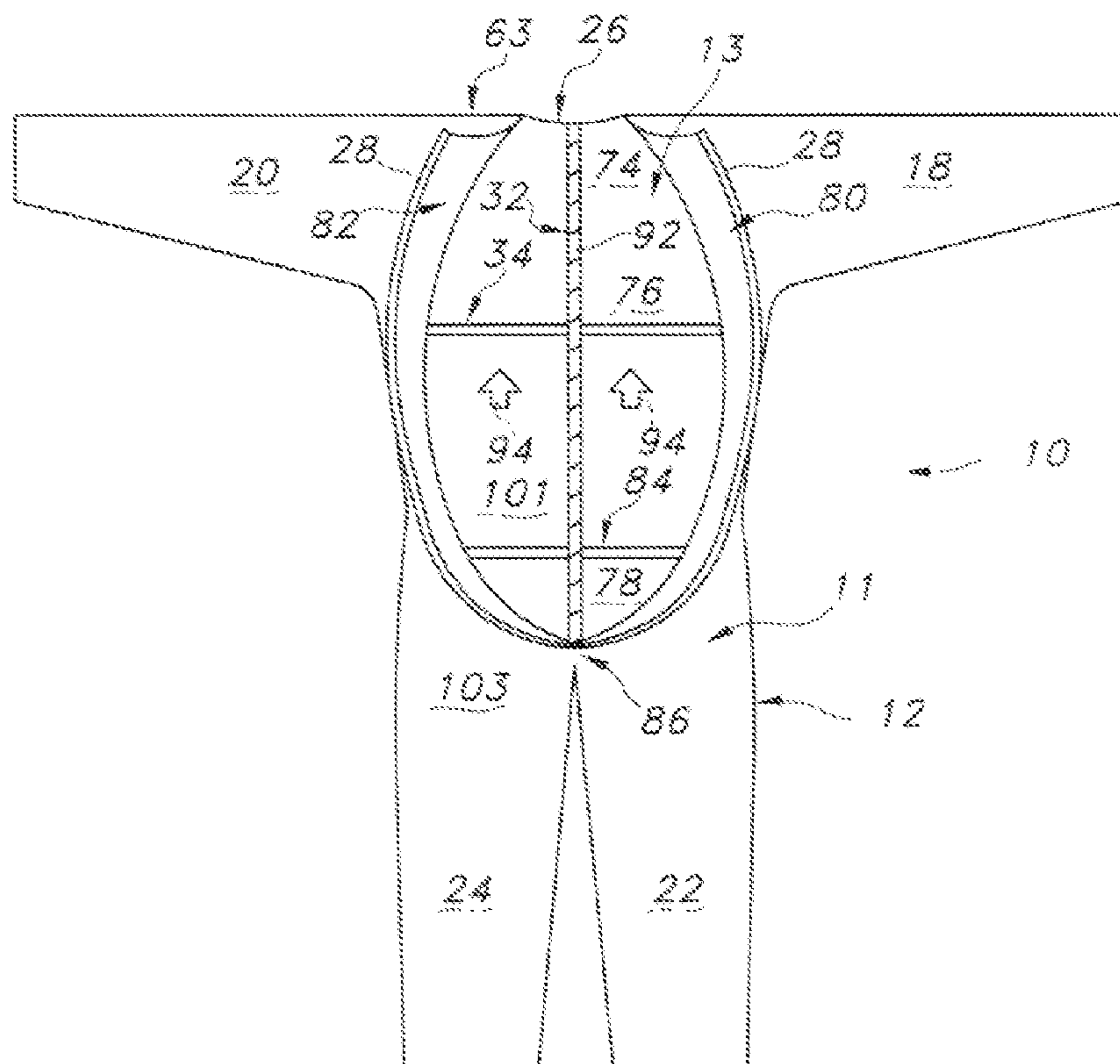




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(54) Title: GARMENT WITH INTERIOR SURFACE INDICATOR



(57) Abrégé/Abstract:

A protective garment with an interior surface indicator to facilitate proper donning of the garment is described. The garment includes at least one indicia on the central portion of the interior surface of the garment to communicate to the wearer which is the interior surface of the garment. This allows the garment to be handled and donned by the wearer, without the wearer touching an exterior surface of the garment. A method of preparing a protective garment for donning is also disclosed.



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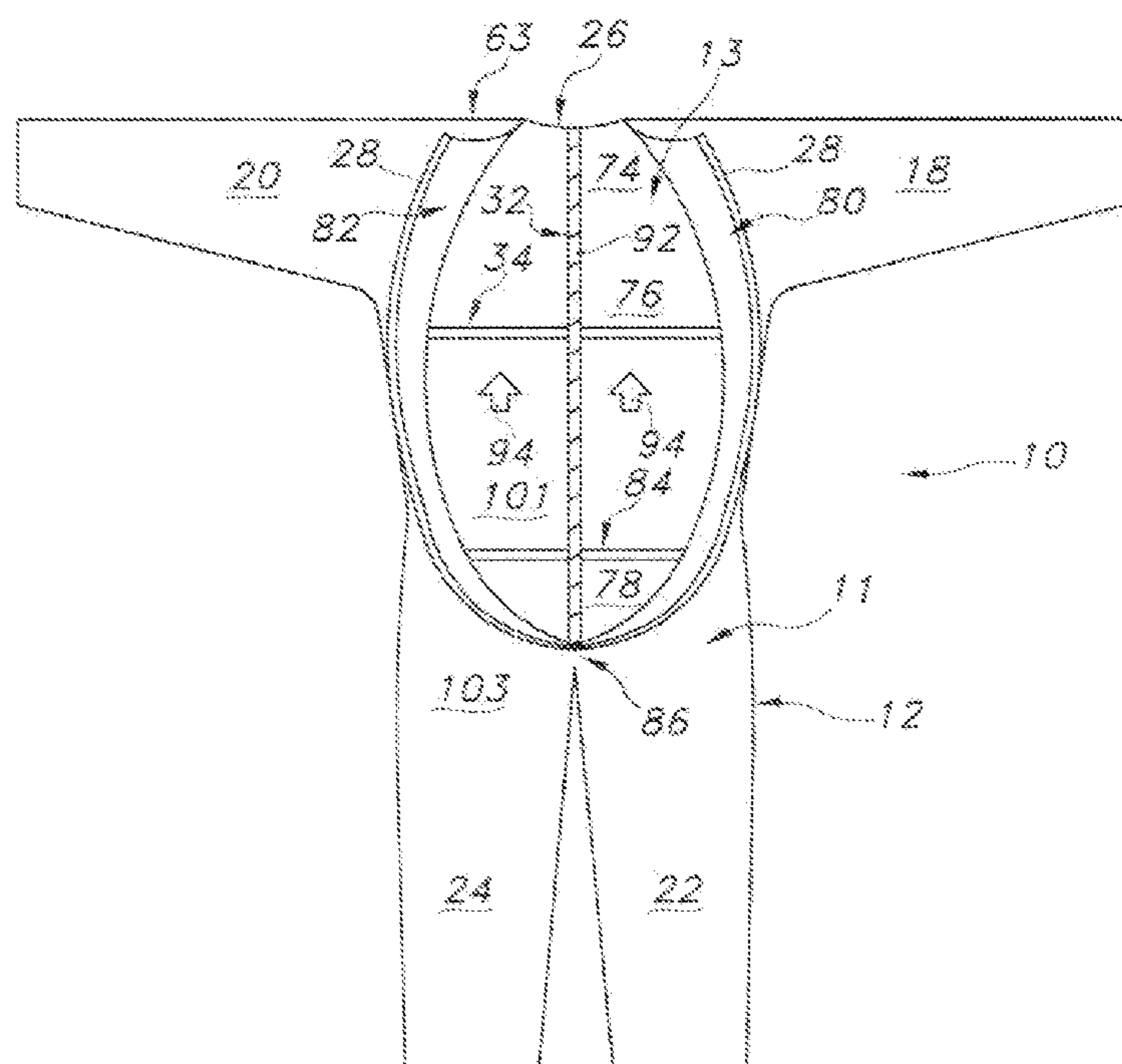


FIG. 7

(57) Abstract: A protective garment with an interior surface indicator to facilitate proper donning of the garment is described. The garment includes at least one indicia on the central portion of the interior surface of the garment to communicate to the wearer which is the interior surface of the garment. This allows the garment to be handled and donned by the wearer, without the wearer touching an exterior surface of the garment. A method of preparing a protective garment for donning is also disclosed.

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Garment With Interior Surface Indicator

BACKGROUND

There are many types of protective garments designed to provide barrier
5 properties. Such protective apparel keeps clothing clean and keeps dirt and other
residue off of the wearer's skin. For a variety of reasons, it is undesirable for
hazardous liquids and/or pathogens that may be carried by liquids to pass through
protective apparel. It is also highly desirable to use protective apparel to isolate
10 persons from dusts, powders, and other particulates that may be present in a work
place or accident site. Conversely, in cleanroom, critical manufacturing, and surgical
environments, the protective apparel protects the environment from dust and debris
that may otherwise be carried into the environment by the wearer. For example, in
aseptic manufacturing, various components are sterile when introduced to the
15 aseptic environment and are assembled in the aseptic environment such that the
resultant assembled article need not be sterilized. Such a manufacturing process
is often found within the manufacturing and packaging of certain pharmaceuticals.
Similar critical environments are also found in other areas such as certain surgical
environments.

Protective garments utilized in such various environments are generally made
20 from protective sheet materials that are designed to minimally keep the wearer clean
and optimally provide some degree of comfort to the wearer. In more critical
environments, such garment materials are typically designed to prevent
contaminants and/or chemicals from contacting the wearer. Additionally, in critical
manufacturing and surgical environments, such garments are designed and
25 processed to substantially eliminate particles, dust and free fibers that may
contaminate the work environment. To optimally provide such protection, such
garments and their materials of construction are often designed to have specific
interior and exterior surfaces. If incorrectly donned, such garments may not provide
the wearer (or the particular environment) with the desired protection.

30 While correct donning of garments is seemingly simple, the nature of such
protective garments often makes the task difficult and cumbersome. Commonly,
garments such as protective coveralls are provided to the wearer in a compact
folded configuration in which the interior and exterior surface are often

indistinguishable. Further compounding the issue is the fact that such garments are often a single color of material which makes distinguishing interior and exterior surfaces and distinguishing between the various components of the garment difficult. Finally, protective coveralls are relatively large in relation to the wearer such that the
5 wearer often does not have a clear view of the entire garment while holding the garment at any one specific point.

Often tags are associated with the neck openings of such protective garments (as well as with many other articles of clothing) to relay information such as sizing, branding, country of origin, or the like. Often such tags are pieces of
10 materials attached proximate the neck opening or on a seam within the recesses of the garment. In some instances, such tags are merely printed on the interior surface of the garment proximate the neck opening. However, all such tags are relatively small (generally, much smaller than about 50 square centimeters) in comparison to the square area of material of the garment on which such a tag is utilized. Such
15 small tag size helps avoid the potential discomfort of a tag on the neck of a wearer, but is also makes it difficult to locate such tags within the larger context of the entire garment. Depending on placement of such tags within the garment, how the user grasps the garment when donning, and/or how the garment is provided to the user in a folded configuration, such relatively small tags may not be easily viewable such
20 that the wearer can quickly and easily distinguish the interior surface from the exterior surface of the garment.

