Nov. 15, 1938.

H. W. ROESENER

KNITTED HOSIERY TOE

Filed Nov. 30, 1936

2,136,892

3 Sheets-Sheet 1

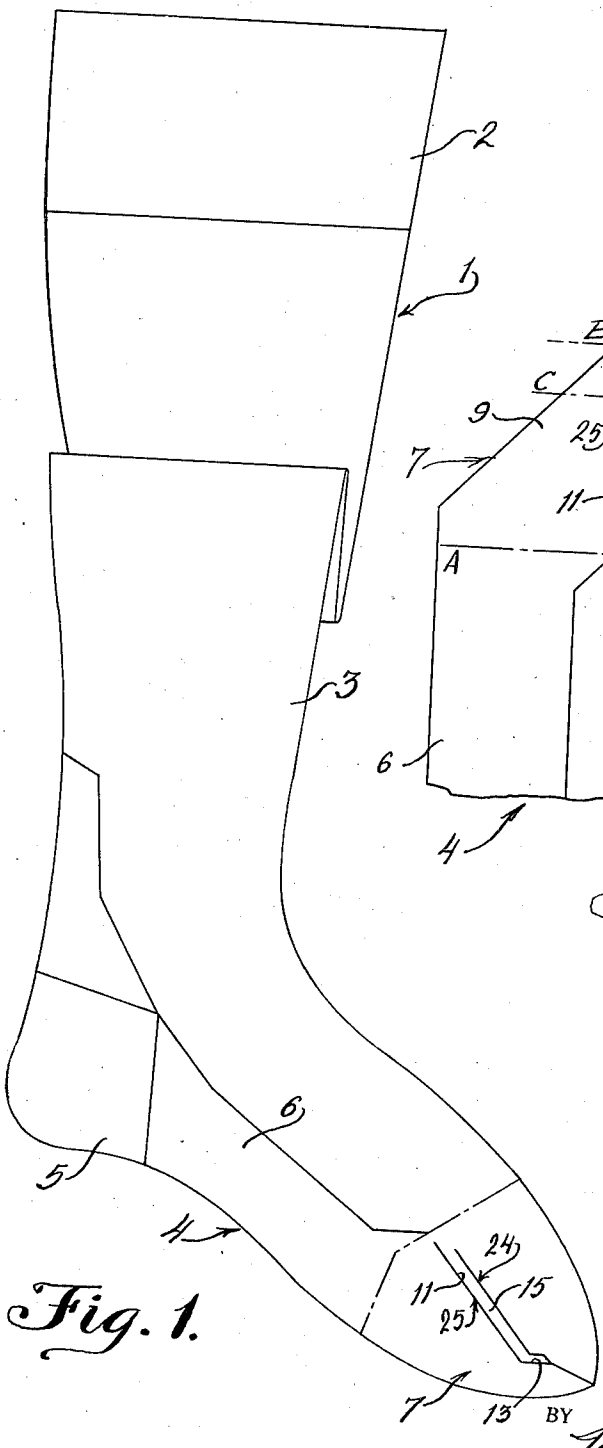


Fig. 1.

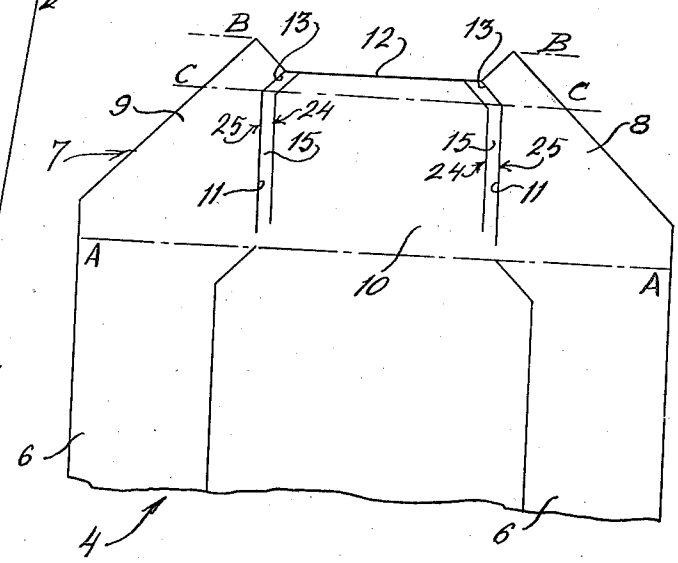


Fig. 2.

