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A. GAGNÉ

SPLIT FABRIC

Original Filed June 28, 1921

Fig. 1.

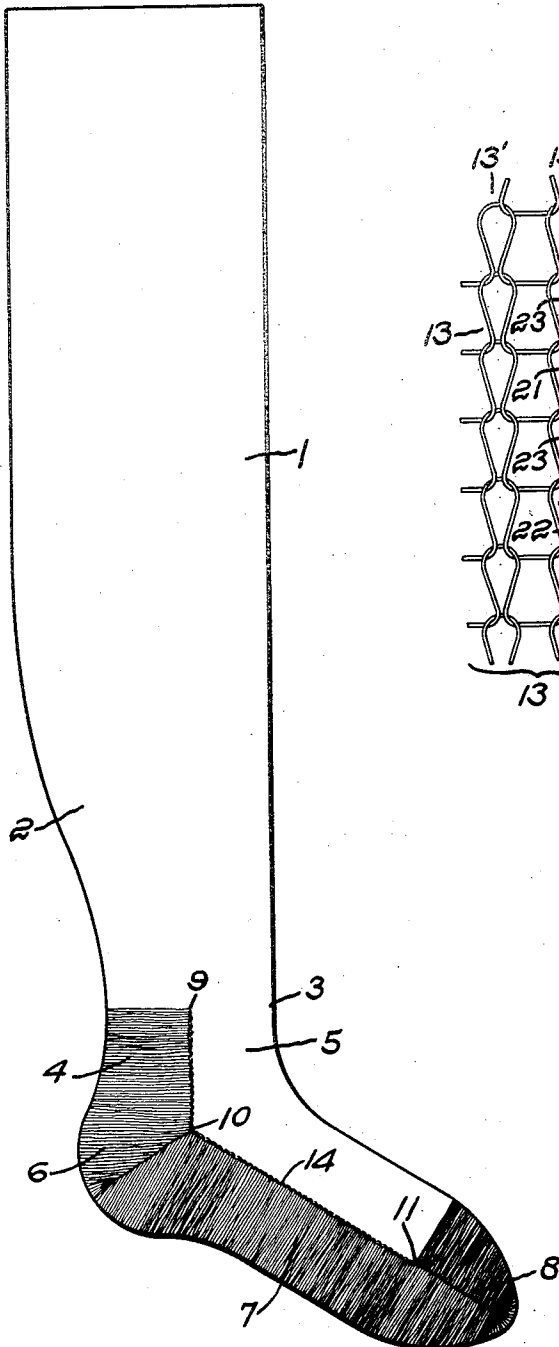


Fig. 2.

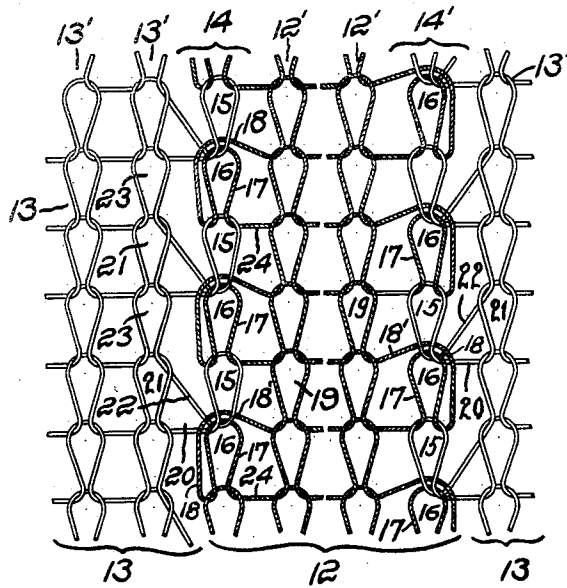
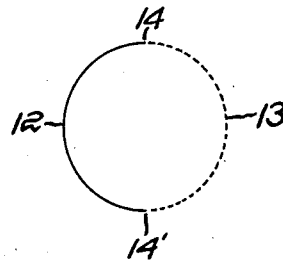


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SPLIT FABRIC.