Such difficulties in determining the interior surface and the exterior surface can be frustrating to the wearer and increase the amount of time used in donning such garments. While such donning frustration may be a mere inconvenience in
25 many industrial manufacturing environments, in cleanrooms, critical manufacturing, and surgical environments, such issues are critical.

Due to the critical, sterile character of cleanroom manufacturing and surgical environments, stringent protocols regarding apparel and apparel donning are followed such that no contaminants, including things such as dead skin and
30 natural bacteria which may be present on workers' skin, are not accidentally transferred to the product or patient that the environment is structured to protect. To prevent such contamination, workers don head-to-toe coverage, including booties, gloves, and coveralls, to protect the environment. To ensure cleanliness,

workers undergo extensive training regarding the donning of such garments. The worker is careful to don such garments without touching exterior surfaces of the garment while being careful that the garment does not touch the floor or other surfaces. If either occurs, the worker must obtain another, uncontaminated,
5 garment to don. Such workers are not able to merely manipulate the garment to determine which is the interior surface; they must be able to determine which is the interior surface before they first touch such garments.

Additionally, workers typically change their coveralls once a day, or every other day, depending on the requirements or standards of their respective industry.
10 In some situations, workers may change their protective apparel even more frequently. After use, it can be quite costly to decontaminate, clean, and/or sterilize protective apparel after it has been used. Thus, it is often important that the protective apparel be inexpensive so as to be a disposable or limited-use garment. Generally speaking, protective coveralls are made from barrier materials/fabrics
15 engineered to be relatively impervious to liquids and/or particulates as well as being low-linting. The materials used, the garment design, and garment manufacturing are all important factors affecting the costs of such garments. Desirably, all of these factors should be suited for the manufacture of protective garment, such as coveralls, at such low cost that it may be economical to discard the garment, if
20 necessary, after only a single use.

DEFINITIONS

As used herein, the term "nonwoven-based material" or "nonwoven web" refers to a material or web that has a structure of individual fibers or filaments which
25 are interlaid, but not in an identifiable repeating manner. Nonwoven webs have been, in the past, formed by a variety of processes known to those skilled in the art such as, for example, meltblowing, spunbonding and bonded carded web processes.

As used herein, the terms "sheet" and "sheet material" shall be
30 interchangeable and in the absence of a word modifier, refer to a material that may be a film, nonwoven web, woven fabric or knit fabric, or laminates made from such materials.

As used herein, the term "machine direction" (hereinafter "MD") refers to the planar dimension of a material web, which is in the direction of a material parallel to its forward direction during processing. The term "cross-machine direction" (hereinafter "CD") refers to the planar dimension of a material, which is in the direction that is generally perpendicular to the machine direction.

As used herein, the term "liquid resistant" refers to material having a hydrostatic head of at least about 25 centimeters as determined in accordance with the standard hydrostatic pressure test AATCCTM No. 1998 with the following exceptions: (1) the samples are larger than usual and are mounted in a stretching frame that clamps onto the cross-machine direction ends of the sample, such that the samples may be tested under a variety of stretch conditions (e.g., 10%, 20%, 30%, 40% stretch); and (2) the samples are supported underneath by a wire mesh to prevent the sample from sagging under the weight of the column of water.

As used herein, the term "breathable" refers to the air permeability of a material, and specifically to a material having a Frazier porosity of at least about 25 cubic feet per minute per square foot (cfm/ft²). For example, the Frazier porosity of a breathable material may be from about 25 to more than 45 cfm/ft². The Frazier porosity is determined utilizing a Frazier Air Permeability Tester available from the Frazier Precision Instrument Company. The Frazier porosity is measured in accordance with Federal Test Method 5450, Standard No. 191A, except that the sample size is 8" X 8" instead of 7" X 7".

As used herein, the term "particle resistant" refers to a fabric having a useful level of resistance to penetration by particulates. Resistance to penetration by particulates may be measured by determining the air filter retention of dry particles and can be expressed as particle holdout efficiency. More specifically, particle hold-out efficiency refers to the efficiency of a material at preventing the passage of particles of a certain size range through the material. Particle holdout efficiency may be measured by determining the air filter retention of dry particles utilizing tests such as, for example, IBR Test Method No. E-217, Revision G (1/15/91) performed by InterBasic Resources, Inc. of Grass Lake, Michigan. Generally speaking, high particle holdout efficiency is desirable for barrier materials/fabrics. Desirably, a particle resistant material should have a particle holdout efficiency of at least about 40 percent for particles having a diameter greater than about 0.1 micron.

As used herein, the term “elastomeric” refers to a material or composite which can be extended or elongated by at least 25% of its relaxed length and which will recover, upon release of the applied force, at least 10% of its elongation. It is generally preferred that the elastomeric material or composite be capable of
5 being elongated by at least 100%, recover at least 50% of its elongation. An elastomeric material is thus stretchable and “stretchable”, “elastomeric”, and “extensible” may be used interchangeably.

As used herein, the terms “elastic” or “elasticized” means that property of a material or composite by virtue of which it tends to recover towards its original size
10 and shape after removal of a force causing a deformation.

As used herein, the term “disposable” is not limited to single use articles but also refers to articles that are so relatively inexpensive to the consumer that they can be discarded if they become soiled or otherwise unusable after only one or a few uses.

15 As used herein, the term “garment” refers to protective garments and/or shields including for example, but not limited to surgical gowns, patient drapes, work suits, coveralls, jumpers, aprons, and the like.

As used herein, the term “coverall(s)” refers to a relatively loose fitting, one-piece, protective garment that can be worn over other articles of clothing and
20 protects substantial areas of a wearer’s body, typically, from the neck region over the trunk of the body and out to the ends of extremities, such as a wearer’s wrists and ankles, which sometimes may include the hands and feet. In some embodiments, the garment may include an attached head cover, such as a hood, or integrated gloves and socks, boots, or other footwear.

25 As used herein, the term “polymer” generally includes, but is not limited to, homopolymers, copolymers, such as, for example, block, graft, random and alternating copolymers, terpolymers, etc. and blends and modifications thereof. Furthermore, unless otherwise specifically limited, the term “polymer” shall include all possible geometrical configurations of the material. These configurations include,
30 but are not limited to, isotactic, syndiotactic and random symmetries.

As used herein, the term “consisting essentially of” does not exclude the presence of additional materials which do not significantly affect the desired characteristics of a given composition or product. Exemplary materials of this sort

would include, without limitation, pigments, antioxidants, stabilizers, surfactants, waxes, flow promoters, particulates or materials added to enhance ability to process of a composition.

As used herein, the term “couple” or “affix” includes, but is not limited to, joining, connecting, fastening, linking, or associating two things integrally or interstitially together. As used herein, the term “releaseably affix(ed)” refers to two or more things that are stably coupled together and are at the same time capable of being manipulated to uncouple the things from each another.

As used herein, the terms “configure” or “configuration” means to design, arrange, set up, or shape with a view to specific applications or uses. For example: a military vehicle that was configured for rough terrain; configured the computer by setting the system's parameters.

As used herein, the term “substantially” refers to something which is done to a great extent or degree; for example, “substantially covered” means that a thing is at least 95% covered.

As used herein, the term “alignment” refers to the spatial property possessed by an arrangement or position of things in a straight line or in parallel lines.

As used herein, the terms “orientation” or “position” used interchangeably herein refer to the spatial property of a place where or way in which something is situated; for example, “the position of the hands on the clock.”

SUMMARY OF THE INVENTION

In light of the problems discussed above, a need exists for an inexpensive protective garment that allows for a wearer to easily identify the interior surface of the garment and to don the garment without touching the exterior of the garment. In accordance with the present disclosure, the problem of garment donning is eased by a protective garment that is provided to the wearer including indicia on the interior surface in a position that is easily visible to wearer when the garment is in the folded configuration and during donning of such a garment.

The present disclosure is directed to a protective garment with an interior and exterior surface, front and back sides, a neck opening, and a body section having upper, central and lower portions. A pair of legs extends from the lower

portion and a pair of sleeves extends from at least the upper portion. At least one surface indicia is positioned on the interior surface of the central portion of the garment. In some embodiments, such a garment may be a part of a packaged garment in which such a garment is configured in a folded configuration, within a
5 packaging member, and the packaging member is sealed.

The present disclosure is also directed to a method of preparing a protective garment for donning. The method includes the steps of providing a garment having at least one surface indicia positioned on an interior surface of the garment and folding the garment into a folded configuration, in which the interior surface of the
10 garment is present on the outer surface of the folded configuration such that a wearer may grasp the garment by the interior surfaces without touching the exterior surface of the garment. Additionally, the surface indicia is present on the outer surface of the folded configuration such that the wearer may easily identify the interior surface.

15 The present disclosure is also directed to a protective coverall having a first body half and second body half; each half is made of a seamless sheet of material. The second body half is substantially the mirror image of the first body half. Each body half includes 1) a body portion with a first edge and second edge, 2) a sleeve portion, and 3) a leg portion. A closure means joins the first edges of each body
20 portion on each body half and a vertical back seam joins the second edges of each body portion on each body half. Additionally, the vertical back seam includes a binding strip that further includes a surface indicia.

Finally, the present disclosure is also directed to a protective garment having interior and exterior surfaces, an upper portion, a central portion, and a neck
25 opening defined by the upper portion. The garment further includes at least one surface indicia positioned on the interior surface of the central portion of the garment.

BRIEF DESCRIPTION OF FIGURES

30 FIG. 1 illustrates a front view of an exemplary protective garment according to the present disclosure.

FIG. 2 illustrates a rear view of an exemplary protective garment according to the present disclosure.

FIG. 3 illustrates a detail of an exemplary protective garment.

FIG. 4 illustrates a detail of an exemplary protective garment.

FIG. 5 illustrates a detail of an exemplary protective garment.

FIG. 6 illustrates a detail of an exemplary protective garment.

5 FIG. 7 illustrates a front view of an exemplary protective garment according to the present disclosure, where the closure means is opened to show the interior surface of the garment.

FIG. 8 illustrates a detail of an exemplary protective garment.

10 FIGS. 9 – 15 illustrate exemplary steps in preparing an exemplary protective garment for donning by folding the garment into a folded configuration and packaging the folded configuration of the garment.

Specifically, FIG. 9 illustrates a top plan view of the back side of an exemplary protective garment with the sleeves and legs in a shortened configuration;

15 FIG. 10 illustrates a top plan view of the garment of FIG. 9 after the shortened sleeves and shortened legs have been folded on to the back side of the garment;

FIG. 11 illustrates a top plan view of the folded garment of FIG. 10 after folding the folded garment of FIG. 10 lengthwise;

20 FIG. 12 illustrates a top plan view of the folded garment of FIG. 11 after folding the folded garment of FIG. 11 widthwise;

FIG. 13 illustrates a top plan view of the folded garment of FIG. 12 after pulling the opening flaps about the folded garment of FIG. 12, exposing the interior surface of the garment;

25 FIG. 14 illustrates a top plan view of the folded configuration formed after a horizontal fold of the folded garment of FIG. 13; and

FIG. 15 illustrates a top plan view of the garment in its folded configuration within a packaging member to form a packaged garment.

