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(54) **PLEATED SEAL FOR SURGICAL HAND OR INSTRUMENT ACCESS**

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See application file for complete search history.

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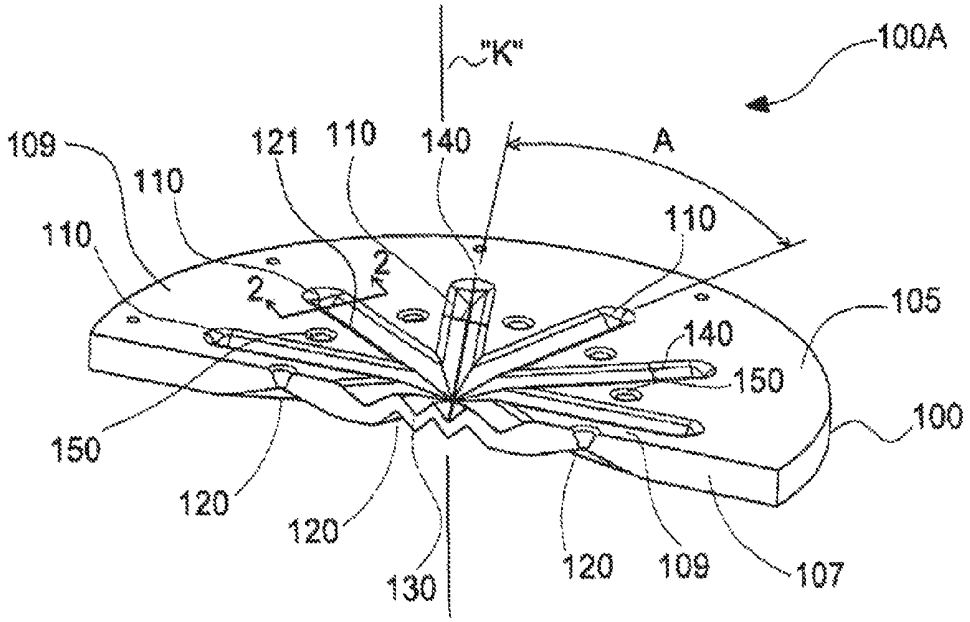
(57) **ABSTRACT**

A surgical access assembly for a surgical instrument and/or a surgeon's hand, the assembly including a housing, such as a wound retractor, and a seal body mounted to the housing. The seal body may have a pleated configuration when viewed in cross-section. The seal body may have a first surface and a second surface, the first surface having a plurality of radially-extending first channels and the second surface having a plurality of radially-extending second channels, the plurality of first channels being offset from the plurality of second channels. The seal body may define a substantially centrally disposed opening for reception of a hand/arm or instrument. In addition, the seal body may define one or more additional openings for simultaneous reception of an instrument and a hand.

19 Claims, 8 Drawing Sheets



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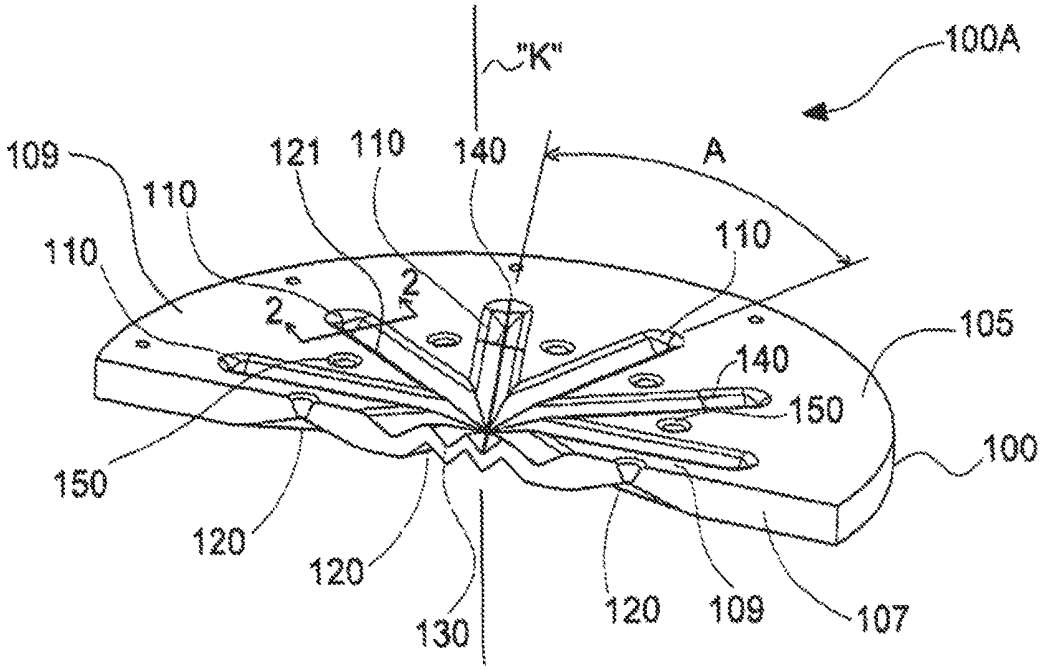
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120
130
120
109
107

FIG. 1

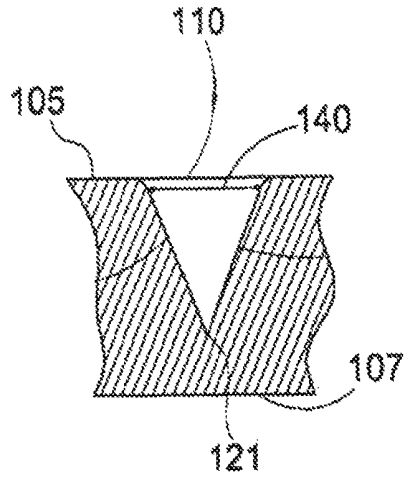
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FIG. 2

