This invention concerns a new method of knitting split work and the product produced thereby.

In the figures of drawing:

Fig. 1 is a view showing to a greatly enlarged scale a section of fabric knitted according to one form of the invention;

Fig. 2 is an elevation showing a typical split foot stocking in accordance with the method herein described.

Heretofore split foot stockings and other split work have been knitted both by circular and by reciprocalatory methods. The method herein described and claimed is practiced by continuous rotation of a circular knitting machine, or other machine of that general type such as is commonly employed for knitting hosiery. Independently operated needles such as latch or spring bead needles may be employed and a certain amount of needle selectivity is desirable at the points at which the sutures are formed, that is, at the junction points between sections of fabric knitted from different yarns. This method and fabric differ from methods of knitting split work by continuous rotation which have been previously practiced in that there is no overlapping of yarns knitting different areas in the sense there is in said methods previously employed. In those methods and fabrics the suture or connecting wales between adjacent sections knitting from different yarns involved knitting each of the yarns at that point on one or more needles. This meant that each needle at the suture took two or more yarns and thus the suture was in effect a thickened wale or wales such as in reinforcing.

That knitting of the thickened suture involved loading up of needles and also, in the fabric, made it very easy to determine the point of division between two areas knitted by split work.

According to the present method each needle knits one only of the yarns, or at least, only those yarns knitted at one of the areas, at any individual course. There are several different forms of the invention possible and one only will be described in detail herein with reference to Fig. 1 of the drawing.

The method includes knitting at least two feeds preferably, one yarn knitting at one side such as a main feed of a hosiery machine and the other yarn knitting at an auxiliary or second feed. Each of the yarns, that is, the yarn at each feed, will be fed on each course knitted, but only for that part of the course in which it is to be knitted, preferably for about one-half the circumference of a knitted tube, although in some hosiery such as stockings having a so-called cradle sole, the division will not be equal but may be of any desired proportion of the needling circle. The yarn fed at this main and auxiliary side will be moved to feeding position and withdrawn at the proper times, preferably in conjunction with a needle division such as is commonly employed in knitting on a definite number of needles less than the whole knitting circle.

Conceivably, needle division alone might be sufficient such as is employed in feeding to a definite group of needles by the so-called "silent finger" reinforcing. These methods of feeding to a group of needles such as one-half the needles, more or less, are well-known as are the mechanism for performing the same and it will not be necessary to make further description at this point.

The suture is formed by knitting at one feed, for example, the main feed, on one particular needle or group of needles, and then at the opposite side of the machine, the auxiliary side, knitting on another adjacent needle or needles adjacent to those first mentioned in a manner hereinafter to be described in greater detail. The adjacent needles will thus knit first at one side and then at the opposite side in the same course. The last needle knitting the yarn at the main side will draw a float of that yarn out and across the cylinder, this float being taken up by any satisfactory take-up and extending to the first needle which will again take that same yarn. Likewise, the same applies to the other or at the auxiliary side and floats from that yarn extend across the fabric thus completing two floats for each course of knitting. These floats may be left in the fabric and cut out at the completion of the knitted stocking. It is also contemplated to cut these floats on the machine itself, any satisfactory cutter being employed for the purpose.

While it is possible to employ needle butts of different lengths and suitable cams for manipulation of needles which knit at the suture, it is preferable that needle jacks or extensions of needles be used and that certain cams to be pattern controlled function upon these jacks. This is a common means of selecting needles for many purposes and need not be described in detail in this case. When jacks are to be employed with the suture needles, these jacks may serve other purposes than that of controlling knitting at the suture. For example, the heel of the stocking will normally be spaced a few needles distant from the suture line. Jacks similar to those used for the suture may be employed adjacent those needles and can be controlled by other cams.
which will function at the proper time with the instep cams. Likewise, a series of jacks may be used in addition to those mentioned for knitting a given sole or for otherwise varying the position of the suture at different parts of the knitted article.

If warp stripe yarns are to be fed during the knitting of this split work, it will probably be essential to cut these floats, but in the usual case, these will be cut only at one end or one side of the fabric only so that they may trail around and avoid interference with wrapping yarns being fed at the other side. In this respect, the wrapping would be done only at one side such as the instep side and floats would be disposed of as described in Patent #2,206,097.

Now referring to Fig. 1, a section of fabric is illustrated in which two yarns are fed, one at one side and the other at the opposite side of a knitting machine such as above referred to. For example, we will consider the black or shaded yarn as being fed at the main feed of the machine, while the white or unshaded yarn 2 would be fed at the auxiliary side. Of course, this is merely by way of example since this main and auxiliary feed are designated arbitrarily and the halves of the fabric knitted could as well be knitted at one side as the other. Beginning in course A, at the main side, the loop 3 is the first loop taken by the leading needle which knits at the main side at that time.

The next needle knitting wale 8 misses the black yarn while the following needle knitting in wale 6 takes it to knit loop 8. Thus there will be a float 7 between the loops 3 and 8 which are the suture loops at this side knitted from the black yarn. Thereafter the next needle in wale 9 misses the yarn so that a float 10 is formed whereupon all needles will then knit the said yarn up to the needle knitting in wale 11 at the opposite side of the fabric.

To complete this half course with the black yarn it is floated by a float 12 to needle 13 in wale 14, then floats at 15 and finally knots loop 16 in wale 17. Then the yarn is withdrawn and floats across the fabric at 18, this float being shown cut at the wale 17. It being understood that it may be cut as knitting goes on in the machine or at some later time.