30 FIG. 16 illustrates a rear view of an exemplary protective garment according to the present disclosure, where the closure means is opened to show the interior surface of the garment.

DETAILED DESCRIPTION

The present invention pertains to a protective garment having a surface indicia to facilitate and ease the handling and donning of the garment. Such protective garments are of particular interest to work areas and industries such as, for example, healthcare, home improvement do-it-yourself, chemical, industrial, sanitation, cleanrooms, and other similar applications. For the ease and convenience of describing the present invention, this description uses an exemplary protective coverall(s) garment to illustrate the inventive concept which may be applied to any protective garment. Terms such a “protective garment” and “protective coverall(s)” may be used interchangeably in the description. However, as would be understood by those skilled in the art, the concepts of the present disclosure (as illustrated for coveralls) may be applied to other protective garments as are well known and defined above. Thus, the following discussion should not be limited to application in coveralls, but may also extend to surgical gowns, patient drapes, worksuits, jumpers, aprons, and the like. Additionally, the following discussion applies to both durable / reusable protective garments and to limited-use / disposable protective garments.

In part, FIGS. 1 and 2 illustrate at 10 a front view of an exemplary protective garment 12. The protective coveralls 12 include a first (or left) body half 14 and a second (or right) body half 16. Each body half 14 and 16 is formed from a seamless sheet of material. The second body half 16 is substantially a mirror image of the first body half 14. The protective coveralls 12 contain left and right sleeves 18 and 20 as well as left and right legs 22 and 24. A neck opening 26 is visible at the top of the coveralls 12. As shown in FIG. 1, a closure means 28 is visible from a front view 10 of the coveralls 12. The garment 12 has a front side 11 and a back side 13.

FIG. 2 illustrates at 30 a rear view of exemplary protective coveralls. The protective coveralls 12 includes a first body half 14 and a second body half 16 (in reversed position as the view is from the rear). The sleeves 18,20 and the legs 22,24 are also in reversed position. As shown in FIG. 2, a vertical back seam 32 and a horizontal back seam 34 are visible from the rear view 30 of the coveralls 12.

The body of the garment 12 includes a torso section 72 from which the sleeves 18, 20 and legs 22, 24 extend. The torso section 72 includes an upper portion 74, a central portion 76, and a lower portion 78. The upper portion 74 extends downward from the shoulder portions 63 to the central portion 76 and will generally include all the areas of the garment 12 over the shoulders of the wearer that will contact the shoulders and neck of the wearer. The neck opening 26 is defined within the upper portion 74. The upper portion 74 generally forms the shoulder cap of the garment 12. Additionally, the sleeves 18, 20 generally extend from at least a portion of the upper portion 74.

10 The lower portion 78 extends upward from the crotch 86 to the central portion 76 and will generally include all the areas of the garment 12 that will contact the waist area of the wearer. The legs 22, 24 extend from the lower portion 78.

The central portion 76 extends between the upper and lower portions 74, 78 and generally will include the areas of the garment 12 corresponding to the chest and midsection of the front of the wearer, generally including the collarbone of the wearer. Additionally, the central portion 76 also generally extends from the shoulder blades to the small of the back on the back side of the wearer, generally including the shoulder blades and the small of the back of the wearer. For the garment 12 illustrated in FIGS. 1, 2 and 7, the upper portion 74 extends over and downward from the shoulder portions 63 to a point between neck opening 26 and horizontal back seam 34. The lower portion 78 extends upward from the crotch 86 to a point generally corresponding to the elastic waistband 84 and circumferential waist of the garment 12. The central portion 76 accounts for the remainder of the torso section 72 of the garment 12 and is illustrated as extending from a horizontal line above the horizontal back seam 34 and extending down to the elastic waistband 84. Each of the portions 74, 76, 78 include parts of the front side 11 and back side 13 of the garment 12 and collectively account for all of the surfaces of the torso of the garment from which the limbs (legs/sleeves) extend.

30 FIG. 7 illustrates the inside of the garment 12 of FIGS. 1 and 2. The left and right opening flaps 80, 82 of the closure means 28 are opened and pulled back to reveal the interior surfaces 101 of the garment 12. The vertical back seam 32 and the horizontal back seam 34 are visible on the interior surface 101 of the back side

13 of the garment 12. Additionally, an elastic waist band 84 may be present on the interior surface 101 of the back side 13 to provide the garment 12 with enhanced waist fit.

Desirably, the garment 12 may include at least one surface indicia 92 on the interior surface 101 of the garment 12, to help the wearer easily identify the interior surface 101 when donning the garment 12. Such a surface indicia 92 may be any sensory cue that communicates to the wearer which is the interior surface 101 of the garment 12. Typically, the sensory cue will be some form of visual cue (color, shape, text, symbol, graphic, or the like) that the wearer can see. However, it is contemplated that such sensory cues may be visual, tactile, olfactory, gustatory, auditory, or combinations of such sensory cues.

In the garment 12 illustrated in FIG. 7, a surface indicia 92 is associated with the vertical back seam 32 and extends from proximate the neck opening 26 to proximate the crotch 86 along the interior surface 101 of the back side 13 of the garment 12. In this particular embodiment, the vertical back seam 32 is a bound seam 732 where the binding strip 734 of the bound seam 732 is made of a material having a color that is visually distinct from the color of the seamless sheet 36 that makes up the garment 10. Thus, the indicia color will be distinctly different than the color of the interior surface 101 to easily identify the interior surface 101 by contrast. For example, for a garment 12 that is primarily made of a seamless sheet 36 that is white, the binding strip 734 may be a blue strip of material that is in contrast to the white background of the interior surface 101. Similarly, instead of being only associated with the vertical back seam 32, the surface indicia 92 may be associated with the horizontal back seam 34, or with both a vertical back seam 32 and a horizontal back seam 34.

Alternatively, the surface indicia 92 may be other similar visual cues. For example, the surface indicia 92 may be repeating contrasting colored shapes printed on the interior surface 101. For garments that are constructed without a vertical back seam 32, the surface indicia 92 may be a colored strip that extends down the central back spine of the garment (generally located along the line where the vertical back seam 32 is located in the garment 12 of FIG. 7). Such a colored strip may be printed directly on the interior surface 101 or may be an additional strip of colored material that is associated with the interior surface 101. In another

embodiment, the surface indicia 92 may be large text printed (or otherwise placed) on the interior surface 101, such as "OK" or "INSIDE SURFACE". The surface indicia 92 may be a symbol such as a check mark or a thumbs-up symbol.

Similarly, such text or symbols may be repeated across the entire interior surface 101, or some smaller portion thereof. The surface indicia 92 may be a holographic image present on the interior surface 101. In some embodiments, stitching only present on the interior surface 101 may be made using a stitching color that is a contrasting color to the that of the material being stitched together.

The surface indicia 92 is desirably present in at least the central portion 76 of the interior surface 101 as the central portion 76 makes up a large area of the visible torso section 72 of the garment 12 when the garment 12 is being handled for donning. In some embodiments, the surface indicia 92 may extend into the upper portion 74, into the lower portion 78, or may be positioned in all of the portions of the torso section 72. However, presence of the surface indicia 92 in at least a portion of the central portion 76 is believed to provide the most reliable minimal indicator to a wearer that handles and dons such a garment 12.

The surface indicia 92 may additionally, or alternatively, include a material having a texture that is distinct from the textures of the surrounding surfaces, which then may be used by the wearer to identify the interior surface 101 by touch. Similarly, the surface indicia 92 may additionally, or alternatively, include a material that produces a unique sound when handled. For example, the surface indicia 92 may include metalized nylon, foil, biaxially-orientated PET film, or other similar material that produces an audible crinkling sound when handled that is distinct from the sound of handling the sheet material the makes up the remainder of the garment 12.

In some embodiments, the surface indicia 92 present on the interior surface 101 may be absence of a particular sensory cue relative to the remainder of the surfaces of the garment 12. For example, the garment 12 may include colored circles printed only on the exterior surface 103 of the garment 12. The surface indicia 92 of such a garment may be the absence of any such printed circles on the interior surface 101. Again, the surface indicia 92 may be any sensory cue that may be used to communicate to the wearer the distinction between the interior surface 101 and the exterior surface 103 of the garment 12.

Additionally, the garment 12 may include a secondary indicia 94 such as illustrated in FIG. 7. Like the surface indicia 92, the secondary indicia 94 may be any sensory cue that communicates to the wearer a desired message. The secondary indicia 94 may be an alternative indicator of the interior surface 101 or may be used to convey a different message. In FIG. 7, the secondary indicia 94 is a shape on the interior surface 101 that both indicates the interior surface 101 and the proper orientation of the garment 12. Such secondary indicia 94 may be helpful to communicate instructions to the wearer such as where on the garment 12 the wearer should grab hold of the interior surface 101 for optimal donning.

One skilled in the art would understand that various types of sensory cues and execution of such cues could be used in combination to help the wearer identify the interior surface 101, aid the wearer in donning the garment, and/or provide the wearer with additional information.

The manufacture of such garments 12 may be in accordance with known automated, semi-automated, or hand assembly procedures. It may be desired that the protective garment 12 contain the fewest practical number of panels, portions or sections in order to reduce the number of seams in the garment for better barrier properties and to simplify the manufacturing steps. However, it is contemplated that the protective garment 12 may contain sections, panels, or portions of barrier fabrics that may have different degrees of strength to customize the coverall for a particular application. For example, the sleeves 18, 20 or other portions (e.g., leg portions, shoulder portions or back portions of the coveralls) may include double layers of barrier fabrics with very high levels of strength and toughness. Examples of the type of garments 12 contemplated may be found in U.S. Patent No. 5,487,189 to Bell, and in those garments available from Kimberly-Clark Corporation (Roswell, GA) sold under the KLEENGUARD® brand.

The assembly of an exemplary garment 12 is illustrated in FIGS. 3 to 6. Referring now to FIG. 3, there is shown at 36 a seamless sheet of material used to form the first body half 14. The first body half 14 includes a body portion 38 having a first edge 40, a second edge 42 and a top edge 44. The top edge 44 extends approximately half-way across the body portion 38 from the second edge 42. The first body half 14 includes a sleeve portion 46 having a top sleeve edge 48 and

bottom sleeve edge 50, a top edge 52, and a segment 54 of the second edge 42 of the body portion 38. The first body half 14 also includes a leg portion 56 having a front leg edge 58 and a rear leg edge 60.

A sleeve 18 of the first body half 14 may be constructed by folding the sleeve portion 46 along line 62 as illustrated in FIG. 4. Next, the body portion 38 and leg portion 56 are folded along line 64 as illustrated in FIG. 5. After these two folds are made, the top edge 52 of the sleeve portion 46 is attached to the top edge 44 of the body portion 38 producing a horizontal back seam 34 which can be seen in FIG. 1. Referring again to FIG. 5, the sleeve portion 46 is closed into a sleeve 18 by attaching the top sleeve edge 48 to the bottom sleeve 44 edge producing a sleeve seam 66 running from point 68 to point 70.

