FOUNDATION GARMENT AND METHOD OF MAKING SAME

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References Cited
UNITED STATES PATENTS
2,026,963 1/1936 Burns 66/176
2,040,058 5/1936 Mendel et al. 66/176
2,074,119 3/1937 Boysen et al. 66/175
3,077,758 2/1963 Sicilian 66/192
3,520,155 7/1970 Koppenberg 66/190
3,570,270 3/1971 Koppenberg 66/193

FOREIGN PATENTS OR APPLICATIONS
1,090,516 3/1955 France 66/195
1,143,424 10/1957 France 66/195

1,585,445 9/1969 Germany 66/192
1,595,181 7/1970 France 66/177

OTHER PUBLICATIONS

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ABSTRACT
Foundation garments having a front panel of a different fabric construction than that of the rear panel are made in continuous web form on a double needle bar warp knitting machine, then cut from the web along transverse lines and inverted. One warp-knit, single fabric is power net with stretchable-retractive yarns extending wale-wise thereof to form a circumferentially stretchable rear panel in each garment. The other warp-knit, single fabric is in a simulated weave pattern and made of less stretchable warp yarns, to form a front restraint panel of woven appearance in each tubular garment, in which the “weft” portions extend axially.

8 Claims, 7 Drawing Figures
Fig. 1.

Fig. 2.

Fig. 3.

EXHIBIT B

Fig. 4.

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CROSS REFERENCES TO RELATED APPLICATIONS

This application relates to my applications, Ser. No. 776,938, filed Nov. 19, 1968, entitled WARP KNITTED GARMENTS AND APPARATUS AND METHOD FOR MAKING THE SAME; Ser. No. 50,234, filed June 26, 1970, entitled SIMULATED-WEAVE, WARP-KNIT FABRIC AND METHOD FOR MAKING SAME; and Ser. No. 55,490 filed July 16, 1970, entitled APPARATUS AND METHOD FOR WARP KNITTING A SIMULATED WOVEN FABRIC, all of said applications, and this application, being owned by a common Assignee.

BACKGROUND OF THE INVENTION

This invention is especially related to the warp knitting of garments on Rascal machines, especially of the double needle bar type, to the end of producing foundation garments, panties, or the like, at high speed and low cost, preferably in continuous web form, ready to be cut transversely into individual garments. In my above-mentioned patent application, Ser. No. 776,938, the two single fabrics, warp knitted on the two needle bars of a machine such as the "Fashionmaster" made by Cocker Machine and Foundry Company of Gastonia, North Carolina, have stretchable retractive yarns inlaid wale-wise and are interknitted along spaced coursewise extending strips to form horizontal, or coursewise, extending tubes. When cut along the strips and turned through 90° the wale-wise extending stretch yarns extend circumferentially around the tubular garment. The front panels and the rear panels of the resulting garment are usually of the same knitted structure and of equal stretchability.

In the other two patent applications mentioned above, the warp knitting machine, whether single or double needle bar, is modified to produce a simulated weave pattern in the warp knit fabric either similar in appearance to the Co-We-Nit fabric of Karl Mayer Co., Offenbach, Germany, or in a knitted structure in which the chain stitch yarns also serve as the "weft" yarns.

It has heretofore been proposed to form stretchable knitted girdles with restraining bands, or areas, of non-stretchable fabric, by either sewing a patch or band of nonstretchable fabric over the front knitted panel, or by incorporating a set of less stretchable yarns in a central band, of sinusoidal shape and forming a tube with a single seam. The latter type garments are disclosed in U.S. Pat. No. 3,177,875 to Garson of Apr. 13, 1965 and in U.S. Pat. No. 3,236,241 to Alexander of Feb. 22, 1966, and they are characterized by having as much restraining area in the front panel as in the rear panel. Thus the rear panel which preferably should be able to stretch to conform to the shape of the wearer is unduly restrained. It will be understood that the restraining band of these patents is continuous around the tubular body, probably for the reason that they are warp knit in a single fabric and the restraining warp yarns cannot simply disappear but must be continuous with the web.

SUMMARY OF THE INVENTION

In this invention, a spot pattern, or area, of restraining yarns which can be localized, in only one panel, and only in the central portion of the panel, if desired, is achieved. Thus the foundation garment whether girdle, panty, or panty girdle, is formed with a tubular body, the major portion of the area of which is of stretchable, retractive yarns, for example, the rear panel and the periphery of the front panel, while the minor portion of the area is of less stretchable, or non-stretchable, yarns, for example, the central portion of the front panel to form an integral, built-in, knitted restraint panel.

