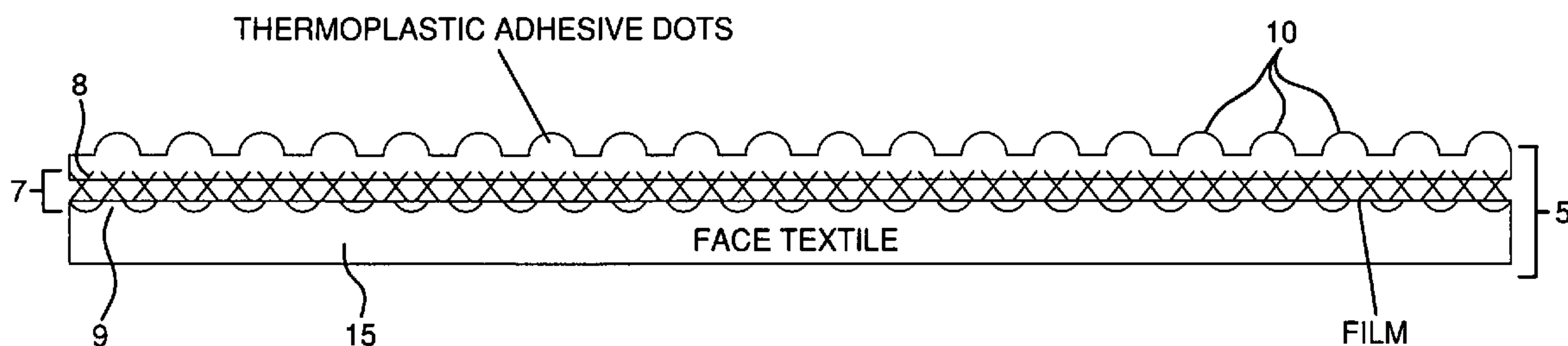




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(57) **Abrégé/Abstract:**

Garment constructs and garments prepared therefrom having a functional layer and an inner layer of a plurality of textiles, at least two of which are dissimilar textiles, adhered to the functional layer are provided.



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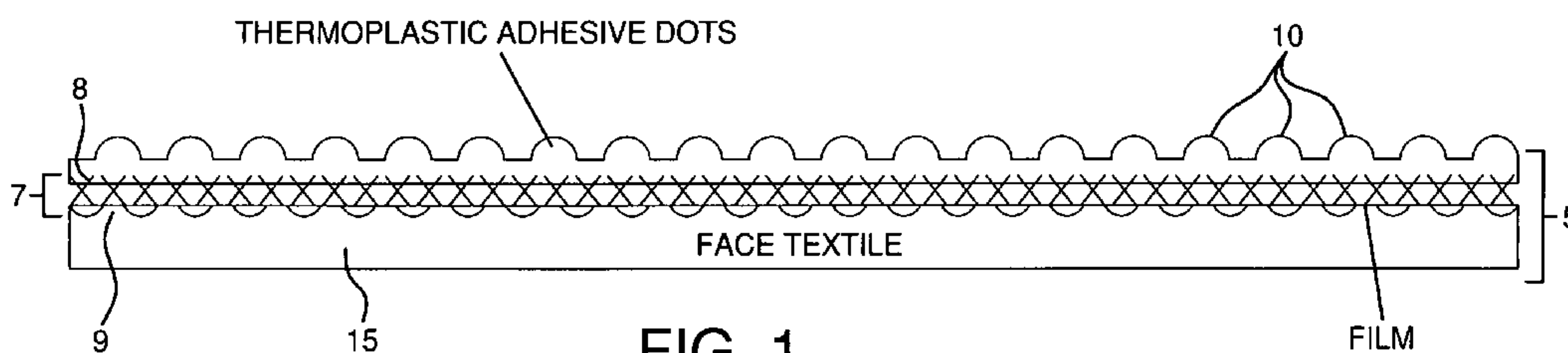


FIG. 1

(57) Abstract: Garment constructs and garments prepared therefrom having a functional layer and an inner layer of a plurality of textiles, at least two of which are dissimilar textiles, adhered to the functional layer are provided.

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TITLE OF THE INVENTION

COMFORTABLE PROTECTIVE GARMENTS

FIELD OF THE INVENTION

This invention relates to garment constructs and garments prepared therefrom having a functional layer and an inner layer formed of a plurality of textiles, at least two of which are dissimilar textiles, adhered to the functional layer. In some embodiments, the garment constructs or garments prepared therefrom have an outer layer adhered to the side of the functional layer opposite to the inner layer.

BACKGROUND OF THE INVENTION

Garments have been described having an outer protective layer ordinarily permeable to liquid water and a waterproof breathable layer affixed inside the outer layer. Optionally, these constructs are provided with an adjacent, but not affixed, inner liner textile.

Garments have also been constructed using a waterproof lining, generally formed from pattern pieces cut out of sheets and then joined together at seams, typically by sewing. This lining is generally loosely disposed against the inner side of the outer layer. However, air gaps between the outer layer and the waterproof lining reduce water vapor permeability and heat transmission. Further, all sewn seams must be water-proofed by providing seam tape over the seam on the surface of the functional waterproof layer.

Garments have been described wherein the outer material is adhered to the functional waterproof layer before pattern pieces of the garment are cut out. In this embodiment, the functional layer must have as many perforating seams as are required for the outer material including decorative seams and seams required for appliqués. Thus, the lining side of these garments contains a large number of seam sealing

tapes which are unattractive, create friction upon contact with the body and can become detached upon rubbing against the body.

Articles of the present invention have been described containing an outer material part adhered via a continuous or discontinuous adhesive layer to a functional layer part composed of a plurality of pieces of waterproof, water-vapor-permeable functional materials. The outer material and functional material composites are joined together by stitched seams which are each waterproofed by waterproof seam sealing tape placed on the functional layer surface oriented towards the outer material part.

SUMMARY OF THE INVENTION

An aspect of the present invention relates to garments or garment panels comprising a functional layer having a first side and a second side; an inner textile layer comprising a plurality of dissimilar textile pieces forming a non-homogenous surface; and a discontinuous adhesive layer which affixes the inner textile layer to the first side of the functional layer. The dissimilar textile pieces of the inner textile layer can be abutted to each other or have at least portions of which are free of contact with each other.

The garment or garment panel may further comprise an outer textile layer affixed to the second side of the functional layer. This outer textile layer may be seamless or may comprise a plurality of dissimilar textile pieces abutted together to form a non-homogenous surface.

Another aspect of the present invention relates to garments or garment panels comprising a functional layer having a first side and a second side; an inner textile layer comprising a plurality of dissimilar textile pieces forming a non-homogenous surface; and a discontinuous adhesive layer which affixes the inner textile layer to the first side of the functional layer.

Another aspect of the present invention relates to a method of making a garment construct. In this method, a functional layer having a

first side and a second side and an outer perimeter is provided. An inner textile layer comprised of a plurality of textile pieces, at least two of which are dissimilar is then affixed to the first side of the functional layer via a discontinuous layer of adhesive to form a non-homogenous surface. In some embodiments, this method further comprises affixing an outer textile layer with an outer perimeter to the second side of the functional layer.

Yet another aspect of the present invention relates to a method of making a garment. In this method, a functional layer with a first side and a second side is provided. An outer textile layer is affixed to the second side of the functional layer to create an outer shell or bond shell material or laminate. The outer shell material is then cut to form garment constructs. A plurality of textile pieces at least two of which are dissimilar are also provided for an inner layer of the garment construct. The inner layer textile pieces are cut to form a desired pattern. These inner layer textile pieces are then affixed in the desired pattern to the first side of the functional layer of the outer shell garment or garment panel via a discontinuous adhesive layer. These garment constructs are assembled via seams to form a finished garment.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a side view of the layers in an exemplary bondable shell useful in producing garments or garment panels in accordance with of the present invention.

Figure 2 is a side view of the layers of a bondable shell wherein the layer of discontinuous adhesive in the form of dots is first applied to a release layer and subsequently transferred to the first side of the functional layer.

Figure 3 is a side view of the layers of a garment construct created with a bondable shell and two dissimilar liner textiles.

Figure 4 is a side view of the layers of an exemplary garment portion formed with an inner textile layer and comprising a sewn-on pocket.

Figure 5 shows a side view of the layers of an exemplary garment or garment panel formed using an inner textile layer comprised of a plurality of dissimilar textile pieces, namely an insulation-filled textile and a second textile.

Figure 6 shows a top view of a garment or garment portion formed using textile liners having different stretch characteristics.

Figure 7 shows a side view of a garment or garment panel formed using inner textile pieces having different air permeabilities.

Figure 8 is a top view of a garment or garment portion having a plurality of dissimilar textile pieces forming an inner textile layer which covers at least a portion of the bondable shell having a functional layer.

Figure 9 shows a side view of an exemplary seam sealed garment or garment panel formed by affixing a bondable shell to a liner comprising multiple dissimilar textiles.

Figure 10 shows a cross section of a drawstring tunnel.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides durably waterproof, highly breathable multilayered garment constructs with improved design freedom for garment production. The present invention also relates to methods for producing these garment constructs and garments thereof.