Generally speaking, this operation would be performed on the second body half 16 following exactly the same procedure as it would apply to the mirror image shape. Referring to FIG. 6, the first body half 14 is attached to the second body half 16 (i.e., the mirror image of the first body half 14). The body halves are joined by attaching the respective second surfaces 42 and 42' of the body portions 38 and 38'. A closure means (e.g., zipper, button fasteners, clip fasteners, snap fasteners, hook and loop fasteners and the like) 28 is attached to the respective first surfaces 40 and 40'. The leg portions are closed by attaching the front leg edge 58 to the back leg edge 60 and the front leg edge 58' to the back leg edge 60' on each body half.

At this point other features may be added such as, for example, a collar, hood, boots and/or elastic cuffs at the wrists and/or ankles of the coveralls.

Desirably, the left sleeve 18 may be an integral part of the first body half 14 (i.e., the first body half 14 cut to form a left sleeve 18), such as for the garment discussed above. It is contemplated that the left sleeve 18 may be a separate piece of material that may be joined to the first body half 14 by a seam (not shown). In the same way, it is desirable that the right sleeve 20 may be an integral part of the second body half 16 (i.e., the right body panel 16 cut to form a right sleeve 20). It is contemplated that the right sleeve 20 may be a separate piece of material that may be joined to the upper right body panel 28 by a seam (not shown). Additionally, In the garment 12 illustrated in FIGS. 1, 2 and 7, the sleeves 18, 20 are shown as extending outward from the body 14, 16 substantially parallel

with the shoulder portions 63. However, other designs are possible. For example, the sleeves may be designed to extend upward from the general plane of the shoulder portions 63.

Desirably, the legs 22, 24 are formed in a way similar to the formation of the sleeves 18, 20. Desirably, the left leg 22 may be an integral part of the left body panel 14 (i.e., the left body panel 14 cut to form a left leg 22), such as for the garment discussed above. It is contemplated that the left leg 22 may be a separate piece of material that may be joined to the first body half 14 by a seam (not shown). In the same way, it is desirable that the right leg 24 may be an integral part of the second body half 16 (i.e., the right body panel 16 cut to form a right leg 24). It is contemplated that the right leg 24 may be a separate piece of material that may be joined to the right body panel 16 by a seam (not shown).

The seams used to form the garment may be any type of seam that is appropriate in forming such garments. Such seams must be appropriate for the materials used in forming the garment, the strength required, and the level of security and protection that is desired. Typical seams used for such garments include serged, sewn, bound, taped, welded, and heat sealed seams. Bound seams 732 (such as shown in FIG. 8) are often used in protective garments. Such bound seams 732 use a binding strip 734 that reinforces the serged seam (formed by two material edges 740 being seamed) for strength and tear resistance as well as covers the raw edges of the materials being joined, to further reduce the possibility of introducing free fibers into the environments in which such garments are to be used.

Such a protective garment 12 may be packaged by any means and/or method that allows for the wearer to easily access the garment 12 for donning, while ensuring that the wearer does not touch an exterior surface 103 of the garment 12. One exemplary method of preparing the garment 12 for donning is shown in FIGS. 9 to 15. The method shown includes the first step of laying the garment 12 with the front side 11 face-down on a surface, opening the closure means 28, and shortening the sleeves 18, 20 and legs 22, 24 of the garment 12. A garment 12 in such a resultant shortened limb configuration (with shortened sleeves 218 and shortened legs 222) is illustrated in FIG. 9. As shown in FIG. 9, the sleeves 18, 20 and legs 22, 24 may be shortened by tucking the ends of such

legs and sleeves back up into such sleeves 18, 20 and legs 22, 24. Such shortened sleeves 218 and/or shortened legs 222 may be releaseably attached on the inside surface 101 of the garment 12 to hold the garment 12 in the shortened configuration of FIG. 9.

5 Next, with the front side 11 of the garment 12 laying against a table, the shortened sleeves 218 may be folded, along the fold line 95, toward the back side 13 of the garment. Similarly, the shortened legs 222 may then be folded up, along the fold lines 97, toward the back side 13 of the garment 12. As seen in folded garment of FIG. 10, the front side 11 of the shortened legs 222 and shortened
10 sleeves 218 now rest (facing up) on the back side 13 of the garment 12.

 Next, as shown in FIG. 10, the initially folded garment may be folded lengthwise in thirds, along the fold lines 99, to form the folded garment illustrated in FIG. 11. Specifically, the left side edge 114 is folded along line 99 toward the center of the back side 13 of the folded garment of FIG. 10. Then, the right side
15 edge 116 is folded, along line 99, towards the center of the garment and on top of the previously folded over left side edge, to form the folded garment of FIG. 11. The bottom edge 118 of the folded garment of FIG. 11 may then be folded upwards along fold line 111 and then again upwards along fold line 113 to form the folded garment of FIG. 12.

20 As seen in FIG. 12, a portion of the interior surface 101 (within the opened closure means 28) is now facing upwards, along with portions of the left and right opening flaps 80, 82. In a next step, the portions of the left and right opening flaps 80, 82 that lie underneath the folded garment of FIG. 12 (not visible) may be pulled around from underneath to on top of the folded garment of FIG. 12. By doing so,
25 the interior surface 101 of the garment 12 are exposed on the outer surfaces of the folded garment, as shown in FIG. 13. Finally, the garment may be folded upward along fold line 115 to form the final folded configuration 140 illustrated in FIG. 14.

 As seen in FIG. 14, such a folded configuration 140 desirably provides the interior surfaces 101 of the garment 12 readily available for the wearer to grasp
30 when donning the garment 12. Additionally, and more specifically, the central portion 74 of the back side 13 is provided on the outer surface 142 of the folded configuration 140. Thus, the surface indicia 92 present on the interior surface 101 of the central portion 74 is clearly visible to the wearer and serves as further

confirmation that the outer surface 142 of the folded configuration 140 is the interior surface 101. The outer surface 142 being the surface forming the exterior of the folded configuration 140 and thus includes all of the surfaces that may be potentially touched when handling the garment 12 in such a folded configuration
5 140. As shown in FIG. 14, substantially all of the outer surface 142 of the folded configuration 140 is made up of the interior surface 101 of the garment 12. In other potential folding methods, the folded configuration 140 may include a lesser percentage of the outer surface 142 being made of the interior surface 101. However, to ensure that the wearer only handles the garment 12 by the interior
10 surfaces 101 it may be desirable to fold the garment such that a majority (greater than 50 percent) of the outer surface 142 of the folded configuration 140 is made up of the interior surfaces 101 of the garment 12.

This illustrated method of folding of the garment 12 is only one potential method of folding the garment 12. Other methods that fold the garment 12 such
15 that the surface indicia 92 and the interior surface 101 are made available to the wearer during subsequent unfolding and donning are also contemplated. One skilled in the art would see how a different order of folding steps, numbers of folds, desired final folded dimensions, and other such considerations, may contribute to different methods of folding up the garment 12.

20 Additionally, such garments 12 may be laundered and dried to remove any excessive particulates that may be present from the garment manufacturing process. This step would likely need to occur before the folding steps.

Once folded, the garment 12 may be packaged by any method as known to package such garments 12 to form a protective garment package 810 to be
25 delivered to the wearer. Typically, as shown in FIG. 15, the folded configuration 140 of the garment 12 may be placed within packaging member 800 and the packaging member 800 sealed to form a packaged garment 810. For example, such a packaging member 800 may be a bag, a pouch, film layers, or the like. It may be desired that the packaged garment 810 be sterilized by any sterilization
30 method as is known for such products. Additionally, it may be desirable that the air within the packaging member 800 be removed during packaging, such that the garment 12 is vacuum-packed, prior to such sterilization.

Another embodiment of a protective garment including a surface indicia 92 for identifying the interior surface 101 of the garment, is illustrated in FIG. 16. The garment illustrated in FIG. 16 is the rear view 30 of a rear-opening gown garment 120, such as may be used in a surgical or laboratory environment. The garment 120 is shown with the closure means 28 (on the back side 13 of the garment 120) opened and the left and right opening flaps 80, 82 pulled back to reveal the interior surfaces 101 of the garment 120.

The garment 120 includes an upper portion 74, a central portion 76, and a lower portion 78. The upper portion 74 extends downward from the shoulder portions 63 to the central portion 76 and will generally include all the areas of the garment 120 over the shoulders of the wearer that will contact the shoulders and neck of the wearer. A neck opening 26 is defined within the upper portion 74. The upper portion 74 generally forms the shoulder cap of the garment 120. Additionally, the sleeves 18, 20 generally extend from at least a portion of the upper portion 74. The lower portion 78 extends upward from the bottom opening edge 122 to the central portion 76 and will generally include all the areas of the garment 120 proximate the waist 85 of the garment 120 down to the bottom opening edge 122. The central portion 76 extends between the upper and lower portions 74, 78 and generally will include the areas of the garment 120 corresponding to the chest and midsection of the front of the wearer, generally including the collarbone of the wearer. Additionally, the central portion 76 also generally extends from the shoulder blades to the small of the back on the back side of the wearer, generally including the shoulder blades and the small of the back of the wearer.

A surface indicia 92 is shown in the garment 120 of FIG. 16 extending along the interior surface 101 of the front side 11 of the garment 120. As discussed above, the surface indicia 92 may be any sensory cue that enables the wearer to distinguish the interior surface 101 from the exterior surface 103 of the garment.

Generally speaking, the manufacture and packaging of such garments may be in accordance with known automated, semi-automated, or hand assembly procedures. For example, attachment of the various portions of the garment may be achieved utilizing sewing or stitching, ultrasonic bonding, solvent welding, adhesives, thermal bonding and similar techniques. The order of manufacturing and packaging steps described above is believed to provide an efficient process

for fabricating and packaging protective garments. However, it is contemplated that changes in the order of these steps may be made without departing from the scope of the present invention.

5 Additionally, it is contemplated that additional helpful features may also be included on the garment 12. For example, the neck opening 26 may be fitted with a collar and/or hood. Sleeve and leg portions extending from the body portion may be fitted with elastic cuffs and/or other elastic means to ensure that they fit snugly against a wearer. Additionally, structures such as thumb loops and stirrups may be added to wrist and/or leg cuffs to aid in donning of the garment 12. Piping may be
10 added to the garment 12, to allow for attachment of badges to the garment without breaching the integrity of the garment material. Such piping may additionally, or alternatively, be included for aesthetic purposes. Other features such as pockets are also considered. The garment 12 may additionally include re-sealable openings to allow a wearer to access the interior of the garment 12 without having to remove the
15 garment 12.

The closure means 28 of the garment 12 may include any type of fastener as are common for such protective garments. Desirably, the closure means 28 will be a mechanical closure device, such as a standard zipper for barrier protection. However, it is contemplated that other fasteners such as hook-and-loop fasteners,
20 snaps, re-sealable tapes, or other similar fasteners may be used, depending on the level of protection required of the garment 12. Additionally, the closure means 28 of the garment 12 may include a closure flap that covers the closure means 28. Such a closure flap may be secured by a variety of fasteners.

The garment 12 may alternatively incorporate an obliquely oriented opening
25 with an associated fastener, across the front torso region of the garment, instead of a conventional vertical opening for entry into the garment. For example, a zipper may start at the shoulder and proceed diagonally across the torso down to the upper thigh region. This allows the torso of the garment to be opened wide. An angled zipper that starts away from the neck of the wearer may be less irritating.