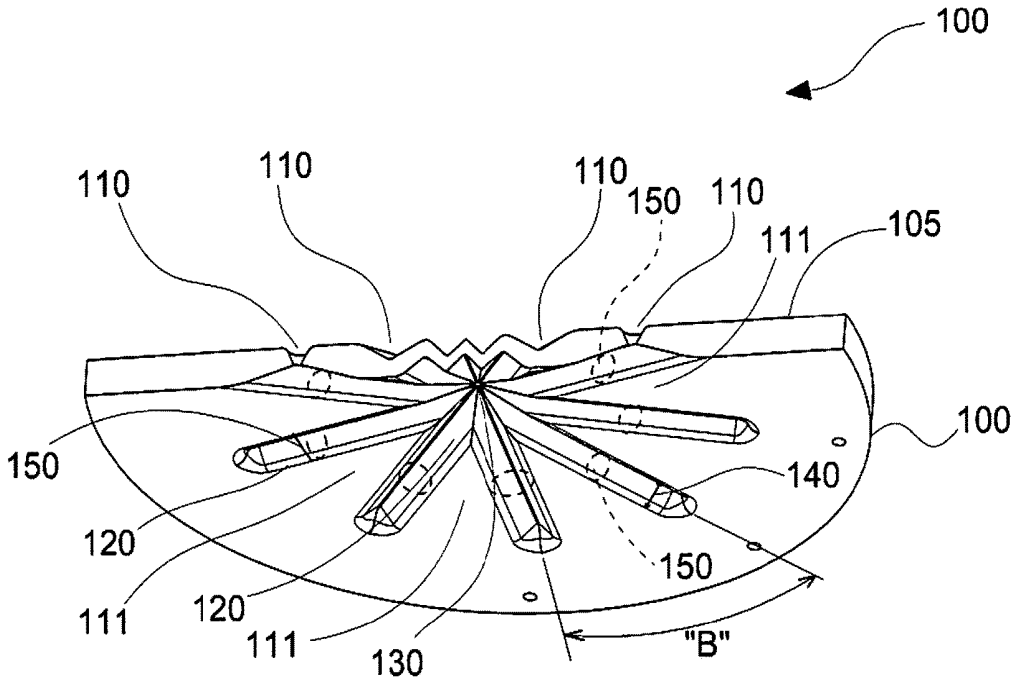
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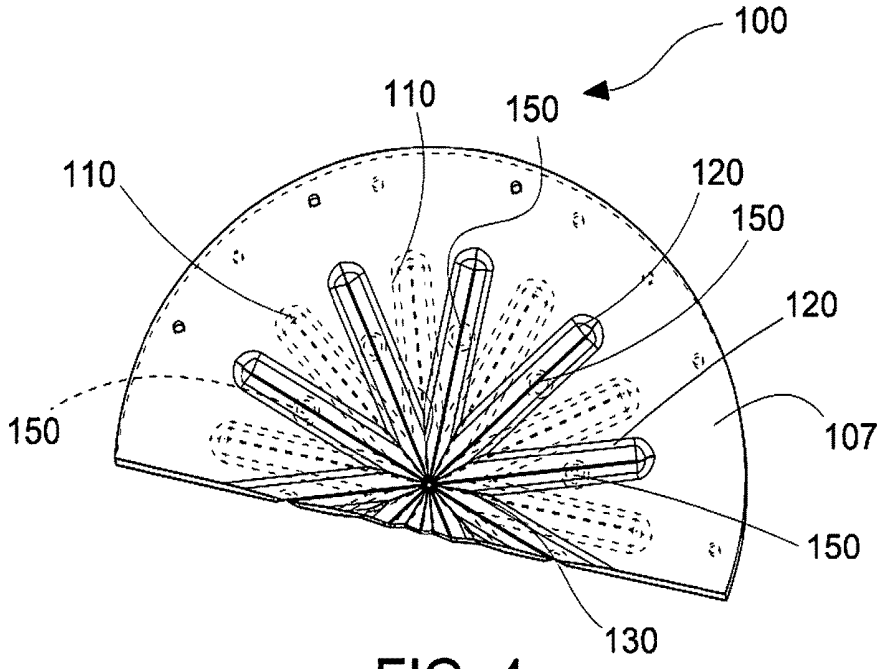
FIG. 3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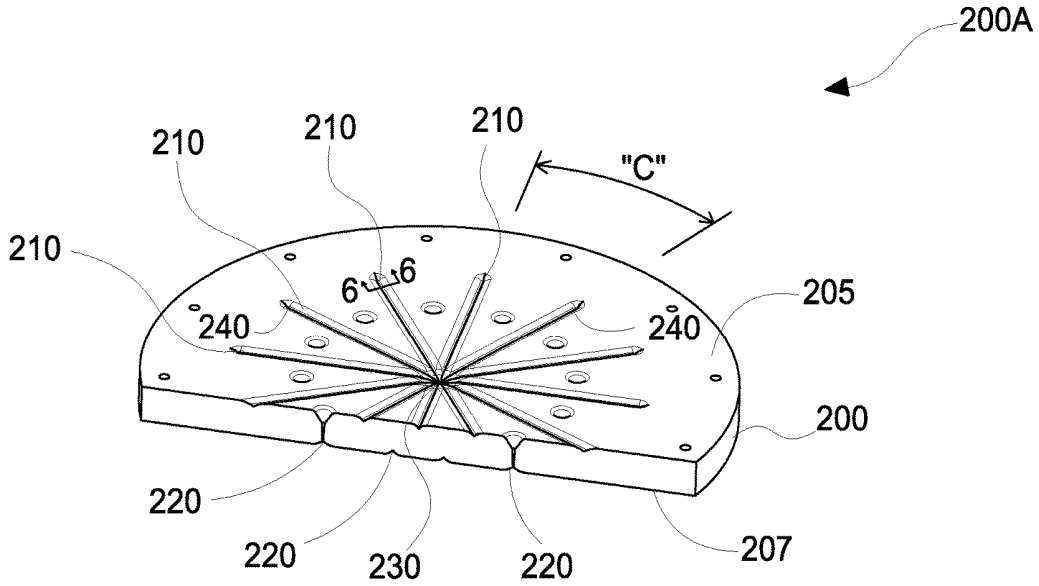
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6
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200
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FIG. 5

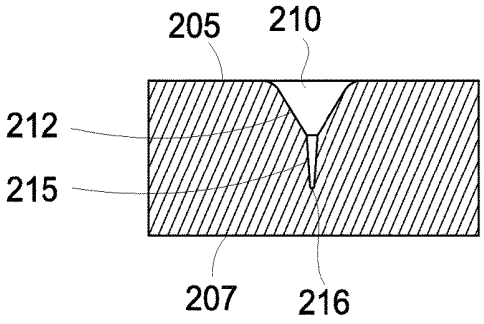
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FIG. 6