This is accomplished by warp knitting a web of two superposed single fabrics, interknitted at spaced coursewise extending strips to create coursewise extending tubes, the strips forming the side seams or the crotch seams when the garments are cut from the web, turned inside out and turned through 90° for use as tubular garments. While this concept is taught in my said U.S. patent application Ser. No. 776,938, instead of inlaying stretchable retractive yarns warp-wise of both single fabrics, in this invention only the single fabric which is to form the rear panels of the garments have such stretch yarns, or strands incorporated therein. The other single fabric, which is identical in area with the stretch yarn fabric while in web form on the warp knitting machine, is warp knit of less stretchable, or non-stretchable, strands, and in a simulated weave pattern, such as disclosed in my above mentioned patent applications. Not only are the front and rear panels of the tubular garment each of a different knitted fabric structure, but the stretch yarns of the rear panel extend circumferentially and the weft portions of the less stretchable weave yarns of the front panel extend axially of the tubular garment. Any desired wale-wise area of either fabric could be warp knit of yarns of various denier, stretchability, or composition, but I have discovered that when the rear panel is stretchable and the identical width front panel is less stretchable, the resulting tubular garment blank stretches desirably when donned by the wearer, so that the marginal portions of the rear panel stretch around the hips, waist and legs to form a peripheral band around the front panel with the restraint area centrally of the front panel.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic side elevation of a typical two needle bar Rascal warp knitting machine showing the continuous webs of horizontal tubular garments of the invention;

FIG. 2 is a rear elevation of the webs shown in FIG. 1 on an enlarged scale;

FIG. 3 is a much enlarged view of the simulated weave warp knit structure of one of the two single fabrics;

FIG. 4 is a view similar to FIG. 3 of another simulated weave warp knit structure;

FIG. 5 is a view similar to FIGS. 3 and 4, but showing the power net structure of the other of the two single fabrics with inlaid stretchable-retractive yarns and with filler yarns;

FIG. 6 is a rear elevation of a foundation garment cut from the web, turned inside out and ready for wear; and
FIG. 7 is a front elevational view of the garment shown in FIG. 6, donned by a wearer and in stretched condition.

DEFINITIONS

The following terms are used herein, in what are believed to be their common, generally accepted and universally applied meanings in the textile art, as set out below:

Woven Fabrics — Interlacings of two sets of yarns usually oriented at right angles to each other. One set is called warp (or woof) and generally constitutes the vertically oriented yarn in the apparel unit. The other set of yarns called weft (or filling) and generally constitutes the horizontally oriented yarn in the apparel unit.

None of the yarns in a woven fabric form a bight or loop in the interlacement part of the structure; special fabrics have surface loops extending above the yarn interlacement level for surface effects.

Warp Knitted Fabrics — Interloopings of individual yarn threads coming from one (at least) set of yarns called warp. Interlooping is accomplished by moving the yarn between loops laterally in a transfer motion from one needle (loop former) to an adjacent needle. Although each yarn as knitted "vertically" on each needle forms a chain of loops with noticeable vertical orientation, careful study of the warp knitted fabric shows that the yarns in fact do not lie unidirectionally as in a woven fabric.

Warp Knit Net — By cross interlooping two sets of warp yarns, both oriented vertically to the fabric web (and the machine) a net (fishnet, lacenet, net net, net structure) is made in which the interlooping ties are diagonal to the vertical chain stitch line. There are no horizontal ties.

Powernet — On inserting (not necessarily knitting or looping or interlooping) an elastic yarn in the warp of vertical direction and under tension, a fabric is knitted which, on release from tension, collapses or retracts and thereafter has stretch, recoverable stretch, and power (modulus) in stretch and recovery.

Knitting Simulated Weaves — In order to approximate the appearance and/or the mechanical performance of a woven fabric on a warp knitting machine, it is necessary to cause a yarn to lie at right angles to the preponderantly vertical direction of the main, "original," or base warp yarn. This may be done by

A. Causing a second set of vertically oriented feed yarns to be moved horizontally (or laterally) from needle to needle by a special lateral movement of the yarn guides.

B. Inserting a yarn or yarns from a second set source which is oriented from feed to fabric 90° from the warp or base set of yarns.

In warp knitting, the specifically laterally oriented yarns are referred to as weft yarns because they perform the intended function of a weft yarn commonly known in woven fabric.

As no knitted fabric is precisely like any woven fabric, the terminology "simulated weaves" is used.