30 In addition to surface indicia 92 and secondary indicia 94, it may be desired to communicate additional messages or information to users. Colors, symbols, words, logos, or other such indicia may be employed to communicate a particular message, such as the relative level of protection, sterility or non-sterility, or to

provide distinctive appearance as a style element. Colors may be applied to the material of the entire garment 12, individual portions of the garment 12, or as fabric piping along seams, around pockets or leggings, or in distinctive patterns. A logo denoting branding or level of protection may be located on the garment 12. Color
5 may be added to the closure means for communication and appearance purposes.

All materials used in the protective garment 12 have barrier properties that meet industrial standards for their respective designated level of protection. The garment materials are generally breathable and liquid resistant barrier materials. The breathability of the material increases the comfort of someone wearing such a
10 garment, especially if the garment is worn under high heat index conditions, vigorous physical activity, or long periods of time. Various suitable woven and non-woven barrier materials are known and used in the art for garments such as surgical gowns, coveralls, industrial protective garments, and the like. All such materials are within the scope of the present disclosure.

15 The material used to form the garment may be one or more bonded carded webs, webs of spunbonded fibers, webs of meltblown fibers, webs of spunlaced fibers, webs of other nonwoven materials, one or more knit or woven materials, one or more films, and combinations thereof. The material may be formed from polymers such as, for example, polyamides, polyolefins, polyesters, polyvinyl
20 alcohols, polyurethanes, polyvinyl chlorides, polyfluorocarbons, polystyrenes, caprolactams, copolymers of ethylene and at least one vinyl monomer, copolymers of ethylene and n-butyl acrylate, and cellulosic and acrylic resins, and mixtures and blends of the same. If the material is formed from a polyolefin, the polyolefin may be polyethylene, polypropylene, polybutene, ethylene copolymers, propylene
25 copolymers and butene copolymers.

Multiple layers of seamless sheet material may be joined into a seamless laminate and used to form garments having desirable barrier properties. Laminates can be formed by combining layers of seamless sheet materials with each other and/or forming or depositing layers of such materials on each other. For example,
30 the material may be a laminate of two or more nonwoven webs. As a further example, the material may be a laminate of at least one web of spunbonded fibers and at least one web of meltblown fibers and mixtures thereof.

For example, useful multi-layer materials may be made by joining at least one web of meltblown fibers (which may include meltblown microfibers) with at least one spunbonded continuous filament web. An exemplary multi-layer seamless material useful for making the protective garment of the present invention is a nonwoven laminated fabric constructed by bonding together layers of spunbonded continuous filaments webs and webs of meltblown fibers (which may include meltblown microfibers) and may also include a bonded carded web or other nonwoven fabric. Such materials may generally be produced inexpensively such that they may be considered to be disposable. An exemplary three-layer fabric having a first outer ply of a spunbonded web, a middle ply of a meltblown web, and a second outer ply of a spunbonded web may be referred to in shorthand notation as SMS. Such fabrics are described in detail in U.S. Pat. Nos. 4,041,203, 4,374,888, and 4,753,843, all of which patents are assigned to the Kimberly-Clark Corporation, the assignee of the present invention.

Another exemplary material which may be used for the manufacture of a protective garment 12 is a laminated fabric constructed by bonding together at least one layer of a nonwoven web with at least one layer of a film. Generally speaking, the film layer may range in thickness from about 0.25 mil to about 5.0 mil. For example, the film may have a thickness ranging from about 0.5 mil to about 3.0 mil. Desirably, the film will have a thickness ranging from about 1.0 mil to about 2.5 mil.

Such films may be applied by extrusion coating the substrates and then passing the superposed materials through the nip of smooth calender rolls. The films may be formed so they would create a layer on the substrate having a desired thickness (excluding the substrate). Exemplary film layers include films formed from polymers which may include polyamides, polyolefins, polyesters, polyvinyl alcohols, polyurethanes, polyvinyl chlorides, polyfluorocarbons, polystyrenes, caprolactams, copolymers of ethylene and at least one vinyl monomer, copolymers of ethylene and n-butyl acrylate, and cellulosic and acrylic resins. If the film layer is made of a polyolefin, the polyolefin may be polyethylene, polypropylene, polybutene, ethylene copolymers, propylene copolymers and butene copolymers and blends of the above.

The seamless sheet material of the garment 12 may have a basis weight ranging from about 15 gsm (i.e., grams per square meter) to about 300 gsm. For example, the seamless sheet material may have a basis weight ranging from about 20 gsm to about 100 gsm. Desirably, the material may have a basis weight ranging from about 20 gsm to about 75 gsm. Although the basis weight of the laminate will vary depending on the materials used, lower basis weight materials are desirable for comfort and conformability, and higher basis weight materials are desirable for toughness and durability. A film-nonwoven web laminate construction may permit combinations of materials providing high strength at relatively low basis weights and the design of the coveralls allows such strong and relatively unyielding materials to be used in a comfortable garment.

Such garments often need to be designed with materials adapted to protect the wearer in hazardous and general, non-hazardous environments. Examples of uses for hazardous environments include protection against water-based acids, bases, salts and splashes of certain liquids, such as pesticides and herbicides. The garments may provide a reliable barrier against exposure to harmful dry particles, such as lead dust, asbestos and particles contaminated with radiation. Non-hazardous, industrial uses include wearing the garments for "dirty jobs" at factories, workshops, engineering plants, farms and construction sites.

The resistance hydrostatic pressure (hydrohead) of the protective articles will depend, in part, on the particular kind of material from which the article is constructed. The garment may be designed to have a liquid hydrohead resistance of at least about 15, 17 or 20 millibars, up to about 180, 187, or 200 millibars, inclusive of all range combinations thereinbetween. More commonly, the garment may have a hydrohead resistance of about 25 or 30 to about 115 millibars, preferably between about 45 to about 110 millibars, and more preferably between about 50 millibars to about 95 millibars of pressure.

The air permeability of the garment materials may be designed to be within the range from at least about 2 cubic feet per meter (cfm) up to about 47 or 50 cfm, inclusive of all range combinations thereinbetween. More typically, the air permeability may be in the range from about 5 or 10 cfm to about 43 or 45 cfm, and preferably between about 15, 17, 20, or 25 cfm to about 40 or 42 cfm.

The garment may be designed to have a moisture vapor transmission rate (MVTR) of up to about 4700 g/m²/24hours, more typically about between about 2700 or 3600 MVTR to about 4500 or 4600 MVTR. The protective garment may protect the wearer resistance of about 9 - 100% against dry particle barrier
5 intrusion of a particle size of 0.3 - 05 microns.

The garment may be made from a material that provides a barrier to dust and microparticulates (e.g., ranging in size from about 0.05 - 0.10 microns or larger (see, e.g., U.S. Patent No. 5,491,753) or light-splash fluids. The materials of the garment may also be electret-treated to generate a localized electrostatic charge within the
10 fibers of the nonwoven web (e.g., U.S. Patent 5,401,446 to Tsai). For example, these materials may be treated with compositions such as Zepel® and Zelec®, available from E. I. du Pont De Nemours, located in Wilmington, Del.

The present invention has been described in general and in detail by way of examples. Persons of skill in the art understand that the invention is not limited to
15 the specific embodiments disclosed. Modification and variations of the general concept may be made without departing from the scope of the invention as defined by the following claims or equivalents, including, equivalent components.

CLAIMS:

1. A packaged garment comprising:
 - a protective garment comprising:
 - an interior surface and an exterior surface;
 - an upper portion, a central portion, and a lower portion;
 - a neck opening defined by the upper portion;
 - at least one surface indicia positioned on the interior surface of the garment;
 - a torso section comprising the upper portion, the central portion, and the lower portion;
 - a right leg and a left leg, wherein both legs extend from the lower portion; and
 - a right sleeve and a left sleeve, wherein both sleeves extend from at least the upper portion;
 - wherein the protective garment is folded into a folded configuration, wherein in the folded configuration, the interior surface of the garment is present on an outer surface of the folded configuration, and wherein the at least one surface indicia is presented to the wearer on the outer surface of the folded configuration; and
 - a packaging member, wherein the packaging member contains the folded configuration,
 - wherein the packaging member containing the folded configuration is sealed;
 - and
 - wherein the at least one surface indicia comprises an indicia strip that extends from the neck opening through the central portion and into the lower portion.

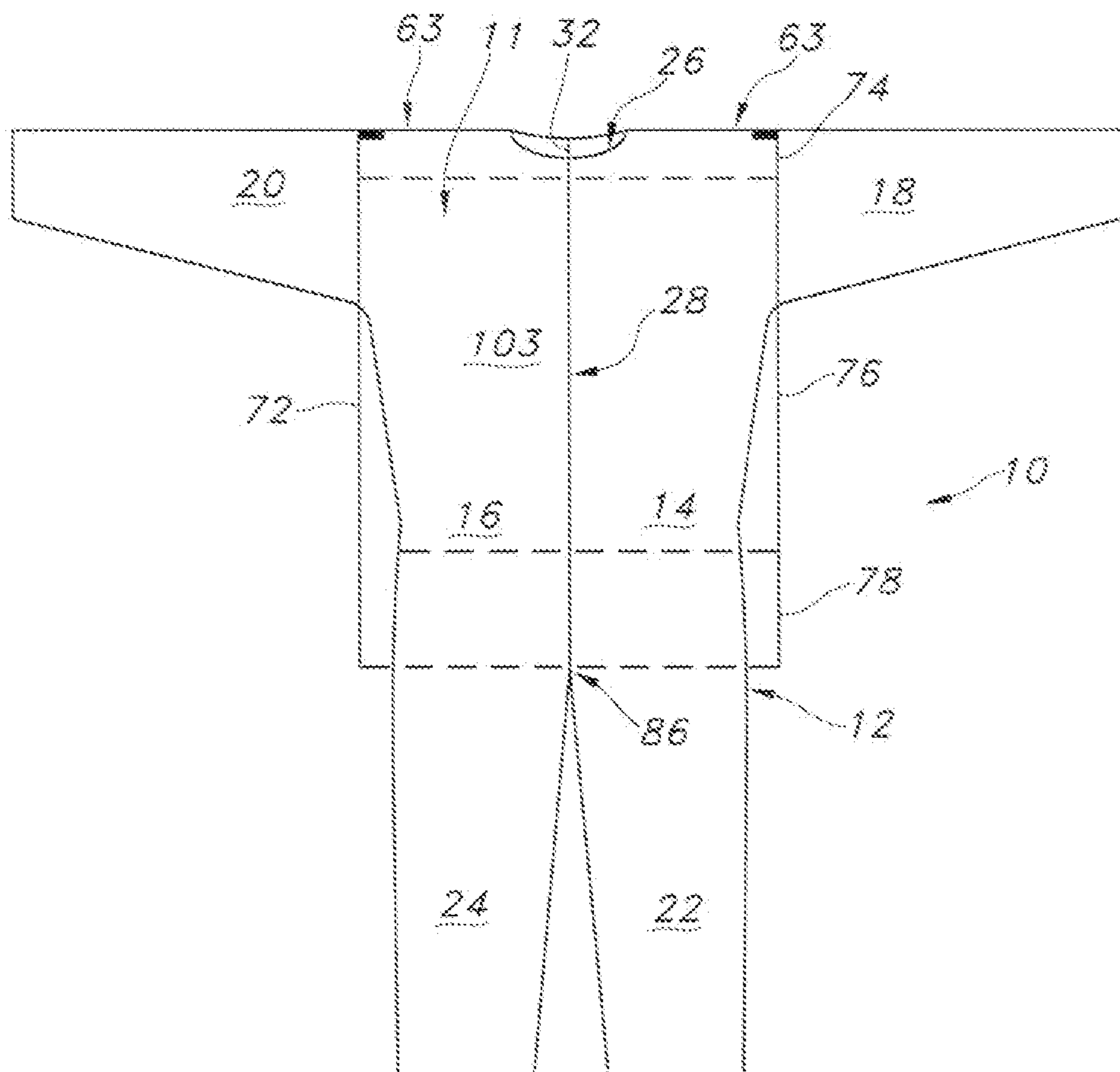
2. The packaged garment of claim 1, wherein the protective garment further comprises a front side and a back side, wherein the at least one surface indicia is positioned on the back side.

