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(54) **NON-STRETCH GARMENT HAVING KNIT STRETCH PANELS**

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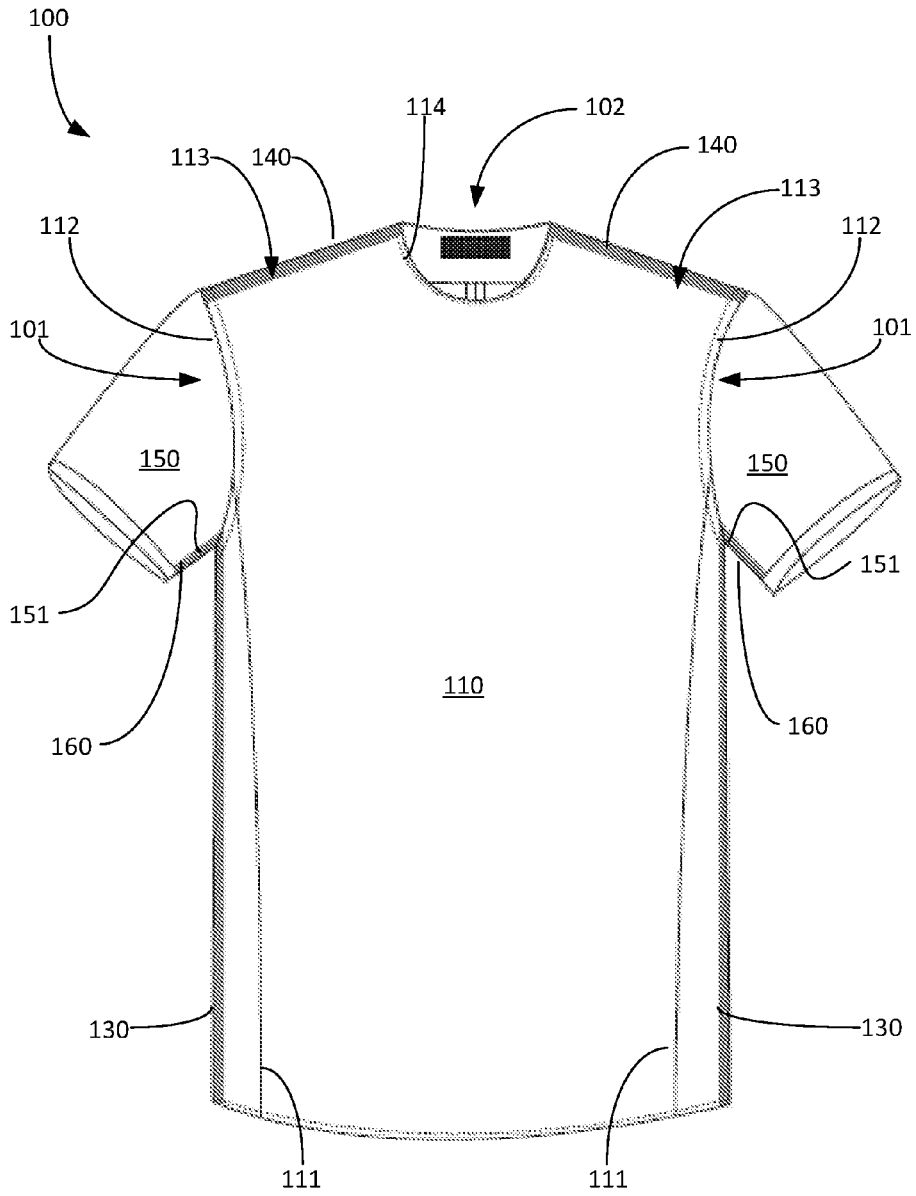
(57) **ABSTRACT**

A garment formed of a woven limited-stretch fabric includes knit stretch panels to provide stretch in key areas of the garment.



