March 14, 1944. J. L. GETAZ 2,344,350

HOSIERY

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Fig. 1.

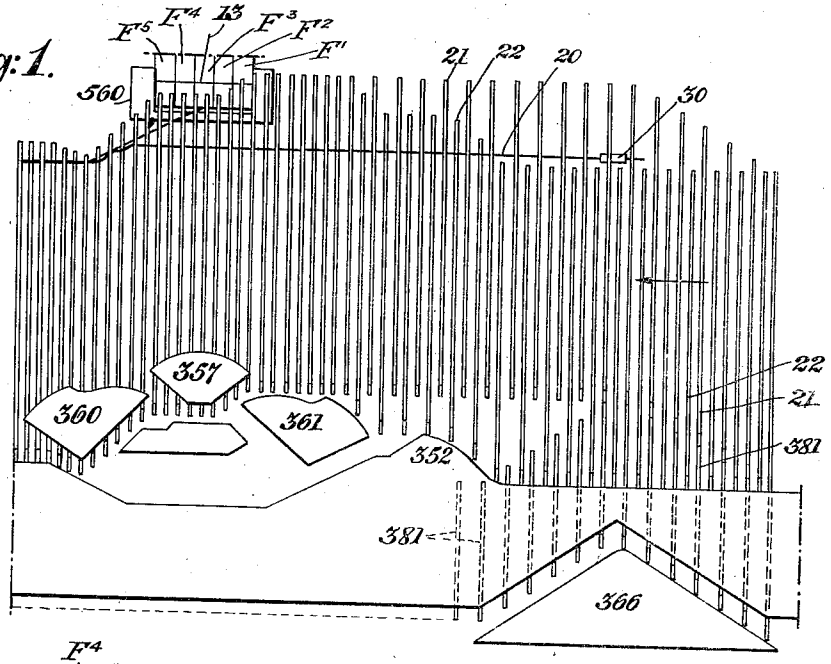
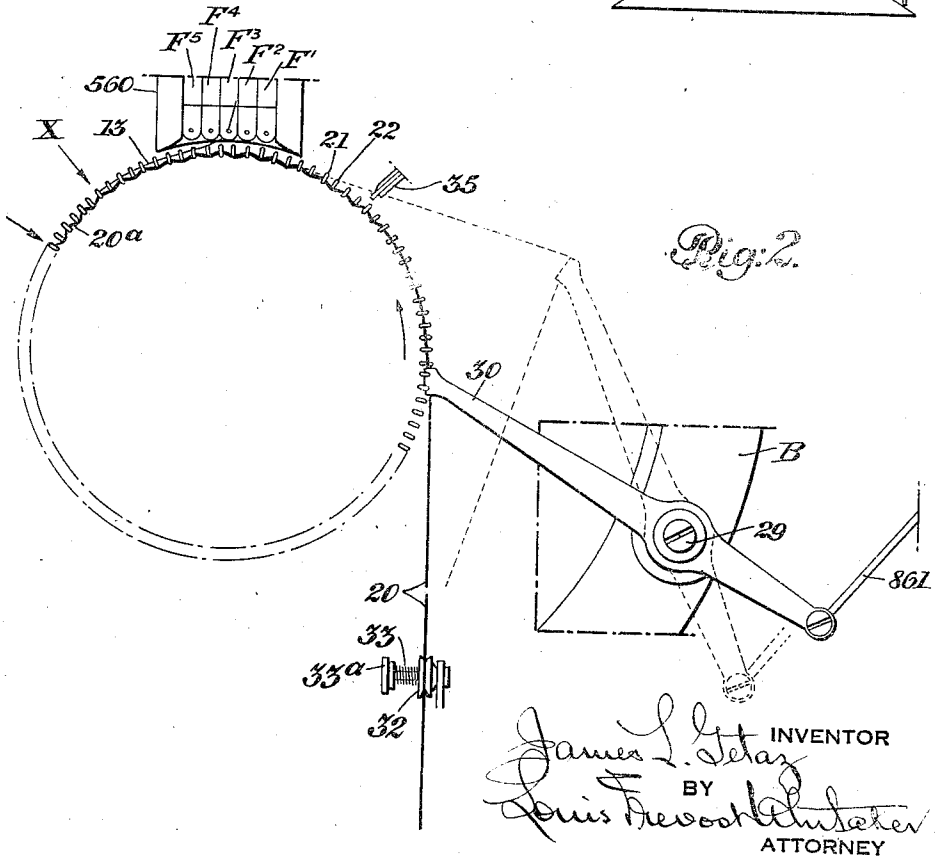