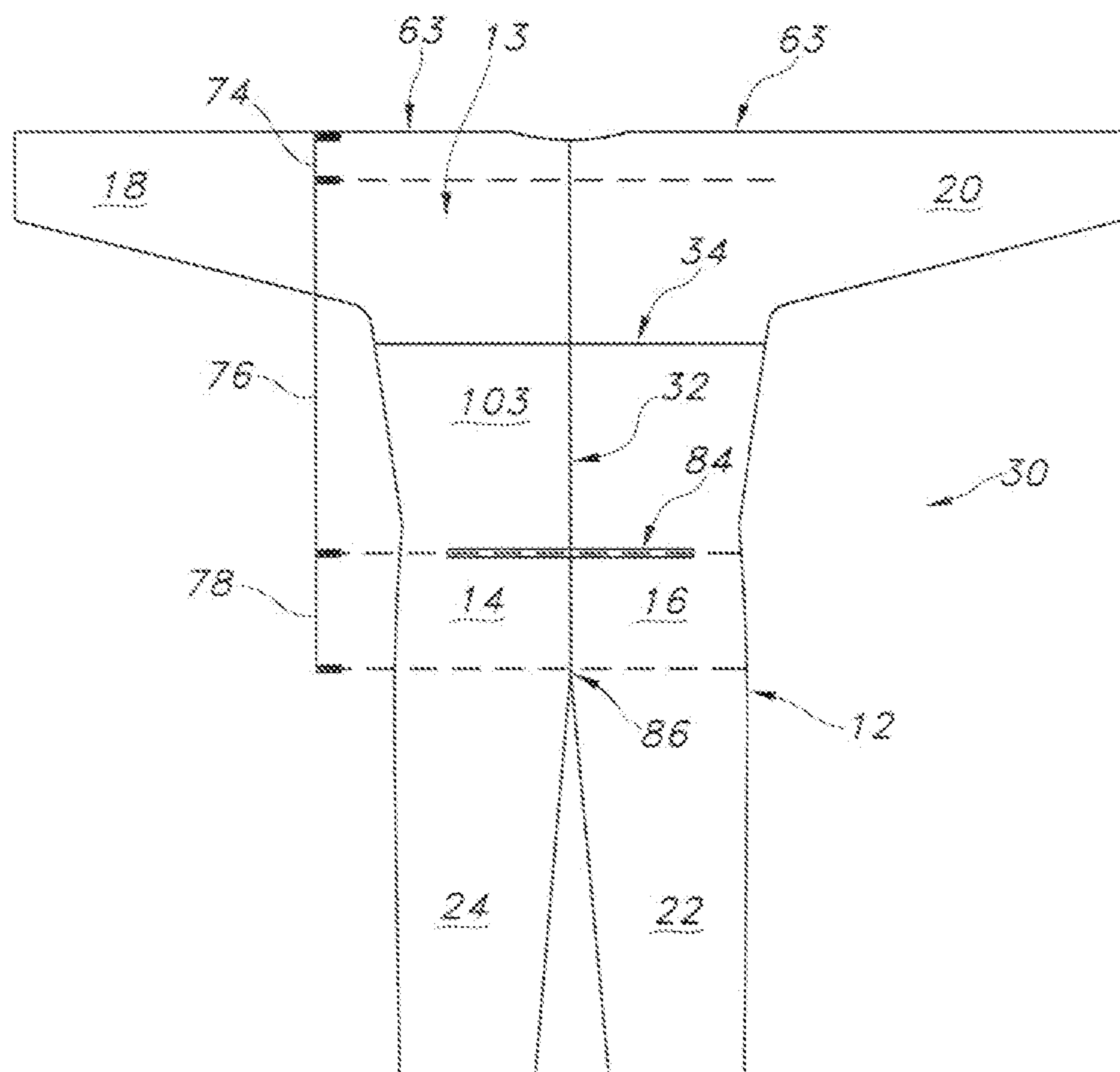
3. The packaged garment of claim 1 or 2, wherein the at least one surface indicia comprises a seam.

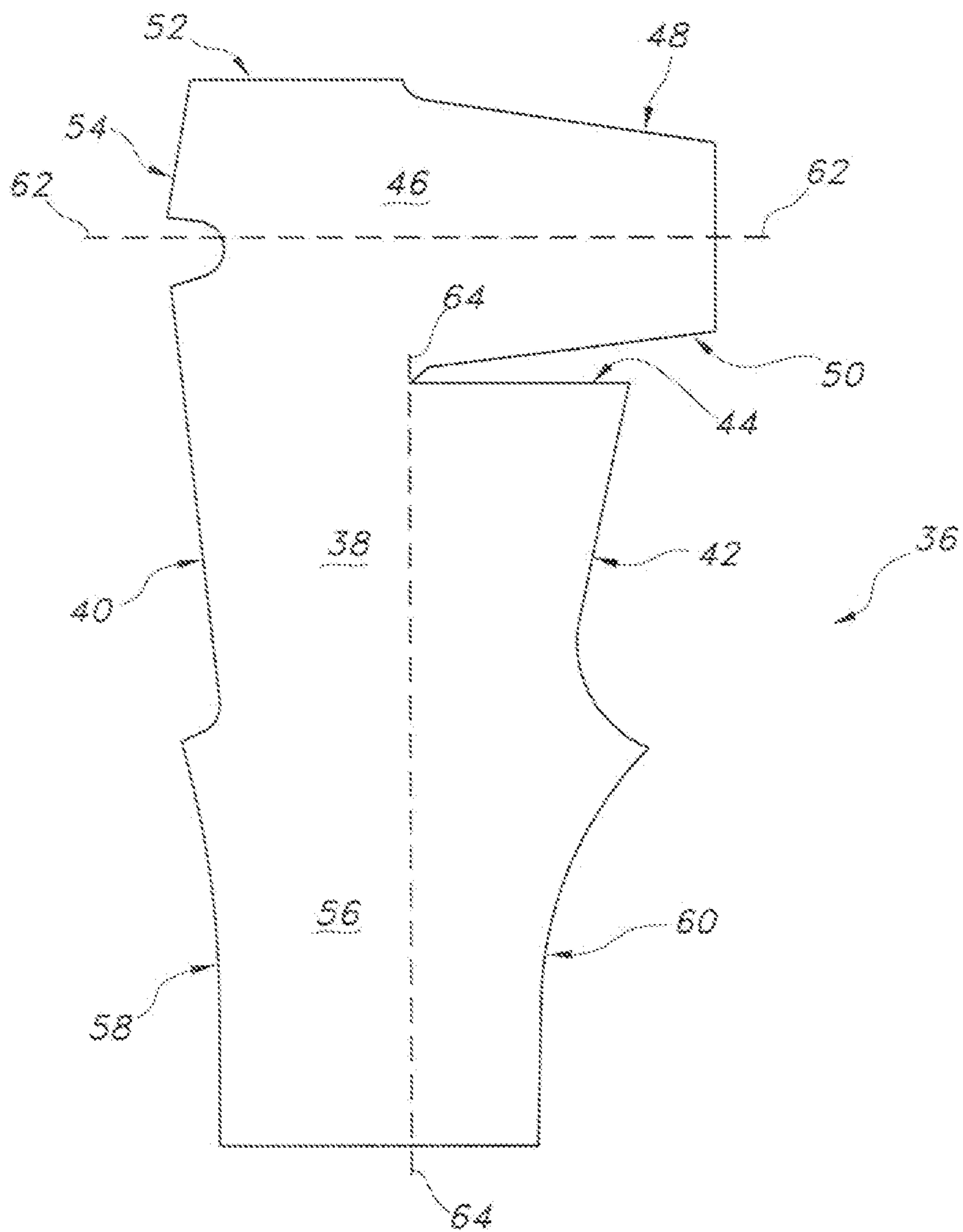
4. The packaged garment of any one of claims 1 to 3, wherein the protective garment further comprises:
 - a first body half and a second body half, each composed of a seamless sheet of material, said second body half being substantially a mirror image of said first body half, and each body half comprising:
 - a body portion comprising a first edge and a second edge;
 - a sleeve portion; and
 - a leg portion;
 - a closure means joining the first edges of each body portion on each body half;
 - a vertical back seam joining the second edges of each body portion on each body half,
 - wherein the vertical back seam further comprises a binding strip, wherein the binding strip comprises the at least one surface indicia.
5. The packaged garment of any one of claims 1 to 4, wherein the protective garment further comprises at least one secondary indicia positioned on the interior surface.
6. The packaged garment of any one of claims 1 to 5, wherein the at least one surface indicia comprises an indicia color, wherein the interior surface comprises an interior surface color, and wherein the indicia color is different than the interior surface color.
7. The packaged garment of any one of claims 1 to 6, wherein the protective garment is a disposable protective coverall.
8. The packaged garment of any one of claims 1 to 7, wherein the packaging member containing the folded configuration is vacuum packaged.
9. The packaged garment of any one of claims 1 to 8, wherein the sealed packaging member containing the folded configuration is sterilized.

