Title: SURGICAL GOWN HAVING ADHESIVE TABS

Abstract: A disposable surgical gown having a front closure is provided. The disposable surgical gown (11) comprises a gown body, which includes a first front portion (12), a back portion (14), and a second front portion (16) which cooperate to provide the gown body. The gown body also includes a pair of sleeves (26) joined at lateral sides to the gown body. A plurality of adhesive tabs (34) are disposed on the first and second front portions, such that when the surgical gown is donned, the second front portion overlaps the first front portion. Selected adhesive tabs each having a pull tab (36) are configured to permit a wearer to easily grasp each pull tab to set and release the plurality of adhesive tabs to and from the surgical gown.
SURGICAL GOWN HAVING ADHESIVE TABS

BACKGROUND

This invention relates to protective attire commonly used in medical or industrial environments, and so forth. More particularly, this invention relates to surgical gowns having an adhesive tab which permits closure of the gown.

As is generally known, sterile surgical gowns are designed to greatly reduce, if not prevent, the transmission through the gown of liquids and biological contaminate which may become entrained therein. In surgical procedure environments, such liquid sources include the gown wearer's perspiration, patient liquids such as blood, saliva, perspiration, life support liquids such as plasma and saline, and so forth.

Many surgical gowns were originally made of cotton or linen and were sterilized prior to their use in the operating room. These gowns, however, permitted transmission or "strikethrough" of many of the liquids encountered in surgical procedures. These gowns were undesirable, if not unsatisfactory, because such "strikethrough" established a direct path for transmission of bacteria and other contaminate which wick to and from the wearer of the gown. Furthermore, the gowns were costly, and, of course, laundering and sterilization procedures were required before reuse.

One use, non-reusable, disposable surgical gowns have largely replaced linen and/or cotton surgical gowns. Because many surgical procedures require generally a degree of liquid repellency of at least a significant portion of the gown to prevent strikethrough, disposable gowns for use under these conditions are, for the most part, made from liquid repellent fabrics, or fabrics having a barrier material in at least one layer or ply of a multilayer or multiply fabric which is liquid repellent.

Such gowns, however, like their linen counterparts, when worn over other surgical clothing, can be hot and cause discomfort to the wearer. In addition, many gowns are complicated to don or put on, especially in a sterile environment, when surgical gowns must be changed periodically as they become contaminated by liquids, particulate matter, and so forth.
Therefore, there is a need for surgical gowns which have reasonable barrier properties, and some degree of light weight. In addition, there is a need for surgical gowns which are easy to put on, and which are readily adjustable about the girth of a wearer.

Such surgical gowns desirably include lighter weight material which may be positioned in non-essential areas which are less likely to be contaminated by liquids, particulate matter, and so forth, such as, by way of non-limiting example, the upper sleeves, the back portion, and the lower front portion of the surgical gown.

Such surgical gowns would desirably be easy for a wearer to put on and take off before, during and/or after surgical procedures. A surgical gown which has a closure in the front of the gown is desirable, because it is easier for an individual to put on and take off by himself/herself. Such a surgical gown would desirably include adhesive spots and pull tab locations. Such an adhesive spots and pull tabs would desirably provide easy connection and release of the gown to itself, as well as adjustability of the gown to the individual wearer.

**SUMMARY OF THE INVENTION**

In response to the difficulties and problems discussed above, a disposable surgical gown having a front closure is provided. The disposable surgical gown comprises a gown body, which includes a first front portion, a back portion, and a second front portion which cooperate to provide the gown body. The gown body also includes a pair of sleeves joined at lateral sides to the gown body. A plurality of adhesive tabs are disposed on the first and second front portions, such that when the surgical gown is donned, the second front portion overlaps the first front portion. Selected adhesive tabs each having a pull tab are configured to permit a wearer to easily grasp each pull tab to set and release the plurality of adhesive tabs to and from the surgical gown.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a schematic plan view of an outside of the present invention, showing adhesive tab locations on the outside of a surgical gown laid flat in an unworn position before the surgical gown is donned;
Figure 2 is a schematic plan view of an inside of the surgical gown of Figure 1, showing adhesive tab locations the inside of the surgical gown laid flat in an unworn position before the surgical gown is donned, the adhesive tabs on the inside of the surgical gown cooperating with the adhesive tabs on the outside of the surgical gown to provide a closure to the surgical gown about a wearer when the surgical gown is positioned on a wearer in a worn position;

Figure 3 is a schematic perspective view of a front side of a wearer donning the surgical gown;

Figure 4 is a schematic perspective view of a front side of the surgical gown of Figures 1-3 and the front side of a wearer after donning the surgical gown, the adhesive tabs on the inside and the outside of the gown providing a closure and a custom fit about the wearer;

Figure 5 is a sectional view taken along line 4-4, showing a selected adhesive tab and a pull tab area;

Figure 6 is schematic perspective view of the surgical gown of Figure 4, showing a back side of the gown when positioned in a worn position;

Figure 7 is a schematic plan view of another embodiment of the present invention, showing an outside of a surgical gown which is provided as one solid piece, showing the adhesive tabs locations on the outside of the surgical gown substantially similar to those shown in Figure 1; and

Figure 8 is a schematic plan view of an inside of the surgical gown of Figure 7 having adhesive tabs locations on the inside of the surgical gown which are substantially similar to those shown in Figure 2.

