The dressing system and apparatuses for treating a tissue site with reduced pressure arc described. The system includes a manifold configured to be placed adjacent the tissue site, and a sealing member configured to be placed over the tissue site and the manifold. The system also includes a reduced-pressure source fluidly coupled to the manifold through the sealing member. The system further includes a pouch having an upstream layer having a first thickness, a downstream layer having a second thickness, and an absorbent member enclosed between the upstream layer and the downstream layer. The second thickness is greater than the first thickness. The upstream layer may have a hydrophilic side adjacent the absorbent member, and the downstream layer may have a hydrophobic side adjacent the absorbent member.

FIG. 1

Title: DRESSING WITH ASYMMETRIC ABSORBENT CORE FOR NEGATIVE PRESSURE WOUND THERAPY

Abstract: Systems and apparatuses for treating a tissue site with reduced pressure arc described. The system includes a manifold configured to be placed adjacent the tissue site, and a sealing member configured to be placed over the tissue site and the manifold. The system also includes a reduced-pressure source fluidly coupled to the manifold through the sealing member. The system further includes a pouch having an upstream layer having a first thickness, a downstream layer having a second thickness, and an absorbent member enclosed between the upstream layer and the downstream layer. The second thickness is greater than the first thickness. The upstream layer may have a hydrophilic side adjacent the absorbent member, and the downstream layer may have a hydrophobic side adjacent the absorbent member.
DRESSING WITH ASYMMETRIC ABSORBENT CORE FOR NEGATIVE PRESSURE WOUND THERAPY

[0001] Under 35 U.S.C. § 119(e), this application claims priority to and the benefit of U.S. Provisional Patent Application No. 61/753,368 filed January 16, 2013, entitled "Dressing with Asymmetric Absorbent Core for Negative Pressure Wound Therapy" the disclosure of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to medical treatment systems for treating tissue sites and processing fluids. More particularly, but not by way of limitation, the present disclosure relates to a dressing having an asymmetric absorbent core for reduced-pressure wound therapy.

BACKGROUND

[0003] Clinical studies and practice have shown that reducing pressure in proximity to a tissue site can augment and accelerate growth of new tissue at the tissue site. The applications of this phenomenon are numerous, but is has proven particularly advantageous for treating wounds. Regardless of the etiology of a wound, whether trauma, surgery, or another cause, proper care of the wound is important to the outcome. Treatment of wounds with reduced pressure may be commonly referred to as "reduced-pressure wound therapy," but is also known by other names, including "negative-pressure therapy," "negative pressure wound therapy," and "vacuum therapy," for example. Reduced-pressure therapy may provide a number of benefits, including migration of epithelial and subcutaneous tissues, improved blood flow, and micro-deformation of tissue at a wound site. Together, these benefits can increase development of granulation tissue and reduce healing times.

[0004] While the clinical benefits of reduced-pressure therapy are widely known, the cost and complexity of reduced-pressure therapy can be a limiting factor in its application, and the development and operation of reduced-pressure systems, components, and processes continues to present significant challenges to manufacturers, healthcare providers, and patients. In particular, reduced-pressure dressings that include an absorbent member
positioned proximate a tissue site may experience absorbent material loss or inefficient absorption that negatively impacts the ability of a reduced-pressure system to provide reduced-pressure therapy to a tissue site.
SUMMARY

[0005] According to an illustrative embodiment, a system for collecting fluid from a tissue site is described. The system may include a manifold adapted to be placed adjacent the tissue site, a sealing member adapted to be placed over the tissue site and a reduced-pressure source adapted to be fluidly coupled to the manifold through the sealing member. The system further may include a pouch. The pouch may include an upstream layer having a first thickness, a hydrophilic side, and a hydrophobic side, and a downstream layer having a second thickness, a hydrophilic side, and a hydrophobic side. The apparatus also may include an absorbent member enclosed between the upstream layer and the downstream layer. The hydrophilic side of the upstream layer may be positioned adjacent the absorbent member so that the hydrophobic side of the upstream layer forms a portion of an exterior of the apparatus. The hydrophobic side of the downstream layer may be positioned adjacent the absorbent member so that the hydrophilic side of the downstream layer forms another portion of the exterior of the apparatus. The second thickness may be greater than the first thickness.

[0006] According to another illustrative embodiment, a system for treating a tissue site with reduced pressure is described. The system may include a manifold adapted to be placed adjacent the tissue site, a sealing member adapted to be placed over the tissue site and the manifold to provide a substantially air-tight seal at the tissue site, and a reduced-pressure source adapted to be fluidly coupled to the manifold through the sealing member. The system further may include a pouch. The pouch may include an upstream layer having a hydrophilic side and a hydrophobic side, a downstream layer having a hydrophilic side and a hydrophobic side, and an absorbent member enclosed between the upstream layer and the downstream layer. The hydrophilic side of the upstream layer may be positioned adjacent the absorbent member, and the hydrophobic side of the downstream layer may be positioned adjacent the absorbent member. The pouch may be adapted to be positioned between the manifold and the sealing member.

[0007] According to yet another illustrative embodiment, an apparatus for collecting fluid from a tissue site is described. The apparatus may include an upstream layer having a hydrophilic side and a hydrophobic side, and a downstream layer having a hydrophilic side and a hydrophobic side. The apparatus also may include an absorbent member enclosed
between the upstream layer and the downstream layer. The hydrophilic side of the upstream layer may be positioned adjacent the absorbent member so that the hydrophobic side of the upstream layer forms a portion of an exterior of the apparatus. The hydrophobic side of the downstream layer may be positioned adjacent the absorbent member so that the hydrophilic side of the downstream layer forms another portion of the exterior of the apparatus.

[0008] According to still another illustrative embodiment, a system for treating a tissue site with reduced pressure is described. The system may include a manifold adapted to be placed adjacent the tissue site, a sealing member adapted to be placed over the tissue site and the manifold to provide a substantially air-tight seal at the tissue site, and a reduced-pressure source adapted to be fluidly coupled to the manifold through the sealing member. The system further may include a pouch. The pouch may have an upstream layer having a first thickness, a downstream layer having a second thickness, and an absorbent member enclosed between the upstream layer and the downstream layer. The second thickness may be greater than the first thickness, and the pouch may be adapted to be positioned between the manifold and the sealing member.

