March 3, 1936. G. GASTRICH 2,032,476

KNITTED FABRIC AND METHOD OF PREVENTING YARN STRAINS THEREIN

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FIG. 3.

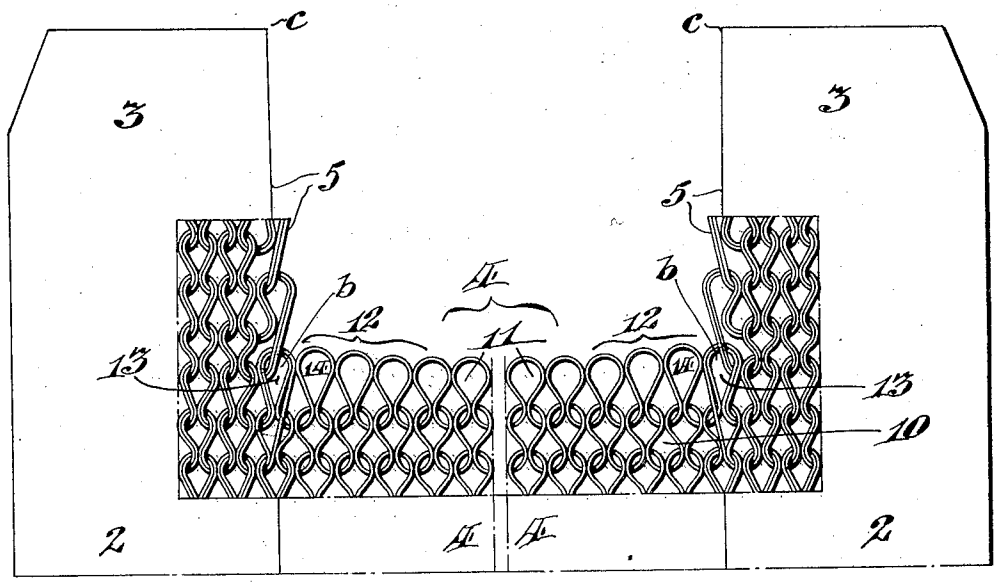


FIG. 2.

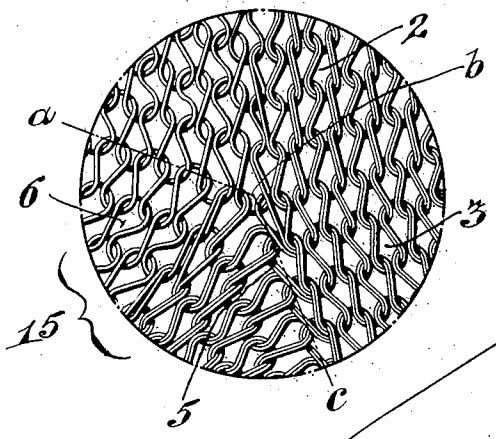


FIG. 1.

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KNITTED FABRIC AND METHOD OF PREVENTING YARN STRAINS THEREIN

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8 Claims. (Cl. 66—185)

This invention relates to knitted fabric and articles, such as hosiery made therefrom, and particularly to a method for substantially preventing yarn strains in the fabric of full fashioned flat knit hosiery at and adjacent the turning points of the heel tabs, where the knitting thread tends to break, resulting in runners in the stocking at such points when the stockings are being boarded or when being applied to the limbs and feet of wearers.

The invention comprises a novel knitted shaped fabric which is free from the usual yarn strains at certain critical turning or shaping points; and in the improved method of producing the same.

In the accompanying drawing:

Fig. 1 is a diagrammatic view of the foot and ankle portions of a full fashioned stocking indicating by a dot-and-dash outlined circle the areas within which the above mentioned strains occur;

Fig. 2 is an enlarged view of the area surrounding one of the turning points of the heel tubs; and

Fig. 3 is a diagrammatic view of a portion of my improved flat knit full fashioned stocking blank, before the turning of the heel tabs and before the knitting of the foot to the blank.

From the following description it will be apparent that the invention is applicable to knitted fabrics generally, but for illustrative purposes it is herein set forth in connection with the manufacture of full fashioned hosiery.

In Fig. 1 of the drawing, the ankle portion of a full fashioned stocking is indicated at 1, with the high splice heel reinforce 2 at the rear thereof, from which depends the heel tabs 3.

