Aug. 18, 1936. H. N. GOODMAN ET AL 2,051,167

FULL FASHIONED HOSIERY AND THE METHOD OF PRODUCTION THEREOF

Filed March 16, 1933 2 Sheets-Sheet 1

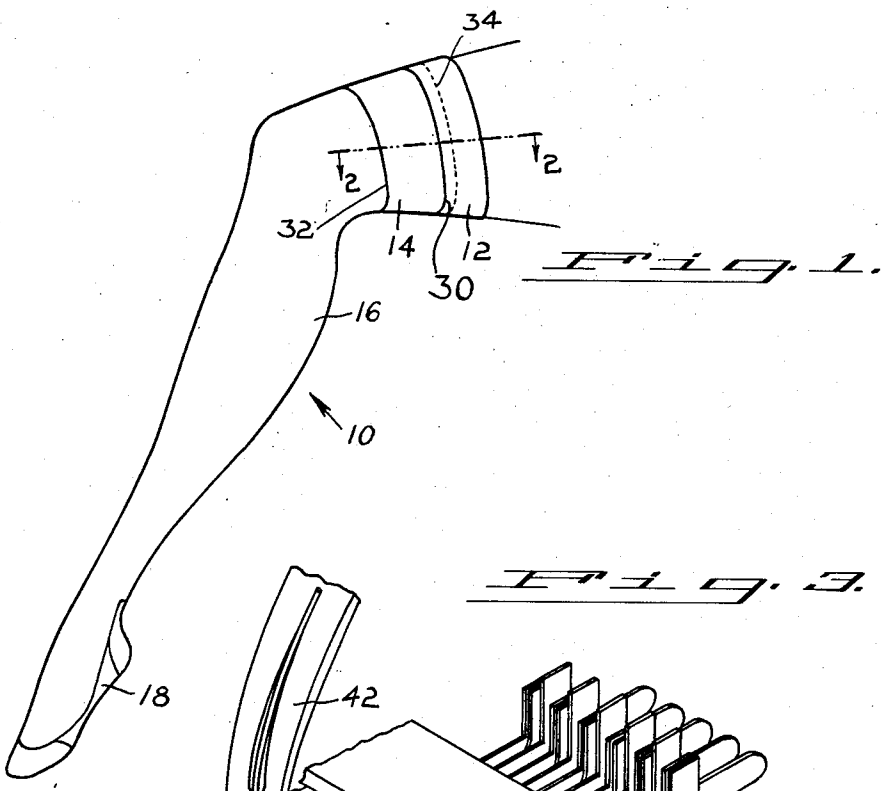


Fig. 1.

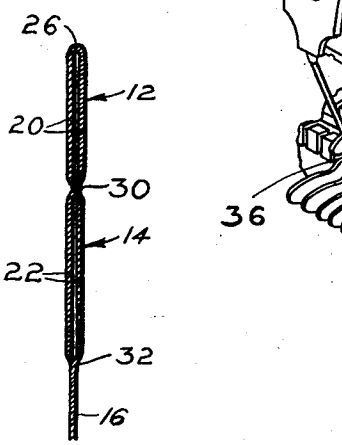
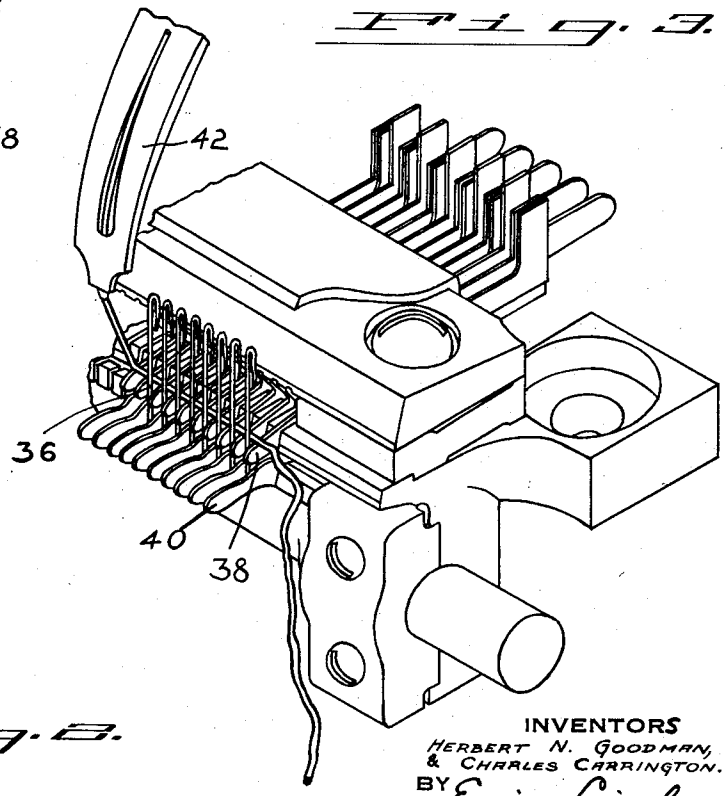


