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Golebieski et al.(10) **Pub. No.: US 2016/0000420 A1**(43) **Pub. Date: Jan. 7, 2016**(54) **PLEATED SEAL FOR SURGICAL HAND OR INSTRUMENT ACCESS**(52) **U.S. CL.**CPC *A61B 17/0218* (2013.01); *A61M 13/003*
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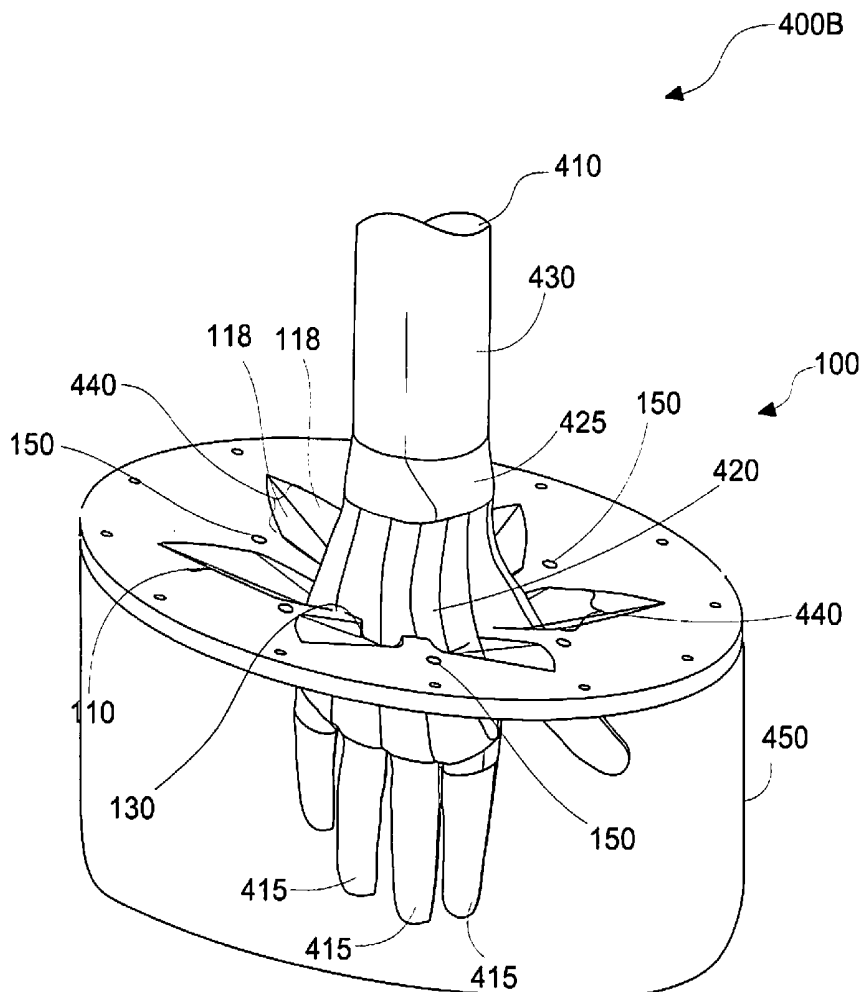
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ABSTRACT

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.

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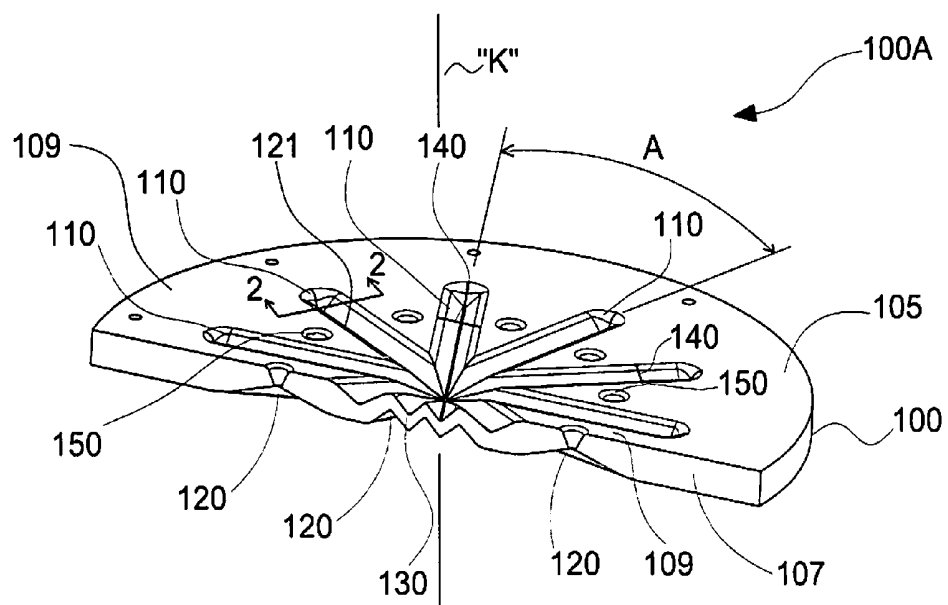


