

July 22, 1947.

E. ST. PIERRE

2,424,516

SUTURE

Filed Dec. 8, 1945

2 Sheets-Sheet 1

FIG. 1.

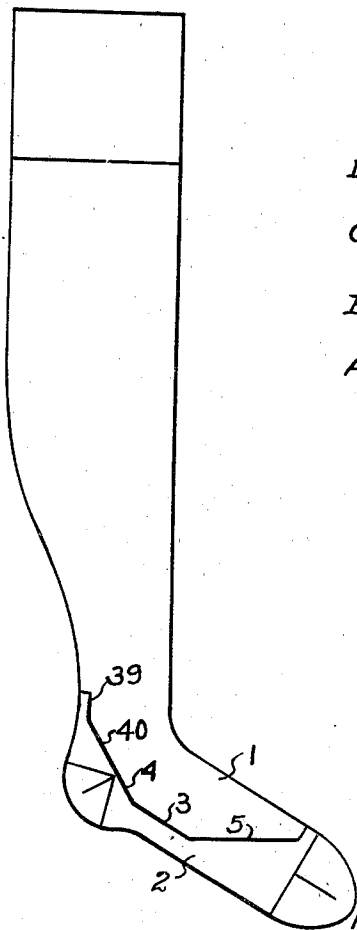


FIG. 2.

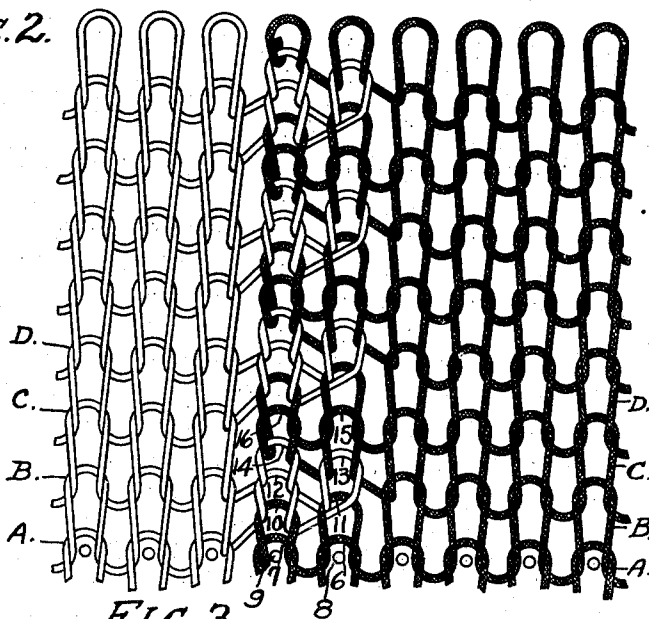
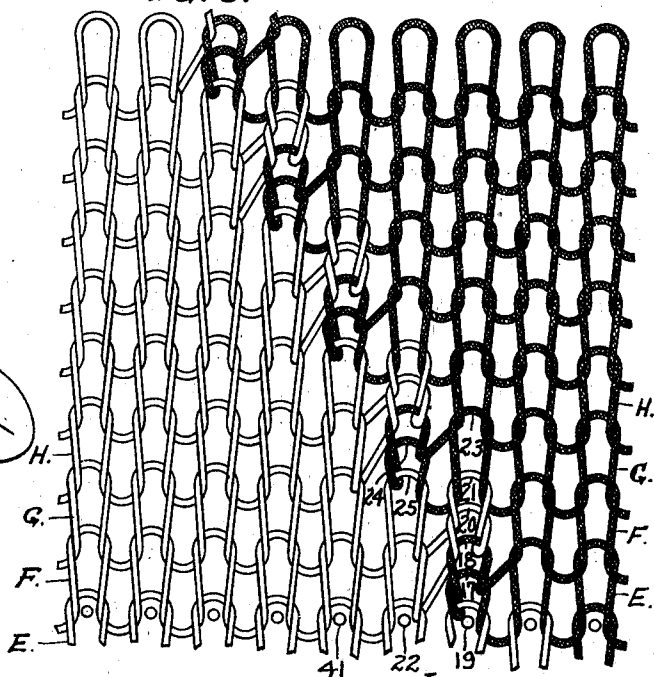


FIG. 3.



