July 6, 1943. W. L. SMITH, JR 2,323,855

KNITTED FABRIC

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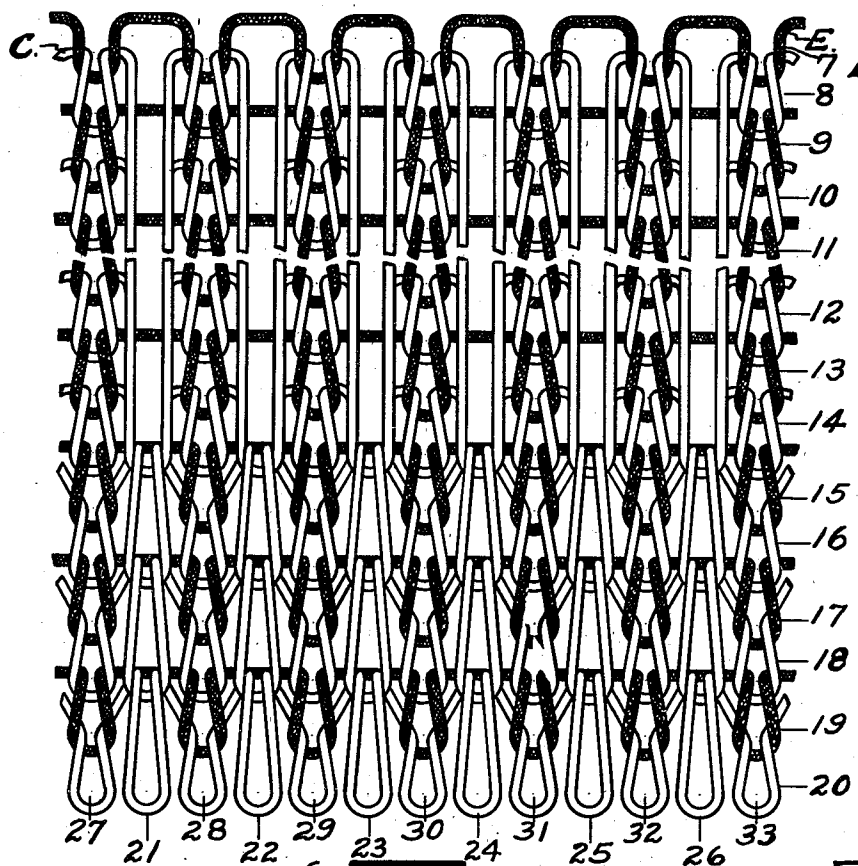


FIG. 2.

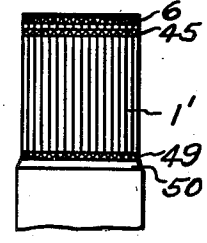


FIG. 3.

FIG. 1.

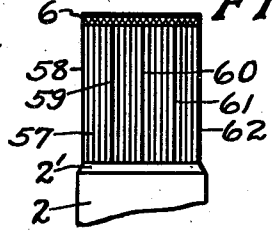


FIG. 7.

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FIG. 4.

