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W. H. CARTER

1,460,477

SEAMLESS STOCKING AND METHOD OF MAKING SAME

Filed Feb. 3, 1922

Fig. 1

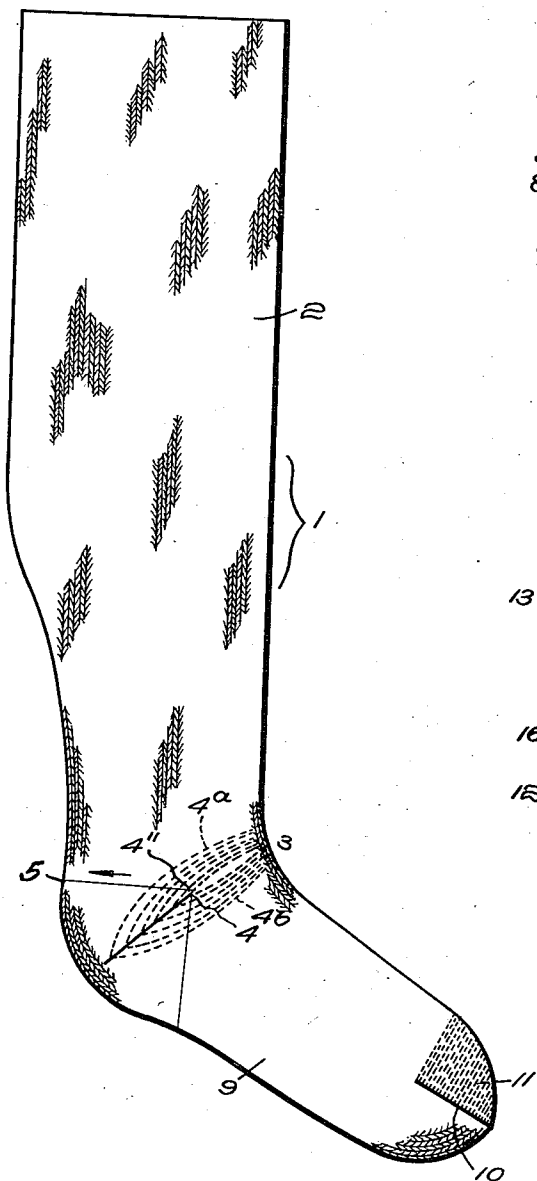


Fig. 2.

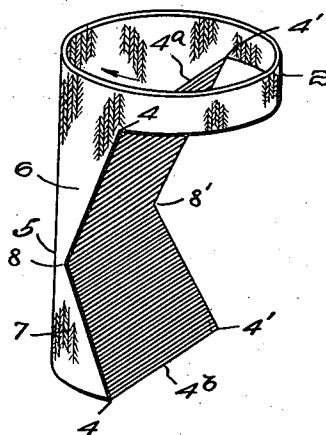
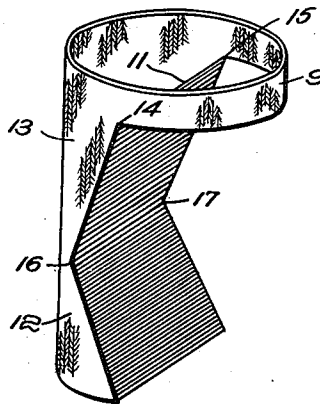


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SEAMLESS STOCKING AND METHOD OF MAKING SAME.

Application filed February 3, 1922. Serial No. 533,834.

To all whom it may concern:

Be it known that I, WILLIAM H. CARTER, a citizen of the United States, and a resident of Needham Heights, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Seamless Stockings and Methods of Making Same, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to seamless or circular knit stockings 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 drawing, wherein—

Fig. 1 is a side elevation of a seamless or circular knit stocking constructed in accordance with my invention;

Fig. 2 is a diagrammatic detail indicating the manner in which the heel is knit; and

Fig. 3 is a similar view indicating the manner in which the toe is knit.

Circular knit or seamless stockings are customarily knitted upon a complete circle of needles beginning at the top of the leg of the stocking, some shaping of the stocking being afforded by a change in stitch length as the knitting progresses or a change in yarn tension, or a change in the yarns themselves, the stocking after completion being boarded. The heels and toes of such stockings are customarily made by a narrowing and widening operation which is carried out by reciprocating movement of the needle cylinder or the cam carrier, whichever element of the two be movable. Preliminary to the narrowing and widening whereby the heel is knitted, substantially one half the needles, termed the instep needles, are thrown out of action while retaining their loops. The reciprocating knitting then begins on the needles left in action, and said needles are gradually retired from action at each end of the series but retain their loops until a minimum number of needles remain in action, which may be

about fifteen. The widening action is then commenced, the needles which have been moved out of action in the narrowing being restored to action, so that the characteristic diagonal seams upon each side of the heel are formed. Upon the completion of the heel pocket, all of the needles which were thrown out of action in narrowing having now been restored, the remaining or instep needles are brought into action, and the foot is knit by rotary knitting until the toe is reached, whereupon the toe is formed by a narrowing and widening action carried out by reciprocating knitting in the manner in which the heel is formed. A typical machine for so knitting a stocking is shown in the patent to Hemphill 933,443, dated September 7, 1909.