In the normal knitting of a full fashioned stocking the leg portion including the ankle portion is knit on a legger as a flat blank, down to the dot-and-dash line *a—b* Fig. 1, which extends across the instep portion 4 of the stocking. After the knitting of the blank down to the line *a—b* the heel pieces 3, 3 are knit thereto as depending tabs each having a selvage edge 5 extending from the point *b* to the point *c* at the lower end of the heel tab.

The instep portion of the blank is then topped onto the needles of a footer along the line *a—b*, and the heel tabs 3 are subsequently turned outwardly about the points *b* until the selvage edge 5 of each heel tab is aligned with the instep loops on the line *a—b*, which have been previously applied to the needles of the footer, the stitch or loop wale of each heel tab 3 lying adjacent the selvage edge 5 being applied to the needles of the footer.

After the leg blank has been topped onto the needles of the footer the top 6 of the foot is knit onto the instep stitches along the line *a—b* and the foot sole 7 is knit onto the selvage edges 5, 5 of the heel tabs 3.

In the knitting of the single ply portions of the blank on the legger the stitches are normally formed of a uniform size under control of the stitch-regulating motion of the machine which also is equipped to make the stitches or loops of the adjacent reinforced areas 2 longer than those of the instep to accommodate the reinforcing or plating thread.

As a result of the uniform size of the single loops of the instep 4 immediately adjacent the turning points *b* of the heel tabs 3 and the double loops of the reinforced areas 2 the yarn of these single loops is placed under severe strains during the topping operation by the turning of the heel tabs about the points *b* and again when the stocking is being boarded, or when being drawn over the foot of the wearer, due to the extreme width of the board on a line across the instep and heel and due to the greatest thickness of the wearer's foot being on a corresponding line across the instep and the round of the heel.

Under such strains the yarn forming the loops at and adjacent the turning points *b* frequently breaks and produces runners in the stocking. In order to obviate this condition, the object of the present invention is to increase the length of the single loops in the instep at and adjacent the turning points *b* of the heel tabs 3.

As shown in Fig. 3, the courses of loops 10 across the instep 4 and preceding the course 11 which latter is adapted to be topped onto the needles of the footer, are of the regular uniform length and consequently these courses are formed of a length of yarn of uniform length. The loops at the center of the topping course 11 are likewise of the same uniform length as the loops of the preceding courses 10, but at and adjacent the points *b*, where the single loops of the instep join with the double loops of the reinforced areas 2, the groups 12, 12 of the loops of the course 11 are progressively lengthened, the double loops 13 of the course 11, which actually constitute the turning points *b* and which lie immediately adjacent the progressively enlarged loops of the groups 12, are of substantially the same size as the longest loops 14 of each group 12. It will be apparent from this that the yarn forming the course 11 is of greater length than that of the courses 10.

By this arrangement the fabric in the area 15

immediately surrounding the turning points *b* is consequently somewhat looser than the outer areas due to the increased length of the loops of the groups **12**, **12**, the loops **12** and **13** forming in effect elastic centers at the turning points.

As shown in Fig. 2, the loops of the groups **12** lose their individuality when the stocking is finished, due to the self-adjusting of the loops immediately adjacent the loops of the groups **12**. Nevertheless, the loops at this point are of somewhat greater length. The compensating effect afforded by the greater amounts of threads in the enlarged loops of the course including groups **12**, which permits the fabric surrounding the turning points *b* to find an arbitrary condition wherein localized strains on the yarn forming the loops adjacent and at the turning points *b*, are eliminated. In this manner the distorting or stretching forces which tend to concentrate at the turning points are neutralized so that there is no strain present at the turning points of sufficient magnitude to cause substantial yarn strain.

While the progressive lengthening of loops in the groups **12**, **12** has been described as occurring in the topping course **11** only, it will be obvious to one familiar with the art that such enlarged stitches may be formed in any desired number of courses at either or both sides of the said topping courses if desired, to further relieve the fabric around the turning points of the heel tabs, but care must be exercised in such procedure in order to avoid the formation of bulges such as would be caused by too great a number of elongated stitches being present in these areas. The loops forming groups **12**, **12** can also be of equal length.