[0009] According to still another illustrative embodiment, an apparatus for collecting fluid from a tissue site is described. The apparatus may include a pouch. The pouch may have an upstream layer having a first thickness, a downstream layer having a second thickness, and an absorbent member enclosed between the upstream layer and the downstream layer. The second thickness may be greater than the first thickness, and the pouch may be adapted to be positioned between the manifold and the sealing member.

[0010] According to yet another illustrative embodiment, a method for treating a tissue site is described. The method positions a manifold adjacent the tissue site and provides a pouch. The pouch may include an upstream layer having a hydrophilic side and a hydrophobic side, a downstream layer having a hydrophilic side and a hydrophobic side, and an absorbent member enclosed between the upstream layer and the downstream layer. The hydrophilic side of the upstream layer may be positioned adjacent the absorbent member so that the hydrophobic side of the upstream layer forms a portion of an exterior of the apparatus. The hydrophobic side of the downstream layer may be positioned adjacent the absorbent member so that the hydrophilic side of the downstream layer forms another portion of the exterior of the apparatus. The method may position the pouch adjacent the manifold
and the tissue site so that the upstream layer is adjacent the manifold. The pouch may include an upstream layer having a first thickness, a downstream layer having a second thickness greater than the first thickness, and an absorbent member having absorbent material disposed between the upstream layer and the downstream layer so that the upstream layer and the downstream layer enclose the absorbent member. The method may position a sealing member over the manifold and the pouch to provide a substantially air-tight seal and fluidly couples a reduced-pressure source to the manifold to provide reduced pressure to the tissue site. The method may distribute reduced pressure to the manifold through the pouch and distributes fluid from the tissue site to an absorbent member in the pouch for storage therein.

[0011] According to another illustrative embodiment, a method for manufacturing a fluid storage canister is described. The method provides a first layer having a first thickness, a hydrophilic side, and a hydrophobic side. The method positions an absorbent member adjacent the hydrophilic side of the first layer. The method also provides a second layer have a second thickness greater than the first thickness, a hydrophilic side and a hydrophobic side. The method positions the hydrophilic side of the second layer adjacent the absorbent member. The method couples peripheral portions of the first layer and the second layer to each other to enclose the absorbent member.

[0012] Other aspects, features, and advantages of the illustrative embodiments will become apparent with reference to the drawings and detailed description that follow.
BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIGURE 1 is sectional view illustrating a reduced-pressure therapy system in accordance with an exemplary embodiment;

[0014] FIGURE 2 is a sectional view illustrating a pouch of the reduced-pressure therapy system of FIGURE 1; and

[0015] FIGURE 3 is an exploded sectional view of the pouch of FIGURE 2.
DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0016] New and useful systems, methods, and apparatuses for fluid storage in a reduced-pressure therapy environment are set forth in the appended claims. Objectives, advantages, and a preferred mode of making and using the systems, methods, and apparatuses may be understood best by reference to the following detailed description in conjunction with the accompanying drawings. The description provides information that enables a person skilled in the art to make and use the claimed subject matter, but may omit certain details already well-known in the art. Moreover, descriptions of various alternatives using terms such as "or" do not necessarily require mutual exclusivity unless clearly required by the context. The claimed subject matter may also encompass alternative exemplary embodiments, variations, and equivalents not specifically described in detail. The following detailed description should therefore be taken as illustrative and not limiting.

[0017] The exemplary embodiments may also be described herein in the context of reduced-pressure therapy applications, but many of the features and advantages are readily applicable to other environments and industries. Spatial relationships between various elements or to the spatial orientation of various elements may be described as depicted in the attached drawings. In general, such relationships or orientations assume a frame of reference consistent with or relative to a patient in a position to receive reduced-pressure therapy. However, as should be recognized by those skilled in the art, this frame of reference is merely a descriptive expedient rather than a strict prescription.

[0018] FIGURE 1 is a sectional view of an exemplary embodiment illustrating a therapy system 100 for supplying reduced pressure to a tissue site 106. The therapy system 100 may include a dressing 102 in fluid communication with the tissue site 106, a reduced-pressure source 104 for providing reduced pressure to a tube 120 that may be fluidly coupled to the reduced-pressure source 104, and a connector 122 that may fluidly couple the tube 120 to the dressing 102.

[0019] The term "tissue site" in this context broadly refers to a wound or defect located on or within tissue, including but not limited to, bone tissue, adipose tissue, muscle tissue, neural tissue, dermal tissue, vascular tissue, connective tissue, cartilage, tendons, or ligaments. A tissue site may include chronic, acute, traumatic, subacute, and dehisced
wounds, partial-thickness burns, ulcers (such as diabetic, pressure, or venous insufficiency ulcers), flaps, and grafts, for example. The term "tissue site" may also refer to areas of any tissue that are not necessarily wounded or defective, but are instead areas in which it may be desirable to add or promote the growth of additional tissue. For example, reduced pressure may be used in certain tissue areas to grow additional tissue that may be harvested and transplanted to another tissue location.

[0020] A reduced-pressure source, such as the reduced-pressure source 104, may be a reservoir of air at a reduced pressure, or may be a manually or electrically-powered device that can reduce the pressure in a sealed volume, such as a vacuum pump, a suction pump, a wall suction port available at many healthcare facilities, or a micro-pump, for example. The reduced-pressure source may be housed within or used in conjunction with other components, such as sensors, processing units, alarm indicators, memory, databases, software, display devices, or user interfaces that further facilitate reduced-pressure therapy. While the amount and nature of reduced pressure applied to a tissue site may vary according to therapeutic requirements, the pressure typically ranges between -5 mm Hg (-667 Pa) and -500 mm Hg (-66.7 kPa). Common therapeutic ranges are between -75 mm Hg (-9.9 kPa) and -300 mm Hg (-39.9 kPa).