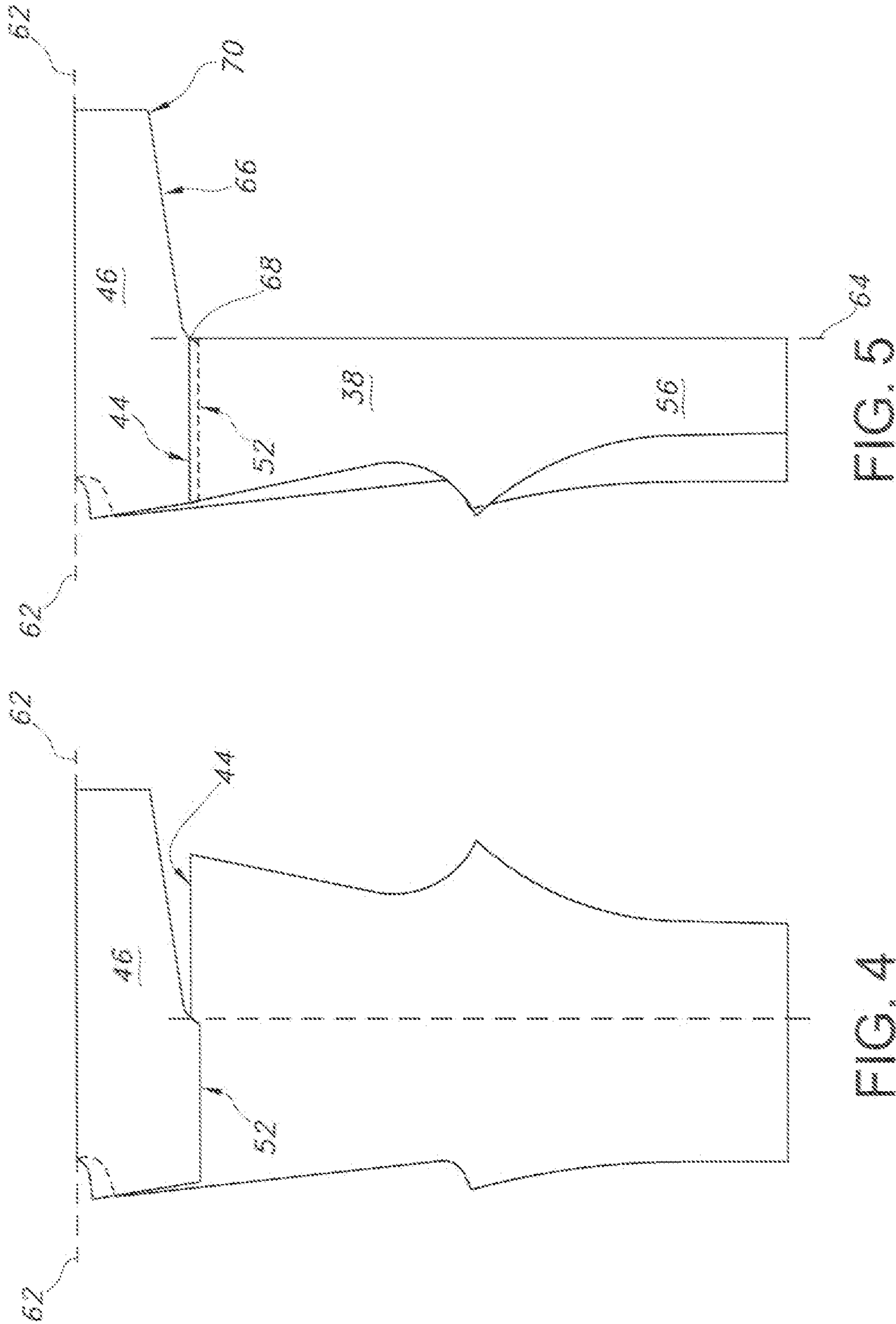
10. The packaged garment of any one of claims 1 to 9, wherein the interior surface of the garment comprises a majority of the outer surface of the folded configuration.

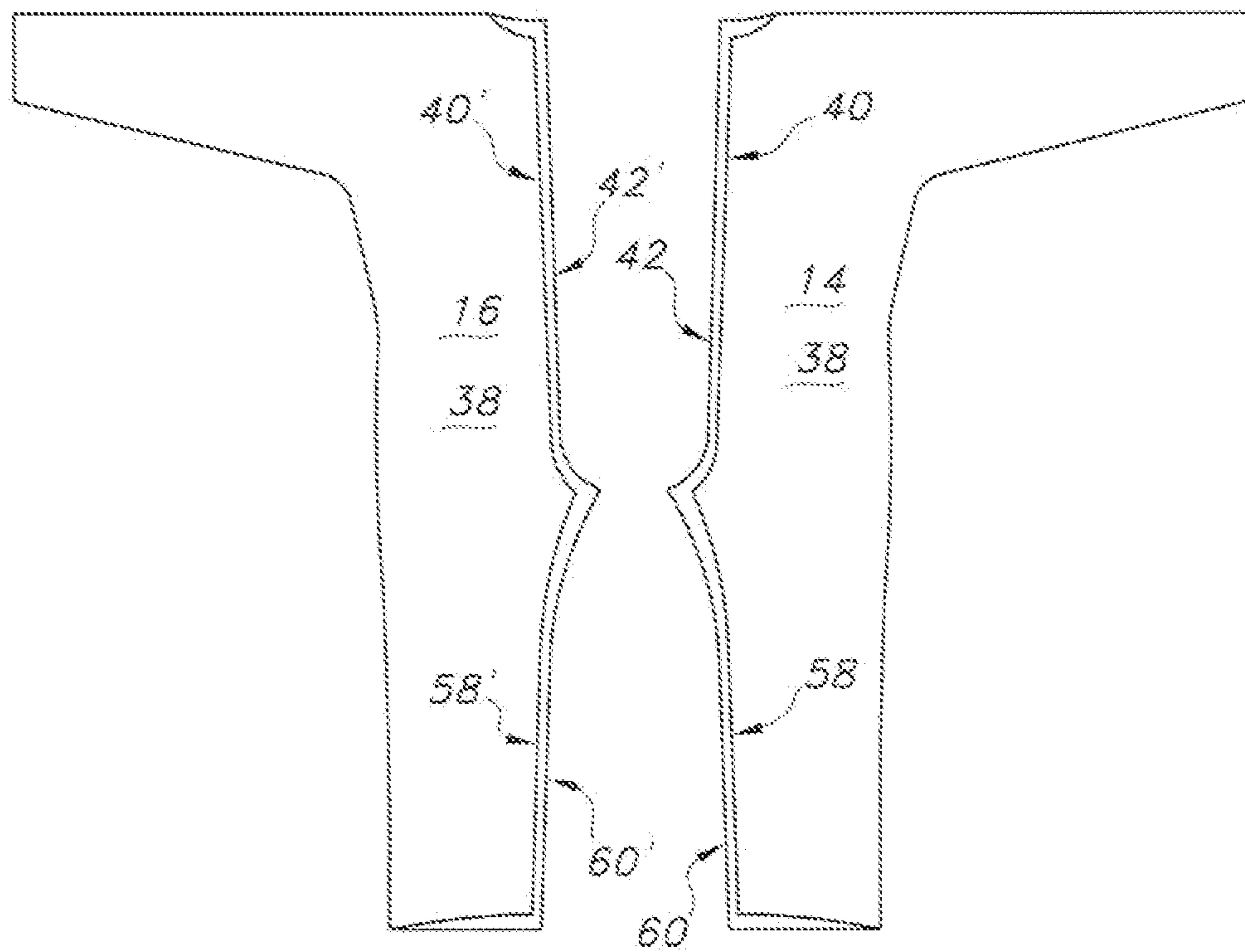
11. The packaged garment of claim 10, wherein the interior surface of the garment comprises all of the outer surface of the folded configuration.