By "bondable shell" as used herein it is meant at least one textile or non-textile material which is able to be bonded to an inner lining or other layer. Preferably the bondable shell further comprises a functional layer and adhesive.

By "garment construct" as used herein it is meant one or multiple joined panels of textile laminates which, upon assembly, make up a finished garment.

By "textile laminate" as used herein it is meant a textile or a plurality of textile pieces adhered to a functional layer.

By "textile" as used herein it is meant any wovens, nonwovens, felts, knits, natural fiber materials, synthetic fiber materials and is inclusive of, but not limited to leathers, vinyls, or other protective materials useful in garment construction.

By "dissimilar textile pieces" as used herein it is meant two or more textile pieces exhibiting different textile characteristics including, but not limited to, material contents, thicknesses, breathability characteristics, waterproof characteristics, insulation, and other measurable textile characteristics. A plurality of dissimilar textile pieces is two or more.

By "non-homogenous surface" as used herein it is meant the surface topography resulting from the joinder of two or more dissimilar textile pieces.

By "discontinuous adhesive" as used herein it is meant the adhesive is disposed in any manner that does not fully cover or coat a given side of a functional layer textile, or textile layer, including, but not limited to, discrete adhesive dots, lines of adhesive, adhesive grid patterns, random adhesive patterns, or any other arrangement that bonds the inner textile pieces to the first side of the functional layer so that the largest distance between any two adjacent bond points is less than 2cm. The close proximity of bond points ensures intimate contact between the bonded layers.

The present invention provides garment constructs useful in the production of garments.

A garment or garment panel of the present invention comprises a functional layer. The functional layer 7 preferably comprises at least one material which is waterproof or waterproof and breathable, the functional layer 7 can be a single material or a combination of materials. Examples of materials which may be present in the functional layer include, but are not limited to microporous polytetrafluoroethylene (PTFE) membranes, dense PTFE, or PTFE membrane coated with protective coatings such

as polyurethanes, or polyolefin films, polyurethane films, silicone and silicone-containing films, polyester films, as well as other fluoropolymer containing films such as skived PTFE and fluorinated ethylene propylene (FEP), composite barrier membranes, composites having microporous polytetrafluoroethylene (PTFE) membranes. The functional layer 7 is preferably a seamless layer or a membrane layer of fewer pieces than either the outer shell or the inner layer of the garment construct to reduce the required seam sealing needed.

The garment or garment panel of the present invention further comprises an inner textile layer. The inner textile layer comprises a plurality of textile pieces, at least two of which are dissimilar, thereby forming a non-homogenous surface. Examples of dissimilar textile pieces useful in this layer include, but are not limited to textiles such as lightweight knits, heavyweight knits, fleeces, wovens, batting, such as Primaloft® insulation, or down-filled baffle chambers with or without quilting, other thermally insulating materials, and foams. The dissimilar textile pieces of the inner textile layer can be abutted to each other or can be free of contact with each other. The inner layer of the garment or garment panel may cover all or a portion of the functional layer.

The ability to use dissimilar textile pieces in the inner layer of the garment constructs of the present invention provides for more flexible and stylish design of garments with targeted regions of breathability, stretch, warmth, softness and/or aesthetics integrated into the garment upon its production.

The garment or garment panel further comprises a discontinuous adhesive 10 layer which affixes the inner textile layer to a first side of the functional layer. This discontinuous adhesive 10 layer of the garment or garment panel is preferably a re-meltable adhesive. The adhesive used for the present invention can be applied in either a discontinuous or continuous pattern. In order to maintain breathability when a continuous adhesive pattern is used, the adhesive must be breathable. If a discontinuous adhesive 10 pattern is used, the adhesive 10 can be either breathable or non-breathable. Because a discontinuous pattern of hot

meltable adhesive dots can be applied by a variety of methods, the specific hot melt adhesive should be chosen so that its rheological characteristics match those required by the application process as well as by the end application. For instance, in garment applications, the hot melt adhesive should have a remelt temperature higher than that of consumer garment heat cycles such as home laundry, home drying, dry cleaning, and ironing. In addition, the hot melt adhesive should have a remelt temperature low enough to minimize damage to textiles (e.g. glazing, chemical breakdown, dye transfer or shade change.) Given these upper and lower temperature constraints, the hot melt adhesive ideally has a softening point between 170 degrees Fahrenheit and 350 degrees Fahrenheit. Meltable polyurethane adhesives which are suitable for this application can be formulated in accordance with United States Patent Number 4,814,412 or are commercially available from various suppliers such as Bostick, Noveon, and other polyurethane adhesive suppliers.

In one embodiment, the garment or garment panel further comprises an outer textile layer 15 affixed to the second side of the functional layer. Examples of outer textile layers include, but are not limited to wovens, knits, non-wovens, The outer textile layer 15 may be a seamless layer of the garment or garment panel or may comprise a plurality of dissimilar textile pieces abutted together to form a non-homogenous surface. The functional layer 7 and the outer textile layer 15 of the garment or garment panel are preferably aligned so that the outer perimeter of the functional layer 7 and the outer perimeter of the outer textile layer 15 are coincident with each other.

The garment or garment panel of the present invention is useful in production of simple and stylish garments which are preferably lightweight, waterproof and breathable as well as aesthetically pleasing on the inside and outside of the garment. The ability to use dissimilar textile pieces in the inner layer allows flexibility in production of garments with targeted regions of breathability and/or warmth through use of dissimilar textile regions of, for example, down-filled baffles, polyester batting

insulation, fleece, light-weight knits, heavy-weight knits, wovens, and/or no textile at all.

The garment or garment panel of the present invention is additionally useful in production of garments having regions of specific functionality. For example, the inner textile layer may comprise a dissimilar textile piece having a low-wicking property located in chosen regions as to provide low wicking to the garment or garment panel and/or finished garment. Low wicking may be desirable around garment openings including, but not limited to the sleeve cuffs, garment hemline, and collar regions. In yet another permutation of this invention, inner textile pieces containing an anti-microbial agent or anti-odor agent can be incorporated into the inner textile layer so that the resulting garment provides odor control in specific areas including but not limited to the underarms, and other high perspiration areas.

In another embodiment, the present invention can be useful to impart varying stretch characteristics within a garment construct. By providing stretch textile pieces as part of inner textile layer, a garment or garment panel can be made which has differing stretch characteristics within a garment construct. Thus, this invention allows designers to make protective garments with longitudinal stretch in some regions, transverse stretch in other regions, bi-directional stretch in yet other regions, and no stretch in yet other regions. Thus, protective garments with varied regional stretch are able to be created without the use of seams 23 in the protective layer.

The present invention further allows the inner layer of a garment to be assembled into a finished lining for the garment independent of the exterior shell of the garment. The advantage to this is that the lining and the exterior shell may then be placed into relative contact with each other and heat and pressure can be used to set the liner to the exterior shell. It is a surprising result to be able to easily form a garment with waterproof or liquid proof seams 23 and a customizable lining. Other benefits include but are not limited to performance mapping of the outside of the garment by the use of materials having low and high

abrasion characteristics without affecting the interior mapping of comfort/insulation. Also, color blocking designs can be done on the outside of a garment without disrupting the inner textile layer design.

Figure 1 is a side view of the layers in an exemplary bondable shell 5 useful in producing garments or garment panels in accordance with of the present invention. In this embodiment, the bondable shell 5 comprises an outer textile layer 15 affixed to the second side 9 of a functional layer 7. In this embodiment, a layer of discontinuous adhesive 10 in the form of dots is applied to the first side of the functional layer 7 for further affixing of an inner textile layer having a plurality of textiles, at least two or which are dissimilar, thereto.

Figure 2 is a side view of the layers and a method of producing a bondable shell 5 wherein the layer of discontinuous adhesive 10 is shown as dots and is first applied to a release layer 17 and subsequently transferred to the first side 8 of the functional layer 7, the second side 9 of which is optionally affixed to an outer textile 15 layer. The release layer is removed after the discontinuous adhesive is affixed to the functional layer.

Figure 3 is a side view of the layers of an exemplary bondable shell 5 comprising an outer textile layer 15 and a functional layer 7 and having a discontinuous adhesive 10 useful to affix an inner textile layer 20. In this embodiment, an inner textile layer 20 comprised of a plurality of dissimilar textile pieces are affixed via discontinuous adhesive 10 to the first side 8 of the functional layer 7.

Figure 4 is a side view of the layers of an exemplary garment portion formed with an inner textile layer 20 and comprising a sewn-on pocket 22. The inner textile layer 20 is then affixed via discontinuous adhesive 10 to the first side of the functional layer 7. The functional layer with adhesive dots, and outer textile layer 15 are joined to form a bondable shell 5. This construction of a garment or garment panel enables the pocket 22 to be sewn to the inner textile layer and then joined to the bondable shell 5 without requiring the stitch 21 to penetrate the functional or liquid-proof membrane layer.