Fig. 2.



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HOSIERY

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Fig. 3.

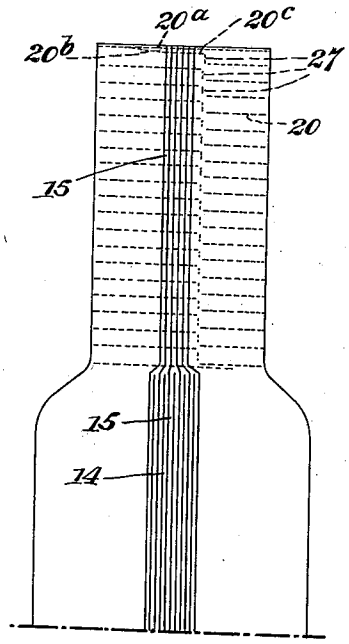


Fig. 4.

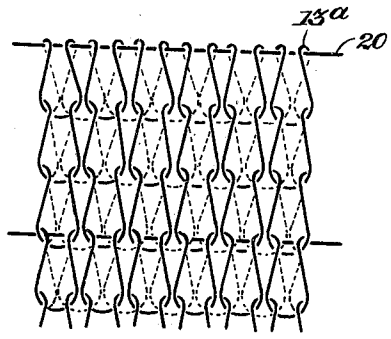
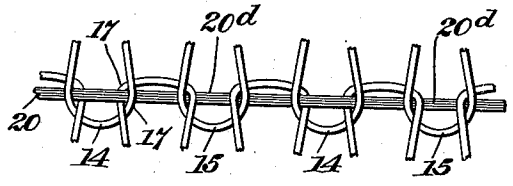


Fig. 5.



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HOSIERY

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Fig:6.

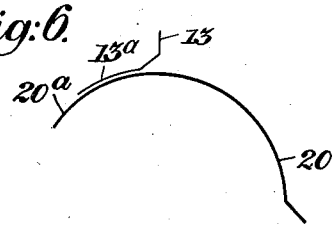


Fig:8.

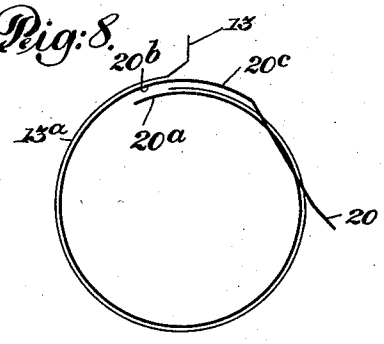


Fig:7.

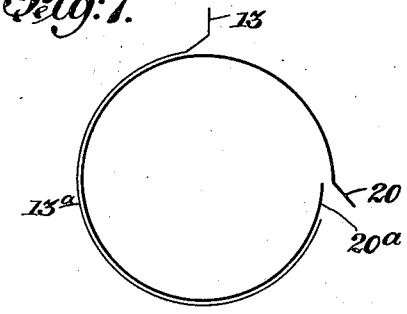


Fig:9.

