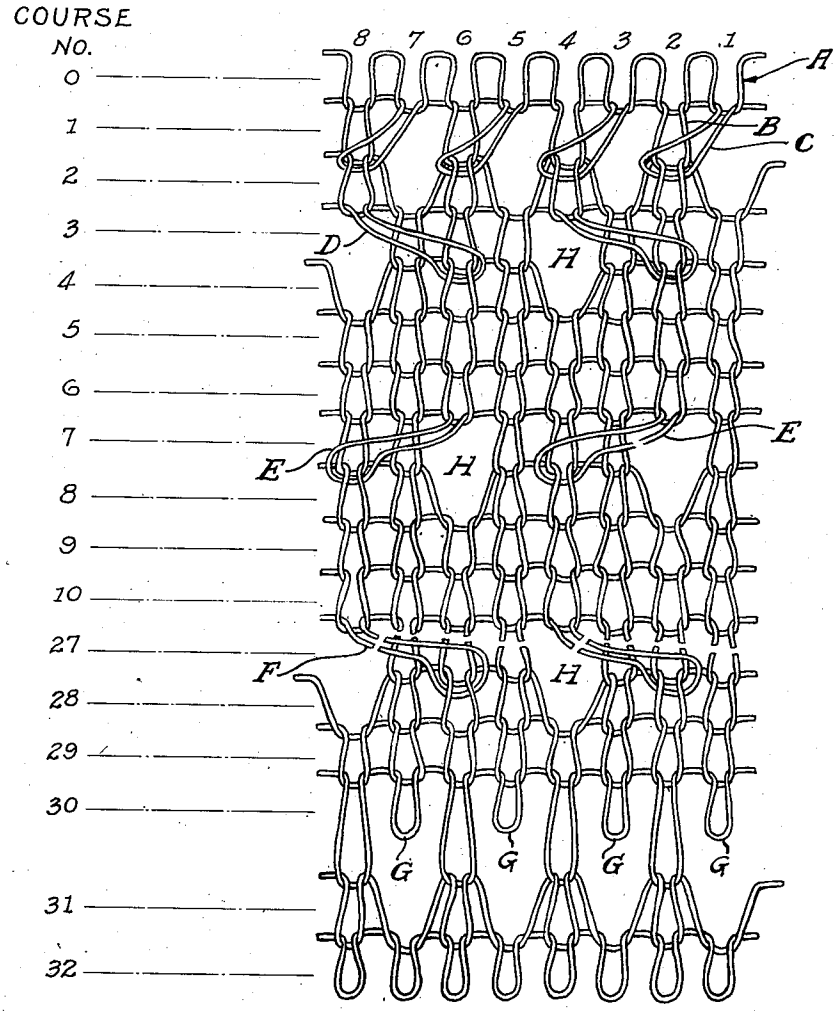
March 25, 1941. J. D. MOYER 2,236,248

KNITTED FABRIC STRUCTURE

Filed Aug. 21, 1939 3 Sheets-Sheet 1

Fig. 1.