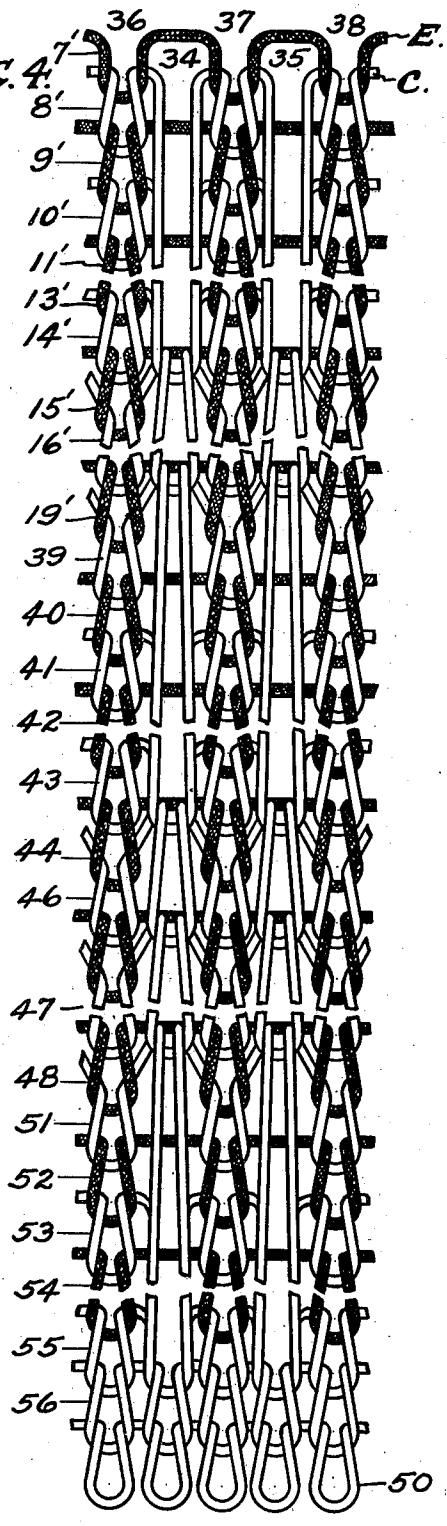


FIG. 5.

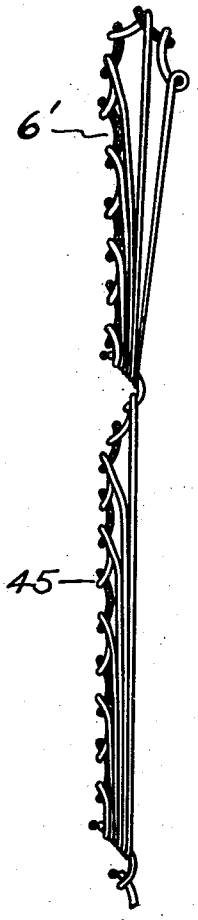
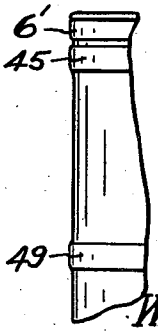


FIG. 6.



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UNITED STATES PATENT OFFICE

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KNITTED FABRIC

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Application September 15, 1939, Serial No. 295,095

4 Claims. (Cl. 66—172)

This invention relates to knitted fabrics and method of knitting the same and more particularly to stocking tops having elastic incorporated therein to provide a self-supporting stocking.

In the drawings:

Fig. 1 is a conventional view of such a stocking;

Fig. 2 is a view showing some of the courses and wales of the stocking top illustrated diagrammatically in Fig. 1;

Fig. 3 is a view similar to Fig. 1 but shrowing a modified construction of the stocking top;

Fig. 4 is a view similar to Fig. 2 but illustrative of the stocking top shown in Fig. 3;

Fig. 5 is a sectional view of the stocking top illustrated in Fig. 4;

Fig. 6 is a diagrammatic illustration of the stocking top shown in Fig. 3 but showing the raised effect produced by the groups of tuck stitches; and

Fig. 7 is a conventional view of the top of the stocking illustrating a further modification.

With especial reference to Figs. 1 and 2, the stocking comprises an elastic section 1, ring top 2', leg 2, foot 3, heel 4, high splice 4', and toe 5. The vertical lines shown in the top portion 1 of the stocking illustrate the rib effect flowing from the method of knitting, such as illustrated in St. Pierre Patent No. 2,131,720. At the top of the stocking, as shown in Fig. 1, there is a tuck welt 6, the said tuck welt comprising courses 7 to 16 inclusive, of Fig. 2.

Referring particularly to Fig. 2, courses 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 are illustrated, course 11 being broken away to illustrate the possibility of additional courses. Alternate wales 21, 22, 23, 24, 25 and 26, etc., are knitted with a relatively inelastic yarn C, such as cotton, whereas the intermediate wales 27, 28, 29, 30, 31, 32 and 33, etc., are alternately knitted with the yarn or thread C and an elastic thread E, the knitting, preferably, being effected substantially in accordance with the disclosure of St. Pierre Patent No. 2,131,720.

When knitting the fabric specifically illustrated in Fig. 2, the elastic thread E is first fed into the hooks of intermediate needles only which needles knit the intermediate wales 27 to 33, etc., inclusive. The needles are, preferably, mounted to move independently in a needle cylinder which needle cylinder rotates in a counter-clockwise direction during the knitting of the top 1 of the stocking, and past auxiliary and main feeding stations, such as illustrated in the St. Pierre patent.

