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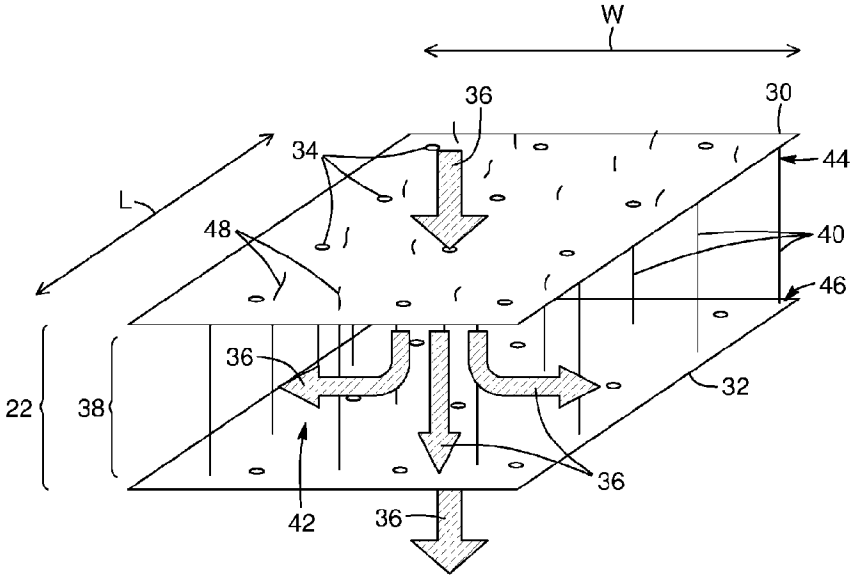


(57) Abrégé/Abstract:
There is provided a multi-layered fabric including at least one first layer and at least one second layer made of impermeable material disposed in parallel and secured to the at least one first layer. The at least one first layer includes a first sublayer made of permeable material and a second sublayer made of permeable material, and a third sublayer located between the first and the second sublayers. The third sublayer includes a plurality of fibers interconnecting the first sublayer with the second sublayer for allowing an airflow between the first and second sublayers,

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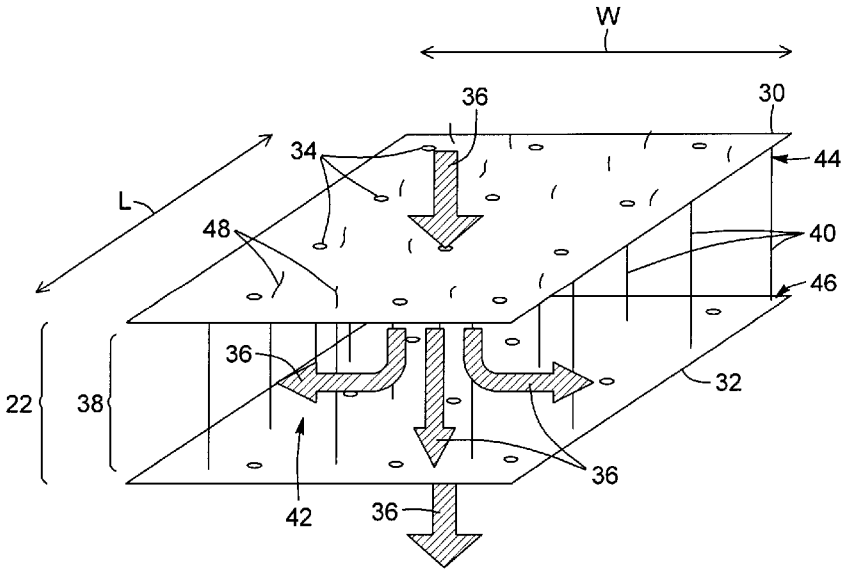


FIG. 4

(57) Abstract: There is provided a multi-layered fabric including at least one first layer and at least one second layer made of impermeable material disposed in parallel and secured to the at least one first layer. The at least one first layer includes a first sublayer made of permeable material and a second sublayer made of permeable material, and a third sublayer located between the first and the second sublayers. The third sublayer includes a plurality of fibers interconnecting the first sublayer with the second sublayer for allowing an airflow between the first and second sublayers,

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# MULTI-LAYERED FABRIC

## FIELD OF THE INVENTION

[001 ] The present invention relates to a multi-layered fabric and bed pad.

## BACKGROUND OF THE INVENTION

[002 ] Hospitals and nursing homes treating long-care immobilized patients are faced with the ancillary medical issue of decubitus ulcers which may be developed by such patients. Decubitus ulcers are more commonly known as bed sores.

[003 ] Bed sores develop in patients who are unable to move and thus constantly have a part of their body, such as their back or the back of their legs, in contact with a support surface, such as a bed, brace, or chair. A continuous contact of a part of the body with such a surface can cause humidity, heat, moisture, and fluid build-up between the support and the skin of the patient which is known to create a breeding ground for bacteria. Such a build-up of humidity, moisture, and fluid may further cause tissue in the area of the build-up to weaken and tear. This weakening, in combination with the pressures applied to the subcutaneous tissues of the skin can lead to the development of ulcers, or bed sores. In certain untreated cases, the ulcer may become infected and discharge exudates tending to further increase the moisture level around the ulcer and aggravate the infection and ulcer. Without pressure relief or aeration of the body part, the ulcer is unable to heal, or may continue to worsen into a chronic condition.

[004 ] Typically, patients with bed sores are confined to a bed. When pressure points between the bed and the body party arise, reduced blood flow to the pressured body area and/or disintegration and necrosis of epithelial tissue may follow. When the patient is shifted in position to relieve pressure or provide aeration to the body part, tears in the weakened skin may occur. Healing is thus

not possible without medical intervention which may include a constant repositioning of the body part, for example an alternation between a person's side, requiring hospital staffing attention and resources.

[005 ] For such type of wound management, dressings are the primary option available to medical staff for managing ulcers and ulcer exudates. While dry dressings are known in the art to prevent bacterial propagation into the open wound, once the dressing becomes sodden, bacteria can in fact use the dressing to propagate to the ulcer. Furthermore, a sodden dressing further causes the skin surrounding the ulcer to become wet from exudates, which can cause excoriation of the area when the patient shifts position, leading to pain and discomfort to the patient.

[006 ] There exists in the prior art various materials used to create pads designed to both absorb fluid while simultaneously providing pressure relief to an ulcered area to facilitate healing. Various combinations of materials, such as foam, sheet foams, cavity foams, knitted dressings formed from cotton, polyester or viscose fibres or fabrics, or other fibrous materials, sheet hydrogels, are layered to create a structure, such as a pad, having ulcer treatment properties, such as fluid absorption, support and aeration properties. For example, to provide aeration to the wound, such layered configurations are designed to create channels for air flow below the skin while simultaneously providing support to the body part.

[007 ] One drawback of such prior art pads is that although the layers of foams, cotton, viscose or polyester textiles are able to retain fluid within internal spaces formed within their structure similar to the structure of a sponge, when such materials are placed under pressure, for example under the weight of a patient, fluid may be released from the spaces and leak from the pad. Pads which provide fluid retention properties, such as hydrophilic materials, may avoid such leaking.

[008 ] Another drawback of such absorbent padding is that their multi-layered material structures also retain exudates which may block the internal spaces and prevent air flow from aerating the wound. Furthermore, it may be difficult to thoroughly clean such materials through washing due to densely and randomly packed internal spaces which form spaces or cavities which are very fine, randomly and densely packed, tending to firmly embed dried exudates therein.

[009 ] Furthermore, the use of materials which are fluid absorptive, such as foam or hydrophilic treated fibres absorb and retain moisture near the skin of a patient which can maintain a high humidity level adjacent to the skin tending to promote degradation and weakening of the area. Still furthermore, the use of materials with such fluid absorptive properties make washing of the material more difficult, since the fluid absorption can render the material heavier and difficult to handle for cleaning staff, as well as lead to increased drying times.

[010 ] The advent of three-dimensional (3D) spacer fabric, which is commonly known to provide a structure with dual breathability and compression/recovery resistance characteristics, provides an interesting material for ulcer treatment. Indeed, three-dimensional spacer materials or fabrics are known to be beneficial for wound management therapy in which the wound dressing itself acts as a waste canister to collect and store wound exudates removed from a wound site, while providing improved air circulation compared to traditional materials such as an absorbent pad of a fibrous material discussed hereinabove.

[011 ] However, one drawback of prior art applications of spacer fabric for the treatment of ulcers is that existing bed pads employing spacer fabrics tend to absorb or pool fluid within the spacer material itself which tends to block the air circulation properties of the air channels formed by the spacer material. Since the spacer material closest to the skin becomes sodden, the spacer fabric prevents fluid from moving towards the base of the pad and away from the ulcer, thereby blocking air circulation channels provided adjacent to the skin. As a result,

existing bed pads employing spacer fabric do not provide airflow and breathability immediately below the skin, a drawback similar to the fibrous materials.

[012 ] Therefore, what is needed is an inexpensive reusable multi-layered fabric for use in padding for treating ulcers and the like which is effective in absorbing fluids, distributing the pressure of a patient's body and providing aeration of the area of the wound. As well, what is needed is multi-layered fabric that is also easy to wash and dry, and which can be adapted for different wound management therapies.

## SUMMARY OF THE INVENTION

[013] According to the present invention, there is provided a multi-layered fabric comprising:

at least one first layer comprising:

first and second sublayers each being made of permeable material; and

a third sublayer located between the first and the second sublayers, the third sublayer comprising a plurality of fibers interconnecting the first sublayer with the second sublayer for allowing an airflow between the first and second sublayers; and

at least one second layer disposed in parallel and secured to the at least one first layer;

wherein the density of the plurality of fibres allows a vertical airflow of at least 140 cubic centimeters per square centimeter of surface area; and

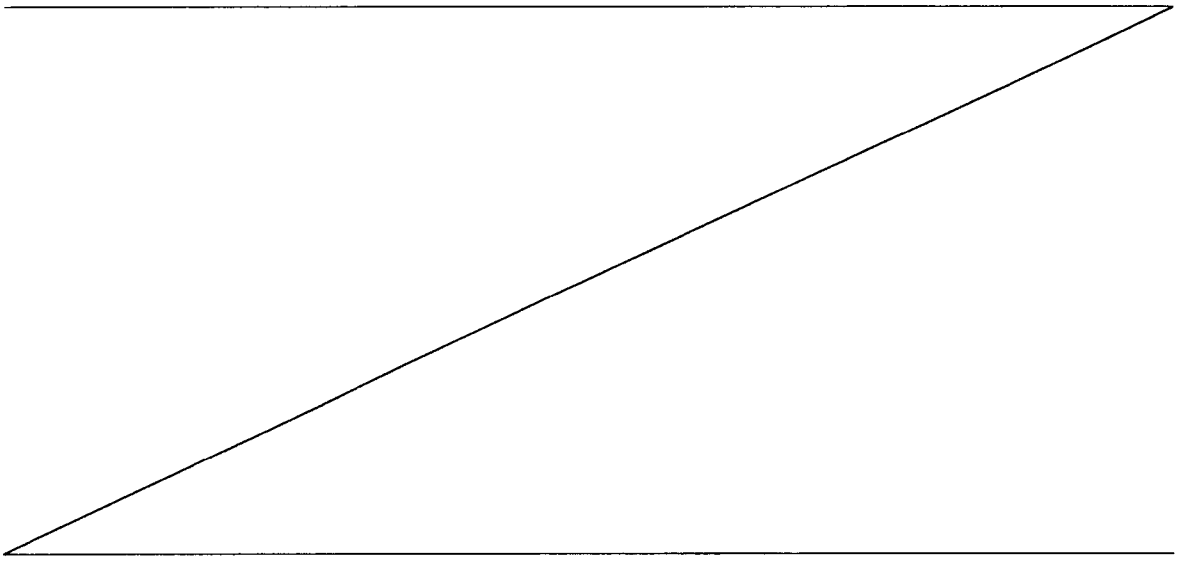
wherein the first and second sublayers comprise bristles protruding from a first sublayer surface and a second sublayer surface for providing frictional engagement with the bristles of an adjacent sublayer.

[013a] Other possible aspect(s), object(s), embodiment(s), variant(s) and/or advantage(s) of the present invention, all being preferred and/or optional, are briefly summarized hereinbelow.

[014 ] For example, in one possible embodiment, the plurality of fibers are configured to form air channels allowing air flow to flow between the first sublayer and the second sublayer.

[015 ] In another possible embodiment, the first sublayer and the second sublayer comprise holes allowing air flow and liquid to flow there through.

[016 ] In another possible embodiment, the first sublayer and second sublayer are made of a flexible material.



[017 ] In another possible embodiment, the multi-layered fabric further includes at least one third layer of permeable material disposed in parallel and secured to the at least one first layer opposite to the at least one second layer.