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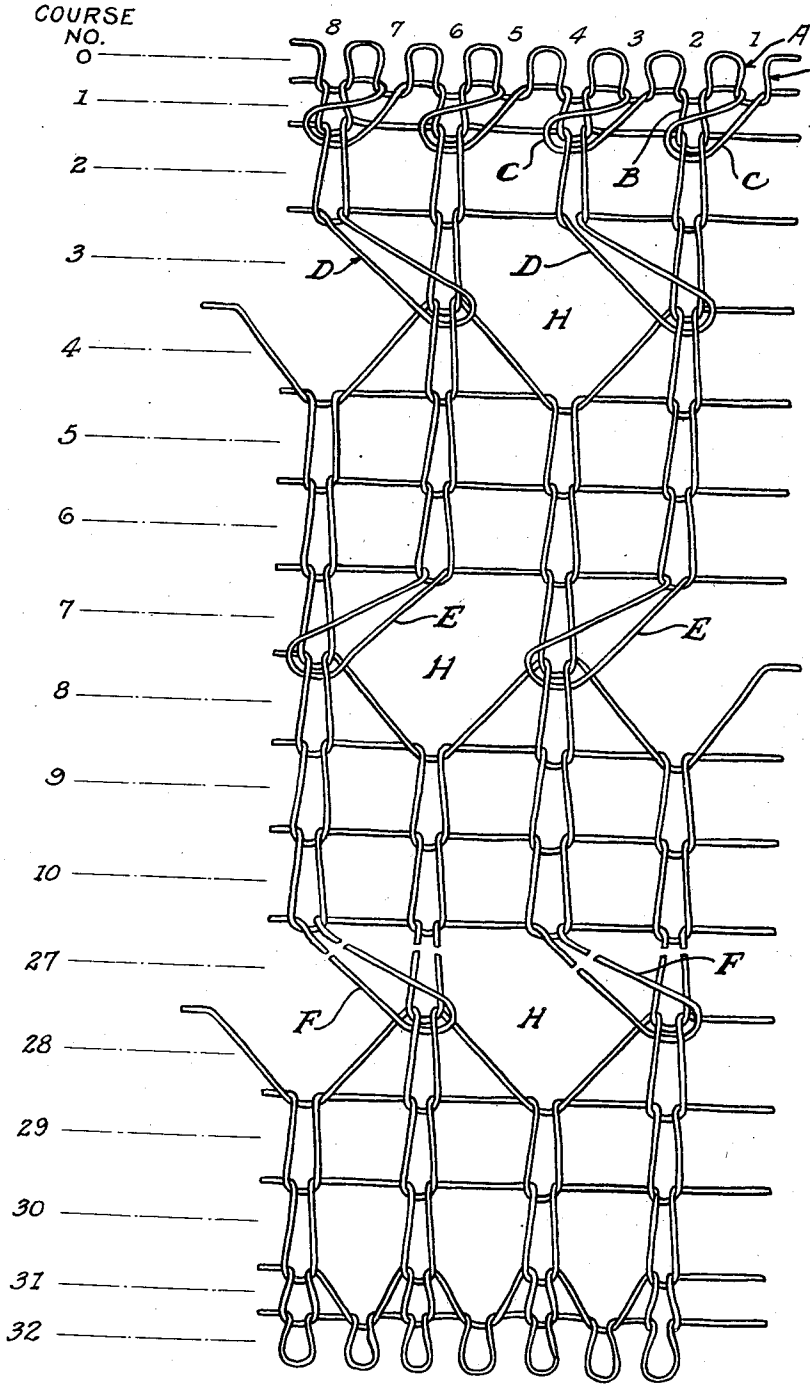

Fig. 2.

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Fig. 3.