Original application filed June 23, 1921, Serial No. 481,144. Divided and this application filed November 27, 1922. Serial No. 603,443.

This invention relates to knitted fabric but more particularly seamless split fabric for use in hosiery and the like and is a division of my copending application for machines for knitting split fabric Serial No. 481,144 filed June 28, 1921.

In order that the principles of the invention may be readily understood I have shown in the accompanying drawings one illustrative embodiment of my invention wherein:

Fig. 1 is a side elevation of a stocking having its ankle and foot formed of fabric embodying this invention;

Fig. 2 is a diagram on a greatly enlarged scale of two sections of the fabric united at opposite edges by knitted loops; and

Fig. 3 is a diagram illustrating the relation of the two sections of fabric and the seams for uniting the same when applied to a tubular knitted web such as the high splice or foot of a stocking.

An object of the present invention is to provide a strong, durable, elastic and inconspicuous seam for uniting two sections of fabric, preferably though not exclusively, in a single wale and so constructed that no unsightly eyelet holes, gaps or open spaces will appear along the sides of the suture seam.

In the accompanying drawings, referring particularly to Fig. 1, 1 represents the leg of a stocking of well known form which may or may not be fashioned at the calf 2 either by withdrawing needles as is customary in the manufacture of full fashioned hosiery or by varying the length of the loops as in so-called seamless hosiery both of which are well known and require no further explanation.

Split fabric when employed in the construction of hosiery is sometimes started in the ankle 3 at the top of the high splice 4, Fig. 1, for the purpose of reinforcing the heel sufficiently to enable it to withstand the chafing to which it is subjected at this point by the heel of the shoe. This high splice is desirably composed of more durable yarn than is used in the front part 5 of the ankle, the latter being generally the same as that used in the leg and this same distinction may be and often is carried through the heel, foot 7, and toe 8 of the stocking. Ob-

viously the yarn of the foot may not only be of a different character from that of the instep or front of the ankle and leg but certain portions of the sole, heel and toe may be of a different or contrasting color as for example, white, the remaining parts of the foot and leg being black, brown or other shades so commonly used.

Whenever it is desirable in a fabric to produce a seamless structure of two or more sections composed of different yarns without floating yarns or loose ends upon the interior of the fabric, a seam usually called a "suture seam" forms the dividing line between the two fabrics and in the stocking shown in Fig. 1 such a seam is disclosed extending from the point 9 at the top of the high splice to the ankle 10 and on to the top 11 of the toe pocket.

Although the present invention contemplates the use of an improved split fabric in hosiery it clearly is not limited to the application shown but may also be employed in all articles wherein yarn of contrasting color and character are desired which sections have to be united during the formation of the fabric and in and by the knitting operations.

In Fig. 2 I have shown in diagram, greatly enlarged, two sections 12 and 13 of knitted fabric, which sections may, for example, correspond respectively with the high splice 4 and front ankle portion 5 or with the sole 7 and opposed instep portion of the stocking.

The two sections 12 and 13 are indicated only in part in order to save room in the drawings, only two needle wales 12', 12' of the section 12 and three needle wales 13', 13' of the section 13 being shown, these sections being united herein by single needle wales 14 and 14' at opposite edges of the section 12.

In the present example the wales 14 and 14' are composed of interengaging or interknitted alternate single and double loops 15 and 16 respectively forming the marginal or terminal loops of the sections 13 and 12 although it is distinctly to be understood that the invention is not limited to the forming of the double loops upon the section 12 or alternately with the single loops.

In order that the relation of the sections

12 and 13 to each other may more readily be understood attention is called to Fig. 3 wherein the section 12 is indicated by a full line semi-circle and the section 13 by a dotted semi-circle while the points 14 and 14', indicate the location of the suture seams 14 and 14' of Fig. 2.