[018 ] In another possible embodiment, the third layer is a polyester material.

[019 ] In another possible embodiment, the third layer includes a patterned surface.

[020 ] In another possible embodiment, the first and second sublayers are formed from a polyester material.

[021 ] In another possible embodiment, the first and second sublayers are formed from a microfiber fabric.

[022 ] In another possible embodiment, the first and second sublayers are formed from a microfilament fabric.

[023 ] In another possible embodiment, the first and second sublayers are hydrophobic.

[024 ] In another possible embodiment, the at least one second layer comprises two second layers.

[025 ] In another possible embodiment, the at least one second layer is formed from nylon.

[026 ] In another possible embodiment, the at least one first layer is a three dimensional spacer fabric.

[027 ] In another possible embodiment, the plurality of fibers are disposed perpendicularly to the first sublayer and the second sublayer.

[028 ] In another possible embodiment, the pluralities of fibers each comprise a bend.

[029 ] In another possible embodiment, the plurality of fibers are aligned such that the fibers bend in a common direction.

[030 ] In another possible embodiment, the plurality of fibers are disposed in pairs of fibers.

[031 ] In another possible embodiment, the pairs of fibers are twisted.

[032 ] In another possible embodiment, the plurality of fibers are made of nylon.

[033 ] In another possible embodiment, the plurality of fibers are made of polyester.

[034 ] In another possible embodiment, the fibers are a monofilament fiber.

[035 ] In another possible embodiment, the density of the plurality of fibres allows a vertical airflow of 140 cubic centimeters per square centimeter of surface area.

[036 ] In another possible embodiment, the first sublayer and the second sublayer are spaced apart by a distance of between three to twelve millimeters.

[037 ] In another possible embodiment, the first sublayer and the second sublayer are spaced apart by a distance that varies over the area of the at least one first layer.

[038 ] In another possible embodiment, the plurality of fibers are hydrophobic.

[039 ] In another possible embodiment, the plurality of fibers are chemically treated to render the plurality of fibres hydrophobic.

[040 ] In another possible embodiment, the plurality of fibers are knitted to the first sublayer and the second sublayer.

[041 ] In another possible embodiment, the first and second sublayers include bristles protruding from a first sublayer surface and a second sublayer surface for providing frictional engagement with the bristles of an adjacent sublayer.

[042 ] In another possible embodiment, the bristles are formed in part by a portion of the fibers.

[043 ] In another possible embodiment, the at least one first layer comprises three first layers.

[044 ] In another possible embodiment, each first layer has a different thickness than an adjacent first layer.

[045 ] In another possible embodiment, each first layer has an increasing thickness to an adjacent first layer wherein the first layer adjacent the second layer has a lessor thickness than a first layer opposite the second layer.

[046 ] In another possible embodiment, the fabric is machine washable.

[047 ] In another possible embodiment, the at least one second layer extends to overlap with the at least one first layer.

[048 ] In another possible embodiment, the at least one first layer is secured to the at least one second layer by stitching.

[049 ] In another possible embodiment, the at least one first layer comprises a first layer periphery and the at least one second layer comprises a second layer periphery, wherein the first layer periphery and the second layer periphery are secured together by stitching.

[050 ] In another possible embodiment, the first layer periphery and the second layer periphery are compressively stitched together.

[051 ] In another possible embodiment, the multi-layered fabric further includes a breathable fabric peripheral cap secured to the first layer periphery and the second layer periphery.

[052 ] In another possible embodiment, a bed pad is provided that includes the multi-layered fabric, wherein the bed pad includes one or more outer pad peripheries.

[053 ] In another possible embodiment, the bed pad further includes at least one elastic band extending between the one or more outer pad peripheries.

[054 ] In another possible embodiment, the bed pad includes a sheet of material secured to the one or more outer pad peripheries to engage a periphery of a bed.

[055 ] In another possible embodiment, the bed pad further includes one or more fourth layers, each fourth layer including a fifth layer including the first layer, and a sheet of material including a sheet outer periphery and a sheet inner periphery, wherein the sheet outer periphery is connected to the at least one first layer and the sheet inner periphery is connected to the fifth layer, wherein the one or more fourth layers is disposed in parallel to the at least one first layer to form protrusions matching the curves of a human body.

[056 ] In another possible embodiment the one or more fourth layers are provided to form protrusions running longitudinally the length of the bed pad.

[057 ] In another possible embodiment, the bed pad is sized to be larger than the surface of a hospital bed such that a portion of the bed pad overhangs the bed.

[058 ] In another possible embodiment, two or more bed pads are provided with each including the multi-layered fabric, wherein each of the two or more bed pads are secured together to create a foldable pad.

## BRIEF DESCRIPTION OF THE FIGURES

[059 ] FIG. 1 is a top view of a bed pad employing a multi-layered fabric, in accordance with an illustrative embodiment of the invention;

[060 ] FIG. 2 is a side cross-sectional view of the multi-layered fabric taken along the lines II-II of FIG. 1;

[061 ] FIG. 3 is a side cross-sectional view of a first sub-layer shown in FIG. 2;

[062 ] FIG. 4 is a top perspective view of the first sub-layer of FIG. 3;

[063 ] FIG. 5 is a top cross-sectional view of a first sub-layer taken along the lines III-III of FIG. 3 showing the air flow channels provided in perpendicular configurations;

[064 ] FIG. 6 is a top cross-sectional view of a first sub-layer taken along the lines III-III of FIG. 3 showing the air flow channels provided in a radial configuration;

[065 ] FIG. 7 is a top cross-sectional view of a first sub-layer taken along the lines III-III of FIG. 3 showing density zone distributions of fibres;

[066 ] FIG. 8 is a top cross-sectional view of a first sub-layer taken along the lines III-III of FIG. 3 showing density zone distributions of fibres;

[067 ] FIG. 9 is a schematic view of a sub-layer of a multi-layered fabric, in accordance with an illustrative embodiment;

[068 ] FIG. 10 is a schematic view of a sub-layer of a multi-layered fabric, in accordance with an illustrative embodiment;

[069 ] FIG. 11 is a schematic view of a sub-layer of a multi-layered fabric, in accordance with an illustrative embodiment;

[070 ] FIG. 12 is a side cross-sectional view of a multi-layered fabric taken along the lines XII-XII of Figure 1;

[071 ] FIG. 13 is a side cross-sectional view of a multi-layered fabric taken along the lines XII-XII of Figure 1;

[072 ] FIG. 14 is a side cross-sectional view of a multi-layered fabric taken along the lines XII-XII of Figure 1;

[073 ] FIG. 15 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1;

[074 ] FIG. 16 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1;

[075 ] FIG. 17 is a top perspective view of a bed pad, in accordance with an illustrative embodiment of the invention;

[076 ] FIG. 18 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1;

[077 ] FIG. 19 is a top view of a bed pad with an integrated pillow, in accordance with an illustrative embodiment of the invention;

[078 ] FIG. 20 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1;

[079 ] FIG. 21 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1;

[080 ] FIG. 22 is a side cross-sectional view of the multi-layered fabric of FIG. 21;

[081 ] FIG. 23 is a side cross-sectional view of a bed pad and bed taken along the lines II-II of Figure 1; and

[082 ] FIG. 24 is a side cross-sectional view of a multi-layered fabric taken along the lines II-II of Figure 1.

## BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

[083 ] Now referring to FIGS. 1 and 2, there is provided a multi-layered fabric generally referred to by the reference numeral 10. The multi-layered fabric 10 allows air flow through and between the multi-layered fabric 10 for providing air circulation beneath the skin 12 of a body 14 of a patient when resting upon or in contact with the multi-layered fabric 10. In accordance with an illustrative embodiment, the multi-layered fabric 10 can be fabricated to form a bedding pad 16 for providing support to the body 14 of a patient when the bedding pad 16 is positioned on top of a bed 18 as will be described in more detail herein below.

[084 ] Still referring to FIGS. 1 and 2, the structure of the multi-layered fabric 10 also allows moisture, fluid, humidity, and exudates, such as bodily fluids 20 secreted from an ulcer (not shown) or other wound on the skin 12, to be collected and pooled away from the skin 12 of the body 14. Once pooled away from the skin 12, the fluid 20 is allowed to evaporate and any residue, such as plasma, which solidifies may be collected and retained by the multi-layered fabric 10. The structure of the multi-layered fabric 10 promotes evaporation of moisture and humidity, away from the skin 12 to remove the basis for the growth of bacteria which can be harmful to the skin of the body 14, provides a structure to collect exudates, as well as provides air circulation for ensuring an aeration of the skin 12. The structure of the multi-layered fabric 10 also provides support and pressure relief to the skin 12 in a manner as will be described herein below.

[085 ] Still referring to FIG. 1 and FIG. 2, the multi-layered fabric 10 includes at least one first layer 22 made of a permeable material and at least one second layer 24 made of impermeable material disposed in parallel and secured to the at least one first layer 22. In the illustrated embodiment, there is shown a multi-

layered fabric 10 including four first layers 22 and two second layers 24, but other combinations of first layers 22 and second layers 24 may be provided. For example, a multi-layered fabric 10 including three first layers 22 and one second layer 24 may be provided. The choice of layers and configurations will depend on the desired moisture retention/evaporation properties, the support qualities, as well as the application, as will be discussed in more detail herein below. The upper most first layer 22, that is the first layer 22 which will be provided adjacent to the skin 12, will define a top layer 26 which will be in contact with the skin 12, while lower most second layer 24 will define a bottom layer 28 positionable adjacent to the bed 18 and which will be in contact with the bed 18. In one embodiment the top layer 26 may be provided with a coloured, patterned or textured fabric for aesthetic purposes. In another embodiment, a third layer 27, such as a sheet of material, may be provided adjacent to the top layer 26.

[086 ] Now referring to FIG. 3 and FIG. 4, in addition to FIG. 2, the at least one first layer 22 includes a first sub-layer 30 made of permeable material and a second sub-layer 32 made of permeable material. For example, the first sub-layer 30 and second sub-layer 32 may be made of a lightweight, breathable, flexible, anti-microbial, non-cotton material that has moisture wicking properties. For example, the first sub-layer 30 and second sub-layer 32 may be stretchable in at least two directions to allow for some give in the multi-layered fabric 10 when subjected to a lateral loading. The first sub-layer 30 and second sub-layer 32 may be hydrophobic, and chemically treated with a fluid repellant. Optionally, the first sub-layer 30 and the second sub-layer 32 may be formed from materials based on a combination of cellulose and synthetic fibres which may be knitted to create air holes 34 to further enhance air permeability, moisture vapour permeability and wicking of fluid 20 and exudates through the first sub-layer 30 and second sub-layer 32. For example, the air holes 34 may be formed by knitting a material such that the first sub-layer 30 and the second sub-layer 32 form a mesh structure, as is commonly known in the art, such that the apertures in the mesh define the air holes 34. The first sub-layer 30 and a second sub-layer

32 therefore allow an airflow 36 to move through each sub-layer 30, 32 and also through the first layer 22 and onwards to an adjacent first layer 22.

[087 ] Still referring to FIGS. 1, 2, 3 and 4, the at least one first layer 22 also includes a third sub-layer 38 located between the first sub-layer 30 and the second sub-layer 32. The third sub-layer 38 includes a plurality of fibres 40 interconnecting the first sub-layer 30 with the second sub-layer 32 for maintaining the first sub-layer 30 and the second sub-layer 32 in a spaced relationship to define a space 42 there between to allow the airflow 36 to move horizontally between the first sub-layer 30 and second sub-layer 32, and also to allow the airflow 36 to move vertically through the first sub-layer 30 and the second sub-layer 32. The fibres 40 may be hydrophobic, and chemically treated with a fluid repellant. Fluid 20 from the skin 12 may enter the multi-layered fabric 10 by diffusion through capillary action or 'wicking', and also under the force of gravity, and be drawn into the space 42 defined between the first sub-layer 30 with the second sub-layer 32 where it may be subjected to airflow 36 to promote evaporation thereof, or further be collected towards the bottom layer 28, atop of the at least one second layer 24.

[088 ] The fibres 40 thus support the first sub-layer 30 and the second sub-layer 32 at a predetermined distance apart from one another. Optionally, the distance between the first sub-layer 30 and the second sub-layer 32 may be constant over the width (W) and length (L) of the multi-layered fabric 10, or the distance between the first sub-layer 30 and the second sub-layer 32 may be variable in a manner as will be described hereinbelow.