[0021] The fluid mechanics of using a reduced-pressure source to reduce pressure in another component or location, such as within a sealed therapeutic environment, can be mathematically complex. However, the basic principles of fluid mechanics applicable to reduced-pressure therapy are generally well-known to those skilled in the art, and the process of reducing pressure may be described illustratively herein as "delivering," "distributing," or "generating" reduced pressure, for example.

[0022] In general, exudates and other fluids flow toward lower pressure along a fluid path. This orientation may be generally presumed for purposes of describing various features and components of reduced-pressure therapy systems herein. Thus, the term "downstream" typically implies something in a fluid path relatively closer to a reduced-pressure source, and conversely, the term "upstream" implies something relatively further away from a reduced-pressure source. Similarly, it may be convenient to describe certain features in terms of fluid "inlet" or "outlet" in such a frame of reference. However, the fluid path may also be reversed in some applications (such as by substituting a positive-pressure source for a reduced-
pressure source) and this descriptive convention should not be construed as a limiting convention.

"Reduced pressure" generally refers to a pressure less than a local ambient pressure, such as the ambient pressure in a local environment external to a sealed therapeutic environment. In many cases, the local ambient pressure may also be the atmospheric pressure at which a patient is located. Alternatively, the pressure may be less than a hydrostatic pressure associated with tissue at the tissue site. Unless otherwise indicated, values of pressure stated herein are gauge pressures. Similarly, references to increases in reduced pressure typically refer to a decrease in absolute pressure, while decreases in reduced pressure typically refer to an increase in absolute pressure.

The components of the therapy system 100 may be coupled directly or indirectly. Components may be fluidly coupled to each other to provide a path for transferring fluids (for example, liquid and/or gas) between the components. In some exemplary embodiments, components may be fluidly coupled with a conduit, such as the tube 120, for example. A "tube," as used herein, broadly refers to a tube, pipe, hose, conduit, or other structure with one or more lumina adapted to convey fluids between two ends. Typically, a tube may be an elongated, cylindrical structure with some flexibility, but the geometry and rigidity may vary. In some exemplary embodiments, components may additionally or alternatively be coupled by virtue of physical proximity, being integral to a single structure, or being formed from the same piece of material. Coupling may also include mechanical, thermal, electrical, or chemical coupling (such as a chemical bond) in some contexts.

The reduced pressure developed by the reduced-pressure source 104 may be delivered through the tube 120 to the connector 122. The connector 122 may be a device configured to fluidly couple the reduced-pressure source 104 to the dressing 102. In some exemplary embodiments, the connector 122 may include a flange portion 123 that may couple to the dressing 102 and a port portion that may fluidly couple to the tube 120. The port portion may be fluidly sealed to the flange portion 123 and may provide fluid communication through the flange portion 123. In some embodiments, the connector 122 may prevent fluid communication between a sealed therapeutic environment formed by the dressing 102 and the ambient environment. The connector 122 may allow fluid
communication through the dressing 102 between the tissue site 106 and the tube 120. The connector 122 may also include a primary filter 121 disposed within a fluid channel of the connector 122. The primary filter 121 may be a hydrophobic material substantially filling the fluid channel through the connector 122 and adapted to limit passage of liquids through the connector 122 into the tube 120. In some embodiments, the connector 122 may be a T.R.A.C.® Pad or Sensa T.R.A.C.® Pad available from Kinetic Concepts, Inc. (KCI) of San Antonio, Texas. In other exemplary embodiments, the connector 122 may be a conduit inserted into the dressing 102.

[0026] The dressing 102 may include a manifold 110 adapted to be in fluid communication with the tissue site 106, a pouch 112 adapted to be in fluid communication between the manifold 110 and the connector 122, and a drape 108 covering both the manifold 110 and the pouch 112 at the tissue site 106. The manifold 110 may be placed within, over, on, or otherwise proximate a tissue site, for example, the tissue site 106. The pouch 112 may be placed adjacent the manifold 110, and the drape 108 may be placed over the manifold 110 and sealed to tissue proximate the tissue site 106. The tissue proximate the tissue site 106 may often be undamaged epidermis peripheral to the tissue site 106. Thus, the dressing 102 can provide the sealed therapeutic environment proximate the tissue site 106, substantially isolating the tissue site 106 from the external environment. The reduced-pressure source 104 can reduce the pressure in the sealed therapeutic environment. Reduced pressure applied uniformly through the manifold 110 in the sealed therapeutic environment can induce macrostrain and microstrain in the tissue site 106, as well as remove exudates and other fluids from the tissue site 106, which can be collected in the pouch 112 and disposed of properly.

[0027] In some embodiments, the manifold 110 contacts the tissue site 106. The manifold may be partially or fully in contact with the tissue site 106. If the tissue site 106 extends into tissue from a tissue surface, for example, the manifold 110 may partially or completely fill the tissue site 106. In other exemplary embodiments, the manifold 110 may be placed over the tissue site 106. The manifold 110 may take many forms, and may have many sizes, shapes, or thicknesses depending on a variety of factors, such as the type of treatment being implemented or the nature and size of the tissue site 106. For example, the size and shape of the manifold 110 may be adapted to the contours of deep and irregular shaped tissue sites.
[0028] The manifold 110 may be a substance or structure adapted to distribute reduced pressure to a tissue site, remove fluids from a tissue site, or distribute reduced pressure to and remove fluids from a tissue site. In some exemplary embodiments, a manifold may also facilitate delivering fluids to a tissue site, for example, if the fluid path is reversed or a secondary fluid path is provided. A manifold may include flow channels or pathways that distribute fluids provided to and removed from a tissue site around the manifold. In one exemplary embodiment, the flow channels or pathways may be interconnected to improve distribution of fluids provided to or removed from a tissue site. For example, cellular foam, open-cell foam, porous tissue collections, and other porous material, such as gauze or felted mat, generally include structural elements arranged to form flow channels. Liquids, gels, and other foams may also include or be cured to include flow channels.