The loops of the wales 12' and 13' are substantially similar except that they are of different yarns but in the present example the loops 16 which have been referred to as double loops composed of the same yarn as the loops of the wales 12' in reality or preferably each includes a loop 17 of the usual form or like the loops of the wales 12' and 13' and a second loop 18 constituting the connecting strand between the course of which the loop 17 is the terminal loop, and the first loop formed of the same yarn in the next course, the latter loop represented by the reference character 19.

Instead of leading directly from the throat of the loop 17, said yarn leads from said throat around the closed end of said loop 17 thence laterally to the throat of a loop 19 preferably in the next or adjacent wale 12' which, in the present example is the first loop of the subsequent course above referred to.

Each loop 17 is the last loop to be formed upon the series of needles used in knitting the section 12. In other words the loop 17 is formed upon the tail needle of said series which needle will be the leading needle upon the reverse movement of the needle carrier, it being understood that the split fabric herein shown is formed during reciprocating knitting, the fabric section 12 being knitted upon one series of needles called the primary needles while the section 13 is generally knitted upon another set of needles designated "instep needles". The two groups of needles called primary and secondary needles are functioned by independent sets of knitting cams called respectively primary and secondary cams and each set of cams has its individual yarn feeding means, all of which are fully described in the original application aforesaid.

The suture seams 14 and 14' may obviously be formed either upon the terminal primary or the terminal secondary needles but in the present example said seams are produced upon the terminal primary needles and in order to effect the interknitting of the yarns of the two sections of fabric said terminal needles hereinafter called "suture needles" are acted upon by means such as pickers which effect their withdrawal from action with respect to the primary knitting cam and primary yarn guide when said suture needles are the advancing or leading needles of their respective set. It is the elevating of said suture needles which effects the formation of the loops causing the

yarn from the primary yarn guide to be wrapped about this leading elevated needle with the loop 17 and the now elevated needle occupies the position of tail needle with the instep series hence passes through the secondary cam and takes the secondary yarn causing the casting off of the loops 17 and 18 over the yarn thus taken and forming the loop 15 hereinbefore referred to as a single loop. This action takes place at the end of each course or reciprocation, thereby producing a double loop at each margin of the section 12 alternating with a single loop 15. The double loops 16 of the wale 14 lie in a different course however from the double loop 16 of the wale 14' at the opposite side of the section 12.

The next loop of the wale 14 and likewise of the wale 14' is a single loop 15 constituting the terminal or marginal loop of the section 13 because it is composed of secondary yarn although knitted upon the terminal needle of the primary series. In this case, however, the loop 15 is knitted through and embraced by the strand of the loops 17 and 18 which cross said loop 15 at the throat thereof and in the seam 14. One side of the loop 15 is connected by a lateral strand 20 with the throat of the preceding loop 21 in the same course but preferably in an adjacent wale while the other side of the throat of said loop 15 is connected by an oblique strand 22 with the throat of the primary or first loop 23 formed of the same or secondary yarn and constituting a loop of the needle wale 13' within which the loop 21 likewise occurs. The fabric section 13 will thus possess single strand terminal loops formed of yarn connecting one course with its succeeding course, which single strand loops inter-engage and herein are shown alternating with double strand terminal loops of the other section of fabric occurring in the same wale and furthermore a single strand terminal loop of this section 13 will be at one end of a course of which a double strand loop forms the terminal loop at its other end. By reason of this construction and particularly in view of the fact that double strand loops are formed upon the primary fabric section 12 which, in a stocking, generally includes the heel pocket, sole and toe pocket, also in some instances the high splice, these sections will be strong and elastic because the said terminal or suture loops are double or, more strictly speaking they consist of complete and partial loops 17 and 18 and each partial loop has a lateral strand 18' which tends to maintain the closed end of the complete loop 17 in definite spaced relation to the throat of the succeeding loop 19 and a strand 24 which tends to maintain the throat of said loop 17 in definite spaced relation to the preceding loop of the same course. As each terminal loop of

the fabric section is thus definitely positioned there will be no danger or chance of the wales of said section 12 being distorted or thrown out of alignment. On the other