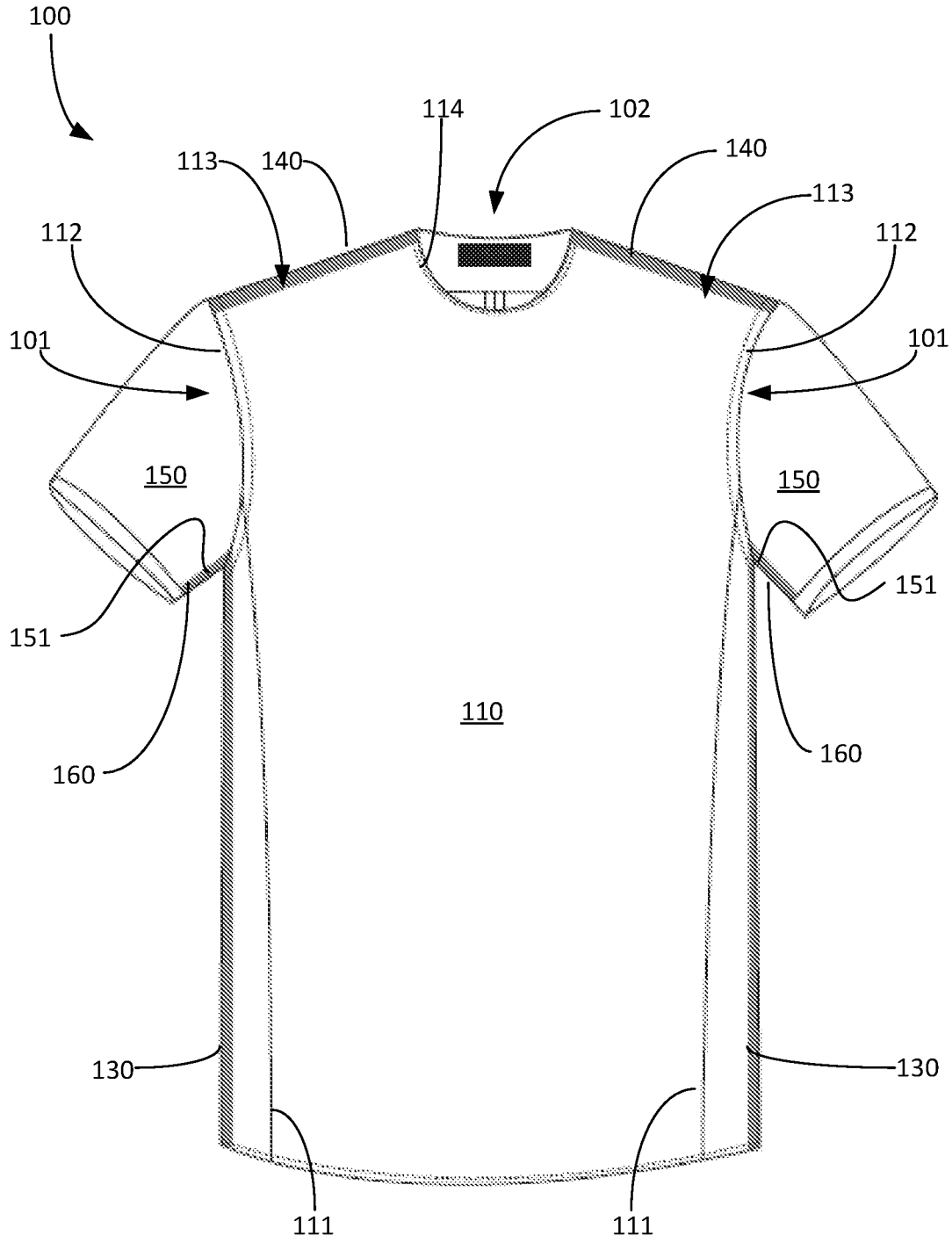

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FIG. 1

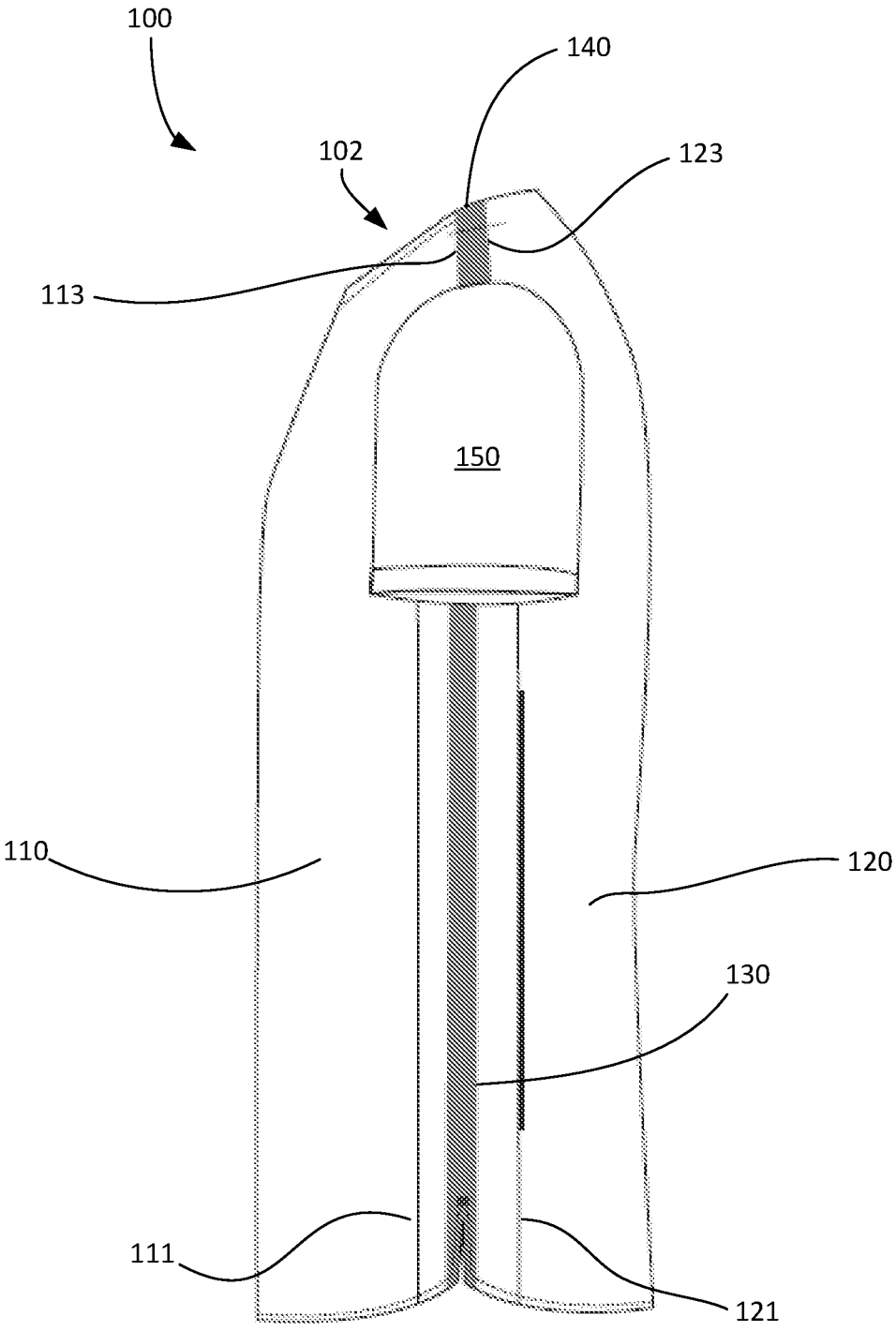

