

April 16, 1963

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3,085,409

ORNAMENTED KNIT FABRIC

Filed Dec. 21, 1959

3 Sheets-Sheet 1

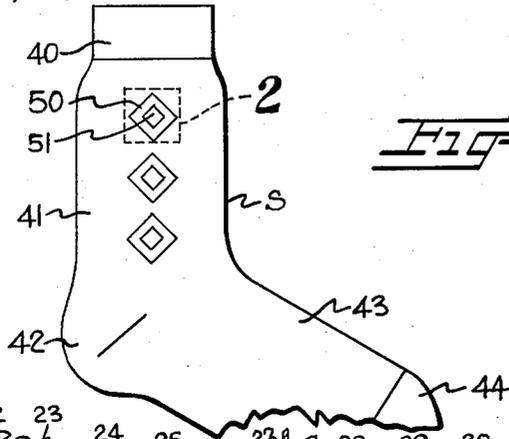


Fig-1

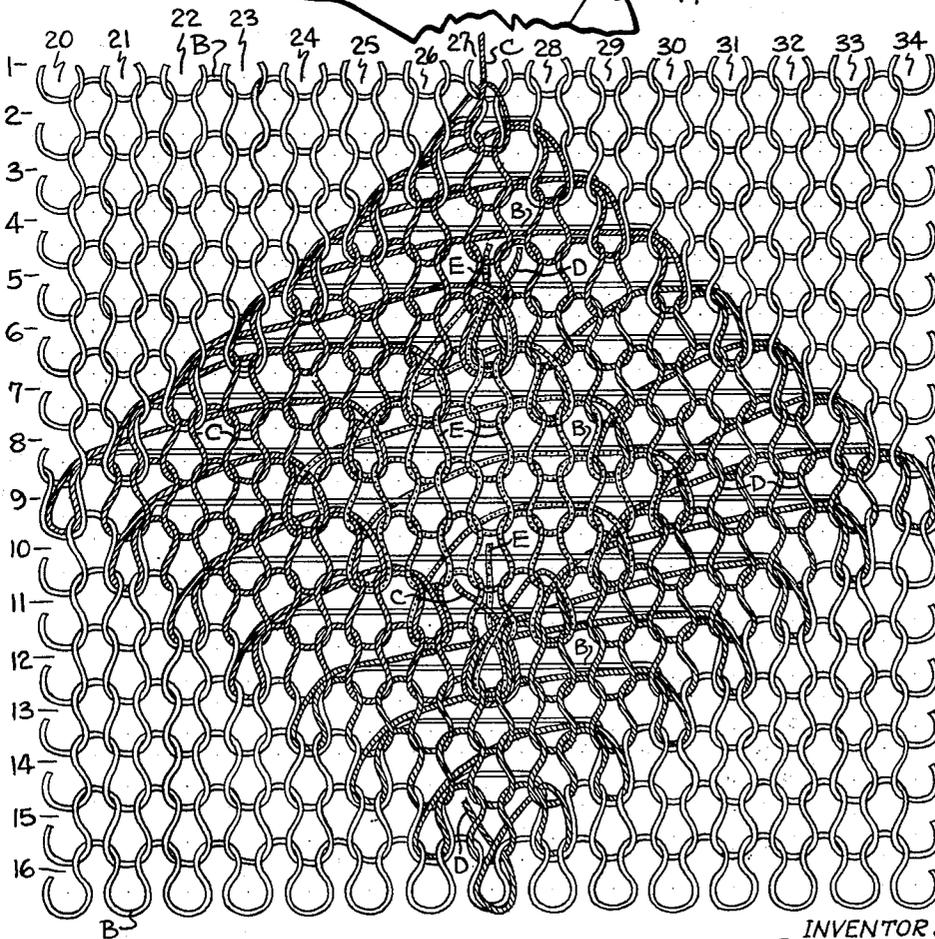


Fig-2

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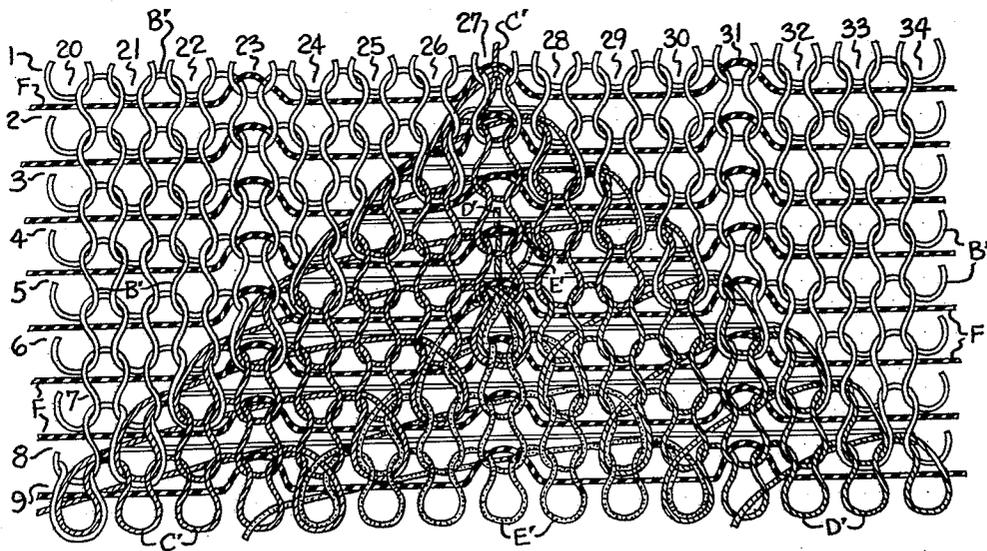
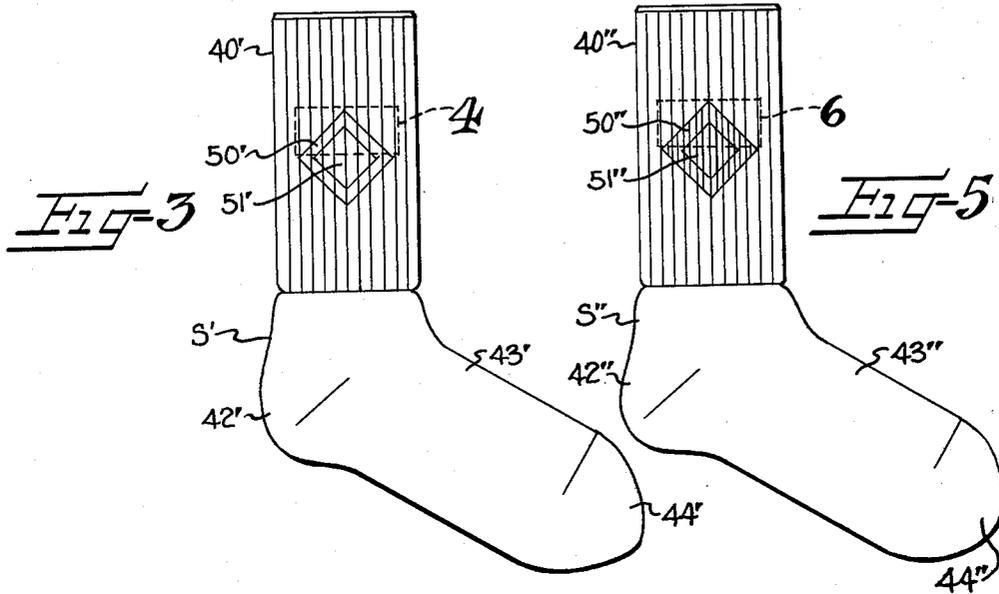


