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(54) **VOLUMETRIC SHOULDER FOR GARMENTS**

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(57) **ABSTRACT**

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A separate section is introduced between the sleeve and the body of any garment such as a jacket, parka, wind shirt, or shirt of any type to isolate, to a considerable extent, the motion of the sleeve from the main body of the garment. This isolation of movement is accomplished by shaping the edges of the separate section and the adjoining edges of the garment body and the sleeve in such a way that excess fabric is available between the sleeve and the body of the garment regardless of which direction the arm is moved. In particular, excess fabric is available to accommodate the volume of the shoulder joint when it moves upward from a rest position as the arm is raised. The result is that the wearer can move the arm over a very wide range of motion with much less movement of the main body of the garment and much less movement of the sleeve cuff up and down the arm than with other methods of sleeve attachment.

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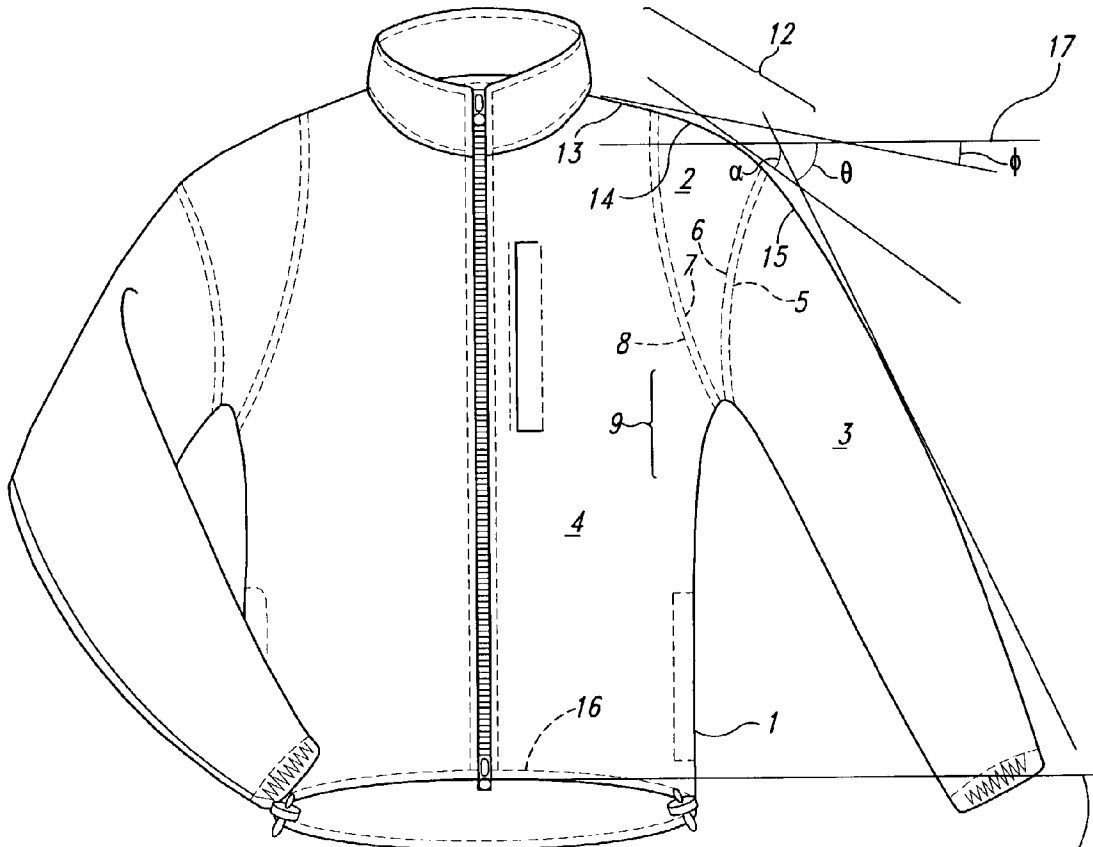
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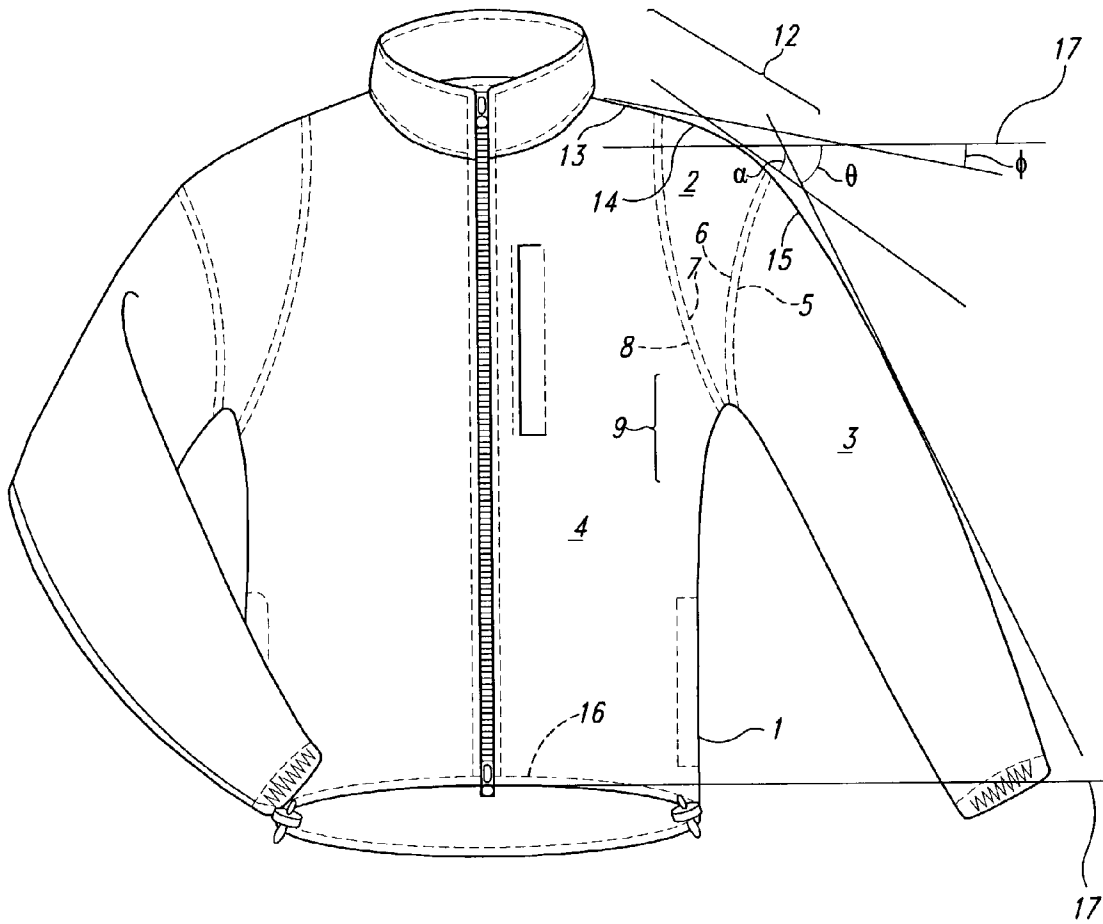


