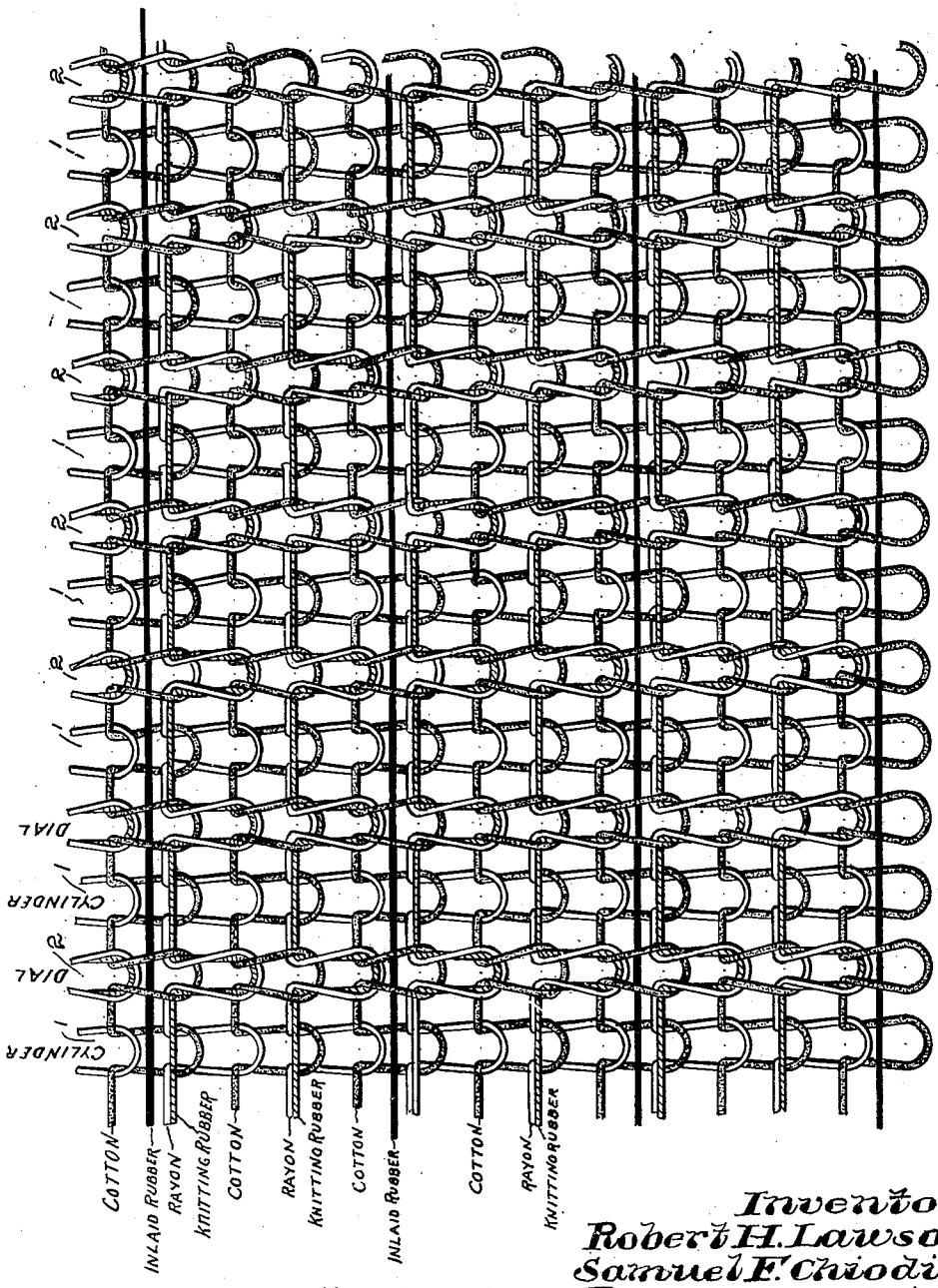
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RIB KNITTED FABRIC CONTAINING INLAID RUBBER AND BARE KNITTED RUBBER

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RIB KNITTED FABRIC CONTAINING INLAID RUBBER AND BARE KNITTED RUBBER

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This invention relates to rib knitted fabrics.