Fig-4

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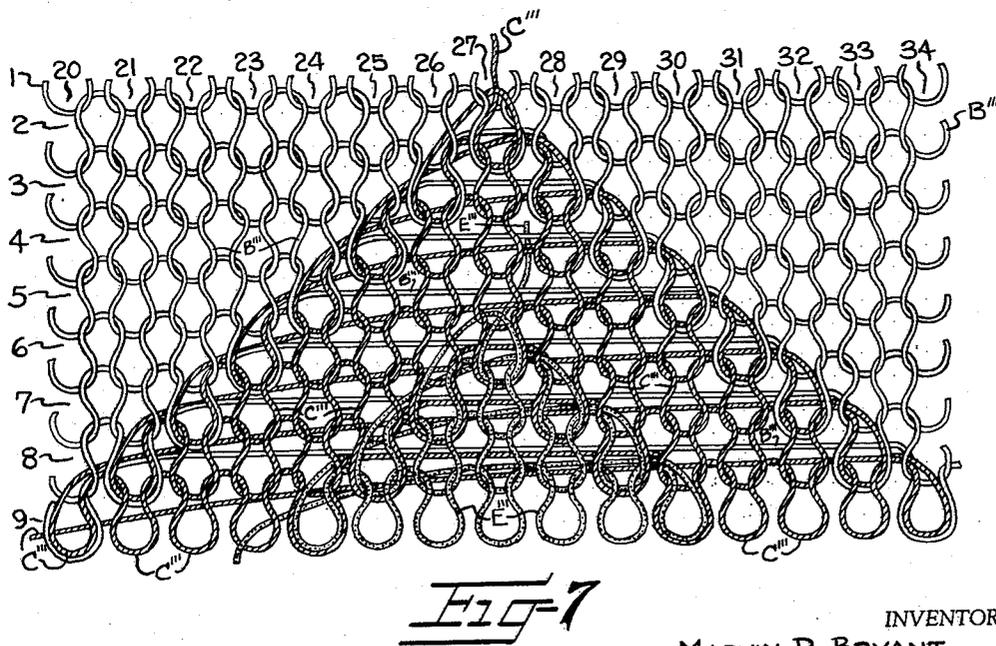
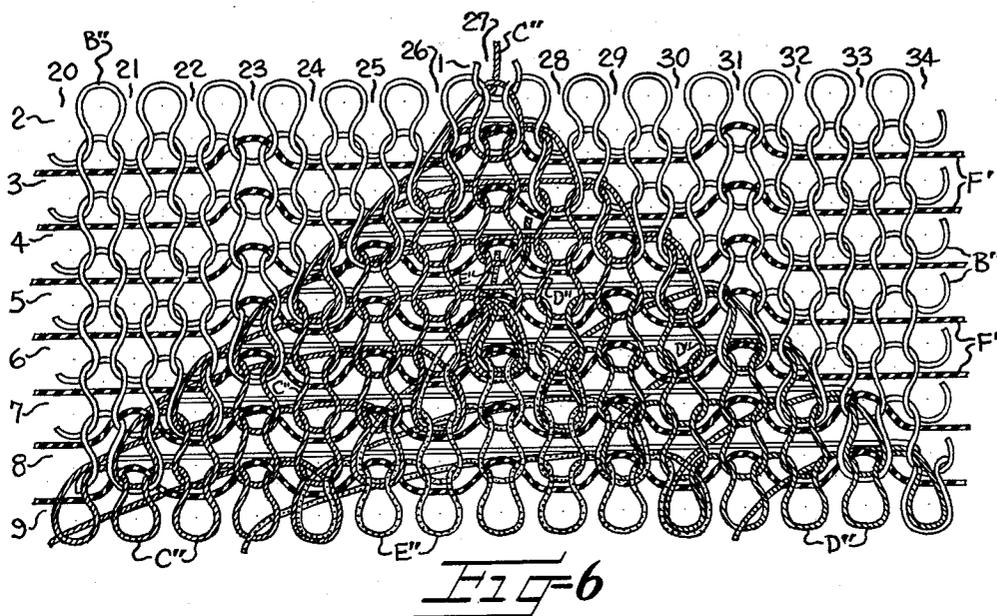
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3,085,409

**ORNAMENTED KNIT FABRIC**

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4 Claims. (Cl. 66-180)

The present invention relates generally to circular knit ornamented fabrics such as hosiery having solid color pattern areas which are knit of ornamental yarns having a different color or character than the main or body yarn and wherein the stitches of the resulting fabric are substantially the same thickness in the ornamented and body areas.