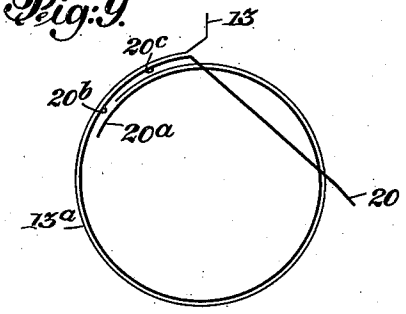
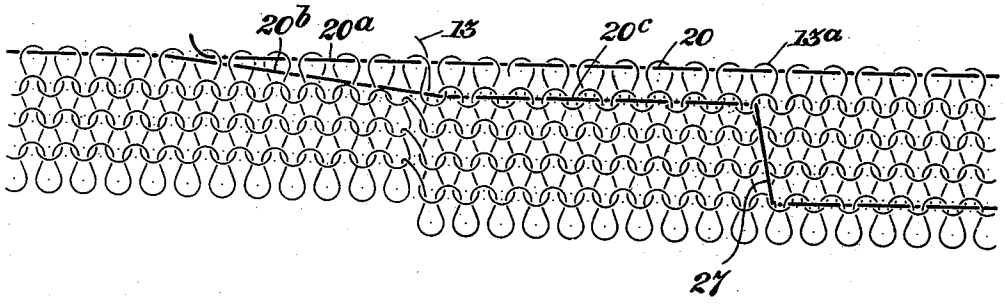


Fig:10.



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Patented Mar. 14, 1944 2,344,350

UNITED STATES PATENT OFFICE

2,344,350

HOSIERY

James Louis Getaz, Maryville, Tenn.

Application April 14, 1938, Serial No. 201,861

8 Claims. (Cl. 66—172)

My invention consists in the novel features hereinafter described and illustrated in the accompanying drawings which show one embodiment of my invention, and the manner in which it is carried into effect, and my invention is fully disclosed in the following description and claims.

The invention consists in a plain knit, circular seamless anti-ravel edge, selvage or welt, of single thickness for a circular knit seamless fabric, having an elastic thread extending through the loops of the first circular course of the knitted fabric, and preferably under tension sufficient to draw the loops of said course into close proximity to materially reduce the diameter of said course, while permitting it to be stretched or expanded when desired to any necessary extent.

This application is a continuation in part of my former application for Letters Patent of the United States, filed December 10th, 1935, Serial No. 53,824.

The single thickness anti-ravel edge, selvage or welt finds its greatest usefulness at the upper edge of the top of a tubular seamless sock or anklet, or at the upper edge of the leg of a tubular seamless stocking, but it may also form part of any other tubular seamless knitted article. The tubular seamless fabric following the anti-ravel edge, selvage or single thickness welt may be formed by plain knitting or rib knitting, or both, and may have incorporated in certain or all the courses thereof an elastic thread, which in the case of plain knitting may be united to the fabric at spaced wales, in the courses containing it, and floated on the inner face of the fabric, and providing horizontal substantially continuous beads which will slightly indent the flesh of the wearer and provide a self-supporting function. One type of such fabric is shown and described and claimed in my aforesaid application Serial No. 53,824. It is to be understood however, that my present invention is not limited to use with the fabric therein described, nor to an elastic thread incorporated fabric, as it may be employed as the selvage or anti-ravel edge of tubular knitted fabrics, either plain knit or rib knit, which do not contain elastic threads.

In the accompanying drawings,

Fig. 1 is a development of part of the knitting wave and knitting cams of a circular knitting machine for carrying my invention into effect, showing how the two yarns are fed to the needles.

Fig. 2 is a diagrammatic plan view corresponding to Fig. 1, showing the needle circle and the manner in which the elastic yarn is fed to the needles and turned out of action, the arrow X indicating the knock-over or shedding point.

Fig. 3 is a diagrammatic view illustrating the appearance of the upper portion of a man's sock embodying my invention at the back thereof.

Fig. 4 is a diagrammatic view of the interlooping of the yarn in the novel anti-ravel selvage, and showing adjacent plain knit courses of a tubular fabric for the top of a sock or stocking containing an elastic thread in spaced courses.