Certain variations of the described manner of forming the heel and toe have been proposed, as, for example, by narrowing to form by reciprocating knitting the upper part of the heel gusset, whereupon several courses are knitted upon all the needles by circular work, after which the complementary widening gusset is formed by reciprocating knitting upon all the needles.

It has been proposed to impart shape to the seamless stocking in various ways, as, for example, in the calf or ankle portion by floating certain of the threads, as shown, for example, in the patent to Scott, No. 1,205,671, dated November 21, 1916.

Always heretofore so far as I am aware, however, the heel and the toe of seamless stockings have been formed by reciprocating knitting in those cases where a narrowing and widening action is carried out. This has necessitated a slowing down of the speed of knitting during the formation of the heel and the toe, and therefore the rate of production is materially less than would be the case had it been found possible to knit the heel and toe by rotary knitting while effecting a shaping thereof. I am also aware that it has been proposed to form a heel bag or pocket by elongating the stitches locally, as, for example, by the use of tuck stitches. Such a heel, however, is wholly unacceptable commercially.

In accordance with my invention, the stocking is knitted by circular knitting throughout and including the heel and the toe. Both the heel and the toe are formed by narrowing and widening, the necessary half circle of needles being temporarily held out of action while retaining their loops. The thread is, however, floated from each side of the heel or the toe gusset around to the other side thereof, as will be hereinafter more fully set forth, such floating threads being removed after the completion of the stocking by cutting or otherwise.

Referring more particularly to the drawing, I have in Fig. 1 indicated a circular knit or seamless stocking at 1. The leg 2 is knitted in the usual manner, and if desired by change in stitch length, or by change in tension, or by a substitution of yarn, some shaping may be given to the leg. When the line 3, 4, 5 is reached at the top of the heel, the instep needles extending from the point 4 around to the opposite point on the other side of the stocking are rendered inactive while retaining their loops, and the knitting continues upon the remaining needles. The first course of the heel may be assumed to be in the direction of the arrow on Fig. 1, starting from the point 4 and continuing around the back of the heel at 5 and to the point 4' at the opposite side of the heel. All the needles between the point 4 and the point 4' are in action and receive loops in the usual manner, so as to form one-half a complete course. In the continued rotation of the rotatable element, either the needle cylinder or the cam ring carries the thread as a floating thread 4^a around the front of the stocking to the point 4, that is, around one half the circle of needles. When the point 4 is reached the second course of the heel is begun and preferably before that course is begun the end needle of the active series of heel needles is thrown out of action, so that the narrowing is here begun. The second course is then completed, and if desired and preferably a needle is retired at the other end of the series. The yarn is then floated as before around the front portion of the stocking until the series of active or heel needles is again reached, prior to which time preferably still another needle is retired and the described action is repeated.

Thus a needle is retired at each end of the series of heel needles for each course, or if desired, two needles may be retired in a manner not necessary more fully to describe. Desirably narrowing and widening pickers are employed, such, for example, as two narrowing pickers and a single double acting widening picker, or two separate widening pickers. These widening pickers function during rotary knitting which, so far as I am aware, has not heretofore been done,

In Fig. 2, I have diagrammatically indicated the heel, the narrowed portion thereof being indicated at 6 and the widening portion being indicated at 7. The heel is here represented as laid out flat or developed for clearness of illustration. From the point 4 down to the point 8 and from the point 4' down to the point 8', the needles are gradually retired from action, and the threads are floated as indicated diagrammatically from the end of the active needles around to the other end of such series of active needles. From the point 8 the widening is effected until the point 4 is again reached, and from the point 8' a similar action is practiced until the point 4' is reached, the threads being floated as before, as indicated at 4^b. The stocking when completed will have the series of floating threads 4^a, 4^b corresponding in number to the number of courses which make up the narrowing gusset and the widening gusset of the heel, and these floating threads are cut away in the completing of the stocking.

The foot 9 of the stocking is knitted upon the entire circle of needles in the usual manner by rotary knitting, and when the toe is reached one half the needles are thrown out of action while retaining their loops, and the toe 10 is formed upon all the needles by circular work in the same manner as the heel, the yarns being floated as indicated at 11.

In Fig. 3, I have indicated the narrowing and widening portions of the toe at 12, 13, the first course of the toe being upon the series of needles between the points 14, 15, the threads being floated as indicated at 11. When the narrowing has progressed down to the line 16, 17, the needles are gradually restored to action, so as to complete the widened gusset or portion 12 and until the line 14, 15 is reached, the threads being floated as before described. The toe is seamed in the usual manner, and desirably across the top, though within the scope of my invention, the operation may be reversed, and the seam may be at the under side.