[089 ] Each fibre 40 has a top fibre end 44 coupled to the first sub-layer 30 and a bottom fibre end 46 coupled to the second sub-layer 32. Optionally, each fibre 40 may be individually connected to the first sub-layer 30 at its top fibre end 44 and connected to the second sub-layer 32 at its bottom fibre end 46. Optionally, the fibres 40 may be integrated with the first sub-layer 30 and second sub-layer 32 by weaving, for example when the first sub-layer 30 and second

sub-layer 32 are being formed. Optionally, each fibre 40 may form part of a continuous strand of material which is knitted with the first sub-layer 30 and the second sub-layer 32 during a knitting process so as to position and secure the fibres 40 with the first sub-layer 30 and a second sub-layer 32 at desired locations, for example in the case where the first layer 22 is a spacer material, as will be described hereinbelow. Illustratively, the fibres 40 are disposed vertically, or perpendicular to the parallel planes of the first sub-layer 30 and the second sub-layer 32.

[090 ] In accordance with an embodiment, the first sub-layer 30 and the second sub-layer 32 may include bristles 48 which protrude from a first sub-layer top surface 50 and a second sub-layer bottom surface 52 for providing frictional engagement with the bristles 48 of an adjacent sub-layer. For example, bristles 49 provided on the first sub-layer bottom surface 51 may engage with bristles 53 provided on first sub-layer top surface 55. A bristle 48 may be formed from the top fibre end 44 and the bottom fibre end 46 projecting through the first sub-layer 30 and the second sub-layer 32, respectively, or may be provided and integrating separately to the first sub-layer 30 second sub-layer 32 itself, for example by being integrated during the knitting process of the first sub-layer 30 and the second sub-layer 32.

[091 ] The fibres' 40 interconnection with the first sub-layer 30 and second sub-layer 32 form a spring action that translates into a support and cushioning effect when the first sub-layer 30 and the second sub-layer 32 are subjected to a compressive loading, for example when the first layer 22 is compressed under the weight of the body 14 when resting upon the bed 18 as shown in FIG 1. When subjected to a load, the fibres 40 will bend or deflect in response, and will provide a counteractive resistance which will maintain the first sub-layer 30 and second sub-layer 32 in a spaced relationship. Depending upon the loading, the first sub-layer 30 and second sub-layer 32 may be brought together due to a bending of the fibres 40. Upon relief from the loading, the fibres 40 will resiliently spring back to their initially biased shape. Optionally, each fibre 40 may have a

biased shape which causes the fibres 40 to vertically or perpendicularly extend relative to the plane of the first sub-layer 30 and the second sub-layer 32, as illustrated. Optionally, each fibre 40 may have a biased shape, such as a curve to form an arch shape.

[092 ] In accordance with an embodiment, the at least one first layer 22 may be formed from a spacer fabric material, such as a 3D knitted or 3D fabric material characterised with the aspects described herein and produced by a warp and/or weft knitting machines as is generally known in the art for example. In one illustrative embodiment, the at least one first layer 22 includes a network of fibres 40 acting as the spacer layer of the spacer fabric material formed from thermoplastic fibres or monofilaments interwoven or knitted with two fabric layers, as is generally known in the art.

[093 ] The density and configuration of the network of fibres 40 within the third sub-layer 38 can be selected to control the level of airflow 36 passing vertically and horizontally through the first layer 22, as well as the support strength provided between the first sub-layer 30 and second sub-layer 32 when subjected to compressive loading. For example, a high density of fibres 40 may provide a more resilient support compared to a lower density of fibres 40. However, as the density of fibres 40 increases, the air flow 36 rate decreases between the first sub-layer 30 and the second sub-layer 32. A lower density of fibres 40 will provide reduced compressive resistance which may cause the first sub-layer 30 and the second sub-layer 32 to come together above a certain loading threshold, effectively collapsing the space 42 and blocking the air flow 36 between the first sub-layer 30 and a second sub-layer 32. Optionally, the density of fibres 40 may be selected to provide an airflow 36 rate greater than 140 cubic centimeters per square centimeter of surface area of the first layer 22.

[094 ] Now referring to FIG. 5 and FIG. 6, in addition to FIGS. 1 to 4, the network of fibres 40 may be aligned in horizontal rows along the width and/or length of the first layer 22 so as to form air flow channels 54 through which the air

flow 36 may freely flow. Organizing and arranging the fibres 40 in such a way reduces resistance against which the air flow 36 may potentially encounter. While horizontal channels are illustrative, other channel shapes may also be formed by appropriately arranging the fibres 40. For example, the air flow channels 54 may be configured to radially extend from a center point of the multi-layered fabric 10 as shown in FIG. 6.

[095 ] Now referring to FIG. 7, in addition to FIGS. 1 to 6, the network of fibres 40 may be dispersed between the first sub-layer 30 and the second sub-layer 32 in zones 56 of varying fibre 40 densities so as to provide varying degrees of load support to avoid the first sub-layer 30 and second sub-layer 32 from being compressed to the point where the first sub-layer 30 and second sub-layer 32 are brought together to pinch the air flow channels 54 closed, thereby removing any aeration effects of the multi-layered fabric 10. For example, when the multi-layered fabric 10 is constructed into a bed pad 16 as described in more detail hereinbelow to provide support to a bedridden patient, fibres 40 may be more densely concentrated about the center of the pad 16 so as to support the torso of the body 14 which tends to be heavier than a patient's extremities, such as their arms legs, and head. Optionally, a higher density of fibres 40 may be provided at a zone 57 of the pad 16 where the shoulders of a patient tend to rest. Optionally, a higher density of fibres 40 may be provided at a zone 59 that runs the length of the pad 16 to correspond with the lower back position of the body 14 when positioned on a bed 18. Optionally, a higher density of fibres 40 may be provided at a zone 61 that corresponds to the buttocks area of a patient.

[096 ] Now referring to FIG. 8, optionally, a higher density of fibres 40 may be provided at a zone 63 that runs the longitudinal length of the pad 16.

[097 ] Fibre 40 densities between zones 57, 59, 61, 63 may vary and can change linearly or non-linearly depending on the desired support and aeration characteristics. The densities of the fibres 40 can be combined with the

organization of air flow channels 54 to create the desired balance between support and aeration characteristics of the multi-layered fabric 10.

[098 ] Now referring to FIGS. 9, 10 and 11, in addition to FIG. 3, the fibres 40 may be optionally disposed relative to the first sub-layer 30 and the second sub-layer 32 perpendicularly thereto, that is in a vertical direction. Optionally, the fibres 40 may be interconnected with the first sub-layer 30 and the second sub-layer 32 in a different configuration. For example, the fibres 40 may be connected to the first sub-layer 30 and the second sub-layer 32 in pairs as shown in FIG. 9 such that the air flow channels 54 are widened, with the pairs of fibres 40 still providing comparable support characteristics between the first sub-layer 30 and the second sub-layer 32 to that of a network of individual fibres 40 positioned evenly apart. Optionally, the pairs of fibres 40 may be biased to have a natural curvature which concaves away from each adjacent fibre 40 to form a spring action between the first sub-layer 30 and the second sub-layer 32 as illustrated in FIG. 10. Optionally, the pairs of fibres 40 may be twisted relative to one another to form a spring coil action between the first sub-layer 30 and the second sub-layer 32 as illustrated in FIG. 11.

[099 ] The pairing of the fibres 40 to enhance the structural integrity of the first layer 22 can result in a multi-layered fabric 10 that comprises less fibres 40 but with an enhanced air flow 36 between the first sub-layer 30 and the second sub-layer 32 by reducing the number of fibres 40 the airflow 36 my encounter resistance against. Furthermore, the widening of the airflow channels 54 allows larger exudates to be trapped and allows for fluid 20 to pass with less resistance through the first layer 22. Of note, while pairs of fibres 40 are illustratively shown, other combinations such as triplets or quadruplets of fibres 40 may be provided.

[100 ] Now referring to FIG. 12 and FIG. 13, in addition to FIGS. 1, 2 and 3, optionally, the height of the third sub-layer 38 and fibre 40 distribution of each of the first sub-layer 22 may include different configurations. For example, the third sub-layer 38 height may be consistent or variable across the width and length of

the first sub-layer 22. For example, the third sub-layer 38 height may be increased at areas of the multi-layered fabric 10 to naturally conform to the curvature surfaces of the body 14, such as the sides of the torso, to provide side support and increase comfort to the patient, as illustrated in FIG. 12. Alternatively, the third sub-layer 38 height may be increased in areas subject to higher compressive loading, for example along the center of a pad 16 to allow greater compression of the at least one first layer 22 while maintaining the spaces 42 which define the air flow channels 54. Protusions 75 may be formed by varying the height in such a manner, or by layering additional first layers 22 as will be described hereinbelow.

[101 ] Still referring back to FIGS. 1 and 2, the second layer 24 is illustratively made of non-permeable material, so as to form a moisture and strikethrough barrier layer to capture or pool fluid 20 there above and thereupon and to prevent fluid 20 from seeping and entering into contact with a support, such as the bed 18, to soil it. Illustratively, the second layer 24 may be formed from a non-permeable material such as vinyl or nylon.

[102 ] Still referring to FIGS. 1 and 2, there is illustratively provided an absorptive layer 58 provided in parallel and between the first layer 22 and second layer 24, and secured thereto to provide the multi-layered fabric 10 with fluid retention properties if desired depending on the type of wound to be managed. The absorptive layer 58 may be formed, for example, from a thin microfiber fabric that is fluid absorptive so as to assist with the wicking and absorption of fluid 20 away from at least one first layer 22. Depending on the medical application, the absorptive layer 58 can assist with maintaining a level of humidity below the skin 12 so as to promote healing as dependent on the medical treatment desired. As the absorptive layer 58 is illustratively provided away from the skin 12, such that the fluid 20 that is drawn away from the skin 12 can be collected and absorbed thereby.

[103 ] Now referring to FIG. 14, FIG. 15, and FIG. 16, in addition to FIG. 2, the at least one first layer 22 and at least one second layer 24 are attached together around their outer first layer periphery 65 and the second layer periphery 67. In accordance with an embodiment, the first layer 22 and at least one second layer 24 may be attached together with a stitching 62 stitched about the first layer periphery 65 and the second layer periphery 67. Illustratively the stitching 62 is a cotton or nylon thread, but other material types may be employed. Optionally, the outer first layer periphery 65 and the second layer periphery 67 may be compressively stitched together so as to bring the at least one first layer 22 and at least one second layer 24 together so as to compress and deform the at least one first layer 22 and at least one second layer 24 about the area of the outer first layer periphery 65 and the second layer periphery 67, as illustrated in FIG 15. Alternatively, the one first layer 22 and at least one second layer 24 are attached together around their outer first layer periphery 65 and the second layer periphery 67 using an adhesive 64, for example, or other form of bonding, as illustrated in FIG. 16.

[104 ] Now referring to FIG. 17, in addition to FIGS. 1 and 2, alternatively, the first layer 22 and at least one second layer 24 may be attached together around their outer first layer periphery 65 and the second layer periphery 67 using a removable fastener, such as VELCRO™ strips 66, or snaps 68, for example, which are provided about the outer first layer periphery 65 and the second layer periphery 67. Of note, the removable fastener, such as VELCRO™ strips 66, or snaps 68 may also be provided at other positions between the layers 22, 24, for example a VELCRO™ strip 66 may be provided down the middle of the multi-layered fabric 10. Removably securing the at least one first layer 22 and the at least one second layer 24 together may provide flexibility for adding or removing first layers 22 and at least one second layers 24 to the multi-layered fabric 10. For example, additional first layers 22 may be secured for creating a pad 16 for providing support to a patient that has a greater mass or for comfort reasons, or first layers 22 may be likewise removed for a patient that has a lessor mass or for applications which require a lessor number of first layers 22. Also a multi-layered

fabric 10 may be disassembled such that the first layers 22 and at least one second layer 24 may be washed separately for more effective cleaning, or the layers 22, 24 may be individually replaced should a layer become worn. Also a multi-layered fabric 10 may be disassembled and reassembled with different first layers 10, for example for interchanging first layers 22 that comprise different thicknesses or different cross-sections depending on the wound management therapy contemplated.

[105 ] Now referring to FIG. 18 and FIG. 19, in addition to FIGS. 1 and 2, one or more fourth layers 70 including a sheet of material 72 connected to a smaller sized one first layers 22 forming a fifth layer 71 at a sheet inner periphery 73, may be provided. The sheet peripheral edge 74 may be connected to the outer peripheral edges 65 of an adjacent first layer 22 using stitching 62, VELCRO™ strips 66, or snaps 68 for example. With such a configuration portions of the multi-layered fabric 10 can be built up by layering smaller sized fifth layers 71 at different positions of the multi-layered fabric 10. For example, one or more smaller sized one first layers 70 can be stacked atop two first layers 22 as illustrated. The connection of the sheet peripheral edges 74 ensures that the fifth layer 71 remains properly positioned without adding height to the multi-layered fabric 10 at areas around its outer pad peripheries 60 for example. Variable heights of the multi-layered fabric 10 can thus be built up in this manner. For example, when the multi-layered fabric 10 is used to form a bed pad 16, one or more fourth layers 70 can be added in such a way so as to create an integrated pillow 76, or a pillow case.