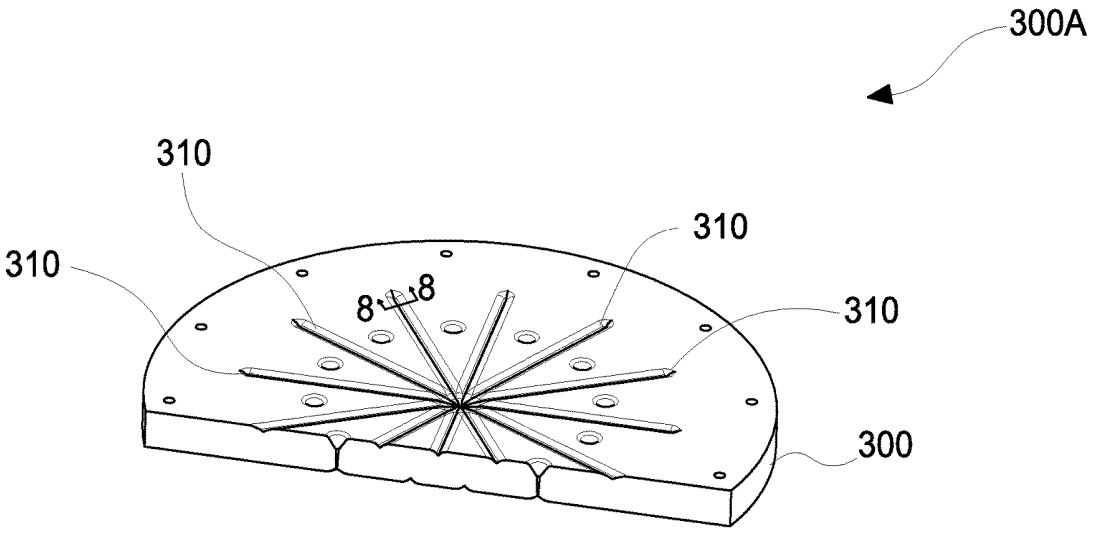

FIG. 7

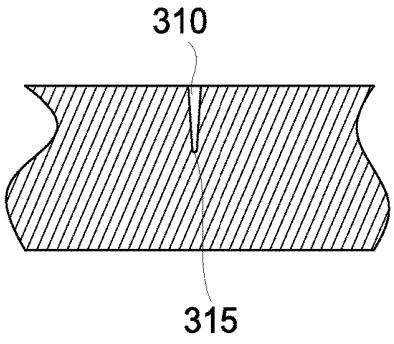

FIG. 8

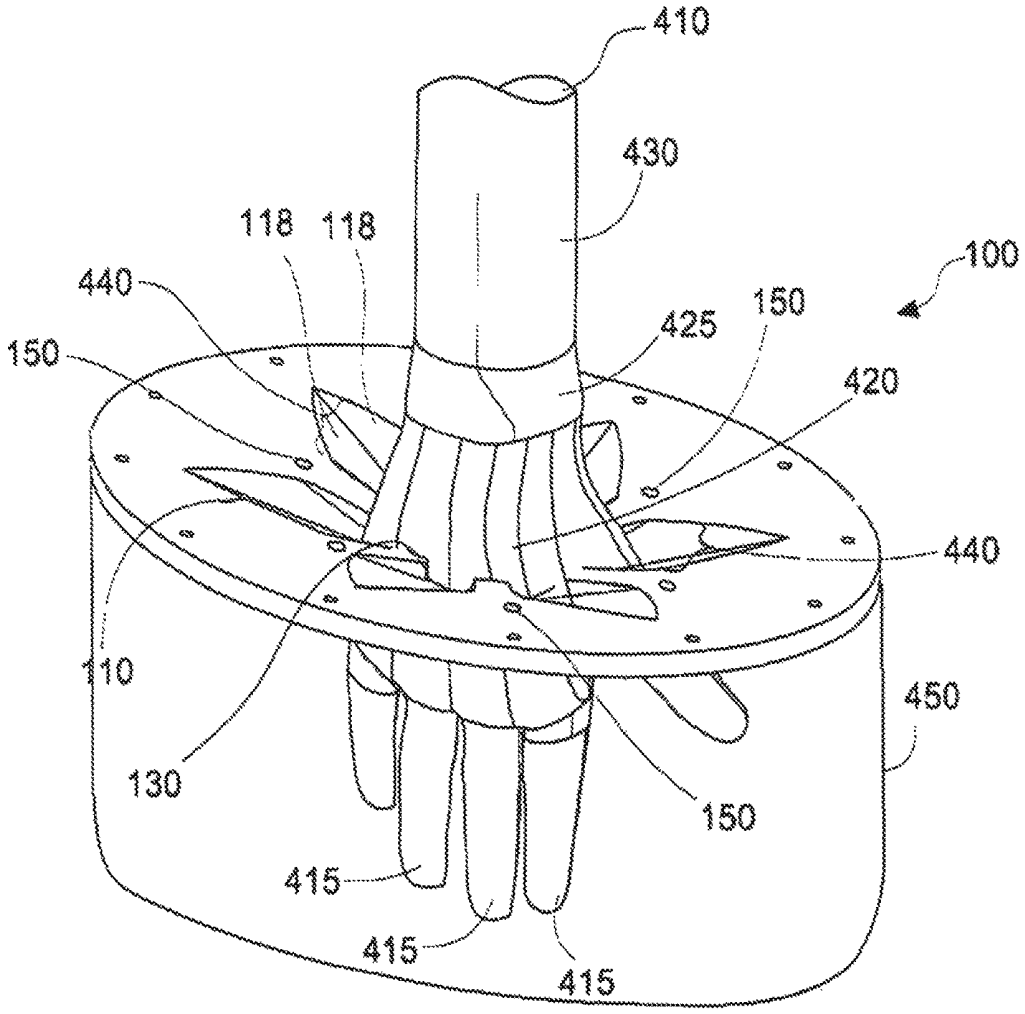
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FIG. 9