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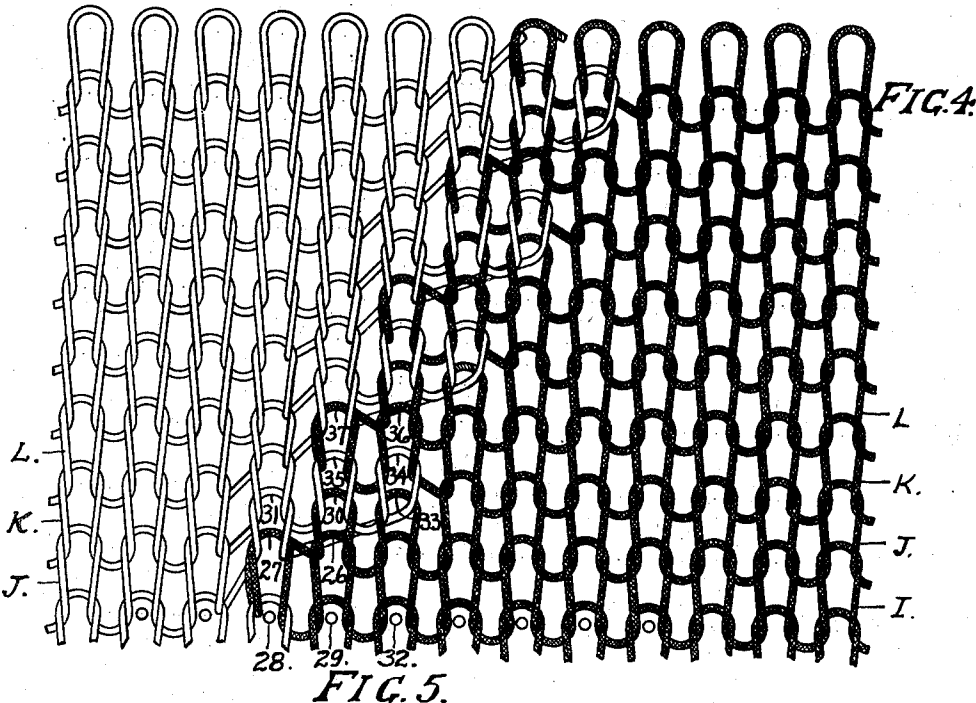
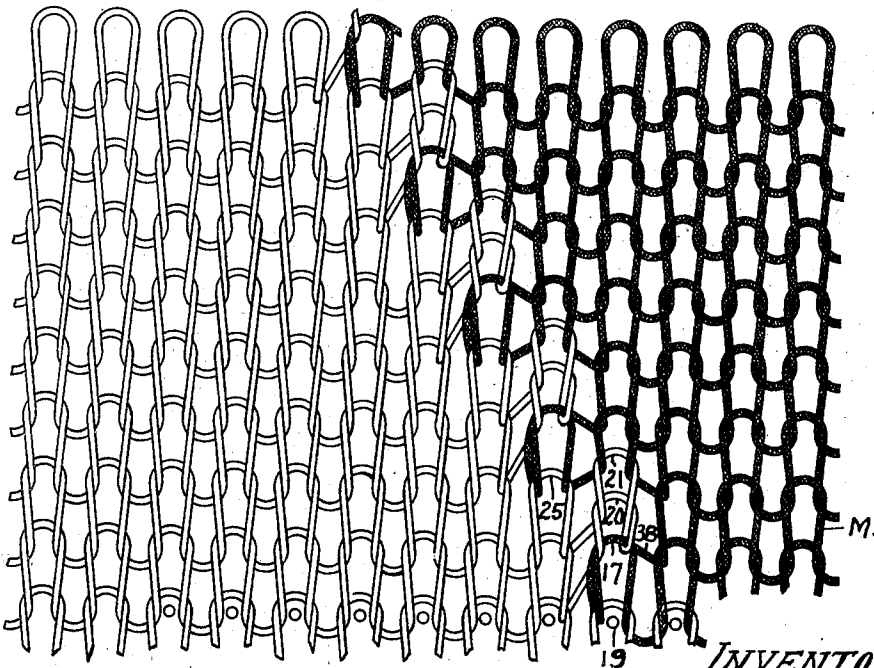
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SUTURE

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2 Sheets-Sheet 2



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SUTURE

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1 Claim. (Cl. 66-179)

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This invention relates to knitted fabric and in particular to so-called split work in which two portions of the fabric are separately knit and connected together by interknitting the edges to form a suture. Although the suture of this invention will be described in relation to a lady's split foot stocking knit on a circular knitting machine such as the well-known Banner type of machine, there is no intention of limiting it to hosiery or to fabrics knit upon circular machines.

