April 22, 1941. J. W. CRAWFORD 2,239,593

HOSIERY

Filed May 9, 1938

Fig. 1.

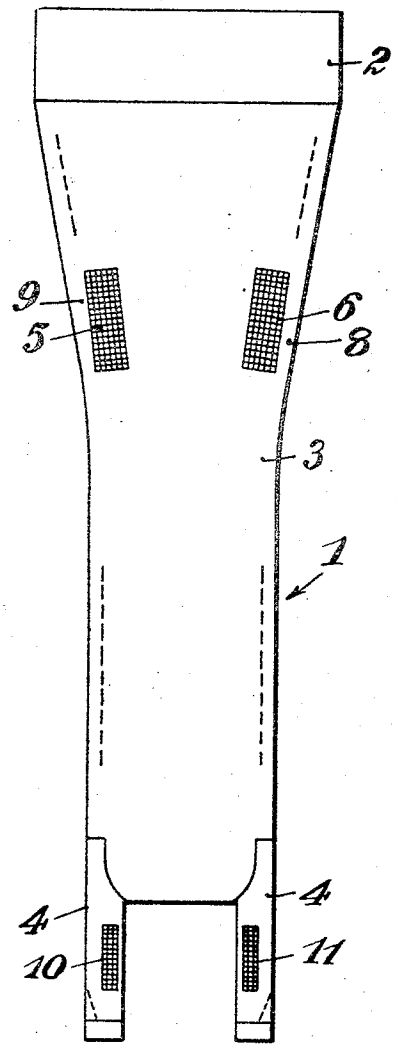


Fig. 4.

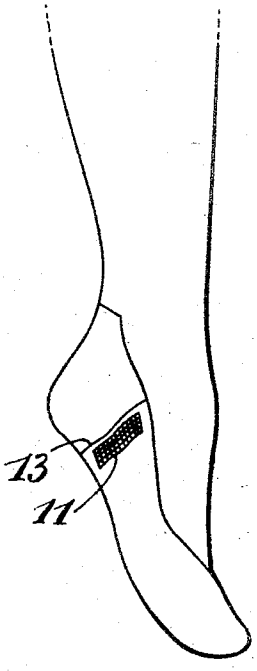


Fig. 2.

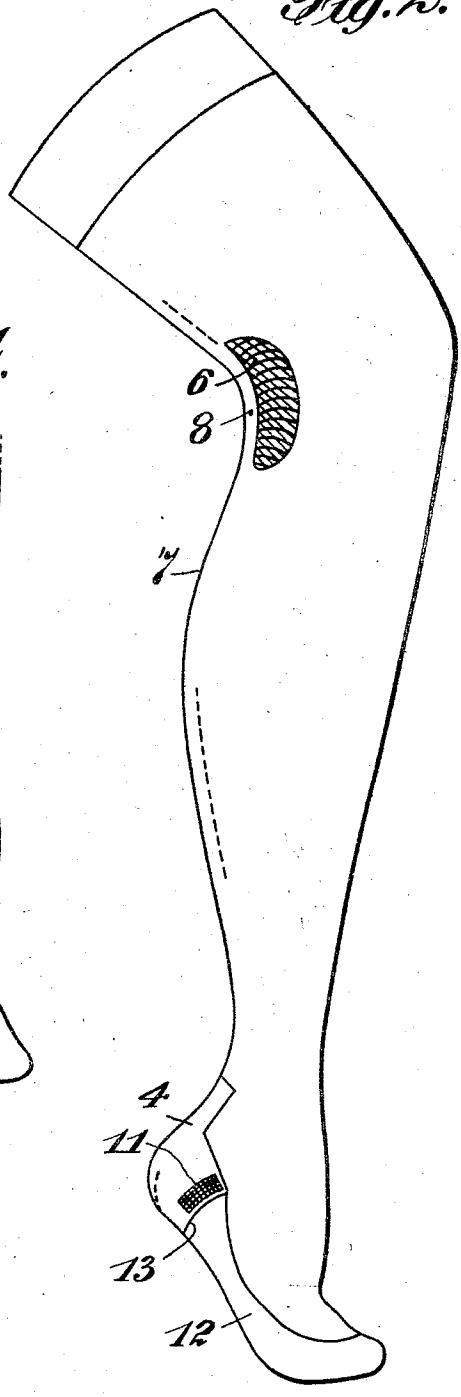
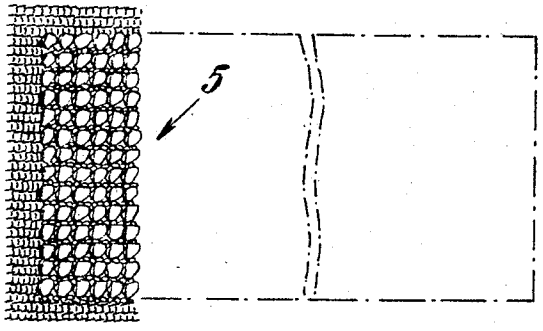


