Aug. 11, 1925.

1,549,307

E. A. HIRNER

HOSIERY MANUFACTURE

Filed Oct. 9, 1922

2 Sheets-Sheet 1

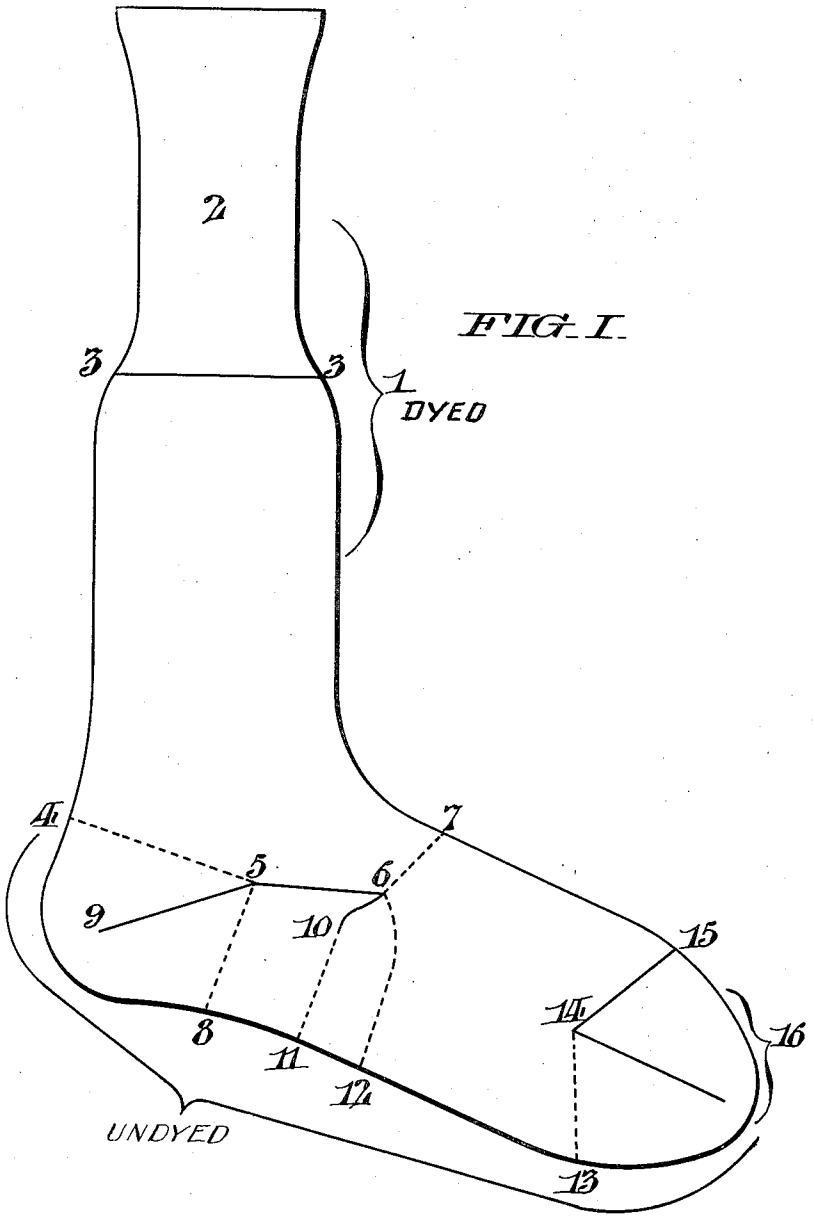

FIG. I.

WITNESSES:

John C. Bergner.

Alfred E. Dschinger.

INVENTOR:

Emil A. Hirner,

BY Fraley & Saul

ATTORNEYS.

