

Oct. 31, 1961

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3,006,175

UNDERWEAR

Filed May 5, 1958

2 Sheets-Sheet 1

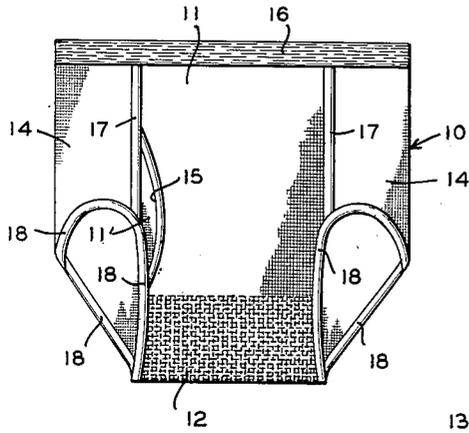


FIG. 1

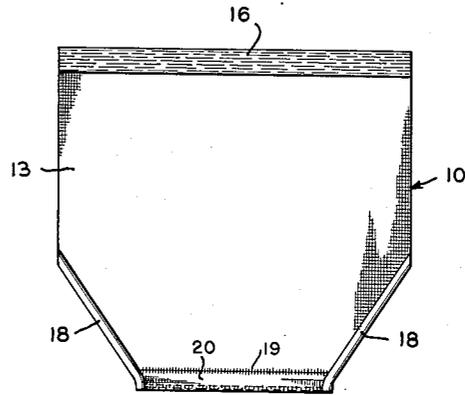


FIG. 2

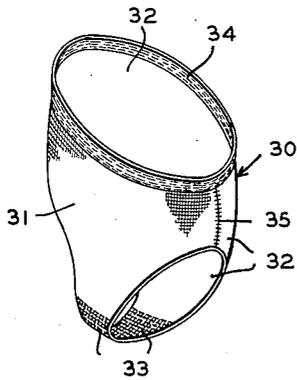


FIG. 3

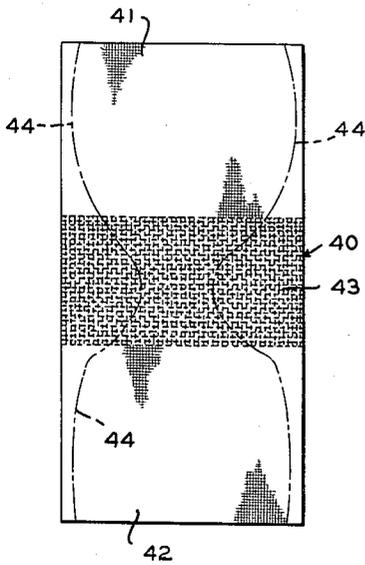


FIG. 4

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2 Sheets-Sheet 2

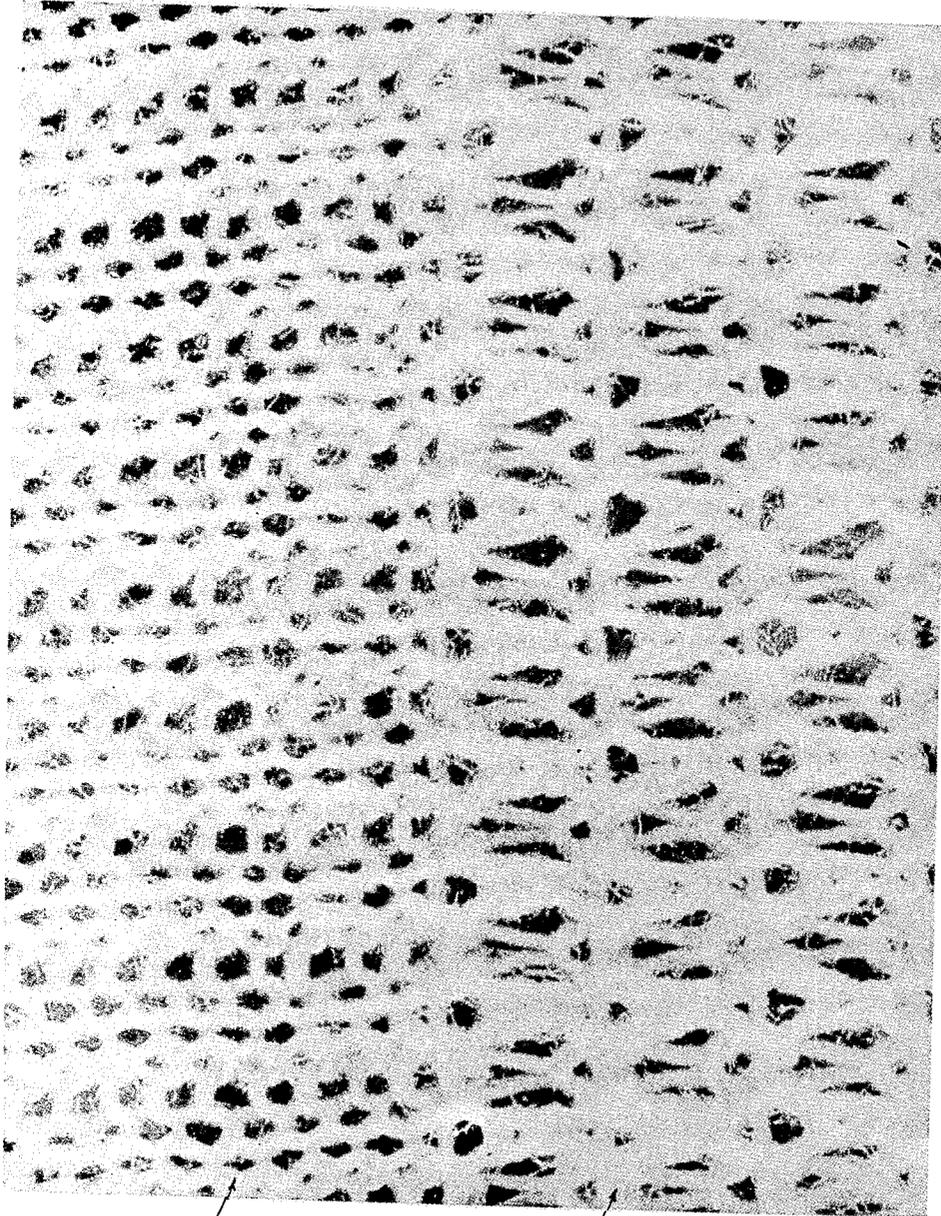


FIG. 5

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3,006,175
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The present invention relates to the production of knitted undergarments such as men's and boys' briefs, undershorts, midways, ankle length drawers and ladies' and children's panties to provide in such undergarments rib knit body sections and crotch sections of enhanced elasticity and porosity which are connected in seamless manner to said rib knit sections.

In accordance with the invention, a section of fabric is rib knitted using a knitting machine comprising a pair of cooperating needle banks having opposed independently mounted needles. When the rib knitted section is completed, the pattern of knitting is altered by having the needles of one of the needle banks produce alternating single or multiple courses of tuck stitches and plain stitches to produce a section of increased elasticity and porosity. When the section of increased elasticity and porosity has been completed, the knitting machine is again employed with the needles of both needle banks knitting plain stitches only to produce a second section of rib knitted product. The switch from rib knitting to pattern knitting is effected by merely altering the cams which project the needles on one of the needle banks so that the rib and patterned sections are knitted together to form a single piece of fabric having no seam between sections. This single knitted piece is then cut to provide at least one rib knitted body portion and a seamlessly connected crotch portion of increased elasticity and porosity. Upon sewing the back and front body portions together, a knitted undergarment is quickly and efficiently provided possessing improved appearance, comfort and utility.

The knitting which is employed in accordance with the invention will now be more precisely described.

