Nov. 30, 1937. E. C. LOCHHEAD 2,100,861

KNITTED FABRIC

Filed Oct. 27, 1932

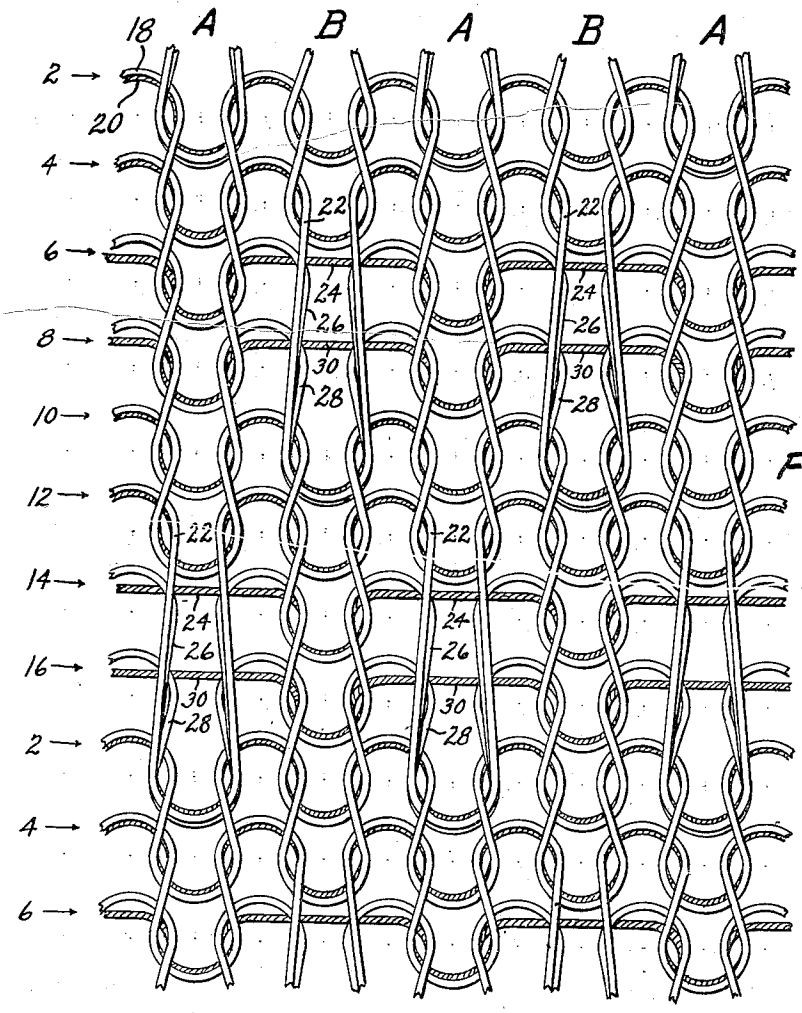


FIG. 1

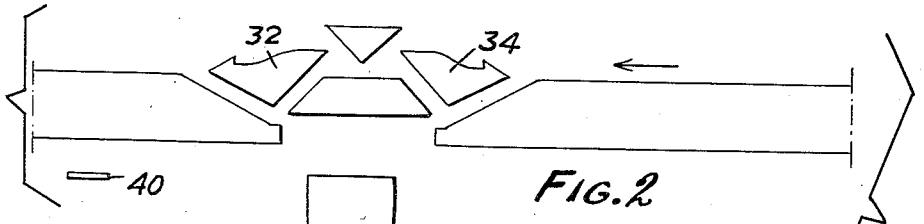


FIG. 2

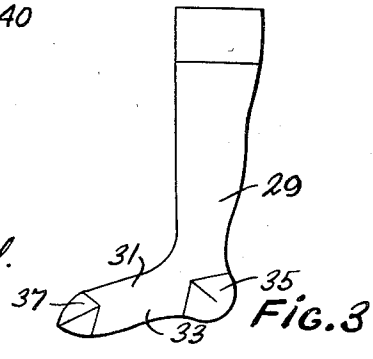
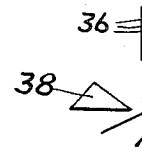


FIG. 3



WITNESS:

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UNITED STATES PATENT OFFICE

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KNITTED FABRIC

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4 Claims. (Cl. 66—198)

This invention relates to a knitted fabric particularly designed for stockings and the method of making the same, the fabric being characterized by a substantial resistance to the production of runs.