Fig. 1A

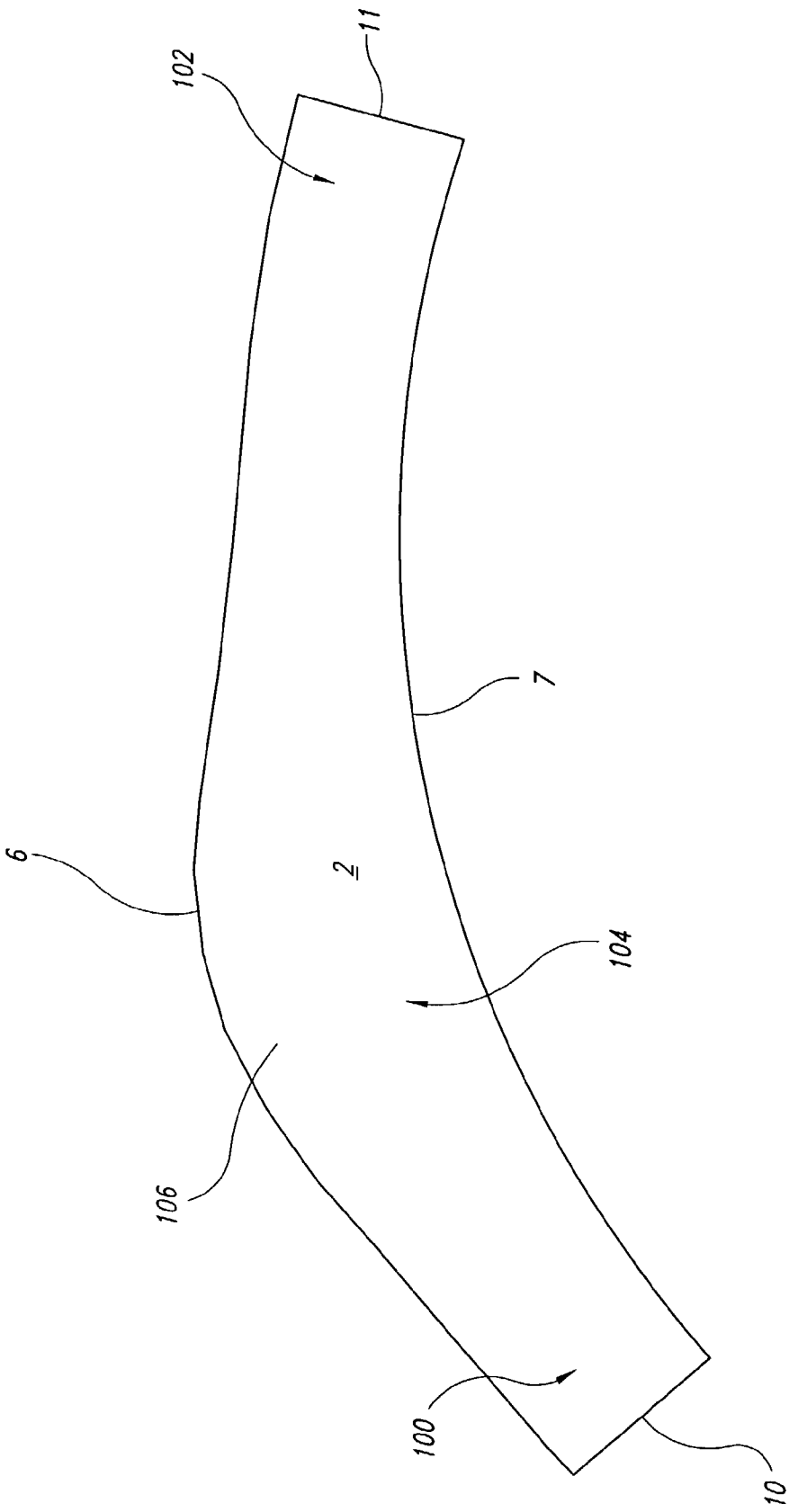


Fig. 1B

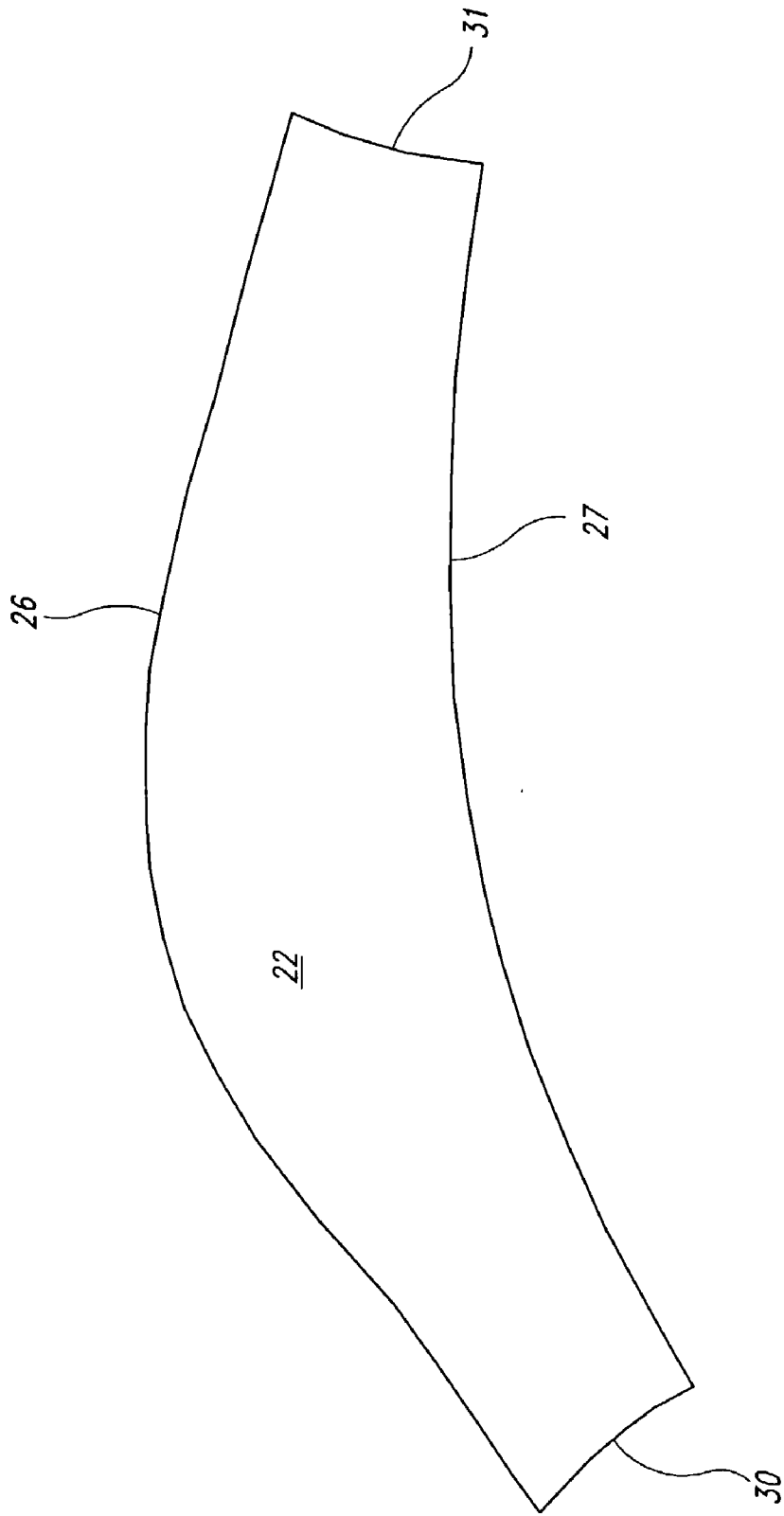


Fig. 2B

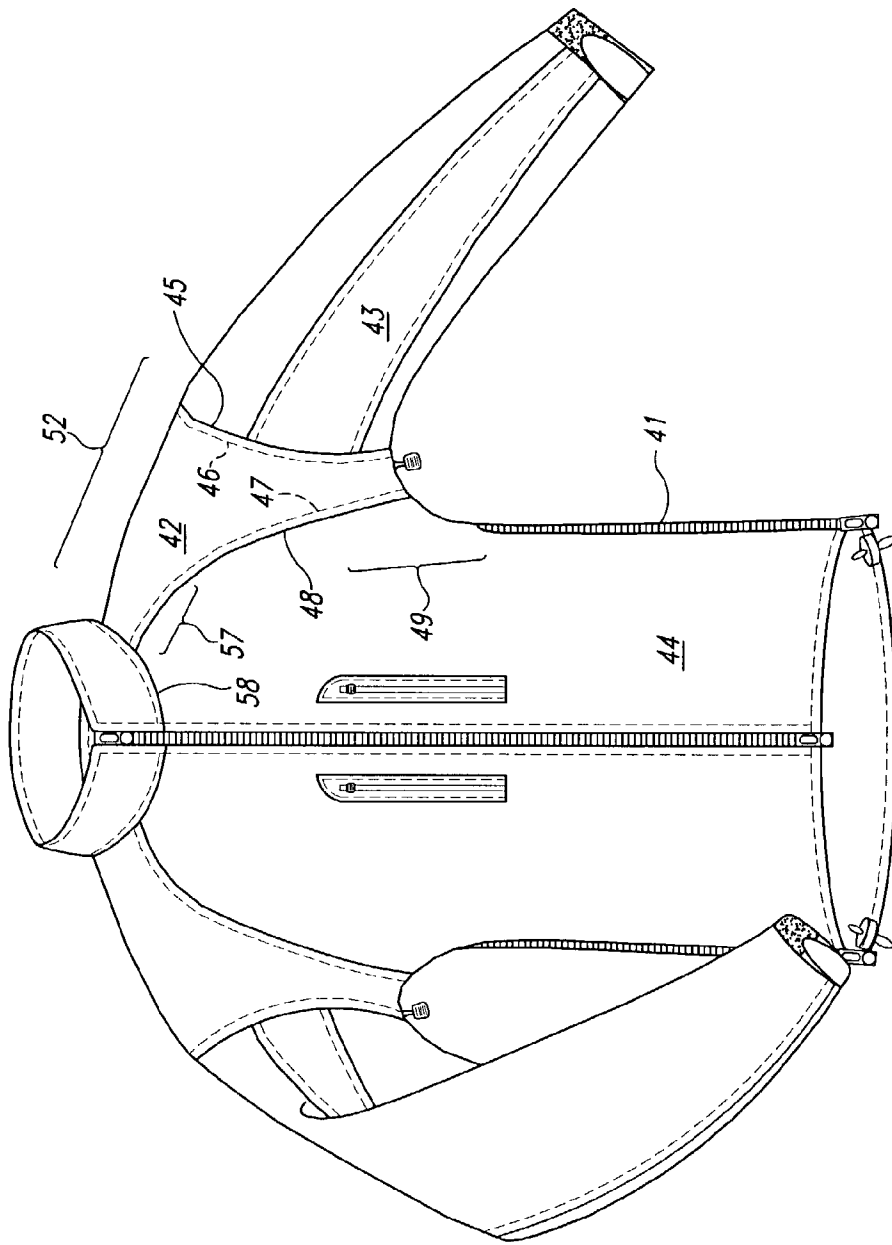


Fig. 3A

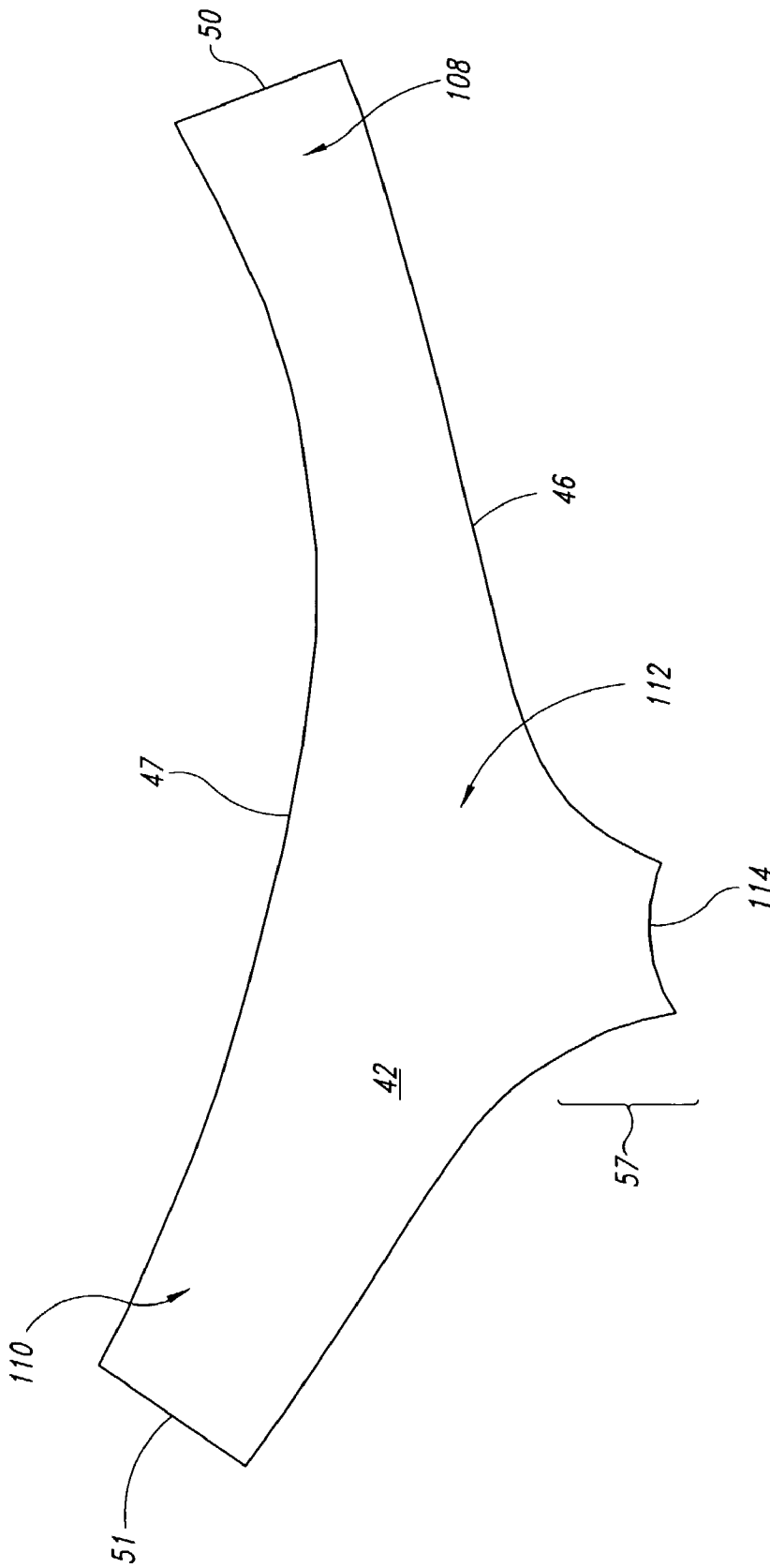


Fig. 3B

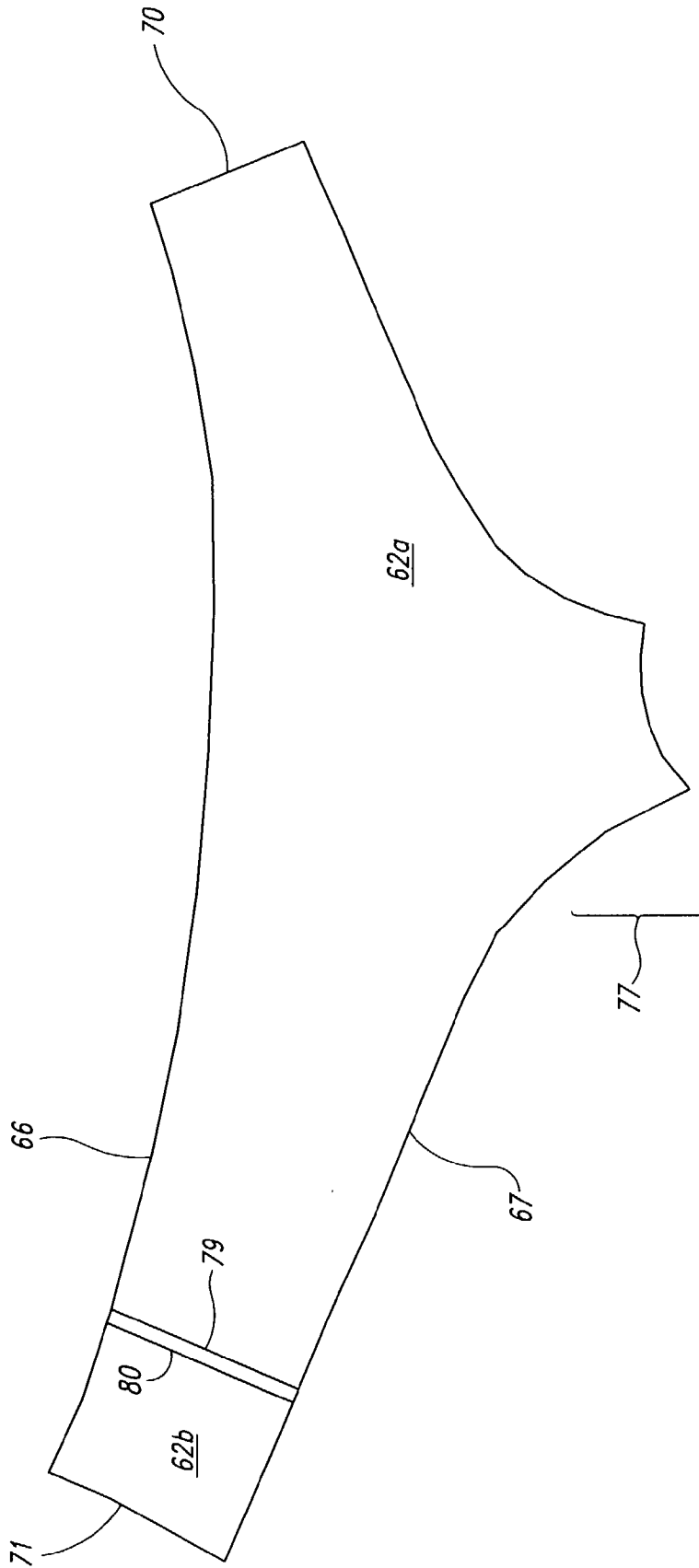


Fig. 4B

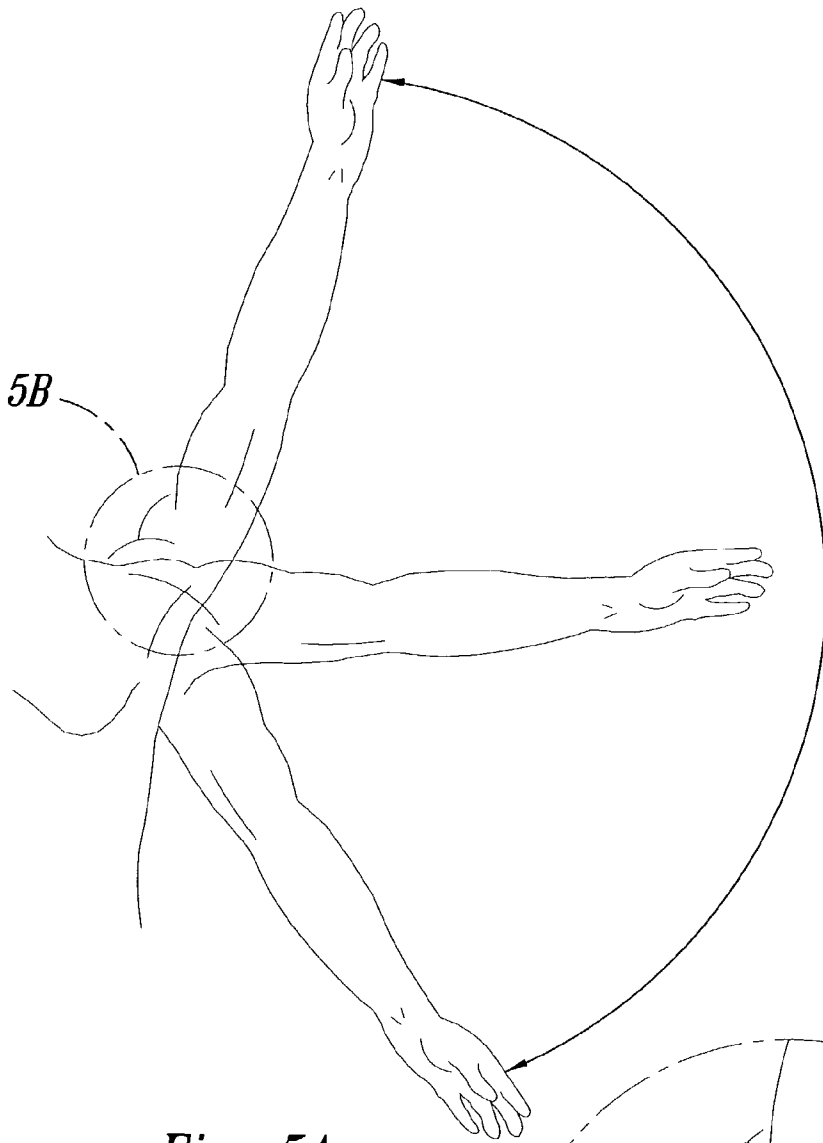


Fig. 5A

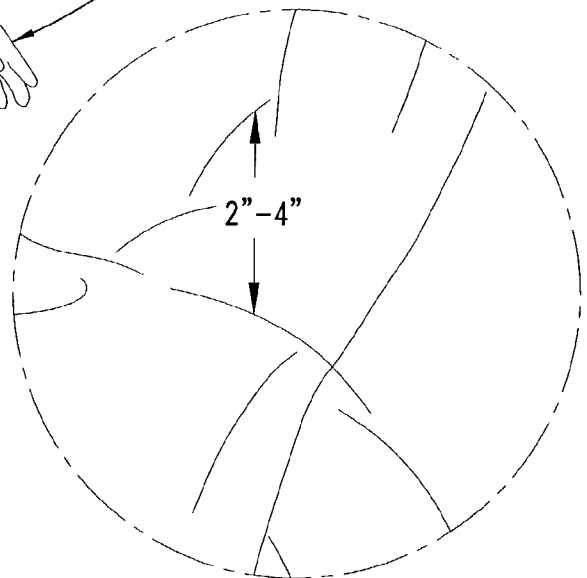


Fig. 5B

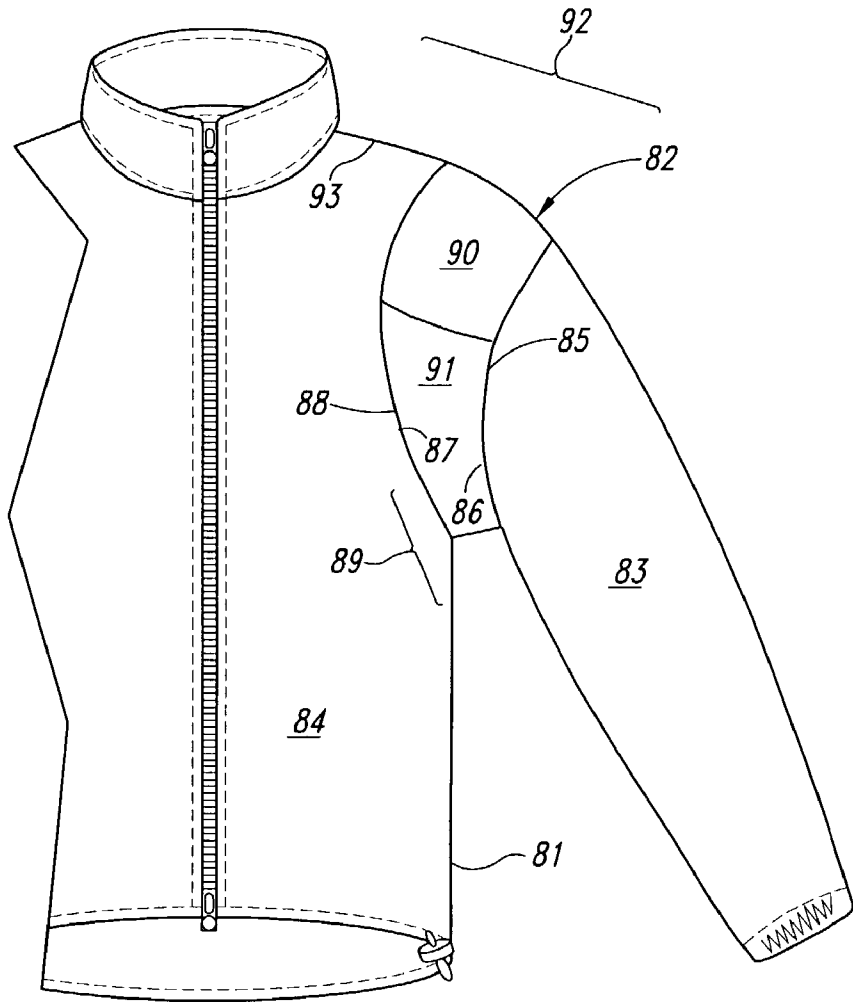


Fig. 6

VOLUMETRIC SHOULDER FOR GARMENTS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/311,372 filed Aug. 9, 2001, where this provisional application is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention pertains to garment shoulder design, and more particularly, to a shoulder joint configuration for joining a sleeve to a garment body in which sleeve movement is isolated from the garment body.