While the usual sutures are adequate in hosiery made of relatively heavy yarn they fail in fabrics knit of fine and, consequently, relatively weak, yarn such as are used in sheer ladies' hosiery. Failure results from the fact that the suture is unbalanced, one side having a greater amount of yarn and elasticity than the other so that if abnormal strain is imposed upon the suture it may break on the weaker side. This invention concerns a suture in which the yarns are so arranged that it is stronger than the adjacent loops so that failure of the suture is eliminated. In spite of this the suture of this invention has the clean cut narrow line essential to the sleek appearance of ladies' hosiery of fine quality.

In the drawing:

Fig. 1 represents a lady's split foot stocking;

Fig. 2 is a greatly enlarged fragment illustrating diagrammatically that part of the suture which is horizontal with the sole;

Fig. 3 is a similar diagrammatic illustration of a suture in that part of the foot in which the sole is widened;

Fig. 4 is a similar illustration of a suture in a portion of the foot in which the sole is narrowed; and

Fig. 5 is a similar illustration of a modified suture in a portion where the sole is widened.

As shown in Fig. 1, the stocking consists of the usual parts including a split foot which includes the instep portion 1 and sole portion 2 joined together along sutures composed of the portion 3 paralleling the sole, a portion 4 adjoining one end thereof and sloping diagonally upward toward the back of the stocking and a portion 5 adjoining the other end of portion 3 and sloping upwardly towards the top of the toe.

As will be seen from the several figures of the drawing, the suture in any given course is confined to two wales thus preserving the requirement that it be extremely narrow. The manner in which it is knit insures that it is strong as or stronger than the adjacent fabric so that it will not break. This is particularly important in the portion 3 which parallels the sole since this en-

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tire portion is confined to the same two wales. In consequence, any given longitudinal strain is greatest upon this portion because it is walewise, the direction of least elasticity. It is this portion which has most frequently broken in sheer hosiery.

The suture will be best understood by a description of the general way in which it is made. Starting with course A of Fig. 2, the sole courses are represented by the heavy yarn knit at the main side of the machine by short butt needles and the instep portion by the light yarn knit at the auxiliary side of the machine by long butt needles including at times short butt needles temporarily functioning as long butt needles in the manner well known to the art. In Fig. 2, the sole portion of course A is knit from right to left terminating in the loops 6 and 7 knit by short butt needles 8 and 9. In the next course B, which is knit from left to right, the sole yarn is knit through loops 7 and 6 into loops 10 and 11. Simultaneously, the instep yarn is being knit at the auxiliary side but before needle 9 knits it is raised so that it will function as a long butt needle and knits the instep yarn through loop 10 into loop 12. This is the last loop knit of the instep yarn in this direction. Before the cylinder reverses to knit course C in the other direction, from right to left in Fig. 2, short butt needles 8 and 9 are brought up into the long butt group so that when knitting is resumed in counter-clockwise direction for course C the instep yarn will be knit through sole loop 11 into loop 13 and through itself at loop 12 into loop 14. Thereafter needles 8 and 9 are brought down to their normal position with the other short butt needles and, at the main knitting cams, knit the sole yarn through loops 13 and 14 of the instep yarn into loops 15 and 16. Thereafter the cycle is repeated, the next course D being similar to course B and so on.

It will be noted that in the wale of this suture nearest the instep portion of the foot both the sole and instep yarns are knitted through themselves in alternation. Consequently, in this wale there are twice as many loops as in the adjacent instep fabric. In consequence, it is stronger than the instep fabric. In fact, it is impossible to break this suture by the application of any reasonable amount of strain in a longitudinal direction whereas a suture such as that disclosed in U. S. Patent #1,673,765, for example, is so weak that if it is made of sheer yarn it will break under less strain than that which may be expected during normal use.