As shown in FIG. 1, the warp knitting machine 20 is of the Raschel type with two needle bars 21 and 22, two sets of guide bars 23 and 24, and suitable powered actuation and patterning mechanism 25 to cause the guide bars to oscillate through two full strokes for each single stroke of the needle bars. The machine 20 may be a modified version of the "Fashionmaster" made by Cocker Machine and Foundry Company of Gastonia, N.C., or any equivalent machine, capable of making the simulated weave patterns of FIGS. 3 and 4 and the power net patterns of FIG. 5.

As disclosed in detail in the above specified patent application, Ser. No. 776,938, each needle bar 21 and 22 produces a continuous warp knit, single fabric 27 or 28, each from a separate set of warp strands 29 or 30, the single fabrics 27 and 28 being joined by interknitting one set of strands with the other at spaced coursewise extending, doubled fabric strips 31 or 32 which define a succession of horizontal, open-ended, coursewise extending tubes 33 or 34. The web 36 of tubular material may be wound up on wind-up roll 37 and the web later cut transversely along the strips 31 and 32 to form individual generally tubular bodies or garments, such as girdles, panty girdles, sweaters, or panties 38, the garments 38 being turned inside out to cover the side seams 39 and 40. A crotch seam 41 may be interknitted to form panties.

A plurality of stretchable-retractive warp yarns 42 are inlaid wale-wise of the stitches of the base yarn 43 of at least one single fabric 28, the power net 28 preferably including suitable filler yarns 44 to create attractive waist bands 45 and leg bands 46. The stretch yarns 42 extend circumferentially of the garment 38, when the garment is cut from the web and turned through 90°, thereby forming a stretchable retractive rear panel 47 which conforms and stretches to fit the shape of the wearer as shown in FIG. 7.

The single fabric 27 is formed of warp strands 30 which are less stretchable-retractive than the strands 42 and which preferably are substantially non-stretchable so that they may form a non-stretch restraint panel, or area, 50 in the front of the garment 38. As shown in FIG. 3, the warp strands 30 may include a chain stitch yarn 51 (shown in black), a pair of warp yarns 52 and 53, (shown cross hatched), and a warp yarn 54 designated as a "weft" yarn (shown in white), having weft portions 56, thereby producing a simulated weave pattern as disclosed in the above mentioned patent application, Ser. No. 55,490, and as known in the trade as the Co-We-Nit process of Karl Mayer Co. of Offenbach, Germany.

The single fabric 27 may also be formed in a simulated weave pattern of relatively non-stretchable yarns as shown in FIG. 4, and described in the said patent application, Ser. No. 50,234. In that case, the warp yarns 30 do not include a separate warp yarn designated as a "weft" yarn, but include only the warp yarns 52 and 53 (shown in white) and a chain stitch yarn 55 which has a weft portion 56 (shown in black and cross hatching).

As shown in FIG. 6, each garment 38 has a stretchable-retractive rear panel 47 with stretchable-retractive yarns 42 running circumferentially at least from side seam 39 to side seam 40 and has a less stretchable, simulated weave front panel 50 of identical area when flatwise and undistended.

However, as shown in FIG. 7, when the garment 38 is donned by a wearer, the marginal portion 58 of the rear panel is stretched to form a peripheral area around the front panel 50, so that panel 50 appears to be a
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5 restraint area formed centrally of the front of the garment. Preferably the waist band 45 and leg bands 46 include warp-wise extending stretch yarns 42 so that they are annular around the waist opening 59 and leg openings 60 and correspond to elastic waist and leg bands on panty briefs or the like. When the full width of the rear fabric, 28, and two side strips of front fabric 27 are of stretchable-retractive power net with the central portion only of front fabric 27 being of non-stretchable strands, it will be understood that the major area of the garment is stretchable and the minor area non-stretchable. Thus the height of the restraint panel 50 can be varied from merely a narrow band to the distance from leg opening to waist opening but the width remains constant as extending from side seam to side seam.

It will be understood that, if desired, the warp yarns 52 and 53 on the front panel 50 can be of stretchable-retractive material similar to the warp yarns 42 inlaid in the power net of the rear panel 47, thereby encompassing the body of the wearer in stretch yarns, while the remaining yarns 51, 54 or 55 of the front panel can be less stretchable or non-stretchable to form the restraint area in the front panel. Thus the panel 50 would have stretch in a circumferential, or horizontal, direction, but not in an axial, or vertical, direction.

It should be noted that when the tubular garments of the invention are cut from the web and turned through an angle of 90°, the stretchable-retractive, inlaid warp yarns 42 of the rear panel will extend circumferentially of the body of the wearer while the web portions 56 of the simulated weave web yarns 54 or 55 of the front panel will extend axially of the tubular garment.