Fig. 3.



INVENTOR

Joseph Wesley Crawford

BY

E. C. Sanborn

his ATTORNEY

Patented Apr. 22, 1941

2,239,593

UNITED STATES PATENT OFFICE

2,239,593

HOSIERY

Joseph Wesley Crawford, Boonton, N. J., assignor to Van Raalte Company, Inc., New York, N. Y., a corporation of New York

Application May 9, 1938, Serial No. 206,732

2 Claims. (Cl. 66—178)

This invention relates to hosiery. An object of the invention is to provide a full-fashioned stocking having greater stretch or give in sections such as the knee region, where the stocking is subjected to the greatest stresses in use. Another object is to provide such a stocking without sacrifice of desired recoverability of the fabric.

According to prevailing practice, full fashioned stockings are knit with varying numbers of courses, each course composed of a number of loops and each loop having a definite limit of stretch. Stockings knitted with large loops comprise a loosely knitted fabric which does not have the desirable body and shape retaining capacity and which therefore does not cling as closely to the limb as is customarily required. Hence quality hosiery is generally knitted with a greater number of courses and smaller loops, resulting in a fabric having the requisite body and a greater degree of recoverability but with lesser limits of stretch. Hosiery of the latter type is susceptible to rupturing of the threads in regions such as the knee under the stresses frequently encountered in such regions, when, for example, the knee is repeatedly flexed. This susceptibility is moreover increased when the stocking is applied to limbs of increasing thickness, so that the stocking cannot accommodate limbs of varying thickness without the likelihood of being subjected to severe stresses in sections such as the knee portion. As a result the useful life of the hose is shortened. Furthermore, hosiery that does not accommodate a limb properly due to deficient flexibility or recoverability is a constant source of discomfort to the wearer.

Excessive fabric stresses are also found to occur in the region of the instep as an incident to expansion of that portion of the foot as in walking, with consequent rupturing of the fabric in that region.

My invention relieves the strain from portions of the fabric embracing the knee, as well as the instep, by providing the necessary flexibility, while at the same time preserving adequate recoverability in these portions. It lessens materially the stresses upon the fabric in those regions, and enables the stocking to accommodate readily knees and insteps of varying sizes without rupture of the threads in the various positions of the knee and instep in the course of the wearer's activities. And these results it attains without impairment of prompt and effective recoverability of the fabric in response to removal of the strain, thus avoiding bagginess and maintaining the appropriate contour in conformity with the wearer's limb and foot.

It may be additionally noted that knee and instep sizes vary substantially, and that one woman may have, for example, a large instep and a small leg size, while another woman may have a large leg size and a small instep. My invention possesses the further distinct advantage of ability to fit smoothly and comfortably a wide range of differing leg and instep sizes.

Other features of the invention will be hereinafter described and claimed.

In the accompanying drawing:

Fig. 1 is a view of a blank from which is formed a stocking leg embodying my invention.

Fig. 2 is a general view of the completed stocking, showing the same in use.

Fig. 3 is a detail view on an enlarged scale illustrating a suitable fabric construction in one of the open-mesh areas.

Fig. 4 is a view of a modification.

Referring to Fig. 1 of the drawing, the numeral 1 designates a blank for the leg of a full-fashioned stocking, comprising the welt portion 2, tapering portion 3, and reinforced heel portions 4, 4. Said blank may be produced on a conventional straight bar knitting machine.

