

[54] **PANTY-TYPE GARMENT AND PROCESS OF MAKING SUCH GARMENT**

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Related U.S. Application Data

[63] Continuation of Ser. No. 10,770, Feb. 12, 1970, abandoned.

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[58] Field of Search 128/523, 528, 580; 2/224 R, 226, 238, 224 A

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[57] **ABSTRACT**

The invention is directed to a panty-type garment, (for example, a panty or panty girdle) which is constructed of a single section of warp knit fabric joined along two seams to form a completed garment. The fabric is knitted, advantageously on Raschel equipment, to provide integral elastic areas lengthwise of the fabric web, usually at the edges but also in other areas where desired (and possibly throughout for panty girdle constructions). A section of such fabric is cut from the web and sewed together at its end edges to provide a tubular garment pre-form with elastic portions at the top and bottom. A crotch seam is placed in the lower portion of the garment, dividing the lower area into two separate, elastically encircled leg portions. The invention enables extraordinary economies to be realized in the manufacture of panty-type garments.

3 Claims, 5 Drawing Figures

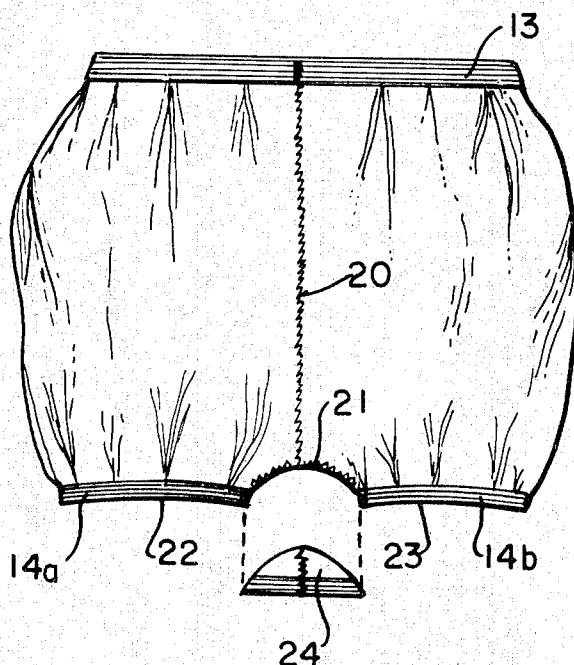


FIG. 1

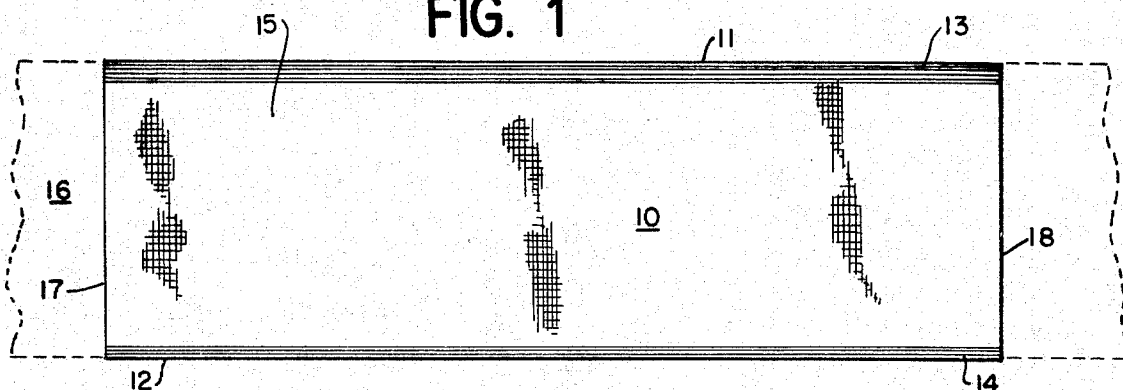


FIG. 2

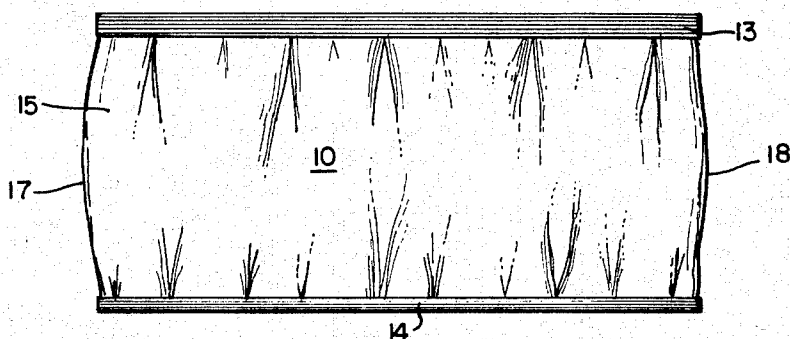


FIG. 3

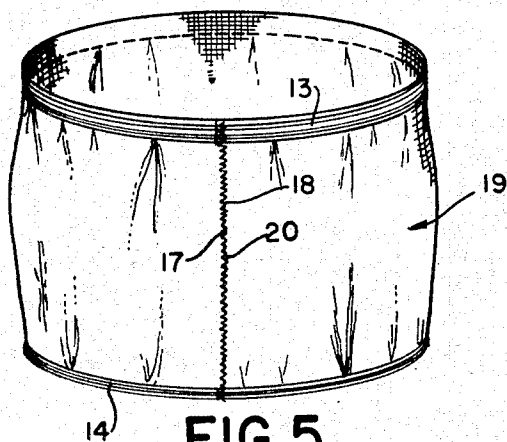


FIG. 4

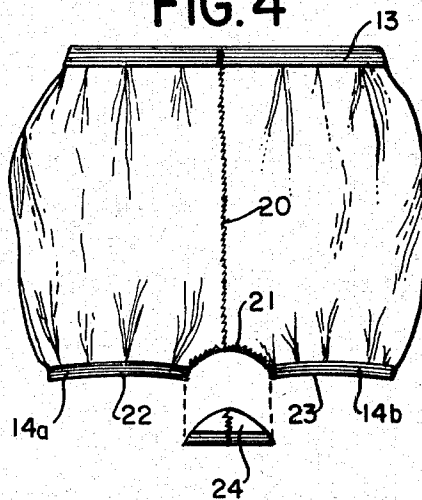
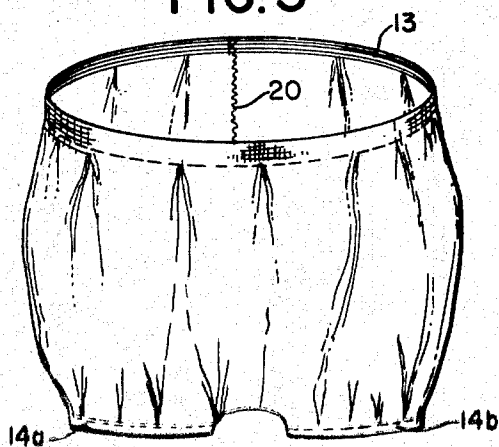


FIG. 5