FIG. 2

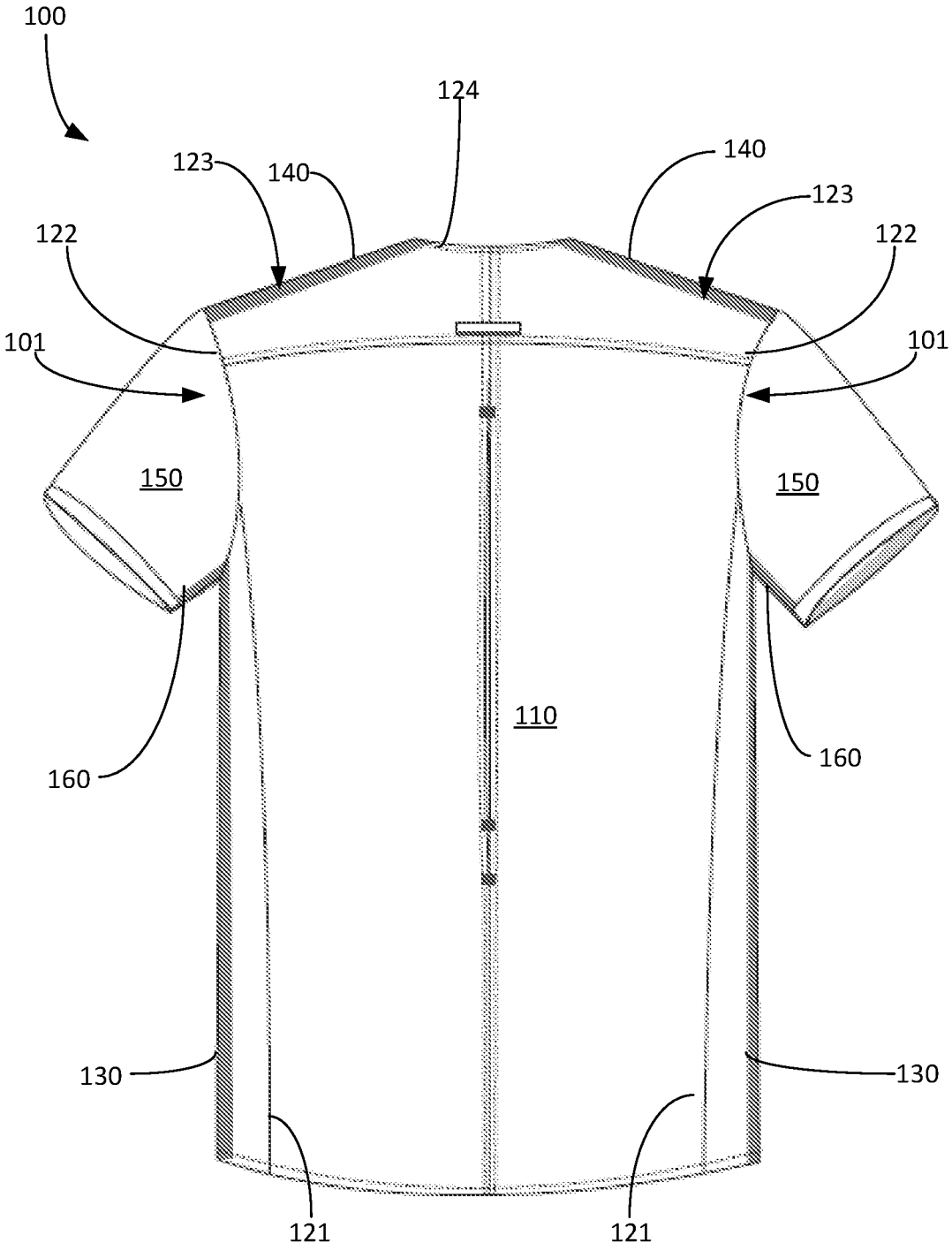
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FIG. 3