[0004] 2. Description of the Related Art

[0005] It has long been desirable to provide shirts, jackets, parkas and the like with a construction in which movement of the body of the garment is minimized when the arms are raised. Upward movement of a shirt hem due to raising of the arms can be problematic when the hem comes partially or completely untucked. Upward movement of an elasticized hem on a lightweight jacket is problematic because the hem will not descend on its own when the arms are lowered, so the jacket is left loosely billowing in the way. Furthermore, upward movement of a parka can be problematic when wearing a pack because parka fabric pulled up through the waist belt of the pack billows out in front when the arms are lowered.

[0006] Various methods have been utilized to address this problem. The most common technique is to provide excess fabric in the armpit area by patterning both the body and the sleeve so they would overlap in the armpit area if laid flat. When sewn together, the excess fabric allows the arm to raise some distance before the side seams pull tight and begin to raise the garment's hem. Done properly, this allows the arm to raise approximately to the horizontal before the wearer's shoulder begins to lift the body of the garment. Another technique involves adding a separate section or piece of material ("gusset") in the armpit area. This provides excess material similar to the previous method with virtually the same results. Another technique involves replacing the gussets or portions of either the sleeves or body with elastic material. Again, the functional results are virtually the same, and this technique cannot be used in cases where elastic materials are undesirable for various reasons, such as in a fully-taped waterproof parka or in a beautifully patterned shirt.

[0007] In fact, an exhaustive survey over the past 20 years has failed to discover any garment construction technique that allows the arms to be raised close to the vertical without substantial upward movement of an unrestrained hem.