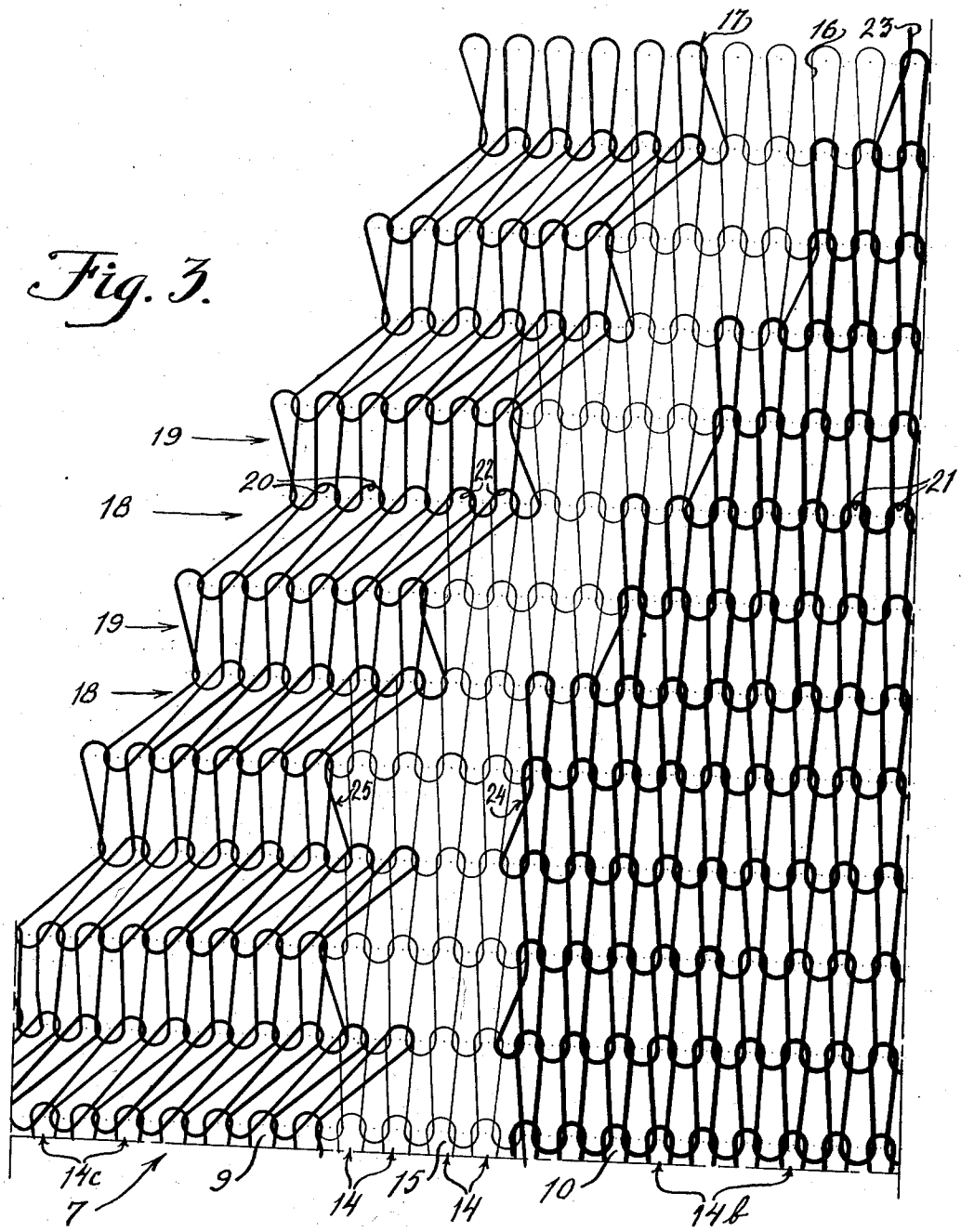
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Fig. 3.