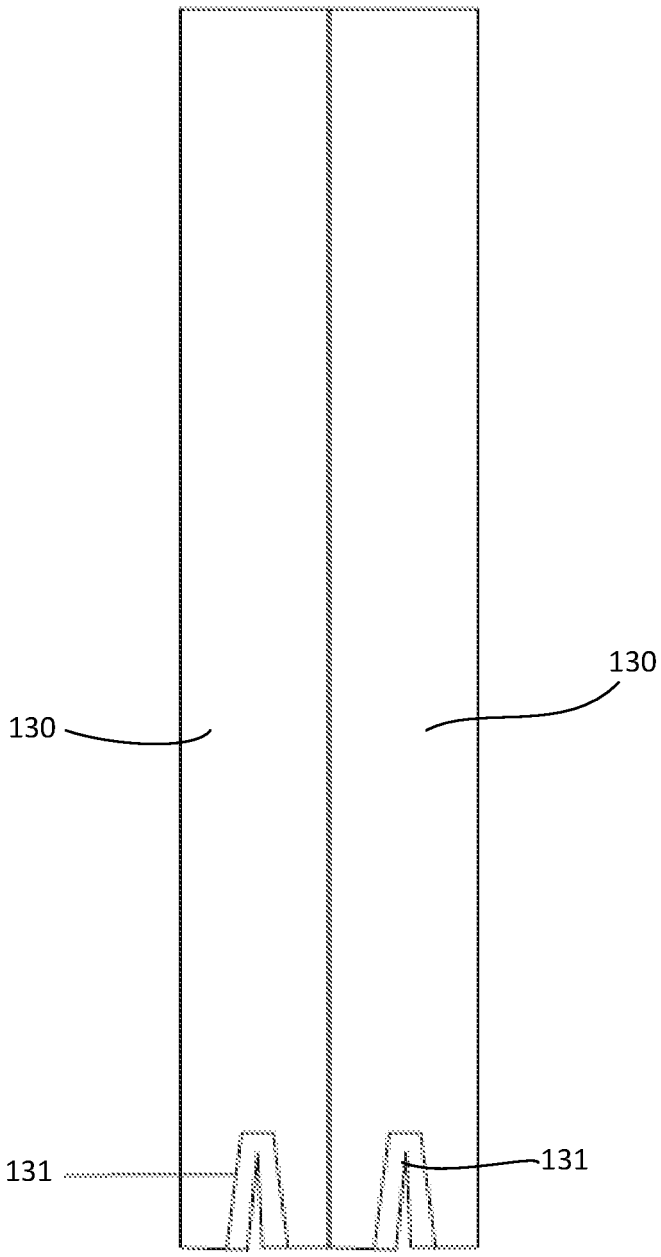

FIG. 4

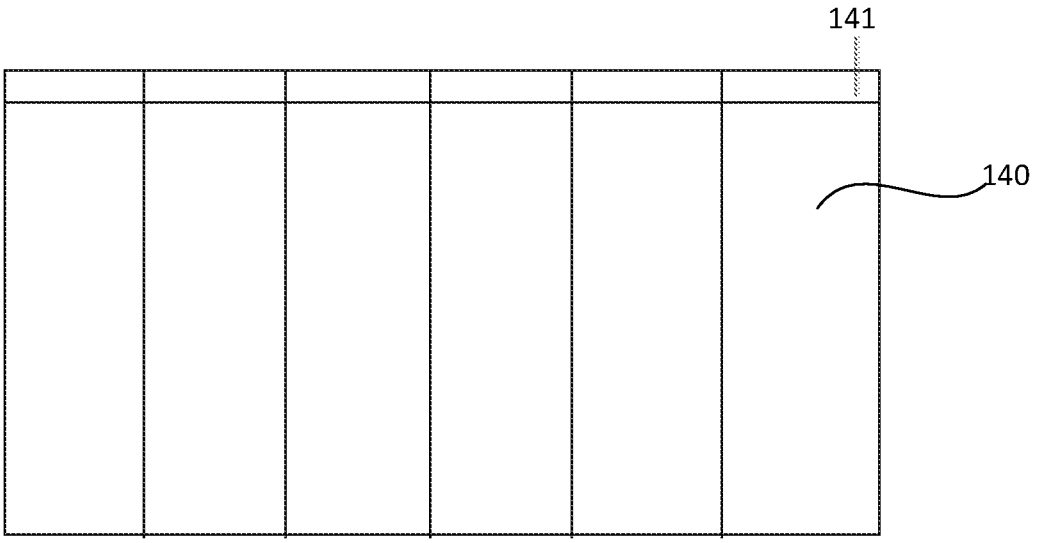

FIG. 5

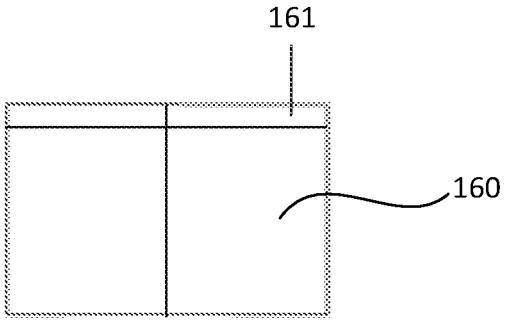

FIG. 6

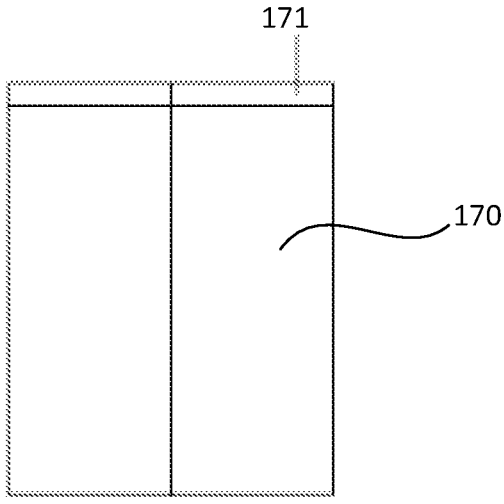

FIG. 7

NON-STRETCH GARMENT HAVING KNIT STRETCH PANELS

TECHNICAL FIELD

[0001] This disclosure relates generally to the field of garment manufacture, and more specifically, to knitted panels incorporated into a non-stretch garment.

BACKGROUND

[0002] In the world of fashion merchandise, it is desirable to offer clothing that, in addition to being aesthetically pleasing, is both close fitting and comfortable. However, given the wide variety of body types and sizes of the customer base, this can be difficult to accomplish for many different types and styles of clothing. Thus, clothing designers and manufacturers continue to look for new ways to achieve these objectives.

[0003] Fitted garments, that is, clothing that is generally form-fitting to the individual and not too large or too small, are very popular. Further, it is often desirable that such clothing not require closures, such as zippers, buttons, or snaps, because these features can be inconvenient, uncomfortable and/or unseemly on an otherwise streamlined design.

[0004] One option is to make the garment entirely out of material that stretches, such as synthetic lycra or a blend of lycra and cotton; however, such garments are generally more suited to active or athletic pursuits. Another option is knits which derive their stretch characteristics from the structure of the stitches.

[0005] For other types of clothing needs, garments are often made of fabrics that are woven from materials that do not stretch or have a limited ability to stretch. In particular, woven fabrics made from natural fibers, such as cotton, wool, linen, silk, etc., generally exhibit durable wear characteristics but have little or no stretch characteristic.

[0006] In many cases, however, particularly for a form fitting or close fitting garment, a garment made from a woven fabric would be difficult to easily don unless the garment is oversized or if it featured closures, such as zippers, buttons, or snaps.

[0007] Therefore it would be desirable to provide a garment, a significant proportion of which comprises woven fabrics made from predominantly natural fibers, or from synthetic fibers or synthetic blends with limited stretch characteristics, but which garment nevertheless is constructed in such a manner that it has the capacity to stretch in crucial locations so that it can easily be donned by the wearer without being oversized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is a front plan view of a T-shirt having knit stretch panels.

[0009] FIG. **2** is a left side plan view of the T-shirt of FIG. **1**.