Fig. 2.

Fig. 3.



INVENTORS
HERBERT N. GOODMAN,
& CHARLES CARRINGTON.
BY Edwin Leisoher
ATTORNEY

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Fig. 4.

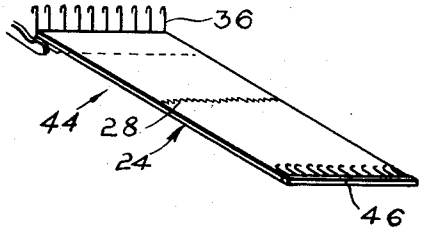


Fig. 5.

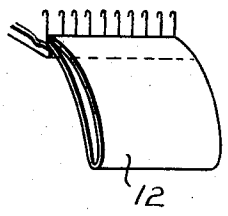


Fig. 6.

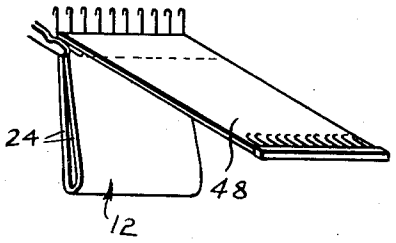


Fig. 7.

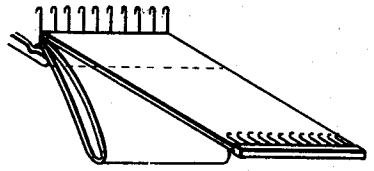


Fig. 8.

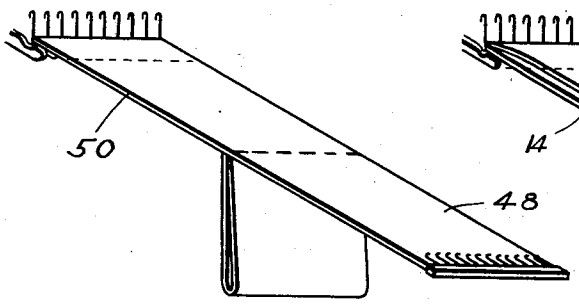
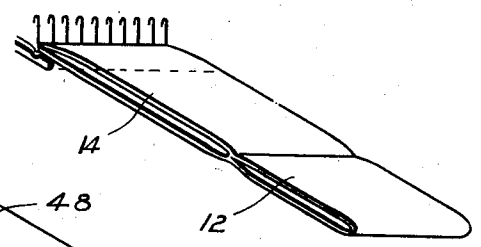


Fig. 9.



INVENTORS
HERBERT N. GOODMAN,
& CHARLES CARRINGTON.
BY Edwin Leisohn
ATTORNEY

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FULL-FASHIONED HOSIERY AND THE METHOD OF PRODUCTION THEREOF

Herbert N. Goodman, East Rockaway, N. Y., and Charles Carrington, York, Pa., assignors to Triumph Hosiery Mills, Inc., New York, N. Y.