The progressive lengthening of the loops, as above noted, may be accomplished in any of a number of different ways, for example the rocker cam of the regulating motion may be provided with additional wedge-shaped cam pieces arranged to provide a quick advance and gradual retreat of the needles toward the sinkers at the start of the slur cock across the needles on which the instep loops of the topping course **11** are being formed and to provide a gradual advance and a quick retreat of the needles as the slur cock reaches the opposite end of the instep-forming needles, or those needles on which the groups of loops **12** are formed may be flexed inwardly and relative to the other needles by any suitable mechanism to draw more than the normal amount of thread being fed to the adjacent needles.

Of course, the improved stocking and novel method of producing the same, as herein shown and described, can be changed and modified in various ways without departing from the scope of the invention disclosed and more particularly pointed out in the appended claims.

I claim:

1. In a flat knitted stocking blank provided with an instep part and reinforced heel tabs adapted to be turned at an angle relative to said instep part in the finished stocking; of means for relieving yarn strains at said turning point comprising one or more special slack loops within a predetermined area of said instep part adjacent the turning points which embody additional yarn compared with the surrounding normal loops of said instep part, said special slack loops progressively decreasing in degree of slackness along lines radiating from said turning points.

2. In a flat knitted stocking blank provided with a non-reinforced instep part and reinforced heel tabs adapted to be turned at an angle relative to said instep part in the finished stocking; of means for relieving yarn strains at said turning points comprising one or more slack fabric loops within a predetermined area of said instep part adjacent the turning points embodying additional yarn compared with the surrounding normal loops of said instep part, said loops progressively decreasing in slackness from said turning points along a course extending between said turning points across the instep part.

3. In a flat knitted stocking blank provided with a non-reinforced instep part and reinforced heel tabs adapted to be turned at an angle relative to said instep part in the finished stocking; of means for relieving yarn strains at said turning points comprising a plurality of slack loops within a predetermined area of said instep part adjacent the turning points which are of greater length than the loops of the surrounding normal loops of said instep part, said enlarged loops progressively decreasing in size from said turning points along a course extending between said turning points across the instep part and in which said turning points are included.

4. In a stocking blank for full fashioned stockings provided with heel tabs adapted to be turned about a point of intersection of the inner selvedge edge of said tab, and the instep of the stocking, said blank comprising courses of plain knit loops requiring a predetermined amount of yarn per course, of one or more courses having an additional amount of yarn embodied in a portion of said course or courses, said additional yarn being provided in the form of single strand yarn distributing loops some of which at least are located in the instep portion of said stocking blank and forming an area including said turning point, said yarn distributing loops being adapted to pay out said additional yarn to thereby relieve strain at said turning point.

5. In a stocking blank for full fashioned stockings provided with heel tabs adapted to be turned about a point of intersection of the inner selvedge edge of said tab, and the instep of the stocking, said blank comprising courses of plain knit loops requiring a predetermined amount of yarn per course, and one or more courses having an additional amount of yarn embodied in a portion of said course or courses, said additional yarn being provided in the form of loose yarn distributing loops varying in degrees of looseness over a plurality of wales, some of which at least are located in the instep portion of said stocking blank and adjacent to said turning points, said yarn distributing loops being adapted to pay out said additional yarn to thereby relieve strain at said turning point.

6. In a stocking blank for full fashioned stockings provided with heel tabs adapted to be turned about the points of intersection of the inner selvedge edges of said tabs and the instep of said stocking, said blank comprising courses of plain knit loops requiring a predetermined amount of yarn per course, and one or more courses of loops including said turning points having an additional amount of yarn embodied in portions of said course or courses adjacent said turning points and provided in the form of slack loops some of which at least are located in the instep portion of said stocking blank, said loops decreasing in degree of slackness in a direction toward the center of the stocking blank.

7. The method of relieving yarn strains at the turning points of the heel tabs of a full fashioned stocking, which comprises producing a number of special loose fabric loops some of which at least are located in the instep of said stocking, embodying additional yarn compared with adjacent normal loops, in a course including said turning points of the heel tabs and progressively decreasing the looseness of said special loops inwardly from said turning points.

8. The method of substantially preventing yarn strains in a knitted fabric at a point of meeting of a suture therein with the line of junction of two adjoining portions of the fabric of different thicknesses at which point distorting forces tend to concentrate when the fabric is in service, which comprises forming in the fabric of lesser thickness at said meeting point an area composed of slack loops having a predetermined length sufficiently greater than that of the remaining loops of the said adjoining portions of the fabric adjacent said meeting point to neutralize said forces, and limiting the length of the loops of said area to avoid the appearance of being appreciably larger than the loops of the adjacent portions.

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