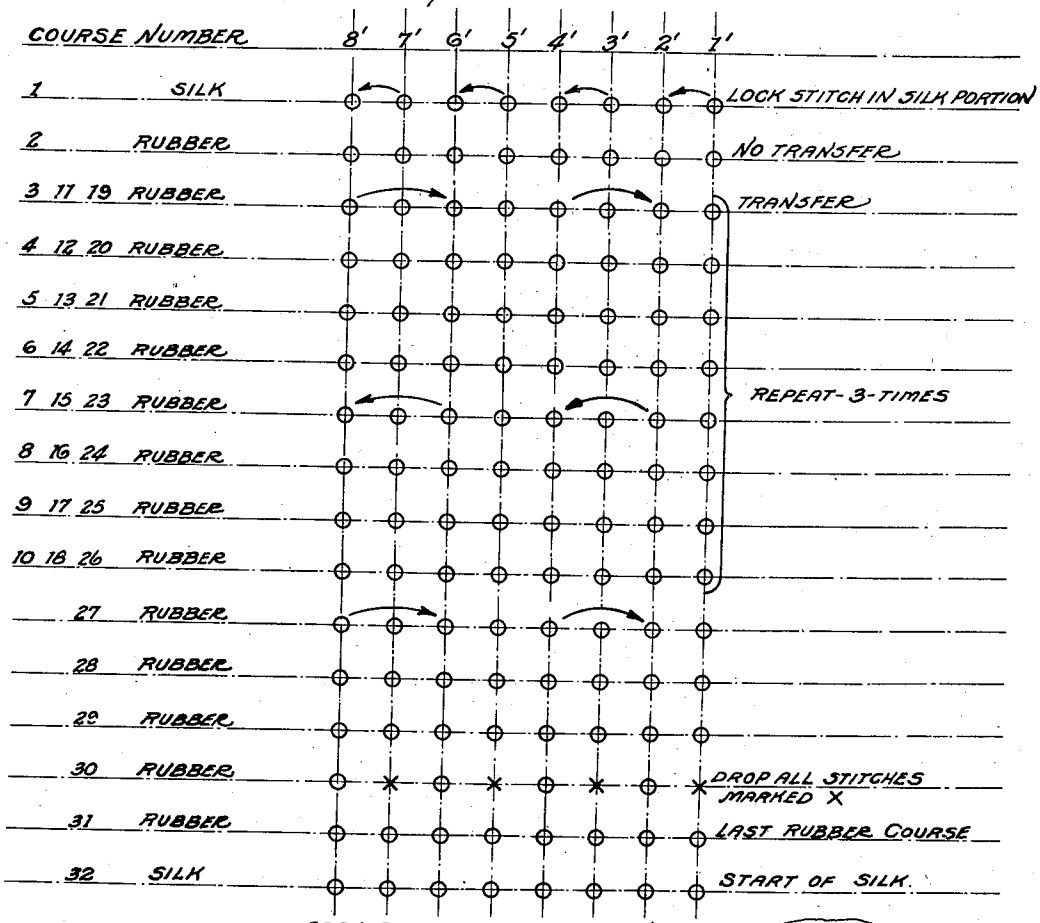

Fig. 4.

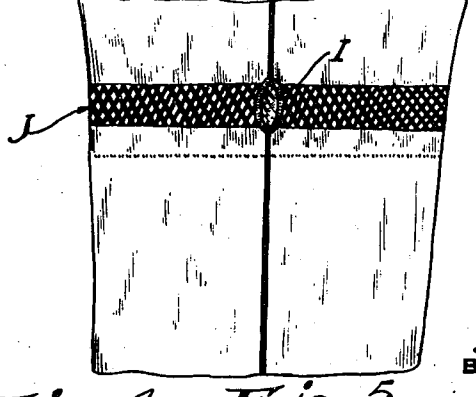

Fig. 5.

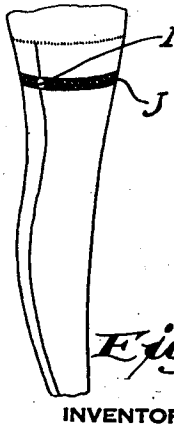

Fig. 6.

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Patented Mar. 25, 1941 2,236,248

UNITED STATES PATENT OFFICE

2,236,248

KNITTED FABRIC STRUCTURE

John D. Moyer, Milwaukee, Wis., assignor to Holeproof Hosiery Co., Milwaukee, Wis., a corporation of Wisconsin

Application August 21, 1939, Serial No. 291,113

19 Claims. (Cl. 66—172)

This invention relates to an improvement in knitted fabrics, especially designed and adapted to be combined in a special and novel way in ladies' hosiery so as to provide a strain-absorbing zone in the region of the knee, although the fabric is also adapted for various other uses and applications.

The object of the invention is to provide a knitted fabric, which may be economically and speedily produced on the conventional flat or full-fashioned knitting machinery, and which possesses a number of advantageous and desirable characteristics, namely a very high degree of longitudinal and transverse flexibility, the capacity to lie flat and not curl, and also a highly pleasing and ornamental appearance.

When the fabric structure is combined in the manner contemplated by the present invention in ladies' hosiery to provide a strain-resisting zone in the region of the knee, it is preferably knitted with elastic thread, although it may be knitted of both elastic and regular thread, or of regular thread alone.

The strain-absorbing zone is preferably in the form of a band which extends completely around the circumference of the stocking, and it possesses such a high degree of elasticity or stretchability longitudinally and circumferentially of the stocking as to take up and absorb all strains, particularly those due to flexing of the knee, thereby relieving the other portions of the stocking of any excessive strain, and preventing runs or laddering. The fabric, constituting the strain-absorbing band or zone, is knit in such a novel and effective way as not only to provide the desirable stretchability, but also lie flat in the stocking. It represents an open-work or lacy appearance, and actually improves the appearance of the stocking. The capacity of the fabric to lie flat is of considerable importance, since it enables the stocking to be attractively displayed for sales purposes, and also to be sightly and pleasing in appearance when worn. One of the serious disadvantages of prior structures, designed to relieve or absorb strain in ladies' hosiery, has been the fact that despite claims to the contrary the tendency to curl or roll has not heretofore been overcome.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts, which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a diagrammatic view showing the loop or stitch arrangement of the fabric after it has been knitted, but before it has been pulled to cause the stitches that have been dropped to run or ladder back to the fabric of the lock stitch course.