DEFINITIONS

As used herein the following terms have the specified meanings, unless the context demands a different meaning, or a different meaning is expressed; also, the singular generally includes the plural, and the plural generally includes the singular unless otherwise indicated.

As used herein, the terms “comprises”, “comprising” and other derivatives from the root term “comprise” are intended to be open-ended terms that specify the presence of any stated features, elements, integers, steps, or components, but do
not preclude the presence or addition of one or more other features, elements, integers, steps, components, or groups thereof.

As used herein, the terms "fabric" or "material" refers to all woven, knitted and nonwoven fibrous webs, unless one type is specified. The terms "fabric" or "material" is used broadly herein to mean any planer textile structure produced by interlacing yarns, fibers or filaments. Thus, the fabric can be a woven or nonwoven web, either of which is readily prepared by methods well-known to those having ordinary skill in the art. For example, nonwoven webs are prepared by such processes as meltblowing, coforming, spunbonding, carding, air laying, and wet laying. Moreover, the fabric can consist of a single layer or multiple layers. In addition, a multilayered fabric can include films, scrim, and other non-fibrous materials. Desirable materials or fabric(s) are disclosed, for example, in U.S. Pat. No. 6,037,281 issued to Mathis et al., and in U.S. Pat. No. 5,695,868, issued to McCormick, both of which are incorporated by reference herein in their entirety.

As used herein, the term "layer" when used in the singular can have the dual meaning of a single element or a plurality of elements.

As used herein the term "meltblown fibers" means fibers formed by extruding a molten thermoplastic material through a plurality of fine, usually circular, die capillaries as molten threads or filaments into converging high velocity, usually hot, gas (e.g. air) streams which attenuate the filaments of molten thermoplastic material to reduce their diameter, which may be to microfiber diameter. Thereafter, the meltblown fibers are carried by the high velocity gas stream and are deposited on a collecting surface to form a web of randomly dispersed meltblown fibers. Such a process is disclosed, for example, in US Patent 3,849,241 to Butin et al. which is incorporated by reference herein in its entirety. Meltblown fibers are microfibers which may be continuous or discontinuous, are generally smaller than 10 microns in average diameter, and are generally tacky when deposited onto a collecting surface.

As used herein "multi-layer laminate" means a laminate wherein some of the layers are spunbond and some meltblown such as a spunbond/meltblown/spunbond (SMS) laminate and others as disclosed in US Patent 4,041,203 to Brock et al., US Patent 5,169,706 to Collier, et al., US Patent 5,145,727 to Potts et al., US Patent 5,178,931 to Perkins et al. and US Patent 5,188,885 to Timmons et al. each of which are incorporated by reference herein in their entirety. Such a laminate may be
made by sequentially depositing onto a moving forming belt first a spunbond fabric layer, then a meltblown fabric layer and last another spunbond layer and then bonding the laminate in a manner described below. Alternatively, the fabric layers may be made individually, collected in rolls, and combined in a separate bonding step. Such fabrics usually have a basis weight of from about 0.1 to 12 osy (6 to 400 gsm), or more particularly from about 0.75 to about 3 osy. Multi-layer laminates may also have various numbers of meltblown (M) layers or multiple spunbond (S) layers in many different configurations and may include other materials like films (F) or coform materials, e.g. SMMS, SM, SFS, SMS etc.

As used herein the terms “bonded" and “bonding" refer to the joining, adhering, connecting, attaching, or the like of two elements. Two elements will be considered to be bonded together when they are bonded directly to one another or indirectly to one another, such as when each is directly bonded to intermediate elements. Such bonding may occur for example, by adhesive, thermal or ultrasonic methods.

As used herein the term “thermal point bonding" or “thermal bonding" involves passing a fabric or web of fibers to be bonded between a heated calender roll and an anvil roll. When layers of fabric, or two or more fabrics, are thermally bonded, the fabric(s) is/are respectively, heated to a melting point, such that all pores, capillaries, and so forth, if any, in the material collapse and/or are sealed in the melting process. The integrity and continuity of the material is maintained (i.e., the material does not become too thin or perforated in the bonded areas).

The calender roll is usually, though not always, patterned in some way so that the entire fabric is not bonded across its entire surface (thermal point bonding), and the anvil roll is usually flat. As a result, various patterns for calender rolls have been developed for functional as well as aesthetic reasons. One example of a pattern has points and is the Hansen Pennings or "H&P" pattern with about a 30% bond area with about 200 bonds/square inch as taught in U.S. Patent 3,855,046 to Hansen and Pennings, incorporated herein by reference in its entirety. The H&P pattern has square point or pin bonding areas wherein each pin has a side dimension of 0.038 inches (0.965 mm), a spacing of 0.070 inches (1.778 mm) between pins, and a depth of bonding of 0.023 inches (0.584 mm). The resulting pattern has a bonded area of about 29.5%. Another typical point bonding pattern is the expanded Hansen Pennings or "EHP" bond pattern which produces a 15% bond area with a square pin
having a side dimension of 0.037 inches (0.94 mm), a pin spacing of 0.097 inches (2.464 mm) and a depth of 0.039 inches (0.991 mm). Another typical point bonding pattern designated "714" has square pin bonding areas wherein each pin has a side dimension of 0.023 inches, a spacing of 0.062 inches (1.575 mm) between pins, and a depth of bonding of 0.033 inches (0.838 mm). The resulting pattern has a bonded area of about 15%. Yet another common pattern is the C-Star pattern which has a bond area of about 16.9%. The C-Star pattern has a cross-directional bar or "corduroy" design interrupted by shooting stars. Other common patterns include a diamond pattern with repeating and slightly offset diamonds with about a 16% bond area and a wire weave pattern looking as the name suggests, e.g. like a window screen, with about a 19% bond area. Typically, the percent bonding area varies from around 10% to around 30% of the area of the fabric laminate web. As is well known in the art, the spot bonding holds the laminate layers together as well as imparts integrity to each individual layer by bonding filaments and/or fibers within each layer.