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3 Sheets-Sheet 3

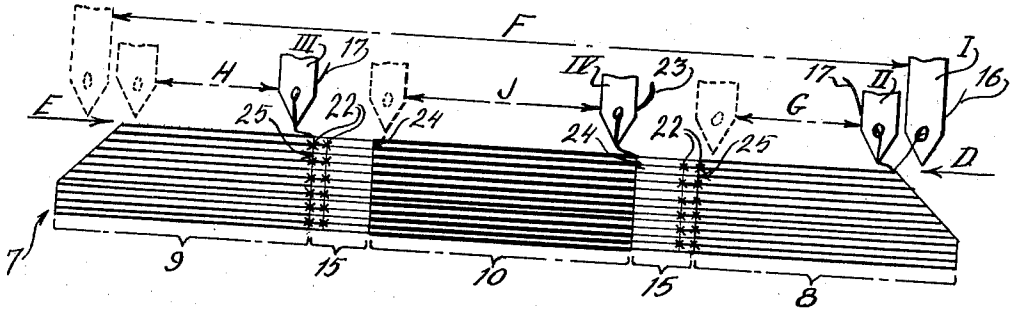


Fig. 4.

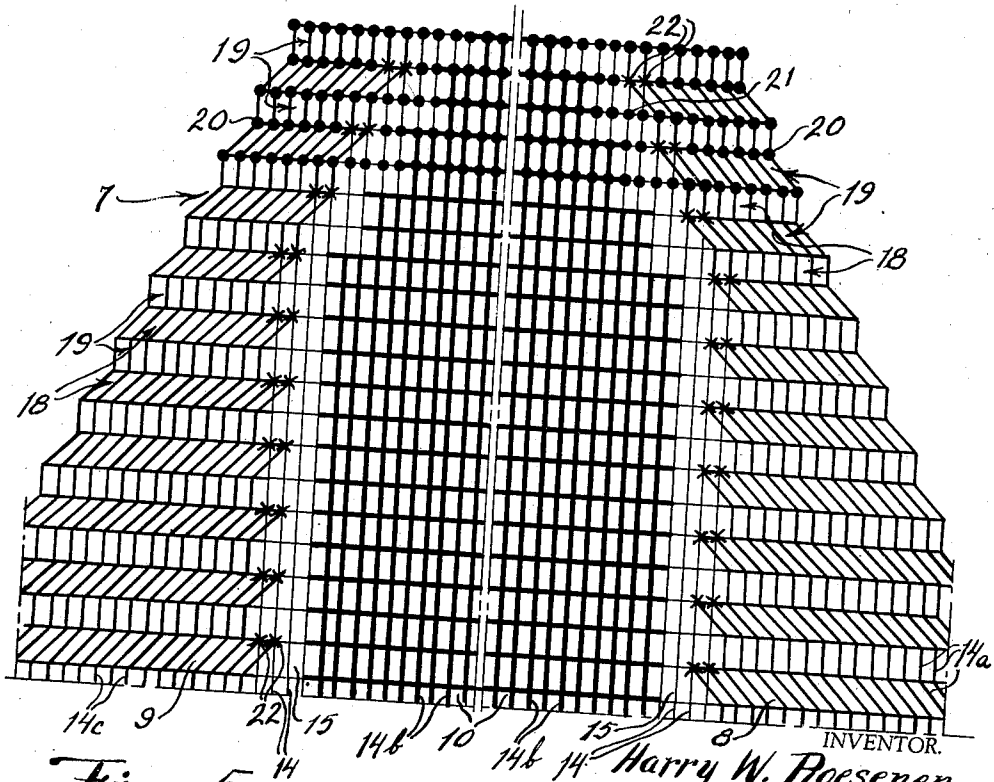


Fig. 5.

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UNITED STATES PATENT OFFICE

2,136,892

KNITTED HOSIERY TOE

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Application November 30, 1936, Serial No. 113,416

11 Claims. (Cl. 66—182)

The present invention relates to hosiery made on full fashioned knitting machines, and more particularly to a toe for full fashioned stockings and the method of knitting the same.