What is claimed is:

1. A warp knitted garment comprising a front panel and a rear panel, each having a separate set of warp strands, and each panel interknitted with the other along opposite side edges to form a generally tubular body having a waist opening at one end and limb openings at the other end;

the warp strands of said front panel being warp knit into a simulated woven fabric with the warp strands thereof, which serve to simulate woven web strands, having weft simulating portions extending coursewise thereof but axially of said body,

the warp strands of said rear panel being warp knit into a warp knitted fabric of knitted structure, different from that of said front panel and including warp strands of stretchable-retractive material inlaid wale-wise thereof but extending circumferentially of said body from one said side to the other, said rear panel being thereby stretchable circumferentially of said tubular body to conform to the shape of the wearer.

2. A warp knitted garment as specified in claim 1, wherein:
said garment is a pair of panties, said body includes a crotch area formed by interknitting the strands of one said panel with the strands of the other said panel in a central narrow strip and the said warp strands forming the front panel of said panties are less stretchable-retractive than the stretchable-retractive warp yarns of said rear panel.

3. A warp knitted garment as specified in claim 1, wherein:
the said warp strands forming said front panel are non-stretchable-retractive to form, when said garment is worn, a built-in integral, restraining area centrally, and a band of said stretchable warp knit fabric of the rear panel peripherally, of said front panel.

4. A warp knitted garment as specified in claim 1, wherein:
the warp strands of said front panel are of non-stretchable-retractive material but said front panel includes a waist band portion alongside said waist opening, and a leg band portion alongside said limb openings of said rear panel fabric, including said inlaid, warp-wise-extending stretchable-retractive, strands for forming elastic waist and leg bands entirely around said tubular garment.

5. A warp knitted stretchable-retractive garment comprising a generally tubular body, the major area of which body, when stretched on the body of the wearer, is of power net fabric with stretchable-retractive yarns extending wale-wise of said fabric but circumferentially of said body;

the warp strands of a minor area of said tubular body being warp knitted in a simulated weave pattern and of relatively non-stretchable yarns and including warp strands designated as “weft” strands with the weft portions of said “weft” strands of said simulated weave pattern extending course-wise of said fabric but axially of said tubular body.

6. A garment as specified in claim 5, wherein:
said garment is a pair of panties having a front panel and a rear panel, the strands of said panels being interknitted in coursewise-extending strips to form opposite interknitted side seams and an interknitted crotch area and wherein, said minor area of simulated weave pattern constitutes the said front panel to thereby form a restraint panel and said major area of power net constitutes the said rear panel to thereby provide stretch circumferentially of said body.

7. The method of making a continuous web of panty blanks, which comprises the steps of
simultaneously warp knitting a pair of superposed single fabrics, each from a separate set of warp strands, on the front and back needle bars of a warp knitting machine, one set of which includes stretchable-retractive yarns and the other set of which comprises non-stretchable yarns;
forming power net stitches, while inlaying said stretchable-retractive yarns wale-wise in one said single fabric to form laterally stretchable rear panels in said web;
forming simulated weave stitches in the other said single fabric of different knitted structure from said power net stitches to form non-stretchable restraint front panels of woven appearance in said web; and
interknitting the strands of said single fabrics into a double fabric, along coursewise extending strips to form interknitted side seams and an interknitted crotch area in each successive panty blank of said web.
the knitted structures formed on said front and back needle bars being different but being formed into successive spaced open-ended, horizontal tubes by spaced horizontally extending interknit bands of the same knitted structure.

8. The method of making foundation garments, each having a warp knitted power net fabric base with a warp knitted simulated weave front panel on a two needle bar warp knitting machine, which comprises the steps of simultaneously warp knitting a web of two superposed single fabrics on said two needle bar machine, each of a different knitted structure, one needle bar forming power net with stretchable-retractive yarns inlaid wale-wise thereof and the other needle bar forming a base, warp knit fabric of nonstretchable yarns in a simulated weave pattern, in which certain warp yarns have "weft" portions extending coursewise thereof, intermittently interknitting the strands of one said fabric with the strands of the other to form coursewise extending strips of doubled fabric constituting spaced apart interknitted side seams defining successive said garments in said web, then cutting said successive garments from said web along said interknitted side seams, turning said garment inside out and turning said garments through an angle of 90° so that said walewise extending, stretchable-retractive yarns run circumferentially of the rear panel and said coursewise extending weft portions run axially of the front panel of said tubular garments when worn.

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