5 hand the fabric section 13 is more elastic because of the fact that lighter yarn is employed and it is subjected to less wear than the section 12. Furthermore two succeeding connected courses of the section 13 are
10 united through one of said single strand loops 15 by the lateral and oblique strands 20 and 22 leading respectively to the previous loop in the same course and to the first loop in the succeeding course normally causing
15 said strands 20 and 22 to diverge but upon tension being applied thereto, these strands tend to draw together slightly, thereby permitting a limited lateral spreading of the loops or wales of the fabric section 13. Ow-
20 ing to the size of the double strand loops 16 as compared with that of the single strand loops and the extra yarn composing said double strand loops any gaps formed by the lateral expansion of said single loops will
25 be substantially concealed hence producing no noticeable effect.

Having thus described one illustrative embodiment of my invention I desire it to be understood that although specific terms
30 are employed they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

Claims:

35 1. As an article of manufacture, a knitted split fabric formed in two sections from different yarns interconnected at each end of of each partial course in a suture seam composed wholly of double strands of one yarn
40 and of single strands of the other yarn, the terminal loops of alternate courses of one section being composed of double strands of the same yarn, both directly interknitted in each instance with the same single strand
45 loop of the other section.

2. As an article of manufacture, a knitted split fabric formed in two sections from different yarns interconnected at each end of each partial course in a suture seam composed wholly of double strands of one yarn
50 and of single strands of the other yarn, the terminal loops of alternate courses of one section being composed of double strands of the same yarn, both directly interknitted in each instance in a single wale with the same
55 single strand terminal loop of the other section.

3. As an article of manufacture, a knitted split fabric formed in two sections from different yarns interconnected at each end of each partial course in a suture seam composed wholly of double strands of one yarn
60 and of single strands of the other yarn, the terminal loops of one of said sections being composed of relatively inflexible double

strands of the same yarn, both directly inter-looped in each instance with a relatively flexible single strand terminal loop of the other section.

4. As an article of manufacture, a knitted 70 split fabric formed in two sections from different yarns interconnected at each end of each partial course in a suture seam composed wholly of double strands of one yarn and of single strands of the other yarn, the 75 yarn of one section being relatively stronger than the yarn of the other section and composed of double strands of the same yarn and alternately directly interknitted in each instance in a single wale with a terminal 80 loop of the other fabric section embodying the relatively weaker yarn which latter is composed of single strand loops possessing a greater capacity for lateral flexibility.

5. A tubular knit fabric formed in two 85 sections of needle loops connected in a suture seam composed wholly of double strands of one yarn and of single strands of the other yarn, one of said sections being formed of silk yarn and the other of relatively stronger 90 yarn, the terminal loops of the fabric composed of said silk yarn containing single strand, laterally flexible loops alternating in the same wales with and in each instance di- 95 rectly interknitted with double strand loops of said relatively strong yarn, said double strand loops existing in each instance in the same identical yarn.

6. A knitted stocking composed of needle 100 loops having two continuous main yarns in the high splice and sole portions thereof interconnected at each end of each partial course in a suture seam composed wholly of double strands of one yarn and of single 105 strands of the other yarn, one of said yarns being silk and the other a relatively stronger yarn, opposite edges of the section composed of relatively stronger yarn having formed therein two strand terminal loops in alter- 110 nate courses directly interknitted in each instance in the same wale with single strand terminal loops of alternate courses of said silk yarn.

7. A knitted article of manufacture composed of needle loops of different yarns 115 joined in a single wale by double strand terminal loops of one yarn directly interknitted in each instance with single strand loops only of another yarn and thereby forming a suture seam composed wholly of double 120 strands of one of said yarns and of single strands of the other of said yarns.