Application March 16, 1933, Serial No. 661,046

7 Claims. (Cl. 66—173)

This invention relates to full-fashioned hosiery and to the method of production thereof.

As is well-known in the manufacture of hosiery, such as the usual full-fashioned stockings, and especially in their manufacture by the flat-bed knitting machine, the thread is first associated with a definite total number of needles, to define a single course, the needles being set to form a predetermined number of loops per unit width. Then, as successive courses are knitted, the total number of loops comprised in each course may be gradually reduced, according to a process commonly known as "fashioning", in order to reduce the effective total width of the knitted fabric in accordance with decreasing girth of the limb, the first portion of the knitted fabric being for the top, open end of the hose. The final article will thus be made to conform more closely to the contouring of the leg.

Thus to fashion the entire stocking, from the portion intended to cover the thighs down continuously along the fabric for the rest of the leg, is entirely possible, but is not practicable for a number of reasons. That sharp tapering is present at the thighs requires consideration. Therefore, the top end of the stocking, intended to cover the thigh, must be elastic and capable of stretching or otherwise producing the tapering casing for that portion of the leg, while the other portions, covering calf and knee, need not have such marked inherent properties.

To secure this tapering casing by fashioning the end portions of the stocking is made impracticable by the seemingly unrelated fact that those upper end portions must be sufficiently strong to withstand the tensions and tearing stresses of the garter clasp, which customarily is therewith engaged. Such engagement subjects the threads at that portion to sharp twisting, and may even cause severance. To strengthen the top end, it is knitted from a yarn of a larger size, heavier gauge or weight than, for the sake of appearance and style, may be used in knitting the calf-covering portions below the top end, which are disclosed to view. Hose of the type indicated, further to reinforce the top end, is made of double thickness, defining a tubular member generally known as the welt. Beyond this welt the stocking continues as a single thickness, knitted of a fine yarn and fashioned. In the welt, no fashioning takes place.

If this section, loosely knitted because of the yarn of heavy weight, be fashioned, then when the change is made to the finer yarn for knitting the body portion, it would become necessary to increase the number of wales as, since the finer yarn would be more tautly knitted, the section using it would have less elasticity and, especially where the two sections intersected, this change would produce a sharp construction. Fashioning to increase the number of wales is at least undesirable from the standpoint of manufacturing cost.

It is an object of the invention to provide full-fashioned hose knitted to introduce the desired and necessary variations in effective girth by variations in the elasticity of respective, successive sections at the top end of the stocking. To obtain this relationship, a plurality of successive welt-defining sections are introduced, the first or topmost section being produced by knitting with heavy yarn, while the reduction in the effective girth of the stocking, progressively down the limb, is accomplished by knitting the other portions of finer yarn. Certain of the effects of this invention are attained by knitting the first portion or portions under a lesser tension than the subsequent portions, the yarn being varied in the same manner as indicated, or the same yarn being used throughout. In this manner, the upper welt section will be more elastic and capable of assuming a greater girth than the lower, as required for conformance to the contouring to the shape of the leg. Successive welt sections may have successively finer yarn, and the knitting may be progressively under greater tension.

Hose now manufactured for general distribution commercially is of an average length, too long for some, and too short for other users. Those taking a stocking which is too long can remedy the situation only by folding it, producing a bulky, undesirable arrangement. To this bulk, the garter is then attached. Adjustability of this character is disagreeable, and, therefore, it is an object of the invention to provide a structure for full-fashioned hosiery having a plurality of distinct, double-walled welt sections for that stocking, so constructed that the same original commercial product may be useful for accurately fitting any of a number of different leg lengths, providing means which makes possible an adjustment to a particular leg length merely by severing the stocking at that welt which best defines the desired length. Then, the raw threads are ravelled down to the next welt boundary, at which the ravelling automatically will cease, leaving a sharply defined, finished edge for the top of the stocking.