Figure 2 is a view similar to Figure 1, but illustrating the arrangement or relationship of the loops or stitches of the fabric after it has been pulled to cause the stitches that have been dropped to run or ladder back to the lock stitch course.

Figure 3 is a graphic diagram with suitable legends applied thereto to illustrate the knitting operations involved in producing one pattern of a fabric of the structure shown in Figures 1 and 2.

Figure 4 is a perspective view illustrating the fabric combined with ladies' hosiery to produce a strain-absorbing zone therein, and showing the stockings as they appear when worn.

Figure 5 is a fragmentary view in rear elevation illustrating the leg seam of the stocking.

Figure 6 is a perspective view of a portion of the stocking illustrating the rear thereof.

In producing a fabric in accordance with the present invention, the welt of the stocking is first knitted on the conventional flat or full-fashioned knitting machine in any suitable way, and after the welt has been turned an after-welt of suitable length is knitted. The knitting of the after-welt is followed by the knitting of another silk course in which lace or lock stitches are produced by the conventional picot bar, as for example in the manner graphically illustrated in Figure 3.

In Figures 1 and 2, one of the courses of the after-welt is designated at A, and is followed by the lock stitch course 1. The plain knit loops of lock stitch course 1 are designated at B, and the transferred or lock stitches at C. After the knitting of the lock stitch course, the elastic yarn is fed to the machine, and a plain knit course of rubber or elastic yarn, designated at 2, is knit. This is followed by the knitting of course 3, and after course 3 has been knit, stitches D of every fourth needle are laterally transferred two needles. The transferred stitches D are all transferred in the same direction in this course. Three plain courses, designated at 4, 5, and 6, are then knit. After course 7 has been knit, stitches or loops E thereof on every fourth needle in the course are transferred laterally two needles, but in a direction opposite to that to which the stitches D were

transferred. The plain knit courses 8, 9, and 10 are then knit. The action involved in the knitting of courses 3 to 10 inclusive is repeated three times so that the total of twenty-six courses are then knit in this way. Thereupon course 27 is knit, and loops or stitches F on every fourth needles of this course are then laterally transferred two needles in the manner illustrated in Figures 1 and 3. Plain knit courses 28, 29, and 30 are knit, and after the course 30 has been knit, the loops or stitches in the wales, corresponding to the needles over which stitches have been transferred, and the stitches intermediate the wales from and to which stitches are transferred, are dropped. Some of these wales are designated in Figure 3 as 1', 3', 5', and 7'. Then another plain knit course 31 of rubber is knit, and this is followed by the knitting of course 32 of silk, whereupon the knitting of the stocking proceeds in the usual or conventional, or in any suitable style or manner.

The knitting operation as described results in the production of a fabric, wherein the loops are interrelated or arranged, as shown in Figure 1. The stitches that have been dropped are designated at G. Now, if this fabric is subjected to pull or longitudinal tension, stitches G will run back to the lock stitch course, and will be distributed throughout the fabric to produce a stitch of loop arrangement of the character illustrated in Figure 2. This fabric is characterized by the provision of staggered holes or openings H throughout the fabric so relatively positioned as to give the fabric a lacy, open-work, and highly pleasing appearance, and also enhance its stretchability both longitudinally and circumferentially or transversely. These properties are had without forming in the fabric any undesirable or unsightly thickened portions. The lacy effect is had by virtue of the provision of the holes, and the slight angular relation of the transferred stitches D, E, and F. Furthermore, the fabric produced in this way, and having this construction, will not tend to roll or curl, but will lie flat.

When full-fashioned stockings are produced, they are produced as usual as blanks, and later seamed up the back of the leg. The seam may extend across the strain-absorbing zone, but preferably it is interrupted at the zone so as to leave the edges I of the strain-absorbing band J free or open so that they may adapt themselves to the leg of the wearer. In this way the presence of a thickened seam portion is avoided, and the stocking may be worn more comfortably.