[106 ] Now referring to FIG. 20, in addition to FIGS. 2 and 17, the at least one first layer 22 and at least one second layer 24 are attached together around their first layer periphery 65 and the second layer periphery 67 with a breathable fabric peripheral cap 78 that overlaps an edge portion of the top layer 26 and the bottom layer 28 . The first layer 22 and the at least one second layer 24 may be attached together along with the breathable fabric peripheral cap 78 using stitching 62 stitched about the outer first layer periphery 65 and the second layer

periphery 67 in a compressive or non-compressive fashion as described hereinabove manner. When stitched in a non-compressive manner, the at least one first layer 22 remains un-deformed and the air channels 54 remain opened at the first layer periphery 65 and the second layer periphery 67 thereof. Optionally, the breathable fabric peripheral cap 78 may include VELCRO™ strips 66, or snaps 68 provided on the top layer 26 and the bottom layer 28 to connect the breathable fabric peripheral cap 78 to the at least one first layer 22 and at least one second layer 24.

[107 ] Now referring to FIG. 21, in addition to FIGS. 1 and 2, in accordance with an illustrative embodiment, the at least one first layer 22 and at least one second layer 24 are attached together around their outer peripheries 65, 67 with an overlapping portion 80 of the at least one second layer 24 that overlaps the top layer 26. With such a configuration, any fluid 20 which may be collected may remain contained within the multi-layered fabric 10 should the pad 16 be tilted, for example.

[108 ] Now referring to FIG. 22 in addition to FIGS. 1, 2 and 21, in accordance with an illustrative embodiment, the first layer 22 and at least one second layer 24 are sized so as to overhang from the edge of the bed 18. In such an application, the overlapping portion 80 acts as a collector for any fluid 20 which may be shifted over the edge of the bed 18.

[109 ] Still referring to FIGS. 1, 2, 3, and 4, the multi-layered fabric 10 can further be configured to provide certain moisture retention or moisture vapour transmission properties below the skin 12, which in some wound management treatments may be beneficial. For example, the number of first layers 22 may be selected to maintain fluid 20 at a distance from the skin 12 while the density of the network of fibres 40 maybe selected to control the evaporation rate, and the use of one or more layers of absorptive layers 50 can be used to manage ulcers with high discharge rate of exudates. Also, the number of air holes 34 can be

selected to provide an airflow rate less than 140 cubic centimeters per square centimeter through the first layer 22.

[110] The multi-layered fabric 10 can be washed to remove any exudates and fluid 20 that might have been collected or solidified within the spaces 42. Due to the organized and arranged network of fibres 40, water is able to easily penetrate the first layers 22 for cleaning of the spacers 42. Due to the hydrophobic structure of the multi-layered fabric 10, during washing water is prevented from being absorbed by the layers 22, 24 which avoids the multi-layered fabric 10 from becoming saturated and heavy. The organized and arranged network of fibres 40, as well as the permeability of the one first layer 22 also promotes airflow .

[111] Now referring to FIG. 23, in addition to FIGS. 1 and 2, in accordance with an embodiment, the bed pad 18 further includes at least one elastic band 82 extending between two of the outer pad peripheries 60 and beneath the bed 16 so as to securely retain the bed pad 16 to the bed 18. In accordance with an embodiment, the bed pad 18 further comprises a sheet of material (not shown) secured to the outer pad periphery 60 of the bed pad 16 to engage a periphery of a bed 18, for example using an elastic edge as is known in the art for bed sheets.

[112] Now referring to FIG. 24, in addition to FIGS. 1 and 2, in accordance with an embodiment of the present invention there is provided a multi-layered fabric 10 including additional at least one first layers 22 made of a permeable material disposed in parallel and secured under the at least one second layer 24. With such a configuration, additional support from the additional one first layers 22 may be employed without affecting the humidity levels beneath the skin 12.

[113] While the present invention has been illustrated hereinabove with reference to a multi-layered fabric formed into a bed pad 16, other potential uses of the multi-layered fabric 10 may be possible, including wheelchair pads, pads for operating tables, pads for infant cribs, and other medical applications where absorption and cushioning properties are desired for the treatment of wounds.

For example, the multi-layered fabric 10 may be formed into a pillow, a pillow case, or a liner for a casing such as a foot or arm support.

[114 ] The multi-layered fabric 10 can thus be employed to treat exudate related conditions for preventative long term disabled care applications, and assist in the healing of existing bed ulcer conditions by enhancing airflow beneath a patient and by providing cushioned pressure relief support. The multi-layered fabric 10 can thus be employed to pre-emptively prevent exudate-related conditions. When used to treat exudate related conditions, the multi-layered fabric 10 can assist in containing leakage or exudate and prevent soiling of the support beneath the patient. The multi-layered fabric 10 can thus assist in relieving pain and discomfort to the patient suffering from decubitus ulcers and help reduce and/or control infection of a wound. The cleaning of the multi-layered fabric 10 is enhanced by providing a structure including a network of fibres 40 which allows water and airflow to easily penetrate to allow for a quick drying. Furthermore, the multilayered fabric 10 may be easily assembled and disassembled to replace, add or remove layers for adapting to specific wound management treatments.

[115 ] Now referring back to FIG. 3, the plurality of fibers 40 are configured to form air channels 54 allowing air flow 36 to flow between the first sublayer 30 and the second sublayer 32.

[116 ] Now referring back to FIGS. 2 and 4, the first sublayer 30 and the second sublayer 32 include holes 48 allowing air flow 36 and liquid 20 to flow there through.

[117 ] Now referring back to FIG. 3, the first sublayer 30 and second sublayer 32 are made of a flexible material.

[118 ] Now referring back to FIG. 2, he multi-layered fabric 10 further includes at least one third layer 27 of permeable material disposed in parallel and secured to the at least one first layer 22 opposite to the at least one second layer

24. Optionally, the third layer 27 is a polyester material. Optionally, the third layer 27 includes a patterned surface.

[119] Still referring to FIG. 2, optionally the first sublayer 30 and second sublayer 32 are formed from a polyester material. Optionally, the first sublayer 30 and second sublayer 32 are formed from a microfiber fabric. Optionally, the first sublayer 30 and second sublayer 32 are formed from a microfilament fabric. Optionally, the first sublayer 30 and second sublayer 32 are hydrophobic.

[120] The at least one second layer 24 may include two second layers 24. Optionally, the at least one second layer 24 is formed from nylon. Optionally the at least one first layer 22 is a three dimensional spacer fabric. Optionally, the plurality of fibers 40 are disposed perpendicularly to first sublayer 30 and the second sublayer 32. Optionally the plurality of fibers 40 each comprise a bend. Optionally, the plurality of fibers 40 are aligned such that the fibers 40 bend in a common direction.

[121] Now referring to FIGS. 9, 10, 11, optionally, the plurality of fibers 40 are disposed in pairs of fibers 40. Optionally, the pairs of fibers 40 are twisted.

[122] Referring back to FIG. 2, optionally the plurality of fibers 40 are made of nylon. Optionally, the plurality of fibers 40 are made of polyester. Optionally, the plurality of fibers 40 are a monofilament fiber. Optionally, the density of the plurality of fibres 40 allows a vertical airflow 36 of 140 cubic centimeters per square centimeter of surface area. Optionally, the first sublayer 30 and the second sublayer 32 are spaced apart by a distance of between three to twelve millimeters. Optionally, the first sublayer 30 and the second sublayer 32 are spaced apart by a distance that varies over the area of the at least one first layer 22. Optionally, the plurality fibers 40 are hydrophobic. Optionally, the fibers 40 are chemically treated to render the plurality of fibres 40 hydrophobic. Optionally, the plurality of fibers 40 are knitted to the first sublayer 30 and the second sublayer 32.

[123 ] Now referring to FIG. 3, optionally, the first sublayer 30 and second sublayer 32 include bristles 48 protruding from a first sublayer surface 55 and a second sublayer surface 51 for providing frictional engagement with the bristles 48 of an adjacent sublayer 30,32. Optionally, the bristles 48 are formed in part by a portion of the fiber 40.

[124 ] Now referring to FIG. 3, optionally, the multi-layered fabric 10 includes three first layers 22.

[125 ] Now referring to FIG. 12 and FIG. 13, optionally, each first layer 22 has a different thickness than an adjacent first layer 22. Optionally, each first layer 22 has an increasing thickness to an adjacent first layer 22 wherein the first layer 22 adjacent the second layer 24 has a lessor thickness than a first layer 22 opposite the second layer 24.

[126 ] Now referring to FIG. 2, the multi-layered fabric 10 is machine washable.

[127 ] Now referring to FIG. 21, optionally the at least one second layer 24 extends to overlap with the at least one first layer 22.

[128 ] Now referring to FIGS. 14, and 15, optionally, the at least one first layer 22 is secured to the at least one second layer 24 by stitching. Optionally, the at least one first layer 22 comprises a first layer periphery 65 and the at least one second layer 24 comprises a second layer periphery 67, wherein the first layer periphery 65 and the second layer periphery 67 are secured together by stitching. Optionally, the first layer periphery 65 and the second layer periphery 67 are compressively stitched together.

[129 ] Now referring to FIG. 20, the multi-layered fabric 10 further includes a breathable fabric peripheral cap 78 secured to the first layer periphery 65 and the second layer periphery 67.

[130 ] Now referring back to FIG. 1, the bed pad 16 includes the multi-layered fabric 10, wherein the bed pad 16 may include one or more outer pad peripheries 60. Optionally, the bed pad 16 includes at least one elastic band 82 extending between the one or more outer pad peripheries 60. Optionally, the bed pad 16 may include a sheet of material secured to the one or more outer pad peripheries 60 to engage a periphery of a bed 18. Optionally, two or more bed pads 16 may be provided with each including the multi-layered fabric 10 wherein each of the two or more bed pads 16 are secured together to create a foldable pad.

[131 ] Now referring to FIGS. 12, 13, and 18, optionally, the bed pad 16, includes one or more fourth layers 70, each fourth layer 70 includes a fifth layer 71 including the first layer 22, and a sheet of material 72 including a sheet outer periphery 74 and a sheet inner periphery 73, wherein the sheet outer periphery 74 is connected to the at least one first layer 22 and the sheet inner periphery 73 is connected to the fifth layer 71, wherein the one or more fourth layers 70 is disposed in parallel to the at least one first layer 22 to form protrusions 75 matching the curves of a human body 14. Optionally, the bed pad 10 includes one or more fourth layers 70 to form protrusions 75 running longitudinally the length of the bed pad 16.

[132 ] Now referring to FIG. 22, optionally, the bed pad 16 is sized to be larger than the surface of a hospital bed 18 such that a portion of the bed pad 16 overhangs the bed 18.

[133 ] Although optional embodiments of the invention have been described in detail herein and illustrated in the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments and that various changes and modifications may be effected therein without departing from the scope of the claims.

**CLAIMS:**

1. A multi-layered fabric comprising:

at least one first layer comprising:

first and second sublayers each being made of permeable material; and

a third sublayer located between the first and the second sublayers, the third sublayer comprising a plurality of fibers interconnecting the first sublayer with the second sublayer for allowing an airflow between the first and second sublayers; and

at least one second layer disposed in parallel and secured to the at least one first layer;

wherein the density of the plurality of fibres allows a vertical airflow of at least 140 cubic centimeters per square centimeter of surface area; and

wherein the first and second sublayers comprise bristles protruding from a first sublayer surface and a second sublayer surface for providing frictional engagement with the bristles of an adjacent sublayer.

2. The multi-layered fabric of claim 1, wherein the plurality of fibers are configured to form air channels allowing the air flow to flow between the first sublayer and the second sublayer.

3. The multi-layered fabric of claim 1 or 2, wherein the first sublayer and the second sublayer comprise holes allowing the air flow and liquid to flow there through.

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4. The multi-layered fabric of any one of claims 1 to 3, wherein the first sublayer and the second sublayer are made of a flexible material.

5. The multi-layered fabric of any one of claims 1 to 4, further comprising at least one third layer disposed in parallel and secured to the at least one first layer opposite to the at least one second layer.

6. The multi-layered fabric of claim 5, wherein the third layer is a polyester material.

7. The multi-layered fabric of claims 5 or 6, wherein the third layer comprises a patterned surface.

8. The multi-layered fabric of any one of claims 1 to 7, wherein the first and second sublayers are formed from a polyester material.

9. The multi-layered fabric of any one of claims 1 to 7, wherein the first and second sublayers are formed from a microfiber fabric.

10. The multi-layered fabric of any one of claims 1 to 7, wherein the first and second sublayers are formed from a microfilament fabric.

11. The multi-layered fabric of any one of claims 1 to 10, wherein the first and second sublayers are hydrophobic.

12. The multi-layered fabric of any one of claims 1 to 11, wherein the at least one second layer comprises two of the second layers.