Figure 5 shows a side view of the layers of an garment or garment panel formed using an inner textile layer 20 comprised of a plurality of dissimilar textile pieces, namely an insulation-filled textile 18 and a second textile 19. As illustrated the insulation-filled textile 18 is formed having multiple insulation-filled chambers 24. The chambers 24 are formed of at least two similar or non-similar textiles with seams 23 which may be stitched, glued or welded to house the insulation. The insulation-filled liner is then affixed via discontinuous adhesive 10 to one side of the functional layer 7, thereby avoiding penetration of the functional layer 7 by the seams used to form the chambers, and incorporating the chambered liner onto a bondable shell 5 to create a desired garment or garment panel.

Figure 6 shows a top view of an exemplary garment or garment portion having an inner textile layer 20 formed using textiles 19 having different stretch characteristics. By combining non-stretch textiles and stretch textiles for the dissimilar textile pieces used to form a textile layer, an inner textile liner can be created having different amounts of stretch and different stretch orientations. The inner textile layer 20 formed in this embodiment is then affixed via discontinuous adhesive 10 to the first side of the functional layer 7, thereby avoiding penetration of the functional layer. The functional layer is shown bonded to an outer textile layer 15.

Figure 7 shows a side view of an exemplary garment or garment panel formed with an inner textile layer 20 having textile pieces each having different air permeability rates. By combining low air permeability textiles and high air permeability textiles as dissimilar textile pieces used to form a textile layer, an inner textile liner is created having regions with differing air permeability rates affixed to a water-resistant membrane barrier or functional layer 7 and an outer textile layer 15 to form a garment or garment portion having regions of differing air permeabilities.

Figures 8A and 8B are views of an exemplary garment or garment portion having a plurality of dissimilar textile pieces forming an inner textile layer 20 which covers at least a portion of the bondable shell 5 having a functional layer. It may be desirable to have more than half of

the bondable shell 5 covered with the inner textile layer 20 for certain apparel. Figure 8 illustrates an embodiment having approximately 70% of the bondable shell 5 covered with the inner textile layer.

Also provided is a process for production of a garment of the present invention. The bondable shell 5 as described in Figure 1 may be provided as a roll or in a sheet form. Garment constructions are formed from the bondable shell 5 laminate. It may be desirable to provide at least two different textiles on rolls for the inner textile layer. Dissimilar textile pieces are then assembled into desired inner textile layers. The outer shell garment constructions to which the inner textile layers are affixed may be constructed independent of the inner layer constructions. Alternatively panels may be constructed which comprise at least inner textile layers and outer textile layers, so that the panels may be assembled into a final form creating a garment or article. Optionally, the textile layers may be left unsealed about the borders or portions of the borders to form sealing regions on the borders. For waterproof garment construction, seam tape can be applied to the sealing regions at the junctions of garment constructs. Advantages in this construction model of the present invention include the desirability of creating an interior design which is de-coupled from exterior design. Less seam tape is required which leads to lighter weight and less bulk in the final garment for any given amount of liner pieces.

Figure 9 shows a side view of an exemplary seam sealed garment or garment panel formed by affixing a bondable shell 5 to an inner textile layer 20 or liner comprising multiple dissimilar textiles. In this example, the bondable shell 5 was sewn and then a seam seal reinforcement 26 or tape was applied over the seam 23. The inner textile layer 20 was affixed (using adhesive) as shown so that the inner textile layer 20 overlapped the seam tape and was joined contiguously to an adjacent inner textile layer 20 thereby making the seam tape not visible upon viewing the inner textile layer. This construction technique enables the creation of seam sealed articles wherein the seam sealing means are not visible when viewed from the inner textile layer 20 side.

Figure 10 illustrates a useful means to secure accessories including but not limited to pockets and draw cord tunnels for draw cords 100 to the inside of garments. By affixing the accessory (e.g., pocket 22 or draw cord tunnel or the like) to a piece of textile 19, and subsequently incorporating this piece of liner textile into the inner textile layer, the accessory is able to be affixed (as shown here via stitches 21) to the inner textile layer of the garment construct as one of a plurality of dissimilar textile pieces forming a part an inner textile layer 20. The inner textile layer 20 is then bonded via discontinuous adhesive 10 dots to the at least a portion of the bondable shell 5. The bondable shell preferably comprises a functional layer 7 which is laminated via a lamination adhesive 150 to the outer textile layer 15. The present invention may be used to affix accessories to either side of the functional layer. Furthermore, accessory attachment via the present invention avoids the need for seam sealing any stitching which might conventionally be used to sew the accessory to the textile laminate. Moreover, the reinforcing nature of the inner textile layer 20 enables the accessory to have greater durability than if attached directly to the functional layer.

TESTS

Suter Test for Liquidproof Seams

To determine whether a protective barrier fabric or the seams of a garment made from the protective barrier fabric are waterproof, the Suter test procedure is used, which is based generally on the description in ISO 811-1981. This procedure provides a low pressure challenge to the sample being tested by forcing water against one side of the test sample and observing the other side for indication that water has penetrated through the sample.

The sealed seam test sample is clamped and sealed between rubber gaskets in a fixture that holds the sample so that water can be applied to an area of the sample 3 inches in diameter (7.62 cm). The water is applied under air pressure of 1 psig (0.07 bar) to one side of the sample. In testing a fabric laminate, the water would be applied to the face or exterior side. In testing a

sealed seam, water is applied to the face side of the sample and the opposite side, or seam backer layer, is observed for leaks.

The opposite side of the sample is observed visually for any sign of water appearing (either by wicking or the appearance of droplets) at the seam edge for 3 minutes. If no water is observed, the sample has passed the test and the sample is considered liquidproof.

Test for Durably Liquidproof Seams

To determine the durability of a liquidproof seam, the seam sample is washed and dried generally following the conditions outlined in ISO 6330:1984 Procedure No. 3B. Specifically, the sample is loaded in a 4 pound (about 2 Kg) load of laundry into a top loading washing machine set to a medium water level (18 gallons, or equivalently 0.0681 m³), hot water temperature (140°F, or equivalently, 60°C), warm rinse cycle and heavy duty wash cycle set for 10 minutes, with 90 g of TIDE[®] powdered laundry detergent. The load is then dried in a rotating dryer on a Hot setting for a 35-45 minute drying time. This wash/dry regimen is repeated five times.

The seam sample is then subjected to the Suter Test for Liquidproof Seams, described above. If no water is observed upon testing, the sample has passed the test and the sample is considered durably liquidproof.

Test for Moisture Vapor Permeability

Moisture vapor transmission rates (MVTRs) were determined using the procedure set forth in U.S. Pat. No. 4,862,730 using potassium acetate as the salt and open pore ePTFE for the waterproof moisture vapor permeable membranes. These membranes nominally had a porosity of between 75% and 80%, average pore size of 0.2 μ m, with a thickness of approximately 0.04 mm. The environment was maintained at 50% relative humidity. The water bath was maintained at 23 \pm 0.5 °C. The samples were constrained in a 3" (about 7.5 cm) diameter plastic hoop and placed on the bath with woven shell fabric facing up. The purpose of using the plastic hoop was to avoid any buckling of the sample. The samples were conditioned on the bath with the salt cup on top for about 15 minutes before starting the test. The MVTR number is reported in the unit of g/m²/day.

The following non-limiting examples are provided to further illustrate the present invention.

EXAMPLES

Example 1:

A seamless garment or garment panel having a liner layer with a plurality of dissimilar textiles with varying moisture vapor permeability was formed in the following manner:

A two-layer textile laminate was formed comprising a composite barrier membrane as the functional layer laminated to a textile layer. In this exemplary embodiment, the composite barrier membrane was a composite of microporous polytetrafluoroethylene (PTFE) membrane coated with a polyurethane, prepared according to U. S. Patent No. 4,194,041 using a water vapor permeable, nonporous polyurethane coating on the ePTFE. This membrane was laminated on one side, using a plurality of dots of moisture curable polyurethane adhesive, to a polyester woven textile layer approximately 0.4 mm thick and having a weight of approximately 100 grams per square meter. The other side of the membrane was coated with a discontinuous thermoplastic polyurethane adhesive 10 using a plurality of dots. A first panel having rough dimensions of about 0.6 m by 0.6 m was then cut from this adhesive 10 backed laminate.

A second panel with approximate dimensions of 0.306 m by 0.3 m was cut from a polyester fleece textile approximately 1.3 mm thick and having a weight of approximately 160 grams per square meter

A third panel with approximate dimensions of 0.306 m by 0.3 m was cut from a polyester tricot knit textile approximately 0.2 mm thick and having a weight of approximately 80 grams per square meter.

The second and third panel were then joined to create a fourth panel at their respective edges by ultrasonically welding in a straight line, 6 mm from the panel edge, using a Sonobond Ultrasonic Welding machine (Model No. SM86, Sonobond, PA).

The fourth panel consisting of two discrete regions, was then disposed on the thermoplastic adhesive 10 side of the first laminate panel such that the edges of the first and fourth panel were coincident. This panel was placed in a large format heat press (Maxipress Automatic Air Operated Large Format Press, Model No. MAXI-3048AP, Geo Knight and Co Inc., Brockton, MA) and pressed at 165°C for 2 minutes, creating a single seamless garment or garment panel with two discrete dissimilar textiles on the liner side. Each textile region of this sheet was then tested using the Test for Moisture Vapor Permeability, and found to have two distinct regions of moisture vapor permeability.