As used herein, the term "ultrasonic bonding" or "ultrasonic welding" means a process performed, for example, by passing a fabric, such as a nonwoven material, between a sonic horn and anvil roll as illustrated in U.S. Patent 4,374,888 to Bornslaeger, incorporated by reference herein in its entirety. When layers of fabric, or two or more fabrics, are ultrasonically bonded, the fabric(s) is/are respectively, heated to a melting point, such that all pores, capillaries, and so forth, if any, in the material collapse and/or are sealed in the melting process. The integrity and continuity of the material is maintained (i.e., the material does not become too thin or perforated in the bonded areas).

As used herein, the terms "nonwoven" and "nonwoven fabric" mean either a nonwoven web, a film, a foam sheet material, or a combination thereof.

As used herein the terms "fibrous nonwoven" and "fibrous nonwoven fabric or web" mean a web having a structure of individual fibers, filaments or threads which are interlaid, but not in an identifiable manner as in a knitted fabric. Fibrous nonwoven fabrics or webs have been formed from many processes such as for example, meltblowing processes, spunbonding processes, and bonded carded web processes. The basis weight of fibrous nonwoven fabrics is usually expressed in ounces of material per square yard (osy) or grams per square meter (gsm) and the
fiber diameters useful are usually expressed in microns. (Note that to convert from osy to gsm, multiply osy by 33.91).

As used herein, the terms "surgical gown" and "protective attire" shall encompass medical garments or medical workwear and other forms of protective attire used by various industries/professions to protect workers from contaminants or to prevent the contamination of others. Such protective attire includes but is not limited to hospital and surgical gowns, medical scrubs, medical drapes, coveralls, and garments used to protect either a portion of, or an entire body. For the purposes of this application, the terms "garment(s)" and "apparel" are used synonymously.

As used herein the term "spunbonded fibers" refers to small diameter fibers which are formed by extruding molten thermoplastic material as filaments from a plurality of fine, usually circular capillaries of a spinneret with the diameter of the extruded filaments then being rapidly reduced as by, for example, in US Patent 4,340,563 to Appel et al., US Patent 3,692,618 to Dorschner et al., US Patent 3,802,817 to Matsuki et al., US Patents 3,338,992 and 3,341,394 to Kinney, US Patent 3,502,763 to Hartman, and US Patent 3,542,615 to Dobo et al. each of which are incorporated by reference herein in their entirety. Spunbond fibers are generally not tacky when they are deposited onto a collecting surface. Spunbond fibers are generally continuous and often have average diameters (from a sample of at least 10) larger than 7 microns, more particularly, between about 10 and 20 microns.

As used herein, the related term "hydrophobic" shall generally refer a nonwoven fabric that does not promote the spreading of water. The water instead, forms drops and a contact angle that can be measured from the plane of the fiber/material surface, tangent to the water surface at the three-phase boundary line (air-water-fiber). Typically the contact angle ranges from 40-110 degrees, and is often greater than 90 degrees. The fiber/material also demonstrates a surface tension or energy of less than about 50 dynes/cm, such as between about 10-50 dynes/cm. Further elaboration on hydrophobic materials may be found in Hydrophobic Surfaces, edited by F.M. Fowkes of the Academic Press, New York, 1969, page 1. Hydrophobic fabrics may be produced from materials that are inherently hydrophobic or from hydrophilic fibers/films that have been treated in some fashion to be hydrophobic. Such treatment may include chemical treatments.
Contact angles can be measured by standard measurement techniques such as those described in the Introduction to Colloid and Surface Chemistry by Duncan J. Shaw, Third Edition, Butterworths 1980, pages 131-135, incorporated herein by reference. Surface energy of materials can be measured using dynopen sets, such as those available from UV Process Supply, Inc., of Chicago, Illinois. However, additional methods of measuring surface energy include Torsion Balance apparatus and other devices, which utilize platinum rings, such as those available from Torsion Balance Supplies of the United Kingdom.

As used herein, the term “wick” or “wicking” shall mean to carry moisture/liquid away, typically by capillary action. Such term also encompasses the ability of a liquid to travel between sheet materials, such as between the surface of a fibrous nonwoven sheet material such as a surgical drape and a film sheet, such as a glove.

As used herein, the term “contaminant” shall mean a chemical agent or biological organism/pathogen that can potentially harm a human being or animal.

As used herein, the terms used to describe affixing the various layers or portions of the surgical gown together include “join”, “secure”, “attach” and derivatives and synonyms thereof. Such affixing may be accomplished by any of several conventional methods. By way of example and not limitation, these methods include stitching, gluing, heat sealing, zipping, snapping, ultrasonic or thermal bonding, using a hook and loop fastening system, and other mechanisms and methods familiar to those skilled in the art. Adhesives suitable for securing the various layers of the present invention together include construction adhesives and pressure sensitive hot-melt adhesives such as Findly H2096 or H2088. Findly adhesives are available from Findly Adhesive Inc. of Wauwatosa, Wis.

