Sept. 2, 1941. H. B. SNADER 2,254,982

TWO-WAY STRETCH STRAIN ABSORBING BAND WITH ELASTICALLY CLOSED RELAXED MESHES

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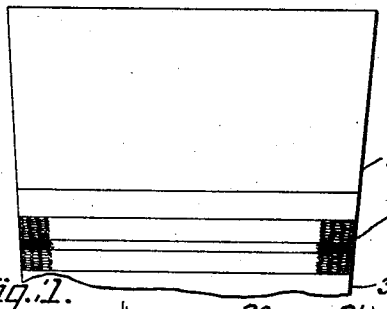
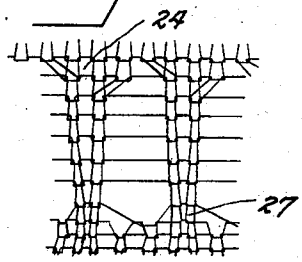


Fig. 1.

Fig. 3.



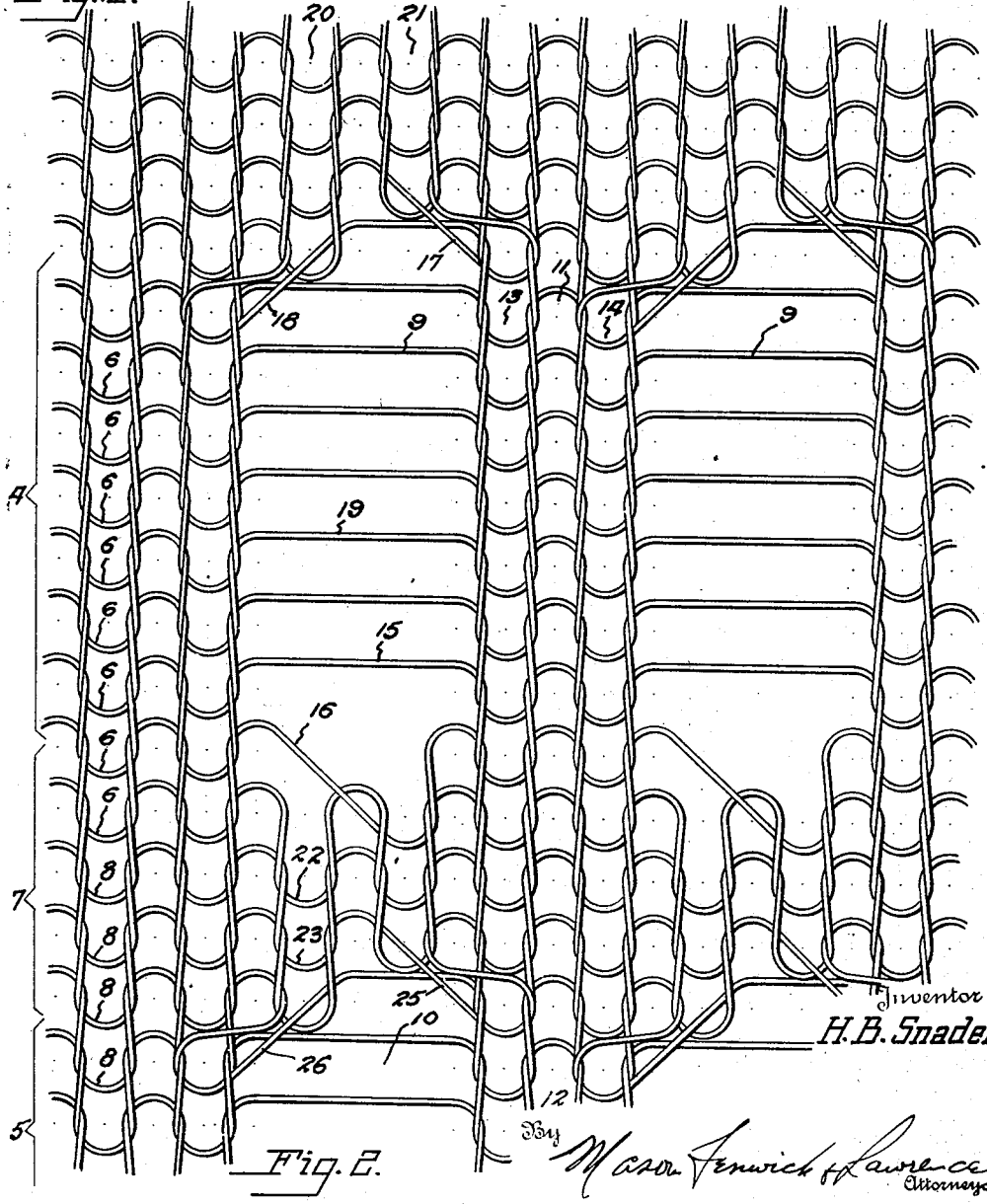


Fig. 2.

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TWO-WAY STRETCH STRAIN ABSORBING BAND WITH ELASTICALLY CLOSED RELAXED MESHES

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10 Claims. (Cl. 66—172)

This invention relates to hosiery of that type having an integrally knit two-way stretch band incorporating fine gauge covered rubber elastic yarn, above the knee, the longitudinal stretch component of which makes the band a strain absorber to relieve the knee portion of the stocking from bursting stresses resulting from the bulge of the knee when the leg is flexed.

A band, such as described, to be of effective service as a strain absorber must comprise quite a number of courses and is subject to an inherent tendency to curl, that is, to shape itself into a channel, this being due to the fact that fine gauge rubber yarn cannot be knit without its becoming tensioned, and as the knitting is released from the needles, the rubber yarn contracts, whereby drawing the fabric of the band together, producing the curling.

This concave or dished appearance of the strain absorbing band is a detriment to the sales appeal of the stocking, to obviate which, several remedial expedients have been proposed. One of these is to break the width continuity of the elastic fabric into a plurality of very narrow bands of the fine gauge covered rubber elastic yarn, alternating with narrow bands of the basic inelastic yarn of the stocking. Another is to cross the band with a widthwise series of stiffening ribs.