[0029] In one exemplary embodiment, the manifold 110 may be a porous foam material having interconnected cells or pores adapted to uniformly (or quasi-uniformly) distribute reduced pressure to the tissue site 106. The foam material may be either hydrophobic or hydrophilic. In one non-limiting example, the manifold 110 can be an open-cell, reticulated polyurethane foam such as GranuFoam® dressing available from Kinetic Concepts, Inc. of San Antonio, Texas.

[0030] In an example in which the manifold 110 may be made from a hydrophilic material, the manifold 110 may also wick fluid away from the tissue site 106, while continuing to distribute reduced pressure to the tissue site 106. The wicking properties of the manifold 110 may draw fluid away from the tissue site 106 by capillary flow or other wicking mechanisms. An example of a hydrophilic foam is a polyvinyl alcohol, open-cell foam such as V.A.C. WhiteFoam® dressing available from Kinetic Concepts, Inc. of San Antonio, Texas. Other hydrophilic foams may include those made from polyether. Other foams that may exhibit hydrophilic characteristics include hydrophobic foams that have been treated or coated to provide hydrophilicity.

[0031] The manifold 110 may further promote granulation at the tissue site 106 if pressure within the sealed therapeutic environment is reduced. For example, any or all of the surfaces of the manifold 110 may have an uneven, coarse, or jagged profile that can induce
microstrains and stresses at the tissue site 106 if reduced pressure is applied through the manifold 110 to the tissue site 106.

[0032] In one exemplary embodiment, the manifold 110 may be constructed from bioresorbable materials. Suitable bioresorbable materials may include, without limitation, a polymeric blend of polylactic acid (PLA) and polyglycolic acid (PGA). The polymeric blend may also include, without limitation, polycarbonates, polyfumarates, and capralactones. The manifold 110 may further serve as a scaffold for new cell-growth, or a scaffold material may be used in conjunction with the manifold 110 to promote cell-growth. A scaffold is generally a substance or structure used to enhance or promote the growth of cells or formation of tissue, such as a three-dimensional porous structure that provides a template for cell growth. Illustrative examples of scaffold materials include calcium phosphate, collagen, PLA/PGA, coral hydroxy apatites, carbonates, or processed allograft materials.

[0033] The drape 108 may include a sealing member. A sealing member may be constructed from a material that can provide a fluid seal between two components or two environments, such as between the sealed therapeutic environment and a local ambient environment. A sealing member may be, for example, an impermeable or semi-permeable, elastomeric material that can provide a seal adequate to maintain a reduced pressure at a tissue site for a given reduced-pressure source. For semi-permeable materials, the permeability generally should be low enough that a desired reduced pressure may be maintained. The drape 108 may further include an attachment device that may be used to attach the sealing member to an attachment surface, such as undamaged epidermis, a gasket, or another sealing member. The attachment device may take many forms. For example, an attachment device may be a medically acceptable, pressure-sensitive adhesive that extends about a periphery of, a portion of, or an entirety of the sealing member. Other exemplary embodiments of an attachment device may include a double-sided tape, paste, hydrocolloid, hydrogel, silicone gel, organogel, or an acrylic adhesive.

[0034] Referring more specifically to FIGURE 2, the pouch 112 may include an absorbent member 124, a first outer layer, such as an upstream layer 126, and a second outer layer, such as a downstream layer 128. The upstream layer 126 and the downstream layer 128 envelop or enclose the absorbent member 124, which absorbs bodily fluids drawn by the reduced pressure through the upstream layer 126.
The absorbent member 124 may be formed of or include an absorbent material. The absorbent material functions to hold, stabilize, and/or solidify fluids that may be collected from the tissue site 106. The absorbent material may be of the type referred to as "hydrogels," "super-absorbents," or "hydrocolloids." If disposed within the dressing 102, the absorbent material may be formed into fibers or spheres to manifold reduced pressure until the absorbent member 124 becomes saturated. Spaces or voids between the fibers or spheres may allow a reduced pressure that is supplied to the dressing 102 to be transferred within and through the absorbent member 124 to the manifold 110 and the tissue site 106. In some exemplary embodiments, the absorbent material may be Texsus FP2325 having a material density of 800 grams per square meter (gsm). In other exemplary embodiments, the absorbent material may be BASF 402C, Technical Absorbents 2317 available from Technical Absorbents (www.techabsorbents.com), sodium polyacrylate super absorbers, cellulosics (carboxy methyl cellulose and salts such as sodium CMC), or alginites.

In some exemplary embodiments, the absorbent material may be formed of granular absorbent components that may be scatter coated onto a paper substrate. Scatter coating involves spreading a granular absorbent powder uniformly onto a textile substrate, such as paper. The substrate, having the granular absorbent powder disposed thereon, may be passed through an oven to cure the powder and cause the powder to adhere to the paper substrate. The cured granular absorbent powder and substrate may be passed through a calender machine to provide a smooth uniform surface to the absorbent material. The absorbent materials that may be formed using a scatter coating process experience partial absorbent material loss during handling. The absorbent material loss may occur while positioning the absorbent material proximate the tissue site, while transporting the absorbent material from the manufacturing facility to the facility of use, or during the process of manufacturing a pouch formed solely of absorbent material.

In some exemplary embodiments, the upstream layer 126 and the downstream layer 128 have perimeter dimensions that may be larger than the perimeter dimensions of the absorbent member 124 so that, if the absorbent member 124 is positioned between the upstream layer 126 and the downstream layer 128 and the center portions of the absorbent member 124, the upstream layer 126, and the downstream layer 128 are aligned, the upstream layer 126 and the downstream layer 128 may extend beyond the perimeter of the absorbent.
member 124. In some exemplary embodiments, the upstream layer 126 and the downstream layer 128 surround the absorbent member 124. Peripheral portions of the upstream layer 126 and the downstream layer 128 may be coupled so that the upstream layer 126 and the downstream layer 128 enclose the absorbent member 124. The upstream layer 126 and the downstream layer 128 may be coupled by high frequency welding, ultrasonic welding, heat welding, or impulse welding, for example. In other exemplary embodiments, the upstream layer 126 and the downstream layer 128 may be coupled by bonding or folding, for example.