Fig. 5 is an enlarged diagrammatic illustration of the interlooping in part of a course where the elastic yarn is presented, the fabric being expanded.

Fig. 6 is a diagrammatic view illustrating the preliminary feeding of the elastic thread and inelastic body thread in the formation of the selvage or anti-ravel edge.

Fig. 7 is a similar view illustrating the arrangement of threads shortly before the completion of the first course.

Fig. 8 is a similar view showing the arrangement of the threads at the completion of the first course of knitting.

Fig. 9 is a similar view showing the arrangement of threads at the part of the second course after the feeding of the elastic thread has been discontinued.

Fig. 10 is a diagrammatic view of the interlooping of the yarns in the selvage or anti-ravel edge, and a plurality of adjacent courses, and illustrating the manner in which the elastic thread is held under tension in the selvage course.

Any circular knitting machine having cylinder needles with selectivity as between successive needles, can be adapted to make this selvage or anti-ravel edge. Thus, the well-known Scott & Williams type of revolving cylinder needle machine, such as shown, for instance, in the United States Letters Patent to Robert W. Scott, No. 1,552,852, dated September 7, 1915, can be adapted to do this work by the addition of a mechanism for feeding and tensioning the rubber yarn and adjusting the knitting cams properly.

The preferred method of feeding the elastic yarn is by means of a finger 30, pivoted on a post 29, on the bed plate B, so as to move in a horizontal plane just above the sinker cap (not shown) into and out of operative relation with the cylinder needles 21 and 22. In this case, the delivery end of the rubber yarn finger 30, applies the rubber yarn 20, at a point on the needle circle which is just after the crest of the cam 366, raising the jacks 361, which lie under alternate needles 21, which are raised to such a height that

the elastic yarn is laid against their shanks, and below the latches of the needles 21, so that as those needles are drawn down, the elastic thread will close their latches and pass over the tops of the needles. If desired, this raising of the jacked needles 21 can take place prior to passage of the switch cam (not shown), that is to say between the customary widening pick and the stitch cam. Shortly after the elastic yarn is laid against the raised needles 21, below their latches, the jackless needles 22 rise on the side cam 352, and pass in front of the elastic yarn, thereby effecting the interlacing of the elastic yarn in front of the alternate jacked needles 21, and in rear of the intervening jackless needles 22, after which the jackless needles are raised by the leading stitch cam 361, to the same level as the jacked needles, so that all of the needles reach the draw down cam at the same level.

In forming the selvage or anti-ravel edge, the knitting may be started up from bare needles, the elastic or anti-ravel yarn which may be ordinary rubber thread, but is preferably the well-known Lastex, being fed by the thread finger 30, in advance of the throat plate 560, to the raised needles 21, below the latches thereof, after which the intervening jackless needles 22 are raised to interlace the elastic yarn as described above. The inelastic yarn or body thread indicated at 13, is preferably fed to the hooks of all of the needles by one of the feed fingers at the throat plate, which in this instance is shown as provided with five fingers F', F^2, F^3, F^4 and F^5, movable into and out of operative position in the usual manner. In Fig. 2, for example, the inelastic thread 13, is shown as being fed by the finger F^3. I prefer to so control the finger which feeds the inelastic thread and the finger 30, which feeds the elastic thread, that the feeding of the elastic thread commences before the feeding of the inelastic thread. Since the elastic thread is interlaced in the manner previously described, it will be firmly gripped by its interlacement with the needles so that the end will be carried around against a considerable tension to which the elastic thread is subjected as it is fed by the finger 30, and I prefer to carry the end of the elastic thread a certain distance beyond the point at which the inelastic thread 13 is introduced to the hooks of all the needles, so that there will be a terminal portion of the elastic thread indicated at 20*a*, (see Figs. 2 and 6, for example) extending beyond the inelastic thread in the first course of loops. Any desired tensioning means for the elastic thread may be employed. For example, I have illustrated in Fig. 2 a tension device 32, comprising opposed disks pressed together upon the elastic thread by a spring 33, the tension of which can be varied by a set nut 33*a*, in a well-known way.