The present invention has for its object the provision of means to prevent objectionable curling of the strain absorbing band, not by breaking it down into a plurality of separated narrow bands, not by providing transverse stiffening ribs, but by the employment of a pattern of knitting which provides sufficient fullness distributed through the band, to allow for the full contraction of the elastic yarn without its drawing the elastic band together.

Another object of the invention is to intersperse the fabric of the strain absorbing zone with meshes constituting nuclei of elasticity from which the fabric may freely contract down to a condition of repose without distorting the strain absorbing band, the meshes being formed as are ordinary meshes, by runs in adjacent wales emanating from drop stitches at one end of the mesh and locked by transferred stitchess from the wales of the runs at the other end, but differing from ordinary meshes in the fact that the runs proceed through courses of elastic yarn and the meshes are closed by a drop stitch of elastic yarn. This construction gives fullness and elasticity to the bounding fabric of the meshes and produces a fabric that is free from curling bias in any direction.

Still another object of the invention is the provision of a strain absorbing band comprising a plurality of groups each consisting of a somewhat large number of courses of elastic yarn, alternating with a group or groups of courses of inelastic yarn, the groups of elastic yarn being provided with circumferential series of walewise extending meshes of the type above described, extending across the elastic group and spaced to form an intervening plurality of continuous wales of elastic yarn acting as paths of force transmission for longitudinal stresses.

In such a stocking construction, the course or courses carrying the transferred loops at the head of the wales are less stretchable circumferentially than other courses, so that when the strain absorbing band is circumferentially distended on the leg the effect of the transferred loops is to draw out the top part of the intervening continuous wales in a circumferential direction, which reduces their capacity to stretch longitudinally of the stocking.