As used herein, the term “outer” or “outside” describes that surface of the garment or gown which faces away from the wearer when the garment is being worn.

As used herein, the term “inner” or “inside” refers to the surface of the garment or gown, or part thereof which faces either the clothes or body of the wearer.

As used herein, the term “particulate matter” refers to a substance formed of separate particles, i.e., one or more particles.
As used herein, the term "liquid" refers to any liquid, fluid, or mixture of gas and liquid; various types of aerosols and particulate matter may be entrained with such liquids.

These terms may be defined with additional language in the remaining portions of the specification.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to one or more embodiments of the invention, examples of which are illustrated in the drawings. Each example and embodiment is provided by way of explanation of the invention, and is not meant as a limitation of the invention. For example, features illustrated or described as part of one embodiment may be used with another embodiment to yield still a further embodiment. It is intended that the invention include these and other modifications and variations as coming within the scope and spirit of the invention.

Turning now to the drawings and with reference to Figures 1-6, protective attire or a surgical gown 10 is schematically illustrated. The surgical gown 10 may be formed from several pieces of fabric or material joined together, as shown in Figures 1 and 2. Alternatively, as shown in Figures 7 and 8, the surgical gown 10 is formed from a single piece or web of fabric or material. Different surgical gowns and their method of manufacture are disclosed, for example, but not by way of limitation, in U.S. Pat. Nos. 4,214,320, 5,025,501, 6,378,136, and so forth. The surgical gown 10 includes a gown body 11 including a first front portion 12 configured to cover a portion of the upper front torso of a wearer. The first front portion 12 also substantially covers a lower front torso and the front of the upper portion of the legs of a wearer. The surgical gown 10 also includes a back portion 14 which is joined with the first front portion 12. The back portion 14 covers the back torso and the back of the upper portion of the legs of a wearer. The surgical gown 10 also includes a second front portion 16 which is joined with the back portion 14 of the surgical gown 10, and which, in a worn position, overlaps the first front portion 12 of the surgical gown 10, thereby cooperating to provide a double layer of covering or protection to the front torso and the upper portion of the front of a wearer's legs. Such double protection is desirable to protect the wearer from
liquid and/or particulate matter. The surgical gown includes a lower end 17 around the lower edge thereof.

The surgical gown 10 is formed by seams 18 which connect or join the first front portion 12, the back portion 14, and the second front portion 16 into the surgical gown. 10. The seams 18 join an edge 19 of the first front portion 12 to an edge 20 of the back portion 14 and an edge 22 the second front portion 16 to an opposite edge 24 of the back portion 14.

The surgical gown 10 also includes a pair of sleeves 26 which are joined on each lateral side 28 of the surgical gown 10. Each sleeve 26 is generally tubular in configuration, and includes a free end 29. A cuff 30 is desirably secured or joined to each free end 29 of each sleeve 26, generally about a wrist opening. Each sleeve 26 may be joined to the surgical gown 10 at a connected end 32 thereof along seams 18 as well. Alternatively, the sleeves 26 may be joined to the surgical gown 10 at other appropriate locations on the surgical gown 10 (Figures 7 and 8).

The surgical gown 10 is configured to provide an adjustable front closure. The adjustability of the front closure of the surgical gown 10 is provided by a plurality of adhesive tabs 34, and, some selected adhesive tabs 34 with associated pull tabs 36. The adhesive tabs 34 and pull tabs 36 are generally positioned on the lateral side 28 of the surgical gown 10 when it is being donned or put on by a wearer. Each lateral side 28 is defined generally as the area on the gown body 11 of the surgical gown itself, as opposed to the sleeves 26, which would lie on or near a lateral side of the wearer, as shown in Figures 3 and 4.

The surgical gown 10 includes a neck opening 40 which may provide a straight configuration, as shown in Figures 1-4 and 6. Alternatively, the neck opening 40 may be rounded in front, and/or it may be scooped on the back portion 14, generally in a V-shaped or a U-shaped configuration (Figures 7 and 8).

Referring to Figures 1 and 2, the surgical gown 10 is illustrated in an unworn position showing the inside 41 of the surgical gown 10 (Figure 2) and the outside 42 of the surgical gown 10 (Figure 1). The plurality of adhesive tabs 34, some with associated pull tabs 36, are provided desirably in specific locations on the surgical gown 10. The adhesive tabs 34 shown herein are illustrated as circular adhesive spots. The adhesive tabs 34, however, may be provided in any
configuration, shape and/or combination of configuration(s) and shape(s). At least a portion of each adhesive tab 34 may be covered by a release strip 43 (one release strip shown partially lifted in Figure 2 over one adhesive tab 34 for illustrative purposes only). Alternatively, the fabric of the surgical gown 10 may act as both a connecting fabric and a release strip or release fabric.