Example 2:

A seamless garment or garment panel having a liner layer with a plurality of dissimilar textiles with varying moisture vapor permeability, a functional layer 7 comprising a composite membrane barrier, and a sealing region was formed in a manner substantially as described in Example 1, with the following exceptions:

The second panel was formed with approximate dimensions of 0.289 m by 0.283 m.

The third panel was formed with approximate dimensions of 0.289 m by 0.283 m.

The fourth panel consisting of two discrete textile regions was disposed on the thermoplastic adhesive 10 side of the first textile laminate panel such that the edges of the first and fourth panel were not coincident. Specifically, the edges of the fourth panel were 17 mm from the edges of the first panel, leaving an exposed region of the composite barrier membrane of the first panel 17 mm wide around the perimeter of the bonded panel, referred to herein as the sealing region. Each textile region of this sheet was then tested using the Test for Moisture Vapor Permeability, and found to have two distinct regions of moisture vapor permeability.

Example 3:

A waterproof seam was formed between two garment constructs having liner layers with a plurality of dissimilar textiles of varying moisture vapor permeability in the following manner:

Two seamless garment constructs, each having a plurality of dissimilar textiles of varying moisture vapor permeability and a functional layer 7 comprising a composite membrane barrier were formed by the method described in Example 2.

The textile laminate panels were then joined at one of their respective sealing regions by sewing in a straight line, 6 mm from the panel edge, using a Juki sewing machine (Model No. DLN-415-5, Juki Corporation, Tokyo, Japan), set to 5.1 stitches per cm, followed by trimming of 4 mm off the seam allowance to ensure that the edge of the resultant 2 mm seam allowance was at least 4 mm from the edge of the textile laminate panels in either of the non-sealing regions.

A 22 mm width seam tape (GORE SEAM® seam tape obtained from W.L. Gore and Associates, Elkton, MD), having a hot melt polyurethane adhesive, was then applied to the sealing region by heating the seam tape to a temperature sufficient to melt the polyurethane adhesive 10 and passing the tape and seam through the nip of a pair of pressure rollers in order to squeeze the molten adhesive 10 onto the functional layer 7 surface so as to ensure good bonding of the tape to the surface. The tape width was such that it covered the entire sealing region and extended about 5 mm beyond the sealing region on each laminate panel. The resulting seam between the two laminate panels was tested using the Suter Test for Liquid-proof Seams and determined to be liquid-proof based on passage of a 0.07 bar/3 minute challenge. The seam was then subjected to the Test for Durably Liquid-proof laminate, and after the washing regimen, the sample again passed the 0.07 bar/3 minute challenge.

Example 4:

A seamless waterproof garment or garment panel containing a sewn pocket 22 on one side which does not compromise the liquid-proofness of the waterproof garment or garment panel was formed in the following manner:

A two-layer textile laminate was formed comprising a functional layer 7 of composite barrier membrane laminated to a textile layer. The composite barrier membrane was a composite of microporous polytetrafluoroethylene (PTFE) membrane coated with a polyurethane, prepared according to U. S. Patent No. 4,194,041 using a water vapor permeable, nonporous polyurethane coating on the ePTFE. This membrane was laminated on one side, using a plurality of dots of moisture curable polyurethane adhesive, to a polyester woven textile layer approximately 0.4 mm thick and having a weight of approximately 100 grams per square meter. The other side of the membrane was coated with a discontinuous thermoplastic polyurethane adhesive 10 comprising a plurality of dots. A first panel having rough dimensions of about 0.6 m by 0.6 m was then cut from this adhesive 10 backed laminate.

A second panel with approximate dimensions of 0.6 m by 0.6 m was cut from a polyester fleece textile approximately 1.3 mm thick and having a weight of approximately 160 grams per square meter.

A third panel with approximate dimensions of 0.1 m by 0.15 m was also cut from the same polyester fleece textile

The third panel was then attached to the second panel by sewing in straight lines around 3 edges of the perimeter of the third panel, 6 mm from the panel edge, using a Juki sewing machine (Model No. DLN-415-5, Juki Corporation, Tokyo, Japan), set to 5.1 stitches per cm, thus forming a pocket on the third panel.

The third panel was then disposed on the thermoplastic adhesive 10 side of the first textile laminate panel such that the edges of the first and third panel were coincident. This panel was placed in a large format heat press (Maxipress Automatic Air Operated Large Format Press,

Model *MAXI-3048AP*, Geo Knight and Co Inc., Brockton, MA) and pressed at 165°C for 2 minutes, creating a seamless waterproof panel containing a on the fleece side. The resulting laminate panel with attachment was tested using the Suter Test for Liquid-proof Seams and determined to be liquid-proof based on passage of a 0.07 bar/3 minute challenge.

Example 5:

A waterproof down-filled garment or garment panel was formed by the following method:

A two-layer textile laminate was formed comprising a functional layer 7 of composite barrier membrane laminated to a textile layer. The composite barrier membrane was a composite of microporous polytetrafluoroethylene (PTFE) membrane coated with a polyurethane, prepared according to U. S. Patent No. 4,194,041 using a water vapor permeable, nonporous polyurethane coating on the ePTFE. This membrane was laminated on one side, using a plurality of dots of moisture curable polyurethane adhesive, to a Polyester woven textile layer approximately 0.4 mm thick and having a weight of approximately 100 grams per square meter. The other side of the membrane was coated with a discontinuous thermoplastic polyurethane adhesive 10 comprising a plurality of dots. A first panel having rough dimensions of about 0.6 m by 0.6 m was then cut from this adhesive 10 backed laminate.

A second panel with approximate dimensions of 0.6 m by 0.6 m was cut from a polyester tricot knit textile approximately 0.2 mm thick and having a weight of approximately 80 grams per square meter.

A third panel with approximate dimensions of 0.6 m by 0.6 m was cut from a nylon "down proof" woven textile approximately 0.15 mm thick and having a weight of approximately 50 grams per square meter

The second and third panels were then attached along their respective perimeters to form a fourth panel using a Juki sewing machine (Model No. DLN-415-5, Juki Corporation, Tokyo, Japan), set to 5.1

stitches per cm, leaving an unstitched portion of the perimeter approximately 0.1 m in length, thus forming a space between the second and third panels.

The space between the second and third panels was then filled with down feathers, and the remaining 0.1 meters of the perimeter were sewn shut to contain the down feathers between the two panels.

Straight lines were then stitched through this new panel using a Juki sewing machine (Model No. DLN-415-5, Juki Corporation, Tokyo, Japan), set to 5.1 stitches per cm, at an approximate spacing of 0.1 m, to create down filled baffles.

The down filled, baffled, fourth panel was then disposed on the thermoplastic adhesive 10 side of the first laminate panel with the tricot knit oriented to the thermoplastic such that the edges of the first and fourth panel were coincident. This panel was placed in a large format heat press (Maxipress Automatic Air Operated Large Format Press, MAXI-3048AP Geo Knight and Co Inc., Brockton, MA) and pressed at 165°C for 2 minutes, to create a down-filled garment construct.

CLAIMS

What is Claimed is:

1. A garment or garment panel comprising:
 - (a) a functional layer having a first side and a second side;
 - (b) an inner textile layer comprising a plurality of dissimilar textile pieces forming a non-homogenous surface; and
 - (c) a discontinuous adhesive layer which affixes the inner textile layer to the first side of the functional layer.
2. The garment or garment panel of claim 1 wherein two or more of the dissimilar textile pieces of the inner textile layer are abutted to each other.
3. The garment or garment panel of claim 1 wherein two or more of the dissimilar textile pieces of the inner textile layer are free of contact with each other.
4. The garment or garment panel of claim 1 further comprising an outer textile layer affixed to the second side of the functional layer.
5. The garment or garment panel of claim 4 wherein the outer textile layer is seamless.
6. The garment or garment panel of claim 4 wherein the outer textile layer comprises a plurality of dissimilar textile pieces abutted together to form a non-homogenous surface.
7. The garment or garment panel of claim 4 wherein the functional layer and the outer textile layer each further comprise an outer perimeter.

8. The garment or garment panel of claim 7 wherein the outer perimeter of the functional layer and the outer perimeter of the outer textile layer are coincident with each other.
9. The garment or garment panel of claim 1 wherein the inner textile layer covers a portion of the functional layer.
10. The garment or garment panel of claim 1 wherein the functional layer is waterproof.
11. The garment or garment panel of claim 1 wherein the functional layer is breathable.
12. The garment or garment panel of claim 1 wherein the functional layer is seamless.
13. The garment or garment panel of claim 1 wherein the discontinuous adhesive layer is a re-meltable adhesive.
14. The garment or garment panel of claim 1 further comprising a release paper covering at least a portion of the discontinuous adhesive layer.
15. The garment or garment panel of claim 1 wherein the release paper covers a perimeter sealing region of the discontinuous adhesive layer.
16. The garment or garment panel of claim 1 wherein the inner textile layer comprises a down filled baffle.
17. A garment or garment panel comprising:
 - (a) a functional layer having a first side and a second side;

(b) an inner textile layer comprising a plurality of dissimilar textile pieces forming a non-homogenous surface;

(c) a discontinuous adhesive layer affixing said inner textile layer to the first side of the functional layer; and

(d) an outer textile layer having plurality of dissimilar textile pieces abutted to form a non-homogenous surface, said outer textile layer being affixed via a discontinuous adhesive layer to the second side of the functional layer.