13. The multi-layered fabric of any one of claims 1 to 12, wherein the at least one second layer is formed from nylon.

14. The multi-layered fabric of any one of claims 1 to 13, wherein the at least one first layer is a three dimensional spacer fabric.

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15. The multi-layered fabric of any one of claims 1 to 14, wherein the plurality of fibers are disposed perpendicularly to the first sublayer and the second sublayer.

16. The multi-layered fabric of any one of claims 1 to 15, wherein the plurality of fibers each comprises a bend.

17. The multi-layered fabric of claim 16, wherein the plurality of fibers are aligned such that the fibers bend in a common direction.

18. The multi-layered fabric of any one of claims 1 to 17, wherein the plurality of fibers are disposed in pairs of fibers.

19. The multi-layered fabric of claim 18, wherein the pairs of fibers are twisted.

20. The multi-layered fabric of any one of claims 1 to 19, wherein the plurality of fibers are made of nylon.

21. The multi-layered fabric of any one of claims 1 to 20, wherein the plurality of fibers are made of polyester.

22. The multi-layered fabric of any one of claims 1 to 20, wherein the fibers are a monofilament fiber.

23. The multi-layered fabric of any one of claims 1 to 22, wherein the first sublayer and the second sublayer are spaced apart by a distance of between three to twelve millimeters.

24. The multi-layered fabric of any one of claims claim 1 to 23, wherein the first sublayer and the second sublayer are spaced apart by a distance that varies over an area of the at least one first layer.

25. The multi-layered fabric of any one of claim 1 to 24, wherein the plurality of fibers are hydrophobic.

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26. The multi-layered fabric of claim 25, wherein the plurality of fibers are chemically treated to render the plurality of fibres hydrophobic.

27. The multi-layered fabric of any one of claims 1 to 26, wherein the plurality of fibers are knitted to the first sublayer and the second sublayer.

28. The multi-layered fabric of any one of claims 1 to 27, wherein the bristles are formed in part by a portion of the fibers.

29. The multi-layered fabric of any one of claims 1 to 28, wherein the at least one first layer comprises three of the first layers.

30. The multi-layered fabric of any one of claims 1 to 29, wherein each of the at least one first layer has a different thickness than an adjacent first layer.

31. The multi-layered fabric of claim 30, wherein each of the at least one first layer has an increasing thickness to an adjacent first layer wherein the first layer adjacent the second layer has a smaller thickness than a first layer opposite the second layer.

32. The multi-layered fabric of any one of claims 1 to 31, wherein the fabric is machine washable.

33. The multi-layered fabric of any one of claims 1 to 32, wherein the at least one second layer extends to overlap with the at least one first layer.

34. The multi-layered fabric of any one of claims 1 to 33, wherein the at least one first layer is secured to the at least one second layer by stitching.

35. The multi-layered fabric of claim 34, wherein the at least one first layer comprises a first layer periphery and the at least one second layer comprises a second layer periphery, wherein the first layer periphery and the second layer periphery are secured together by stitching.

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36. The multi-layered fabric of claim 35, wherein the first layer periphery and the second layer periphery are compressively stitched together.

37. The multi-layered fabric of any one of claims 35 or 36, further comprising a breathable fabric peripheral cap secured to the first layer periphery and the second layer periphery.

38. A bed pad comprising the multi-layered fabric of any one of claims 1 to 37, wherein the bed pad comprises one or more outer pad peripheries.

39. The bed pad of claim 38, further comprising at least one elastic band extending between the one or more outer pad peripheries.

40. The bed pad of any one of claims 38 or 39, further comprising a sheet of material secured to the one or more outer pad peripheries to engage a periphery of a bed.

41. The bed pad of claims 38 to 40, further comprising one or more fourth layers, each of the one or more fourth layer comprising:

a fifth layer comprising the first layer; and

a sheet of material comprising a sheet outer periphery and a sheet inner periphery, wherein the sheet outer periphery is connected to the at least one first layer and the sheet inner periphery is connected to the fifth layer;

wherein the one or more fourth layers is disposed in parallel to the at least one first layer to form protrusions matching curves of a human body.

42. The bed pad of claims 41, wherein the one or more fourth layers are provided to form the protrusions running longitudinally the length of the bed pad.

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43. The bed pad of any one of claims 38 to 42, wherein the bed pad is sized to be larger than a surface of a hospital bed such that a portion of the bed pad overhangs the bed.

44. Two or more bed pads each comprising the multi-layered fabric of any one of claims 1 to 43, wherein each of the two or more bed pads are secured together to create a foldable pad.

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International Application Number: CA2015050360
Article 34 Amendments
submitted with Demand for IPEA dated 28 Feb 2017

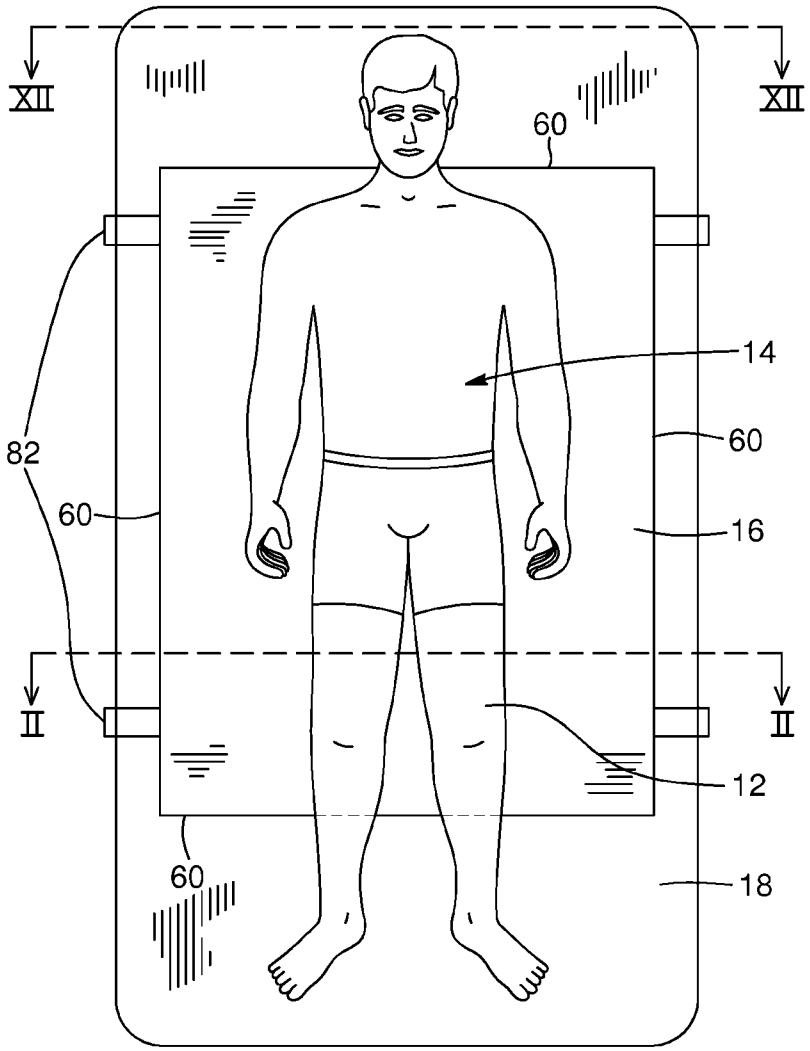


FIG. 1

**AMENDED SHEET**

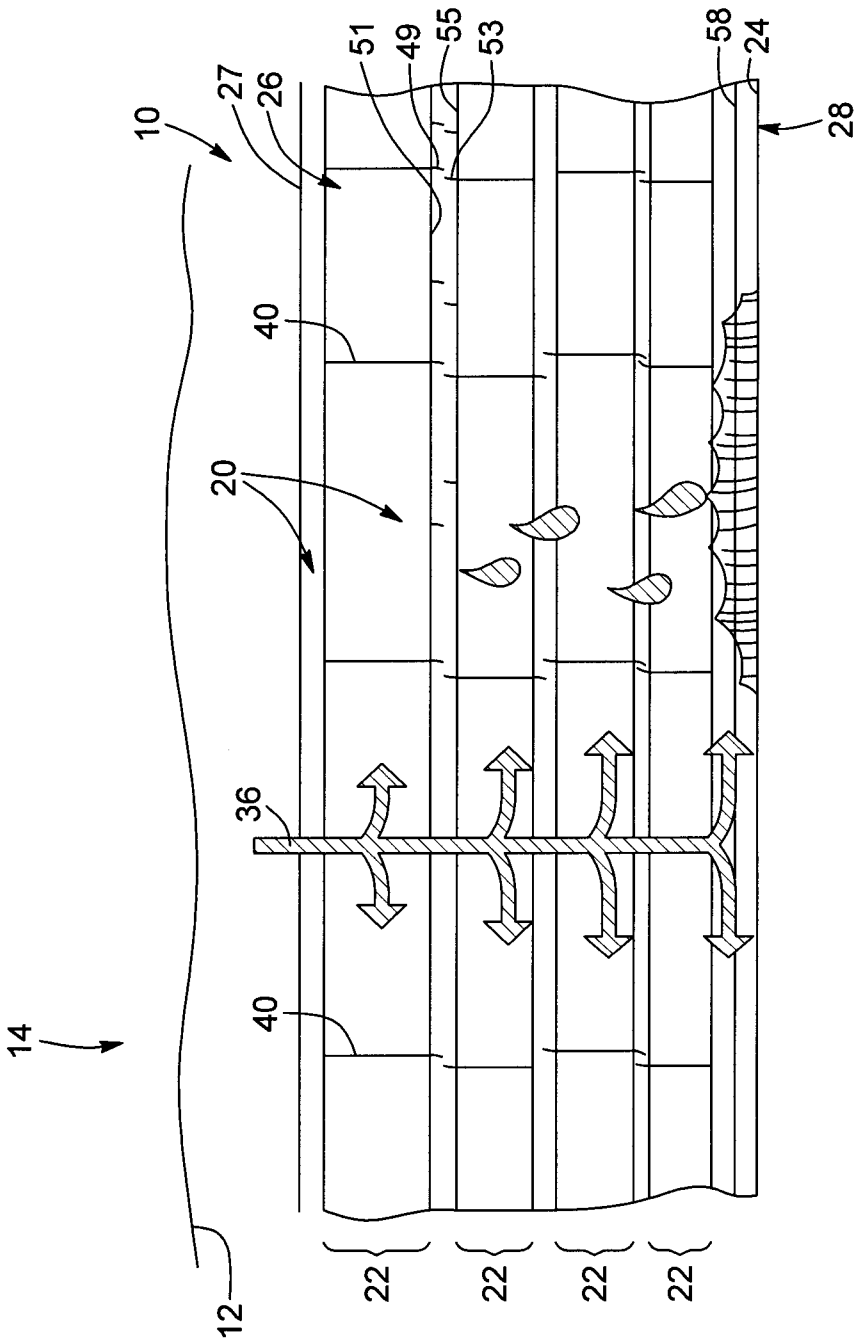


FIG. 2

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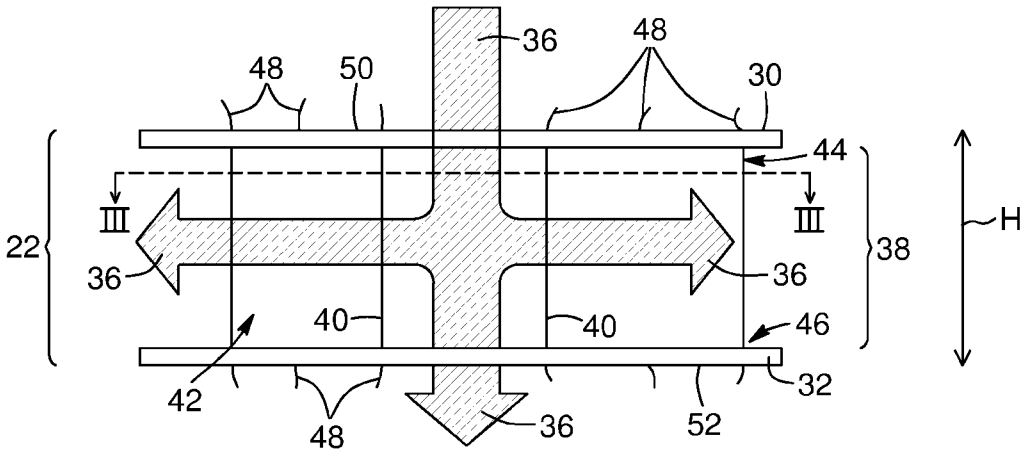


