March 15, 1955 J. L. BAUSHER 2,703,971

KNITTED FABRIC

Filed April 21, 1952

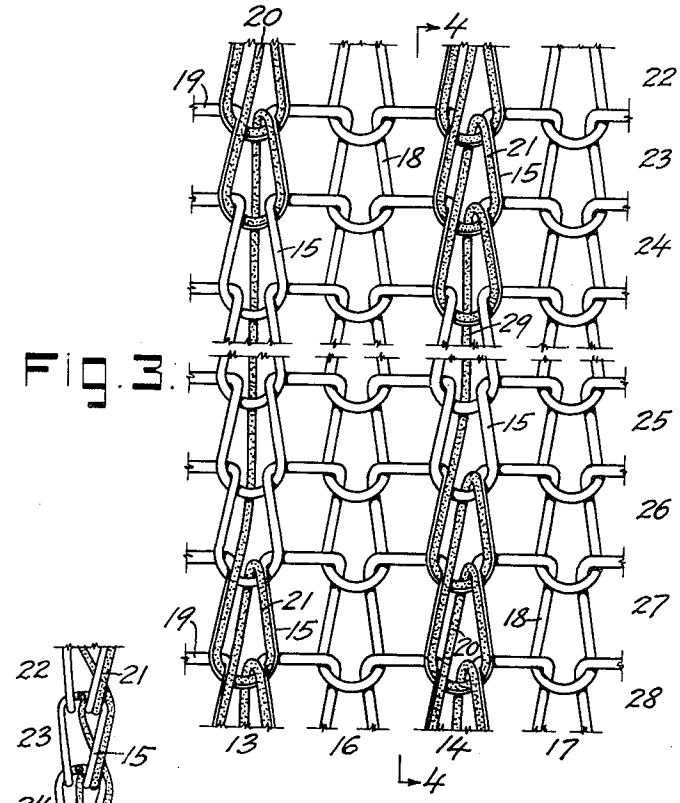


Fig. 3.

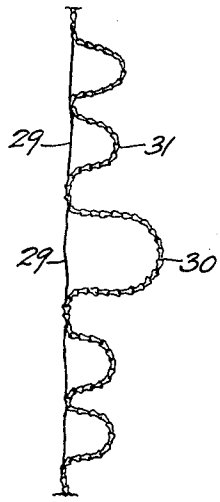


Fig. 2.

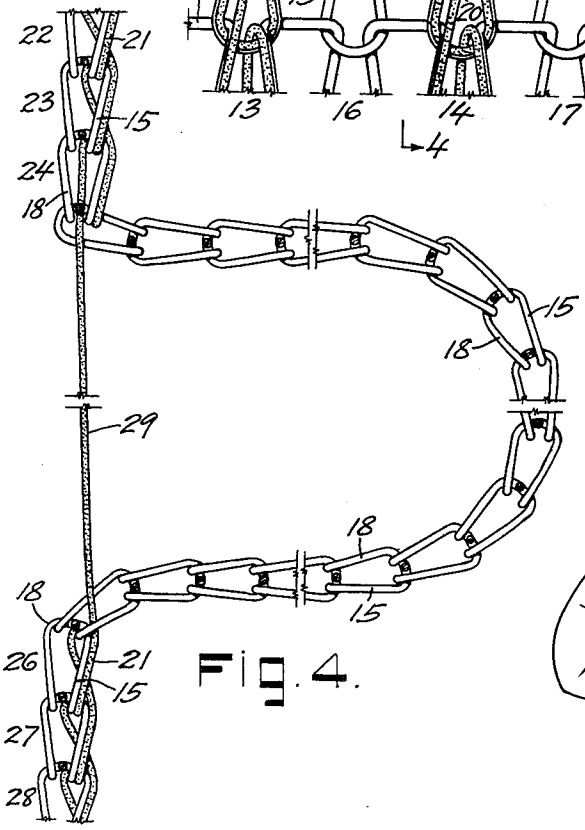


Fig. 4.