A pair of cooperating needle banks having needles mounted thereon for independent movement with the needles of one of said banks being interposed between adjacent needles of another of said needle banks is operated in conventional manner to knit with the needles of both of said banks to produce conventional rib knit courses. After a desired number of said rib knit courses have been knitted to produce a rib knit body section, the pattern of knitting is altered. In the new knitting pattern, the needles of one of the needle banks is operated in conventional manner so that whenever a fresh yarn is presented to the needles, these needles receive the fresh yarn and knit off the old yarn loop thereon. However, the needles of the cooperating needle bank are operated differently. During some of the knitting courses, the needles of the cooperating bank are projected to an intermediate or "tuck" position in which the fresh yarn is received within the hook of the needles but the old yarn loop is not cast off the latch. Thus, when the needle is retracted, a pair of yarn loops is left trapped within the hook and the old yarn loop is not knitted off. When a plurality of "tuck" courses are knitted, additional yarn loops pile up in the hooks of the cooperating needle bank. When the needles of the cooperating needle bank are knitted in conventional manner, all of the piled up yarn loops are knitted off. When courses of "tuck" stitches and courses of conventional stitches are knitted with the cooperating needle bank while the other needle bank continuously knits in conventional manner, a pattern is formed in which the fabric produced possesses increased elasticity and porosity.

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The invention is preferably carried out on a multi-feed circular rib knitting machine in which the stitch cams corresponding with yarn feeds which are spaced apart by other yarn feeds are automatically changeable to enable conversion from a conventional cam which projects the needles to a "cast off" position to a cam which only projects the needles to a "tuck" position to enable courses of "tuck" stitches to be produced. Thus, whenever the "tuck" cams are in operative position, conventional stitch cams with associated yarn feeds will pass the needles to cause conventional rib knitting action to take place for one or more courses. Then, when one or more yarn feeds associated with "tuck" cams passes on one of the needle banks, conventional stitches will be knit by one of the needle banks and "tuck" stitches will be knit by the other bank. Repeating this, a crotch section is knitted possessing increased elasticity and porosity. When the yard goods so produced is cut in appropriate manner, the cut product will possess a crotch section of increased elasticity and porosity which is connected without the presence of a seam to at least one and desirably two body sections which are rib knitted.

In a particularly preferred form of the invention, yard goods are produced having a pair of horizontal rib knitted sections separated by a horizontal patterned section which is produced to provide increased elasticity and porosity in accordance with the invention. After appropriate cutting to include terminal rib knitted portions and an intermediate patterned or mesh portion, there is provided rib knitted front and back body portions and an intervening crotch portion of increased elasticity and porosity which is connected to the rib knitted front and back portions without the presence of any seam.

The invention will be more fully understood from the description which follows taken in conjunction with the accompanying drawings in which:

FIG. 1 is a front view of a pair of men's undershorts produced in accordance with the invention;

FIG. 2 is a back view of the undergarment shown in FIG. 1;

FIG. 3 is a perspective view of a pair of ladies' panties produced in accordance with the invention;

FIG. 4 is a plan view of a single piece of yard goods knitted in accordance with the invention and having phantom lines drawn across the same to indicate the lines on which the piece is to be severed to produce the undergarment of FIG. 3; and

FIG. 5 is a photographic illustration, on an enlarged scale, and showing that portion of the undergarment of FIGS. 1 and 2 where the front body portion joins the crotch portion to illustrate each of these portions and their seamless interconnection.

Referring more particularly to the drawings, the men's under shorts pictured in FIGS. 1 and 2 is generically identified by the numeral 10 and comprises a front body portion of panel 11 knitted together with a crotch portion 12 of increased elasticity and porosity and a back portion 13 which extends around the sides of the undergarment as indicated at 14. The front portion 11 is doubled, the underlying layer of fabric being designated 11' to form the fly front 15. Both of the layers which combine to form the front portion 11 are similarly knitted to include, without additional seam, the crotch portion 12. The body portions are seamed at their upper end to the elastic waistband 16. The front and back body portions are seamed together as indicated at 17 and the free edges of the various panels are seamed as indicated at 18. The lower ends of front body portions 11 and 11' are seamed together and to the back body portion as indicated at 19. The crotch portion 12 preferably terminates before the seam 19 to provide the rib knitted border 20.

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The ladies' panties pictured in FIG. 3 and identified by numeral 30 is sewn from a single piece of fabric which has been cut to provide a front body section 31, a rear body section 32 and an interconnecting crotch portion 33. The sections 31 and 32 are rib knitted whereas the crotch portion 33 is knitted with tuck stitches as explained hereinbefore. A waistband 34 is provided as shown and the sections 31 and 32 are seamed at the sides as indicated at 35.