FIG. 3

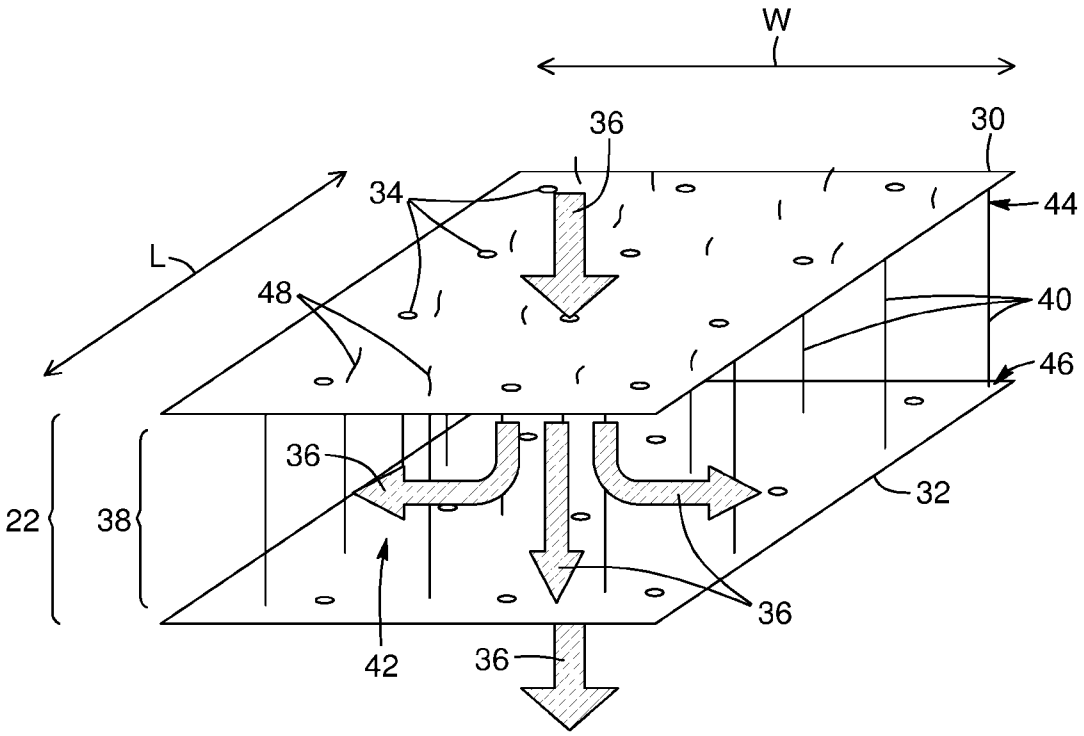


FIG. 4

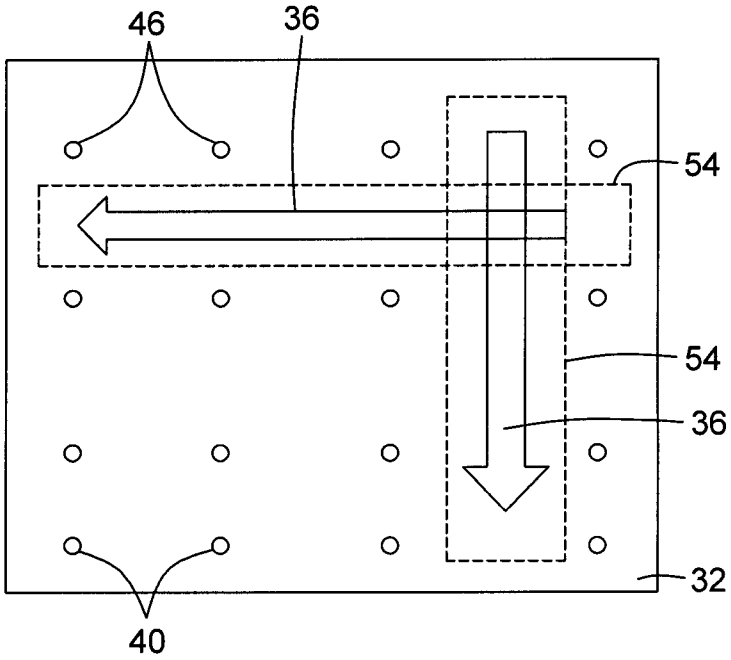


FIG. 5

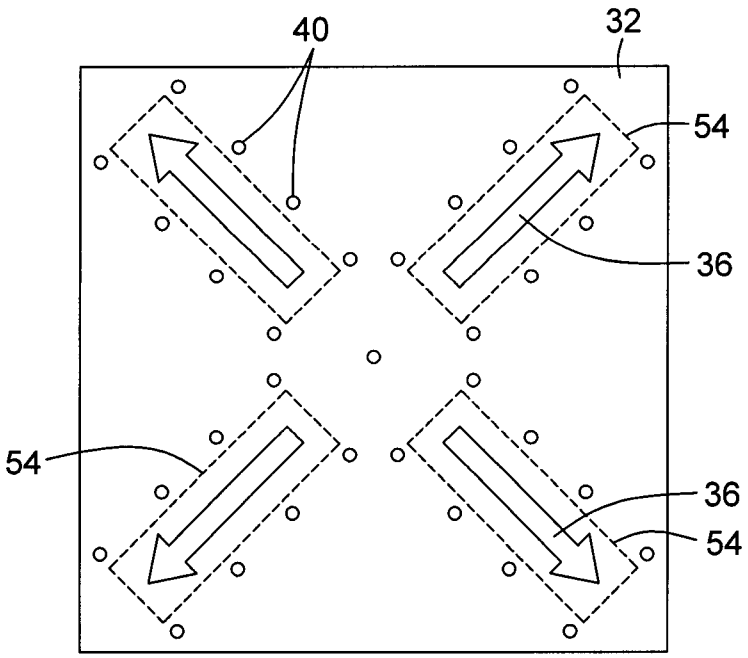


FIG. 6

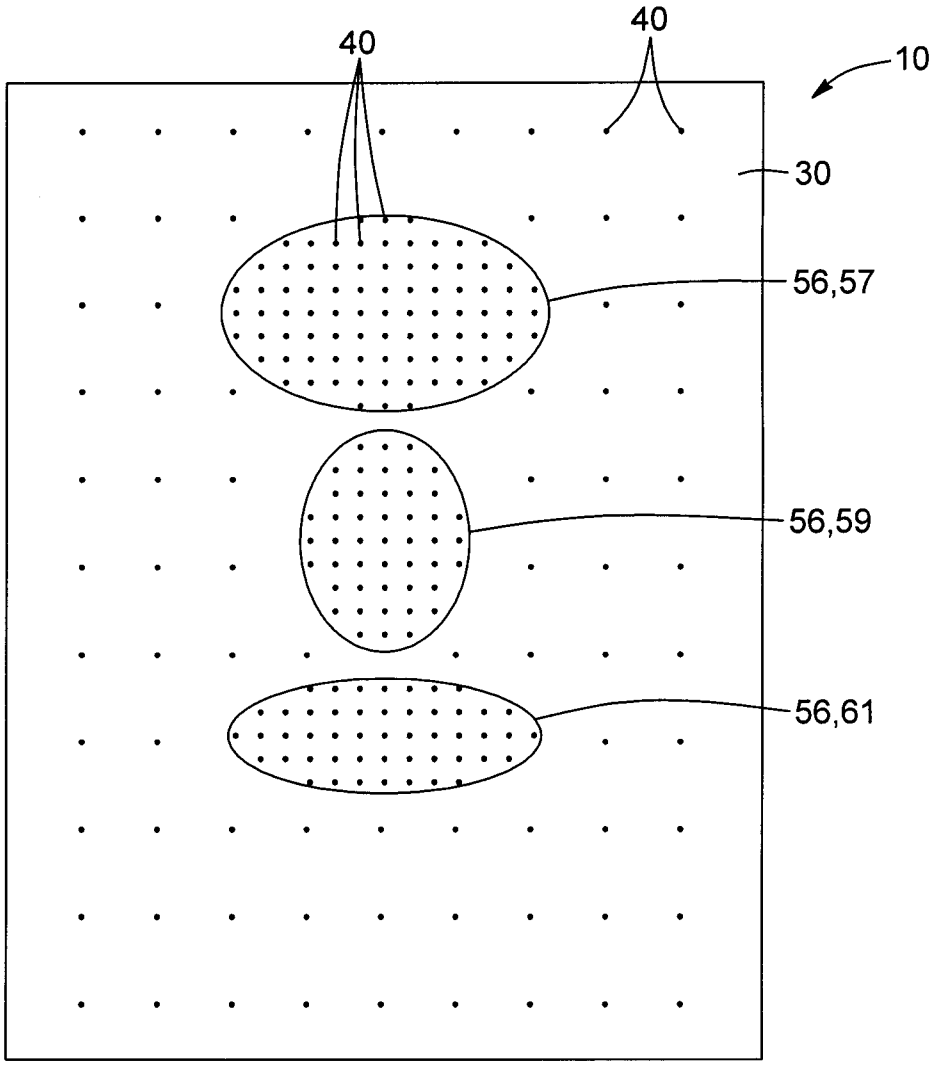


FIG. 7

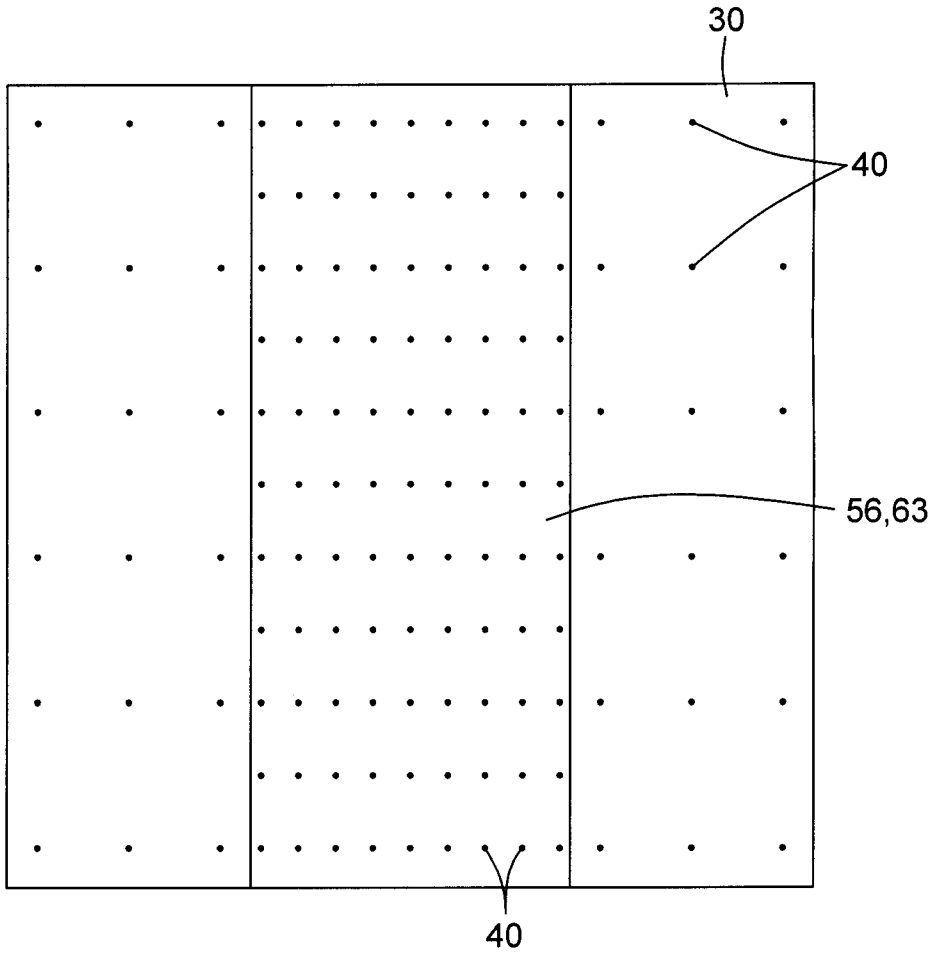


FIG. 8

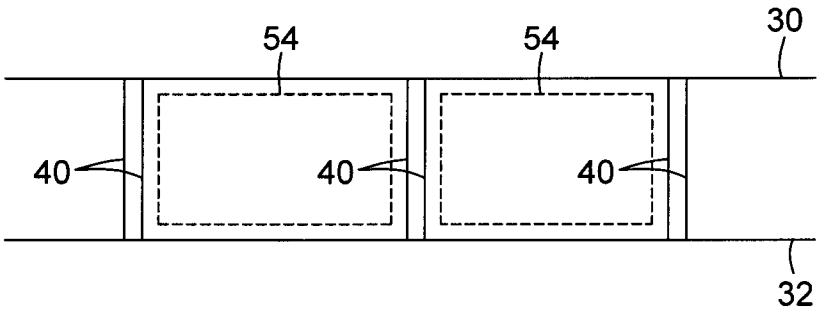


FIG. 9

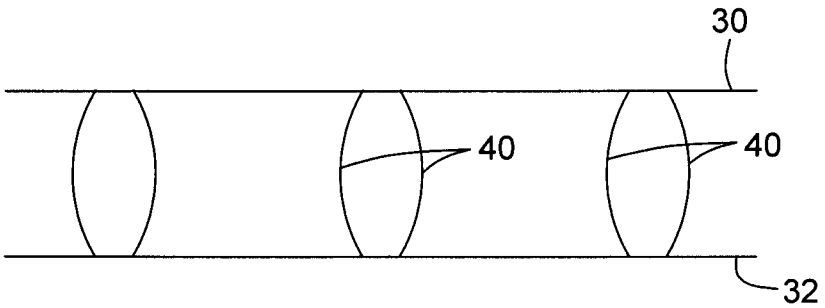


FIG. 10

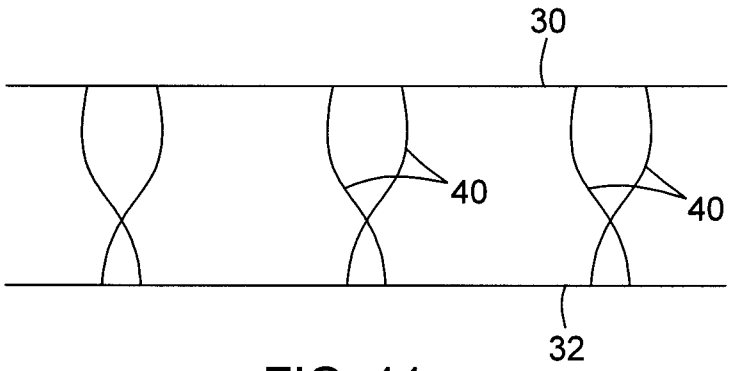


FIG. 11

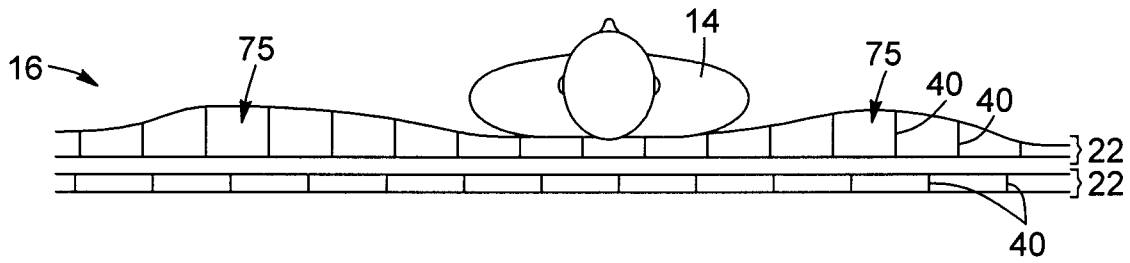