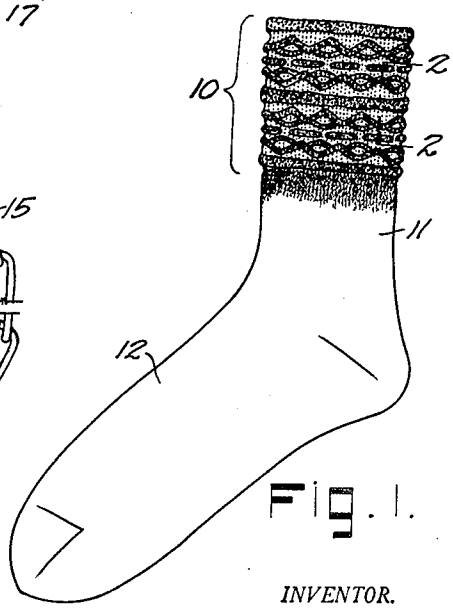


Fig. 1.

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United States Patent Office 2,703,971
Patented Mar. 15, 1955

2,703,971

KNITTED FABRIC

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Application April 21, 1952, Serial No. 283,478

6 Claims. (Cl. 66—172)

The present invention relates to an improvement in knitted fabric and more particularly to fabric knit of a relatively inelastic textile yarn and having elastic wrap yarns individually associated with the wales of the fabric. The invention also relates to hosiery having a top the fabric of which is knit to provide an ornamental raised welt design of ridges or rolls of body fabric having an outline which may extend at an angle to the wales.

It is an object of the invention to provide seamless tubular fabric knit of a relatively inelastic body yarn and having elastic wrap yarns individually associated with the outside fabric wales, with the wrap yarns incorporated in selected courses of the fabric and extending as vertical floats at the rear of the fabric between the said selected courses to contract the fabric in a walewise direction.

It is also an object of the invention to provide seamless tubular rib fabric having outside plain and inside rib wales knit of a relatively inelastic body yarn and having elastic wrap yarns individually associated with the plain wales, with the wrap yarns being knit with and plated on stitches of the body yarn in selected courses and extending as vertical floats rearwardly of the fabric between the said selected courses, the contractile effect of the floats in a relaxed or in non-elongated condition acting to contract the fabric in a walewise direction to provide the raised ornamentation.

It is a further object of the invention to knit such fabric on a knitting machine with the elastic wrap yarns under sufficient yarn-elongating tension so that when the fabric has come off the machine and the tension is removed, the fabric is contracted in a walewise direction with the non-plated areas providing a raised welt design.

It is a still further object of the invention to provide hosiery with a top or cuff of such walewise contracted fabric to provide an ornamental raised welt design for the hose, and in this hose when the top is subjected to a pulling action by the wearer thereof, it will stretch and thus cushion any harmful effect of the pull on the hose itself.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the appended claims, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawing forming a part hereof, in which,

Figure 1 is a side elevational view of an anklet, illustrating particularly a top or cuff of the fabric of the present invention;

Figure 2 is an enlarged diagrammatic sectional view of the fabric forming the top or cuff taken on line 2—2 of Figure 1 and showing the relationship of the elastic wrap yarn floats in non-elongated condition and the opposed raised fabric;

Figure 3 is an enlarged diagrammatic view of a portion of the rib fabric forming the top or cuff showing the individual stitches of body and wrap yarns with the elastic floats in elongated condition under tension; and

Figure 4 is a sectional view on line 4—4 of the fabric shown in Figure 3 with the elastic floats in relaxed non-elongated condition with the opposed fabric curved outwardly therefrom.

For the purposes of illustration, the fabric of the present invention is disclosed in connection with its application to hosiery in the formation of an anklet to which the fabric is especially well adapted, however it will be understood, as the description proceeds, that the invention may be applied to other articles of apparel.

The present invention comprises a fabric having courses and wales knit of an inelastic body yarn and having individual elastic wrap yarns associated with the wales, the wrap yarns being plated on the body yarn under sufficient yarn-elongating tension in selected courses of the fabric and floated therebetween during the knitting so that upon release of the tension, as the fabric leaves the machine, the contractile effect of the wrap yarns in relaxed or in non-elongated condition is sufficient to cause the fabric to be contracted lengthwise and the series of floats cause the opposed fabric to provide a raised welt design of ridges or rolls of fabric between the plated areas.

Referring now to Figure 1, the anklet is formed with a top or cuff portion **10**, the construction of which is hereinafter more fully described, a leg or ankle portion **11**, and a foot portion **12**, the latter being provided with the usual heel, instep and toe portions of any suitable construction.