[0038] Referring more specifically to FIGURE 2 and FIGURE 3, the upstream layer 126 may have a first side, such as a hydrophilic side 132, and a second side, such as a hydrophobic side 130. The hydrophilic side 132 may be positioned adjacent the absorbent member 124 such that the hydrophobic side 130 of the upstream layer 126 is also an upstream side of the pouch 112. The upstream layer 126 may be formed of non-woven material having a thickness 138. In some exemplary embodiments, the upstream layer 126 may have a polyester fibrous porous structure. The upstream layer 126 may be porous, but preferably not be perforated. The upstream layer 126 may have a material density of about 80 gsm. In other exemplary embodiments, the material density may be lower or greater depending on the particular application of the pouch 112. The upstream layer 126 may be formed of Libeltex TDL2, for example.

[0039] The hydrophobic side 130 may be configured to distribute bodily fluids from the manifold 110 across the upstream surface area of the pouch 112. The hydrophobic side 130 may also be referred to as a wicking side, wicking surface, distribution surface, distribution side, or fluid distribution surface. The hydrophobic side 130 may be a smooth distribution surface configured to move fluid through the upstream layer 126 along a grain of the upstream layer 126, distributing fluid throughout the upstream layer 126. The hydrophilic side 132 may be configured to acquire bodily fluid from the hydrophobic side 130 to aid in bodily fluid movement into the absorbent member 124. The hydrophilic side 132 may also be referred to as a fluid acquisition surface, fluid acquisition side, hydrophilic acquisition surface, or hydrophilic acquisition side. The hydrophilic side 132 may be a fibrous surface and be configured to draw fluid into the upstream layer 126. While illustrated in FIGURE 3 as separate components, the hydrophilic side 132 and the hydrophobic side 130 of the
upstream layer 126 may be opposite sides of the upstream layer 126 and are shown as separate components to aid in explanation.

[0040] The downstream layer 128 may have a first side, such as a hydrophobic side 134, and a second side, such as a hydrophilic side 136. The hydrophobic side 134 may be positioned adjacent the absorbent member 124 so that the hydrophilic side 136 of the downstream layer 128 is also a downstream side of the pouch 112. The downstream layer 128 may be formed of a non-woven material having a thickness 140. In some exemplary embodiments, the downstream layer 128 may have a polyester fibrous porous structure. The downstream layer 128 may be porous, but preferably not be perforated. The downstream layer 128 may have a material density of about 150 gsm. In other exemplary embodiments, the material density may be lower or greater depending on the particular application of the pouch 112. The material density of the downstream layer 128 may be greater than the material density of the upstream layer 126. The thickness 140 of the downstream layer 128 may be greater than the thickness 138 of the upstream layer 126. In the exemplary embodiment illustrated in FIGURES 2 and 3, the thickness 140 may be about three times greater than the thickness 138. The downstream layer 128 may be formed of Libeltex TL4. In other exemplary embodiments, the downstream layer 128 may be formed of Libeltex TDL2.

[0041] The hydrophobic side 134 may be disposed adjacent the absorbent member 124 on an opposite side of the absorbent member 124 from the hydrophilic side 132 of the upstream layer 126. The hydrophobic side 134 may be configured to distribute bodily fluids not contained by the absorbent member 124 to the hydrophilic side 136 of the downstream layer 128. The hydrophobic side 134 may also be referred to as a wicking side, wicking surface, distribution surface, distribution side, or fluid distribution surface. The hydrophobic side 134 may be a smooth distribution surface configured to move fluid through the downstream layer 128 along a grain of the downstream layer 128, distributing fluid throughout downstream layer 128. The hydrophilic side 136 may be configured to acquire excess bodily fluids wicked by the hydrophobic side 134 from the absorbent member 124. The hydrophilic side 136 may also be referred to as a fluid acquisition surface, fluid acquisition side, hydrophilic acquisition surface, or hydrophilic acquisition side. The hydrophilic side 136 may be a fibrous surface and be configured to draw fluid into the
downstream layer 128. While illustrated in FIGURE 3 as separate components, the
hydrophobic side 134 and the hydrophilic side 136 may be opposite sides of the downstream
layer 128 and may be shown as separate components to aid in explanation of the described
exemplary embodiments.

[0042] As described herein, the upstream layer 126 and the downstream layer 128
contain the absorbent member 124, reducing absorbent material loss during manufacturing,
shipping, and use of the pouch 112. Containment of the absorbent material prevents loss of
the granular absorbent components as the pouch 112 may be moved during the manufacturing
process. In addition, containment of the absorbent material in the pouch 112 formed from the
upstream layer 126 and the downstream layer 128 may reduce loss of the granular absorbent
components during use of the pouch 112, for example, while placing the pouch 112 adjacent
the tissue site 106 or positioning the pouch 112 in the therapy system 100. Still further, if the
pouch 112 is used at the tissue site 106, containment of the absorbent material may limit
migration of the granular absorbent components into the tissue site 106.

[0043] If the tissue site 106 is small, the pouch 112 may aid the manifold 110 in
distribution of reduced pressure to the tissue site 106. The upstream layer 126 and the
downstream layer 128 may enclose the absorbent member 124, manifold reduced pressure to
the tissue site 106, and wick fluids from the tissue site 106 into the absorbent member 124.
The pouch 112 may accommodate the increased difficulties of enclosing, manifolding, and
wicking that may be experienced when treating a smaller tissue site 106. In addition, the
pouch 112 may prevent the loss of structural integrity associated with using scatter coated
absorbent material to form the absorbent member 124 that may often lead to more frequent
replacement of the pouch 112.

[0044] During the application of reduced pressure, some pouches containing
absorbent materials tend to become saturated at the point of fluid entry into the absorbent
member itself. If the absorbent material becomes saturated in one area prior to saturation of
the absorbent material in other areas, the absorbent material experiences a reduced ability to
move fluid from the point of entry to areas of the absorbent material that may be unsaturated.
In addition, the amount of reduced pressure distributed to the tissue site may be reduced,
decreasing the therapeutic benefits of using reduced pressure. If pouches are decreased in
size to be placed adjacent smaller tissue sites or tissue sites that produce smaller amounts of
exudate, the pouch's absorbent capability may be further reduced. If the absorbent capability
of such pouches is reduced, more frequent dressing changes may be needed, thereby
increasing the cost of supplying reduced-pressure therapy.

