UNITED STATES PATENT OFFICE

2,444,403

HOSTERY AND METHOD OF PRODUCING SAME

Howard Marsland; Northfield, Vt., assignor to Vermont Hosiery and Machinery Co., Northfield, Vt., a corporation of Vermont.

Application September 19, 1945; Serial No. 617,351

8 Claims. (Cl. 66—187)

This invention relates to hosiery and is more especially concerned with hosiery of the type adapted to be manufactured in circular hosiery knitting machines.

As is well understood by those skilled in this art, the customary method of producing a heel pocket in a machine of this type, is to stop circular knitting when the point has been reached at which the formation of the heel pocket is to be begun and then to resume knitting with approximately the front half of the needles out of action. The knitting throughout the heel, therefore, is produced entirely by reciprocating motion; the fabric being progressively narrowed toward a predetermined point and then progressively widened to produce the pocket. While this method is almost as old as circular knitting machines themselves, it is well recognized that it does not produce as smooth a heel as is desired. The diagonal sutures formed during the reciprocating knitting restrict or limit the elasticity of the fabric and tend to leave points, sometimes referred to as “dog ears,” at the lower ends of the sutures.

The present invention aims to improve both the methods of knitting heel pockets and also the structure of this portion of a stocking, with a view both to producing a better fitting heel and also reducing the expense of manufacture of this part of the stocking.

The nature of the invention will be understood from the description of the drawings and discussion relating thereto.

In the drawings:

Fig. 1 is a perspective view illustrating diagrammatically the heel and a portion of the leg of a circular knitting article embodying the present invention; and

Fig. 2 is a side view, also diagrammatically illustrating on a larger scale the steps performed in producing a heel pocket in accordance with this invention.

No attempt has been made in this figure to show, except in a very general way, the number or direction of either the courses of knitting or the wales produced during this operation.

Assuming that the machine in which the stocking is to be produced has a total of 176 needles in the cylinder, there are 46 medium butt needles and 42 short butt needles in the rear half and a total of 80 long butt needles in the front half, the knitting operation proceeds in the usual manner down to the point A where the formation of the heel pocket is begun. Then the front needles are thrown out of action and reciprocating knitting is started. The next step is to narrow in the ordinary way on, say, 12 medium butt needles on each side out of a total of 23 per side. This brings the knitting operation down to the point B. Next, all of the needles in the rear half of the cylinder are returned simultaneously into action and knitting is resumed while narrowing for eight courses; that is, four needles on each side. This completes the narrowing operation, produces the section of fabric indicated at C and brings the knitting operation down to the point D. At this time 19 needles on each side are put out of operation simultaneously and reciprocating knitting is again begun. Proceeding from the point E but bringing in these needles one at a time so as to widen the fabric progressively. Usually this is done by allowing the lifters or pickers to continue to work so that one needle will be raised out of action on one side of the cylinder while the dropper drops two needles back into action on the other side, the net result being that one needle is brought into action at each reciprocation, first on one side and then on the other. When 18 of the 23 needles previously put out of action on each side have been returned to knitting, then the remaining 5 needles on each side are brought into action simultaneously and circular knitting is resumed. During the widening operation just-mentioned, which starts at the point E, the heel pocket is completed and thereafter the foot and toe may be produced in the orthodox manner.

It will be observed that the narrowing of the fabric has proceeded in two steps, during the first of which the suture line A—B has been formed, while in the second step, a second suture line A—D is produced; both of these lines extending downwardly and rearwardly from the normal narrowing point A. The remaining suture line D—E starts at the end of the second suture line and extends downwardly and rearwardly but is curved somewhat so that it ultimately terminates at a point which, in the particular stocking shown, is roughly in line with the suture line A—B. Actually when the widening steps proceed as far as indicated in Figs. 1 and 2, the rearward end portion of the line D—E will be intersected by an extension of the line A—B.

It will also be observed that while the narrowing operation has been performed in two steps, producing sutures which are relatively short, the widening operation has been produced in one continuous step and the suture line D—E formed during that step is longer than either of the other two suture lines, but is not as long as the single
diagonal suture line produced in the orthodox method of making heel pockets.

The resulting heel fabric consists of an upper gore, the inner edge of which is bounded by the line A-B, a lower gore the upper edge of which terminates at the line A—D—E, and an intermediate fabric section extending around the back of the heel and terminating at each side of the stocking in a tapered end portion bounded by lines A—B, A—D, and D—E. This section has a fixed number of courses throughout its length but these courses are gradually shortened from top to bottom.

In the upper gore the wales run approximately vertical, or at right angles to the generally horizontal courses indicated roughly by the lines a and b. These are, respectively, the first and last courses in this gore section. But throughout the intermediate section the direction of the wales vary considerably, those in the rear portion being nearly at right angles to the top and bottom courses c and d, while those nearer the tapered end sections take on more and more of a curve parallel to the wales in the sides of the ankle section. In the lower gore, lying roughly between the line e, and the points D, E, and the line c, Fig. 1, the wales run nearly parallel to the outline of this part of the heel itself, crossing both the lines c and e in directions at nearly right angles to them.