More particularly, the present invention relates to an ornamented fabric in which one ornamental area may be knit to surround another ornamental area and the ornamental yarns are knit during regular or rotary motion of the knitting machine. Also, the knitting of different ornamental yarns to produce so-called "color within color" or "color beside color" ornamental effects may be carried out during the knitting of the body portion of the hose and may also be carried out in combination with the incorporation of an elastic yarn during the knitting of the top or cuff portion of the hose.

Most so-called solid color pattern fabrics are presently produced by special machines in which the needle cylinder is reciprocated and either a complete or partial course is knit with each reciprocation. In this type machine, needle selecting means is provided to raise the needles to pick up and knit different yarns in selected spaced pattern areas or in some cases a single group of needles is activated and a single yarn fed thereto to knit a single pattern area and then the needle cylinder is shogged and another group of needles is activated to knit another pattern area which is joined to the first pattern area. Production on this special type machine is naturally slower than it is on a machine in which the needle cylinder continuously rotates in one direction at a relatively high speed.

Ornamental fabrics have been produced during circular or rotary knitting by plating, floating, wrapping and combinations of these. In the plating process, two or more yarns are fed to each of the needles in the cylinder and when the needles draw stitches a selected yarn is positioned in front of the other yarns in certain pattern areas and another yarn is positioned in front of the other yarns in other pattern areas. The positions of the yarns may be controlled by the manner in which the yarns are fed to the needles or by suitable sinker controls. In the floating process, the needles are controlled to pick up and knit one yarn in certain pattern areas and to knit other yarns in other pattern areas and the yarns which are not knitting during any given pattern area are floated thereacross. In the wrapping process, it is the usual practice to feed the wrap yarn to the same needles which subsequently pick up and knit another yarn whereby the wrap and the other yarn are knit in plated relationship. In some instances, the wrap yarn has been fed to the needles and knit independently of the body yarn but in all known instances, only a single wrap yarn has been independently knit in a pattern area and a wrap yarn has not been independently knit when incorporating an elastic yarn in the fabric to form a solid color ornamental area in the cuff or top of the hose. It is with an ornamental fabric of the type having pattern areas formed of independently knit wrap yarns that the present invention is concerned.

With the foregoing in mind, it is the primary object of the present invention to provide an ornamental knit fabric in which two or more wrap or overhead fed yarns are knit in pattern areas independently of the main or

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body yarn with the body yarn and wrap yarns both being knit on at least one needle along the juncture of the pattern areas and the body portion of the fabric.

It is another object of the present invention to provide a knit article of hosiery having solid color ornamental pattern areas knit of wrap or ornamental overhead fed yarns in the top or cuff portion of the hose in conjunction with the selective laying in of an elastic yarn in certain wales during the knitting of the ornamental cuff.

It is still another object of the present invention to provide ornamental hosiery and method of producing the same whereby a wide range of patterns may be achieved and the hosiery will have the design characteristics of reciprocatorily knit solid color patterns but which may be knit in a rotary manner at a much faster rate of speed so that they may be produced in quantity at much less cost.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevation of a hose illustrating one form of ornamental fabric of the present invention comprising a series of diamond-shaped color within color pattern areas extending down one side of the leg of the hose;

FIGURE 2 is a greatly enlarged fragmentary view of the area enclosed by the dotted rectangle 2 in FIGURE 1 which illustrates the stitch structure and the manner in which the various yarns are knit into the fabric;

FIGURE 3 is a side elevation of another type of hose or half sock wherein the top or cuff has elastic yarn incorporated therein to provide a mock rib effect and having an ornamental pattern incorporated therein;

FIGURE 4 is a greatly enlarged view of that portion of the knit fabric enclosed in the dotted rectangle 4 in FIGURE 3;

FIGURE 5 is a side elevation of a hose similar to that shown in FIGURE 3 but showing the elastic yarn incorporated in a different manner;

FIGURE 6 is a greatly enlarged view of that portion of the knit fabric enclosed in the dotted rectangle 6 in FIGURE 5;

FIGURE 7 is a view similar to the upper portion of FIGURE 2 except showing the ornamental yarns being introduced and knit into the fabric in a different manner.