In order that the principle of the invention may be readily understood, we have disclosed a single embodiment thereof in the accompanying drawing.

The single figure of the drawing represents the front face of a rib knitted fabric constructed in accordance with our invention.

An important object of our invention is to provide a rib knitted fabric having a well defined two-way stretch, and having a wholly inlaid, preferably bare, rubber strand, and also having a closely adjacent knitted-in bare, rubber strand, for the purpose of obtaining a softer and better garment made from said fabric, and wherein such rubber strands do not show at either face of the fabric, and also for the purpose of preventing the inlaid, non-knitted, rubber strand from moving any substantial distance in the garment or other fabric made therefrom, when in use.

The fabric is made upon a circular or upon a straight knitting machine, either of the independent needle type or otherwise, wherein there are a multiple of feeds or stations, and for the purpose of this description, but without limiting our invention to a fabric made on such type of machine, we will, for clearness of description and disclosure, set forth that embodiment of our invention that is made upon a circular, independent needle machine provided with both cylinder needles and dial needles, the machine being provided with suitable cams for causing both the cylinder needles and the dial needles to knit at each feed or station, the cylinder needles knitting primary and the dial needles knitting secondary.

It has been customary, as in providing garter-top socks or stockings, to inlay a rubber strand, known in the trade as rubber, uncovered or covered. It has also been customary to knit many different non-elastic yarns or threads such as cotton, wool, silk, rayon, rayon plated over cotton, and others.

It has been found that rayon alone (or rayon plated over cotton) fed at the stations where the bare rubber is knitted by the dial needles, shows prominently on the outside of the fabric, while cotton alone fed to the intermediate stations where rubber is not knit results in a fabric which shows rayon prominently on the outside, the cotton stitches being submerged. On the inside of the fabric, however, cotton shows prominently while the rayon stitches are even more submerged than the cotton stitches were on the outside.

In the drawing, the knitted stitches are shown

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diagrammatically. In the actual fabric of our invention the rubber which has been knitted into loops under tension on the dial needles, pulls into as nearly a straight line as possible. The fabric is desirably but not necessarily knitted with a cotton thread and with a rayon thread, or a rayon thread plated over cotton, but our invention is not limited thereto. Of necessity, the cotton thread knit on the feeds before and after the rubber, forms a long loop on the dial needles, robbing from the cylinder stitches to accomplish this. Thus the cotton thread covers most of the inner or back face of the cloth and shows a short stitch on the outside or front face of the cloth. The rayon thread follows the rubber on the inside of the fabric and since each stitch thereof is made as the smallest possible loop, the rayon thread makes a long stitch on the outside of the fabric. At the same time the rayon thread is loose in the dial stitch and also in the wale before the cylinder and the dial loops, thus effectively covering the rubber.

With respect to the inlaid rubber strand, the fact that the bare rubber is knit in the feed following the inlaid rubber causes the inlaid strand to be well covered and at the same time to be locked into the fabric, so that even if the fabric is cut or the inlaid rubber is broken, there is enough friction between the inlaid strand and the stitches covering it to prevent the inlaid strand from moving more than a wale or two from where it was cut, regardless of how much the fabric is pulled in either direction.

One of our reasons for using bare rubber in the fabric is to achieve thinness of fabric.

In the herein disclosed fabric, the fact that a bare rubber strand (knit under tension in, say, the back wales of the rib fabric while inelastic thread is knit into both back and face wales) hides itself by pulling into a very small loop, and at the same time enlarging the inelastic thread loops of the next succeeding course in the same wale into long loops by drawing thread from its adjacent stitch on the opposite side of the fabric, thereby making these stitches shorter, said shortening of such stitches pulling the inelastic thread which was knitted in the same course as the bare rubber strand into long full loops in those wales which did not knit the rubber strand, and shortening said inelastic thread in those wales which did knit said rubber strand, the inlaid rubber between the above courses being well hidden by the enlarged stitches and prevented from pulling through the fabric by reason of its contact with the knitted-in rubber. Thus there can be made without tuck stitches a fabric having substan-

tially an all cotton back and an all rayon face, although cotton only is fed to the inelastic courses while rayon is fed to the courses containing rubber, providing the latter are in alternation. The lack of tuck stitches makes a smoother, thinner fabric.