As soon as the needles having the inelastic thread 13, in their hooks reach the knitting cam, they will be drawn down, the needles 21 and 22 respectively, drawing their loops on opposite sides of the elastic thread which is thus confined within the loops of the first course as indicated in Figs. 4 and 10, and forming a selvage or anti-ravel edge. As the needle cylinder revolves, it brings the leading unenclosed portion 20*a*, of the elastic thread to the feeding point of the auxiliary finger 38, which is still feeding elastic thread as indicated in Fig. 7, the first course of loops not yet having been completed. From this point onward, part of a second coil of elastic thread will be fed to interlace with the needles overlapping the portion 20*a*, as indicated at 20*b*, in Fig. 8, so that during the last portion of the first course of stitches the overlapped portions 20*a* and 20*b*, of the elastic thread will both be enclosed within the loops of the first course as indicated in Figs. 8 and 10. It being understood that the elastic thread is at all times fed under very considerable tension, it will be seen that the enclosing of the overlapped portions 20*a* and 20*b*, of the elastic thread within the portion of the loops of the first course, will hold them tightly in frictional engagement with each other, and with the said loops, so as to prevent the releasing of the tension of the elastic thread 20, in the selvage or anti-ravel edge when released from interlaced engagement with the needles by formation of the next course of stiches. The feeding of the elastic thread may be discontinued by throwing the thread guide 30 out of operative position, with respect to the raised needles, or the elastic yarn finger 30 may be kept in its operative position, and in courses where the elastic thread is not desired, no needles are raised until a point subsequent to a feed position of the elastic yarn finger is reached, as by withdrawing cam 366. In this connection, it should be noted that the normal level of the tops of the needles at a point opposite the elastic yarn finger is below such finger, so that unless a needle is specially raised by a jack, it will pass the rubber yarn finger without taking the yarn.

By whatever means the feeding of the elastic yarn is discontinued, I prefer to so time the discontinuance of its feed that a short length of the elastic yarn indicated at 20*c* will be fed to, and interlaced with the needles after the first course of loops or stitches has been entirely completed, so that this supplemental portion 20*c* will be laid into the loops of the second course for a few stitches thereof, in the manner indicated in Figs. 8, 9 and 10. Thus, as illustrated particularly in Figs. 5 and 10, in the alternate wales 15, knit on the needles 21, where the elastic yarn 20 is laid in front of the shanks and is subsequently shed or knocked-over the tops of the needles, the elastic yarn is floated as indicated at 20*d*, which floats lie on the inner face of the fabric, and cover the alternate wales 15, of non-elastic yarn. In those wales 14, where the elastic yarn is laid behind the needles 22, the entire structure is outside the elastic yarn except for the sinker wales 17, each of which passes around in back of the elastic yarn, thus laying the elastic yarn in every sinker wale, and uniting it therein to the fabric, as best seen in Figs. 5 and 10.

It will therefore be seen that my improved selvage or anti-ravel edge comprises in the first instance a marginal series of loops indicated at 13*a*, in Figs. 4 and 10, for example, through which the elastic thread 20 extends under very considerable tension, the forward end portion 20*a* of the elastic thread being overlapped with the portion 20*b*, within a plurality of loops of the first course, thus frictionally holding the overlapped portions against endwise slipping, and maintaining the original tension at which the elastic thread is fed, and preferably to further anchor the elastic thread in the fabric against slipping, a portion thereof is carried into a plurality of stitches of the second course, being in this instance locked or united to the fabric at alternate wales in the manner just described. In this manner a sufficient amount of tension may be set up in the