[0008] It has also long been desirable to minimize tightness and stress across the back of a shirt, jacket, parka or the like when moving the arms forward. Tightness can be uncomfortable, and, in extreme cases, can result in restricted motion and/or damage to the garment itself.

[0009] The primary method for avoiding such tightness and stress is simply to construct the garment larger than otherwise necessary. This is frequently acceptable, but there

are many cases when it is less than desirable. When garment weight is an issue, or the cost of the garment fabric is high, or when a well-fitted garment is desired for reasons of comfort, appearance, or functionality, it is less than desirable to simply make the garment oversized.

[0010] Another method for avoiding tightness and stress is to sew a gusset between the back of the sleeve and the back of the garment, as is sometimes seen in motorcycle jackets or ski jackets. Again this is less than desirable when garment weight is an issue, when the cost of the garment fabric is high, or when it is necessary to seam-tape the garment for waterproofness.

[0011] In addition, it has long been desirable to provide shirts, jackets, parkas and the like where movement of the cuffs is minimized when the arms are raised or lowered. In typical garments, the cuffs hang down over the knuckles when the arms are fully lowered, but the cuffs move well down on the wrist when the arms are raised to near vertical. Consequences range from merely cosmetic, such as when worn with suit coats, to downright dangerous, such as with jackets used for ice climbing or other winter pursuits.

[0012] The methods discussed above for minimizing hem movement are all somewhat effective in reducing movement of the cuffs, as well. In addition, in many cases the sleeves are built longer than necessary but restrained by elastic edging at the cuffs, or by adjustment systems at the cuffs, so that the cuffs can't simply fall down over the wearer's knuckles. This results in considerable excess fabric being gathered around the forearms when the arms are lowered, however. This is particularly problematic in waterproof parkas and jackets intended for outdoor use. Fabrics for such garments are frequently both stiff and expensive, so excess fabric gets in the way, impedes free arm movement, creates undesirable noise as it "accordions" back and forth with arm motion, and adds expense to the garment.

[0013] Again, an exhaustive survey over the past 20 years has failed to discover any garment construction technique that allows the arms to be raised close to the vertical without substantial movement of unrestrained sleeve cuffs. Unrestrained sleeve cuffs on even the most advanced mountain parkas typically move 3 inches or more as the arm travels from fully lowered to nearly vertical.

[0014] The present invention alleviates all of the shortcomings mentioned above. By essentially isolating the sleeve from the body of the garment, it allows a wide range of arm motion in every direction with minimal movement of either unrestrained hem or cuffs.

BRIEF SUMMARY OF THE INVENTION

[0015] In the disclosed embodiments of the present invention, no part of the sleeve attaches directly to the body of the garment. Rather, a separate section is introduced between the sleeve and the body. This separate section isolates, to a considerable extent, the motion of the sleeve from the main body of the garment. This isolation of movement is accomplished by shaping the edges of the separate section and the adjoining edges of the garment body and the sleeve in such a way that excess fabric is available between the sleeve and the body of the garment no matter which direction the arm is moved. In particular, excess fabric is available to accommodate the volume of the shoulder joint when it moves up from the rest position as the arm is raised.

[0016] The volume occupied by the shoulder joint is a key issue not addressed by all the garment construction methods that concentrate on providing extra fabric in the armpit area. In all these cases, the rising shoulder joint begins to pick up the body of the garment before the arm even reaches the horizontal position. As the arm is raised from the fully lowered position to near vertical, the top of the shoulder joint moves upward several inches. If a garment does not provide enough volume of fabric to accommodate the joint when raised, then the body of the garment will certainly rise with it. It is not sufficient to simply provide 2-dimensional relief under the arms along the side seams as is almost always done. Rather, to be effective, additional volume must be provided, as is provided in the present invention.

[0017] The result is that the wearer can move the arm over a very wide range of motion with much less movement of the main body of the garment and much less movement of the sleeve cuff up and down the arm than with other methods of sleeve attachment. When the arm is lowered, the added fabric volume gathers under, behind, and in front of the armpit area. It looks somewhat bulkier than normal, but is generally not found to be objectionable.

[0018] Thus, in accordance with one embodiment of the invention, a garment is provided having at least one sleeve, the garment including a separate section interposed between the body and the at least one sleeve, the separate section structured to provide extra volume in the shoulder to isolate movement of the sleeve from the body of the garment when a user moves their arm. Ideally, the separate section is not formed of stretchable material, although it may be used if desired. In accordance with one aspect of this embodiment of the invention, the separate section can be configured to extend to a neck hole of the garment. The separate section includes first and second edges configured for attachment to the body and the sleeve, respectively, the first and second edges configured to not match up to corresponding edges on the body and the sleeve when disposed flat on a common planar surface.

[0019] In accordance with a method of the present invention, a garment is formed to have at least one sleeve, the method including providing a separate section interposed between the body of the garment and the sleeve, the separate section structured to provide extra volume in the shoulder to isolate movement of the sleeve from the body of the garment when a user moves their arm. Ideally the separate section is formed of non-stretch material, as discussed above. In one embodiment the separate section is formed to extend to a neck hole of the garment. In this embodiment the separate section has first and second edges that are formed to be attached to corresponding edges of the garment and the sleeve such that when disposed flat on a common planar surface the edges of the separate section do not match up to the corresponding edges of the garment and the sleeve to thereby provide a volumetric shoulder area when assembled.

[0020] In accordance with an alternative embodiment of the invention, the separate section can be formed of individual subsections that have first and second edges configured for attachment to the body and the sleeve, respectively, of the garment, and third and fourth edges for attachment to adjacent subsections, the third and fourth edges configured to not match up with edges of adjacent subsections when disposed flat on a common planar surface.

[0021] As is the case with other embodiments of the present invention, variations in the curves along the edges of the separate section, and of the curves along the edges of the garment and the sleeves that attach to the separate section, affect the degree to which this method is effective. Compromises can be made depending on other constraints or desires. For example, in parkas where it is desired to eliminate any seam on top of the shoulder, the separate section may be shaped in that area so that it includes an extension that extends all the way to the neck hole. Production parkas prove that this modification can be made with only minor loss in isolation of sleeve and garment body movement.

[0022] The separate section may be constructed from a single piece of fabric, 2 pieces, or it may be composed of several. In the embodiments described herein, the separate section can be made from the same fabric as the rest of the garment. The separate section could easily be constructed from completely different fabric, of course, or the same fabric in a different color. In another embodiment, the lower piece of fabric is the same as that from which the main body is constructed, while the upper piece is heavier fabric to provide reinforcement.

[0023] A variation of the foregoing embodiment has a mesh underarm vent. The vent could be made of three pieces of mesh, one of which forms the underarm portion of the separate section. Optionally, the seams in the mesh vent can be eliminated so that the vent is more readily cut and sewn in. The basic outlines of the vent and of the separate section are unchanged, however.