In accordance with our invention, and because of the marked advantages which we have ascertained in the course of our investigations, experiments and tests to result from the use of a bare, knitted, rubber strand, we employ bare knitted rubber in a knitted fabric containing inlaid rubber, preferably uncovered, and we obtain a softer and a better garment. We also prevent the inlaid rubber strands moving any substantial distance in the garment made from the fabric in the event the inlaid rubber is cut or broken. The advantages are more fully stated subsequently herein.

The fabric of our invention comprises a rib knit fabric composed of courses knit as groups of different threads, one course of each of said groups containing a wholly inlaid, desirably uncovered, elastic strand such as rubber, with an elastic strand which is an uncovered rubber strand, knit in at least some wales of a following course, to hold the said uncovered inlaid elastic strand from slipping through the fabric.

In knitting the fabric, the bare or uncovered rubber strand is fed only to the dial needles at alternate feeds and is knitted by them. The bare rubber thus knits into or with the dial stitches along with the thread which has already knit into the cylinder stitches and a portion of which has been measured off, so that it may be knit into the dial stitches.

A bare or uncovered rubber is laid onto the stitches held between the cylinder and the dial needles at each fourth course. This is done immediately prior to one of the feeds that are knitting the bare rubber. Thus rubber is laid (as contrasted with being knitted into loops) at every fourth feed while other rubbers are actually knitted into loops into the fabric every two feeds.

Referring specifically to the drawing, the wales of the stitches knitted upon the cylinder needles are indicated at 1, and those knitted upon the dial needles are indicated at 2. In the disclosed embodiment of the fabric of our invention, we employ a cotton thread knitted upon the cylinder and the dial needles and a rayon thread also knitted upon the cylinder and the dial needles. Obviously our invention is not limited to the use of such textile threads, as any other textile threads may be employed. The inlaid rubber strand is indicated at 3. This is preferably an uncovered rubber strand and, as shown, is laid alternately at opposite faces of the fabric, and herein to the back of the stitches knitted upon the cylinder needles and to the front of the stitches knitted upon the dial needles. Desirably, but not necessarily, such inlaid, uncovered, rubber strand is introduced into every fourth course.

The knitted, uncovered, rubber strand is indicated at 4. This is desirably knitted upon each of the dial needles, but not upon the cylinder needles. This uncovered knitted rubber strand is desirably knitted into every other course, but our invention is not necessarily limited to the knitting of the uncovered rubber strand into every other course.

The advantages which we have discovered to result from the employment of an uncovered, knitted, elastic strand, such as rubber, in a garment wherein the rubber is covered by the textile thread or threads that make up the garment, are as follows.

Uncovered rubber in a knitted garment, and particularly knitted uncovered rubber, makes a softer garment. When covered rubber is knitted over an inlay, the bulk or body of the inlay rubber forces the spiral windings of a covered-rubber knitted strand to the outside of the cloth, giving a harsh feel to the garment. Uncovered rubber is less bulky than covered rubber for the same power. This means that a garment using bare rubber both for the rubber inlay and the rubber knitting strand will be less bulky. The spiral windings of a covered rubber strand tend to cut into rubber and also to hold impurities against the rubber, thus tending to rot the rubber. Bare rubber properly covered by the textile threads of the garment is amply protected from the abrasion and from the body of the wearer. The covering knitted stitches of textile material do not tend to cut into the rubber. The covering created by the textile knitted stitches is sufficiently loose so that impurities can be readily washed away, thus prolonging the life of the garment. Spiral covering on rubber causes a friction that prevents the rubber from exerting its full strength and also causes the garment to lose "snap." A garment made entirely of uncovered rubber and of textile threads is much more lively and exerts more power for the same amount of rubber used.

The above advantages make the use of uncovered rubber as a knitting rubber highly desirable notwithstanding that even with the cost of covering the rubber eliminated, other technicalities make the use of bare rubber more expensive.