The invention primarily aims to provide a method of knitting the toe section of full fashioned hosiery whereby the toe may be made with the commonly known and used legger equipment, that is, without necessitating the use of pairs of narrowing combs and the complicated, involved narrowing and transferring mechanism of a footer machine.

As is generally known in the art, the foot narrowings are such that four narrowing combs are required for each knitting section of the machine, two large combs and two small combs. The large combs are used on the outer edge portions of the fabric to narrow and shape the same, while the small combs act on the intermediate portions, the associated combs being relatively operated through the double action of the narrowing mechanism of a footer to form the so-called toe gores and diamond points which heretofore have been deemed necessary to properly fashion the toe.

The present invention has for one of its main objects the provision of a full fashioned hosiery toe construction that may be properly shaped by means of large combs alone thus permitting the knitting of the foot on a legger machine which, as well known, is of greatly simplified structure in comparison with the footer machine.

Another object of the invention resides in the provision of a toe construction embodying a plurality of fabrics knitted from yarns reinforced to different degrees and separated by interposed fabric panels knitted from an unreinforced relatively light body yarn, whereby it is possible to incorporate in the hosiery toe a toe patch reinforced to a much greater extent than is practically possible in ordinary full fashioned hosiery now on the market, thereby imparting an increased wearing quality to the hosiery toe section.

It is also an important feature of the invention to provide a full fashioned hosiery toe section which may be heavily reinforced without danger of subjecting the parts of the knitting machine, such as the needles and narrowing points, to excessive stresses, which may cause distortion or breakage of such parts, the construction of the toe being such that the possibility of accidental occurrence of drop loops and the formation of runs in the toe part while the same is being knitted are practically eliminated.

Another meritorious feature of the invention contemplates the provision of a hosiery toe section wherein the transferred loops throughout the major portion of said section are in engagement with loops disposed in the same wales so that the fashioning lines for the greater portion of their lengths extend walewise of the fabric, with the result that several wales adjacent to and paralleling said fashioning lines may be knitted from a relatively light yarn for the purpose of imparting an increased elasticity to the fabric.

Other important objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by persons skilled in the art, I have, in the accompanying drawings, and in the detailed description based thereupon, set out a possible embodiment of the same. In these drawings:

Figure 1 illustrates a finished stocking constructed in accordance with the invention.

Figure 2 shows a portion of the foot including the toe section of the stocking blank.

Figure 3 is a greatly enlarged diagrammatic representation showing the knitted structure of a fashioned portion of the toe section.

Figure 4 diagrammatically illustrates the method of making the stocking toe section in accordance with the present invention.

Figure 5 is a diagrammatic view of the toe section in which the courses are designated by horizontal lines; the wales by vertical lines; the narrowings by crosses; and the loops by dots.

Having more particular reference to the drawings, wherein like characters of reference will designate corresponding parts throughout, I have shown in Figure 1 a full fashioned stocking 1 which comprises the welt 2, the leg portion 3, and the foot portion 4 including the heel 5, sole 6, and toe 7. The welt 2, leg 3, and foot 4 with its heel 5 and sole 6 are of the usual construction and, therefore, need not be described herein.

As previously stated, this invention has to do with improvements in the construction and method of knitting the toe section 7, which will now be described in detail.

In the drawings, particularly Figure 2, it will appear that the toe section 7, that is, the portion of the blank represented between the lines A—A and B—B, consists of a pair of side fabrics 8 and 9 respectively, and an intermediate fabric or toe patch 10, said fabrics 8, 9, and 10 being defined by the fashioning lines 11 extending walewise of the toe fabric for the major portion of their length, that is to say, the fashioning lines 11 extend wale-

wise of the fabric to the point indicated by the dotted line C—C.

From the point indicated by the dotted line C—C to the tip 12 of the blank, the fashioning lines 11 are tapered inwardly of the fabric in the manner represented at 13. It will be noted from Figures 3, 4 and 5, that the side fabrics 8 and 9 and intermediate fabric 10 have a reinforced construction, the intermediate fabric 10 being reinforced to a greater degree than the side fabrics 8 and 9, the latter preferably being of ordinary reinforcement.