18. A garment comprising the garment or garment panel of claim 1.

19. The garment of claim 18 further comprising discrete pockets.

20. A garment comprising the garment or garment panel of claim 17.

21. The garment of claim 20 further comprising discrete pockets.

22. An insulation-filled garment comprising:

(a) a waterproof breathable seamless functional layer having a first side and a second side;

(b) at least two textile pieces having insulation- filling therebetween creating an insulation-filled inner textile layer

(c) a discontinuous adhesive layer affixing said inner textile layer to the first side of the functional layer; and

(d) an outer textile layer affixed via a discontinuous adhesive to the second side of the functional layer.

23. A method of making a garment or garment panel comprising the steps of:

(a) providing a functional layer having a first side and a second side and an outer perimeter;

(b) affixing an inner textile layer comprised of a plurality of textile pieces to the first side of the functional layer via a discontinuous layer of adhesive to form a non-homogenous surface wherein at least two textile pieces of the inner textile layer are dissimilar; and

(c) affixing an outer textile layer having a plurality of dissimilar textile pieces to form a non-homogenous surface to a second side of the functional layer via an adhesive layer.

24. The method of claim 23 wherein the outer textile layer has an outer perimeter and is affixed to the second side of the functional layer with a discontinuous adhesive layer.

25. The method of claim 24 further comprising the step of:
creating a substantially coincident outer perimeter between the functional layer and the outer textile layer.

26. The method of claim 23 wherein the inner textile layer covers a portion of the functional layer.

27. A method of making a garment comprising:
(a) providing a functional layer with a first side and a second side;
(b) affixing an outer textile layer to the second side of the functional layer to create an outer shell material;
(c) cutting the outer shell material to form garment pattern pieces;
(d) assembling the garment pattern pieces via seams to form an outer shell garment construct;
(e) providing a plurality of textile pieces for an inner layer of a garment wherein at least two of the textile pieces are dissimilar;
(f) cutting and joining the inner layer textile pieces to form a desired pattern; and

(g) affixing the inner textile pieces in the desired pattern to the first side of the functional layer of the outer shell material via a discontinuous adhesive layer to form a finished garment.

28. The method of claim 27 wherein the inner textile pieces are bonded to the outer shell garment via heat and pressure to form the finished garment.

29. The method of claim 27 further comprising:
disposing seam tape along at least one of the seams of the outer shell garment.

30. The garment or garment panel according to any one of claims 1 to 21, or the insulation-filled garment of claim 22, wherein the functional layer comprises a microporous polytetrafluoroethylene (PTFE) membrane, a dense PTFE, a coated PTFE membrane, a composite including a microporous PTFE membrane.

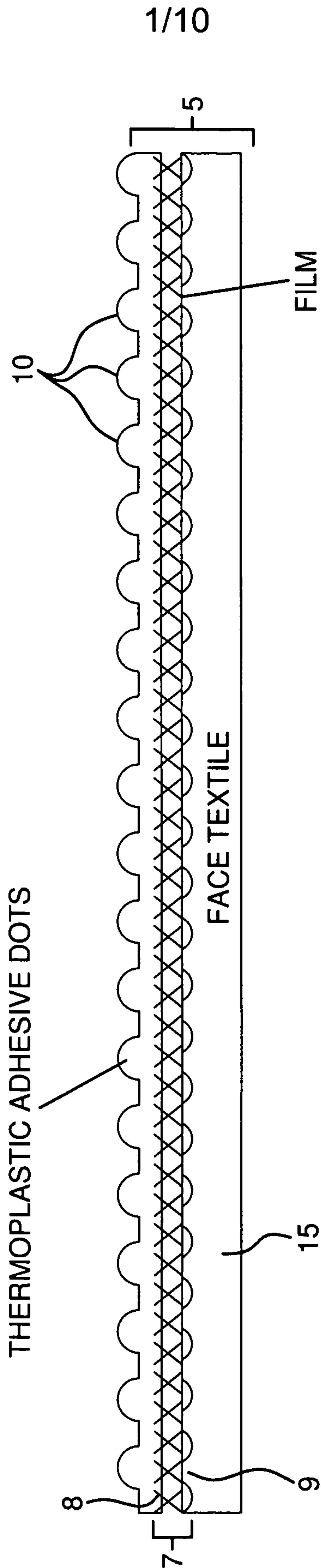


FIG. 1

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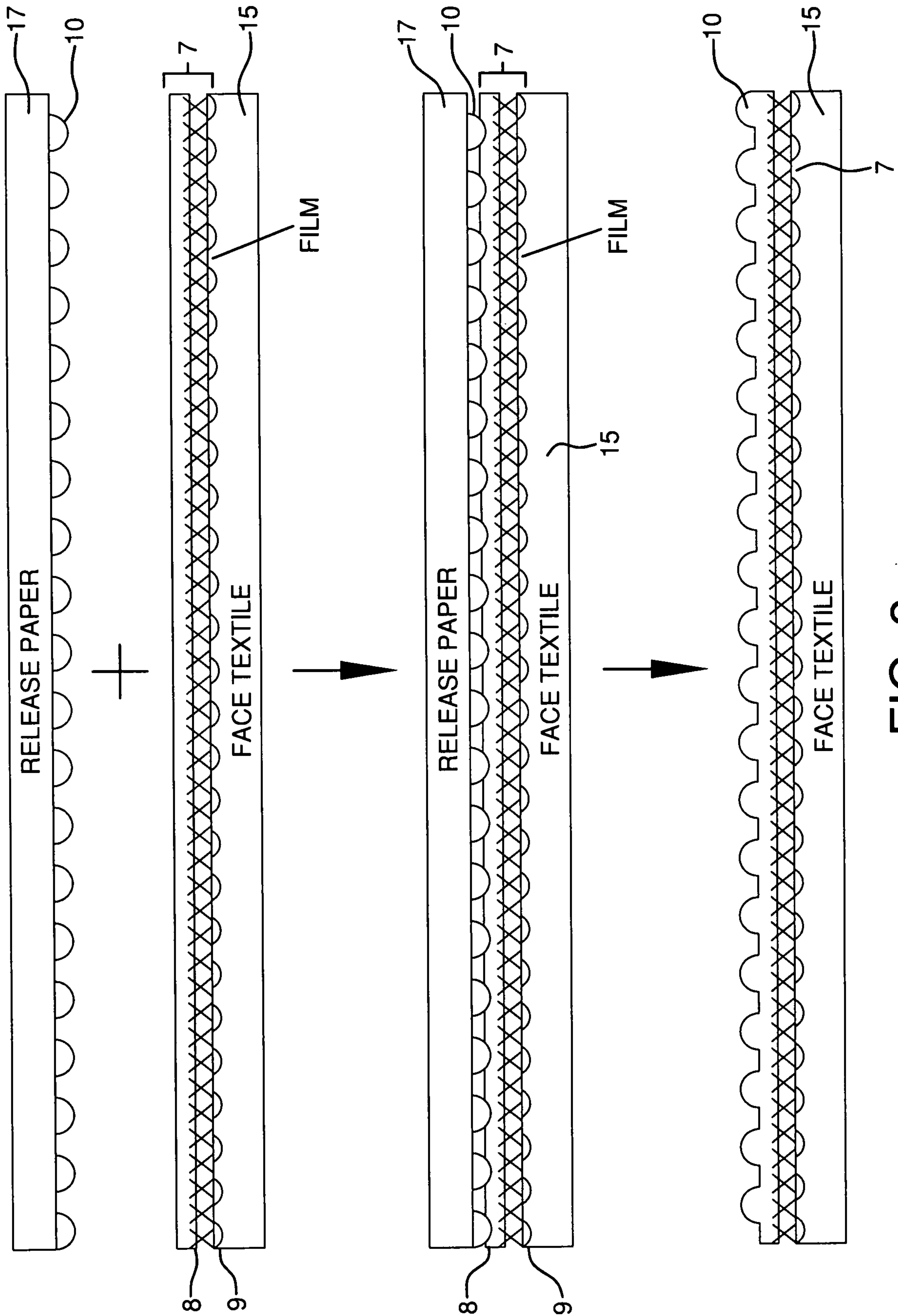