A pull tab 36 is desirably associated with at least some selected adhesive tabs 34. The pull tabs 36 are desirably positioned in a non-adhesive area directly adjacent or against the selected adhesive tab 34. The selected adhesive tabs 34 are desirably positioned adjacent a free edge 44 of the surgical gown 10, the non-adhesive area adjacent the free edge 44 provides at least a portion of the pull tab 36. This placement of the pull tabs 36 and their associated selected adhesive tabs 34 permits a wearer to easily grasp and lift and set the non-adhered pull tab 36 and therefore the adjacent adhesive tab 34 as well. Therefore, each pull tab 36 is desirably positioned specifically to permit a wearer to easily lift and grasp the pull tab 36 to release one or more adhesive tabs 34 or, alternatively, to set one or more adhesive tabs 34 in a position or location on the surgical gown 10. For example, in the present embodiments, the selected adhesive tabs 34 which include pull tabs 36 include adhesive tabs 34a, 34b, 34c and 34d.

In addition, at least some of the pull tabs 36 may include "pull indicia" thereon, such as, by way of non-limiting example, the arrow 44 on the pull tabs 36 shown in Figures 1 and 4. The term "pull indicia" as used herein refers to and includes any word(s) (in any language) and/or any symbol(s) or pictoral representation, and any combination thereof, to indicate to a wearer the location and/or the purpose of the pull tab 36 and/or the adhesive tab 34.

In the present embodiment, as shown generally in Figures 1-6, the wearer desirably dons the surgical gown 10 with the inside 41 (Figure 2) positioned against the wearer, and the outside 42 (Figure 1 and 4) positioned away from the wearer. After the wearer places his/her arms in the sleeves 26, the wearer desirably moves adhesive tab 34a in a direction 46 (Figure 2) to adhere to adhesive tab 34a', as shown indirectly in Figures 3 and 4. This procedure positions the first front portion 12 of the surgical gown 10 across a portion of the front torso of the wearer. Then, as illustrated in Figures 3 and 4, the wearer positions the second front portion 16 of the surgical gown in a direction 47 across
the front of his/her torso, and adhesively connects, by way of non-limiting example, 34b with 34b', 34c with 34c' and 34d with 34d'.

In this example, each of the adhesive tabs 34 corresponds to and acts as a landing zone for its corresponding adhesive tab (i.e., adhesive tab 34a to adhesive tab 34a'). However, this is intended as a non-limiting example, and it will be appreciated that the adhesive tabs 34 may be adhesively and releasably connected to any area or location on the surgical gown 10. Therefore, the plurality of adhesive tabs 34 do not require a “landing zone” to adhesively connect a portion of the surgical gown 10 to itself. Further, the position of the plurality of adhesive tabs 34 may vary, so that the position of each adhesive tab 34 is not intended as a limitation of the present invention.

For example, a wearer having a smaller girth may position the surgical gown more tightly about his/her torso, while a wearer having a larger girth may position the surgical gown more loosely and widely about his/her torso. Therefore, some adhesive tabs 34 may be used to adhere to each other, while other adhesive tabs may be adhered directly to the fabric or material of the surgical gown 10. As a result, the surgical gown 10 via the adhesive tabs 34 and pull tabs 36 may be adjusted and re-adjusted as necessary about a wearer to promote increased comfort as well as easy removal, by the wearer lifting the pull tab 36 desirably associated with each adhesive tab 34 to release the adhesive tab(s) 34 and resetting the adhesive tab(s) 34 in another position.

In this manner, the plurality of adhesive tabs 34 are easily set on a certain position or location on the surgical gown 10, which custom fits the surgical gown 10 to the wearer.

The adhesive may be any adhesive which operates as shown and/or described herein. Desirably, the adhesive is a pressure sensitive adhesive. Many pressure sensitive adhesives are known in the art and are commercially available. Alternatively, the adhesive may be a cohesive adhesive, which only adheres to itself. Many cohesive adhesives are known in the art and commercially available.

Turning to Figures 1 to 8, the basis weight of the surgical gown is desirably between about 0.5 oz/y and about 3.0 oz/y. Certain areas of the surgical gown may include a fabric having a heavier basis weight. These areas of heavier basis weight are desirably in areas or zones 50 most likely to be contacted and
contaminated by liquids, particulate matter, and the like, during surgery, medical procedures, and so forth. These high contamination zones 50 may include a lower sleeve portion of the sleeves. Desirably, the fabric in these areas has a basis weight of about 1.45 osy to about 3.0 osy. Even more desirably, the fabric in these areas has a basis weight of about 1.45 osy to about 2.0 osy. Combined in an overlapped configuration, the total basis weight of the overlapped portions is doubled.

Another high contamination zone 50 is the front torso area of a wearer. This high contamination zone 50, however, may be addressed by the combination of the first and second front portions 12, 16, which overlap each other. Therefore, in this high contamination zone 50, since portions of the gown are overlapped for protection, the basis weight of each layer may each be less, that is, a lighter basis weight. Desirably, the fabric in these areas has a basis weight of about 0.5 osy to about 1.44 osy. Even more desirably, the fabric in these areas has a basis weight of about 0.5 osy to about 1.3 osy. Combined in an overlapped configuration, the total basis weight of the overlapped portions is doubled (i.e., from about 1.0 osy to about 2.88 osy).

