METHOD FOR MANUFACTURE OF STOCKING TOES

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ABSTRACT

A method of knitting the closed toe portion of an article of knitted footwear using a circular knitting machine which includes a needle cylinder having needles sliding in longitudinal grooves of the cylinder and a hook platen with hooks which slide in radial grooves of the platen, comprises first knitting a main portion and thereafter knitting an annular section pouch with a double layer of fabric at one end of the main portion, each layer being knitted on a lesser number of needles than the main portion. Retaining loops are then formed on the hooks at the end of the double layer substantially at the extremity of the toe portion. A first end flap of fabric is formed after the loops between the hooks and the needles and thereafter the first end flap is disengaged from the needles by keeping it engaged to the hooks through the intermediary of the loops. The two layers are then collected together or throttled in order to close the fabric and the loops are returned to the needles. Thereafter a further course of stitches is knitted to produce a second final flap.

5 Claims, 7 Drawing Figures
METHOD FOR MANUFACTURE OF STOCKING TOES

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method for the formation of a closed toe in a stocking or another equivalent article, by means of the creation of a double layer of knit fabric, that is as an annular section pouch similar to the so-called double welt, and with a closure at the center of said pouch, the latter being advantageously made with a reduced number of operative needles.

2. Summary of the Prior Art

In articles of this kind, the forming of a closed toe, that is the interconnection at the center of the fabric forming the pouch is generally effected by relative rotation between the initial portion and the end portion of the fabric forming the pouch before matching, that is before the insertion of the knit end on the needles, which retain the initial end of the stocking fabric, or is effected by winding of one or more yarns which close the article at the height, corresponding to substantially half the height of the pouch before the insertion.

With the previously proposed methods, the article may be started at the closed toe, which involves a substantial modification of the conventional knitting system. By starting the article from the welt in the conventional manner, the toe after being formed and closed, must be manually turned inside out in the case of closure by rotation, or must be formed with more than two fabric layers, in the case of closure with a clamping or closing thread or yarn.

SUMMARY OF THE INVENTION

According to the present invention there is provided a method of knitting the closed toe portion of an article of knitted footwear comprising the steps of knitting a main portion, knitting an annular section pouch with a double layer of fabric at one end of the main portion, each said layer being knitted on a lesser number of needles than the main portion, interconnecting the two layers of the double layer substantially at the extremity of the toe portion, forming an end flap of fabric with loops, picking up the end flap by retaining means of the machine through the intermediary of said loops, and after formation of the interconnection at the extremity, knitting further courses of stitches to produce a final flap.

Further according to the present invention there is provided a method for the formation on a knitting machine of a closed toe portion of a stocking, said toe portion having the form of an annular section pouch with a double layer of knit fabric and an interconnection between the two layers substantially at the center of the pouch, said method comprising the steps of forming a main portion of the fabric, excluding from operation a portion of the needles of the machine, said excluded needles retaining the stitch, forming the pouch with operative needles interposed between the excluded needles, forming yarn loops and engaging them on the hooks of the machine, forming courses of knit fabric beyond said loops, forming the central interconnection between the layers of fabric of the pouch, taking-up the knit fabric by releasing the fabric from the hooks on to the needles, and forming a final knitted flap having a plurality of end stitches.

Preferably, the method includes, after the completion of the tubular fabric, the following stages, exclusion of a portion of the needles from operation, which needles retain the stitch, and knitting of the annular section pouch with the remaining, operative, needles interposed between the excluded needles, forming of yarn loops on the hooks (or other equivalent retaining means), forming of a plurality courses of fabric beyond the loops and subsequent exclusion of the yarn feed or supply, central clamping or interconnection of the pouch, while the end of the pouch being formed is supported by the hooks, renewed pick-up of the fabric by clearing the hooks on the needles, and finally forming a final flap with a plurality of courses of end stitches.

Preferably in the formation of the pouch the operative needles amount to one half of the total needles during the formation of the main portion of the stocking and alternate with the inoperative needles which retain the stitches, but remain lowered and inactive.

The final flap is preferably formed with all the needles.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, needles 1 of a circular knitting machine each have hooks 3, a latch 1A and are arranged to retain the yarn loops, and thereby to support the knit fabric. The needles 1 are slidable in longitudinal grooves of the knitting cylinder 5 and are operated in a manner known per se while the hooks are mounted to slide radially on the hook support plate or dial 7. Sinkers 9 cooperate with the needles 1.

FIG. 1 illustrates a first operating stage of the process in accordance with the invention, which is subsequent to the formation of the tubular article M. In this stage, the needles 1X are kept lowered while the other needles 1Y are kept operating; in particular and advantageously one half of the needles 1Y, interspersed with the needles of the other half 1X are kept operating. In this way a fabric pouch or pocket M1 is formed and it is developed progressively as indicated by the multiple broken lines in FIG. 1. A first edge of the fabric of the pouch M1 is connected to the body of the article M by means of stitches retained by the lowered needles 1X and is formed by the needles 1Y and thus is built up by a number of stitches smaller than those of the article M, for instance, with a number of stitches (and thus of needles) equal to one half of those which have formed the fabric M; the fabric of the pouch M1 is therefore lighter than the fabric M.