Referring to FIGURES 1 and 2, an ornamented half-hose or sock, indicated at S, is illustrated for convenience of illustration and it is to be understood that the present invention is not limited to the particular type sock shown nor to the particular diamond-shaped solid color pattern areas shown but may also be utilized in the knitting of hosiery having stripes, squares and various other shapes of ornamental areas. The sock S (FIGURE 1) is provided with a cuff or top 40, a leg portion 41, a heel pocket 42, a foot portion 43 and a toe pocket 44. It will be noted that the leg portion 41 contains the ornamental pattern areas but it is to be understood that the pattern areas could also extend into the foot portion 43, if desired.

In FIGURE 1, the ornamental areas are spaced apart vertically along both sides of the sock S, only one side of which is shown, and each ornamental pattern area includes a first diamond-shaped solid color pattern area 50 which encloses or surrounds a second diamond-shaped solid color pattern area 51. Referring to FIGURE 2, it will be noted that the plain or non-ornamented portion of the fabric is knit with plain stitches from a body yarn B in needle wales 20-34 of course 1. In knitting course 2, the needle in wale 27 is raised by a suitable selecting mechanism to a height sufficient to take an overhead fed

or warp yarn C from an overhead yarn feeding mechanism, not shown, which may be positioned above the circle of needles in a manner similar to a conventional wrap head mechanism. The needle in wale 27 will subsequently take and knit the body yarn B and the wrap yarn C in plating relation in wale 27 during the knitting of the course 2.

During the formation of course 3, the needles in wales 26, 27 and 28 are raised to a height sufficient to take the wrap yarn C in their hooks and the needles in the wales 20-26 and 28-34 take the body yarn B. The needle in wale 27 does not take the body yarn so that the body yarn B floats behind the stitch loop in needle wale 27 of the course 3. Since the body yarn B and the ornamental yarn C are both knit in plated relation in the needle wales 26 and 28 of course 3, the fabric sections are securely joined together.

During the knitting of course 4, the wrap yarn C is taken and knit by the needles in wales 25-29 while the body yarn B is taken and knit by the needles in wales 20-25 and 29-34. When the course 4 is formed, the needles in wales 25 and 29 draw stitches with the yarns B and C in plating relationship while the body yarn B is floated behind the stitches in the needle wales 26-28. Thus, in course 4, single stitch loops of the yarn B are formed in needle wales 20-24 and 30-34 while single stitch loops of the yarn C are formed in needle wales 26-28 and double stitch loops of both yarns are formed in needle wales 25 and 29 to tie the separate solid color areas of this course together. Because the yarn C is fed to raised needles or groups of needles from an overhead feed device, the yarn C is floated from the last needle wale in which it is knit in the preceding course to the first needle wale in which it is knit in the next course.

During the knitting of course 5, the yarn C is fed to the needles in wales 24-30 while the body yarn B is fed to the needles in wales 20-24 and 30-34 so that both yarns are knit on the needles in the wales 24 and 30. The body yarn B is floated behind the stitch loops in wales 25-29 and the wrap yarn C extends from the last stitch loops of the ornamental area in course 4 to the first stitch loop in course 5 and behind the ornamental area 50.

The formation of the ornamental area 51 is begun during the formation of course 6 by selecting the needle in wale 27 to take the wrap yarn C and newly introduced wrap yarns D and E and then knitting the same simultaneously. In course 6, the main body yarn B is fed to the needles in wales 20-23, floated behind the needles in wales 24-30 and fed to the needles in wales 31-34, the wrap yarn C is fed to the needles in wales 23-27, the newly introduced wrap yarn E is fed to the needle in wale 27 and the newly introduced wrap yarn D is fed to the needles in the wales 27-31. Thus, all three wrap yarns C, D and E are knit in plated relationship in the wale 27 of course 6.