FIG. 2

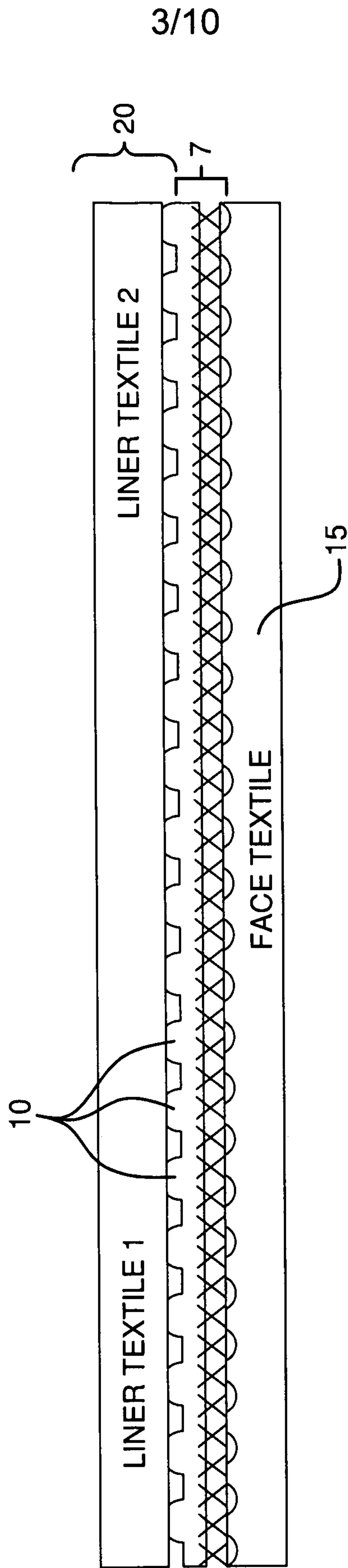


FIG. 3

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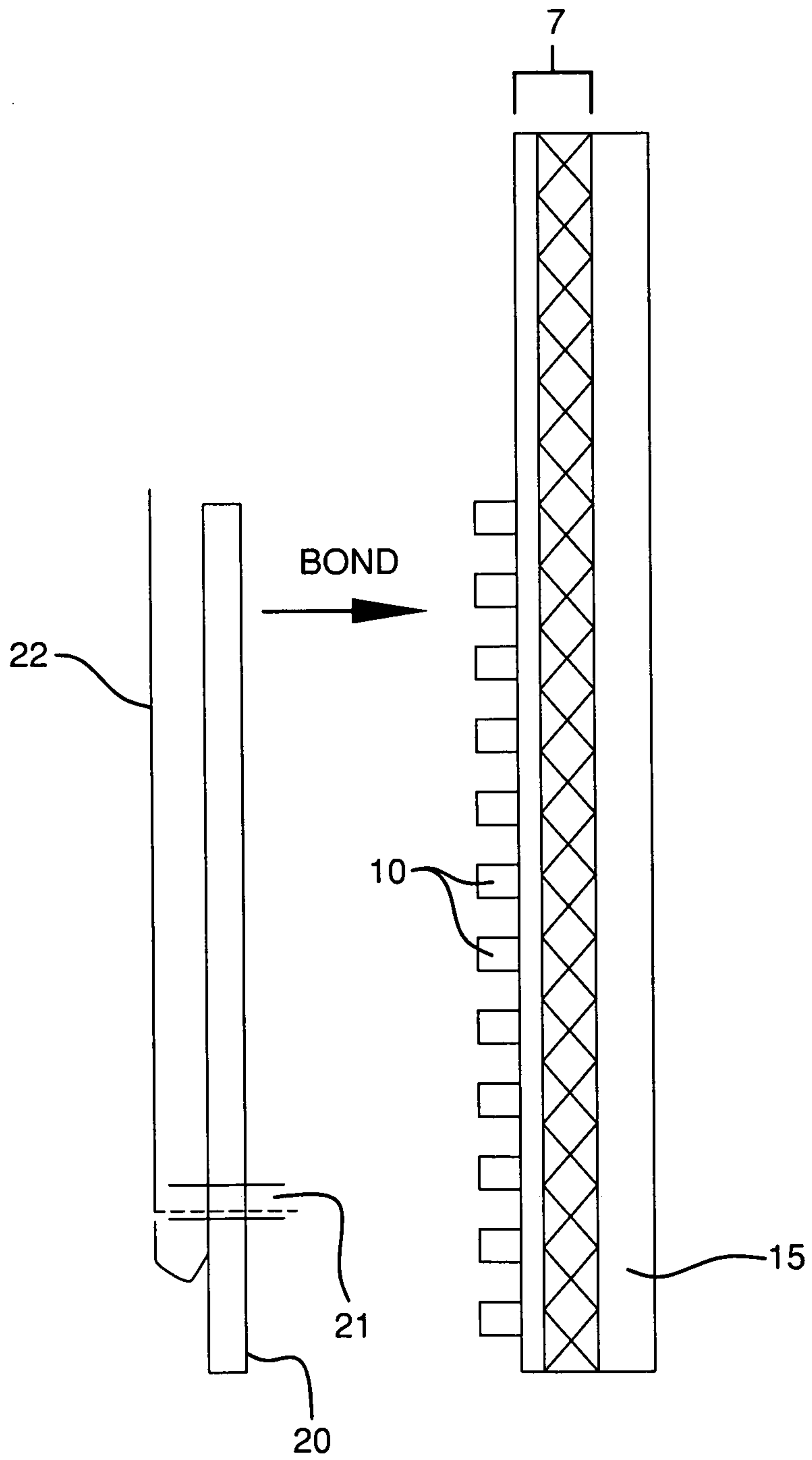