Disposed adjacent to, and paralleling each fashioning line 11 are wales 14 knitted from relatively light body yarn, said wales constituting unreinforced fabric panels 15 separating the heavy reinforced intermediate fabric 10 from the ordinary reinforced side fabrics 8 and 9, thereby imparting a certain degree of elasticity to the fabric, allowing the toe section to readily adjust itself to the foot of the wearer, while permitting the provision of a greatly reinforced toe patch, which enhances the wearing ability of the toe section.

The method of knitting the stocking having the toe construction above described will be more clearly understood from the showing made in Figures 3, 4, and 5. As shown by these figures, at the beginning portion of the toe section, there is made a series of alternating narrowing and plain courses 18 and 19 respectively, for the purpose of shaping the fabric. It will appear, particularly from Figures 3 and 5, that the shaping of the fabric is had by transferring inwardly of the fabric those loops designated by the reference character 20, which are the loops of the narrowing courses 18 normally disposed in the side fabrics 8 and 9. Preferably, the loops 20 are transferred the distance of two wales, although it is to be understood that said loops may be transferred for a greater or lesser distance, as preference or necessity may dictate.

Whereas the loops 20 of the narrowing courses 18 are transferred inwardly of the fabric, the remaining loops 21 of said courses, that is, the loops disposed in the intermediate fabric 10, retain their original position so that pairs of narrowing marks 22 are formed on the opposite sides of the fabric at a point between the side fabrics 8 and 9 and the intermediate fabric 10. It will be noted that the loops 21 in the intermediate section 10 are knitted from the body yarn 16 and a relatively heavy reinforcing yarn 23, which is of a heavier weight than the reinforcing yarn 17.

From the foregoing description of the toe fabric construction, it will be understood that the intermediate fabric 10 is preferably reinforced to a greater degree than the side fabrics 8 and 9, and the intermediate fabric is separated from the side fabrics by a number of wales 14 of relatively light body yarn constituting the fabric panels 15.

The manner of laying the yarns to attain this construction is diagrammatically shown in Figure 4 from which it will be apparent that a set of four carriers are utilized in the formation of the fashioned portion of the toe fabric. One of the carriers I, which may be termed the main carrier, is threaded with the body yarn 16 and is adapted to reciprocate over the entire width of the fabric, that is, from selvedge edge to selvedge edge, as indicated by the arrow F. Two of the carriers, designated by the characters II and III, and called the main reinforcing carriers, are each threaded with separate ordinary reinforcing yarns 17, said yarns respectively being of the same weight, but of a heavier weight than the body yarn 16. The carrier II is disposed to reciprocate over one of the side fabrics, for instance the side fabric 8 as indicated by the arrow G, whereas the carrier III is adapted to reciprocate over the other of said side fabrics, that is, the fabric 9 as indicated by the arrow H.

The fourth and last carrier, designated by the reference character IV and, for convenience, called the auxiliary reinforcing carrier, is threaded with relatively greatly reinforced yarn 23, said yarn 23 being of a greater weight than the main reinforcing yarns 17. The carrier IV is arranged to reciprocate over the intermediate fabric 10, as represented by the arrow J.

With the carriers arranged in the manner aforesaid, it will be appreciated that during the initial yarn laying movement in the direction indicated by the arrow D in Figure 4, carriers I and II are moved simultaneously, thus laying their respective yarns 16 and 17 to form the series of wales 14a of the corresponding side fabric 8. Upon reaching the inner marginal edge of said side fabric, the carrier II is stopped while the carrier I continues its movement to lay its yarn for the formation of a limited number of loops which constitute the corresponding set of unreinforced wales 14 to form one of the separating panels 15. After having laid the necessary amount of yarn to form the loops of said wales 14, the carrier I proceeds to lay its body yarn 16 over the intermediate fabric 10. Simultaneously with the laying of the yarn over said intermediate fabric 10 by the carrier I, the auxiliary reinforcing carrier IV lays its heavy reinforcing yarn 23 over said fabric so that there is formed a series of greatly reinforced wales 14b covering the entire width of said intermediate fabric 10.