[0045] As disclosed herein, the therapy system 100 overcomes these shortcomings
and others by providing the pouch 112 as described above with respect to FIGURES 2-3. In
the operative exemplary embodiments, the rate of fluid flow received by the pouch 112 may
be relatively slow for a relatively long duration. Placing the hydrophobic side 130 of the
upstream layer 126 adjacent the manifold 110 may allow the hydrophobic nature of the
hydrophobic side 130 to move the fluid along a grain (not shown) of the hydrophobic side
130 across a width of the upstream layer 126. The fluid movement may be parallel to the
manifold 110 and away from the strongest point of reduced pressure. This wicking action
spreads the fluid drawn from the tissue site 106 across a wider area. As the fluid moves
through the upstream layer 126 from the hydrophobic side 130 toward the absorbent member
124 it reaches the hydrophilic side 132. The hydrophilic side 132 draws the fluid into the
absorbent member 124. The gradient of hydrophilicity increases from the hydrophobic side
130 to the hydrophilic side 132 as the fluid moves downstream toward the absorbent member
124.

[0046] In operation, the increased thickness 140 and increased material density of the
downstream layer 128 aid the distribution of reduced pressure to the upstream layer 126 and
the manifold 110. In one exemplary embodiment, the upstream layer 126 may have a density
of about 80 gsm, and the downstream layer 128 may have a density of about 150 gsm so that
the relative thickness of the downstream layer 128 to the upstream layer 126 may be about
1.875. The relative thickness of the downstream layer 128 in other exemplary embodiments
may fall in the range from about 1.5 to about 3.0 for other reduced-pressure therapy
applications. The distribution of reduced pressure by the downstream layer 128 aids the
wicking action of the hydrophobic side 130 of the upstream layer 126 so that fluids drawn
from the tissue site 106 may be more evenly distributed in the dressing 102. In turn, more
even distribution of the fluids drawn from the tissue site 106 provides for more efficient use
of the absorbent member 124, increasing the time between replacement of the dressing 102,
and decreasing costs as fewer dressings may be needed to absorb an equivalent amount of
fluid.
Positioning of the upstream layer 126 and the downstream layer 128, as described herein, may orient grains of the upstream layer 126 and the downstream layer 128 in a manner that increases the efficient use of the absorbent member 124. By placing the hydrophilic side 136 proximate the reduced-pressure source 104. The hydrophilic side 126 may also act as an additional filter mechanism that may aid in preventing blockage of the primary filter 121 of the connector 122. The duration during which the dressing 102 can manifold reduced pressure may also extended. By using materials that provide a wicking function, the efficient use of available absorbent materials can be improved.

The use of layers that wick fluids and manifold reduced pressure allows for controlled use of the available absorbent material. The layers, arranged as described above, distribute reduced pressure such that fluid may be more evenly distributed to the absorbent member of the pouch, increasing the total time necessary to saturate the absorbent materials of the absorbent member as more fluid pathways may be used to distribute the fluid. The use of layers to form the pouch with structures of differing hydrophilicity allows for better control of the fluids entering the absorbent member of the pouch. The use of layers having different coatweights allows the properties of the pouch to be matched to the application in a technically better and cost effective solution. The solution disclosed will result in a greater level of absorption before capacity may be reached without requiring additional absorbent material.

The systems and methods described herein may provide significant advantages, some of which have already been mentioned. For example, the therapy system provides improved materials efficiency, lower cost, and does a better job at manifolding reduced pressure. The disclosed exemplary embodiment may also be used with inline canisters, for example, fluid absorbing pouches or fluid absorbing canisters disposed external to the dressing.

It should be apparent from the foregoing that an invention having significant advantages has been provided. While shown in only a few forms, the systems and methods illustrated are susceptible to various changes and modifications without departing from the spirit thereof.

Although certain illustrative, non-limiting exemplary embodiments have been presented, it should be understood that various changes, substitutions, permutations, and
alterations can be made without departing from the scope the appended claims. It will be appreciated that any feature that is described in connection to any one exemplary embodiment may also be applicable to any other exemplary embodiment.

[0052] It will be understood that the benefits and advantages described above may relate to one exemplary embodiment or may relate to several exemplary embodiments. It will further be understood that reference to "an" item refers to one or more of those items.

[0053] The steps of the methods described herein may be carried out in any suitable order, or simultaneously where appropriate.

[0054] Where appropriate, features of any of the exemplary embodiments described above may be combined with features of any of the other exemplary embodiments described to form further examples having comparable or different properties and addressing the same or different problems.

[0055] It will be understood that the above description of preferred exemplary embodiments is given by way of example only and that various modifications may be made by those skilled in the art. The above specification, examples and data provide a complete description of the structure and use of exemplary embodiments of the invention. Although various exemplary embodiments of the invention have been described above with a certain degree of particularity, or with reference to one or more individual exemplary embodiments, those skilled in the art could make numerous alterations to the disclosed exemplary embodiments without departing from the scope of the claims.
CLAIMS

We claim:

1. A system for collecting fluid from a tissue site, the system comprising:
   a manifold adapted to be placed adjacent the tissue site;
   a sealing member adapted to be placed over the tissue site and the manifold;
   a reduced-pressure source adapted to be fluidly coupled to the manifold through the
   sealing member; and
   a pouch adapted to be positioned between the manifold and the sealing member, the
   pouch comprising:
      an upstream layer having a first thickness, a hydrophilic side, and a
      hydrophobic side,
      a downstream layer having a second thickness, a hydrophilic side, and a
      hydrophobic side, and
      an absorbent member enclosed between the upstream layer and the
      downstream layer, the hydrophilic side of the upstream layer positioned adjacent the absorbent member so that the hydrophobic side
      of the upstream layer forms a portion of an exterior of the apparatus,
      and the hydrophobic side of the downstream layer positioned adjacent the absorbent member so that the hydrophilic side of the downstream
      layer forms another portion of the exterior of the apparatus,
   wherein the second thickness is greater than the first thickness.