In carrying out my invention I provide open mesh areas 5, 6, in the portion of the blank which lies in the region of the knee when the stocking is applied to the wearer. As shown, these open mesh areas are preferably so located that they lie at the inner side of the knee when the stocking is worn. Said areas may be conveniently formed by so arranging the transfer points of the knitting machine as to pass the thread to alternate needles, skipping each intermediate needle, and providing alternate needles with two stitches or points. Such arrangements of transfer points are employed in conventional net stitches, as, for example, in clockwork designs in hosiery. In producing the particular open mesh areas shown in the drawing, the skipping of needles is effected only in every third course of the fabric, though the skipping of said needles may, if desired, take place in each alternate course or in any other desired number of courses.

The aforesaid open-mesh areas 5, 6, are more easily extensible or stretchable than is the adjacent plain knitted fabric of the stocking, which plain knitted fabric may be produced with the number and sizes of loops and courses ordinarily employed in the production of full fashioned

stocking fabrics. The spacing and size of the meshes of said areas 5, 6 may be controlled by suitably arranging the transfer points. The spacing of the meshes and the size of the areas 5, 6, are factors in the degree of elasticity obtained, and these may be varied as desired. Said areas are more readily stretchable both longitudinally and laterally than the adjacent fabric. In bending the knee, the strain on the fabric is relieved by the lateral (i. e. cross-wise as distinguished from vertical or wale-wise) stretching of said areas. It may be observed in this connection that while in a knitted fabric, stretch in a lateral direction is accompanied by a tendency to contract the fabric longitudinally, and longitudinal stretch is accompanied by a tendency to contract the fabric laterally, longitudinal stretching of the aforesaid areas is limited by the longitudinal stretch of the adjacent fabric at the sides of said areas, and that such areas are not stretched to their maximum extent longitudinally. Thus even where said areas stretch longitudinally, such stretch is limited and cross-wise or lateral stretch thereof is insured despite such longitudinal stretch. When the areas 5, 6 are positioned at the inside of the knee portion of the stocking, as illustrated, the adjacent plain fabric is not stretched during bending of the knee but is instead contracted, wherefore substantial additional cross-wise stretch is available. The areas 5, 6 thus, in short, constitute stretch reservoirs from which the plain fabric can draw in response to strains incident to bending the knee. Not only do these areas supply additional cross-wise stretch accommodating lateral expansion of the knee muscles when the knee is bent, but also such cross-wise stretch supply enables additional longitudinal stretch of the plain fabric to take place in the regions where it is subjected to longitudinal strains by bending of the knee. This follows from the fact that longitudinal stretching imparts to the fabric of the stocking cross-wise or lateral forces, tending to draw the fabric on each side of the leg from the inner to the outer side of the knee, and the open mesh areas 5, 6 enable the stocking fabric to yield more readily to such cross-wise forces, thus in turn enabling the stocking to stretch longitudinally with greater facility in response to the longitudinal forces.

The foregoing advantages are attained without interference with the desired recoverability, of the stocking pursuant to restoration of the knee from bent to upright or normal position. While an open mesh construction such as that of the areas 5, 6, is more readily extensible, its recoverability is not so pronounced as that of the plain knitted fabric customarily employed in stockings, and hence a stocking composed substantially entirely of said open mesh construction would entail a considerable sacrifice recoverability. But in my invention, the open mesh areas, while augmenting the stretchability as above noted, form only a small portion of the area of the stocking and do not impair its recoverability. This is preserved and insured by the substantial proportion of the plain knitted fabric employed. Hence, when the knee resumes its normal unbent position, the stocking concurrently recovers its corresponding normal position and continuously conforms to the contour of the wearer's knee and limb.

It will thus be apparent that the invention provides definitely augmented flexibility, at the same time insuring adequate recoverability of the stocking, obviating rupturing of the fabric under the strains produced by bending the knee, and avoiding bagginess when the knee returns to normal position. Damage to the stocking and discomfort to the wearer are thereby prevented despite repeated bending and unbending of the knee.