In operation, the elastic thread E having been fed to the hooks of intermediate needles at the auxiliary feeding station, continued rotation of the needle cylinder causes the needles to move past the cams at the main feeding station, the cam that ordinarily raises the needles to clear the latches, if latch needles be used, being withdrawn, jacks elevating the intermediate needles to clear their latches. At the said main feeding station, all the needles, both intermediate and alternate, engage the yarn or thread C in their hooks to effect the knitting of course 8, the intermediate needles that knit wales 27 to 32 inclusive, drawing the yarn C through the bights of the elastic thread E previously engaged in the hooks of the said intermediate needles. Continued rotation of the needle cylinder causes the needles to approach the auxiliary feeding station for the second round of knitting, the intermediate needles 27 to 32, etc., drawing bights or loops of the elastic thread E through loops constituting course 8 and to effect the knitting of the course 9. The needles that knit the alternate wales 21 to 26, etc., pass idly by the auxiliary feeding station during the knitting of the course 9 holding their previously drawn loops of the yarn C without knitting. As the needles again approach the main feeding station to knit the course 10, the needles that knit the intermediate wales 27, etc., are elevated by jacks as before to clear the latches of the elastic loops constituting the course 9, continued rotation of the needle cylinder causing the said intermediate needles to draw loops of the thread C through the previously cleared elastic loops of course 9. The needles that knit the alternate wales 21, etc., are not elevated by jacks to clear the needle latches but again engage the thread C in their hooks. Courses such as 11, 13 and 15, are knitted in the same manner as just described in connection with the knitting of course 9, the courses such as 12 and 14 are knitted in the same manner as just described in connection with the knitting of course 10.

After knitting the course 15 all the needles are elevated by the raise cam at the main side of the machine which causes all the needles to clear their previously drawn loops, all the needles then, upon continued rotation of the needle cylinder, engaging the thread C in their hooks and drawing loops or bights of the same through previously drawn loops for course 16. During the last mentioned loop drawing, intermediate needles 27, etc., draw loops of the thread C through the loops of the thread E which were drawn or knitted at the auxiliary side of the knit-

ting machine during the knitting of the course 15, while the needles that knit the alternate wales 21, etc., draw loops or bights of thread C through the tuck loops accumulated in the hooks of the needles that knit the alternate wales 21, etc., during the knitting of courses 8, 10, 12 and 14 and of any similar courses that may intervene between courses 11 and 12. As illustrated and as just described, four loops were cleared from the latches of each of the needles that knit the alternate wales 21, etc., as the needles were elevated by the raise cam just prior to the knitting of the course 16.

The knitting of the following courses 17 to 20, etc., may proceed in the manner described in St. Pierre Patent No. 2,131,720.

The modifications shown in Figs. 3, 4, 5 and 6 includes a stocking top 1' having a tuck welt 6' which may be constructed in the same manner as that of the tuck welt 6, Fig. 1. Comparing Fig. 4 with Fig. 2, the courses designated as 7', 8', 9', 10', 11', 13', 14', 15', 16' and 19' correspond to 7, 8, 9, etc., of Fig. 2, the breaking away of the fabric between courses 11' and 13' and between courses 16' and 19' indicating the possibility of intervening courses. Preferably the tuck welt 6' is identical with respect to the method of knitting and the number of courses, with tuck welt 6. Preferably there are two elastic courses, such as elastic course 19', and two non-elastic courses, such as course 16', between courses 16' and 19' although the number may be varied, e. g., four courses each of elastic and inelastic thread.

Following the knitting of the course 19' at the auxiliary side of the machine, the needles that knit the alternate wales, such as 34 and 35, cast off the accumulated loops as hereinbefore described in connection with the description of Fig. 2, and knit the thread C through the previously accumulated loops. At the same time the needles that knit the intermediate wales, such as 36, 37 and 38, draw loops of the yarn C through the previous elastic loops constituting course 19'. Knitting as just described produces the course 39. The following course 40 is knitted in the same manner as hereinbefore described in connection with the knitting of the course 9, Fig. 2. Course 41 is knitted in the same manner as course 39, likewise course 42 is knitted as course 40. The following courses 43 and 44 are knitted respectively as courses 39 and 40. The break in the fabric between courses 42 and 43 indicates the possibility of a greater number of courses, however, the knitting of the second welt 45, as just described, is, preferably, identical with respect to stitch construction and courses with welt 6'. Following the knitting of elastic course 44 all the needles are raised to latch clearing position by the raise cam at the main side of the kniting machine after which all of the said needles engage and knit the thread or yarn C to effect the knitting of plain course 46, needles that knit the alternate wales 34, 35, etc., drawing the bights or loops of the thread C through the previously accumulated loops which were cast off the latches of the needles by the raise cam as just described.