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PANTY-TYPE GARMENT AND PROCESS OF MAKING SUCH GARMENT

This is a continuation, of application Ser. No. 10,770, filed Feb. 12, 1970
RELATED PATENTS

This invention is related to the subject matter of my prior U. S. Pat. Nos. 3,613,119,

Oct. 19, 1971, No. 3,629,871, granted Dec. 28, 1971, and No. 3,673,820, granted July 4, 1972.

BACKGROUND AND SUMMARY OF THE INVENTION

In the manufacture of panty-type garments by conventional techniques, there is frequently a need to perform a substantial number of production operations, where warp knit materials such as tricots are employed, in order to effectively incorporate the desired elastic bands and to provide the appropriate garment configuration. This has resulted in relatively high manufacturing costs for such garments. Some of the operations can be avoided through the use of circular knitting techniques, but these too have important disadvantages. It is therefore a basic accomplishment of the present invention to provide a garment and process of constructing it, whereby a panty-type garment may be constructed of warp knit materials, such as tricots, at extraordinary savings in manufacturing costs, relative to conventional procedures. The term "panty-type garment", as used in the context of this specification, is intended to include all appropriate garments, whether considered as underwear or outerwear. The term clearly contemplates, but is not limited to, such garments as panties, panty girdles, shorts, bathing suits, for example, and may include certain styles of garments for the upper torso.