However, certain low contamination areas or zones 54 of the surgical gown 10 may include a fabric having a lighter basis weight, in which the surgical gown 10 does not overlap itself. These low contamination zones 54 of lighter basis weight allow the surgical gown 10 to be cooler and more comfortable to a wearer. These zones are less likely to be contacted and contaminated by one or more liquids, particulate matter, and so forth during procedures, such as surgery. These low contamination zones 54 desirably include an upper sleeve portion of the sleeves 26, and the back portion 14. Desirably, the fabric in these areas has a basis weight of about 0.5 osy to about 1.44 osy. Even more desirably, the fabric in these areas has a basis weight of about 0.5 osy to about 1.3 osy. Lower basis weight permits the gown to be constructed less expensively.

Alternatively, the surgical gown 10 may utilize the same basis weight throughout. In this instance, the basis weight desirably is between 0.5 osy and about 3.0 osy. Such a basis weight may be used in both high contamination zones and low contamination zones, although it will be appreciated that the basis weight
in a particular area will increase if the fabric of the surgical gown 10 is overlapped in that area.

The double layer of protection provided by the first and second front portions 12, 16 provides light weight with the added protection of two layers against the insult of liquid and/or particulate matter. The single layer of the back portion 14 provides coolness to the wearer. The front opening and closure of the surgical gown 10, along with the use of adhesive tabs 34 and pull tabs 36, permits quick and easy donning by the wearer alone. Such front opening and closure is intended as non-limiting, and it will be appreciated that the surgical gown 10 shown and described herein may be reversed to be adapted to be donned from the rear, with some assistance.

The present invention is desirably used with an improved cloth-like, liquid-impervious, breathable barrier material, such as that disclosed in U.S. Pat No. 6,037,281, which is incorporated in its entirety herein, and which is discussed below in detail herein. The breathable barrier material possesses a unique balance of performance characteristics and features making the material suitable for use in forming surgical articles, as well as other garment and over-garment applications, such as personal protective equipment applications. The barrier material is a laminate comprising three layers—a top nonwoven layer formed, for example, of spunbond filaments, a bottom nonwoven layer formed, for example, of spunbond filaments, and a middle breathable film layer formed, for example, of a microporous film. The individual layers of barrier material are laminated, bonded or attached together by known means, including thermal-mechanical bonding, ultrasonic bonding, adhesives, and the like. As used herein, the terms "layer" or "web" when used in the singular can have the dual meaning of a single element or a plurality of elements. In another alternative, the material is a nonwoven material of any type known in the art having a film or polymer layer or coating. Such a film or polymer layer or coating is desirably provided in a range of about 0.5 mils to about 3.0 mils.

Commercially available thermoplastic polymeric materials can be advantageously employed in making the fibers or filaments from which the top and bottom layers are formed. As used herein, the term "polymer" shall include, but is not limited to, homopolymer, copolymers, such as, for example, block, graft,
random and alternating copolymers, terpolymers, etc., and blends and modifications thereof. Moreover, unless otherwise specifically limited, the term "polymer" shall include all possible geometric configurations of the material, including, without limitation, isotactic, syndiotactic, random and atactic symmetries.

As used herein, the terms "thermoplastic polymer" or "thermoplastic polymeric material" refer to a long-chain polymer that softens when exposed to heat and returns to the solid state when cooled to ambient temperature. Exemplary thermoplastic materials include, without limitation, polyvinyl chlorides, polyesters, polyamides, polyfluorocarbons, poly-olefins, polyurethanes, polystyrenes, polyvinyl alcohols, caprolactams, and copolymers of the foregoing.

Nonwoven webs that can be employed as the nonwoven top and bottom layers can be formed by a variety of known forming processes, including spunbonding, airlaying, meltblowing, or bonded carded web formation processes. For example, the top layer and bottom layer are both spunbond nonwoven webs, which have been found advantageous in forming barrier material. Spunbond nonwoven webs are made from melt-spun filaments. The melt-spun filaments are deposited in a substantially random manner onto a moving carrier belt or the like to form a web of substantially continuous and randomly arranged, melt-spun filaments. Spunbond filaments generally are not tacky when they are deposited onto the collecting surface. The melt-spun filaments formed by the spunbond process are generally continuous and have average diameters larger than 7 microns based upon at least 5 measurements, and more particularly, between about 10 and 100 microns. Another frequently used expression of fiber or filament diameter is denier, which is defined as grams per 9000 meters of a fiber or filament.

Spunbond webs generally are stabilized or consolidated (pre-bonded) in some manner immediately as they are produced in order to give the web sufficient integrity and strength to withstand the rigors of further processing. This pre-bonding step may be accomplished through the use of an adhesive applied to the filaments as a liquid or powder which may be heat activated, or more commonly, by an air knife or compaction rolls. As used herein, the term "compaction rolls" means a set of rollers above and below the nonwoven web used to compact the web as a way of treating a just produced, melt-spun filament, particularly...
spunbond, web, in order to give the web sufficient integrity for further processing, but not the relatively strong bonding of later applied, secondary bonding processes, such as through-air bonding, thermal bonding, ultrasonic bonding and the like. Compaction rolls slightly squeeze the web in order to increase its self-adherence and thereby its integrity. An air knife, as its name implies, directs heated air through a slot or row of openings onto the web to compact and provide initial bonding.