This is a necessary evil insofar as the tops of the intervening continuous wales are concerned, for the meshes must be locked by transferred loops, but the loss of longitudinal elasticity which the continuous wales incur in this manner is compensated by the extraordinary fullness and elasticity imparted to the intervening wales through the closing of the meshes by an elastic drop stitch.

If only one or two inelastic courses separate the groups of elastic yarn, the transferred loops at the head of the succeeding series of meshes come so close to the bars of continuous wales between the meshes of the preceding group so as to draw out circumferentially the bases of said bars in the same manner as the top of said bars are drawn out (through distension of the leg) and thus to thwart the purpose for which the full elastic closure of the meshes is provided, which is to feed elasticity into said bars.

Therefore, it is the object of the present invention to let several courses of normal loops of inelastic yarn come between the closure course of the preceding series of meshes and the locking course of the succeeding series of meshes. The normal loops, of course, have a greater freedom of circumferential distortion than the transferred loops and therefore permit the closing yarn of the preceding series of meshes to contract into the bases of the intervening bars, preventing them from stretching circumferentially, and thus preserving their full capacity to stretch in a walewise direction.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawing, throughout the several figures of which the same characters of reference have been employed to designate identical parts:

Figure 1 is a side elevation of the upper part of the stocking showing a strain absorbing band embodying the principles of the present invention;

Figure 2 is a diagram of the pattern of knitting constituting the subject invention; and

Figure 3 is a side elevation illustrating the behavior of one of the intervening bars under circumferential stress.

Referring now in detail to the several figures, the strain absorbing band, which is designated by the reference character 1, occupies a position above the knee portion of the stocking, and preferably at some little distance from the top edge of the stocking, and it extends circumferentially thereabout. The strain absorbing band 1 is integrally knit with respect to the adjacent portions 2 and 3 of the stocking.

In the present embodiment of the invention the strain absorbing band is composed of a plurality of groups 4 and 5, each comprising a somewhat large number of courses of elastic yarn, indicated by the reference character 6, separated by a group 7 of courses 8 of inelastic yarn. The groups of elastic yarns are provided with circumferential series of meshes 9 and 10 extending walewise across the group of elastic yarns, and being elongated on account of the width extent of the groups of elastic yarns. The meshes in each series are spaced apart, alternating with bars 11 and 12 formed by the continuous wales 13 and 14, which wales throughout the width extent of the groups of elastic yarns are made from the elastic yarns.

Each of the meshes is formed by runs extending walewise through the group of elastic yarns and emanating from drop stitches 15 and 16 respectively in the next to last knit and last knit courses of elastic yarns of a group. The runs are stopped at the top of the mesh by the loops 17 and 18 transferred to the right and left from the wales of the runs of the respective drop stitches. In the formation of the runs all of the elastic stitches in the area of the mesh are dropped, become straight bars 19 with fullness derived from the dissolution of the loops. The bar constituted by the lowermost drop stitch 16 acquires the fullness of a single loop from the wale 20, while the straight transverse bars 19 have acquired the fullness of two loops from the wales 20 and 21. This fullness permits the elastic yarn in the wales 13 and 14 of the intervening bars to contract down to a state of repose without in any way distorting the fabric. Consequently, there is no tendency of the fabric to curl.

Figure 2 shows that in the group 7 of inelastic courses there are two inelastic courses 22 and 23, of normally knit loops, between the closure course of the meshes of group 4 and the locking course of group 5.

These two courses play a most important function in preserving the capacity of the intervening bars 11 to stretch freely in a longitudinal direction. It is readily understood, referring to the inelastic courses carrying the transferred loops 17 and 18, that these loops are already deflected circumferentially almost to a straight angle and that, therefore, the stretchability of these courses through deformation of the loops is consequently diminished. When the stocking is distended by the leg of the wearer, the courses of the transferred loops 17 and 18 will be tensioned more than the rest of the fabric, and this will cause the intervening bar 11 to be drawn out wide at the top, as indicated at 24 in Figure 3. It is axiomatic that the more a knit fabric is distorted in one direction the less capacity for elongation it has in another direction. Consequently, the longitudinal stretchability of the intervening bars 11 will be impaired to the extent that they are drawn out in a circumferential direction at the top by the courses of transferred loops. This cannot be avoided, for it is necessary that the meshes shall be locked at the top by transferred loops.