So much has been said for knitting the half course of black yarn in course A and it must be understood that while that is going on at the main side and white yarn is being knitted at the auxiliary side in practically the same manner.

That white yarn fed in course A is first knitted in a loop 18 in wale 20 and then a loop 21 in wale 22. A float 23 connects the two loops. Then the said yarn floats at 24 and knits in loop 25 in wale 26. It is then knitted around approximately one-half of the circumference of the machine to the wale 27 whereupon it floats at 28, is knitted in loop 28 at wale 5, then floats at 30 past wale 5, finally knitting the loop 31 in wale 9. It then floats across the knitted tube in a long float 32 which is similar to the previously described float 18. This completes the knitting of one complete course including the suture at each side. It can be seen that the alternation of loops 3, 8 and the previously drawn plain loops between at one side and the loops 13, 16 and 19, 21 at the other side form a sort of interlocking seam which is of only single fabric or single yarn thickness, but which is sufficiently strong to withstand pull or strain incident to uses to which the fabric may be put. The floats cross between the various wales at the sutures and this tends to tighten the grip of the loops as they are strained or when attempted to be pulled apart.

What has been described with respect to knitting the course A also applies to the following courses, the machine merely duplicating at each course what was done in the previous course. The float 18 of the black yarn will be drawn across the needle at wale 22, at which point a loop drawn through the loop 3 is drawn from the extending float 10 designated at the opposite side of numeral 18. Likewise in this course B the float 32 of the white yarn extends across to the other end designated by numeral 32' which leads to the first loop 34 of white yarn in the said course B.

In the specific illustration of the invention herein described four needles at either side are employed in knitting the suture. However, it is not necessary that the particular arrangement of needles herein shown be used since a suture may be knitted with two needles, one knitting the yarn at the main side and the other knitting that in the auxiliary side. Other schemes may include the employment of an odd number of needles at either side, or there may be a double needle which would knit one of the yarns and the intermediate needle would knit the other. According to another embodiment of the invention spaced needles may include spaced groups of needles. The floats are normally cut fairly close to the point at which they project from the fabric, it being necessary to leave enough of the float so that it would not be drawn back through the fabric in normal usage.

The type of split-fabric herein illustrated has certain advantages from the machine point of view in that it is knitted on a two feed machine and entirely by rotary work. Thus the speed in the split portion is greater than that in the ordinary reciprocatory split work. Since a two feed machine is used, plain rotary work may be knitted at both feeds further increasing production. In knitting certain types of elastic tops such as the garter tops now more common in men's hosiery and anklets, certain types are knitted at two distinct feeding stations as in St. Pierre #2,131,720. The auxiliary feeding station hereinbefore described may have means for attaching for knitting an elastic yarn to make that type of top after which a yarn change may be made at the beginning of the split-foot.

In Fig. 2 a conventional half-hose has been illustrated to show one application of the method and fabric of this case. The half-hose has a leg 35 knitted in rotary work from a single yarn of from two yarns as by double feed knitting. A top 35 may be a rib top transferred to the needles of the machine before starting the leg portion or may be knitted on the same machine with an elastic yarn incorporated in any of the known ways to simulate a rib appearance and for purposes of a garter. The instep 37 and the high splice 38 as well as the sole 39 are all knitted in split work according to this invention. The suture 40 between the instep and the fabric would be knitted as in Fig. 1 or in some similar way. While the suture is shown as clearly visible and prominent in this Fig. 2, in the actual fabric it will not be clearly perceptible, but in fact will be rather difficult to detect except by close examination. Naturally a heavier yarn is used in the high splice and sole than in the instep. The instep will merely appear of lighter fabric than the opposite portions, but will
not be separated by a raised seam such as in types of split work in which there is a reinforced, overlapping of fabric. The heel 41 and toe 42 are of usual construction for stockings of this type. The invention is not necessarily applicable only to men's half hose of this sort, but may be used in any type of stocking or hosiery or in other fabrics wherein it is desired to knit two or more parts and to join them as in split fabric, but to conceal the actual knitted seam between the parts.

The invention has been described more or less specifically for purposes of illustration, but is not to be limited other than by the scope of the claims appended hereto.

I claim:

1. A method of knitting split work including the steps of feeding two yarns during rotary knitting and connecting the two yarns by knitting one on spaced non-adjacent needles at a suture and the other on intervening needles so that both yarns will be knitted at the suture on each course, but only one of the yarns will be knitted on a needle.

2. A method of knitting split work by feeding a plurality of yarns at separate feeds and in rotary knitting, each yarn feeding at every course but only for a part of every course, connecting the yarns at a suture by knitting one of the yarns on at least one needle and floating it over an adjacent needle, and knitting the other yarn on that needle over which the first said yarn was floated.

3. A method of knitting split work including the feeding of a plurality of yarns at at least two feeding stations and in rotary knitting, feeding one yarn at part of a course and another yarn at another part of said course, connecting said yarns by knitted sutures in which spaced needles knit one of the yarns continuously and intervening needles knit the other of said yarns continuously said spaced and intervening needles knitting one only of the yarns.

4. A method of knitting a split fabric including feeding two or more yarns within each course by continuous rotary knitting, feeding one yarn for part of each course and another yarn for another part of each course, connecting the two yarns by knitted sutures formed by knitting one of the yarns on spaced needles and floating it over intervening needles and the other yarn on said intervening needles and floating it over needles on which the first yarn was knitted.

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