The fabric of the top **10** of the anklet, as particularly shown in Figure 3 in diagrammatic manner to illustrate the stitch construction without fabric distortion due to the walewise contractive effect of the elastic yarns, is preferably of rib formation having outside wales **13**, **14** of plain stitches **15** and inside wales **16**, **17** of rib stitches **18** knit of a relatively inelastic textile ground or body yarn **19**. Individually associated with each of the outside plain wales **13**, **14** of the fabric are walewise extending elastic wrap threads or yarns **20**, of "Lastex" or of other elastic-like yarn construction, which are selectively knit along with the body yarn **19** to form stitches **21** of the elastic yarn plated on the body stitches **15** in certain of the fabric courses depending upon the particular raised welt pattern desired in the fabric. In the fabric section illustrated which has courses **22** through **28** inclusive, the wrap yarn **20**, in wale **14** thereof, forms plated stitches **21** of elastic yarn **20** on plain stitches **15** of body yarn **19** in courses **22**, **23**, **24**, **26**, **27**, and **28**, and extends as a vertical float **29** rearwardly of the fabric behind those courses extending between the courses **24** and **26**. There may be a number of courses in wale **14**, between the courses **24** and **26**, behind which the wrap yarn **20** extends as a float as indicated by the broken lines in the course between courses **24** and **25** Figure 3, and as indicated in Figure 4 (in which the wrap yarns may be shown in relaxed or in non-elongated condition) by the courses between the courses **24** and **26** shown extending outwardly from the face of the fabric to form raised fabric, these welt forming ridges of fabric being indicated in Figure 2 at **30** and **31** of varying size depending in each instance upon the number of courses in which the elastic wrap yarn is floated and is not knitted. In the wale **13**, the wrap yarn **20** forms plated stitches on the body stitches in courses **22**, **23**, **27** and **28**, and extends as a rearward float behind those opposed courses extending between the courses **23** and **27**, so that the wrap yarn float is longer in wale **13** than in wale **14** by two courses. In a similar manner in other portions of the wales **13** and **14** and in other wales of the fabric, the wrap yarns may be knitted along with the body yarns to incorporate the elastic yarns in certain selected courses and to cause them to float rearwardly of the fabric between said courses, so that the outlines of the plated areas of the fabric may extend parallel to the courses and wales or may extend at an angle to them and so that the series of adjacent floats at the rear of the fabric between the plated areas may be of equal or of unequal lengths depending upon the particular raised design desired in the fabric.

The fabric may be made upon a circular rib wrap knitting machine of a type well known in the art, having cylinder and dial needles and having individual wrap fingers adapted to feed individual wrap yarns selectively to the cylinder needles, the machine having means to knit a body yarn upon the cylinder and dial needles to form seamless tubular rib fabric and at the same time to knit the wrap yarns along with the body yarn to form one or more design areas of plated stitches of wrap yarn on

body yarn on those cylinder needles to which the wrap yarns are selectively fed under pattern control. It will be understood that the wrap yarns float vertically at the rear of the fabric between the courses in which they are knit and that when both body and wrap yarns are of inelastic textile character that the fabric as it comes off the machine is not unduly contracted lengthwise (although it is contracted somewhat upon release of the tension applied by the take-up rolls) and the fabric and opposed floats are of substantially the same length. However in the present invention the wrap yarns are of rubber or of other elastic-like yarn construction, such for example as the textile yarn covered rubber known as "Lastex," which are under a certain amount of yarn-elongating tension in the machine and in the fabric so that upon its release from the take-up rolls, the plated stitches of elastic on the body stitches form areas of tight flat fabric and the circular series of wrap floats now in lengthwise contracted relaxed non-elongated condition are of lesser length than the opposed fabric of non-plated stitches with the result that the latter fabric is caused to extend outwardly from the face of the fabric. The contractile effect of the circular series of elastic floats (there is a series of floats for each raised welt in the design) is sufficient to retain the opposed fabric in raised welt-like position, the composite effect of the various raised portions of the fabric forming a raised design where the wrap yarns are not plated on the body yarns, the plated portions of the fabric forming a relatively flat complementary background for the raised design.