However, it is not necessary for the intervening bars 11 to be stretched circumferentially at the bottom, and to prevent such stretching, the present invention provides that instead of the courses of inelastic yarn which carry the transferred loops 25 and 26 at the head of the meshes of the succeeding series being placed directly contiguous to the closure course of the preceding series of meshes, there shall be several courses, for example, courses 22 and 23 of inelastic yarn, intervening. If the courses of the transferred loops 25 and 26 immediately follow the closure course of the meshes 9, the effect would be the same as it is at the top of said meshes. The relatively small stretchability of the courses carrying the transferred loops 25 and 26 would compel said courses to draw out the bottom of the intervening bars 11 under the stress of distension. Under such circumstances a great deal of the advantage of the full and elastic closure bar 16 of the mesh 9 would be lost. The intervening courses of inelastic yarn 22 and 23 are preferably, and as shown, of normally undistorted loops, which loops by their capacity to distort lend great stretchability to their courses. Thus, the circumferential stretching of the courses of the transferred loops 25 and 26 is gradually absorbed by the intervening courses 22 and 23 so that in the course of the closure bars 16, said stretchability is not felt, and the fullness of the bars 16 permits the lower portions of the intervening bars of continuous wales 11 to freely contract down to a repose state, as shown at 27 in Figure 3, imparting the maximum amount of longitudinal stretchability to said intervening bars.

It is, of course, well understood that the wales to which loops are transferred ordinarily assume ribbed effect, due solely to the thickening of the wales produced by the doubling of the loops. In the present invention it will be apparent that due to the length of the meshes and the fact that transferred loops occur only at the heads of the meshes, the transferred loops will occur in the continuous wales 13 and 14 only at widely spaced intervals, and in staggered courses, so that no ribbed effect is produced. On the contrary, the intervening bars 11 between the ends of said meshes are absolutely flat and limp, due to the fact that the covered rubber elastic yarn has not only contracted to its state of repose, but that the loops themselves are loose with the fullness derived from the bars 19 of the adjacent meshes.

It is preferred, although not essential to the invention, that the heads of the meshes be locked by transferred loops in courses of inelastic yarn, for this gives a mild but desired garter effect to the stocking, without as we have seen, materially

affecting the capacity of the strain absorbing band to stretch in a longitudinal direction.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood to those skilled in the art that the principles of the invention may be exemplified in other patterns of knitting than those specifically described.

What I claim as my invention is:

1. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups of courses of elastic yarn separated by a group or groups of courses of inelastic yarn, said fabric being provided with circumferential series of meshes, each mesh constituted by runs through a group of elastic yarns emanating from dropped stitches in said group of elastic yarns, said meshes being locked at one end by loops transferred from the wales of said runs, and said meshes being closed at the other end by a bar of elastic yarn resulting from one of said dropped stitches.

2. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups of courses of elastic yarn separated by a group or groups of courses of inelastic yarn, said fabric being provided with circumferentially spaced, walewise series of drop stitch meshes locked at one end by loops transferred from inelastic courses preceding said group of elastic yarns, and said meshes being closed by a bar of elastic yarn resulting from the first of said dropped stitch meshes.

3. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups, each group comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of courses of elastic yarns being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being constituted by runs through a group of elastic courses emanating from dropped stitches in the group of elastic courses, said meshes being locked at one end by loops transferred from the wales of said runs, and said meshes being closed by a bar of elastic yarn resulting from one of said dropped stitches.

4. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups each comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of elastic yarns being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being constituted by runs through a group of courses of elastic yarn emanating from dropped stitches in said group of elastic yarn, said meshes being locked at one end by loops transferred from inelastic courses preceding said elastic group, and said meshes being closed by a bar of elastic yarn resulting from one of said dropped stitches.

5. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups each comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of elastic yarns being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being constituted by runs through a group of courses of elastic yarn emanating from dropped stitches in said group of elastic yarn, said meshes being locked at one end by loops transferred from inelastic courses preceding said elastic group, said meshes being closed by a bar of elastic yarn resulting from one of said dropped stitches, there being courses of loops intervening between the closure course of a series of meshes and the locking course of the succeeding series of meshes.

6. In a knit stocking of the strain absorber type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups each comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of elastic yarns being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being constituted by runs through a group of courses of elastic yarn emanating from dropped stitches in said group of elastic yarn, said meshes being locked at one end by loops transferred from inelastic courses preceding said elastic group, said meshes being closed by a bar of elastic yarn resulting from one of said dropped stitches, there being courses of loops of inelastic yarn intervening between the closure course of a series of meshes and the locking course of the succeeding series of meshes.

7. In a knit stocking of the strain absorbing type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups each comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of courses of elastic yarn being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being formed by runs in adjacent wales, emanating from staggered drop stitches starting respectively in the last and next to last knit courses in a group of elastic courses, said runs being locked by staggered stitches oppositely transferred from said adjacent wales respectively in the last and next to last knit inelastic courses in the precedingly inelastic group, said stitches being transferred to loops of inelastic yarn in the continuous wales of said bars whereby said meshes are bounded at one end by

inelastic relaxed transferred loops of inelastic yarn, closed at the opposite end by a full bar of elastic yarn, and being crossed intermediately by bars of elastic yarn of double fullness acquired from both wales, there being courses of loops intervening between the closure course of one series of meshes and the locking courses of the succeeding series of meshes.

8. In a knit stocking of the strain absorbing type, a strain absorbing band integrally knit in the stocking above the knee, the fabric of said band including a plurality of groups each comprising a somewhat large number of courses of elastic yarn, separated by a group or groups of courses of inelastic yarn, the groups of courses of elastic yarn being provided with circumferential series of walewise extending elongated meshes, spaced apart by a series of intervening elongated bars knit of elastic yarn formed as spaced sections of continuous wales, said bars acting as paths of force transmission for longitudinal stresses, each mesh being formed by runs in adjacent wales, emanating from staggered drop stitches starting respectively in the last and next to last knit courses in a group of elastic courses, said runs being locked by staggered stitches oppositely transferred from said adjacent wales respectively in the last and next to last knit inelastic courses in the precedingly inelastic group, said stitches being transferred to loops of inelastic yarn in the continuous wales of said bars whereby said meshes are bounded at one end by relaxed transferred locps of inelastic yarn, closed at the opposite end by a full bar of elastic yarn, and being crossed intermediately by bars of elastic yarn of double fullness acquired from both wales, there being courses of loops of inelastic yarn intervening between the closure course of one series of meshes and the locking courses of the suceeding series of meshes.

9. In a knitted stocking of the strain-absorbing type, a strain-absorbing band integrally knit in the stocking above the knee, said band including a plurality of groups of courses of elastic yarn alternating with a plurality of groups of courses of inelastic yarn, said band being provided with circumferentially spaced series of groups of dropped loops defining dropped stitches and groups of loops transferred in opposite directions located at the terminus of each of said series of dropped stitches.

10. A knitted stocking having incorporated therein above the knee a strain-absorbing band consisting of a plurality of groups of courses of elastic yarn alternating with a plurality of groups of courses of inelastic yarn, the groups of courses of elastic yarn being provided with a plurality of circumferentially spaced dropped stitches each of a width greater than the width of a single wale, said groups of courses of inelastic yarn having loops transferred in opposite directions at the terminus of each series of dropped stitches.

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