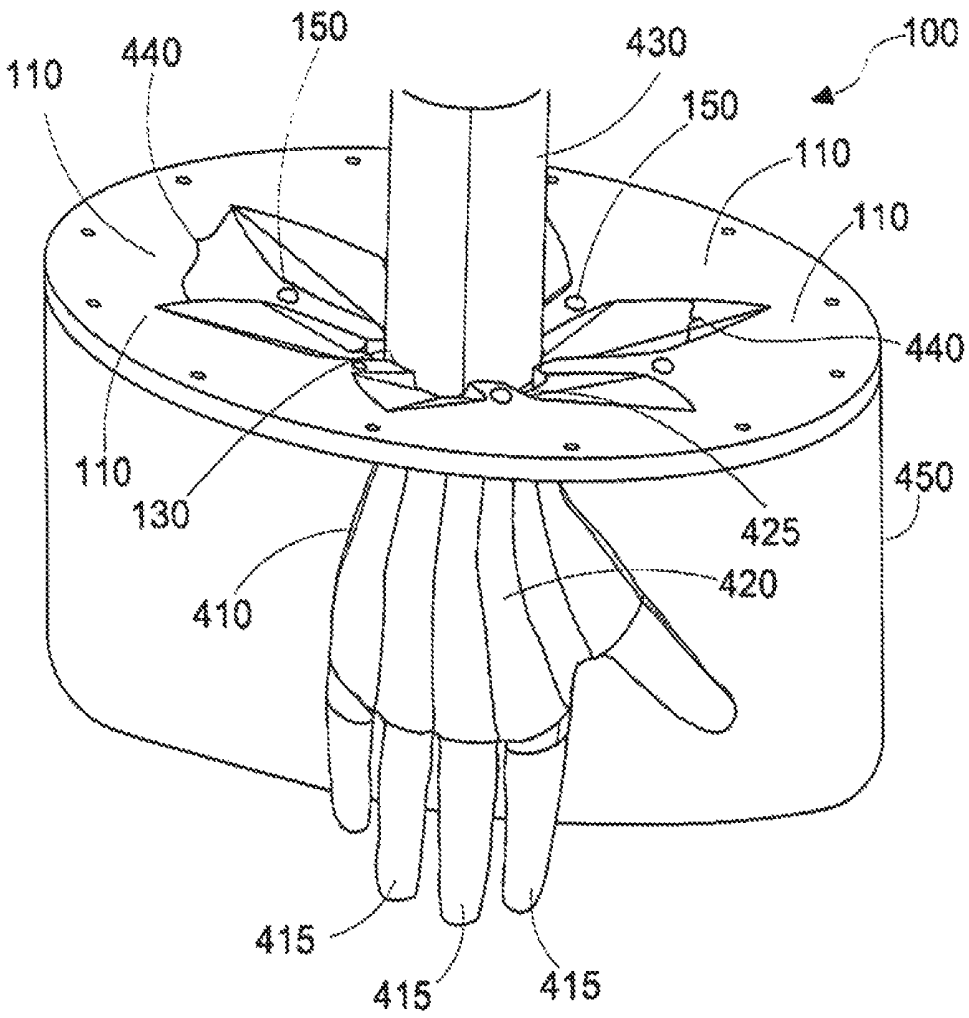
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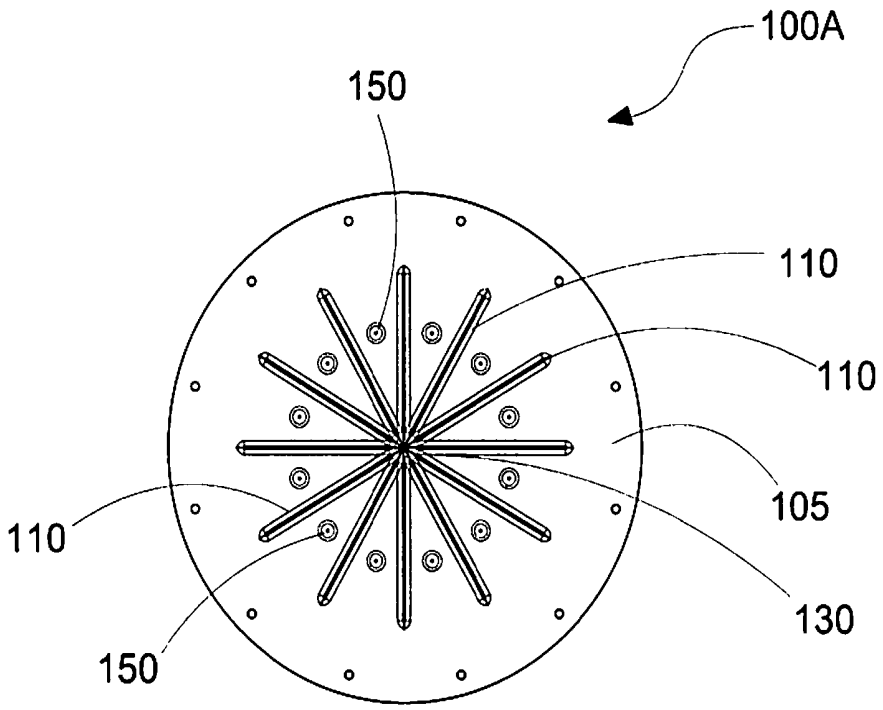
FIG. 10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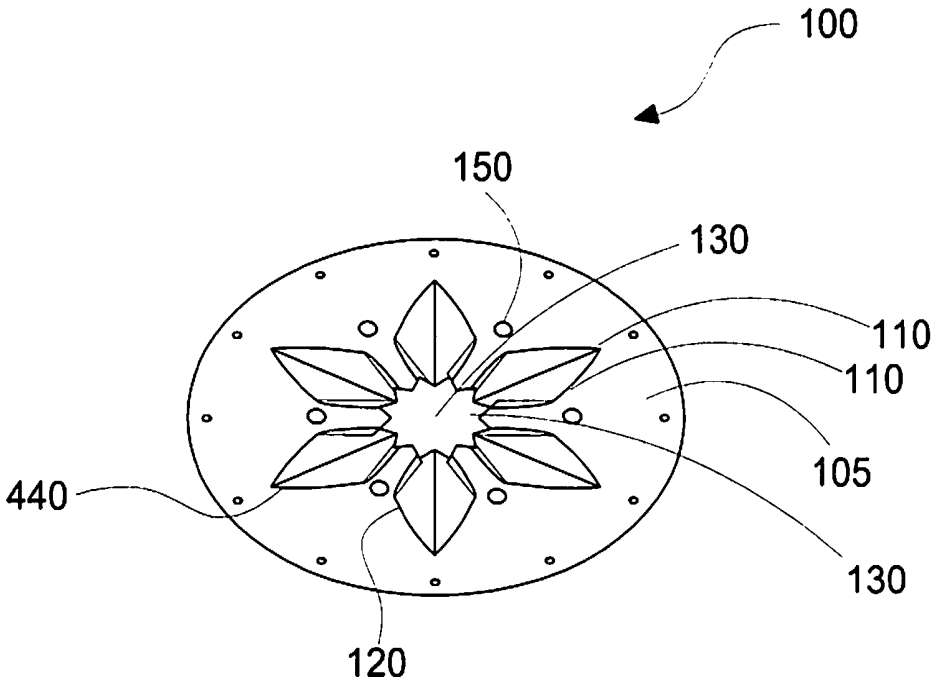
105
130
110
150

FIG. 11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110
110
105
130
440
120

FIG. 12

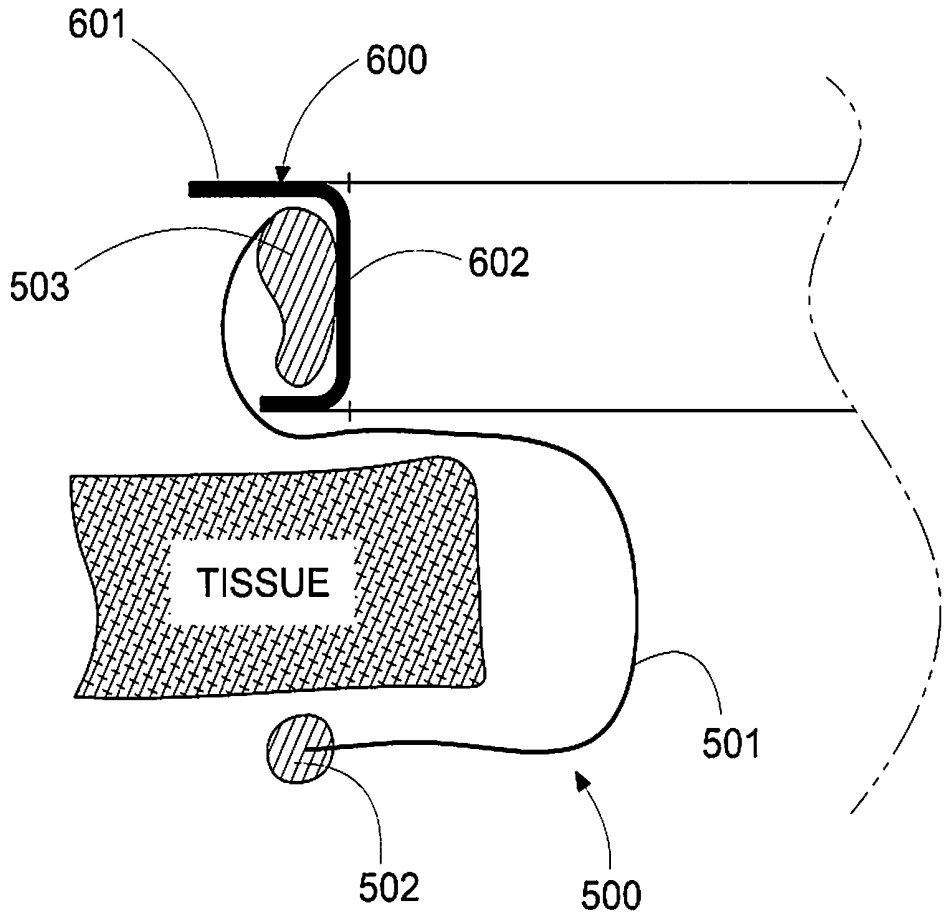

FIG. 13

PLEATED SEAL FOR SURGICAL HAND OR INSTRUMENT ACCESS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and priority to U.S. Provisional Patent Application No. 62/021,298, filed Jul. 7, 2014, the entire disclosure of which is incorporated by reference herein.

TECHNICAL FIELD

The present application is directed to devices for providing sealed access of a hand or instrument plugs for use in surgical procedures and, more particularly, to access surgical site seal covers or plugs that improve a surgical seal while providing greater flexibility.

SUMMARY

The present disclosure, according to various embodiments thereof, relates to a hand or instrument access assembly comprising a housing and a seal body mounted to the housing, the seal body having a first surface and a second surface, the seal body defining a substantially centrally disposed opening therethrough, wherein the first surface has a plurality of radially-extending first channels and the second surface has a plurality of radially-extending second channels, the plurality of first channels being offset from the plurality of second channels.