After the simultaneous laying of the yarns 16 and 23 over the intermediate fabric 10, the auxiliary carrier IV is stopped but the main carrier I keeps on moving and, accordingly, again lays its body yarn 16 for the formation of the few loops knitted for the formation of the second set of unreinforced wales 14 constituting the other panel 15, after which the main carrier I and the main reinforcing carrier III move in unison to lay their respective yarns 16 and 17 for the formation of that series of wales 14c constituting the side fabric 9.

Following the laying of the yarns 16, 17, and 23 in the manner aforesaid, the knitting operation of the machine is accomplished in the usual well known manner and a course is formed consisting of reinforced end rows of loops made from the body yarn 16 and the reinforcing yarn 17, a reinforced intermediate row of loops made from the body yarn 16 and the heavy reinforcing yarn 23, and an unreinforced row of loops made from the body yarn 16 and interposed between the intermediate row of loops and each end row of loops. Due to the mode of laying the various yarns, there are formed, as will more clearly appear from Figure 3 of the drawings, spaced selvedges 24 and 25 defining the unreinforced panels 15.

After the various yarns have been laid and knitted to form one course, as described, the carrier motion is momentarily disrupted and during this momentary disruption, the inward transfer of the loops in the side fabrics is performed by means of narrowing combs having the usual construction and operating in the usual way.

Subsequent to the transfer operation, the yarn laying movement of the carriers is resumed and

yarns are again laid and knitted to form the succeeding course in the same manner as above described, with the exception that the carriers travel in the opposite direction, that is, in the direction indicated by the arrow E in Figure 4.

At the completion of this latter course, however, no transfer of loops takes place so that a plain course is knitted in alternation with the narrowing courses. At this point, attention is called to the fact that one or more additional plain courses may be knitted between each narrowing course if the insertion of such additional courses is found preferable or necessary to provide the proper or required amount of fabric for the formation of the toe pocket.

It is pointed out that the laying of the separate yarns of different weights at spaced intervals during the laying of the body yarn produces a central or intermediate heavily reinforced fabric flanked by ordinary reinforced fabrics, with a panel of unreinforced fabric interposed between the heavily reinforced and each ordinary reinforced fabric.

It will particularly appear from Figures 3 and 5, how the successive transferred courses narrow the toe section in order to fashion the fabric thereof. It will be understood by those skilled in the art that the narrowing of the courses may be accomplished through the operation of the well known narrowing mechanism generally provided upon full fashioned knitting machines now in common use, which mechanism includes automatically adjustable stops controlling the length of the reciprocating strokes of the carriers.

It will also clearly appear from Figures 3 and 5 that whereas the fabric is reduced in width, the transfer of the loops in the major portion of the side fabrics 8 and 9 is not affected thereby, that is, the loops will be transferred repeatedly onto the same inner needles so that the transfer marks 22 occur in the same wales, with the result that the greater part of the fashioning lines 11 created by said transfer marks, extend walewise of the toe fabric to a point (line C—C) in close proximity to the tip of the stocking blank. When the blank has been knitted to the point represented by the line C—C, the narrowing is carried out in such a manner as to cause the innermost of the transferred loops in the successive narrowing courses to move step by step inwardly of the fabric and, at the same time, to shorten the relative stroke of the four carriers hereinbefore referred to so that the lines of transfer marks and the rows of unreinforced loops at the opposite side portions of the toe section gradually converge to the tip 12 of the blank.

Because of this constructional feature of the invention, it will be appreciated that the major portion of the wales 14 consisting of loops made from the relatively light body yarn extend on a straight line in the general longitudinal direction of the toe fabric, thus providing between the reinforced fabrics 8 and 9 and 10 well defined panels 15 of knitted fabric, the elasticity of which is not hindered by the reinforcement of the adjacent fabrics. Consequently, the preserved elasticity of the panels 15 gives to the toe that degree of stretchability sufficient to assure its fit and adaptation to the foot of the wearer. Moreover, due to the presence in the toe fabric of wales of loops constructed from a relatively light yarn with which the transferred loops are engaged, the usual thick and conspicuous rows of overlapping transferred loops of the common toe gores are eliminated, resulting in not only improving the general appearance of the stocking, but also making it more comfortable to wear.

In concluding, I wish it to be understood that whereas I have shown and described in detail the preferred embodiment of the invention, such embodiment is capable of modifications without departing from the spirit of the invention. Accordingly, those modifications reading in the scope of the claims are considered as part of this invention.