2. The system of claim 1, wherein the second thickness is about three times greater than the
first thickness.

3. The system of claim 1, wherein the upstream layer has a material density of about 80
   gsm.

4. The system of claim 1, wherein the downstream layer has a material density of about 150
   gsm.
5. The system of claim 1, wherein the upstream layer has a material density of about 80 gsm and the downstream layer has a material density of about 150 gsm.

6. The system of claim 1, wherein:
   the second thickness is about three times greater than the first thickness;
   the upstream layer has a material density of about 80 gsm; and
   the downstream layer has a material density of about 150 gsm.

7. The system of claim 1, further comprising a connector fluidly coupled to the reduced pressure source and coupled to the sealing member to fluidly couple the reduced-pressure source to the manifold.

8. The system of claim 1, further comprising a tube having at least one lumen fluidly coupled to the reduced pressure source on a first end and fluidly coupled to the manifold on a second end that is opposite the first end.

9. The system of claim 1, further comprising:
   a tube having a least one lumen, a first end, and a second end, the first end fluidly coupled to the reduced-pressure source; and
   a connector having a flange portion and a port portion, the flange portion coupled to the sealing member and the port portion fluidly coupled to the second end of the tube.

10. A system for treating a tissue site with reduced pressure, the system comprising:
    a manifold adapted to be placed adjacent the tissue site;
    a sealing member adapted to be placed over the tissue site and the manifold to provide a substantially air-tight seal at the tissue site;
    a reduced-pressure source adapted to be fluidly coupled to the manifold through the sealing member; and
    a pouch adapted to be positioned between the manifold and the sealing member, the pouch comprising:
    an upstream layer having a hydrophilic side and a hydrophobic side,
    a downstream layer having a hydrophilic side and a hydrophobic side, and
    an absorbent member enclosed between the upstream layer and the
downstream layer, the hydrophilic side of the upstream layer positioned adjacent the absorbent member and the hydrophobic side of the downstream layer positioned adjacent the absorbent member.

11. The system of claim 10, wherein the upstream layer has a first thickness and the downstream layer has a second thickness, and the second thickness is greater than the first thickness.

12. The system of claim 10, wherein the upstream layer has a first thickness and the downstream layer has a second thickness, and the second thickness is about three times greater than the first thickness.

13. The system of claim 10, wherein the upstream layer has a material density of about 80 gsm.

14. The system of claim 10, wherein the downstream layer has a material density of about 150 gsm.

15. The system of claim 10, wherein the upstream layer has a material density of about 80 gsm and the downstream layer has a material density of about 150 gsm.

16. The system of claim 10, wherein:
   wherein the upstream layer has a first thickness and the downstream layer has a second thickness;
   the second thickness is about three times greater than the first thickness;
   the upstream layer has a material density of about 80 gsm; and
   the downstream layer has a material density of about 150 gsm.

17. An apparatus for collecting fluid from a tissue site, the apparatus comprising:
   an upstream layer having a hydrophilic side and a hydrophobic side;
   a downstream layer having a hydrophilic side and a hydrophobic side; and
   an absorbent member enclosed between the upstream layer and the downstream layer,
   the hydrophilic side of the upstream layer positioned adjacent the absorbent member so that the hydrophobic side of the upstream layer forms a portion of
an exterior of the apparatus, and the hydrophobic side of the downstream layer positioned adjacent the absorbent member so that the hydrophilic side of the downstream layer forms another portion of the exterior of the apparatus.

18. The apparatus of claim 17, wherein the upstream layer has a first thickness and the downstream layer has a second thickness, and the second thickness is greater than the first thickness.

19. The apparatus of claim 17, wherein the upstream layer has a first thickness and the downstream layer has a second thickness, and the second thickness is about three times greater than the first thickness.

20. The apparatus of claim 17, wherein the upstream layer has a material density of about 80 gsm.

21. The apparatus of claim 17, wherein the downstream layer has a material density of about 150 gsm.

22. The apparatus of claim 17, wherein the upstream layer has a material density of about 80 gsm and the downstream layer has a material density of about 150 gsm.

23. The apparatus of claim 17, wherein:
   wherein the upstream layer has a first thickness and the downstream layer has a second thickness;
   the second thickness is about three times greater than the first thickness;
   the upstream layer has a material density of about 80 gsm; and
   the downstream layer has a material density of about 150 gsm.

24. A system for treating a tissue site with reduced pressure, the system comprising:
   a manifold adapted to be placed adjacent the tissue site;
   a sealing member adapted to be placed over the tissue site and the manifold to provide a substantially air-tight seal at the tissue site;
   a reduced-pressure source adapted to be fluidly coupled to the manifold through the sealing member; and
a pouch adapted to be positioned between the manifold and the sealing member, the
pouch having an upstream layer having a first thickness, a downstream layer
having a second thickness, and an absorbent member enclosed between the
upstream layer and the downstream layer, wherein the second thickness is
greater than the first thickness.

25. The system of claim 24, wherein the upstream layer has a hydrophilic side adjacent the
absorbent member.

26. The system of claim 24, wherein the upstream layer has a hydrophobic side opposite the
absorbent member.

27. The system of claim 24, wherein:
   the upstream layer has a hydrophilic side adjacent the absorbent member; and
   the upstream layer has a hydrophobic side opposite the absorbent member.

28. The system of claim 24, wherein the downstream layer has a hydrophobic side adjacent
the absorbent member.

29. The system of claim 24, wherein the downstream layer has a hydrophilic side opposite the
absorbent member.

30. The system of claim 24, wherein:
   the downstream layer has a hydrophobic side adjacent the absorbent member; and
   the downstream layer has a hydrophilic side opposite the absorbent member.

31. The system of claim 24, wherein:
   the upstream layer has a hydrophilic side adjacent the absorbent member;
   the upstream layer has a hydrophobic side opposite the absorbent member;
   the downstream layer has a hydrophobic side adjacent the absorbent member; and
   the downstream layer has a hydrophilic side opposite the absorbent member.