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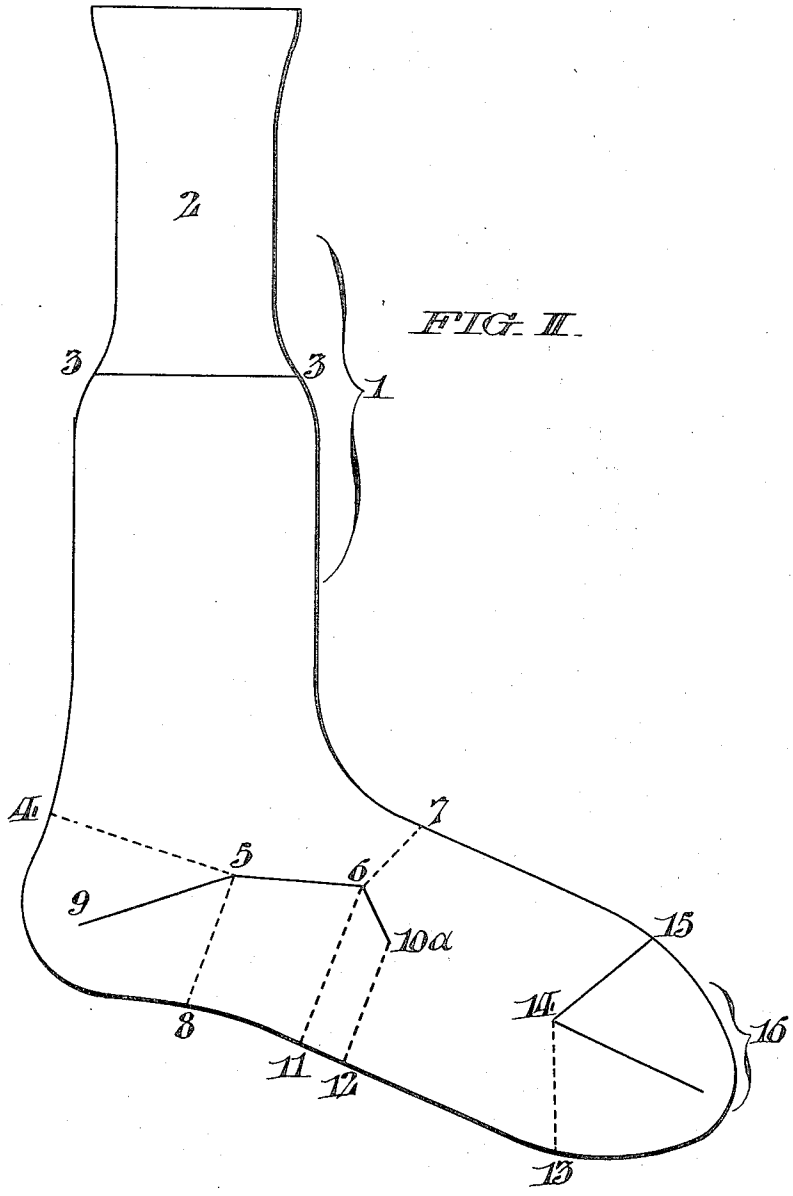

FIG. II.

WITNESSES:
John C. Bergner.
Alfred E. Tschinger.

INVENTOR:
Emil A. Hirner,
BY Fally & Paul
ATTORNEYS.

Patented Aug. 11, 1925. 1,549,307

UNITED STATES PATENT OFFICE.

EMIL A. HIRNER, OF ALLENTOWN, PENNSYLVANIA.

HOSIERY MANUFACTURE.

Application filed October 9, 1922. Serial No. 593,213.

To all whom it may concern:

Be it known that I, EMIL A. HIRNER, a citizen of the United States, residing at Allentown, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Hosiery Manufacture, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to the manufacture of hosiery and its most important objects are first, to enable production of stockings conforming more perfectly to the shape or contour of the human foot than those produced under methods heretofore practiced with a view to assuring utmost ease to the wearer, and secondly, in cases where the requirement is for hosiery with foot portions of undyed or uncolored yarn, to enable the instep to be carried down well into the foot portion to the end of preventing the undyed portion of the fabric from appearing above the tops of low shoes.

Other objects and attendant advantages of my invention will become apparent from a detailed description thereof which follows, while its scope will in turn be clearly manifest from the appended claims.