FIG. 4

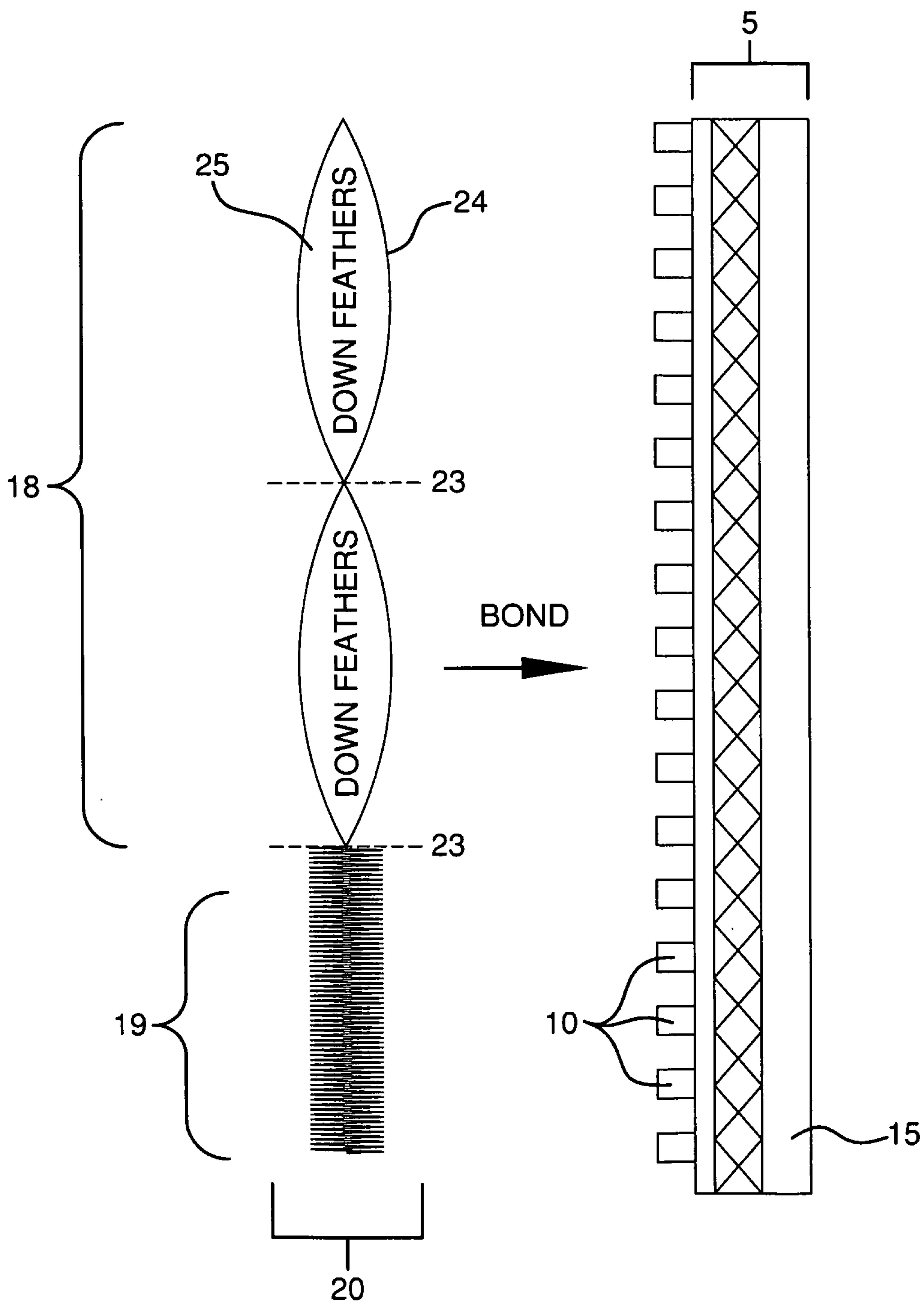


FIG. 5

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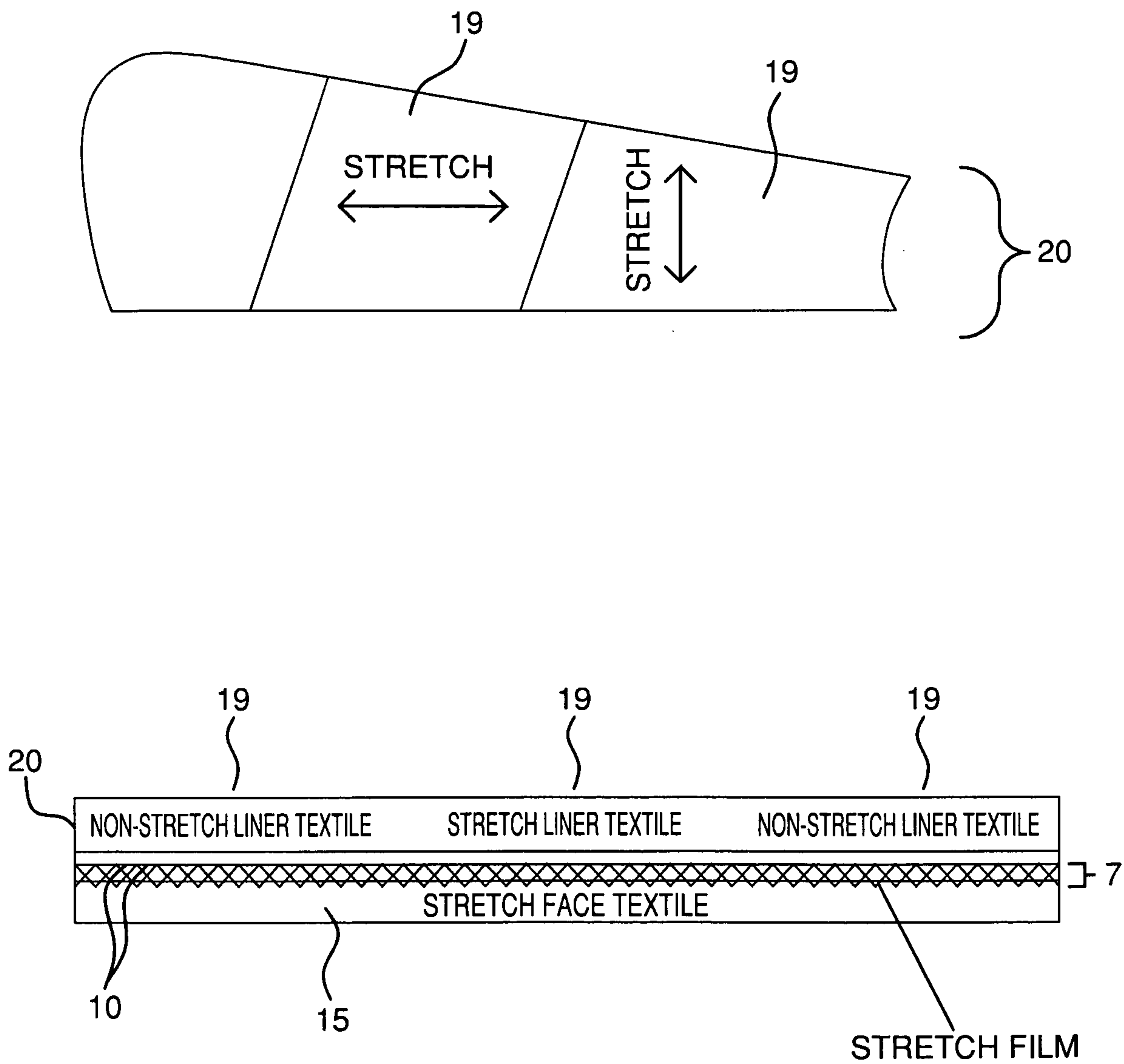


