthwise the needle wales, said blank at the leg narrowings having stitches of the main thread laterally transferred one or more needles, the warp threads at the transferred stitches also similarly transferred therewith, the knitting of the fabric blank being continued of the full width only to the termination of said narrowings, whereby the fabric outside said opposite lines of narrowings may be trimmed away, said blank having heel, foot and toe portions.

3. A blank for a full-fashioned or flat-knit stocking consisting of a main or body yarn knitted course after course, and a series of warp threads one for substantially each needle wale knitted into and extending lengthwise the needle wales, said blank at the leg narrowings having stitches of the main thread laterally transferred one or more needles, the warp threads at the transferred stitches also similarly transferred therewith, the knitting of the fabric blank being continued of the full width only to the termination of said narrowings at which point the traverse of the main or body thread is materially shortened, whereby the fabric outside said opposite lines of narrowings may be trimmed away, said blank also containing a top foot portion integrally knitted therewith said blank also having heel, lower foot and toe portions.

4. A run-proof or run-resistant, plain knit, full-fashioned or flat-knit stocking consisting of a main or body thread and a series of warp threads one for substantially each needle wale knitted into and extending lengthwise the needle wales, said stocking having stitches of the main thread and the corresponding warp threads laterally transferred at the leg narrowings, the

stocking blank being knitted of the full width of the blank only to the termination of the said narrowings at which point the traverse of the main or body thread is materially shortened, said stocking having a foot, heel and toe and seamed at the back of the leg along said lines of leg narrowings, the fabric outside said leg narrowings being trimmed away.

5. A run-proof or run-resistant, plain knit, full-fashioned or flat-knit stocking consisting of a main or body thread and a series of warp threads one for substantially each needle wale knitted into and extending lengthwise the needle wales, said stocking having stitches of the main thread and the corresponding warp threads laterally transferred at the leg narrowings, said stocking having a foot, the top whereof constitutes an integral continuation of the leg portion and contains the warp threads of the needle wales pertaining to said foot top, the stocking being seamed along the back of the leg at said lines of narrowings, the stocking blank being knitted of the full width of the blank only to the termination of the said narrowing at which point the traverse of the main or body thread is materially shortened and the fabric outside said lines of narrowings being trimmed away, said stocking having heel, foot and toe portions.

6. That method of making a run-proof or run-resistant, plain knit, full-fashioned or flat-knit stocking consisting in knitting a main or body thread by traversing the same the full width of the fabric course after course, and in interknitting warp threads into substantially each needle wale thereof; laterally transferring inward a series of stitches of the main thread and contained warp threads at the selvage portions at points lengthwise the stocking corresponding to the usual narrowings of a full-fashioned stocking, but at the same time continuing the knitting of the fabric blank for the full width thereof only to the termination of the said narrowings, at which point the traverse of the main or body thread is materially shortened, and continuing the knitting of the stocking to complete the foot, heel and toe.

7. That method of making a run-proof or run-resistant, plain knit, full-fashioned or flat-knit stocking consisting in knitting a main or body thread by traversing the same the full width of the fabric course after course, and in interknitting warp threads into substantially each needle wale thereof; laterally transferring inward a series of stitches of the main thread and contained warp threads at the selvage portions at points lengthwise the stocking corresponding to the usual narrowings of a full-fashioned stocking, shortening the traverse of the main thread at the termination of said narrowings and then continuing the knitting with both the main thread and those warp threads apportioned to the continued needle wales, completing the knitting of the stocking by knitting heel, foot and toe portions and seaming the stocking along the selvage edges and also said lines of narrowings and trimming away the fabric outside said lines of narrowings.

HERBERT V. W. SCOTT.