In the drawings Fig. I represents diagrammatically in outline, a stocking knit in accordance with my invention, and, Fig. II, is a slight modification produced by an alternative intermediate step in the knitting process. While I have shown in this connection illustrations of half-hose, it will be understood from subsequent disclosure that my invention is equally and with corresponding advantages applicable to the manufacture of long, and ladies' hosiery. The stockings herein shown may be produced as integral structures upon a circular knitting machine of the type ordinarily employed in seamless hosiery production, and, for the purposes of exemplification herein, the stockings will be described as having been produced on one of the machines of said type and with the assumption that 228 needles represent the full complement employed in each instance.

Referring first to the type illustrated in Fig. I, 1 designates comprehensively, the leg portion of the stocking which is ordinarily knit with dyed or colored yarn, and as is usual with half-hose, comprises a ribbed top 2, shown as terminating along a line 3—3. Beyond this line, the lower portion of the stocking leg is produced by plain round and round knitting until the line 4—5—6—7 is reached. At this time a portion of the full complement of the knitting needles are withdrawn from action (preferably half or those which knit the instep) to permit production by oscillatory knitting, of the heel pocket 4—5—8 for which, and preferably for the remainder of the foot, I use undyed or uncolored yarn when commercial demands require it. The last mentioned portion of the stocking is knit by narrowing and widening upon say 35 needles at opposite ends of the active set, with incidental formation of a suture 5—9 at each side of the structure. The knitting is thus brought down to a line 8—5—6—7 and upon completion of the heel pocket as described, I proceed by widening beyond the inner ends 5 of the sutures say upon 25 needles of the instep set at each side of the stocking with resultant production directly adjacent the heel and along the sole, of an arch gusset 8—5—6—10—11. In bringing the 25 needles just referred to into action on each side of the stocking, it will of course require just double the number or specifically 50 reciprocations or oscillations of the knitting machine. As a consequence of this, there are twice as many wales produced in the arch gusset as in the corresponding width of the fabric in the leg portion, or in other words, there is a pair of wales of the arch gusset web united to each of the wales of the leg portion along the sutures 5—6, (which, it will be observed, are virtually prolongations of the sutures 5—9) the latter wales in accommodating themselves to the condition imposed, gradually dilating through the extent of a number of courses in the after or lower part of the leg portion and in a direction toward the suture. Such dilation results in the characterization of the stocking with a novel appearance whereby it may be readily distinguished, in connection with other outstanding features yet to be described, from those manufactured in accordance with previous methods. In proceeding with the knitting of the stocking structure after completion of the arch gusset, I withdraw from action in the neighborhood of 14 needles at each side of the stocking (at the ends of the active needle

groups just described) and in subsequently widening upon them produce an additional gusset 11—10—6—12 with incidental formation of sutures 6—10, as segmental continuations of the sutures 9—5—6. It is to be noted that these continuations take a position at an abrupt angle in retroversion relative to the main portions of the sutures. Round and round knitting is thereupon again resumed beginning with the line 12—6—7 and continued throughout the foot portion of the stocking to the line 13—14—15, when oscillatory knitting is once more resorted to for production of a toe pocket 16 which may be produced in any appropriate manner and with the knitting of which the present invention is not especially concerned. It is worthy of note at this point that the leg portion 1 of my novel stocking above the lines 4—5—6—7 is knit with dyed or colored yarn; whereas the entire foot part below said line, to and including the toe pocket 16, is knit from undyed or uncolored yarn.

By virtue of the interposition of the arch gusset 8—5—6—10—11 between the heel and foot proper, it will be observed that the instep of the stocking is drawn well down into the foot portion thereby avoiding the possibility of the undyed portions of the foot from appearing beyond or above the tops of low shoes. The presence of said arch gusset also tends to amplify considerably the length of the stocking sole thereby affording a correspondingly greater degree of comfort to the wearer, and assists in disposing the foot portion of the stocking more nearly at right angles to the leg thereby giving the stocking a contour approaching closely the relation of the human foot and leg, and the conditions last stated are enhanced by the addition of the supplemental gusset 11—10—6—12.