elastic thread 20, in the selvage or anti-ravel course, so as to materially reduce the diameter of the selvage and adjacent fabric after it has been disengaged from the needles, and I prefer to apply sufficient tension to the elastic thread so as to force alternate wales adjacent to said edge to one face of the fabric, and the intervening wales to the opposite face of the fabric, thereby producing an effect closely resembling 1 x 1 rib. The tension of the coil of elastic thread will draw the loops of the anti-ravel course into close proximity with each other, when the fabric is in undistended position, and the loops will engage the elastic thread with greater friction than they would an inelastic thread so as to tend to prevent the slippage of the elastic thread through said loops and consequent loss of tension. Where the end portions of the coil overlap each other as described, they will also have a strong frictional engagement with each other and with the closely associated surrounding loops which keep them in close frictional engagement, so that the maintenance of the tension imparted to the elastic thread during the formation of the anti-ravel edge is further insured, and by carrying the elastic thread into stitches of the succeeding course, the locking of the elastic thread against loss of tension is further secured.

Obviously, after the completion of the selvage or anti-ravel edge, which, according to my preferred process of knitting, is completed during the first revolution of the machine after the introduction of the inelastic thread, subsequent courses of stitches can be knit with the body thread 18, as plain knitting, or the subsequent courses may be of rib knitting, if the knitting machine is of such character as to be able to produce both plain and rib knit fabric. For some types of socks, I find it desirable to knit the subsequent courses which ordinarily form the top of a sock or anklet, of plain knitting, and to introduce the rubber thread 20, into spaced courses, as every fourth course for example, under the same high degree of tension as is applied to it during the knitting of the selvage or anti-ravel course, and in the manner indicated in Fig. 5, and previously described, the elastic thread being united to the fabric in alternate wales, and floated on the inner face of the fabric at intervening wales, the tension of the elastic thread being sufficiently great to draw alternate wales not only of the courses containing the elastic thread, but also of the intervening courses to one face of the fabric, while the intervening wales of all courses will be drawn to the opposite face of the fabric, thus producing smooth faced fabric very closely resembling 1 x 1 rib, the alternate wales of which correspond with the aligned wales of the selvage or anti-ravel course.

Such a fabric as above indicated, is shown in Fig. 10 in which the elastic thread, after being withdrawn from the second course as previously described, is floated vertically downward during the knitting of a plurality of successive courses of the body thread or inelastic thread, and is again introduced in this instance, in the fifth course, as shown in Fig. 10. In this case, it will be seen that a vertical float 27 is formed extending downwardly from the point in the second course where the elastic thread is withdrawn, and making a sharp angle therewith, which further tends to prevent the adjacent portions of the elastic thread in the second course, and in the anti-ravel course, from slipping endwise, and thus assists in maintaining the tension of the elastic thread in the selvage or anti-ravel course. It will be understood, however, that where it is desired, the elastic thread 20, after it has been carried throughout the selvage course and preferably a few stitches of the next adjacent course, and has been withdrawn from the needles, it may be carried into a clamp 35, which may be also provided with a cutter for severing the thread, if desired, or it may simply be held in the clamp and permitted to break by the further rotation of the needle cylinder, if preferred. In such case, the elastic thread need not be reintroduced until it is desired to form another selvage or anti-ravel edge of another sock, anklet or stocking. Where, however, the elastic thread is introduced into spaced courses throughout the formation of the top of a sock, anklet or stocking, or part thereof, it may be continued from course to course by the formation of vertical floats such as is indicated at 27, from course to course containing it, and severed and clamped after the completion of the tubular fabric, in which it is incorporated.