The plurality of first channels may have a first width and the plurality of second channels may have a second width, the first width being equal to the second width or the first width being different than the second width. The plurality of first channels and the plurality of second channels may each form a star-shaped configuration. The plurality of first channels and the plurality of second channels may extend partially along the radius of the seal. One end of each of the plurality of first channels and one end of each of the plurality of second channels may converge at the opening.

In various embodiments, when a hand or an instrument is inserted through the opening, the plurality of first channels and the plurality of second channels deform in an accordion-like manner to accommodate the hand or the instrument. The seal may be formed of foam, e.g., a monolithic piece of foam.

The housing may be a wound retractor. The wound retractor may include a distal ring for positioning through an incision for placement inside a body wall and against an interior surface of a body wall, a proximal ring for positioning outside of the body wall and a flexible sleeve connecting the distal and proximal rings, the sleeve configured to be rolled around the proximal ring so as to shorten the length of the sleeve and thereby generate a retraction force to retract the incision. In addition, the housing may also include a stiffening ring that assists with maintaining the proximal ring in a circular shape, the seal mounting directly to the stiffening ring.

The opening may be closed in a rest position so as to prevent the escape of insufflation gas therethrough when no hand or instrument is inserted. The seal body may also have one or more additional openings for sealed reception of an instrument therethrough. At least a portion of the one or more additional openings may be molded so as to be closed until reception of an instrument therethrough tears the material to fully form the opening. At least a portion of the one or more additional openings may include a pre-formed slit that, in a rest position, is closed.

The present disclosure, according to various embodiments thereof, may also relate to a hand access assembly for performing a laparoscopic surgical procedure, the assembly comprising a housing, and a seal body mounted to the housing and defining an opening therethrough for reception of a hand, the seal body having a pleated configuration. The pleated configuration may include a plurality of first and second channels positioned on opposite sides of the seal body, and may be offset relative to each other. The plurality of first channels may have a first width and the plurality of second channels have a second width, the first width being equal to the second width or the first width being different than the second width. The plurality of first channels and the plurality of second channels may each form a star-shaped configuration. The plurality of first channels and the plurality of second channels may extend partially along the radius of the seal. One end of each of the plurality of first channels and one end of each of the plurality of second channels may converge at the opening.

In various embodiments, when a hand or an instrument is inserted through the opening, the plurality of first channels and the plurality of second channels deform in an accordion-like manner to accommodate the hand or the instrument. The seal may be formed of foam, e.g., a monolithic piece of foam.

The housing may be a wound retractor. The wound retractor may include a distal ring for positioning through an incision for placement inside a body wall and against an interior surface of a body wall, a proximal ring for positioning outside of the body wall and a flexible sleeve connecting the distal and proximal rings, the sleeve configured to be rolled around the proximal ring so as to shorten the length of the sleeve and thereby generate a retraction force to retract the incision. In addition, the housing may also include a stiffening ring that assists with maintaining the proximal ring in a circular shape, the seal mounting directly to the stiffening ring.

The opening may be closed in a rest position so as to prevent the escape of insufflation gas therethrough when no hand or instrument is inserted. The seal body may also have one or more additional openings for sealed reception of an instrument therethrough. At least a portion of the one or more additional openings may be molded so as to be closed until reception of an instrument therethrough tears the material to fully form the opening. At least a portion of the one or more additional openings may include a pre-formed slit that, in a rest position, is closed.

The present disclosure, according to various embodiments thereof, may also relate to a hand or surgical instrument access assembly comprising a wound retractor, wherein the wound retractor includes a distal ring for positioning through an incision for placement inside a body wall and against an interior surface of a body wall, a proximal ring for positioning outside of the body wall and a flexible sleeve connecting the distal and proximal rings, the sleeve configured to be rolled around the proximal ring so as to shorten the length of the sleeve and thereby generate a retraction force to retract the incision; a stiffening ring for maintaining the proximal ring in a circular shape; and a seal body mounted to the stiffening ring, the seal body defining an opening therethrough for reception of a surgical instrument or hand, wherein the seal body has a pleated configuration.

The pleated configuration may include a plurality of first and second channels positioned on opposite sides of the seal body, and may be offset relative to each other. The plurality

of first channels may have a first width and the plurality of second channels have a second width, the first width being equal to the second width or the first width being different than the second width. The plurality of first channels and the plurality of second channels may each form a star-shaped configuration. The plurality of first channels and the plurality of second channels may extend partially along the radius of the seal. One end of each of the plurality of first channels and one end of each of the plurality of second channels may converge at the opening.

In various embodiments, when a hand or an instrument is inserted through the opening, the plurality of first channels and the plurality of second channels deform in an accordion-like manner to accommodate the hand or the instrument. The seal may be formed of foam, e.g., a monolithic piece of foam.

The housing may be a wound retractor. The wound retractor may include a distal ring for positioning through an incision for placement inside a body wall and against an interior surface of a body wall, a proximal ring for positioning outside of the body wall and a flexible sleeve connecting the distal and proximal rings, the sleeve configured to be rolled around the proximal ring so as to shorten the length of the sleeve and thereby generate a retraction force to retract the incision. In addition, the housing may also include a stiffening ring that assists with maintaining the proximal ring in a circular shape, the seal mounting directly to the stiffening ring.

The opening may be closed in a rest position so as to prevent the escape of insufflation gas therethrough when no hand or instrument is inserted. The seal body may also have one or more additional openings for sealed reception of an instrument therethrough. At least a portion of the one or more additional openings may be molded so as to be closed until reception of an instrument therethrough tears the material to fully form the opening. At least a portion of the one or more additional openings may include a pre-formed slit that, in a rest position, is closed.

Further scope of applicability of the present disclosure will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating illustrative embodiments of the present disclosure, are given by way of illustration only, since various changes and modifications within the spirit and scope of the present disclosure will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the present disclosure and, together with the detailed description of the embodiments given below, serve to explain the principles of the disclosure:

FIG. **1** is a perspective view in partial cross-section of a hand or instrument access surgical site seal cover or plug according to one exemplary embodiment of the present disclosure, including a pleated seal having a plurality of first and second channels on respective first top and second bottom sides of the pleated seal;

FIG. **2** is an enlarged cross-sectional view taken along the lines **2-2** of FIG. **1** illustrating the configuration of the first and second channels;

FIG. **3** is a perspective view in partial cross-section illustrating the second side of the pleated seal and the second channels;

FIG. **4** is a top plan view of the pleated seal illustrating the radial displacement of the first and second channels with the second channels being shown in phantom;

FIG. **5** is a perspective view in partial cross-section of a hand or instrument access surgical site seal cover or plug according to another exemplary embodiment of the present disclosure;

FIG. **6** is an enlarged cross-sectional view taken along the lines **6-6** of FIG. **5** illustrating the configuration of the first and second channels of FIG. **5**;

FIG. **7** is a perspective view in partial cross-section of a hand or instrument access surgical site seal cover or plug according to another exemplary embodiment of the present disclosure;

FIG. **8** is an enlarged cross-sectional view taken along the lines **8-8** of FIG. **7** illustrating the configuration of the first and second channels of FIG. **7**;

FIGS. **9-10** are perspective views illustrating introduction of a patient's arm through the pleated seal body;

FIGS. **11-12** are top plan views of the seal in closed and open positions respectively; and

FIG. **13** is a side partial cross-sectional view of a wound retractor having a stiffening ring to which the laparoscopic sealing covers or plugs may be mounted, according to various embodiments of the present invention.