The stocking structure shown in Fig. II is very similar to that previously described and may be produced by a slight modification or variation in the method of procedure, and the features which are identical to those of the first form are accordingly identified with the same reference characters. The knitting of the leg portion 1, the heel 4, 5, 8, and the arch gusset 8, 5, 6 and 11 is effected down to the line 7, 6, 11 in the manner already understood. From this point on, however, instead of throwing out of action the fourteen needles at each side of the active series, as in the previous instance, I immediately narrow upon a similar number of needles with resulting production of the auxiliary or additional gusset 11, 6, 10^a, 12. This gusset, as will be at once apparent, is very similar to the gusset of the first form, the only difference being in the direction taken by the suture prolongation 6—10^a which now makes an obtuse angle with respect to the suture 5, 6, instead of an acute angle as before. The auxiliary or additional gusset 11—6—10^a—12 of the modification affords the same advantages described in connection with the one of the first form. The remainder of the foot portion of the stocking beyond the line 7—6—10^a—12 is knit precisely as before and therefore need not be again described in detail.

It is of course to be understood that the numbers herein given with regard to the subdivision of the needles in preordering the extent of various stages of fashioning as described are for purposes of exemplification only and that they are subject to indefinite variation in practice.

Having thus described my invention, I claim:

1. The method of manufacturing hosiery which consists in knitting a leg portion; fashioning a heel pocket by narrowing and widening upon a portion of the knitting needles; continuing the widening beyond the heel suture to produce an arch gusset adjacent the heel and along the sole of the stocking foot; manipulating a suitable number of the fashioning needles to produce a supplemental instep gusset in forward prolongation of the arch gusset aforesaid to cause the foot portion of a stocking to be drawn more nearly at right angles to the leg portion; and thereupon knitting the remainder of the foot in continuation.

2. The method of manufacturing hosiery which consists in knitting a leg portion; fashioning a heel pocket by narrowing and widening upon a portion of the knitting needles; continuing the widening beyond the heel suture to produce an arch gusset adjacent the heel and along the sole of the stocking foot; withdrawing a number of the needles at each end of the complement thus far active in fashioning and subsequently widening upon said needles to produce an additional gusset in prolongation of the arch gusset aforesaid to cause the foot portion of the stocking to be drawn more nearly at right angles to the leg portion; and thereupon knitting the remainder of the foot in continuation.

3. The method of manufacturing hosiery which consists in knitting a leg portion with dyed or colored yarn; substituting an uncolored or undyed yarn for that previously used and fashioning a heel pocket by narrowing and widening on a portion of the knitting needles; widening beyond the heel suture to produce an arch gusset adjacent the heel pocket along the sole of the foot; withdrawing a number at each end of the complement thus far active and subsequently widening upon said needles to produce an additional gusset in prolongation of the arch gusset aforesaid to cause the foot portion of the stocking to be drawn more nearly

at right angles to the leg portion; and thereupon knitting the remainder of the foot in continuation.

4. As an article of manufacture, a stocking of the type described characterized by sutures extending diagonally of the heel to a medial point at each side of the stocking with segmental prolongations continuing to points at opposite sides of the instep, and further angularly disposed continuations terminating at points approximately in the medial lines at opposite sides of the stocking foot, said continuations being defined by a supplemental instep gusset that aids in disposing the foot and leg portions at right angles to one another.

5. As an article of manufacture, a stocking of the type described characterized by sutures extending diagonally of the heel to a medial point at each side of the stocking with segmental prolongations continuing to points at opposite sides of the instep, and further continuations terminating in points approximately in the medial lines at opposite sides of the stocking foot, said continuations being defined by a supplemental instep gusset that aids in disposing the foot and leg portions at right angles to one another.

In testimony whereof, I have hereunto signed my name at Allentown, Pennsylvania, this 30th day of September, 1922.

EMIL A. HIRNER.

Witnesses:
HORACE O. WARMKESSEL,
VALENTINE GULDIN.