It will be understood that the principle of the invention is not limited to rib fabric and that it may be used in plain jersey fabric as made upon an open top machine and that the elastic yarn may be incorporated in the fabric in other ways than by being plated on the body stitches, as for example by being incorporated unknit with the body stitches by being fed under the latches of the needles as the latter have the body yarn fed into their hooks. It will also be understood that the invention may be used in flat as well as tubular fabrics and that by the use of contrasting varicolored elastic wrap yarns the plated fabric areas may present a wrap yarn design in itself in addition to presenting a contrasting complementary background for the fabric of the raised welt design which will have the color of the body yarn.

In the use of the fabric in apparel such as a hosiery top or cuff, it serves as a safeguard for the hosiery should the latter be subjected to undue pulling strain by the wearer of the hose as it will elongate under such pull and cushion any otherwise harmful effect on the other portions of the hose. Such conditions often arise as the wearer pulls the hose over the foot and heel into proper position on the leg.

I claim:

1. Knit fabric having courses and wales knitted of relatively inelastic body yarn and having individual walewise extending elastic wrap yarns incorporated therein to contract the fabric walewise to form a raised design thereon, said wrap yarns being incorporated in the body yarn stitches of selected areas of the fabric, the wrap yarns between said areas floating rearwardly of the fabric in a relaxed condition, said wrap yarns having such stretch resistance and said floats being of such length that the body yarn stitches of the non-selected areas of the fabric extend upwardly from the selected areas to form said raised design while the selected areas form relatively flat fabric providing a complementary design for said raised design.

2. Knit fabric having courses and wales knitted of relatively inelastic body yarn and having individual walewise extending elastic wrap yarns knitted therein to contract the fabric walewise to form a raised design thereon, said wrap yarns being knitted with the body yarn to form stitches of wrap and of body yarn in selected areas of the fabric, the wrap yarns between said areas floating rearwardly of the fabric in a relaxed condition, said wrap yarns having such stretch resistance and said floats being of such length that the body yarn stitches of the non-selected areas of the fabric extend upwardly from the selected areas to form said raised design while the selected areas form relatively flat fabric providing a complementary background design for said raised design.

3. Seamless tubular knit fabric having wales and courses knitted of relatively inelastic body yarn and having individual walewise extending elastic wrap yarns knitted therein to contract the fabric walewise to form a raised design thereon, said wrap yarns being knitted with the body yarn to form plated stitches of wrap yarn on body yarn in selected areas of the fabric, the wrap yarns between said areas floating rearwardly of the fabric in a relaxed condition, said wrap yarns having such stretch resistance and said floats being of such length that the body yarn stitches of the non-selected areas of the fabric extend upwardly from the selected areas to form said raised design while the selected areas form relatively flat fabric providing a complementary plated stitch background design for said raised design.

4. Seamless tubular rib fabric having inside rib and outside plain wales knitted of relatively inelastic body yarn of at least one color and having individual walewise extending elastic wrap yarns of at least one other color to contract the fabric walewise to form a raised design thereon, said wrap yarns being knitted in the plain wales with the body yarn to form plated stitches of wrap yarn on body yarn in selected areas of the fabric, the wrap yarns between said areas floating rearwardly of the fabric in a relaxed condition, said wrap yarns having such stretch resistance and being of such length that the body yarn stitches of the non-selected areas of the fabric extend upwardly from the selected areas to form said raised design while the selected areas form relatively flat fabric providing a complementary contrastingly colored plated stitch background design for said raised design.

5. A seamless tubular fabric as set forth in claim 3 in which the outlines of said areas extend at an angle to the wales, in which the floats vary in length, and in which said raised design varies in heighth.

6. A stocking having a leg and a top, said top being made of fabric having courses and wales knitted of relatively inelastic body yarn and having individual walewise extending elastic wrap yarns knitted therein to contract the fabric walewise to form a raised design thereon and to permit walewise elongation of the top, said wrap yarns being knitted with the body yarn to form stitches in selected areas of the fabric, the wrap yarns between said areas floating rearwardly of the fabric in a relaxed condition, said wrap yarns having such stretch resistance and said floats being of such length that the body yarn stitches of the non-selected areas of the fabric extend upwardly from the selected areas to form said raised design while the selected areas form relatively flat fabric providing a complementary background design for said raised design, said wrap yarn floats permitting elongation of said top.

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