[0010] FIG. **3** is a rear plan view of the T-shirt of FIG. **1**.

[0011] FIG. **4** is a front plan view of knit panels made for the side seams of the T-shirt of FIG. **1**.

[0012] FIG. **5** is a front plan view of knit panels made for the shoulder seams of the T-shirt of FIG. **1**.

[0013] FIG. **6**A is a front plan view of knit panels made for the underarm seams of the short sleeve T-shirt of FIG. **1**.

[0014] FIG. **6**B is a front plan view of knit panels made for the underarm seams of a long sleeve T-shirt.

DETAILED DESCRIPTION

[0015] FIGS. **1-3** illustrate the front, left side and rear views, respectively, of a basic garment **100**, namely a short sleeve T-shirt having a corresponding front panel **110** and back panel **120** each made from a limited-stretch fabric. For example, a woven fabric, such as such as cotton, wool, silk, cashmere, linen, mohair; a woven synthetic material such as acrylic, nylon, polyester, rayon; or any woven mixed composition material, such as rayon/cotton, polyester/cotton, polyester/wool, or wool/acrylic; typically provides little or no stretch and/or recovery from stretch, and may often be used in form-fitting and/or custom-tailored clothing. Thus, in general, most woven fabrics have a relatively small stretch percentage.

[0016] The stretch of a fabric is usually measured across the grain horizontally, from selvedge to selvedge, and is termed two-way stretch. The percentage of stretch in a fabric may be estimated by laying the fabric at ease against a ruler or ruler grid, marking an edge point, and then stretching the fabric to a comfortable extension point and reading the new measurement of the edge point. For example, if the fabric lays out at 4 inches at ease, and the fabric stretches comfortably to the 6 inch measure, then the 2 inch stretch of the 4 inch fabric sample amounts to a 50% stretch percentage. Four-way stretch refers to when the fabric can stretch in both the horizontal and vertical directions.

[0017] In general, woven fabrics are characterized by a relatively low stretch percentage, for example, in the range of 1-15%, depending on the fabric type and weave. A typical 100% wool suit has a stretch percentage of about 4% while a 100% wool that is woven especially to provide some limited degree of stretch has a stretch percentage of only about 12%.

[0018] In contrast, all knit fabrics stretch to some degree, and this inherent "give" in the knit fabric tends to make a garment more comfortable and easier to fit. For example, warp knits will generally provide a flat, smooth surface and have little or no vertical stretch and varying degrees of crosswise stretch. Weft knits tend to have moderate to large amounts of stretch in the crosswise direction and some lengthwise stretch.

[0019] Thus, in order to provide greater comfort to a garment made primarily from a woven fabric, the front and back panels **110**, **120** are attached together using a pair of side panels **130** and a pair of shoulder panels **140** each made from a fabric that stretches, such as a knit fabric. There are several types of knit fabrics, varying from lightweight to medium weight, and all provide a significant amount of stretch, i.e., typically in the range of 50-100% but in general greater than the chosen woven fabric. For the purposes described herein, it is desirable to provide a stretch panel made with a fabric having at least twice the stretch percentage of the corresponding limited-stretch fabric used to make to primary portions of the garment. Fabric patterns are typically designed for either woven fabric or knit fabric, but the patterns sized for knit fabric specify the amount of stretch required in the fabric to make the pattern.

[0020] A pair of sleeves **150**, also made from a limited-stretch woven fabric, are attached to respective arm openings defined by the front, rear, side and shoulder panels. Although short sleeves are shown, the sleeves **150** could be

any length or omitted altogether. Each of the sleeves **150** is a generally circular or cylindrical fabric panel coupled to itself at seams **151** on the bottom side of its respective arm opening **101** by an underarm knit stretch panel **160**. In an alternative embodiment, the sleeves may instead be made of knit fabric such that the knit stretch panel is not required.

[0021] The pattern for cutting the front panel **110** defines side edges **111** or seams running from the bottom of the panel (bottom hem of shirt) to the seam **112** at arm openings **101** on each side; arm edges **112** or seams that define arm openings **101** in a generally half-circular pattern connecting the side edges to respective shoulder edges **113** or seams, the shoulder edges running horizontally generally along the shoulder line; and a scoop neck edge **114** or seam connecting each of the shoulder edges and defining the front of the neck opening **102**.

[0022] The pattern for cutting the back panel **120** is similar to the front side pattern, defining side edges/seams **121** corresponding with the side edges **111** on front side **110**; arm edges/seams **122** corresponding with the front side arm edges **112** that define the arm openings **101**; shoulder edges/seams **123** running horizontally generally along the shoulder line in correspondence with front side edges **113**; and a rear neck edge/seam **124** connecting each of the shoulder edges and defining the back of the neck opening **102**. In this example, the back panel includes a pleat down the center to provide additional comfort, although this element is not essential to the garment. In an alternative embodiment, the back panel may instead be made entirely of knit fabric, i.e., the entire back panel is a stretch panel. In the alternative embodiment, the side panels may or may not be included.