32. The system of claim 24, wherein the second thickness is about three times greater than the
first thickness.
33. The system of claim 24, wherein the upstream layer has a material density of about 80 gsm.

34. The system of claim 24, wherein the downstream layer has a material density of about 150 gsm.

35. The system of claim 24, wherein the upstream layer has a material density of about 80 gsm and the downstream layer has a material density of about 150 gsm.

36. The system of claim 24, wherein
   - the second thickness is about three times greater than the first thickness;
   - the upstream layer has a material density of about 80 gsm; and
   - the downstream layer has a material density of about 150 gsm.

37. An apparatus for receiving fluid from a tissue site, the apparatus comprising:
   - an upstream layer having a first thickness;
   - a downstream layer having a second thickness greater than the first thickness;
   - an absorbent member disposed between the upstream layer and the downstream layer
     so that the upstream layer and the downstream layer enclose the absorbent member.

38. The apparatus of claim 37, wherein the upstream layer has a hydrophilic side adjacent the absorbent member.

39. The apparatus of claim 37, wherein the upstream layer has a hydrophobic side opposite the absorbent member.

40. The apparatus of claim 37, wherein:
   - the upstream layer has a hydrophilic side adjacent the absorbent member; and
   - the upstream layer has a hydrophobic side opposite the absorbent member.

41. The apparatus of claim 37, wherein the downstream layer has a hydrophobic side adjacent the absorbent member.

42. The apparatus of claim 37, wherein the downstream layer has a hydrophilic side opposite
43. The apparatus of claim 37, wherein:
   the downstream layer has a hydrophobic side adjacent the absorbent member; and
   the downstream layer has a hydrophilic side opposite the absorbent member.
44. The apparatus of claim 37, wherein:
   the upstream layer has a hydrophilic side adjacent the absorbent member;
   the upstream layer has a hydrophobic side opposite the absorbent member;
   the downstream layer has a hydrophobic side adjacent the absorbent member; and
   the downstream layer has a hydrophilic side opposite the absorbent member.
45. The apparatus of claim 37, wherein the second thickness is about three times greater than
   the first thickness.
46. The apparatus of claim 37, wherein the upstream layer has a material density of about 80
   gsm.
47. The apparatus of claim 37, wherein the downstream layer has a material density of about
   150 gsm.
48. The apparatus of claim 37, wherein the upstream layer has a material density of about 80
   gsm and the downstream layer has a material density of about 150 gsm.
49. The apparatus of claim 37, wherein
   the second thickness is about three times greater than the first thickness;
   the upstream layer has a material density of about 80 gsm; and
   the downstream layer has a material density of about 150 gsm.
50. A method for treating a tissue site, the method comprising:
   positioning a manifold adjacent the tissue site;
   providing a pouch comprising:
       an upstream layer having a hydrophilic side and a hydrophobic side,
       a downstream layer having a hydrophilic side and a hydrophobic side, and
       an absorbent member enclosed between the upstream layer and the
downstream layer, the hydrophilic side of the upstream layer positioned adjacent the absorbent member so that the hydrophobic side of the upstream layer forms a portion of an exterior of the apparatus, and the hydrophobic side of the downstream layer positioned adjacent the absorbent member so that the hydrophilic side of the downstream layer forms another portion of the exterior of the apparatus; positioning the pouch adjacent the manifold and the tissue site so that the upstream layer is adjacent the manifold; positioning a sealing member over the manifold and the pouch to provide a substantially air-tight seal; fluidly coupling a reduced-pressure source to the manifold to provide reduced pressure to the tissue site; distributing reduced pressure to the manifold through the pouch; and distributing fluid from the tissue site to an absorbent member in the pouch for storage therein.

51. A method for manufacturing a fluid storage canister, the method comprising:
   providing a first layer having a first thickness, a hydrophilic side, and a hydrophobic side;
   positioning an absorbent member adjacent the hydrophilic side of the first layer;
   providing a second layer have a second thickness greater than the first thickness, a hydrophilic side and a hydrophobic side;
   positioning the hydrophobic side of the second layer adjacent the absorbent member;
   and coupling peripheral portions of the first layer and the second layer to enclose the absorbent member.

52. The method of claim 51, wherein coupling peripheral portions of the first layer and the second layer comprises welding peripheral portions of the first layer and the second layer.

53. The method of claim 51, wherein coupling peripheral portions of the first layer and the second layer comprises bonding peripheral portions of the first layer and the second layer.
54. The method of claim 51, wherein coupling peripheral portions of the first layer and the second layer comprises folding peripheral portions of the first layer and the second layer.

55. The method of claim 51, wherein the second thickness is about three times greater than the first thickness.

56. The method of claim 51, wherein the first layer has a material density of about 80 gsm.

57. The method of claim 51, wherein the second layer has a material density of about 150 gsm.

58. The system, methods, and apparatuses as described herein.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A61F13/00 A61F13/02 A61M1/00 A61M27/00

ADD.

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A61F A61M

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

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

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>Wo 2009/089016 Al (SOUTHEASTERN MEDICAL TECHNOLOG [US]; JONES CURTIS E [US]; KENNEDY JOHN) 16 July 2009 (2009-07-16) figures 1-1 page 9, line 6 - page 9, line 9 page 25, line 22 - page 25, line 29</td>
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<td>US 2012/143157 Al (RI EISINGER BI RGIT [DE]) 7 June 2012 (2012-06-07) claim 1; figures 1-3</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) one of which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

**Date of the actual completion of the international search**

17 March 2014

**Date of mailing of the international search report**

25/03/2014

Name and mailing address of the ISA:
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Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

Authorized officer
Gennari, Silvia

Form PCT/ISA/210 (second sheet) (April 2005)
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</table>
### Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **X** Claims Nos.: 50 because they relate to subject matter not required to be searched by this Authority, namely:
   - Rule 39.1(i) PCT - Method for treatment of the human or animal body by therapy

2. **☐** Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **☐** Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. **☐** As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. **☐** As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. **☐** As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. **☐** No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- **☐** The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.
- **☐** The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- **☐** No protest accompanied the payment of additional search fees.