In the succeeding courses 7 through 9, the number of needles which take and knit the wrap yarn E is increased in each course so that during the knitting of course 9, the needles in wales 24-30 take and knit the wrap yarn E. It will be noted in FIGURE 2 that the wrap yarn E extends behind the ornamental area 51 and from the last stitch in any given course to the first stitch in the next succeeding course. Beginning with course 10, the number of needles which take and knit the wrap yarn E is decreased in succeeding courses until only a single needle knits the wrap yarn E in course 12.

In the courses 7 through 12, the wrap yarn C is fed to and knit by five needles at the left-hand side of the ornamental area 51. In each succeeding course, down to and including course 9, the five needles which take and knit the wrap yarn C are positioned one needle wale to the left and after course 9 is formed, the five needles which take and knit the wrap yarn C are positioned one needle wale to the right in courses 10, 11 and 12. It

will be noted that the wrap yarn C and the wrap yarn E are both removed from action upon completion of the stitch loop in wale 27 of course 12 and all three wrap yarns C, D and E are knit in plated relationship in this wale.

The wrap yarn D is knit down the right-hand side of the ornamental area 51 and is fed to and knit on five needles in each of the courses 7-12. In each succeeding course, the five needles which take and knit the wrap yarn D are positioned one needle wale to the right, down to and including the course 9. In the course 10, 11 and 12, the five needles which take and knit the wrap yarn D are positioned one needle wale to the left in each succeeding course. Upon completion of the course 12, the wrap yarn D is floated behind the wales 25-30 in course 12 to the needle wale 24 in course 13.

During the formation of course 13, the wrap yarn D is knit on the needles in wales 24-30 and the body yarn B is knit on the needles in wales 20-24 and 30-34. The body yarn B is floated behind the wales 25-29 in course 13 and the stitch loops in wales 24 and 30 are formed of both the wrap yarn D and the main body yarn B in plated relationship. During the formation of course 14, the number of needles which are raised to take and knit the wrap yarn D is decreased so that the wrap yarn D is knit in the wales 25-29 while the body yarn B is knit in the wales 20-25 and 29-34. When course 15 is knit, the wrap yarn D is knit in wales 26, 27 and 28 while the body yarn B is knit in the wales 20-26 and 28-34. In knitting course 16, the wrap yarn D is knit in wale 27 only while the body yarn B is knit in the wales 20-34.

Thus, when the courses 1-16 are knit, a solid color pattern is formed which includes an ornamental area 51 and an ornamental area 50 which surrounds the area 51. In the fabric shown in FIGURE 2 the area 51 is formed of a single wrap yarn E and the surrounding pattern area 50 is formed of a pair of wrap yarns C and D. The wrap yarn C extends down and around the left-hand side of the ornamental area 51 and the wrap yarn D extends down and around the right-hand side of the ornamental area 51 to thus produce a solid color within color pattern which is formed of wrap yarns. Although the wrap yarns C and D are illustrated in FIGURE 2 as being of different colors, for purposes of distinguishing between them, in most instances the same color of yarn would be used so that a single color would surround the pattern area 51, although two separate yarns of the same color could be utilized in forming the pattern area 50.

The same pattern effect or ornamental appearance as shown in FIGURE 2 may be obtained by using only two overhead fed or ornamental wrap yarns, if desired. Referring to FIGURE 7, a modified form of ornamental solid color fabric is illustrated in which a single wrap yarn has been used in forming each of the solid color pattern areas 50 and 51. Since the fabric shown in FIGURES 2 and 7 is identical except for the manner in which the ornamental yarns are fed to the first pattern area 50, portions of FIGURE 7 which correspond with portions of FIGURE 2 will bear the like reference characters with the triple prime notation added.