[0023] Referring to FIG. **4**, a pair of the knit side panels **130** or ribbing, prior to incorporation into garment **100**, is illustrated. The knit side ribbing **130** can be formed in pairs as shown, then separated and sewn in place at the side seams of garment **100** as described above. A finished edge feature **131** can be provided at the bottom of the ribbing.

[0024] Similarly, in FIG. **5**, the shoulder panels **140** are illustrated as one complete knitted piece including a finished edge **141** on one side thereof. The piece is then divided into six individual shoulder panels to service up to three different sets of shoulders on garments. Likewise, FIG. **6**A illustrates a pair of the underarm panels **160** for a short sleeve shirt, each panel having a finished edge **161**. FIG. **6**B illustrates a pair of the underarm panels **170** for a long sleeve shirt, each panel having a finished edge **171**.

[0025] In one embodiment, for a medium size shirt, the side panels **130** could be approximately 19 inches tall and 3.5 inches wide; the shoulder panels **140** could be approximately 6 inches tall and 3 inches wide; the underarm panels **160** could be approximately 4 inches tall and 3.5 inches wide for a short sleeve shirt, and approximately 18 inches taller for a long sleeve shirt. Proportional measurements can be determined for other sizing options. Although the illustrated embodiment shows the side stretch panels, shoulder stretch panels, and underarm stretch panels as extending along the full length in their respective garment positionings, this feature is intended to be illustrative and not limiting. Shorter stretch panels could be employed at critical places in a particular garment. For example, the side stretch panels may run from the underarm position to just under the rib cage rather than all the way to the bottom hem to provide a better fit for a person with a larger upper body.

[0026] Note that garment **100** does not have or need any closure mechanisms, such as buttons, zipper, etc., although such features could still be present for aesthetic purposes. The knit panels are attached, e.g., cut and sewn, to the edges/seams of the woven garment panels to create an additional garment piece that allows for stretch in certain areas of the garment, for example, in the side, shoulder and underarm areas of exemplary garment **100**. Thus, each of the knit side panels **130** is attached to respective side seams **111**, **121** and to an underarm portion of respective arm seams **112**. Each of the knit shoulder panels **140** is attached to respective shoulder seams **113**, **123** and to a top portion of respective arm seams **112**. The shoulder panels **140** allow for flexibility in upper body movement and allow for enough stretch to allow a person's head and neck through the neckline **102** of the garment. Each of the knit underarm panels **160** is attached to respective sleeve seams **151** and to the underarm portion of respective arm seams **112** together with the side seams **111**, **121**. The underarm panels in FIG. **5** are sewn underneath the sleeve of the garment to allow the room for a variety of bicep and arm sizes and for enhanced movability through in the arm area. All the seams can be flat felled, French, overlock, or any other style or kind of sewn attachment.

[0027] It should be clear that incorporating ribbing pieces that stretch allows for both movement and fit. If the stretch panels were not present, the woven garment would not be able to be placed on the body unless the garment was severely oversized. The number and placement of the knit stretch panels can therefore vary depending on the style of the garment. For example, on a long sleeve shirt, the knit panels may extend along the arm to the cuff in order to give stretch to the entire sleeve of the garment.

[0028] The custom knit panels may require finished edges, for example, where the knit panel will not be sewn into a seam which can be made by full Milano stitches, links-links stitches, jersey tubular stitches, or any other knit stitch that provides a clean edge that will not deteriorate over time. These finished edges allow for a clean, unsewn edge depending on the placement of the knit panel. These type of knit finishes can vary depending on the placement and desired texture of the knit and are not limited to those described above. The only requirement of the finished edges is that they not fray or otherwise be destructive to the garment as it is worn repeatedly.

[0029] Any fabric with a high degree of stretch that would provide the same utility described herein can also be used in the placement of the custom knit panels. These could include but are not limited to woven jersey fabrics, synthetic stretch fabrics, or any mixed composition fabric with a high degree of stretch. The requirements for using these fabrics would be the same as for the custom knit panels, in that the stretch panels would allow for a non-stretch or limited stretch fabric to be made into a garment that could be fitted to the body without any closures.

[0030] While specific embodiments have been described by way of example, it should be understood that the invention is not limited to the disclosed embodiments. To the contrary, this disclosure is intended to cover various modifications and similar arrangements as would be apparent to those skilled in the art. Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

I claim:

1. A garment, comprising:

a plurality of limited-stretch garment panels each forming one of a plurality of major portions of the garment, each limited-stretch garment panel having a pattern defined with a plurality of seam edges; and

a plurality of stretch panels, wherein the garment panels are sewn together to include the stretch panels at preselected portions of preselected seam edges.