In the foregoing description rubber has been described as being knitted by the dial needles only. It should be understood, however, that within the scope and purpose of the invention rubber may be fed to the cylinder needles only instead of to the dial needles. In such case rayon or rayon and rubber may be fed at the feeds either side of those feeds where the rubber is knitted to show the rayon on the outside of the fabric. Also, if rubber is fed to the cylinder needles at one feed and to the dial needles at another feed within the group of feeds considered, then the fabric will have no curling tendency.

Having thus described one illustrative embodiment of the invention, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

We claim:

1. A rib-knit fabric having back wales and intervening face wales, said fabric including a series of different inelastic threads, each knitted in regular stitches only, said different inelastic threads being alternated by courses among themselves in different courses of the fabric, every fourth course of the said fabric containing a wholly inlaid, uncovered rubber strand, and every second course only of the said fabric containing an uncovered rubber strand knitted in alternate wales only, in said second courses.

2. A rib knit fabric having back wales and intervening face wales, said fabric including inelastic thread knitted throughout in regular stitches in each course and wale, and including two sets of bare elastic strands that are effectively hidden at both faces of the fabric, the strands of one set of said bare elastic strands being inlaid in unknitted condition in the said fabric and the

strands of the other set of said bare elastic strands being interknitted under tension at alternate wales with said inelastic thread in following courses that respectively closely succeed those courses into which the elastic strands of the first mentioned set of elastic strands are inlaid, the said knitted-in elastic strands, because of being knitted under tension, hiding themselves in the said fabric by pulling themselves into very small knitted stitches and at the same time lengthening the inelastic thread stitches at the next succeeding course in the same wale into long full stitches by drawing thread from an adjacent stitch on the opposite side of the fabric, thereby making such stitches shorter, said shortening of such stitches pulling the inelastic thread which was knitted in the same course as the bare rubber strand into long stitches in those wales in which the rubber strand was not knitted into stitches, and shortening said inelastic thread in those wales which knitted said rubber strand into stitches, each of the said inlaid strands being well hidden by the said larger stitches of said inelastic thread and being prevented from pulling through the said fabric by reason of the contacting of said inlaid strand with the said knitted-in elastic strands.

3. A rib knit fabric in accordance with claim 2, but wherein the fabric is knitted with a cotton thread and also a thread containing rayon as its inelastic threads, and wherein one of the faces of said fabric is all rayon and the other face thereof is all cotton when the fabric is unstretched.

4. A rib knit fabric in accordance with claim 2, but wherein the fabric is knitted with a cotton thread and also a thread containing rayon as its inelastic threads, and wherein the front face of the fabric is all rayon and the back face thereof is all cotton when the fabric is unstretched.

5. A rib knit fabric in accordance with claim 2, but wherein the fabric is knitted in alternate courses with a thread containing rayon and with a cotton thread.

6. A rib knit fabric in accordance with claim 2, but wherein the fabric is knitted with two different, inelastic threads, one of which is cotton, and wherein the said inlaid, bare, elastic strands are inlaid into courses of said knitted cotton thread.

7. A rib knit fabric in accordance with claim 2, but wherein the fabric has as an inelastic thread thereof, a thread composed in part at least of rayon, and wherein the knitted-in elastic strands are interknitted with said thread composed in part at least of rayon.

8. A rib knit fabric in accordance with claim 2, but wherein the fabric is knitted with a cotton thread and also with a thread consisting of rayon overlying and concealing cotton, and wherein one of the faces of the fabric is all rayon overlying and concealing cotton and the other face is all cotton when the fabric is unstretched.

9. A rib knit fabric in accordance with claim 2, but wherein the said inlaid bare-elastic strands are inlaid in every fourth course of the said fabric.

10. A rib knit fabric in accordance with claim 2, but wherein the said knitted-in bare-elastic strands are knitted in alternate courses only of the fabric.

11. A rib knit fabric in accordance with claim 2, but wherein each said inlaid bare-elastic strand is always followed in the next course of the fabric by a knitted-in bare-elastic strand.

12. A rib knit fabric in accordance with claim 2, but wherein the said fabric has as its inelastic knitted threads in successive courses, groups of alternating threads of different characteristics.

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