Fig. 3 illustrates the form which this suture assumes when the sole is widened as in portion 5 of Fig. 1. This is knit as follows: Starting with course E which is knit from right to left the sole is knit by the short butt group of needles at the main knitting cams to the loop 17. When the next course F is knit from left to right, the sole yarn is knit through loop 17 into loop 18. Simultaneously, the corresponding instep portion is being knit by the long butt group of needles at the auxiliary knitting cams but before needle 19 by which loop 18 was knit reaches the auxiliary knitting cams, it is raised so that it will function as a long butt needle and knit loop 20 of the instep yarn through loop 18 of the sole yarn.

At the end of this course F needle 19 is raised again into the long butt group and knits loop 21 of the instep yarn through loop 20 also of that yarn during the next course G of knitting from right to left. Before the main knitting cams are reached by needle 19, it is lowered into the short butt group again and along with the adjacent needle 22 so that they knit loops 23 and 24 of the sole yarn through loops 21 and 25 of the instep yarn. The sole fabric has now been widened to the extent of one wale.

The cycle above described is now repeated beginning with course H on needles 22 and 41 and so on for the requisite number of times to produce the widening suture 5. In this section of the suture the characteristic referred to in relation to Fig. 2 persists, i. e., in the wale nearest the instep portion each of the two yarns of which the foot is composed is knitted through itself in alternation.

The portion 4 of the suture where the sole is narrowed may be produced in the following way. Referring to Fig. 4 and starting for convenience with the knitting of the sole yarn from right to left in course I, this knitting terminates with the loops 26 and 27. For the next course J which is knit from left to right a needle 28 is raised so that it takes this sole yarn around its shank but will not knit and needle 29 knits the sole yarn through loop 26 of itself into loop 30. At the auxiliary side of the machine at which the knitting of the instep is going on needle 28 is raised into the long butt group before it reaches the knitting cams so that it will knit loop 31 of the instep yarn through loop 27 of the sole yarn and also through the bight of the same yarn resulting from the fact that needle 28 did not knit, as above described. This is the last needle of the long butt group to knit in this course.

At the end of this course, needles 29 and 32 are raised so that when course K is knit from right to left needle 32 will knit the instep yarn through loop 33 of the sole yarn into loop 34 and needle 29 will knit the instep yarn through loop 30 of the sole yarn into loop 35. Before needles 29 and 32 reach the main knitting cams they are lowered so that at these cams they will knit loops 36 and 37 respectively of the sole yarn through loops 34 and 35 respectively of the instep yarn. Beginning with the next course L, the cycle is repeated. This course corresponds to course J. In this way, the sole may be narrowed to the desired extent.

A modified suture for the widened portion 5

of the split foot is illustrated by Fig. 5. This differs from that shown in Fig. 3 primarily in the wale adjacent the instep. The sole yarn is not knitted through itself in adjacent courses but is confined to single courses separated by two interknitted loops of the instep yarn. The manner of knitting described in connection with Fig. 3 may be followed with the exception that in course M corresponding to course F of Fig. 3, needle 19 is raised into the long butt group so that it takes the sole yarn around its shank but does not knit it with the result that needle 19 knits loop 20 of the instep yarn through loop 17 of the sole yarn and through the bight 38 of the sole yarn which, as just stated, was not knit by needle 19. Otherwise the knitting of this suture proceeds as described in connection with Fig. 3.

The suture of the high splice 39, if its sides are parallel as shown in Fig. 1, is the same as that of portion 3. The suture of portion 40 which is a rearward extension of portion 4 but is obtained by widening the sole instead of by narrowing as in portion 4 may have the form of either Fig. 3 or Fig. 5 the same as the other widened portion 5.

This description has been confined to a suture at one side of the stocking. Of course, it will be understood that there is a corresponding suture on the other side.

Reference has been made to short and long butt needles and short and long butt groups of needles. It is well-known that short butt needles are sometimes manipulated so that they function as long butt needles. It is also well known that needles having butts of intermediate length may also be used with long and short butt needles sometimes functioning as long butt needles and sometimes as short butt needles. The reference to long and short butt groups of needles is not intended to define the length of the butts but the function of the needles at a given time regardless of the characteristics of their butts. The long butt group knits the instep yarn and the short butt group the sole yarn. The number of needles in each group depends upon the widths of the instep and sole and may vary as needles are transferred from one group to the other for widening and narrowing.

I claim:

A two wale split foot suture of which one wale is composed of two courses of one yarn and two courses of another yarn in alternation and the other wale of two courses of the first mentioned yarn in alternation with one course of the other yarn.

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

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