FIG. 12

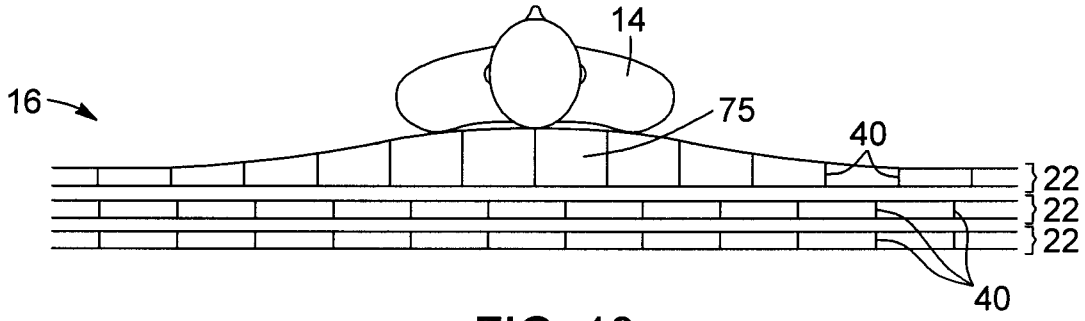


FIG. 13

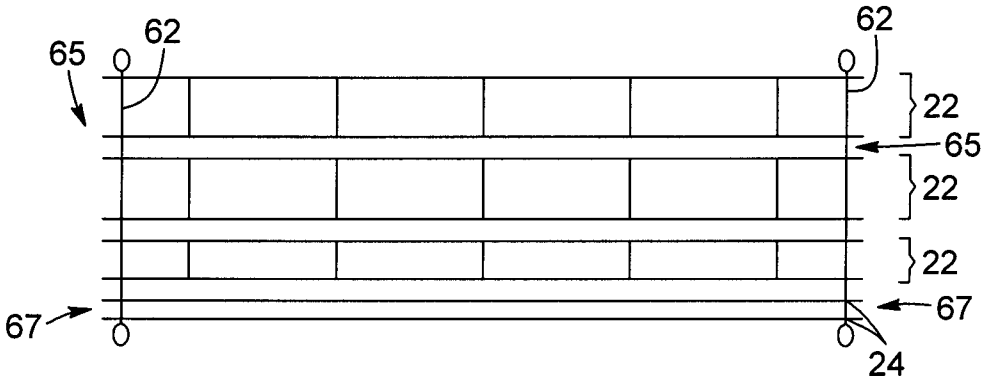


FIG. 14

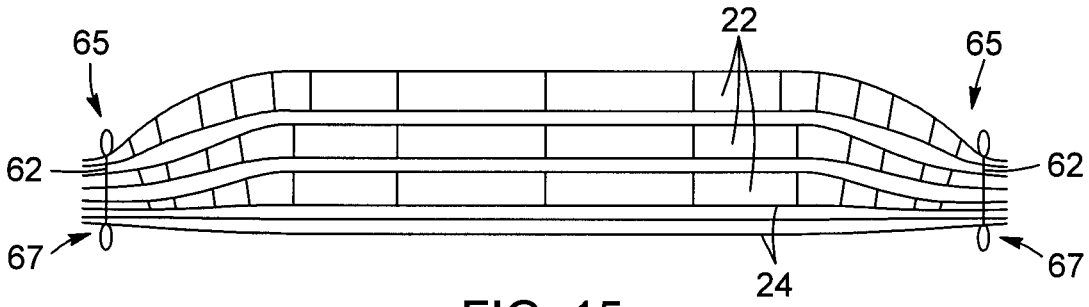


FIG. 15

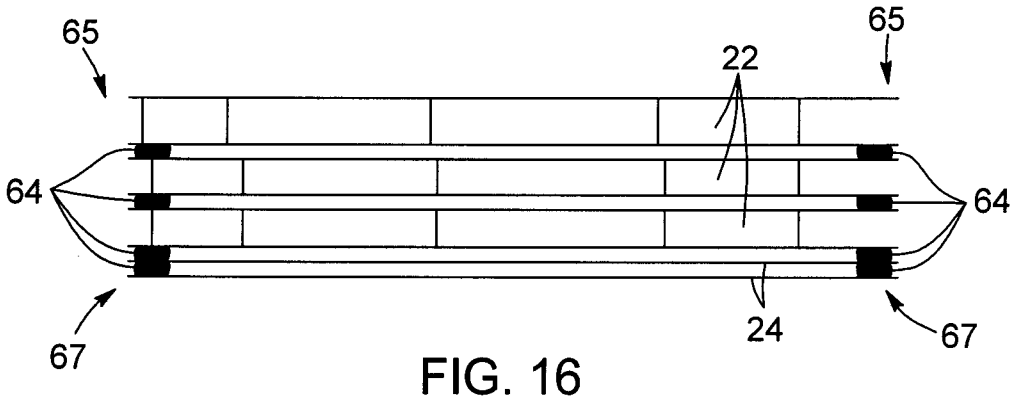


FIG. 16

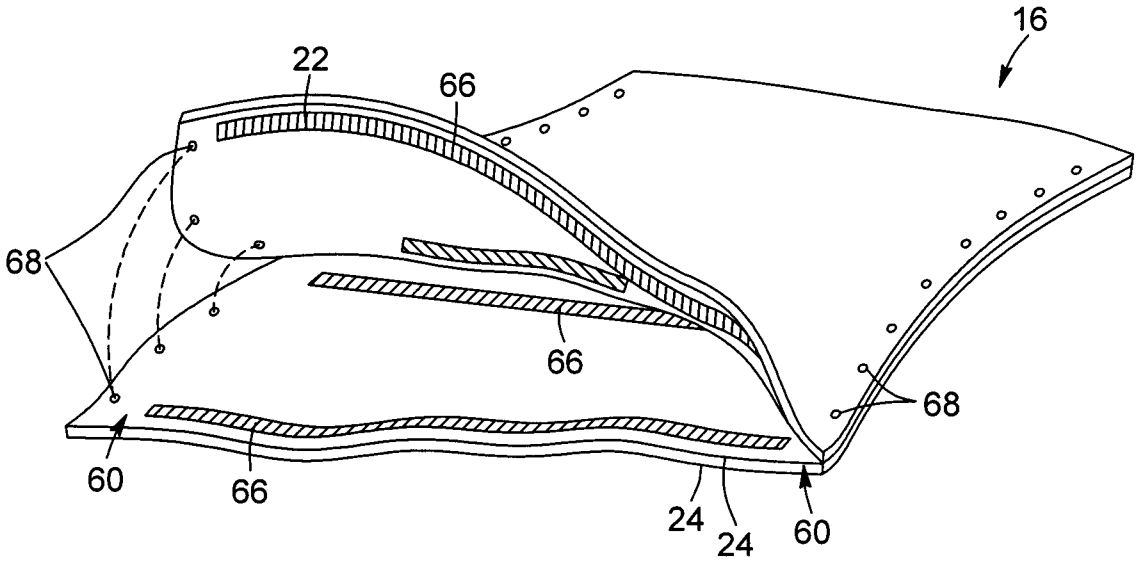
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FIG. 17

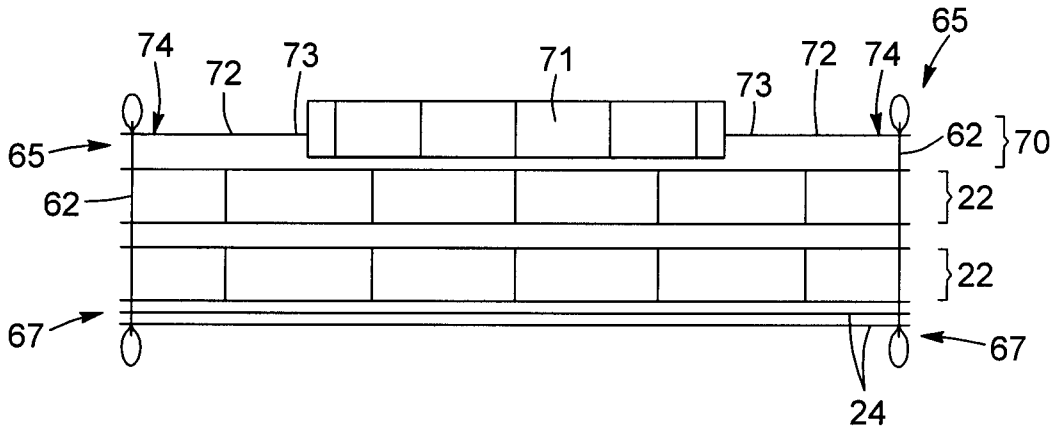
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FIG. 18