Following the knitting of the course 46, the elastic top 1' of the stocking is knitted in a manner preferably similar to that disclosed in St. Pierre Patent No. 2,131,720. The numeral 47 indicates a break in the fabric, being illustrative of the fact that courses may intervene between the course 46 and the course 48. As illustrated in Fig. 3, a tuck welt 49 is knitted immediately preceding the so-called ring top 50. The knitting of the tuck welt 49 is illustrated by the courses 48, 51, 52, 53, 54, 55, the said welt 49 being, preferably, knitted in the same manner as the welt 45. The course 56 constitutes the first plain course of the so-called ring top 50, the course 56 constituting loops, in the alternate wales 34 and 35 of which, loops of the course 56 are drawn through accumulated or tuck loops of the thread, whereas in the intermediate wales, such as 36, 37 and 38, the loops of said course 56 are drawn through previously drawn loops of the thread C.

In Fig. 7 is disclosed a stocking top having a tuck welt 6, an elastic, garter top 57 and a ring top 2' which are knitted, preferably, in a manner identical with the knitting of the tuck welt 6, elastic top 1, and ring top 2', Fig. 1, with the exception of certain wales. These wales, or the omission of such wales, are indicated by vertical lines 58, 59, 60, 61, 62. To create the desired effect, the needles knitting, for example, every tenth elastic wale, i. e., every tenth intermediate wale, are withdrawn during the knitting of the top 57 which causes the elastic carrying wales on each side of those floats left due to needles being withdrawn to bunch up and be forced to the outside of the fabric thus creating an embossed or ribbed appearance, simulating broad rib fabric.

Although in Figs. 2 and 4, courses 7 and 7' respectively, are shown as though loops were formed in the elastic, such is not the case in the actual fabric as the elastic E being under some, although light, tension, the said elastic 1 which, in knitting, constitutes course 7, straightens out without the semblance of loop formation.

For convenience in describing the method of knitting, reference has been made, for example, to the knitting of elastic course 17 and the following non-elastic course 18, however, in the fabric, the courses 17 and 18 tend to merge into one course, this being due in part to the tension placed upon the elastic which, when the fabric is cast from the needles, causes the so-called elastic courses to straighten out in the fabric. The merging of adjacent elastic and non-elastic courses into one course or the seeming disappearance of the theoretically separate elastic yarn courses, is illustrated or proven by the fact that the length of fabric knitted in a given number of revolutions of the needle cylinder is substantially the same whether the non-elastic thread is alone knitted or whether the elastic and non-elastic threads are both knitted in a manner similar to that disclosed in St. Pierre Patent No. 2,131,720. The preceding remarks with respect to the courses 17 and 18 apply also to courses in the welt, such as courses 9 and 10. The welts 6, Figs. 1 and 7, 6', 45 and 49, Fig. 3, may consist of any number of courses, such as two, three, four, five and six. Preferably the tuck welt 6 Fig. 1, comprises six courses, the tuck welt 6', Fig. 3, comprises six courses, the tuck welt 45, four courses, and the tuck welt 49, six courses, four non-tuck courses, preferably, intervening between the welts 6' and 45. That is, at each revolution of the machine there is a non-elastic yarn course and, as a part of that course, a so-called elastic yarn course. However, for the present description and througthout the claims, the term course will be considered to apply to each separate formation of a single yarn at one revolution of the machine, or in other words, reference to inelastic yarn courses and elastic yarn courses will be made despite the fact that the elastic yarn courses in the final fabric really becomes a part of the inelastic yarn courses.

Figs. 5 and 6 illustrate the bunching up of the fabric on the inside thereof caused by the knitting of the tuck welts, noting that the plain courses between the welts 6' and 45 are sunk between the adjacent ends of the two tuck welts, noting likewise that the courses following the knitting of the tuck welt 45 do not stand out on the inner face of the fabric as do the welts 6' and 45.