In accordance with a specific aspect of the invention, the starting material for the new garment and process is a Raschel-knitted fabric web which integrally incorporates a knitted-in elastic band or region extending along each edge, at least, and perhaps in other locations as well. In the case of panty girdles, for example, the entire web may be knitted of an elastic construction. The elastic sections are knitted in under extended condition so that, when the fabric is relaxed, it will shorten and gather in the warp direction, at the edges. The basic fabric is knitted in more or less "continuous" lengths (i.e., lengthy "batches"), and short lengths of the knitted web are severed to form the fabric sections from which individual garments are manufactured.

In accordance with another specific aspect of the invention, short, severed lengths of the above described fabric are formed into completed panty-type garments in two simple seaming steps, which may be performed rapidly and by workers of minimal skills. One step is to form the fabric section into a tubular pre-form, by sewing together the cut end edges of the severed fabric section. The pre-form is of plain tubular configuration, and the elastic sections, originally at the side edges of the knitted web, are at the top and bottom of the pre-form. The second step is to form a crotch by sewing together the front and back layers of the tubular pre-form, in the center region of the bottom elastic. Most desirably, the second seam is of inverted U-shaped general configuration, and the small fabric section below it may be cut away and discarded. The thus-formed crotch seam provides a pair of separate and separated leg openings, each encircled by an elastic band.

The invention admits of wide variations in fabric constructions, for achieving various end results. In each instance, however, the fundamental concept is retained, of utilizing a short section of warp knit fabric, incorporating knitted-in elastic side edge areas which, in the final garment form upper and lower elastic portions, typically an elastic waist band and elastic leg bands.

For a more complete understanding of the invention, reference should be made to the following detailed description of a preferred embodiment of the invention, and to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a short section of warp knit fabric, shown in its "as-knit" condition in which elastic side edge regions are extended lengthwise (warpwise).

FIG. 2 is a plan view, similar to that of FIG. 1, illustrating the fabric section with the elastic side edge regions in a relaxed condition.

FIG. 3 is a perspective view of a tubular garment pre-form constructed, in accordance with the invention, by joining the end edges of the fabric section of FIG. 2.

FIG. 4 is a front view of a panty-type garment constructed from the pre-form of FIG. 3, by providing a crotch seam in the center region of the lower elastic edge section.

FIG. 5 is a perspective view of a finished panty-type garment according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENT OF THE INVENTION

Referring now to the drawing, FIG. 1 illustrates a fabric section generally designated by the numeral 10. For the purposes of this invention, the fabric section 10 is of warp knit construction and, to great advantage, is constructed on a Raschel knitting machine. The warp direction of the fabric section 10 is the length direction of the section shown in FIG. 1. That is, the Raschel-knitted fabric is produced in a more or less continuous length, with the edges 11, 12 constituting the side edges of the fabric as it emerges from the knitting machine. It is considered that the knitted fabric web is more or less "continuous" in that it is produced in a continuous length by the machine and is gathered and substantially handled in large "batch" rolls. The lengths of knitted web material in a batch roll, being very large in relation to the length of the fabric section 10, may be considered for the purpose of this specification as "continuous" lengths.

In accordance with one aspect of the invention, the Raschel-knitted fabric section 10 is continuously knitted on the Raschel machine with elastic sections 13, 14 at each side edge, formed as an integral part of the knitting process and constituting integral parts of the fabric web. The center panel 15 of the fabric web may be of any suitable construction for the end use intended. For example, where the garment is intended for use as a panty, the center panel 15 may be of a typical lightweight tricot construction. Where the garment is intended for use as a panty girdle, for example, the center panel 15 may be of a two-way stretch, elastic construction. For illustrative purposes, the specific garment shown and described herein is representative of a typical panty garment. However, it will be understood that the basic concepts of the invention are applicable to a wide range of garment constructions, including both underwear and outerwear, and the garment and gar-

ment constructions specifically illustrated should be considered as representative and not limiting of the inventive concept.

In the fabric section illustrated in FIG. 1, the elastic area 13 advantageously may comprise a knitted elastic braid whose width dimension (vertical in FIG. 1) may be on the order of inch, typically, and which may advantageously function in the completed garment to be described as a waist band elastic. At the opposite edge of the fabric, the elastic band 12 likewise may be a knitted elastic braid, typically having a width on the order of ¼ inch and functioning in the completed garment as a leg band elastic. For a typical garment, the overall width dimension of the fabric web, as produced by the knitting machine, may be on the order of 9 or 10 inches, for example, and corresponds to a desired "height" dimension of the finished garment. However, it should be understood that the specific dimensions herein mentioned are referenced to a typical garment produced in accordance with the invention and are exemplary only.