In forming the fabric shown in FIGURE 7, the wrap yarn C''' is first introduced to the fabric at needle wale 27 of course 2 where it is knit in plated relationship with the body yarn B''. In forming course 3, the wrap yarn C''' is fed to and knit by the needles in the needle wales 26-28 while the body yarn B'' is knit in the needle wales 20-26 and 28-34 and floated across the needle wale 27. In course 4, the wrap yarn C''' is knit in wales 25-29. In course 5, the wrap yarn C''' is knit in wales 24-30. In course 6, the wrap yarn C''' is knit in wales 23-31 and a newly introduced wrap yarn E''' is knit in plated relationship with the wrap yarn C''' in the single wale 27. During the knitting of courses 3-6 the body yarn B'' is knit in plated relationship with the endmost wales of the wrap yarn C''' and floated behind the intervening

wales. In course 7, the wrap yarn E''' is knit in the wales 26-28 while the wrap yarn C''' is knit in the wales 22-26 and 28-34. During the knitting of course 8, the wrap yarn E''' is knit in the wales 25-29 while the wrap yarn C''' is knit in the wales 21-25 and 29-33 and the wrap yarn C''' is floated behind the wales 26-28. In knitting course 9, the wrap yarn E''' is knit in the wales 24-30 while the wrap yarn C''' is knit in the wales 20-24 and 30-34 and the wrap yarn C''' is floated behind the wales 25-29.

Thus, in the modification shown in FIGURE 7, the single wrap yarn C''' is used to knit the solid color portions of the first pattern area 50 at each side of the second pattern area 51 and the wrap yarn E''' is used to knit the second pattern area 51. It will be noted that the overhead fed or wrap yarns C''' and E''' extend behind the fabric and from the last wale in which they are knit in any given course to the first knit wale in the next succeeding course. Also, the wrap yarn C''' is knit with the end-most stitches of the wrap yarn E''' and the body yarn is floated behind the wales of both solid color pattern areas 50 and 51.

Referring to FIGURES 3 and 4, there is shown a sock S' which has a top or cuff portion 40' in which an elastic yarn F is incorporated and which also contains a first solid color pattern area 50' which encircles a second solid color pattern area 51'. Referring to FIGURE 4, it will be noted that the solid color pattern areas 50' and 51' are formed of wrap yarns C', D', and E' in an identical manner to that described in connection with FIGURE 2 and the fabric is knit in corresponding needle wales 20-34 and courses 1-9. Therefore, the formation of the solid color portion of the fabric shown in FIGURE 4 will not be described in detail. The elastic yarn F is incorporated in each course of the fabric and in the wales 23, 27 and 31 of FIGURE 4. The elastic yarn F is incorporated throughout the top or cuff 40' of the sock S', including the first and second pattern areas 50' and 51'. This is accomplished by raising the needles in wales 20-22, 24-26, 28-30 and 32-34 high enough to take the elastic yarn in their hooks while leaving the remaining needles in wales 23, 27 and 31 at a lower elevation. All of the needles are then raised to shed level and as the stitch loops are formed, the elastic yarn F will be incorporated in the stitches in wales 23, 27 and 31 and floated behind the stitches in the intervening wales. The stitch loops behind which the elastic yarn F is floated will bulge outwardly and form mock ribs in the fabric.

Referring to FIGURES 5 and 6, there is shown another sock S'' which has a mock rib top or cuff 40'' and first and second pattern areas 50'' and 51'' which are similar to the pattern areas 50' and 51' shown in FIGURES 3 and 4. However, in FIGURES 5 and 6, the elastic yarn F' is taken in the hooks of the needles in wales 20, 22, 24, 26, 28, 30, 32 and 34 during the knitting of the pattern areas 50'' and 51'' while the elastic yarn F' is taken in the hooks of the needles in wales 20-22, 24-26, 28-30 and 32-34 during the knitting of the body yarn B''. The fabric shown in FIGURE 6 thus has the elastic yarn F' incorporated in every other or alternate wales in the pattern areas 50'' and 51'' and the elastic yarn F' is incorporated in every fourth wale throughout the body of the top or cuff 40''. Thus, a wide mock rib effect is achieved in the body portion of the cuff while a narrower mock rib effect is achieved in the pattern areas of the fabric.