It will be understood from the foregoing description that the entire operation of forming the stocking is accomplished by rotary knitting, and therefore substantially the high speed of usual rotary knitting may be maintained throughout the entire knitting of the stocking or more nearly approached than heretofore, with consequent increase in the speed of production.

While I have referred to the use of pickers to effect the narrowing and widening, it is to be understood that the narrowing and widening may be accomplished in any manner. I may, if desired, manipulate the needles in any other way, so as to render them inactive at the ends of the series, as, for example, by moving the stems of the needles

radially or in and out with respect to the knitting cams. Such an operation is shown in the patent to Blood 674,667, May 21, 1901, and in the patent to Houseman 903,190, November 10, 1908. Also, if desired, the yarn guide may be so arranged as not to feed to the needles which are intended to be withheld from action to effect the described gradual narrowing and gradual widening, as disclosed in the patent to Kilbourn 408,111, July 30, 1889.

Inasmuch as in this application I do not claim the mechanism for forming the stocking, but claim only the stocking and the method of making the same, I have not illustrated a machine for practising my invention.

Claims:

1. As a new article of manufacture, a seamless or circular knit stocking having the heel thereof narrowed and widened, the corresponding ends of the narrowing courses and the corresponding ends of the widening courses being connected by floated threads.

2. As a new article of manufacture, a circular knit or seamless stocking having the toe thereof narrowed and widened, the corresponding ends of the narrowing courses and the corresponding ends of the widening courses being connected by floated threads.

3. As a new article of manufacture, a circular knit or seamless stocking having both the heel and the toe thereof narrowed and widened, the corresponding ends of the narrowing courses and the corresponding ends of the widening courses being connected by floated threads.

4. As a new article of manufacture, a circular knit or seamless stocking having narrowed and widened heel gussets, the corresponding ends whereof are connected by floating threads.

5. As a new article of manufacture, a circular knit or seamless stocking having narrowed and widened toe gussets, the corresponding ends whereof are connected by floating threads.

6. A circular knit or seamless stocking having a circular knit leg, a heel formed by narrowing and widening but with floating threads connecting the respective ends of the narrowings and widenings, a circular knit foot, and a toe formed by narrowing and widening but with floating threads connecting the respective ends of the narrowings and widenings.

7. That method of knitting a circular knit or seamless stocking comprising knitting the leg by circular knitting, knitting the heel by circular knitting upon less than the entire series of needles, and varying the number of needles employed in successive courses in the heel to form gussets, floating the yarn or thread from end to end of the active or heel needles, knitting the foot by circular

knitting, and knitting the toe upon less than the entire series of needles, and varying the number of needles employed in successive courses in the toe to form gussets, floating the yarn or thread from end to end of the active or toe needles.

8. That step in the method of manufacturing a circular knit or seamless stocking which comprises forming the heel by a narrowed gusset, and a complementary widened gusset, and floating the yarn or thread from one end of the active series of needles during the formation of said gussets around to the other end of the said active series of needles.

9. That step in the method of manufacturing a circular knit or seamless stocking which comprises forming the toe by a narrowed gusset, and a complementary widened gusset, and floating the yarn or thread from one end of the active series of needles during the formation of said gussets around to the other end of the said active series of needles.

10. That method of knitting a circular knit or seamless stocking comprising knitting the leg by circular knitting, throwing substantially one half the needles out of action but permitting them to retain their loops, knitting a course by circular knitting upon the remaining needles but floating the yarn from end to end of the active series of needles, repeating the last operation but upon a successively decreasing number of needles, thereby forming narrowing gussets, the ends whereof are connected by floating threads, continuing said operation but upon a gradually increasing number of needles to form widening gussets, the ends whereof are connected by floating threads, thus forming the heel, then restoring the remaining needles to action and knitting the foot by circular knitting.

11. That method of knitting a circular knit or seamless stocking comprising knitting the leg by circular knitting, throwing substantially one half the needles out of action but permitting them to retain their loops, knitting a course by circular knitting upon the remaining needles but floating the yarn from end to end of the active series of needles, repeating the last operation but upon a successively decreasing number of needles, thereby forming narrowing gussets, the ends whereof are connected by floating threads, continuing said operation but upon a gradually increasing number of needles to form widening gussets, the ends whereof are connected by floating threads, thus forming the heel, then restoring the remaining needles to action and knitting the foot by circular knitting, throwing substantially one half the needles out of action but permitting them to retain their loops, knitting a course by circular knitting upon the remaining

needles but floating the yarn from end to end of the active series of needles, repeating the last operation but upon a successively decreasing number of needles, thereby forming narrowing gussets, the ends whereof are connected by floating threads, continuing said operation but upon a gradually increasing number of needles to form widening gussets, the ends whereof are connected by floating threads, thus forming the toe. 10

In testimony whereof I have signed my name to this specification.

WILLIAM H. CARTER.