DETAILED DESCRIPTION

Particular embodiments of the present disclosure will be described herein with reference to the accompanying drawings. As shown in the drawings and as described throughout the following description, and as is traditional when referring to relative positioning on an object, the term "proximal" refers to the end of the laparoscopic sealing cover or plug that is closer to the user and the term "distal" refers to the end of the laparoscopic sealing cover or plug that is further from the user.

The laparoscopic sealing covers or plugs of the present disclosure, according to various embodiments thereof, include sealable openings that receive various types of instrumentation or objects (e.g., a hand of a user) while maintaining a fluid tight seal about the instrumentation or hand to prevent the loss of insufflation pressure within a laparoscopic surgical site. In addition, the laparoscopic sealing covers or plugs of the present disclosure, according to various embodiments thereof, maintain insufflation pressure within a laparoscopic surgical site when no instrumentation or objects are introduced, the sealable openings thereby providing a zero seal. The laparoscopic sealing covers or plugs accommodate angular manipulation of the hand, arm or a surgical instrument. The sealable openings may prevent the escape of insufflation gas from the body cavity, as well as prevent the entry of undesirable foreign matter into the body cavity. Examples of instrumentation include trocars, clip appliers, graspers, dissectors, retractors, staplers, laser probes, photographic devices, endoscopes and laparoscopes, tubes, and the like.

The present disclosure relates to various embodiments of hand/or instrument access surgical site seal covers or plugs that enable sealed access to a surgical site with either a surgeon's hand and/or one or more instruments.

A surgical site may include an opening or incision in a patient or a natural orifice through which a surgical procedure may be performed.

FIGS. **1-4** illustrate an exemplary embodiment of the present invention. The laparoscopic sealing cover or plug may be mounted to a housing, such as a wound retractor or

a separate stiffening ring used in combination with a wound refractor. The laparoscopic sealing cover or plug **100**A includes a seal body **100** defining a central longitudinal axis "k" and a central seal passage or opening **130** in general longitudinal alignment with the central longitudinal axis "k". The seal body **100** has a first top (e.g., proximal) side or surface **105** and an opposed second bottom (e.g., distal) side or surface **107**. The laparoscopic sealing cover or plug **100** has a plurality of first grooves or channels **110** disposed on the top surface **105** and a plurality of second grooves or channels **120** disposed on the bottom surface **107**. The first and second channels **110**, **120** do not extend fully through the seal body **100** but rather extend partially from therethrough. The plurality of second channels **120** are more clearly depicted in FIG. **3**, which is a bottom view of the laparoscopic sealing cover or plug **100**A. The laparoscopic sealing cover or plug **100**A is illustrated as being flat, although it may have a domed or other suitable shape. A plurality of different materials may be used to form or construct the laparoscopic sealing cover or plug **100**A, as discussed below in further detail.

Each of the first and second channels **110**, **120** may be generally V-shaped, as best depicted in FIG. **2**, or U-shaped, having a first width or dimension **140** at or near the exterior surface of the laparoscopic sealing cover or plug, the first width or dimension **140** gradually decreasing toward the interior of the seal body **100** and terminating at a bottom surface **121**. The first and second channels **110**, **120** may be substantially identical in their respective cross-sectional shapes or dimensions, or, in the alternative, may have different cross-sectional shapes or dimensions. Referring to the embodiment shown herein, the V-shape of the second channels **120** is inverted relative to the V-shape of the first channel **110** due to their arrangement on the opposite side of surface of the laparoscopic sealing cover or plug **100**A. In an embodiment, the top surface **105** has ten channels (see FIG. **1**) and the bottom surface **107** also has 10 channels (see FIG. **3**). However, any number of channels may be located on either the top or bottom surfaces **105**, **107**, such as, for example, 5 through 20 channels per side. In the embodiment shown, the first and second channels **110**, **120** do not extend fully to the outer perimeter of the laparoscopic sealing cover or plug **100**A (or along the entire radius of the laparoscopic sealing cover or plug **100**A). Instead, the first and second channels **110**, **120** extend about ¾ of the radius of the laparoscopic sealing cover or plug **100**A. The first and second channels **110**, **120** each extend radially outwardly relative to the longitudinal axis "k", and may or may not be coterminous with the central seal passage **130**. The first and second channels **110**, **120** form star-shaped configurations on the top surface **105** and the bottom surface **107**, respectively. As illustrated, the plurality of first channels **110** are arranged in a circumferential manner and the plurality of second channels **120** are also arranged in a circumferential manner. The plurality of first channels **110** may form a first pattern on the top surface **105** and the plurality of second channels **120** may form a second pattern on the bottom surface **107**. In the exemplary embodiments described herein, the first and second patterns are similar.

Adjacent first channels **110** are separated by wedge segments **109** of the seal body **100** (FIG. **1**) and adjacent second channels **120** are separated by wedge segments **111** of the seal body **100** (FIG. **3**). This arrangement of alternating channels and wedge segments, offset on opposite sides of the laparoscopic sealing cover or plug **100**A, provides an undulating or corrugated structure in cross-section so as to form pleats, such structure increasing the structural integrity of the laparoscopic sealing cover or plug **100**A while enabling the laparoscopic sealing cover or plug **100**A to accommodate stretching and deformation during passage of an instrument or a clinician's hand and arm.

In an embodiment, the first channels **110** are equidistantly spaced relative to each other at a first predefined angular displacement "A" and the second channels **120** are equidistantly spaced relative to each other at a second predefined angular displacement "B." In an embodiment having the same number of first and second channels **110**, **120**, the first and second predefined angular displacements "A", "B" may be substantially equal. For example, in an embodiment having ten first and second channels **110**, **120** on the top and bottom surfaces **105**, **107**, the angular displacement "A", "B" is about 36 degrees. In other embodiments, the first and second channels **110**, **120** may have varying angular displacements. Furthermore, while the first and second channels **110**, **120** are each straight in the embodiments shown and described herein, in still other embodiments, the first and second channels **110**, **120** may define a shape other than straight, e.g., curved, angled, etc.

With reference to FIG. **4**, the first and second channels **110**, **120** may be angularly offset or displaced with respect to each other. In FIG. **4**, the second channels **120** are depicted in phantom. In an embodiment, the second channels **120** are angularly offset to bisect adjacent first channels **110**, e.g., the second channels **120** are arranged along the midline separating adjacent first channels **110**, e.g., along the midline of the wedge segment **109**. The first channels **110** are angularly offset to bisect adjacent second channels **120**, e.g., the first channels **110** are arranged along the midline separating adjacent second channels **120**, e.g., along the midline of the wedge segment **111**. This arrangement adds to the structural integrity of the seal body **100** by ensuring that the thickness beneath each of the first channels **110** and above each of the second channels **120** is sufficient to withstand stretching of the seal body during passage of the arm or hand of the clinician without the laparoscopic sealing cover or plug **100**A inadvertently tearing.