FIG. 4 shows a single piece of yard goods 40 comprising rib knitted portions 41 and 42 interconnected by patterned portion 43. Phantom lines 44 indicate cut lines for producing a blank which when sewn together at the sides and provided with a waistband will produce the ladies' panties of FIG. 4.

In order to provide the desired elasticity and porosity, rib knitting may be performed using single opposed needles (1 x 1 needle positioning). It is preferred that there be employed groups of opposed needles so that the rib knitting is 2 x 2 or greater, e.g., 3 x 3, 2 x 4, 3 x 6, etc. A 2 x 1 knitting arrangement may also be used.

The invention is specifically illustrated with a circular knitting machine having a cylinder and a dial and either a 1 x 1 or a 2 x 2 needle arrangement with eight yarn feeds. It will be appreciated that twelve, sixteen, twenty or more yarn feeds may also be used. When the needles of both needle banks are fully projected and retracted, a rib knit product is produced. However, when the dial, for example, is caused to knit some tuck courses, and then some plain courses, a patterned fabric will be produced. Some illustrative preferred patterned knitting sequences are set forth below.

Pattern sequence #1 (2 x 2 needle positioning)

Feed Number	Dial Action	Cylinder Action
1.....	P.....	P.
2.....	P.....	P.
3.....	T.....	P.
4.....	T.....	P.
5.....	P.....	P.
6.....	P.....	P.
7.....	T.....	P.
8.....	T.....	P.

P designates a plain stitch and T designates a tuck stitch.

Pattern sequence #2 (1 x 1 needle positioning)

Feed Number	Dial Action	Cylinder Action
1.....	P.....	P.
2.....	P.....	P.
3.....	T.....	P.
4.....	P.....	P.
5.....	P.....	P.
6.....	T.....	P.
7.....	T.....	P.
8.....	T.....	P.

The fabric pictured in FIG. 5 is produced by Pattern Sequence #2 set forth above.

The invention is defined in the claims which follow.

I claim:

1. A method of producing men's undershorts, ladies' panties and the like, comprising a rib knit body and a crotch portion of increased porosity and elasticity knitted to said body comprising, rib knitting a first section of fabric with cooperating needle banks having opposed independently mounted needles, continuing said rib knitting by projecting the needles of one of said needle banks on only some of the knitting courses to a tuck position to

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produce a second section of knitting in which the fabric knitted is of increased porosity and elasticity, to thereby provide a single knitted piece having a rib knitted section knitted to a patterned section of increased porosity and elasticity, severing an undergarment blank from said single knitted piece to provide a crotch section of increased porosity and elasticity and sewing said blank to form an undergarment in which said rib knit body includes said first section of fabric and said patterned section constitutes the crotch portion thereof.

2. A method as recited in claim 1 in which said needles of one of said needle banks are repetitively projected to a tuck position on a plurality of consecutive knitting courses.

3. A method as recited in claim 1 in which at least one of said cooperating needle banks is provided with groups of adjacent needles opposing the needles of the other of said needle banks.

4. A method of producing men's undershorts, ladies' panties and the like comprising a rib knit body and a crotch portion of increased porosity and elasticity knitted to said body comprising rib knitting a first section of fabric with cooperating needle banks having opposed independently mounted needles, continuing said rib knitting by projecting the needles of one of said needle banks on only some of the courses of knitting to a tuck position to produce a second section of knitting in which the fabric knitted is of increased porosity and elasticity, further continuing said rib knitting with the needles of said cooperating needle bank to produce a third section of rib knitted fabric and thereby provide a single knitted piece having a pair of rib knitted sections separated by a patterned section of increased porosity and elasticity, severing an undergarment blank from said single knitted piece to provide a crotch section of increased porosity and elasticity and sewing said blank to form an undergarment in which said patterned section constitutes the crotch portion thereof.

5. A method as recited in claim 4 in which said needles of one of said needle banks are repetitively projected to a tuck position on a plurality of consecutive knitting courses.

6. A method as recited in claim 4 in which said single piece of fabric is severed to provide a rib knitted front portion, a rib knitted back portion and an intervening crotch portion and said front and back portions are sewn together at their sides to provide an undergarment.

7. A method as recited in claim 4 in which said single piece of fabric is of uniform width and is sewn at its sides to a bulk portion to provide an undergarment.

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