BRIEF DESCRIPTIONS OF THE SEVERAL VIEWS OF THE DRAWINGS

[0024] FIG. 1A is a front view of one embodiment of a jacket incorporating a separate section between each sleeve and a body of the jacket, each separate section consisting of a single piece;

[0025] FIG. 1B shows a typical pattern for the fabric used to make the separate section of FIG. 1A;

[0026] FIG. 2A is a front view of another embodiment of the invention showing a windbreaker incorporating a separate section between each sleeve and the body of the windbreaker, each separate section comprising a piece of the same fabric as the windbreaker and a small section of a mesh underarm vent;

[0027] FIG. 2B shows a typical pattern for the fabric used to make the separate section of FIG. 2A;

[0028] FIG. 3A is a front view of a further embodiment of the invention showing a parka incorporating a separate section between each sleeve and the body of the parka; each separate section comprising a piece of the same fabric as the parka, patterned in such a way that it extends to the neck hole;

[0029] FIG. 3B shows a typical pattern for the fabric used to make the separate section of FIG. 3A;

[0030] FIG. 4A is a front view of yet another embodiment of the invention showing a parka incorporating a separate section between each sleeve and the body of the parka, each separate section comprising a piece of the same fabric as the

jacket under the arm and a piece of heavier fabric, for reinforcement, patterned in such a way that it extends to the neck hole;

[0031] FIG. 4B shows a two-piece pattern for the fabric used to make the separate section of FIG. 4A;

[0032] FIGS. 5A-5B illustrate the distance that a shoulder moves upward when the arm is raised to a near vertical position; and

[0033] FIG. 6 is a front view of yet a further embodiment of the invention illustrating a parka that incorporates a separate section inserted between each sleeve and the body of the parka, each separate section consisting of several pieces that are patterned to add volume to the separate section when assembled.

DETAILED DESCRIPTIONS OF THE INVENTION

[0034] A first embodiment of the invention is illustrated in FIGS. 1A and 1B. FIG. 1A shows a front view of a jacket 1, with a separate section 2 interposed between a sleeve 3 and a jacket body 4. The separate section 2 wraps over a shoulder area 12, and it includes ends 10 and 11 that are joined together at a seam in an armpit area 9, typically by sewing or by fabric welding, although any other joining method is usable without affecting the utility of the invention. Joining of the ends 10, 11 of the separate section 2 in the armpit area 9 generally provides the best appearance and the best fabric utilization in manufacturing; however, it is entirely possible to break the separate section 2 anywhere else and join the ends together, such as on top of the shoulder area 12, for example.

[0035] A typical pattern for the fabric used to make the separate section 2 is shown in FIG. 1B. The section 2 includes opposing longitudinal edges 6, 7 and opposing transverse edges 10, 11. The longitudinal edges 6, 7 approach a parallel relationship at end portions 100, 102, adjacent the transverse edges 10, 11, respectively. The longitudinal edges each have a general arcuate shape along their length, although the radius varies, especially at a mid-portion 104, where the longitudinal edge 6 extends outward to create a larger area 106. In this larger area 106 the longitudinal edges 6, 7 are at the greatest distance apart.

[0036] In this and the embodiments described and illustrated in FIGS. 2-4, the edges of the separate section and corresponding edges of the sleeve and garment body do not match up when laid flat. In this configuration, when assembled together, extra volume is provided in all directions as the separate section assumes a volumetric shape.

[0037] The general shape is typically such that, in the completed jacket 1, the angle α made by a top 14 of the separate section 2, as compared to a line 17 that is parallel to the hem 16 of the jacket 1, is intermediate between the angle Φ made by the top 13 of the jacket body 4 and line 17 and the angle θ made by the top 15 of the sleeve 3 and to the line 17. This intermediate angle α in the shoulder area 12 provides a much better fit compared to jackets where the sleeve 3 is joined directly to the jacket body 4; and it provides improved mobility for a wearer's arms.

[0038] Varying the shapes of the longitudinal edges 6 and 7 of the separate section 2 and the shapes of an edge 5 of the

sleeve 3 and an edge 8 of the jacket body 4 affects the amount of extra fabric available to accommodate the motion of the sleeve 3 without causing substantial motion of the jacket body 4. For example, the shapes of the longitudinal edges 6, 7 of the separate section 2 can be changed to add fabric in the shoulder area 12. This extra fabric then provides extra volume in the shoulder area 12 of the jacket 1 when it is worn. This extra volume helps reduce movement of the jacket body 4 when the wearer raises an arm. The shapes of the edge 5 of the sleeve 3 and the edge 8 of the jacket body 4 can also be altered to provide extra fabric in the shoulder area 12. Likewise the shapes of the edges 5, 6, 7, and 8 can be altered in the armpit area 9 to provide extra fabric there, which further isolates motion of the sleeve 3 from the jacket body 4 especially when the sleeve 3 is rotated upward compared to the jacket body 4. Likewise, the shapes of the edges 5, 6, 7, and 8 may be altered in other areas to help isolate motion of the sleeve 3 from the jacket body 4. In practice, the amount of alteration of the shapes of the edges 5, 6, 7, and 8 in various areas can be determined by the directions the sleeve is intended to move the most and by compromises between the aesthetics and the functionality associated with the extra fabric.

[0039] It is understood that all of the foregoing description applied to a jacket is applicable with equal utility to shirts, parkas, windbreakers, raincoats and all other roughly similar articles of apparel having sleeves.

[0040] A different embodiment of the invention is illustrated in FIGS. 2A and 2B. FIG. 2A is a front view of a windbreaker 21 in which a separate section 22 is interposed between a sleeve 23 and a windbreaker body 24. In this embodiment a mesh underarm insert 37 is interposed between and joined to the ends 30 and 31 of the separate section 22 and is joined to the sleeve 23 and to the windbreaker body 24. FIG. 2B shows a typical pattern for the fabric used to make the separate section 22. As in the previous discussion, extra fabric can be provided in the areas desired by altering the shapes of the edges 26 and 27 of the separate section 22, by altering the shape of the edge 25 of the sleeve 23, and by altering the shape of the edge 28 of the windbreaker body 24. In practice, the precise shape of a mesh underarm insert 37 minimally enhances or minimally diminishes the affects achieved by shaping the edges 25, 26, 27, and 28.

[0041] A different embodiment of the invention is illustrated in FIGS. 3A and 3B. FIG. 3A is a front view of a parka 41 in which a separate section 42 is interposed between a sleeve 43 and a body 44 of the parka 41. As in the first embodiment discussed, a separate section 42 wraps over the shoulder area 52, and its ends 50 and 51 are joined together in the armpit area 49. In this embodiment the shape of the separate section 42 has been modified to have an extension 57 that extends all the way to a neck hole 58 of the parka 41, thus eliminating any seams over the top of the shoulder area 52 that might be subjected to abrasion. FIG. 3B shows a typical pattern for the fabric used to make the separate section 42. The separate section 42 includes a first longitudinal edge 46 having an arcuate shape that extends to first and second transverse edges 50, 51, and a second longitudinal edge 47 that extends between the first and second transverse edges 50, 51 to define first and second end portions 108, 110, and a mid-portion 112. At the mid-portion

112, the second longitudinal edge 47 includes a neck-hole edge 114 formed on extension 57 of the mid-portion 112.