Ordinary knitted fabric of either plain or ribbed type is subject to destruction by the occurrence of runs which start whenever a course of the fabric is ruptured or freed at the end of the fabric. Such rupture is very liable to occur in the case of knitted fabrics of stockings inasmuch as they are generally placed under tension by garters or subject to wear or breakage by contact with furniture or the shoes. Heretofore, various weaves have been devised for reducing the tendency for such fabrics to run in the direction of the wales after a single course or a plurality of adjacent courses are ruptured. In general, however, the fabrics of this type have been somewhat objectionable in that they are of comparatively heavy weight as compared with the simple plain or ribbed fabrics.

It is the broad object of the present invention to provide a fabric suitable for fine grade hosiery which is substantially resistant to the production of runs while at the same time being of light weight so as to retain the desirable appearance and texture of conventional stocking fabrics. Specifically this fabric comprises two yarns knitted together, in such fashion, however, that the fabric is of an open nature and quite light in weight so as to be comparable with conventional sheer fabrics.

It is a further object of the invention to provide a method for the production of such fabric whereby the fabric may be produced as rapidly as conventional fabric upon conventional types of circular knitting machines.

The specific objects of the invention will be apparent from the following description read in conjunction with the accompanying drawing in which:

Fig. 1 is an enlarged diagrammatic view showing a portion of the fabric of sufficient extent to include the repeats in the directions of both courses and wales;

Fig. 2 is a diagrammatic view of certain of the knitting elements, including the needle cams, in developed form; and

Fig. 3 is a stocking embodying the improved fabric in the leg and instep thereof.

Referring first to Fig. 1, it may be pointed out that the fabric comprises a repeat after every eight courses and every two wales. The different courses constituting a single repeat are designated 2, 4, 6, 8, 10, 12, 14 and 16 respectively. The different wales are designated A and B.

The course designated 2 consists of a series of ordinary loops formed of yarns 18 and 20 in plated relationship. Inasmuch as such fabrics are generally knitted with yarns of the same color it is relatively immaterial which yarn is the plating yarn. If, however, it is desired to make a choice of the yarn which appears on the surface as, for example, where the two yarns are different in color or weight, then these yarns may be conventionally manipulated in well known manners by being differently tensioned or fed from fingers positioned in proper relative relationship to each other. Inasmuch as such manipulation of two yarns for plating and reverse plating is well known in the art, further description thereof is considered unnecessary.

Following the formation of the plain course 2 a course is formed in which ordinary loops of the two yarns 18 and 20 are formed in the wales A while tuck stitches indicated at 22 and including both of the yarns are formed in the wales B, these being produced by a failure to cast off the stitches in the production of the following two courses. This will be more apparent from a brief description of the type of mechanism employed for the production of the fabric.

In the following course designated 6 ordinary plated stitches are again formed in the wales A. In this course, however, tuck stitches 26 are formed in yarn 18 in the wales B while the yarn 20 floats across these wales as indicated at 24. The tuck stitches 22 remain held by the needles together with the new tuck stitches 26.

In the formation of the next wale ordinary plated stitches are again formed in the wales A. In the wales B the yarn 18 forms ordinary stitches 28, these stitches being cast off together with the tuck stitches 22 and 26 with the result that all three of these stitches are held by corresponding loops of the next course. The yarn 20 is floated across the wales B in the formation of the course 8 as indicated at 30.

In course 10 plain stitches are formed as in the case of the course 2.

The subsequent courses 12, 14, and 16 correspond to the courses 4, 6 and 8 in construction with the exception, however, that the tuck stitches and floats occur in the wales A while the plain stitches occur in the wales B. Following the formation of the course 16 a course identical with 2 is produced and a repetition of the preceding stitches takes place.

The fabric just described may be readily produced upon conventional machines which are capable not only of knitting the leg of a stocking but also the foot including the heel and toe. In general, the fabric just described will extend through the leg 29 and instep 31 of the stocking and may if desired be continued in the foot 33 and also by a suitable adjustment of the machine in the heel 35 and toe 37 thereof. As an example of one method of producing the fabric there are

illustrated in Fig. 2 certain elements of a Scott and Williams spiral float stitch machine which by cooperation with needles and the well known type of tilting pattern jacks will serve to produce the fabrics. This machine includes two stitch cams 32 and 34 of which 32 is operative in the present instance to draw stitches in the rotary production of the leg portion of a stocking. In the general operation of this machine the cam 34 is used during rotation to move the needles upwardly so that stitches previously formed will drop below the latches prior to the taking of yarn at the feed. In the production of the present fabric this cam 34 is retracted so as not to raise the needles and so that except for other provisions hereafter described tuck stitches would be produced without any cast off.