It is understood, of course, that while the particular knitting operation described illustrates only one way of carrying out the invention, the invention lends itself to various patterns. For example, the number of needles over which, or from which, stitches are transferred may be varied, and the direction of transfer in the same or different courses may be varied. Furthermore, the number of plain knit courses in any plain knit group, as well as the number and sequence of the transferred courses, may be varied as desired. And while elastic thread is usually preferred for the strain-absorbing zone, regular thread may be used, or each loop may be knitted with two threads, one regular and the other elastic. The essential feature of the invention resides in constituting the fabric of plain knit courses with intervening transferred courses, and in having stitches in wales, other than those to which, or from which, stitches are transferred, dropped. This fundamental combination is enhanced and improved by the feature of transferring all of the stitches in any one course laterally in the same direction, while having the direction of transfer of alternate transferred courses opposite. Where the structure is embodied in a lady's stocking to produce a strain-absorbing band or zone, the capacity of the fabric best to serve its intended purpose is further enhanced by constituting the fabric of a plurality of groups of plain knit courses with a single transferred course knitted to the boundary plain knit courses of each group, and with rows of stitches paralleling the wales to which stitches are transferred dropped.

While I have shown and described one construction in which the invention may be advantageously embodied, it is to be understood that the construction shown has been selected merely for the purpose of illustration or example, and that various changes in the size, shape, and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A stocking having a welt provided with an afterwelt terminating in a locked stitch course and also having a strain-absorbing band integrally knit to the after-welt and constituted of elastic thread, said band comprising a plurality of groups of plain knit courses and a single transferred stitch course knitted to the boundary plain course of each group of plain knit courses, each transferred stitch course, excluding the selvedge stitches, having every fourth stitch transferred laterally two needle wales, the stitches in the wales corresponding to the needle wales over which the stitches are transferred, and the stitches in the wales intermediate those from and to which stitches are transferred, being dropped to provide an open-work, lacy, and non-curling band of high stretchability longitudinally and circumferentially of the stocking.

2. A stocking having a welt provided with an after-welt and also having a strain-absorbing band integrally knit to the after-welt and comprising a lock stitch course followed by a plurality of groups of plain knit courses and a single transferred stitch course knitted to the boundary plain course of each group of plain knitted courses, said plain knit courses and said transferred stitch courses being constituted of elastic thread, each transferred stitch of each of said transferred stitch courses being transferred at least two needle wales, rows of stitches in said band paralleling the wales to which stitches have been transferred being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

3. A stocking having a strain-absorbing band therein comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, said plain knit courses and said intervening transferred stitch courses being knit of elastic thread, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, the body of the band having rows of stitches extending transversely of the band and on both sides of each wale to which stitches are transferred dropped to provide an openwork, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

4. A stocking having a strain-absorbing band

therein comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, said plain knit courses and said intervening transferred stitch courses being knit of elastic thread, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, rows of stitches in said band paralleling the wales to which stitches are transferred being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

5. A stocking having a strain-absorbing band therein knit of elastic thread and comprising plain knit courses and intervening transferred stitch courses, each transferred stitch course having every fourth stitch transferred two needle wales, stitches in wales in said band corresponding to the needle wales over which stitches are transferred being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

6. A stocking integrally knit of regular yarn and elastic yarn and having a lock stitch course followed by an integrally knit strain-absorbing band constituted entirely of elastic thread, said band comprising plain knit courses and intervening transferred stitch courses, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, rows of stitches in said band paralleling the wales to which stitches have been transferred in said transferred stitch courses being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

7. A stocking having a welt provided with an after-welt terminating in a lock stitch course and also having a strain-absorbing band integrally knit to the after-welt and constituted solely of elastic thread, said strain-absorbing band comprising first a plain knit course of elastic thread, then a single transferred stitch course followed by a plurality of groups of plain knit courses with a single transferred stitch course between each two adjacent groups of plain knit courses, each transferred stitch course having every fourth stitch transferred two needle wales, the stitches in the wales corresponding to the needle wales over which stitches are transferred, and the stitches in the wales intermediate those from and to which stitches are transferred, being dropped and run back to the lock stitch course, and a single plain knit course of elastic thread following said drop stitch course whereby to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

8. A stocking having a strain-absorbing band therein comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, said plain knit courses and said intervening transferred stitch courses being knit of elastic thread, the stitches transferred in each transferred stitch course being all laterally transferred at least two needle wales in the same direction, the direction of transfer of adjacent transferred stitch courses being opposite, rows of stitches in said band paralleling the wales to which stitches are transferred being dropped to provide an open-work, lacy, and non-curling band of high stretchability longitudinally and circumferentially of the stocking.