My improved selvage or anti-ravel edge can also be formed by feeding the anti-ravel yarn 20, from a finger in the throat plate separated a distance from the finger which feeds the inelastic thread 18. Thus, the finger F' at the right side of the throat can be used for feeding the anti-ravel yarn 20, while the finger F^5 at the left side of the throat can be used for the inelastic or body yarn instead of the finger F^3, as shown. In this modification of the method of producing the selvage, the needles behind which the anti-ravel yarn 20 is to lie, are drawn down early, so that they miss the yarn 20, and the anti-ravel yarn is laid in the hooks of every other needle instead of below the latches thereof, and the anti-ravel yarn 20 will not be thrown clear of those needles until the second revolution of the needle cylinder. However, during the second revolution, before the needles reach the knocking-over point, the anti-ravel yarn will lie on the shank of the needles to which it was fed in the hooks, and below the latches thereof. At this point the inelastic yarn is fed to the hooks of all the needles so that the resultant selvage or edge is formed and is substantially the same as that previously described. It will be understood that the timed action of the yarn fingers in either case can be obtained from either the main pattern drum or an auxiliary drum in any usual or preferred manner.

I do not herein claim the process for the formation of the selvage or anti-ravel edge, as the same forms the subject matter of my former Patent No. 2,054,217, granted September 15, 1936, upon an application Serial No. 59,125, filed January 14, 1936, which in a division of my former application Serial No. 53,824.

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

1. A selvage or anti-ravel edge for the top of a seamless circular plain knit article of hosiery which consists of a seamless circular knit body yarn course and an elastic yarn extending through all of the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in the undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic thread under tension extending through subsequent courses

of the fabric and being united to the fabric at spaced points in said courses and floated between said points on the inner face of the fabric.

2. A selvage or anti-ravel edge for the top of a seamless circular knit article of hosiery which consists of a seamless circular plain knit body yarn course and an elastic yarn extending through all of the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in the undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastitc thread under tension extending into the next adjacent course of the fabric and certain courses subsequent thereto, without being knit therein, and being united to the fabric at alternate wales and floated on the inner face of the fabric between said alternate wales, the elastic thread being under sufficient tension in said subsequent courses to draw said alternate wales together and submerge the intervening wales in the undistended condition of the fabric.

3. A selvage or anti-ravel edge for the top of a plain knit article of hosiery which consists of a knit body yarn course and an elastic yarn extending through all of the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the length of the edge in the undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic thread under tension extending through subsequent courses of the fabric and being united to the fabric at spaced points in said courses and floated between said points on the inner face of the fabric.

4. A single thickness selvage or anti-ravel edge for the top of a seamless circular article of hosiery, which comprises a body yarn course of seamless circular plain knit fabric and an elastic yarn extending through the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic of the selvage extending continuously in the same direction more than one complete round to further secure said elastic against loss of tension.

5. A single thickness selvage or anti-ravel edge for the top of a seamless circular article of hosiery, which comprises a body yarn course of seamless circular plain knit fabric and an elastic yarn extending through the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic yarn having a portion incorporated in a plurality of stitches in a subsequent course of stitches of said fabric to further secure the elastic yarn against loss of tension.

6. A single thickness selvage or anti-ravel edge for the top of a seamless circular article of hosiery, which comprises a body yarn course of seamless circular plain knit fabric and an elastic yarn extending through the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic yarn being carried into the next adjacent course of the fabric for a plurality of stitches thereof to further secure said elastic against loss of tension.

7. A single thickness selvage or anti-ravel edge for the top of a seamless circular article of hosiery, which comprises a body yarn course of seamless circular plain knit fabric and an elastic yarn extending through the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic yarn extending under tension into the next adjacent course and a plurality of spaced courses subsequent thereto and being united to the fabric at spaced points in said spaced courses.

8. A single thickness selvage or anti-ravel edge for the top of a seamless circular article of hosiery, which comprises a body yarn course of seamless circular plain knit fabric and an elastic yarn extending through the loops of said body yarn course, and being under sufficient tension to draw the said loops into close relation with each other around said elastic yarn, and materially reduce the diameter of the edge in undistended condition, the frictional engagement of said closely associated loops with said elastic thread holding the latter against loss of tension when the edge is distended, said elastic yarn extending more than one complete round and having an adjacent portion floated downward on the inside of the fabric to a subsequent course of stitches of the fabric to further insure the elastic yarn of said selvage against loss of tension.

JAMES LOUIS GETAZ.