A stocking knitted in accordance with the invention includes welts and body portion pro-

duced on the flat-bed knitting machine, the knitting operation commencing substantially in the customary manner. After the welt bar has drawn off a predetermined number of courses, the loops on the bar are transferred from the bar to the needles. Then knitting of the fabric is resumed, but not until the loops engaged on the needles and the fabric retained by those loops at that position have been forced below the knock-over bits. After a further length of fabric, equal in length to the desired second welt, has been knitted and drawn off by the welt bar, the fabric and the loops retained beneath the knock-over bits are brought up along the needles and above the bits, where the loops so engaged on the needles may be interlocked into the next successive course. The knitting operation then is resumed, and another length of fabric, equal to the length of fabric just completed, is knitted. The loops are again transferred from the welt bar to the needles.

This intermediate welt forming operation may be repeated as many times as desired in accordance with the number of intermediate welts required. After the whole number of welts has been completely knitted, the normal and continuous knitting of the single thickness fabric for the calf and other portions of the leg may take place.

The resultant stocking has a plurality of welts, each of which is tubular in character, and each of which consists, therefore, of a plurality of layers of material. In the knitting of these welts, the first welt is knitted from heavy yarn, and the successive welts each from successively finer yarn, or all the successive welts from a yarn finer than that of the first welt. By the method of interlocking the fabric edges at the interconnection of the successive welts and of the final welt with the body portion the fabric has the property that runners, commenced in any one of the welts, will be confined entirely to that welt, and will be unable to extend down along the stocking, being stopped by the interlocked loops defining the transfer interlock where new welt sections or the body portion, were begun.

Other objects of this invention will hereinafter be set forth, or will be apparent from the description and the drawings, in which is illustrated a stocking embodying the invention, and certain features of a method of producing such hosiery, and apparatus therefor, in accordance with the invention.

The invention, however, is not intended to be restricted to any particular construction or arrangement of parts, or to any particular application of such construction, or to any specific method of operation, or to any specific manner of use, or to any of various details thereof herein shown and described, as the same may be modified in various particulars or be applied in many varied relations without departing from the spirit and scope of the claimed invention, the practical embodiments herein illustrated and described merely showing various forms and means by which the invention might be demonstrated.

On the drawings, in which the same reference characters refer to the same parts throughout, and in which there are disclosed elements entering into the invention:

Fig. 1 is a perspective view of a stocking, embodying certain features of the invention, shown as applied to use on a leg;

Fig. 2 is a sectional view, on the line 2—2 of Fig. 1, and transversely through the fabric at the upper end of the stocking body;

Fig. 3 is a perspective view of a portion of a flatbed knitting machine, illustrating certain details of the elements of that machine which enter into the knitting process for producing an article such as shown in Figs. 1 and 2; and

Figs. 4, 5, 6, 7, 8 and 9 are diagrammatic, perspective views, illustrating successive steps entering into the manufacture of a fabric in accordance with the invention.

In stocking 10, shown on the drawings, which is of the type generally known as a full-fashioned stocking, welt sections 12 and 14 have been associated with a body portion 16 and a foot section 18 for its determination. The stocking, as clearly appears, has more than one welt section. As appears in Fig. 2, welt sections 12 and 14 include a pair of layers 20 and 22, respectively, of knitted material. Layers 20 are formed by folding a section 24 of knitted material, defining an upper edge for the stocking, indicated by the numeral 26. Figs. 26 may be picot in character, if desired, as the result of the introduction of a set of picot stitches or loops 28, which, on folding the fabric, are accurately located to give character to edge 26. Layers 20, at their lower ends, are united with layers 22, course 30, at that point, being entirely locked together between the two sets of layers and so firmly binding the layers together that each set of layers, in itself, defines a tubular construction. Layers 22 at their lower ends, unite, at a course 32 into a section of fabric of single layer thickness for body portion 16.