2. The garment of claim **1**, wherein each of the stretch panels has a second stretch percentage that is at least double a first stretch percentage of each of the limited-stretch garment panels.

3. A garment, comprising:

a plurality of garment panels each made using a first fabric, the first fabric having a limited stretch characteristic, each garment panel forming one of a plurality of major portions of the garment, each garment panel having a plurality of seam edges; and

a plurality of stretch panels each made using a second fabric, the second fabric not having a limited stretch characteristic, each stretch panel affixed between the seam edges of one or more of the plurality of garment panels.

4. The garment of claim **2**, wherein first fabric is a woven fabric and the second fabric is a knit fabric.

5. The garment of claim **3**, the garment panels comprising at least a first pair of corresponding major portions, each of the first pair of corresponding major portions having a pair of side seams, each side seam disposed on an opposite edge of the major portion, wherein each one of a first pair of the plurality of the stretch panels is affixed between the side seams of corresponding major portions.

6. The garment of claim **5**, each of the first pair of corresponding major portions further including at least a first pair of shoulder seams, each shoulder seam disposed on a top edge of the major portion and separated by a neckline portion, wherein each one of a second pair of the plurality of the stretch panels is affixed between the shoulder seams of corresponding first pair of major portions.

7. The garment of claim **6**, each of the first pair of corresponding major portions further including a pair of arm openings disposed on opposite edges of the major portions between the respective side seam and shoulder seam, the garment panels further comprising a second pair of major portions, each of the second pair of corresponding major portions is formed as a sleeve and affixed to respective arm openings, each of the second pair of corresponding major portions having a pair of underarm seams, wherein each one of a third pair of the plurality of the stretch panels is affixed between the underarm seams of respective ones of the second pair of major portions.

8. The garment of claim **4**, wherein the woven fabric comprises a natural fiber, a synthetic fiber, or a blend of natural and synthetic fibers.

9. The garment of claim **8**, wherein the natural fiber comprises wool, silk, cashmere, cotton, linen, or mohair.

10. The garment of claim **3**, wherein the first fabric has a fabric stretch percentage that does not exceed **15** percent.

11. The garment of claim **10**, wherein the second fabric has a fabric stretch percentage that exceeds **15** percent.

12. The garment of claim **3**, wherein the second fabric has a second stretch percentage that is double a first stretch percentage of the first fabric.

13. The garment of claim **3**, further comprising:

one of the plurality of garment panels is a front panel; and

one of the plurality of stretch panels is a rear panel.

14. The garment of claim **13**, further comprising:

at least one pair of additional stretch panels affixed between the front panel and the rear panel.

15. A garment, comprising:

a plurality of garment panels each made using a first fabric, the first fabric having a limited stretch characteristic, including:

a front panel having a neckline seam edge and a pair of shoulder seam edges on opposite sides of the neckline seam edge along a top edge of the front panel, a pair of side seam edges on corresponding side edges of the front panel, and a pair of arm seam edges connecting respective side seam edges to respective shoulder seam edges, formed across opposite top corner portions of the front panel;

a rear panel having a neckline seam edge, a pair of shoulder seam edges corresponding to the shoulder seam edges on the front panel along a top edge of the rear panel, a pair of side seam edges corresponding to the side seam edges on the front panel, and a pair of arm seam edges corresponding to the shoulder seam edges on the front panel; and

a plurality of stretch panels each made using a second fabric, the second fabric not having a limited stretch characteristic, including:

each one of a first pair of the stretch panels is affixed between the corresponding side seams of the front and rear panels; and

each one of a second pair of the stretch panels is affixed between the corresponding shoulder seams of the front and rear panels.

16. The garment of claim **15**, wherein first fabric is a woven fabric and the second fabric is a knit fabric.

17. The garment of claim **15**, further comprising:

the garment panels include a pair of sleeve panels each having a generally cylindrical shape and each having a pair of underarm seam edges, each of the sleeve panels affixed to respective arm seam edges of the front and rear panels; and

the stretch panels include a third pair of the stretch panels affixed between the underarm seams of the respective sleeve panels.

18. The garment of claim **15**, wherein the second fabric has a second stretch percentage that is double a first stretch percentage of the first fabric.

19. The garment of claim **15**, further comprising:

the stretch panels include a pair of sleeves each having a generally cylindrical shape and each having a pair of underarm seam edges, each of the sleeves affixed to respective arm seam edges of the front and rear panels.

20. The garment of claim **15**, wherein the second fabric has a second stretch percentage that is double a first stretch percentage of the first fabric.

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