9. A stocking integrally knit of regular yarn and elastic yarn and having a lock stitch course followed by an integrally knit strain-absorbing band constituted entirely of elastic thread, said band comprising plain knit courses and intervening transferred stitch courses, each transferred stitch course having every fourth stitch transferred laterally two needle wales in the same direction, the direction in which the stitches are transferred in adjacent transferred stitch courses being opposite, the stitches in the wales corresponding to the needle wales over which stitches are transferred, and the stitches in the wales intermediate those from and to which stitches are transferred, being dropped to provide an open-work, lacy, and non-curling band of high stretchability longitudinally and circumferentially of the stocking.

10. A stocking having a strain-absorbing band integrally knit therewith and comprising a lock stitch course followed by a plurality of groups of plain knit courses and a single transferred stitch course knit to the boundary plain knit course of each group of plain knit courses, said plain knit courses and said transferred stitch courses being constituted of elastic thread, each transferred stitch of each of said transferred stitch courses being transferred at least two needle wales, rows of stitches paralleling the wales to which the stitches are transferred being dropped to provide an open-work, lacy pattern of high stretchability longitudinally and circumferentially of the stocking.

11. A stocking having a strain-absorbing band integrally knit therewith and comprising a lock stitch course followed by a plurality of groups of plain knit courses and a single transferred stitch course knit to the boundary plain knit course of each group of plain knit courses, said plain knit courses and said transferred stitch courses being constituted of elastic thread, the stitches transferred in each transferred stitch course being all transferred laterally at least two needle wales and in the same direction, the direction in which the stitches of adjacent transferred stitch courses are transferred being opposite, rows of stitches in said band paralleling the wales to which stitches are transferred being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

12. A knitted fabric structure comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, the stitches transferred in each transferred stitch course being all laterally transferred at least two needle wales and in the same direction, the direction of transfer of adjacent transferred stitch courses being opposite, rows of stitches paralleling wales to which stitches are transferred in said transferred stitch courses being dropped.

13. A knitted fabric structure comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, rows of stitches paralleling wales to which stitches are transferred being dropped.

14. A knitted fabric comprising a lock stitch course followed by integrally knit plain knit courses and intervening transferred stitch courses, each transferred stitch course having every fourth stitch transferred laterally two needle wales in the same direction, the direction in which stitches are transferred in adjacent transferred stitch courses being opposite, the

stitches in the wales corresponding to the needle wales over which stitches are transferred, and the stitches in the wales intermediate those from and to which stitches are transferred, being dropped.

15. A knitted fabric structure comprising a lock stitch course followed by an integrally knit plurality of groups of plain knit courses and a single transferred stitch course knit to the boundary plain knit course of each group of plain knit courses, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, rows of stitches paralleling the wales to which stitches are transferred in said transferred stitch course being dropped.

16. A knitted fabric of the character described having a lock stitch course followed by an integrally knit plurality of groups of plain knit courses and a single transferred stitch course knit to the boundary plain knit course of each group of plain knit courses, the stitches transferred in each transferred stitch course being all laterally transferred in the same direction, the direction of transfer of adjacent transferred stitch courses being opposite, rows of stitches paralleling the wales to which the stitches are transferred being dropped.

17. A knitted fabric structure comprising a lock stitch course followed by an integrally knit plurality of groups of plain knit courses and a single transferred stitch course knit to the boundary plain knit course of each group of plain knit courses, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, stitches in wales other than those to which stitches have been transferred in said transferred stitch courses being dropped.

18. A knitted fabric structure comprising a lock stitch course followed by plain knit courses and intervening transferred stitch courses, each transferred stitch in each of said transferred stitch courses being transferred at least two needle wales, stitches in wales other than those to which stitches have been transferred being dropped.

19. A stocking having a strain-absorbing band therein knit of elastic thread and comprising plain knit courses and intervening transferred stitch courses, each transferred stitch course having every fourth stitch transferred two needle wales, stitches in wales corresponding to the needle wales over which stitches are transferred, and the stitches in the wales intermediate those from and to which stitches are transferred, being dropped to provide an open-work, lacy, non-curling band of high stretchability longitudinally and circumferentially of the stocking.

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