Layers 20 are preferably formed from yarn of heavier quality than the yarn used for knitting welt section 14 and body portion 16. In fact, section 14 likewise may be knitted of a yarn heavier than that used for body portion 16 but lighter than that used for section 12. In this manner, section 12 is made more greatly expansible than is section 14 and, in like manner, section 14 may be more expansible than body portion 16. There may be other welt sections successively following section 14, and each of successively finer, more tightly knitted yarn. Also, the width of each welt section may be determined by the effective girth of the limb at the position for which that section is intended.

Also, to compensate for the use of the heavier and lighter yarns, different densities or tension may be applied to the yarn during knitting of each distinct yarn, in order to assure the desired condition of elasticity for each different weight of yarn. The ultimate result will be that section 12 will be more elastic than the rest of the stocking, permitting it more readily to conform to the contouring of the portions of the thighs which are greater in girth than the portions to be covered by sections 14, the succeeding welt sections, if any, and portion 16.

The lengths of the different sections are to be determined in accordance with the market conditions and the demand for stockings of different sizes. In this relation, it is to be noted that it is merely necessary to cut across any welt section such as section 12, as, for instance, on the line 34, to sever the stocking at that line. All the threads remaining of that section down to course 30, may quickly be unravelled, leaving the top of welt section 14 as the top edge of the stocking. This edge will be found to be of exactly the same character as edge 26.

In knitting the fabric for producing stocking 10, preferably a full-fashioned or flat-bed knitting machine is used, a portion of which is shown in Fig. 3. That portion discloses the general

association of needles 36, sinkers and dividers 38 and knock-over bits 40, as well as the thread carrier 42. As shown in Figs. 4 to 9, inclusive, these elements cooperate in the production of a knitted fabric 44, which is drawn off from the needles by welt-bar 46.

In the procedure of knitting fabric for stockings of the character herein set forth, there will first be formed a length of fabric 24, as shown in Fig. 4, produced in the customary manner. Then the loops are transferred from welt-bar 46 onto needles 36, defining the double thickness welt section 12, as appears in Fig. 5. Then, and instead of the customary procedure of drawing off further fabric by applying tension to the double-thickness welt section 12, the needle bar is thrown out, and the welt section is pressed down beneath the knock-over bits, and the loops engaged on needles 36 are also moved down along the needles beneath the bits, as shown in Fig. 6, so that these elements no longer enter directly into the knitting of the fabric at that time.

The welt-bar, however, is again positioned in association with the needles as in the commencement of an ordinary knitting operation, and the knitting of another fabric section 48 begun, as appears in Fig. 6. During the entire knitting of section 48, fabric 24 and the end loops thereof remain engaged beneath the knock-over bits and are unaffected. When section 48 has been knitted to a predetermined length, which is to be the length of welt section 14, then the machine is stopped, welt section 12 moved above the knock-over bits, and, as shown in Fig. 7, the engaged loops brought up along the needles to a position where they will interlock in sections 48 and the newly formed section 50, on the next successive course-forming action of the machine.

Now, commencing from the structure shown in Fig. 6, and after the interlocking just described, section 50 is knitted, section 12 drawing away from the needles together with section 48. Section 50, as shown in Fig. 8, is knitted to a length exactly equal to that of section 48. When this condition is reached, the welt-bar is again returned to the needles, and the loops on the welt-bar engaged with the needles, defining welt section 14. Now the knitting of body portion 16 may be commenced, if desired, or the formation of other sections 14 produced in exactly the same manner, that is, sections 12 and 14 are tucked away beneath the knock-over bits together with the loops last formed and the loops last removed from the welt bar, while additional sections 48 and 50 are knitted in exactly the same manner.

During the knitting of section 24, a heavier yarn is introduced while, for the next successive sections 48 and 50, lighter yarn is used. Also the tension on the yarn may be varied as, for instance, during the knitting of the heavier yarn, less tension will be applied, while, with the lighter yarn, for sections 14 and portion 16, a higher degree of tension would be applied to the thread. After the fabric has been fully knitted and fashioned, it is transferred to the footer. The finished fabric then may be sewed up, in the usual manner, to define the stocking body.