With reference to Figs. 3, 4 and 6, the welt 49 has a twofold function, first, the elastic welt 49 serves as an effective junction between the elastic top and the ring top portion of the fabric, second, the presence of the elastic welt 49 further assists in retaining the stocking top in position as strains on the stocking, such as may be due to the bending of the ankle of the wearer when walking, are taken up by tuck welt 49 to such an extent that the strains are not transmitted to the top welts 6', 45' of the stocking. Absence of the welt 49 causes some slipping of the stocking resulting from constant intermittent strains upon the elastic top which follows when the wearer of the stockings walks from place to place.

With respect to the first mentioned function of the elastic welt 49, if the welt were not present, the substitution of the relatively heavy ring top yarn for the light yarn C, used in conjunction with the elastic thread E in the top of the stocking, would be effected in the following manner: the relatively heavy ring top yarn is first moved to feeding position and then after a short overlap of a few needles, the yarn C is moved to an idle position. The elastic thread E is withdrawn from feeding position with respect to the needles before all of the needles that have previously knitted the light yarn C, have moved past the auxiliary feeding station and knitted the elastic thread E. As a consequence of that, in actual knitting, about one-half of the needles draw loops of the relatively heavy ring top yarn through the previous loops of the light yarn C only. The fabric knitted in such a manner provides a half-course of loops of the light yarn C only leaving a relatively weak line of stitches. Now by knitting the tuck welt 49, as hereinbefore described, the junction between the elastic top and the ring top is effected by causing loops of the relatively heavy ring top yarn to be drawn through all the loops of course 55, as hereinbefore described, to constitute the course 56, thus providing a strong junction between the elastic top 1' and the ring top 50.

In the foregoing description, reference has been made to the knitting of the elastic thread E; if desired, the elastic may be inlaid in the manner disclosed in the British patent to Sturgess No. 4,418 of 1886. In either case, the elastic will be held or locked to spaced wales which, with reference to the modification illustrated in Fig. 7, will span each missing wale, such as 58 to 62 inclusive.

The tuck welts 6, 6' and more especially the tuck welt 6', 45 of Fig. 3, eliminates the natural rolling tendency of the top of a stocking knitted plain, i. e., as distinguished from rib fabric knitted on two sets of needles.

In the preceding description specific terms have been used but such terms have been used for illustrative purposes only, the invention being limited by the terms of the claims themselves, e. g., the reference to alternate, such as 21, 22, etc., is not intended to call necessarily for a one and one relation of the so-called alternate and intermediate wales. Furthermore, while, to illustrate the method of knitting, reference has been made to a rotating needle cylinder, the stockings described may be knitted on, and the methods described may be practiced on knitting machines having stationary needle cylinders and knitting machines having straight banks of needles although preferably, the invention is practiced on knitting machines have so-called independent needles.

I claim:

1. A knitted selvage fabric having elastic and relatively non-elastic threads knitted therein, interspersed wales adjacent to the selvage comprising alternating loops of the two threads, each intervening wale comprising, adjacent to the selvage, four accumulated loops, the first accumulated loop of each wale being the first loop of the relatively inelastic thread.

2. A knitted selvage fabric having elastic and relatively non-elastic threads knitted therein, interspersed wales adjacent to the selvage comprising alternating loops of the two threads, each intervening wale comprising, adjacent to the selvage, four accumulated loops, the first accumulated loop of each wale being the first loop of the relatively inelastic thread, a course of knitted stitches of the relatively inelastic thread connected to the said accumulated loops, and a plurality of following courses, interspersed wales of which consist of alternating loops of the two threads, the intervening wales of which each comprise a plurality of accumulated loops.

3. A knitted selvage fabric having elastic and relatively non-elastic threads knitted therein, interspersed wales adjacent to the selvage comprising alternating loops of the two threads, each intervening wale comprising, adjacent to the selvage, four accumulated loops, the first accumulated loop of each wale being the first loop of the relatively inelastic thread, a course of knitted stitches of the relatively inelastic thread connected to the said accumulated loops, and a plurality of following courses, interspersed wales of which consist of alternating loops of the two threads, the intervening wales of which each comprise four accumulated loops.

4. An article of hosiery knitted of an elastic thread and at least two relatively inelastic threads, one of which is relatively light, courses adjacent to the top of the article of hosiery being knitted of the elastic thread and the relatively light inelastic thread, some of the wales including accumulated loops of the relatively light inelastic thread, and a course of loops of the relatively heavy inelastic thread passing through the accumulated loops.

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