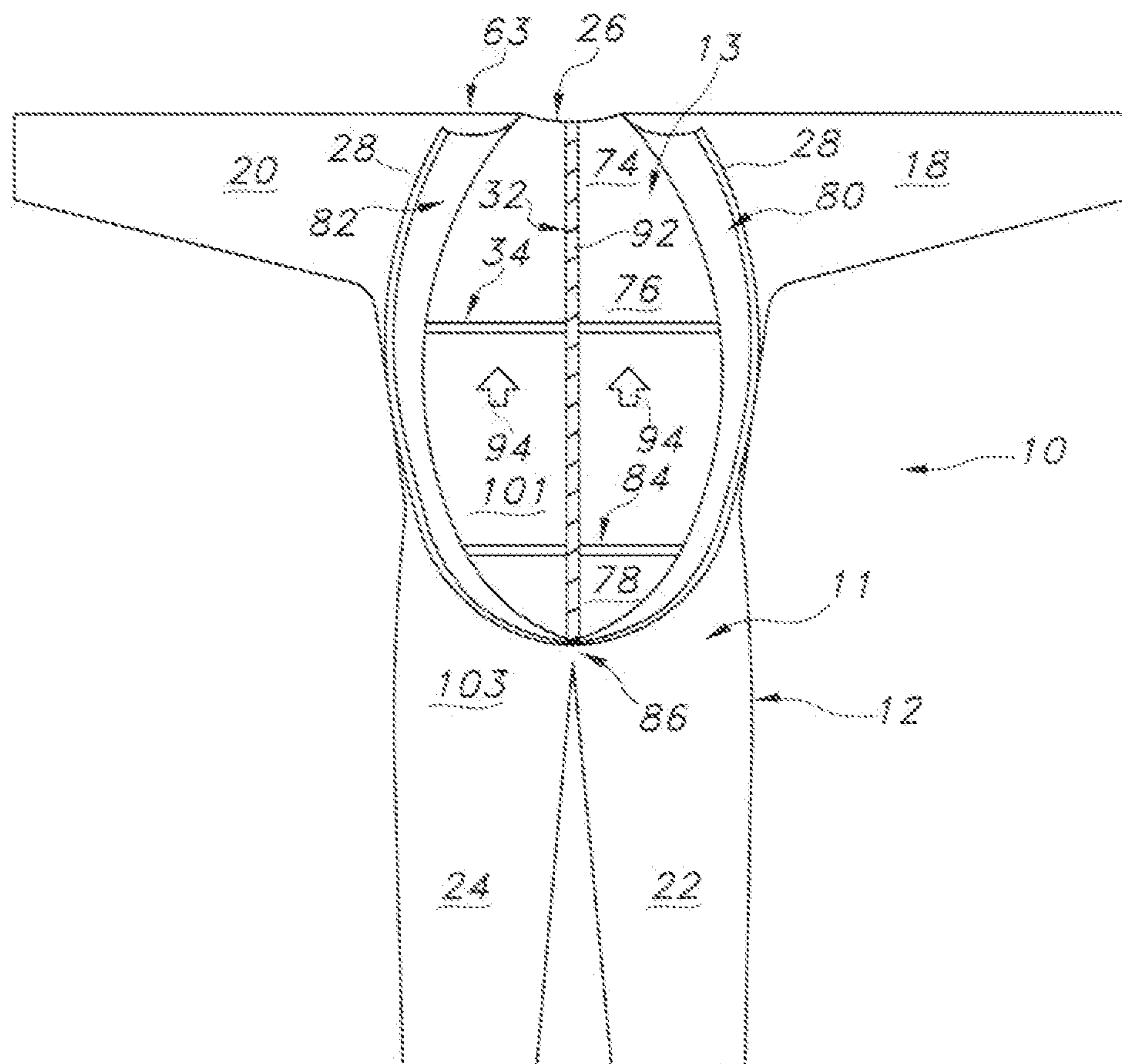
1/9**FIG. 1**

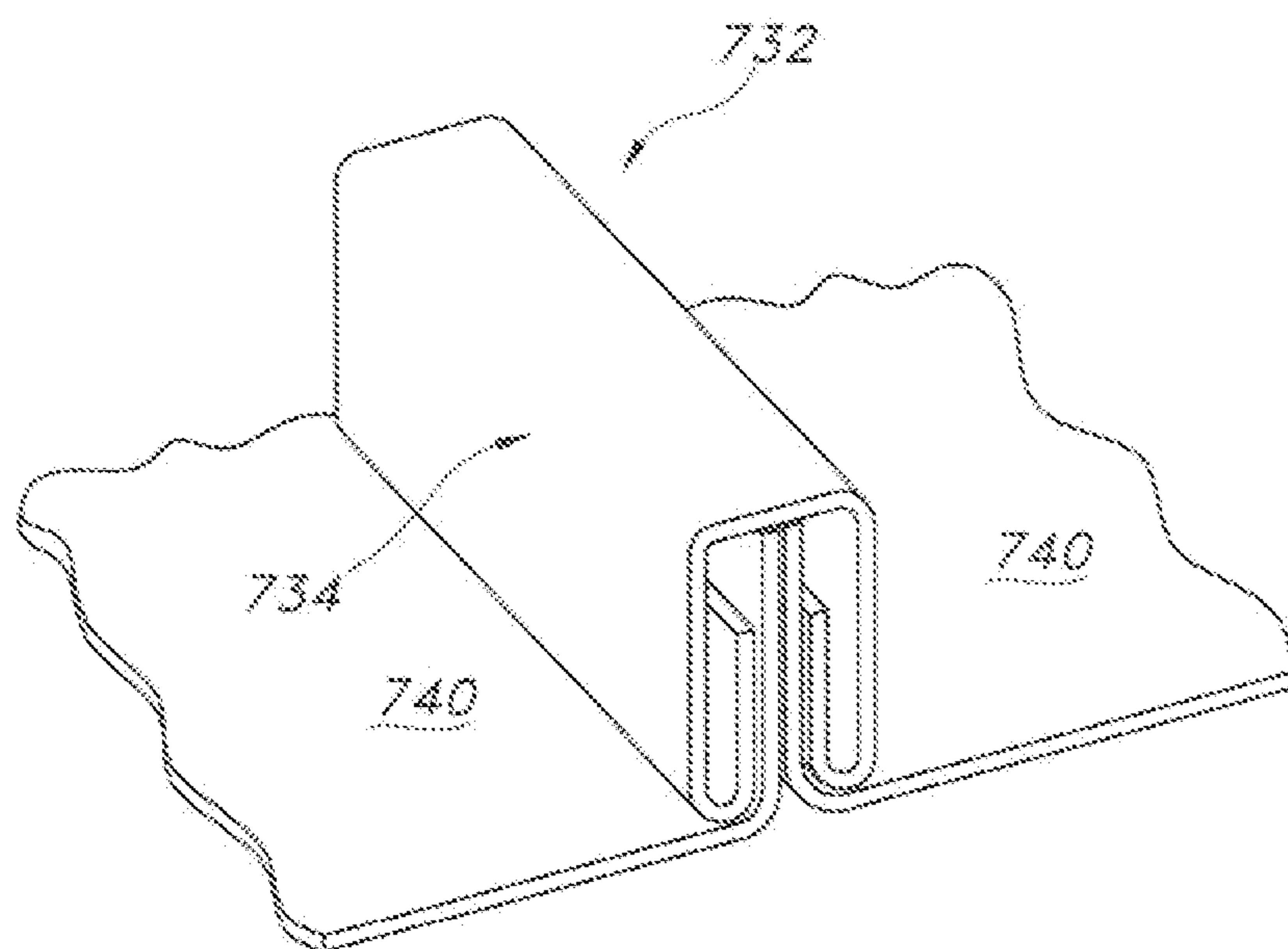
2/9**FIG. 2**

3/9**FIG. 3**

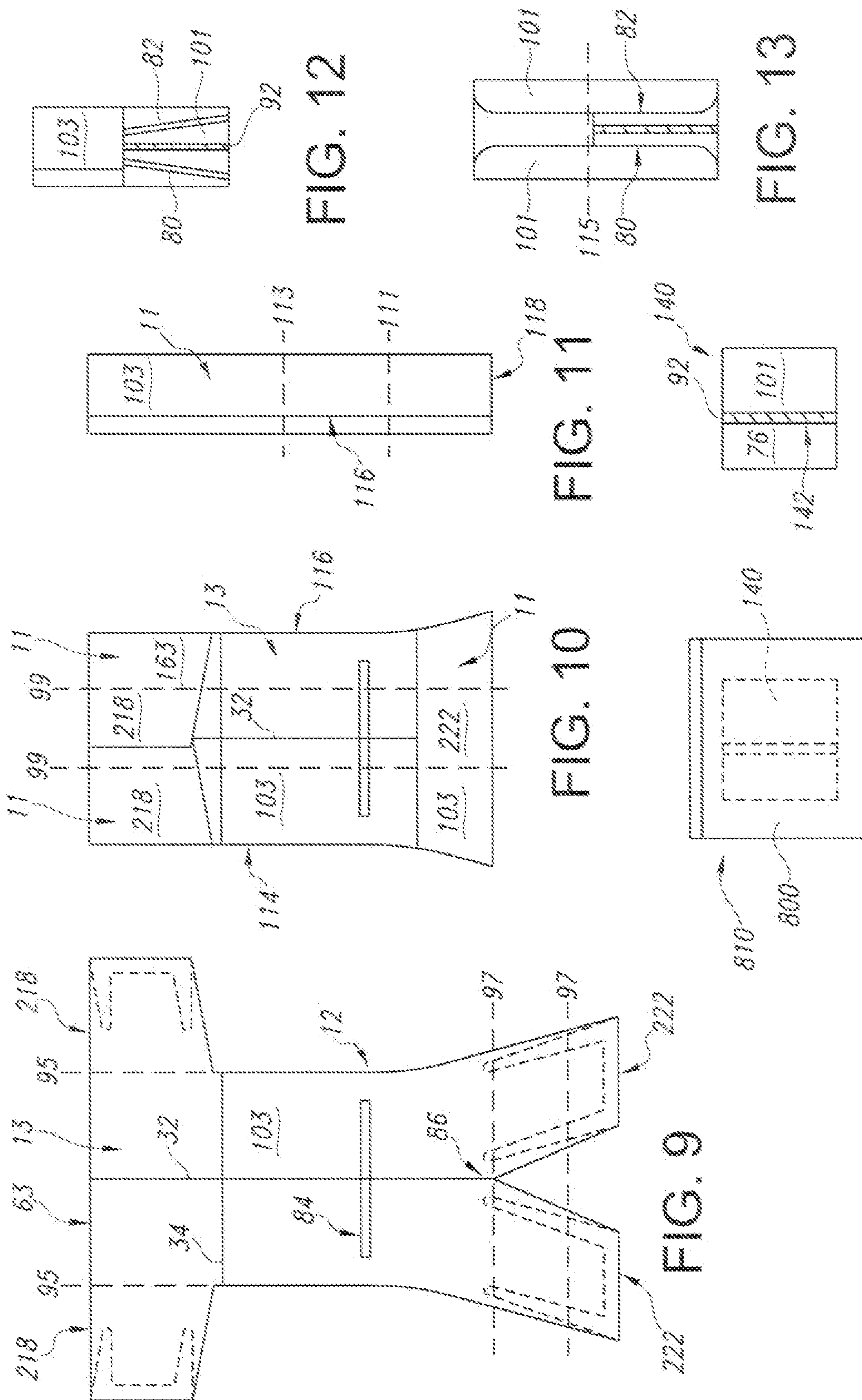
4/9

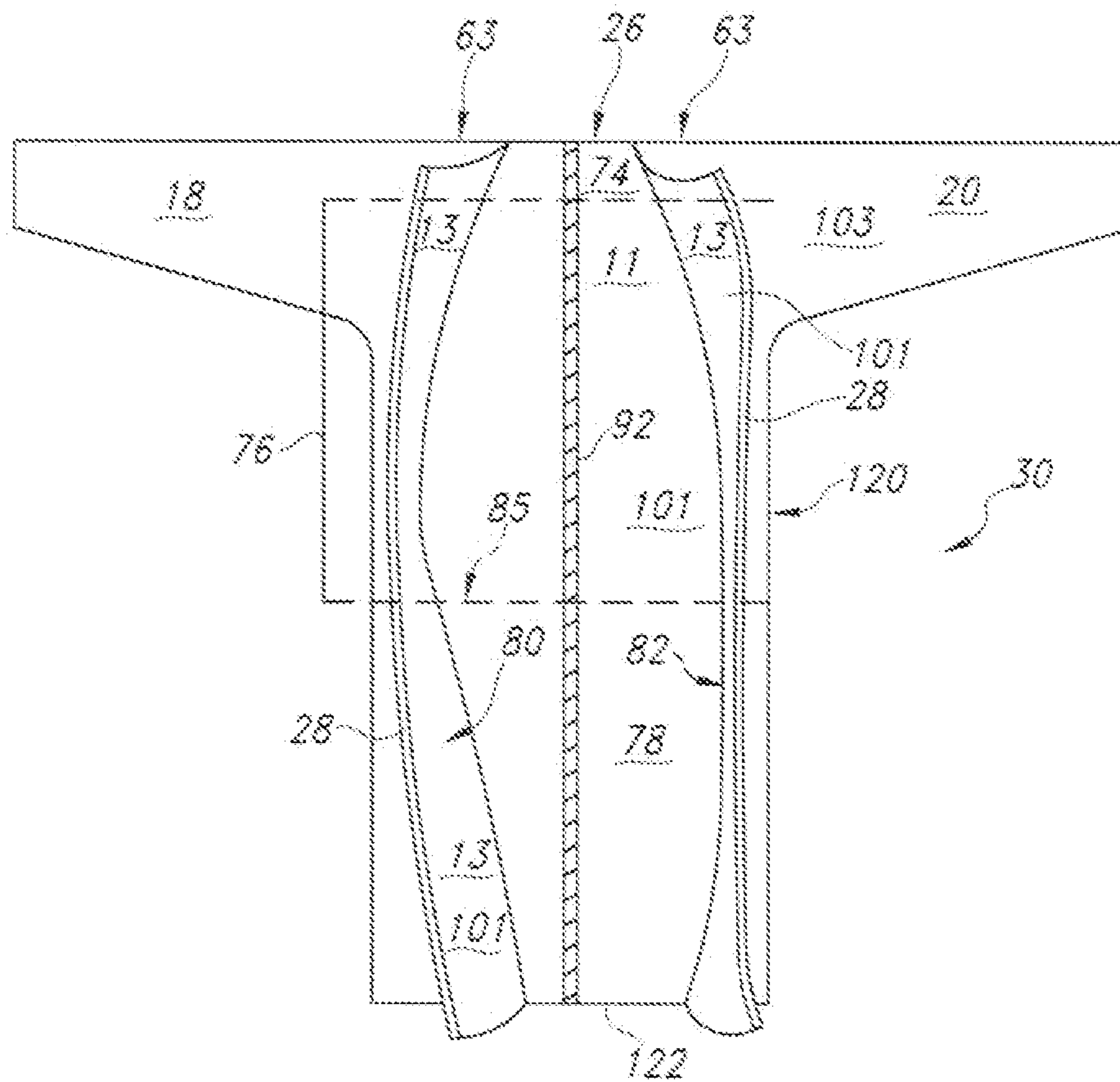
5/9**FIG. 6**

6/9**FIG. 7**

7/9**FIG. 8**

8/9



9/9**FIG. 16**