It has been found in actual practice that such a pocket construction provides a better fitting heel and, what is also important from the standpoint of production costs, a heel which can be produced with a smaller number of needles in actual operation, and, consequently, a smaller number of courses of knitting. In the example given, the total number of courses in the heel is 24 in the upper gore, 8 in the intermediate section, and 36 in the lower gore, or a total of 68 courses, which is 23 less than would have been required if the heel had been produced in the customary manner with 24 needles on each side, thus making 96 courses. This saving in the number of courses of reciprocating knitting is important because a relatively large amount of reciprocating knitting required in the production of a stocking is an important item of cost, since it is much slower than circular knitting.

While I have herein shown and described a typical stocking construction embodying my invention, and a preferred method of producing it, it will be understood that some variations in both the method and the product may be made without departing from the spirit or scope of the invention. For example, the number of courses in each of the three sections of the heel can be varied within reasonable limits, while still producing satisfactory results. It is preferable, however, to make the number of courses in the section C at least four, and not more than ten. Also, the number of courses in the upper and lower gores can be varied. In general, it is preferable to make the number in the upper gore from about one-half to three-quarters of the number in the lower gore.

This stocking can be produced in any of the better known commercial circular hosiery knitting machines and the adjustments and set-up of any of these machines necessary to produce this stocking will be obvious to those skilled in the use and manipulation of these machines.

Having thus described my invention, what I desire to claim as new is:

1. A circular knit stocking having a heel pocket provided with two suture lines extending downwardly and backwardly one above the other, at each side of the heel and a gusset connecting said suture lines and terminating at each side of the stocking in a thirteenth line connecting the forward ends of the first two suture lines, the lower of said first two suture lines being much longer than the upper and both being longer than the third suture line.

2. A circular knit stocking according to preceding claim 1 in which said gusset contains from two to ten courses.

3. A circular knit stocking according to preceding claim 1 in which said lower diagonal suture line is curved upwardly so that its rearward end portion intersects an extension of the upper suture line.

4. A circular knit stocking having a heel pocket provided at each side thereof with two suture lines starting substantially at the normal narrowing point on the opposite sides of the stocking and extending downwardly and rearwardly in diverging directions, and a third suture line extending from the end of the lower of the first two suture lines and running downwardly and rearwardly to a point below and behind the first suture line and terminating approximately in line with said first suture line.

5. A circular knit stocking having a heel pocket provided on each side thereof with two suture lines positioned one above the other and both extending downwardly and rearwardly, the upper of said suture lines starting substantially at the normal narrowing point, an intermediate narrow section of knitted fabric containing said suture lines and extending around the back of the heel but terminating at its opposite ends in a suture line connecting the forward ends of the two first mentioned suture lines, said narrow strip of fabric being composed of courses which decrease in length from top to bottom.

6. A circular knit stocking having a heel pocket comprising a short gore section terminating at its forward end in a suture line which extends downwardly and backwardly from approximately the normal narrowing point, a second gore section extending around the back of the heel but terminating at its opposite ends in a suture line connecting the forward ends of the two first mentioned suture lines, said narrow strip of fabric being composed of courses which decrease in length from top to bottom.

7. That improvement in methods of knitting hosiery in a circular knitting machine, comprising the steps of knitting downwardly to the narrowing point of the heel and then narrowing in a normal manner for a substantial distance and thereby producing an upper gore section of the heel, next knitting in a short intermediate section, the first course of which has approximately the same number of stitches as the widest part of said upper gore section and is united to the lower edge of the latter section, narrowing said intermediate section as the knitting operation progresses, and thereafter producing, by reciprocating knitting, a gradually widened lower gore section, the upper edge of which is knitted to the lower edge of said intermediate section.

8. That improvement in methods of knitting hosiery in a circular knitting machine, comprising the steps of knitting downwardly to the narrowing point of the heel and then narrowing in a normal manner until a gore forming somewhat
more than half of the total narrowed section of the heel has been produced, then knitting in a short intermediate section of between four and ten progressively shortened courses starting with the maximum number of stitches in the widest part of said gore section initially produced, and thereafter continuing reciprocating knitting while increasing the number of stitches in successive courses to produce a gradually widened lower gore completing the heel section.

HOWARD MARSLAND.

REFERENCES CITED

The following references are of record in the file of this patent:

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>495,860</td>
<td>Branson</td>
<td>Apr. 18, 1933</td>
</tr>
<tr>
<td>1,387,775</td>
<td>Allen</td>
<td>May 10, 1932</td>
</tr>
<tr>
<td>2,123,701</td>
<td>Lawson</td>
<td>July 12, 1928</td>
</tr>
<tr>
<td>2,333,649</td>
<td>Sheppard</td>
<td>Nov. 6, 1945</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>399,010</td>
<td>Sept. 28, 1933</td>
</tr>
</tbody>
</table>