What I claim is:

1. In a hosiery toe section, a pair of reinforced side fabrics, a reinforced intermediate fabric disposed between said side fabrics, said intermediate fabric being reinforced to a greater degree than that of the side fabrics, and an unreinforced fabric panel interposed between said intermediate fabric and each side fabric.

2. In a hosiery toe section, ordinary reinforced side fabrics, a heavy reinforced fabric disposed between said side fabrics, and an unreinforced fabric panel interposed between said intermediate fabric and each side fabric.

3. In a hosiery toe section, side portions consisting of narrowed reinforced fabrics, an intermediate portion consisting of a reinforced plain fabric, and a connecting portion disposed between said intermediate portion and each side portion and consisting of a panel of unreinforced fabric.

4. In a knitted hosiery toe section, a plurality of courses, each course consisting of reinforced end rows of loops, a reinforced intermediate row of loops, and an unreinforced row of loops connecting said intermediate row of loops and each end row of loops.

5. In a knitted hosiery toe section, a plurality of courses, each course consisting of reinforced end rows of loops, a reinforced intermediate row of loops, and an unreinforced row of loops connecting said intermediate row of loops and each end row of loops, the reinforced loops of the end rows being transferred from one wale to another and the reinforced loops of the intermediate row and the unreinforced connecting loops being disposed in their original wales.

6. In a knitted hosiery toe section, a plurality of courses, each course consisting of reinforced end rows of loops, a reinforced intermediate row of loops, and an unreinforced row of loops connecting said intermediate row of loops and each end row of loops, said intermediate row of loops being reinforced to a greater degree than the end rows of loops.

7. In a knitted hosiery toe section, a plurality of courses, each course consisting of reinforced end rows of loops, a reinforced intermediate row of loops, and an unreinforced row of loops connecting said intermediate row of loops and each end row of loops, the reinforced loops of the end rows being transferred from one wale to another and the reinforced loops of the intermediate row and the unreinforced connecting loops being disposed in their original wales, said intermediate row of loops being reinforced to a greater degree than the end rows of loops.

8. In a knitted hosiery toe section, a plurality of courses, each course consisting of reinforced end rows of loops, a reinforced intermediate row of loops, and an unreinforced row of loops connecting said intermediate row of loops and each end row of loops, the loops of the end rows being transferred from one wale to another, the outermost transferred loops engaging certain of said unreinforced loops and the reinforced loops in the

intermediate row and the unreinforced connecting loops remaining in their original wale.

9. A knitted fabric toe section comprising: knitted reinforced side fabrics, a knitted reinforced intermediate fabric, and intervening unreinforced knitted fabric panels connecting each of said side fabrics to the intermediate fabric, each of said side fabrics, for the major length of the toe section, having end rows of loops arranged in overlapping interknit relation with rows of loops of its associated intervening fabric panel to fashion the toe section, said rows of loops in overlapping relation extending in parallel relationship with the wales of the toe section.

10. A knitted fabric toe section comprising: knitted reinforced side fabrics, a knitted reinforced intermediate fabric, and intervening unreinforced knitted fabric panels connecting each of said side fabrics to the intermediate fabric, each of said side fabrics, for the major length of the toe section, having end rows of loops arranged in overlapping interknit relation with rows of loops of its associated intervening fabric panel, the rows of loops in overlapping relation extending in parallel relationship with the wales of the toe section, each of said side fabrics having additional rows of end loops arranged in overlapping interknit relation with additional rows of loops of the intervening fabric panels and forming a continuation of, and extending at an angle to, said first rows of loops and at an angle to the wales of the toe section, to fashion the toe section.

11. A hosiery toe section comprising: a pair of outer reinforced knitted fabrics, an intermediate reinforced knitted fabric, and fashioning rows of overlapping loops between the fabrics, the overlapping loops for the major length of each row being disposed in the same wales of the toe section whereby the same will extend in parallel relation with the wales of the toe fabric, and the overlapping loops of the remaining length of each row being disposed in different wales of the toe section to extend at an angle to, and across, certain wales of the toe section.

HARRY W. ROESENER.