FIG. 6

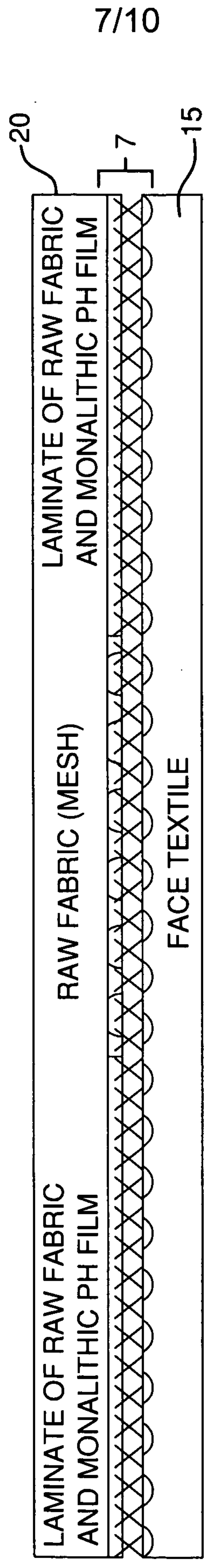


FIG. 7

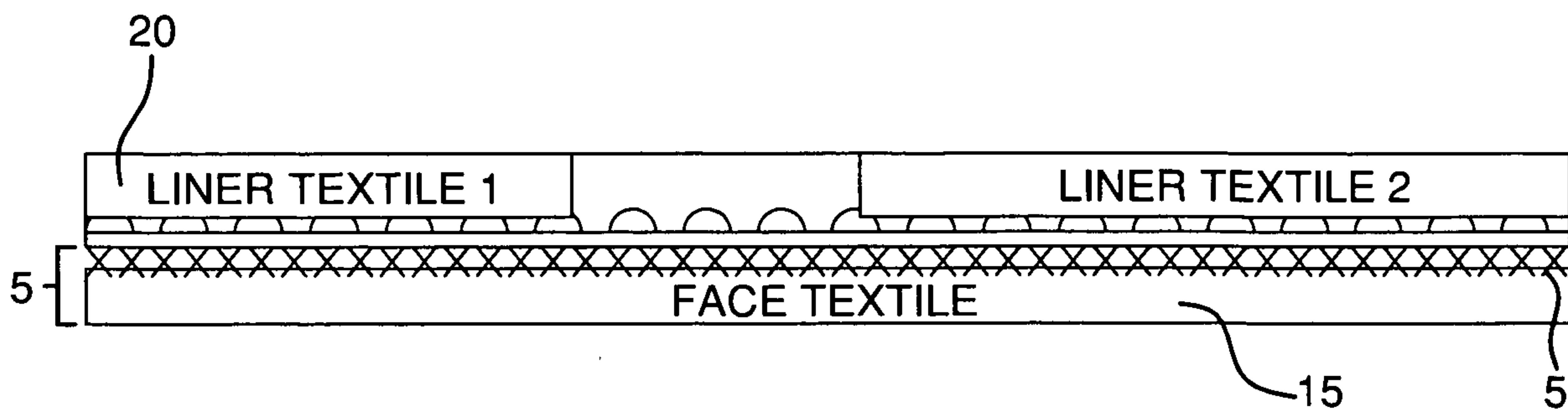


FIG. 8A

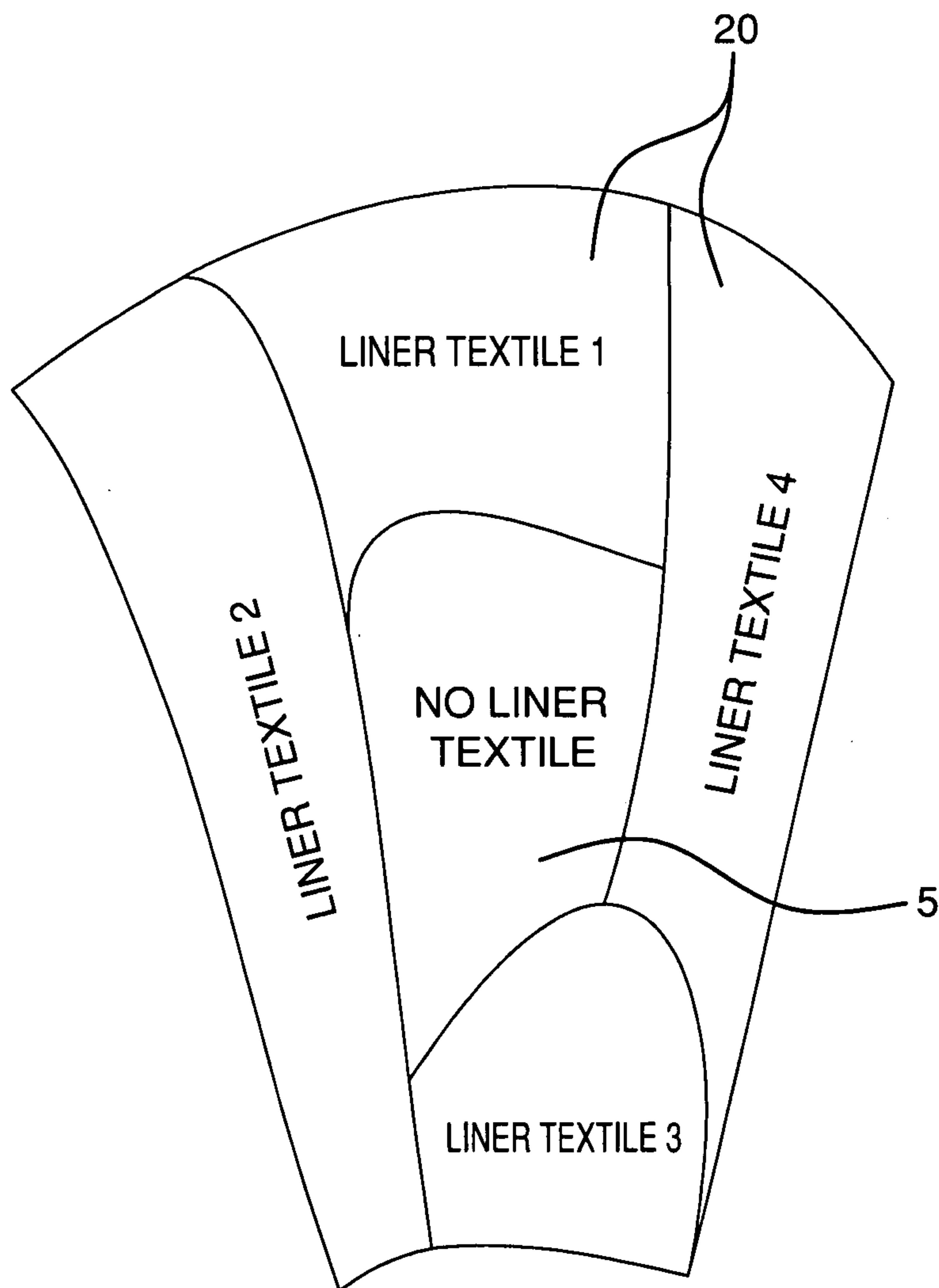


FIG. 8B

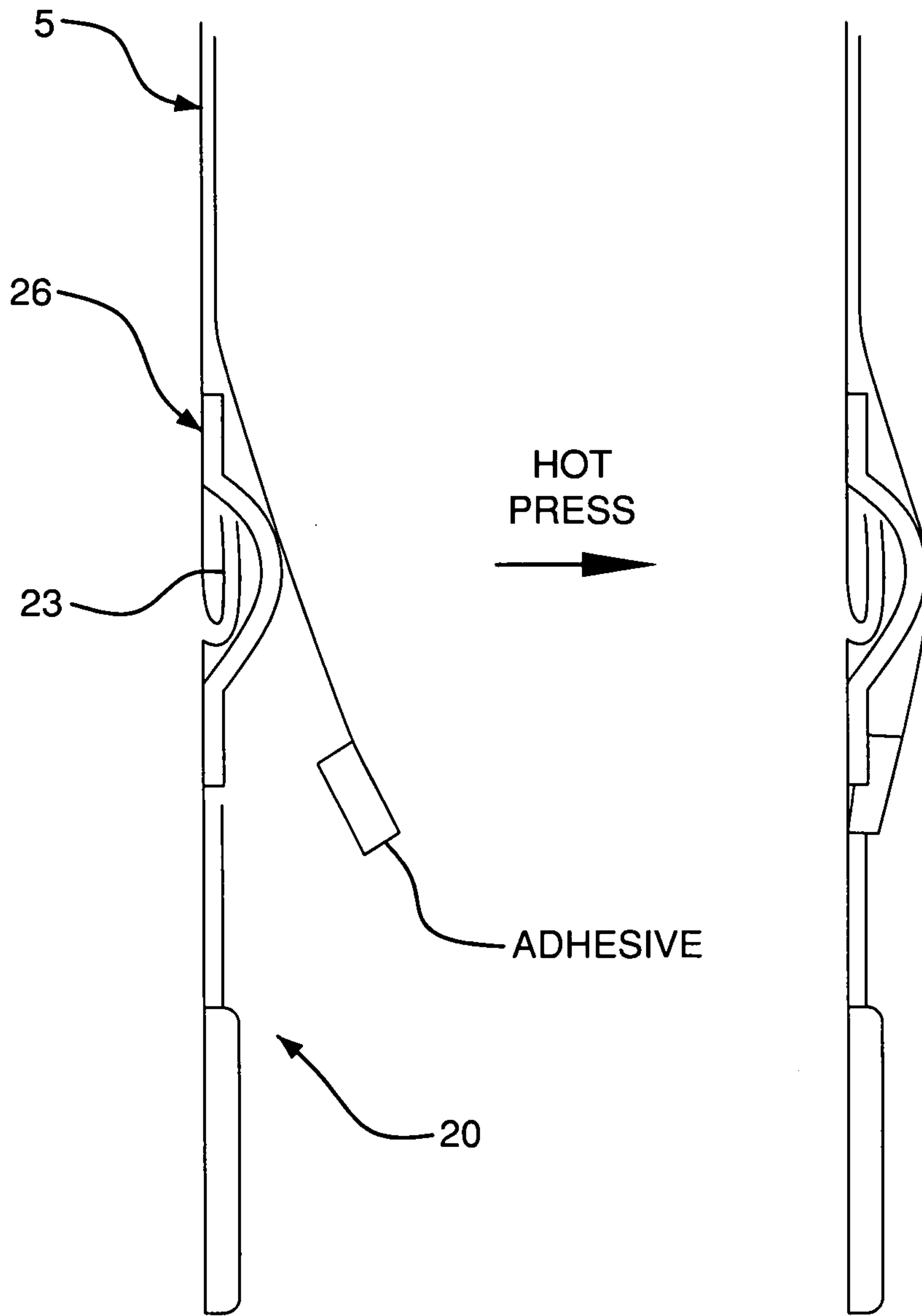


FIG. 9

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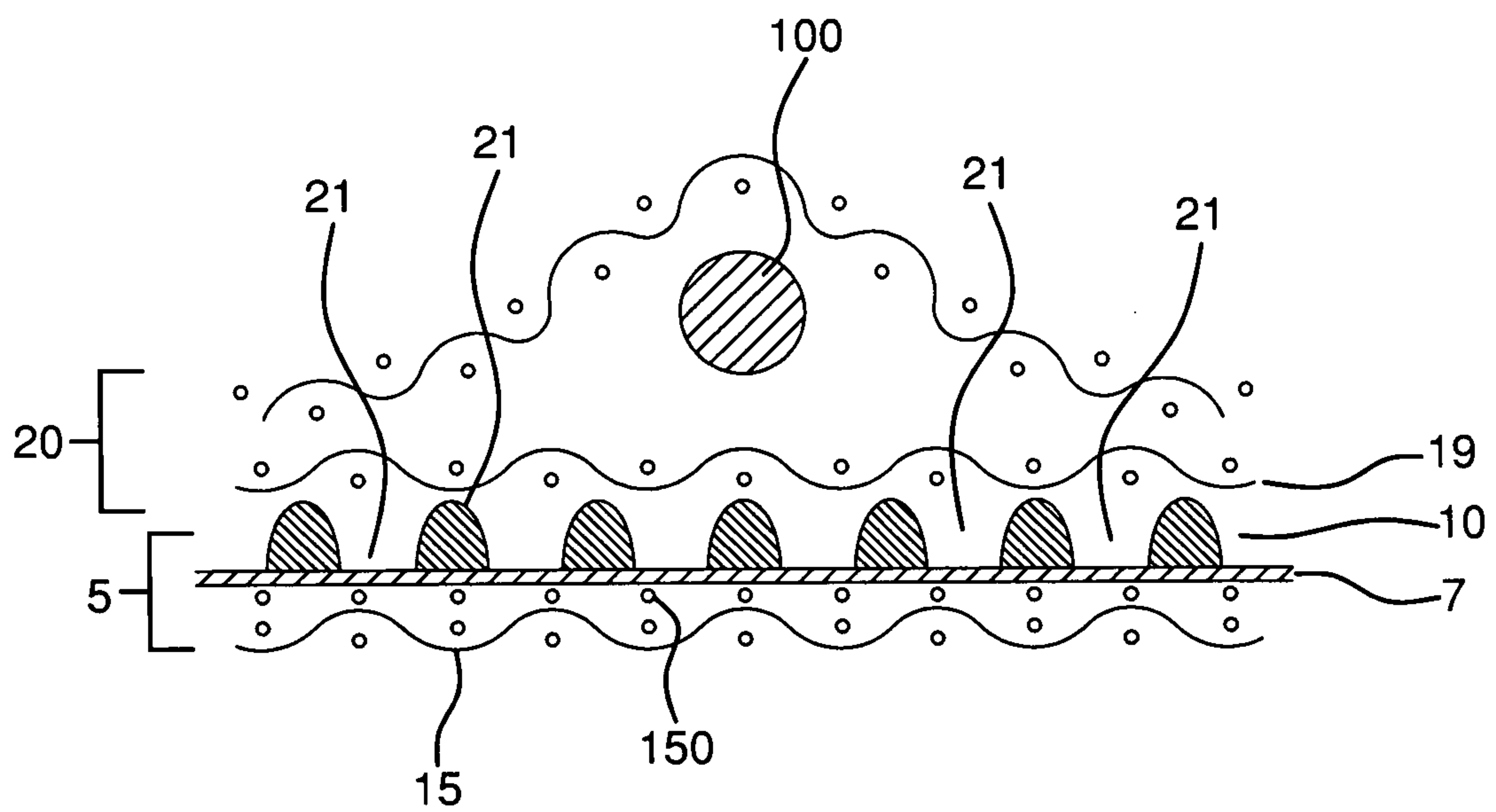


FIG. 10

THERMOPLASTIC ADHESIVE DOTS