Although the elastic yarn has been described as being incorporated in certain wales, it is to be understood that the described arrangement can be varied, if desired. Also, the fabric is described as having diamond shaped solid color pattern areas formed with wrap yarn but it is to be understood that the pattern areas could be formed in other shapes without departing from the spirit of the invention. Where the terms "elastic yarn" appears in the specification and claims it is intended to include any type

of stretchable strand having sufficient resiliency to cause the fabric to contract.

The solid color pattern fabric disclosed in the present invention can be rapidly produced by round and round or rotary knitting as opposed to prior types of solid color pattern fabrics which have been produced by reciprocatory knitting and although the pattern areas of the present fabric are formed of wrap yarns there is no bleeding through or overlapping of one color area into another, as frequently occurs when knitting ornamental pattern fabrics by plating and the like.

In the drawings and specification there have been set forth preferred embodiments of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A circular knit hosiery fabric having successively knit courses and wales of stitch loops comprising a body portion and interconnected solid color ornamental areas, a body yarn forming the stitch loops of the body portion, one of said ornamental areas surrounding another of said ornamental areas, a first ornamental yarn forming the stitch loops of said one ornamental area which extend along one side of the other ornamental area, a second ornamental yarn forming the stitch loops of said one ornamental area which extend along the other side of said other ornamental area, a third ornamental yarn forming the stitch loops of said other ornamental area, said ornamental yarns floating from the last stitch loop of a course to the first stitch loop of the next course in each ornamental area, and the body yarn floating behind the stitch loops formed in the ornamental areas.

2. A circular knit hosiery fabric having successively knit courses and wales of stitch loops comprising a body portion and interconnected solid color ornamental areas, the walewise width of said ornamental areas varying in successive courses of the fabric, a body yarn forming the stitch loops of the body portion, one of said ornamental areas surrounding another of said ornamental areas, a first ornamental yarn forming the stitch loops of said one ornamental area which extend along one side of the other ornamental area, a second ornamental yarn forming the stitch loops of said one ornamental area which extend along the other side of said other ornamental area, a third ornamental yarn forming the stitch loops of said other ornamental area, said ornamental yarns floating from the last stitch loop of a course to the first stitch loop of the next course in each ornamental area, and the body yarn floating behind the stitch loops formed in the ornamental areas.

3. A circular knit hosiery fabric having successively knit courses and wales of stitch loops comprising a body portion and interconnected solid color ornamental areas, a body yarn forming the stitch loops of the body portion, one of said ornamental areas surrounding another of said ornamental areas, a first ornamental yarn forming the stitch loops of said one ornamental area which extend along one side of the other ornamental area, a second ornamental yarn forming the stitch loops of said one ornamental area which extend along the other side of said other ornamental area, a third ornamental yarn forming the stitch loops of said other ornamental area, said ornamental yarns floating from the last stitch loop of a course to the first stitch loop of the next course in each ornamental area, an elastic yarn incorporated without interknitting in spaced stitch loops of the body portion and both ornamental areas, and the body yarn floating behind the stitch loops formed in the ornamental areas.

4. A circular knit hosiery fabric having successively knit courses and wales of stitch loops comprising a body portion and interconnected solid color ornamental areas, a body yarn forming the stitch loops of the body portion, one of said ornamental areas surrounding another of said ornamental areas, a first ornamental yarn forming the

stitch loops of said one ornamental area which extend along one side of the other ornamental area, a second ornamental yarn forming the stitch loops of said one ornamental area which extend along the other side of said other ornamental area, a third ornamental yarn forming the stitch loops of said other ornamental area, said ornamental yarns floating from the latch stitch loop of a course to the first stitch loop of the next course in each ornamental area, an elastic yarn incorporated without interknitting in stitch loops in certain wales of the body portion and incorporated without interknitting in said certain wales and other wales therebetween in both ornamental areas, and the body yarn floating behind the stitch loops formed in the ornamental areas.

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