In the stage shown in FIG. 2, the hooks 3, suitably advanced, have engaged a yarn loop 13 in the second edge of the pouch, setting up the loops in combination with the needles 1Y, which are kept operating, while the needles 1X are still kept in a lowered position, retaining the stitches of the fabric M and of the start of the fabric M1 of the annular pouch or pocket. After the
of fabric at one end of the main portion is knitted. Each layer is knitted on a lesser number of needles than the main portion. The retaining loops are then formed on the hooks at the end of the double layer substantially at the extremity of the toe portion. A first end flap of fabric is formed after the loops between the hooks and the needles thereafter the first end flap is disengaged from the needles by keeping it engaged to the hooks through the intermediary of the loops. The two layers are then collected together or throttled in order to close the fabric and the loops are returned to the needles. Thereafter a further course of stitches is knitted to produce a second final flap.

The method as hereinbefore particularly described enables the closure of the article at the final end of the article, in particular in the case of stockings and the like to be effected, in the conventional way, i.e. at the welt, and without thus having to alter the conventional working method of producing a stocking. In the case of the embodiment wherein the toe closure is effected by relative rotation between the plate carrying the hooks and the needle cylinder, the method avoids the aforesaid disadvantage of having to turn the toe inside out after the latter has been finished. In the case wherein the closure is formed by clamping with turns of clamping yarn, with the method hereinbefore described it is possible to avoid the necessity of introducing the article through the hole corresponding to the clamping zone, or it is possible to avoid having to form the article with more than two fabric layers. The method enables the knitting of the fabric of the closure pouch with a smaller number of needles than the number of needles which forms the main portion of the fabric, without the danger of ladders and obtaining a better appearance of the article.

I claim:

1. A method of knitting a closed toe portion of an article of knitted footwear in a circular knitting machine including a needle cylinder with needles sliding in longitudinal grooves of the cylinder and a hook platen with hooks sliding in radial grooves of the platen, comprising the steps of knitting a main portion, knitting to said main portion a first layer of a knit annular section pouch, knitting to said first layer a first edge of a second layer of said pouch, each said layer being knitted on a lesser number of needles than the main portion, forming retaining loops on the hooks at an edge of said second layer removed from the said first edge, forming a first end flap of fabric after the loops between the hooks and needles and contiguous with the said second layer, disengaging said first end flap from the needles and keeping it engaged to the hooks through the intermediary of said loops, centrally collecting the two layers of the pouch to close the fabric to form a closed toe, transferring the retaining loops to needles, and knitting further courses of stitches to produce a second final flap.

2. A method according to claim 1 wherein said final flap is produced by all of the needles.

3. A method for the formation on a circular knitting machine having a cylinder with needles and a platen with hooks of a closed toe portion of a stocking, said toe portion having the form of an annular section pouch with a double layer of knit fabric and a central throttling between the two layers substantially at the
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center of the pouch, said method comprising the steps of knitting a main portion of the fabric with all of the needles, excluding from operation a proportion of the needles of the machine, said excluded needles retaining said main portion, forming the pouch with a first edge contiguous with the main portion with operative needles interposed between the excluded needles, forming yarn loops on the a second pouch edge and retaining said loops on the hooks of the machine platen, knitting courses of a first end flap of fabric knitted beyond said loops and contiguous with said second edge with operative needles and disengaging said first end flap of fabric from said operative needles, centrally throttling the layers of fabric of the pouch to close the toe, transferring the loops from the hooks on to needles, and knitting a second final end flap contiguous with said pouch and said main portion with a plurality of end courses being knitted with all of said needles.

4. A method according to claim 3 wherein the number of needles used in knitting the pouch is equal to the number of excluded needles and wherein the operative needles alternate with the excluded needles.

5. A method of forming and closing one end of a fabric tube on a circular knitting machine having a circle of needles adapted for rotary operation, a circle of dial bits cooperating with alternate needles of said circle and means for feeding yarns to said circle of needles including the steps of
   a. knitting yarn fed to said circle of needles and forming courses of said fabric tube including a terminal course thereof,
   b. inactivating alternate needles of said circle of needles with stitches of said terminal course of said tube suspended thereon,
   c. knitting yarn fed to needles of said circle inter-

mediate said alternate needles and forming courses of a first ply at said one end of said tube including an inner terminal course having stitches connected to stitches of said terminal course of said tube and an outer terminal course,

d. knitting yarn fed to said intermediate needles and forming courses of a second ply including an outer terminal course connected to said outer terminal course of said first ply and an inner terminal course, said outer terminal courses of said first and second plies defining the outer end of said one end of said fabric tube,

e. engaging said dial bits with bights of yarn connecting the stitches of said inner terminal course of said second ply,

f. knitting yarn fed to said intermediate needles and forming courses of a first fabric tab including a terminal course at one end thereof connected to said inner terminal course of said second ply and a terminal course at the other end thereof,

g. casting said terminal course at said other end of said first tab from said intermediate needles,

h. gathering said outer terminal courses of said first and second plies into a bunch to close said outer end of said one end of said fabric tube,

i. transferring said yarn bights engaged by said dial bits to said alternate needles and enclosing said first tab within said first and second plies, and

j. knitting yarn fed to said alternate and intermediate needles and forming a first course of a second fabric tab to connect said stitches of said terminal course of said tube and said yarn bights of said terminal course of said second ply on said alternate needles.

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