It may be additionally noted that the openwork areas 5, 6, when positioned at the inner side of the knee, provide ventilation in a region where perspiration is prone to occur, thus further contributing to the comfort of the wearer.

In the embodiment disclosed, I have shown the areas 5, 6 as spaced from the selvage seam 7 with the result that areas 8, 9 of the plain fabric of the stocking lie between said seam and said open mesh areas. These plain fabric areas 8, 9, receive the longitudinal stresses in the rear of the stockings as the latter are maintained in position by the garters, and limit the longitudinal stretch of the open mesh areas so that the latter, despite the stretch of the stockings as worn, are not stretched to their full longitudinal extent. It may be noted that the stockings are stretched longitudinally when applied to the wearer and are maintained under longitudinal tension by the garters. Frequently a garter attachment is fastened to the stocking at the rear, adjacent the selvage seam, for insuring tensioning of the stocking in the region adjacent said seam. The plain fabric areas 8, 9, further relieve the salvage seam, which would be more likely to crack under longitudintal stresses if the open mesh areas extended to said seam. In short, the aforesaid areas 8, 9 of plain fabric provide support for the seam and prevent the open mesh areas 5, 6, from being stretched to their full longitudinal extent when the stocking is gartered to the wearer.

In the region of the instep I also provide open mesh areas 10, 11, similar in construction to those designated 5, 6. The openwork areas 10, 11 may, as shown in Figs. 1 and 2, be located in the heel tabs 4, 4. These areas provide a flexibility across the instep which relieves the fabric from stresses imparted thereto by expansion of the foot in the instep region during walking or other exercising. At the same time, due to the retention of plain knitted fabric between said open mesh areas, the increase in flexibility provided by said areas does not detract from prompt retraction or recoverability of the fabric when the instep region returns to its normal size.

In addition, the flexibility provided by the areas 10, 11 enables the stocking to conform readily to insteps of various sizes. Likewise, the areas 5, 6, enable the stocking to better accommodate itself to varying knee or leg sizes. As noted hereinbefore, one woman may have a large instep and a small leg size, while another may have a large leg size and a small instep. The open work areas 5, 6, 10, and 11 impart to the stocking the capacity for fitting wide ranges of differing leg and instep sizes with comfort to the wearer and increase in the useful life of the stocking despite repeated flexing of the knee and instep in the course of the daily activities of the wearer.

The open mesh areas 10, 11, instead of being positioned in the heel portions may, as shown in Fig. 4, be positioned in the sole section of the foot 12. For example, they may be located in said section 12 at the same distance from the topping line 13 as are the areas 10, 11 in the heel sections in the embodiment shown in Fig. 2.

When positioned in the sole section, said areas are not readily visible, as they might otherwise be with certain types of sandals, while at the same time the benefit of increased flexibility across the instep is attained.

The mesh areas 5, 6, 10 and 11 need not be made from the same fabric threads as the other portions of the stocking, but may be inserted as pieces of separate fabric united to the remainder of the stocking by stitching or otherwise. For example, if, for any reason greater elasticity should be desired than is provided by meshes of the same fabric threads, more elastic inserts of suitable fabric may be inserted and attached to the plain fabric.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intension, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but recognize that various modifications are possible within the scope of the invention claimed.

I claim:

1. A full-fashioned stocking having areas of open work meshes in the inner knee portion on opposite sides of the selvage seam and adjacent thereto, said areas being of greater flexibility than the adjacent fabric of the stocking and providing a source of stretch supply for said fabric to draw from under stresses incident to bending of the knee, said open work areas being separated from the selvage seam by plain fabric areas.

2. A full-fashioned stocking comprising a leg portion having a fabric area at the inner knee region of greater stretchability than the adjacent fabric of the stocking, said adjacent fabric extending above and below said area and also laterally adjacent said area, said fabric area of greater stretchability being limited by said adjacent fabric to a longitudinal stretch less than the maximum longitudinal stretch of which the fabric of said area is capable and thereby providing a source of stretch supply for said adjacent fabric to draw from under stresses incident to bending of the knee.

JOSEPH WESLEY CRAWFORD.