[0042] As in earlier discussions, extra fabric can be provided in the areas desired by altering the shapes of the edges 46 and 47 of the separate section 42, by altering the shape of the edge 45 of the sleeve 43, and by altering the shape of the edge 48 of the body 44. In practice, the shape of the extension can substantially diminish the overall effectiveness achieved by careful shaping of the edges 45, 46, 47, and 48 if one is not careful. It has been demonstrated, however, that the extension 57 can be carefully shaped such that the reduction in effectiveness is minimal.

[0043] Yet another embodiment of the invention is illustrated in FIGS. 4A and 4B. FIG. 4A is a front view of a parka 61 in which a separate section 62 is interposed between a sleeve 63 and a body 64 of the parka 61. In this embodiment the separate section 62 is composed of sub-pieces 62a and 62b joined at an edge 79 of the sub-piece 62a and an edge 80 of the sub-piece 62b. Typically the sub-piece 62a would be made from heavier fabric than the sub-piece 62b so as to provide reinforcement in the shoulder area 72 of the parka 61. As in the first embodiment discussed above, the separate section 62 wraps over the shoulder area 72, and its ends 70 and 71 are joined together in the armpit area 69. The shape of the separate section 62 has again been modified to have an extension 77 that extends all the way to the neck hole 78 of the parka 61. FIG. 4B shows a typical pattern for the fabric used to make the separate section 62. It also shows the sub-piece 62a joined by its edge 79 to the edge 80 of the sub-piece 62b. Extra fabric can be provided in the areas desired by altering the shapes of the edges 66, 67 of the separate section 62, by altering the shape of the edge 65 of the sleeve 63, and by altering the shape of the edge 68 of the body 64. There is no change in the effectiveness of shaping the edges 65, 66, 67, and 68 by breaking the separate section 62 into sub-pieces 62a and 62b.

[0044] FIG. 6 illustrates a further embodiment of the invention wherein a jacket or parka 81 is shown having a separate section 82 interposed between a sleeve 83 and parka body 84. In this embodiment, the separate section 82 is composed of a plurality of section pieces 90, 91, that are patterned such that the edges do not match up when laid flat on a common planar surface, but rather impart a three-dimensional shape to the separate section 82 when assembled. It is to be understood that the plurality of section pieces 90, 91 can consist of three, four, or more pieces to form the separate section 82.

[0045] As discussed above, additional fabric can be provided in each separate section 90, 91 in the areas desired by altering the shapes of the edges 86, 87 of the separate section 82, by altering the shape of the edge 85 of the sleeve 83, and by altering the shape of the edge 88 of the parka body 84. Volume added to the shoulder area 92 by altering the edges 85, 86, 87, and 88 would be in addition to any volume provided by the shaping of the edges of the section pieces 90, 91 that form the separate section 82.

[0046] U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent publications referred to in this specification and/or listed in the Application Data Sheet, are incorporated herein by reference, in their entirety.

[0047] From the foregoing it will be appreciated that, although specific embodiments of the invention have been

described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims and the equivalents thereof.

1. A garment, comprising:

a body and at least one sleeve, and a separate section interposed between the body and the at least one sleeve, the separate section structured to provide extra volume in a shoulder area defined by the separate section to isolate movement of the at least one sleeve from the body of the garment as a user raises and lowers the user's arm.

2. The garment of claim 1 wherein the separate section is formed of non-stretch material.

3. The garment of claim 1 wherein the separate section extends to a neck hole in the garment.

4. The garment of claim 1 wherein the separate section is formed to have first and second edges for attachment to a body edge and a sleeve edge, and wherein the first and second edges of the separate section are shaped to not match up to the body edge and the sleeve edge when the body, separate section, and sleeve are disposed flat on the same planar surface.

5. The garment of claim 1 wherein an angle α formed by the top of the separate section and a bottom hem of the garment is intermediate to an angle Φ made by a top of the garment body and the garment hem and the angle θ made by a top of the sleeve and the garment hem.

6. The garment of claim 5, wherein the separate section is formed of non-stretch material.

7. A garment, comprising:

a body having a shoulder section and an armpit section, the body having an edge in the shoulder and armpit sections that defines a shoulder opening;

a sleeve having an edge defining a sleeve opening for attachment; and

a separate section configured to couple the sleeve to the body, the separate section having a first edge shaped to be attached to the edge of the body and a second edge shaped to be attached to the edge of the sleeve, the edges of the separate section configured to not match up with the edge on the body and the corresponding edge on the sleeve when disposed flat on a common planar surface to provide a volumetric shoulder area when assembled.

8. The garment of claim 7 wherein the separate section is formed of non-stretch material.

9. The garment of claim 8 wherein the separate section extends to a neck hole of the garment.

10. The garment of claim 6 wherein an angle α formed by the a top of the separate section and a bottom hem of the garment is intermediate to an angle Φ made by a top of the garment body and the garment hem and the angle θ made by a top of the sleeve and the garment hem.

11. The garment of claim 10, wherein the separate section is made of non-stretch material.

12. The garment of claim 7 wherein the separate section is formed of a first section that is thicker and heavier than a second section, the second section being positioned in an armpit of the garment.

13. The garment of claim 7 wherein the separate section is constructed of subsections, each subsection having first and second opposing edges configured for attachment to the body and to the sleeve, respectively, and opposing third and fourth edges that are shaped to not match up with adjacent subsections when disposed flat on a common planar surface.

14. The garment of claim 13 wherein the first and second edges are formed to not match up to the respective edge on the body and the edge on the sleeve when disposed flat on a common planar surface.

15. The garment of claim 13 wherein the first and second edges of each subsection are configured to match up with the corresponding edge of the body and the edge of the sleeve, respectively, when disposed flat on a common planar surface.

16. A method of forming a garment having a body and a sleeve, the method comprising:

forming a separate section to be interposed between the body and the sleeve, the separate section formed to provide extra volume in a shoulder of the garment to isolate movement of the sleeve from the body of the garment as a user moves the user's arm.

17. The method of claim 16 wherein forming the separate section comprises forming the separate section of non-stretch material.

18. The method of claim 16 wherein forming the separate section comprises forming the separate section to extend to a neck hole of the garment.

19. The method of claim 16 wherein forming the separate section comprises forming the separate section to have first and second edges for attachment to an edge on the body and an edge on the sleeve, respectively, the first and second edges of the separate section configured to not match up to the edge of the body and the edge of the sleeve, respectively, when disposed on a common planar surface.

20. The method of claim 16 wherein forming the separate section comprises forming the separate section of a plurality of subsections having first and second edges configured for attachment to the garment and the sleeve, respectively, and third and fourth edges configured for attachment to adjacent subsections, the third and fourth edges configured to not match up with adjacent corresponding third and fourth edges of adjacent subsections when disposed flat on a common planar surface.

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