An exemplary secondary bonding process utilizes a patterned roller arrangement for thermally bonding the spunbond web. The roller arrangement typically includes a patterned bonding roll and a smooth anvil roll which together define a thermal patterning bonding nip. Alternatively, the anvil roll may also bear a bonding pattern on its outer surface. The pattern roll is heated to a suitable bonding temperature by conventional heating means and is rotated by conventional drive means, so that when the spunbond web passes through the nip, a series of thermal pattern bonds is formed. Nip pressure within the nip should be sufficient to achieve the desired degree of bonding of the web, given the line speed, bonding temperature and materials forming the web. Percent bond areas within the range of from about 10 percent to about 20 percent are typical for such spunbond webs.

The middle breathable film layer can be formed of any microporous film that can be suitably bonded or attached to top and bottom layers to yield a barrier material having the unique combination of performance characteristics and features described herein. A suitable class of film materials includes at least two basic components: a thermoplastic elastomeric polyolefin polymer and a filler. These (and other) components can be mixed together, heated and then extruded into a mono-layer or multi-layer film using any one of a variety of film-producing processes known to those of ordinary skill in the film processing art. Such filmmaking processes include, for example, cast embossed, chill and flat cast, and blown film processes.

Generally, on a dry weight basis, based on the total weight of the film, the middle breathable film layer will include from about 30 to about 60 weight percent of the thermoplastic polyolefin polymer, or blend thereof, and from about 40 to about 70 percent filler. Other additives and ingredients may be added to the film
layer 14 provided they do not significantly interfere with the ability of the film layer to function in accordance with the teachings of the present invention. Such additives and ingredients can include, for example, antioxidants, stabilizers, and pigments.

In addition to the polyolefin polymer, the middle breathable film layer also includes a filler. As used herein, a "filler" is meant to include particulates and other forms of materials which can be added to the film polymer extrusion blend and which will not chemically interfere with the extruded film but which are able to be uniformly dispersed throughout the film. Generally, the fillers will be in particulate form and may have a spherical or non-spherical shape with average particle sizes in the range of about 0.1 to about 7 microns. Both organic and inorganic fillers are contemplated to be within the scope of the present invention provided that they do not interfere with the film formation process, or the ability of the film layer to function in accordance with the teachings of the present invention. Examples of suitable fillers include calcium carbonate (CaCO3), various kinds of clay, silica (SiO2), alumina, barium carbonate, sodium carbonate, magnesium carbonate, talc, barium sulfate, magnesium sulfate, aluminum sulfate, titanium dioxide (TiO2), zeolites, cellulose-type powders, kaolin, mica, carbon, calcium oxide, magnesium oxide, aluminum hydroxide, pulp powder, wood powder, cellulose derivatives, chitin and chitin derivatives. A suitable coating, such as, for example, stearic acid, may also be applied to the filler particles.

As mentioned herein, the breathable film layer may be formed using any one of the conventional processes known to those familiar with film formation. The polyolefin polymer and filler are mixed in appropriate proportions given the ranges outlined herein and then heated and extruded into a film. In order to provide uniform breathability as reflected by the water vapor transmission rate of the film, the filler should be uniformly dispersed through-out the polymer blend and, consequently, throughout the film layer itself so that upon stretching pores are created to provide breathability. For purposes of the present invention, a film is considered "breathable" if it has a water vapor transmission rate of at least 300 grams per square meter per 24 hours (g/m² /24 hours), as calculated using the test method described herein. Generally, once the film is formed, it will have a weight per unit area of less than about 80 grams per square meter (gsm) and after
stretching and thinning, its weight per unit area will be from about 10 gsm to about 25 gsm.

The breathable film layer used in the example of the present invention described below is a mono-layer film, however, other types, such as multi-layer films, are also considered to be within the scope of the present invention provided the forming technique is compatible with filled films. The film as initially formed generally is thicker and noisier than desired, as it tends to make a "rattling" sound when shaken. Moreover, the film does not have a sufficient degree of breathability as measured by its water vapor transmission rate. Consequently, the film is heated to a temperature equal to or less than about 5 degrees C. below the melting point of the polyolefin polymer and then stretched using an in-line machine direction orientation (MDO) unit to at least about two times (2X) its original length to thin the film and render it porous. Further stretching of the middle breathable film layer, to about three times (3X), four times (4X), or more, its original length is expressly contemplated in connection with forming middle breathable film layer. After being stretch-thinned, the middle breathable film layer should have an "effective" film gauge or thickness of from about 0.2 mil to about 0.6 mil. The effective gauge is used to take into consideration the voids or air spaces in breathable film layers.

Cuffs 30, as illustrated best in Figures 3, 4 and 6, are desirably attached to the sleeves 26 of the surgical gown 10, and may also be attached at the neck of each garment, and so forth (not shown). Such cuffs 30 are desirably made from elastic yarns formed from synthetic or natural materials. An example of a synthetic material for forming the elastic yarns is polyurethane. Spandex is an example of polyurethane-based elastomer. More particularly, spandex is a polyurethane in fiber form containing a thermoplastic polyurethane elastomer with at least 85% polyurethane content. Commercial examples of spandex include LYCRA, VYRENE, DORLASTAN, SPANZELLE and GLOSPAN. An example of a natural material for forming elastic yarns is natural rubber. Polyester, nylon, and combinations of any of the foregoing synthetic and/or natural elastic yarns may also be used. The use of these, and other materials to construct sleeves and/or cuffs is disclosed in U.S. Pat. No. 5,594,955, which is incorporated by reference in its entirety herein. In the present embodiment, the cuffs 30 are desirably sewn,
thermally bonded, ultrasonically bonded, adhesively attached, and so forth to the free end 29 of each sleeve 26.