8. As an article of manufacture, a split 125 fabric composed of needle loops and formed in two sections united in a wale composed of alternate single loops of one yarn and double strand loops of another yarn in each instance directly interknitted with each other and thereby forming a suture seam composed 130 wholly of double strands of one of said

yarns and of single strands of the other of said yarns.

9. As a new article of manufacture, a circular knit split fabric formed in two sections united by two suture seams at their respective edges, in each course throughout the extent of said seams there being a single loop of one yarn forming the entire portion of one of said two suture seams and a double loop existing in another yarn, and forming the entire portion of the other of said suture seams for said course.

10. As a new article of manufacture, a circular knit, split fabric formed in two sections united by two suture seams at their respective edges, in each course throughout the extent of said seams there being a single loop of one yarn forming the entire portion of one of said two suture seams and a double loop existing in another yarn and forming the entire portion of the other of said suture seams for said course, said single loop and double loop formation alternating in alternate courses throughout both of said seams.

11. As an article of manufacture, a circular knit, split fabric formed in two sections, the respective edges whereof are connected in two suture seams, in each suture seam there being a single loop of one yarn directly interknitted with a double loop of the other yarn, and said single loop having one strand extending laterally from its throat to the next adjacent loop in the same course and having another strand extending obliquely from its throat to an adjacent loop in another course.

12. As an article of manufacture, a circular knit split fabric formed in two sections, the respective edges whereof are connected in two suture seams, in each suture seam there being a single loop of one yarn directly interknitted with a double loop of the other yarn and said single loop having one strand extending laterally from its throat to the next adjacent loop in the same course and having another strand extending obliquely from its throat to an adjacent loop in another course, said double loop consisting of a complete loop and a partial loop, which latter extends from the throat of said first loop to the throat of an adjacent loop in the next course.

13. As a new article of manufacture, a circular knit, fabric having therein a split fabric portion formed in two sections from two distinct yarns, said sections being connected by two spaced suture seams interconnected at each end of each partial course, each said seam being composed wholly of double strands of one yarn and of single strands of the other yarn, all of the suture loops formed from one of said yarns being single loops and all of the suture loops formed from the other of said yarns being double loops.

14. As a new article of manufacture, a circular knit fabric having therein a split fabric portion formed in two sections from two distinct yarns, said sections being connected by two spaced suture seams, each said seam being composed wholly of double strands of one yarn and of single strands of the other yarn, all of the suture loops formed from one of said yarns being single loops and all of the suture loops formed from the other of said yarns being double loops, said single loops and double loops alternating in successive courses throughout both of said seams.

15. As a new article of manufacture, a circular knit fabric having therein a split fabric portion formed in two sections from two distinct yarns, said sections being connected by two spaced suture seams, each wholly in a single wale and interknitted at each end of each partial course, in each course of the fabric throughout which the suture seams extend there being a single loop of one of said yarns at one suture seam and a double loop existing in the other yarn at the other suture seam constituting the entire seam construction for said course.

16. As a new article of manufacture, a circular knit split fabric formed in two sections, the respective edges whereof are connected in two suture seams, each said seam being composed wholly of double strands of one yarn and of single strands of the other yarn, both said sections being interconnected directly in and by each course at each end thereof, and in each suture seam there being a single loop of one yarn directly interknitted with a double loop existing in the other yarn.

17. As a new article of manufacture, a single knit split fabric formed in two sections, each section interconnected at each end directly and by each course with the other section, so as to form two suture seams, each said seam being composed wholly of double strands of one yarn and of single strands of the other yarn, there being in each suture seam a single loop of one yarn directly interknitted with a double loop of the other yarn.

18. As a new article of manufacture, a circular knit split fabric formed in two sections, each section interconnected at each end directly in and by each course with the other section, so as to form two suture seams, each said seam being composed wholly of double strands of one yarn and of single strands of the other yarn, there being in each suture seam a single loop of one yarn directly interknitted in the same wale with a loop and a partial loop formed of the other yarn.

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

AUGUSTIN GAGNE.