Owing to the manner in which courses 30 and 32 are formed by interlocking the loops retained upon the needles so that in fact, four edges of fabric unite at a single point, runs commencing in any one of those layers will be stopped by an interlocked loop in one of the other layers, preventing runners from building up down the stocking.

Many other changes may be effected in the particular article of manufacture, and in methods of operation set forth, and in specific details thereof, without substantial departure from the invention intended to be defined in the claims, the specific description merely illustrating certain specific phases of the invention and elements entering into the operative embodiments in accordance with those phases.

What is claimed as new and useful is:—

1. A knitted full-fashioned stocking construction comprising a knitted body portion of substantially uniform texture, and a welt section for the stocking, the welt section being of a plurality of thicknesses of fabric, the thicknesses being interknitted at least once intermediately of their extent forming contiguous welt sections, the interknitted portions being constructed to prevent runs from extending from above the portions down below the portions, the section above the interknitted portions being of a yarn of a heavier texture than in the section below the interknitted portions.

2. A knitted full-fashioned stocking construction comprising a knitted body portion of substantially uniform texture, and a welt section for the stocking, the welt section being of a plurality of thicknesses of fabric, the thicknesses being interknitted at least once intermediately of their extent forming contiguous welt sections, the section above the interknitted portions being of a yarn of a heavier texture than in the section below the interknitted portions.

3. A knitted full-fashioned stocking construction comprising a continuous knitted fabric, the fabric being folded and interknitted to form a plurality of contiguous multiple thickness welt sections, the topmost welt section being knitted from yarn of a heavier texture than that used in the rest of the fabric.

4. The process of manufacturing full-fashioned stockings, which includes the steps of: knitting a length of fabric on a flat-bed knitting machine, bringing the loops at the free edges of the knitted length upon the needles upon which the last course of loops being formed are retained, positioning the loops engaged on the needles below the knock-over bits, knitting another fabric length with yarn of lighter weight than the yarn of the first fabric length while the two other sets of loops remain engaged upon the needles, moving the engaged loops above the knock-over bits, then knitting the fabric length with the two other sets of loops located intermediately of the length, engaging the loops at the free end of the length upon the needles with the loops thereon retained, and knitting the fabric continuously thereafter.

5. A knitted full-fashioned stocking construction comprising a knitted body portion of substantially uniform texture, and a welt section for the stocking, the welt section being of a plurality of thicknesses of fabric, the thicknesses being interknitted at least once intermediately of their extent forming contiguous welt sections, the interknitted portions being constructed to prevent runs from extending from above the portions down below the portions, the section above the interknitted portions being of a yarn under a lesser tension than that of the yarn in the section below the interknitted portions.

6. A knitted full-fashioned stocking construction comprising a knitted body portion of substantially uniform texture, and a circumferentially continuous welt section for the stocking,

the welt section being of a plurality of thicknesses of fabric, the thicknesses being interknitted at least once intermediately of their extent, forming contiguous welt sections each of substantial length, the interknitted portions being constructed to prevent runs from extending from above the portions down below the portions, the section above the interknitted portions being of a yarn of a heavier texture than in the section below the interknitted portions, and the latter section being of a yarn of heavier texture than in the body portion.

7. A knitted full-fashioned stocking construction comprising a knitted body portion of substantially uniform texture, and a welt section for the stocking, the circumferentially continuous welt section being of a plurality of thicknesses of fabric, the thicknesses being interknitted at least once intermediately of their extent forming contiguous welt sections each of substantial length, the interknitted portions being constructed to prevent runs from extending from above the portions down below the portions, the section above said interknitted portions being knitted of yarn of greater effective elasticity than in the section below the interknitted portion and the latter section being knitted of a yarn of greater effective elasticity than in the body portion.

HERBERT N. GOODMAN.
CHARLES CARRINGTON.