Referring to FIG. **1**, opening **130** is shown adjacent the center of top surface **105**. In the embodiment shown, the opening **130** is configured to receive a hand and/or arm of a user (e.g., a surgeon). In addition, FIG. **1** illustrates a plurality of additional openings **150** (although any number of such openings, e.g., one or more, may be employed). Openings **150** are located on the top surface of the laparoscopic sealing cover or plug **100**A and advantageously are positioned such that their uppermost portion (the portion that is co-planar with the top surface of the laparoscopic sealing cover or plug **100**A) is located in a respective wedge section of the top surface, and such that their lowermost portion (the portion that is co-planar with the bottom surface of the laparoscopic sealing cover or plug **100**A) is located in a respective channel **120** of the bottom surface. In an embodiment, the openings **150** taper from the top surface of the laparoscopic sealing cover or plug **100**A to the bottom surface of the laparoscopic sealing cover or plug **100**A. In this manner, the openings **150** have a relatively large diameter at the top surface, allowing a surgeon to easily locate and place an instrument therethrough, and a relatively small diameter at the bottom surface, providing for an improved seal. In an embodiment, the openings **150** may, in a rest position of the laparoscopic sealing cover or plug **100**A, be open. Alternatively, in other embodiments, the openings **150** may, in a rest position of the laparoscopic sealing cover or plug **100**A, be closed so as to provide a zero seal when an instrument is not present therethrough. In such an embodi-

ment, the laparoscopic sealing cover or plug **100**A may be molded such that the material that forms the lowermost portion of the openings **150** forms a thin barrier that prevents passage of insufflation gases, the thin barrier being puncturable by an instrument inserted therethrough. Alternatively, the laparoscopic sealing cover or plug **100**A may be molded such that the material that forms the lowermost portion of the openings **150** has a pre-formed hole or slit therethrough, the hole or slit being pressed closed during use so as to prevent passage of insufflation gases. Any number of openings **150** may be employed, so as to enable simultaneous sealed access of both a hand/arm (through the opening **130**) and an instrument (through the openings **150**).

The laparoscopic sealing cover or plug **100**A may be constructed of rigid materials or alternatively made from a disposable, pliable, compressible, and/or flexible type material, for example, but not limited to, a suitable foam material having sufficient compliance to form a seal about one or more surgical objects. In one embodiment, the foam may be at least partially constituted of polyisoprene, urethane, or silicone, or the like. Moreover, the laparoscopic sealing cover or plug **100**A may be formed of a medical grade plastic or medical grade foam or, e.g., latex, silicone rubber, Mylar®, polyethylene, polyurethane, a flexible polymeric material, or a composite material, such as a polyethylene and nylon composite, or any other resilient material suitable for the intended purpose of permitting insertion and manipulation, e.g., off-axis manipulation, of a surgical instrument or clinician's hand.

FIG. **5** illustrates a top view of a laparoscopic sealing cover or plug **200**, according to another exemplary embodiment of the present disclosure. The laparoscopic sealing cover or plug **200** is generally similar to the seal **100** described with reference to FIGS. **1-4**, except that the plurality of first channels **210** and the plurality of second channels **220** are twelve in number. Thus, the first channels **210** may be angularly displaced at an angle "C" of about 30 degrees. Similarly, the second channels **120** may be angularly displaced at an angle "D" of about 30 degrees. Other symmetrical and non-symmetrical arrangements are envisioned as well. In addition, similar to the embodiment of FIGS. **1-4**, the first and second channels **210**, **220** are radially offset with respect to each other, e.g., when viewing the laparoscopic sealing cover or plug **200** in plan view, to bisect adjacent first and second channels **210**, **220** as discussed hereinabove.

As best depicted in FIG. **6**, the first and second channels **210**, **220** may each define cross-sectional dimensions that differ at varying depths thereof. For example, the first and second channels **210**, **220** each define a first, relatively wider V-shaped segment **212** adjacent the respective top and bottom surfaces of the seal **200** and a second, relatively narrower segment **215** extending therefrom farther into the interior of the laparoscopic sealing cover or plug **200** so as to provide still further flexibility of the laparoscopic sealing cover or plug **100**A. The second, relatively narrower segment **215** may, in a rest position of the laparoscopic sealing cover or plug **200**, be slightly V-shaped or may be closed and converge to bottom **216**.

FIG. **7** illustrates a top perspective view of a laparoscopic sealing cover or plug **300**A, according to another exemplary embodiment of the present disclosure. The laparoscopic sealing cover or plug **300**A is similar to the embodiments previously described hereinabove—however, in this embodiment, the channels **310** define a slight taper or elongate V-shape, e.g., almost substantially linear in configuration, and terminating at an apex **315** such that, in a rest position, they are nearly closed (the channels, in other embodiments, may be completely closed, e.g., the opposing side walls that define the channels may touch each other when the laparoscopic sealing cover or plug **300**A is in a rest position). These different channel configurations may further increase the flexibility and structural integrity of the laparoscopic sealing cover or plug **300**A.

FIGS. **9-10** illustrate an arm **410** extending through the laparoscopic sealing cover or plug, e.g., the laparoscopic sealing cover or plug **200**A of FIGS. **5-6** having the opening **230**. FIG. **9** depicts the fingers and palm of a hand of the clinician initially introduced within the opening **230**. As the fingers pass through the opening **230**, the opening **230** stretches in, e.g., an accordion-like manner as facilitated by the pleated configuration provided by the first and second channels **210**, **220**. For example, the channels **210**, **220** expand to accommodate passage of the hand, and may also contract once the hand passes through the seal opening **230** to maintain the seal about the arm. FIG. **10** illustrates the seal opening **230** expanded to accommodate the arm of the clinician. It is noted that FIGS. **9-10** further illustrate schematically a housing **450**, which may be a wound retractor or a wound retractor in combination with a proximal stiffening ring. It is contemplated that the laparoscopic sealing cover or plug **100**A is selectively attachable/detachable to a housing **450** in order to form a hand or instrument access assembly.

In operation, as illustrated in FIGS. **9-10**, as the user (e.g., a surgeon) inserts his/her fingers **415**, palm **420**, wrist **425**, and forearm **430** through the opening **130** of the seal **200**, the seal **200** deforms in an accordion-like manner. The deformation may be an expansion/contraction of the individual channels **210**, **220** as various portions of the arm **410** are inserted through the opening **230** of the seal **200**. The expansion/contraction action occurs to the first surface **218** of each channel **110**. Thus, the width of each channel **210** is expanded to accommodate the arm **410**. The channels **110** on the top surface **205** expand and/or flex in order to enable the central opening to more easily accommodate the hand **420** and maintain a secure sealing relationship between the hand **420** and the opening **230**. The channels **220** on the bottom surface **207** may likewise expand and/or flex when the hand **420** is accommodated in the opening **230**. The off-centered or offset relationship between the plurality of first channels **210** and the plurality of second channels **220** allows for the creation of an accordion-like deformation **440** of the seal **200** as an object (e.g., an arm **410**) is inserted through the opening **230**.

FIGS. **11-12** illustrate such accordion-like deformation **440**. FIG. **11** is a top view **500**A of the laparoscopic sealing cover or plug **200** in a closed, rest configuration. FIG. **12** is a top view **500**B of the laparoscopic sealing cover or plug **200** in a biased configuration. Each of the plurality of channels **210** is deformed to a biased or expanded condition due to the insertion of an object (e.g., an arm **410**, not shown) in opening **230**. This deformation **440** is characterized as an accordion-like deformation due to the expansion/contraction of channels **210**, **220**.