In the construction of the continuous fabric web, designated generally in FIG. 1 by the numeral 16, appropriately increased tension is maintained upon the elastic band sections 13, 14, during the knitting thereof as well as during the roll-up, to cause the elastic bands to be maintained in an extended condition relative to the body panel 15 of the fabric, here assumed to be a tricot material. Thus, during this phase of the manufacturing operation, with the body portion 15 of the web in its "normal" condition, the elastic bands 13, 14 are maintained in an extended condition of about, say, 130 percent of their fully relaxed length. The overall extensibility of the elastic bands typically may be to about 180-200 percent of its fully relaxed length, it being understood, again, that the foregoing relationships of extended to relaxed conditions are representative and not specifically limiting.

One of the initial steps in the manufacture of a garment according to the invention, following the construction of the knitted fabric web 16, is the severing from the web 16 of a generally rectangular fabric section 10. The fabric section 10 is referred to as "generally rectangular" in the sense that the fabric section assumes such a configuration when the elastic band sections 13, 14 are extended to their "as-knit" condition. It will be understood, of course, that upon severing of the section 10 from a tensioned web, the elastic band sections 13, 14 will contract to their "relaxed" lengths, causing a gathering of the edge portions of the center panel 15 and causing the fabric section 10 to assume a configuration somewhat along the lines reflected in FIG. 2 of the drawings. In the properly tensioned web, the end edges 17, 18 of the fabric section 10 extend substantially straight and at right angles to the web axis, as reflected in FIG. 1, although the end edges 17, 18 in the severed fabric section shown in FIG. 2 are, of course, distorted from the original straight line disposition.

The length dimension of the fabric section 10, which is the horizontal direction in FIG. 1 and the warp direction as the fabric is knitted, is determined to correspond to the desired waist size of the eventual garment. This length will take into account any appropriate design factors, such as the extensibility of the elastic, the margins required for overlap and seaming, etc. Thus, for each given fabric construction, it may be necessary

to establish empirically the optimum severed length of the fabric section 10 for a given ultimate waist size.

After severing of the fabric section 10 from the continuous web length 16, the fabric section is folded about a transverse axis to form a tubular garment pre-form, as designated by the reference numeral 19 in FIG. 3. The respective end edges 17, 18 of the fabric section are secured together, typically by a conventional sewing operation, to form an edge seam 20. Normally, the tubular pre-form 19 may be of a straight, tubular configuration, in which the circumference of the waist band elastic 13 is substantially the same as the circumference of the leg band elastic 14. However, where desirable or appropriate, some degree of "tapering" of the tubular pre-form might be desirable, so that one of the elastic bands would be of greater circumference than the other. A similar result might be achieved, where desired, by imparting differential extension to the respective elastic bands 13, 14 during the knitting and wind-up phases, such that the relaxed fabric section, after severing from the batch roll, will have relaxed elastic sections 13, 14 of slightly different length.

The tubular garment pre-form 19, typically after completion of the edge seam 20 but in appropriate cases prior thereto or simultaneous therewith, is provided with an appropriate crotch seam 21 (see FIG. 4). The minimal requirements of the crotch seam 21 are that it secure the front and back layers of the tubular garment pre-form together in the immediate area of the lower elastic band 14, to divide the lower portion of the garment and the lower elastic band 14 into separate leg openings 22, 23, encircled by separate elastic leg band sections 14a, 14b. More desirably, the crotch seam 21 is of a generally inverted U-shaped configuration, as reflected in FIG. 4, with the lower extremities of the seam being separated as much as an inch or two, to provide for a predetermined separation between the leg openings 22, 23. The width of the U-shaped crotch seam 21 also may be varied to control the relationship between the circumference of the elastic leg bands 14a, 14b and the elastic waist band 13 in the completed garment, as will be understood. It will be understood, of course, that reference to the crotch seam as being of generally inverted U-shaped configuration does not imply any special restriction in the specific size or shape of this seam, but only to aid in the description of the concepts involved in constructing a garment in accordance with the invention. As reflected in FIG. 4, the small section 24 of the fabric embraced by and located below the crotch seam 21 advantageously may be severed from the garment and discarded, as it serves no desirable function. This can be readily accomplished as an integral part of the seaming operation, by means of an appropriate attachment to the sewing machine, in accordance with conventional techniques.