For all embodiments shown and/or described herein, desirably, as illustrated in Figure 5, the adhesive on a portion of each of the plurality of adhesive tabs 34 has strong shear and friction properties in an area 70. Desirably, the peels strength in the area 70 is sufficiently strong or adhesive so that the adhesive tabs 34 hold the surgical gown 10 securely in the worn position. If the adhesive tabs are is removed after its initial application, it will be understood that this removal results in deformation of the fabric or material of the surgical gown 10. In addition, the for all embodiments shown and/or described herein, desirably the adhesive on a portion of the adhesive tabs 34 near the pull tab 36 has a week peal strength in an area 72. Desirably, the peel strength in an area 72 is less strong than that in the area 70, so that at least a portion of the adhesive tabs 34 can be easily lifted, to facilitate adjustment of the fit of the surgical gown 10 to a user, or to permit removal of the surgical gown 10.

In another embodiment of the present invention, illustrated by Figures 7 and 8, an alternative surgical gown 110 is schematically illustrated. The surgical gown 110 is substantially similar to the surgical gown 10, except that it is formed from a blank of fabric or material about a form such that it does not include any seams. In addition, the surgical gown 110 may include a "scooped" or lowered neck opening 140 on the back portion 14. Such a scooped neck opening 114 may be provided in a V-shaped, a U-shaped, or other configuration which permits heat from a wearer's neck and upper back to escape, providing increased coolness and comfort. It will be appreciated that the surgical gown 110 may be donned or put on and taken off by a wearer in the same manner is that previously shown and described in detail herein. In addition, the surgical gowns 10 and 110 may include any feature or characteristic shown and/or described herein.

While the present invention has been described in connection with certain preferred embodiments it is to be understood that the subject matter encompassed by way of the present invention is not to be limited to those specific embodiments. On the contrary, it is intended for the subject matter of the invention to include all alternatives, modifications and equivalents as can be included within the spirit and scope of the following claims.
What is claimed is:

1. A disposable surgical gown having a front closure, the disposable surgical gown comprising:
   a gown body having a first front portion, a back portion, and a second front portion, the gown body including a pair of sleeves joined at lateral sides to the gown body, a plurality of adhesive tabs disposed on an outer surface of the first front portion and an inner surface of the second front portion such that when the surgical gown is donned by a wearer, the second front portion is positioned to overlap the first front portion and the adhesive tabs on the outer surface of the first front portion releasably bond to one of a portion of the inner surface of the second front portion and a portion of an adhesive tab on the second front portion, and the adhesive tabs on the inner surface of the second front portion releasably bond to one of a portion of the outer surface of the first front portion and a portion of an adhesive tab on the first front portion, wherein selected adhesive tabs each include a pull tab configured to permit a wearer to easily grasp the pull tab to set each of the plurality of selected adhesive tabs on a portion of the gown body and to release each of the plurality of selected adhesive tabs from the portion of the gown body.

2. The disposable surgical gown of claim 1, wherein seams connect the first and second front portions to the back portion.

3. The disposable surgical gown of claim 1, wherein the gown is formed without seams.

4. The disposable surgical gown of claim 1, wherein the adhesive includes a pressure sensitive adhesive.
5. The disposable surgical gown of claim 1, wherein each adhesive tab requires no landing area for adhesion to and release from the surgical gown.

6. The disposable surgical gown of claim 1, wherein the pull tab is formed adjacent a free edge of the gown body.

7. The disposable surgical gown of claim 1, wherein the pull tab includes a non-adhesive area adjacent an adhesive which is configured to be easily grasped by a wearer.

8. The disposable surgical gown of claim 7, wherein one of the gown and the pull tab includes pull indicia.

9. The disposable surgical gown of claim 1, wherein at least a portion of the adhesive on the adhesive tab is protected prior to use by a release strip positioned over the adhesive.

10. The disposable surgical gown of claim 1, wherein the basis weight for surgical gown is in a range of about 0.5 osy to about 3.0 osy.

11. The disposable surgical gown of claim 1, wherein the basis weight for the surgical gown varies between high contamination zones and low contaminated zones.

12. The disposable surgical gown of claim 11, wherein the first and second front portions and a lower portion of the sleeves provide high contamination zones.

13. The disposable surgical gown of claim 12, wherein the basis weight of the sleeves in the high contamination zones is in a range of about 1.45 osy to about 3.0 osy.
14. The disposable surgical gown of claim 11, wherein the an upper portion of
the sleeves and the back portion are included in low contamination zones.

15. The disposable surgical gown of claim 14, wherein the basis weight of the first
and second front portions are each about 0.5 osy to about 1.44 osy.

16. The disposable surgical gown of claim 1, wherein the back portion is
configured to provide a scooped opening near a wearer's neck and upper
back.

17. The disposable surgical gown of claim 16, wherein the scooped opening is
one of V-shaped and U shaped.
FIG. 5

FIG. 6
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7  A41D 13/12

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7  A41D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>Y</td>
<td>WO 95/32641 A (FRANZONI, MARIO) 7 December 1995 (1995-12-07) page 3, line 11 - page 5, line 28; figures 5-8</td>
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Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search 18 February 2005

Date of mailing of the international search report 09/03/2005

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Thibaut, E
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