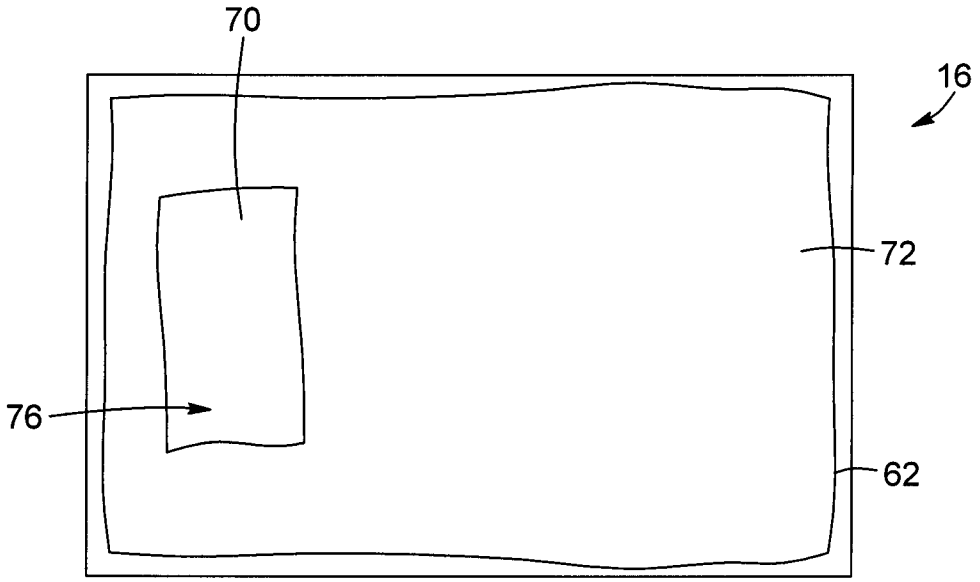



FIG. 19

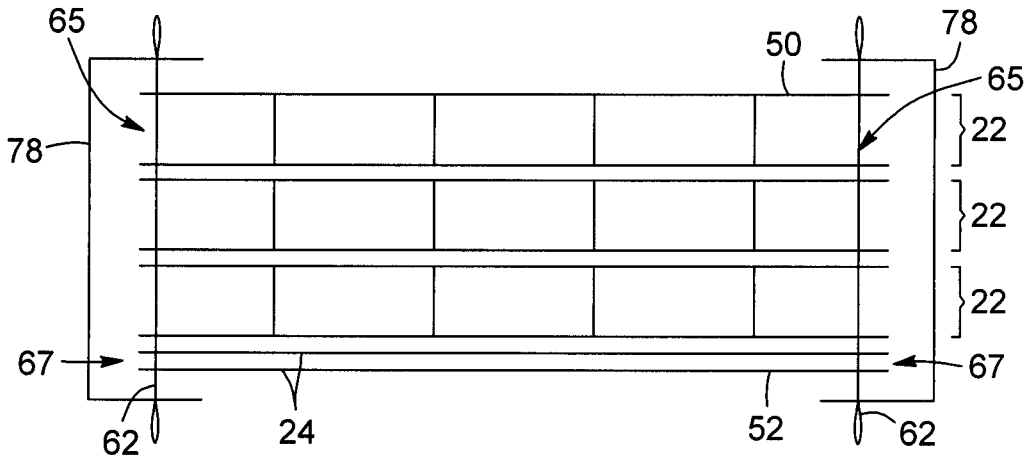



FIG. 20

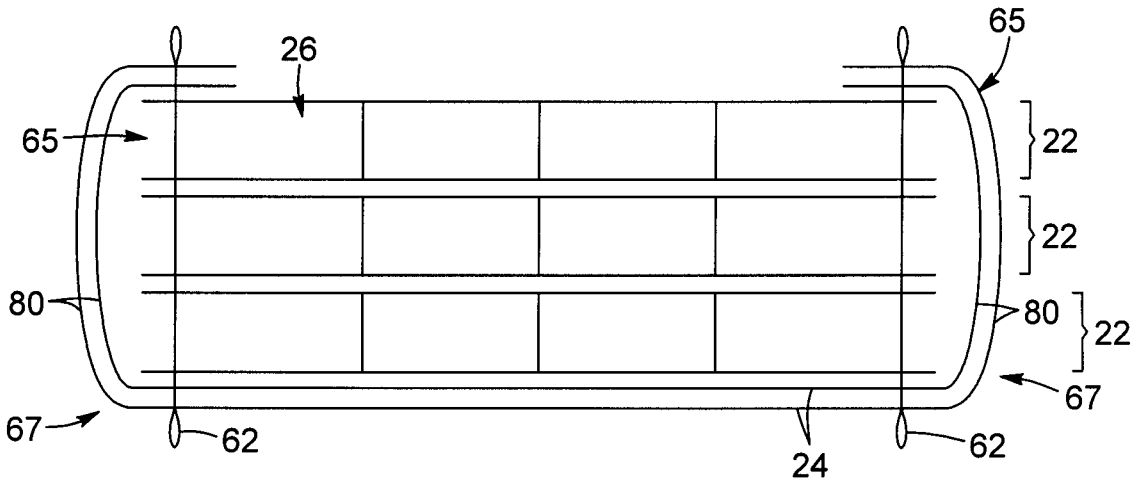



FIG. 21

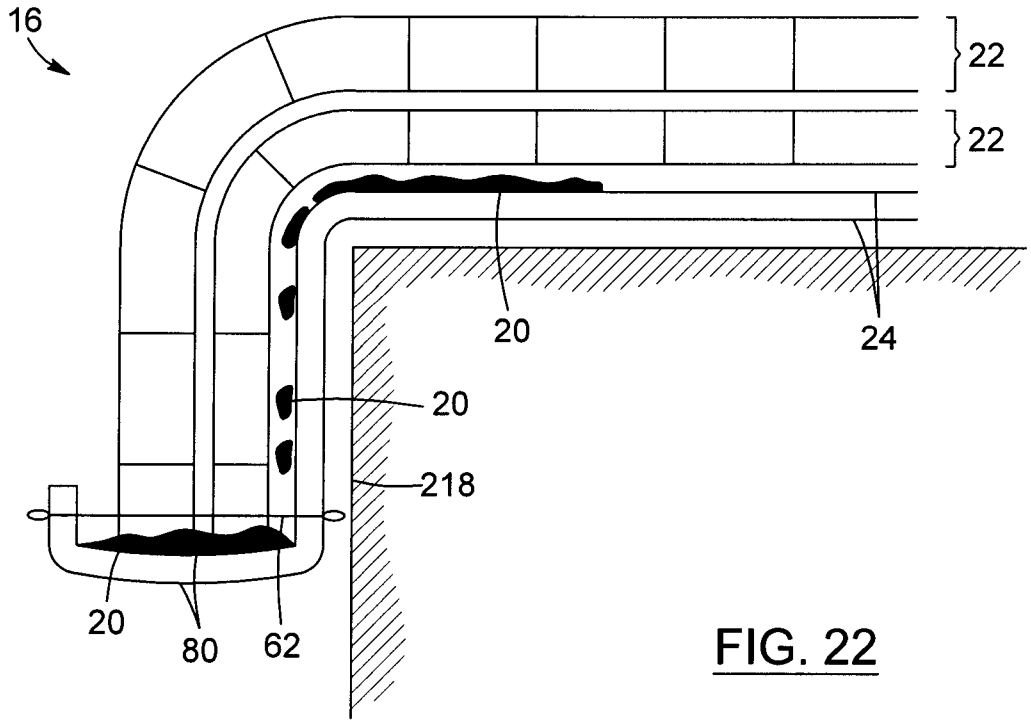



FIG. 22

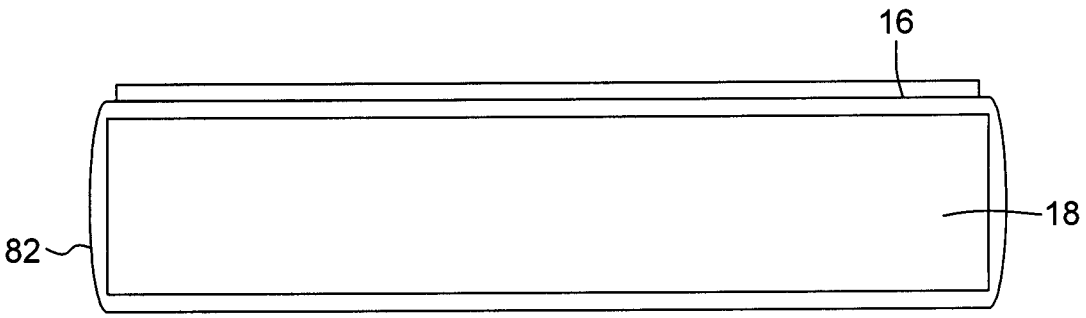



FIG. 23

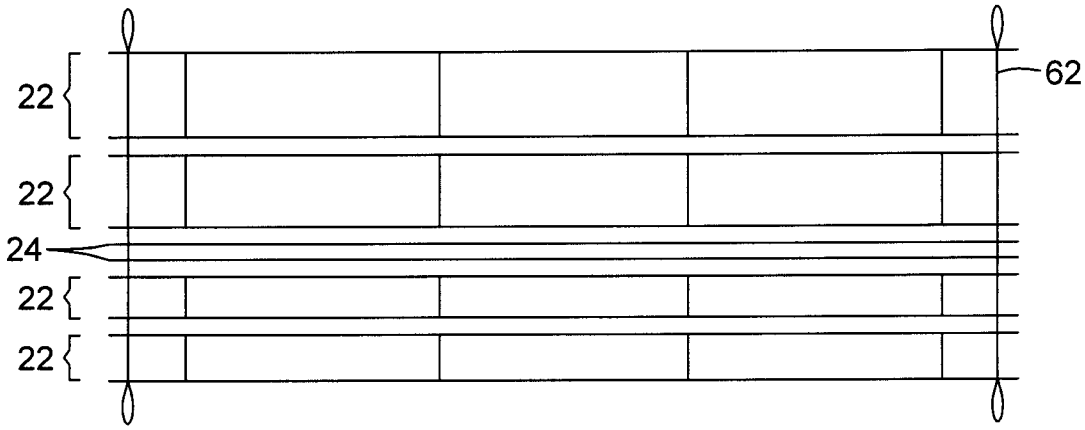
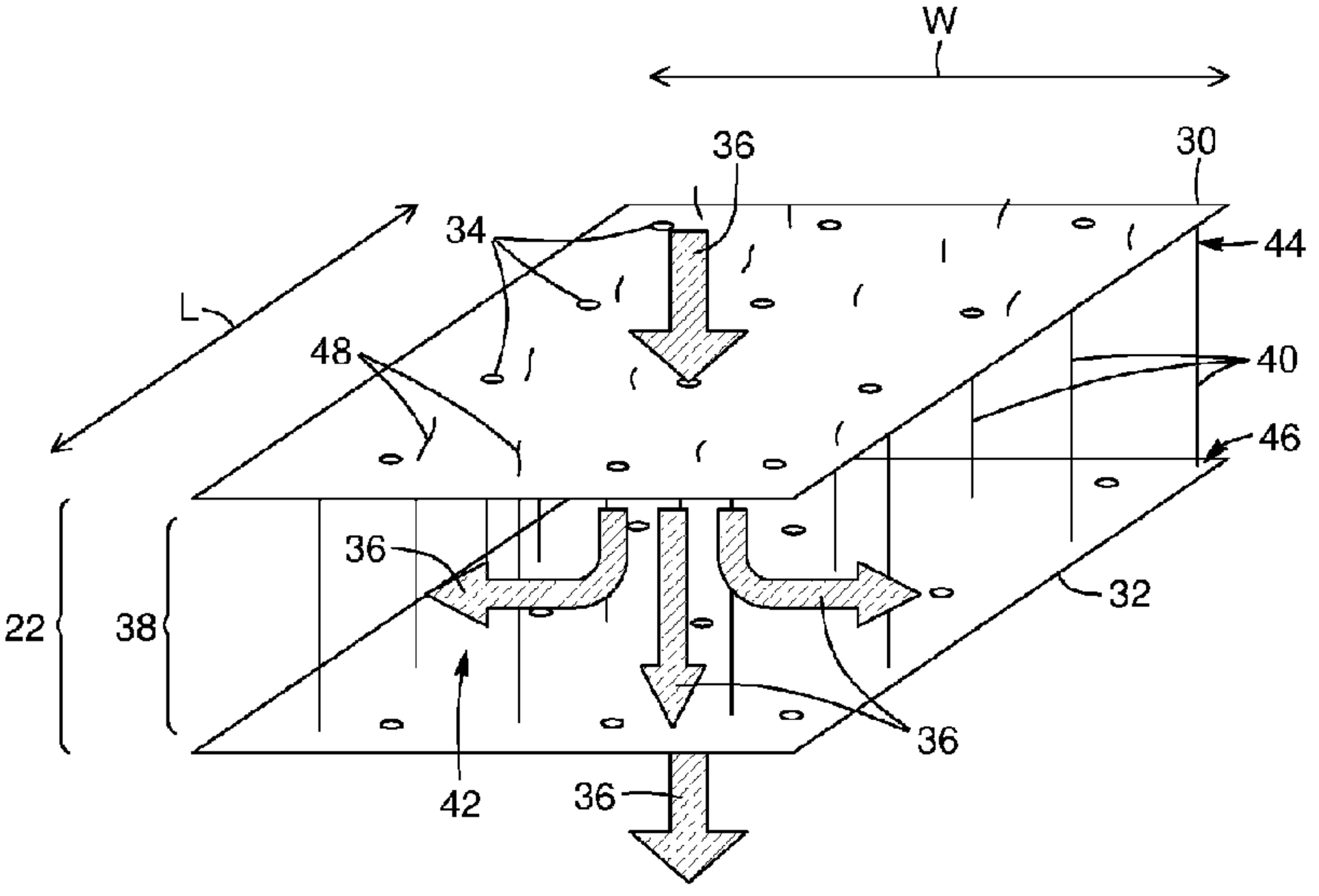



FIG. 24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