Desirably, but not necessarily, the edge seam 20 may be aligned with the apex of the crotch seam 21. This minimizes the number of seams required to be made in the leg band elastics 14a, 14b and also provides that the edge seam 20 will be of minimum length in the final garment. Alternatively, the edge seam may be located at one side edge of the completed garment.

After sewing of the edge seam 20 and the crotch seam 21, the construction of the garment is complete. The garment may then be turned inside out, so that the raw edges of the seams are exposed only in the interior of the garment, as reflected in FIG. 5.

As will be readily appreciated, the garment construction and process according to the invention enables enormous economies to be realized in the manufacture of a panty-type garment as compared to, for example, conventional panty-type garments incorporating warp knit body materials. In a typical such conventional manufacturing process, the pair of front and back body panels is cut and seamed together along both side edges as well as at the crotch. This requires the cutting and handling of two separate pieces of fabric and three seaming operations, up to this point in the manufacturing process. Thereafter, the conventional manufacturing technique involves sewing on separate waist band elastics and leg band elastics, involving the handling of many elements and requiring relatively skilled operators for quality production. In distinct contrast, the process of the invention involves the production of a Raschel-knit fabric having integral elastic bands at the edges. The knitted material, in bulk form, is severed into predetermined lengths corresponding to desired waist sizes, and the garment is manufactured from such severed sections by a folding operation and two simple seaming operations. Not only is there an extensive reduction of labor in the new process, but the level of skills required in the new process is considerably lower than that required by more conventional manufacturing techniques.

The garment construction and manufacturing process of the invention are ideally suited for the mass production of panty-type garments on a low-cost basis. Nevertheless, the principles of the invention are applicable to a wide range of fabric constructions, and they also accommodate considerable specific variation in garment design, which is especially desirable for the market to be served.

It should be understood that the specific form of the invention herein illustrated and described in detail is intended to be representative only, as certain changes may be made therein without departing from the clear teachings of the disclosure. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim:

1. A process for making one-piece panty-type garments, the steps of which comprise
 - a. supplying a length of warp knit fabric having spaced, parallel elastic selvedge bands formed with lengthwise-only stretch and an integral intermediate fabric section, the width of the fabric corresponding to the height of the garment,

- b. severing a section of the warp knit fabric to form a generally rectangular fabric blank,
 - c. forming said section into a tubular garment preform having said elastic selvedges along its upper and lower edges,
 - d. forming a first seam by securing together the severed opposite end edges of said preform to define a closed-loop garment pre-form having a single vertical seam and having continuous closed elastic selvedges at the upper and lower edges thereof, and
 - e. thereafter forming a second seam by joining diametrically opposed portions of said garment preform adjacent the lower elastic selvedge to form a crotch portion dividing said lower selvedge into a pair of elastic leg bands of combined total circumference less than the original cut length of the lower elastic selvedge.
2. The process of claim 1, further characterized by
 - a. said joining step being carried out along a substantially inverted U-shaped seam with the apex thereof intersecting said first seam and with the legs of said U-shaped seam intersecting the lower selvedge, and
 - b. severing and removing the fabric section defined by said U-shaped seam.
 3. A one-piece panty-type garment which comprises
 - a. a single section of warp knit fabric severed from a web of such fabric,
 - b. the width of the severed section constituting the desired height of said garment,
 - c. said fabric section having parallel elastic one-way stretch selvedges along its upper and lower edges,
 - d. said fabric section being substantially rectangular in shape,
 - e. said section being severed to have a length corresponding to the desired waist size of said garment,
 - f. the severed end edges of said section being joined by a single vertical seam to form a substantially tubular-shaped garment having said parallel upper and lower edge elastic selvedges,
 - g. a substantially inverted U-shaped crotch seam disposed adjacent the lower edge elastic selvedge with the apex thereof intersecting said vertical seam and with the legs thereof intersecting the lower edge elastic selvedge at a large angle,
 - h. said U-shaped seam forming a pair of leg openings encircled by portions of said lower edge elastic selvedge, and
 - i. the fabric portions embraced by said seam being severed from said garment.

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