This pleated or undulating cross-sectional arrangement may incorporate any number of channels on the top and bottom surfaces of the seal to create a plurality of different patterns thereon. By off-centering the channels of the top surface from the channels of the bottom surface, the probability of tearing the seal is reduced and the laparoscopic sealing cover or plug has improved flexibility to accommodate passage and movement of an instrument and/or hand/arm.

As set forth above, the laparoscopic sealing cover or plug may be mounted to a housing, such as a wound retractor or a separate stiffening ring used in combination with a wound retractor. FIG. **13** is a side partial cross-sectional view of a wound retractor having a stiffening ring to which the laparoscopic sealing covers or plugs may be mounted, according to various embodiments of the present invention. For example, FIG. **13** illustrates a wound retractor **500** that includes a distal ring **502** for positioning through an incision for placement inside a body wall and against an interior surface of a body wall, a proximal ring **503** for positioning outside of the body wall and a flexible sleeve **501** connecting the distal and proximal rings **502**, **503**, the sleeve **501** configured to be rolled around the proximal ring **503** so as to shorten the length of the sleeve **501** and thereby generate a refraction force to retract the incision. FIG. **13** also illustrates a stiffening ring **600** that assists with maintaining the proximal ring **503** in a circular shape. In various embodiments, the laparoscopic sealing covers or plugs may be selectively mounted directly to the stiffening ring **600** so as to be attached and/or detached as desired by the user. In various embodiments, the seal body may engage, e.g., by friction-fit or any other method of engagement, a radial inward-facing surface **602** of the stiffening ring **600** such that a compression force creates a seal between the stiffening ring **600** and the seal body. Additionally or alternatively, the seal body may engage, e.g., by friction-fit or any other method of engagement, an upper flange **601** of the stiffening ring **600** such that a seal between the stiffening ring **600** and the seal body is created at this location.

While several embodiments of the disclosure have been shown in the drawings, it is not intended that the disclosure be limited thereto, as it is intended that the disclosure be as broad in scope as the art will allow and that the specification be read likewise. Therefore, the above description should not be construed as limiting, but merely as examples of particular embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

Persons skilled in the art will understand that the various covers or plugs, and corresponding methods of use described herein, and shown in the accompanying drawings, constitute non-limiting, exemplary embodiments of the present disclosure, and that additional components and features may be added to any of the embodiments discussed herein above without departing from the scope of the present disclosure.

Additionally, persons skilled in the art will understand that the elements and features shown or described in connection with one exemplary embodiment may be combined with those of another embodiment without departing from the scope of the present disclosure, and will appreciate further features and advantages of the presently disclosed subject matter based on the above-described embodiments and the claims. Accordingly, the present disclosure is not limited by what has been particularly shown and described.

What is claimed is:

1. A hand or instrument access assembly comprising:

a housing; and

a seal body mounted to the housing, the seal body having a first proximal surface and a second distal surface opposing the first proximal surface, the seal body defining a substantially centrally disposed opening extending through the first proximal surface and the second distal surface, and second openings for sealed reception of an instrument therethrough;

the first proximal surface having a plurality of first channels extending radially outwardly from the substantially centrally disposed opening and coterminous therewith and the second distal surface having a plurality of second channels extending radially outwardly from the substantially centrally disposed opening and coterminous therewith, the plurality of first channels being radially offset relative to the plurality of second channels, wherein the plurality of first and second channels are separate and distinctly formed from one another, at least one of the second openings being positioned in between at least two of the first channels of the plurality of first channels.

2. The hand or instrument access assembly according to claim **1**, wherein the plurality of first channels have a first width and the plurality of second channels have a second width, the first width being equal to the second width.

3. The hand or instrument access assembly according to claim **1**, wherein the plurality of first channels have a first width and the plurality of second channels have a second width, the first width being different than the second width.

4. The hand or instrument access assembly according to claim **1**, wherein the plurality of first channels and the plurality of second channels each form a star-shaped configuration.

5. The hand or instrument access assembly according to claim **1**, wherein the plurality of first channels and the plurality of second channels are configured to deform in an accordion-like manner to accommodate a hand or an instrument introduced therein.

6. The hand or instrument access assembly according to claim **1**, wherein the seal body is formed of foam.

7. The hand or instrument access assembly according to claim **6**, wherein the seal body is formed of a monolithic piece of foam.

8. The hand or instrument access assembly according to claim **1**, wherein the housing is a wound retractor.

9. The hand or instrument access assembly according to claim **8**, wherein the wound retractor includes a distal ring for positioning through an incision for placement inside a body wall and against an interior surface of the body wall, a proximal ring for positioning outside of the body wall and a flexible sleeve connecting the distal and proximal rings, the sleeve configured to be rolled around the proximal ring so as to shorten the length of the sleeve and thereby generate a retraction force to retract the incision.

10. The hand or instrument access assembly according to claim **9**, wherein the housing further comprises a stiffening ring that assists with maintaining the proximal ring in a circular shape, the seal body mounted directly to the stiffening ring.

11. The hand or instrument access assembly according to claim **1**, wherein the substantially centrally disposed opening is closed in a rest position and configured to inhibit the escape of insufflation gas therethrough when no hand or instrument is inserted.

12. The hand or instrument access assembly according to claim **1**, wherein at least a portion of one of the second openings is molded so as to be closed until reception of the instrument therethrough, which tears the material to fully form the opening.

13. The hand or instrument access assembly according to claim **1**, wherein at least a portion of one of the second openings includes a pre-formed slit that, in a rest position, is closed.

14. The hand or instrument access assembly according to claim 1, wherein each of the first and second channels are partially configured to be normally closed to inhibit passage of fluids therethrough.

15. A hand access assembly for performing a laparoscopic surgical procedure, the assembly comprising:

a seal body defining a central longitudinal axis and having a first proximal surface and a second distal surface, and defining a first opening extending through the first proximal surface and the second distal surface for reception of a hand, and a second opening for sealed reception of an instrument therethrough, the seal body having a plurality of first channels within the first proximal surface and extending radially outwardly relative to the opening and a plurality of second channels within the second distal surface and extending radially outwardly relative to the opening, the plurality of first and second channels being radially offset with respect to each other and the longitudinal axis, wherein the plurality of first and second channels are separate and distinctly formed from one another, the second opening interposed between two first channels of the plurality of first channels.

16. The hand access assembly according to claim 15, wherein the first channels and the second channels each terminate within the seal body.

17. The hand access assembly according to claim 16, wherein each of the first and second channels have portions configured to be normally closed to inhibit passage of fluids therethrough.

18. The hand access assembly according to claim 15, wherein the second opening is molded so as to be closed until reception of the instrument therethrough, which tears the material to fully form the opening.

19. The hand access assembly according to claim 15, wherein the second opening includes a pre-formed slit that, in a rest position, is closed.

* * * * *

专利名称(译)	用于手术或仪器通道的折叠式密封		
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申请(专利权)人(译)	COVIDIEN LP		
当前申请(专利权)人(译)	COVIDIEN LP		
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摘要(译)

一种用于外科器械和/或外科医生的手的外科进入组件，该组件包括壳体，例如伤口牵开器，以及安装到壳体的密封体。当在横截面中观察时，密封体可以具有褶皱构造。密封体可以具有第一表面和第二表面，第一表面具有多个径向延伸的第一通道，第二表面具有多个径向延伸的第二通道，多个第一通道偏离多个第二通道。第二频道。密封体可以限定基本上居中设置的开口，用于接收手/臂或器械。另外，密封体可以限定一个或多个附加开口，用于同时接收器械和手。