In the machine described there is provided a cam 38 which is arranged to engage lower butts on tilting jacks to raise the jacks when their lower ends are rocked inwardly by the action of selector fingers 36 on butts on the jacks, these selector fingers 36 being controlled in their movements by the action of well known pattern mechanism. By a suitable combination of pattern mechanism and butts on the tilting jacks the needles corresponding to the jacks may either move past the position of cam 38 without rising or may be raised at this place by the action of cam 38 on the jacks. A cam 40 tends to move the lower ends of all of the jacks outwardly prior to a new selection by the action of the selector fingers 36.

In the present machine the cam 38 serves to effect the raising of needles to such extent that loops carried within the hooks thereof will be located below the latches so as to be cast off the needles during the drawing of loops of the next course. The needles associated with jacks which do not ride up the cam 38 will fail to cast off the stitches of a previous course and tuck stitches will result.

Besides the above action effected by the selective raising of needles by cam 38 the feed fingers are located so that those needles which are raised at the position of cam 38 will engage both yarns 18 and 20 while on the other hand those needles which are not raised by the cam 38 will fail to engage the yarn 20 thereby producing floats, while they will engage the yarn 18. It will be readily seen how the fabric of Fig. 1 is produced by this machine inasmuch as the floats 24 and 30 will be produced by the lowered position of the needles carrying and failing to cast off the tuck stitches 22 and 26. A suitable arrangement of butts on the pattern jacks together with a suitable pattern actuation of selector fingers 36 will serve to locate the various tuck stitches and floats selectively as indicated in Fig. 1.

While the fabric already described is the preferred form, it will be obvious that numerous other arrangements within the scope of the invention may be produced by modifications. The fabric just described is found to be highly resistant to the production of runs while those modifications which more closely approach a conventional fabric will correspondingly have less resistance to runs although substantial resistance for ordinary purposes and of a commercially satisfactory type is secured. For example, instead of producing tuck stitches in two successive courses, single tuck stitches and floats may be provided with one or more intervening courses of ordinary loops of that yarn which forms loops in every wale whether of ordinary or tuck stitch variety. Also, instead of having plain courses a fabric may be formed without any plain courses. In other words, the courses indicated at 2 and 12 could be omitted so that the tuck stitches in adjacent wales would, in a sense, overlap. The resistance to runs of all of these fabrics not only results from provision of tuck stitches but also from the presence of the floats which prevent substantial increase of lateral spacing of the various wales which would tend to promote the freeing of loops for the production of runs.

One notable property of the fabric herein disclosed and claimed is its resistance to destruction by the occurrence of "snags", or "pull threads". The pulling of a substantial length of thread from a course of this fabric will not result in the production of a destructive run.

While one specific type of mechanism has been indicated for the production of the fabric of the invention, it will be obvious that the fabric may be produced in numerous other ways in both its preferred form and in the modifications indicated above.

What I claim and desire to protect by Letters Patent is:

1. A knitted run-resist fabric, at least a portion of substantial area of which includes two yarns and has in each wale a periodically recurring series of stitches including, in one course, a tuck stitch including both yarns, in the next course a tuck stitch including one yarn with the other yarn floating, in the next course a normal stitch of the first yarn with the second yarn floating and in a plurality of subsequent courses normal stitches including both yarns, the tucks and floats in alternate wales occurring in courses in which normal stitches of both yarns occur in intermediate wales.

2. A run resistant knitted fabric, at least a portion of substantial area of which includes two yarns and has in each wale a periodically recurring series of stitches including, in one course, a tuck stitch including both yarns, in a subsequent course a normal stitch of one yarn with the other yarn forming a single wale float, and in a plurality of subsequent courses normal stitches including both yarns, the tucks and floats in alternate wales occurring in courses in which normal stitches of both yarns occur in intermediate wales.

3. A run resistant knitted fabric, at least a portion of substantial area of which includes two yarns and has periodically recurring series of stitches including, in one course, a tuck stitch including both yarns, and in a subsequent course a normal stitch of one yarn with the other yarn forming a single wale float, said series of stitches recurring in both courses and wales and being separated in each case by normal stitches including both yarns, the series of stitches being staggered in the directions of both wales and courses.

4. A run resistant stocking, at least the leg and instep portions of which are of uniform structure and of a weight substantially that of the leg portions of conventional sheer stockings, said leg and instep portions including two yarns and having periodically recurring stitches involving a normal stitch of one yarn with the other yarn forming a single wale float, said stitches recurring in both courses and wales and being separated in each case by normal stitches including both yarns, said recurring stitches being staggered in the directions of both wales and courses.

ELMER C. LOCHHEAD.