FIG. 1

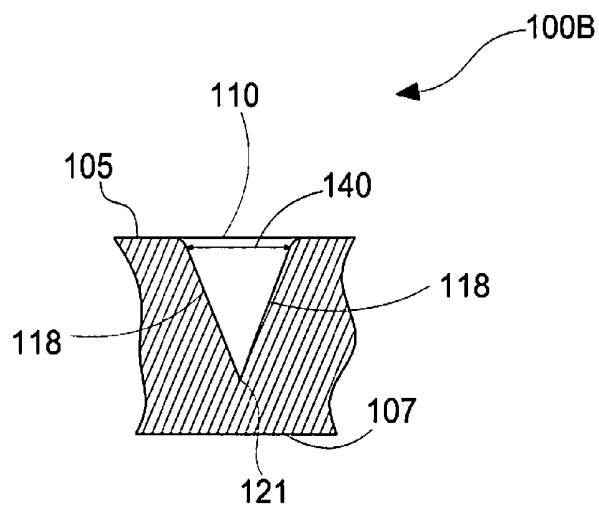
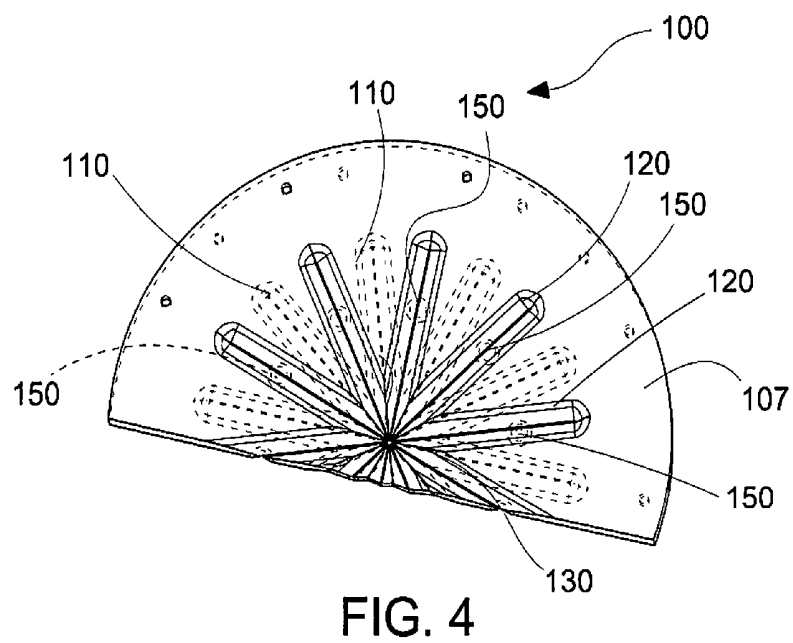
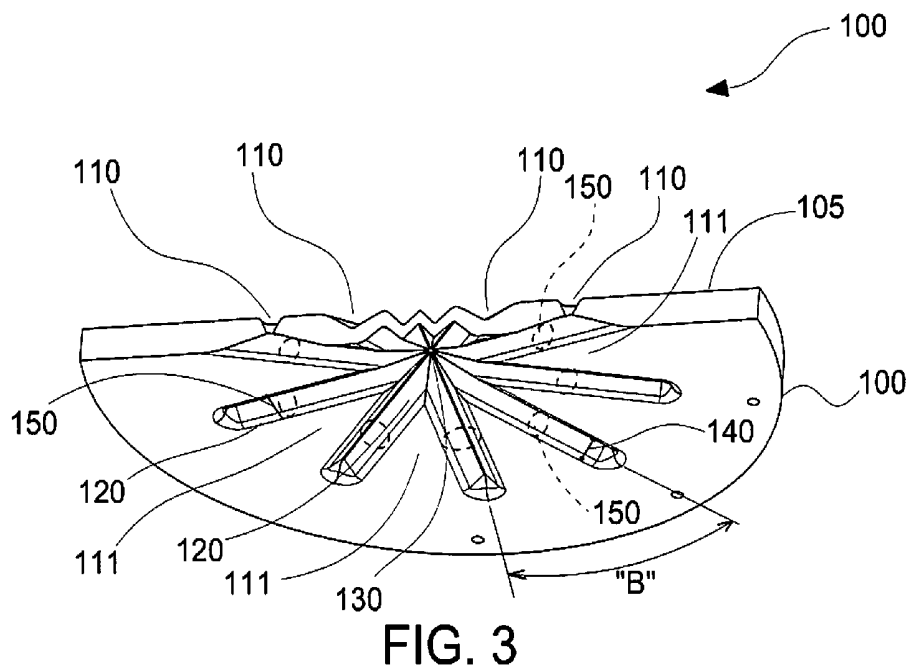


FIG. 2



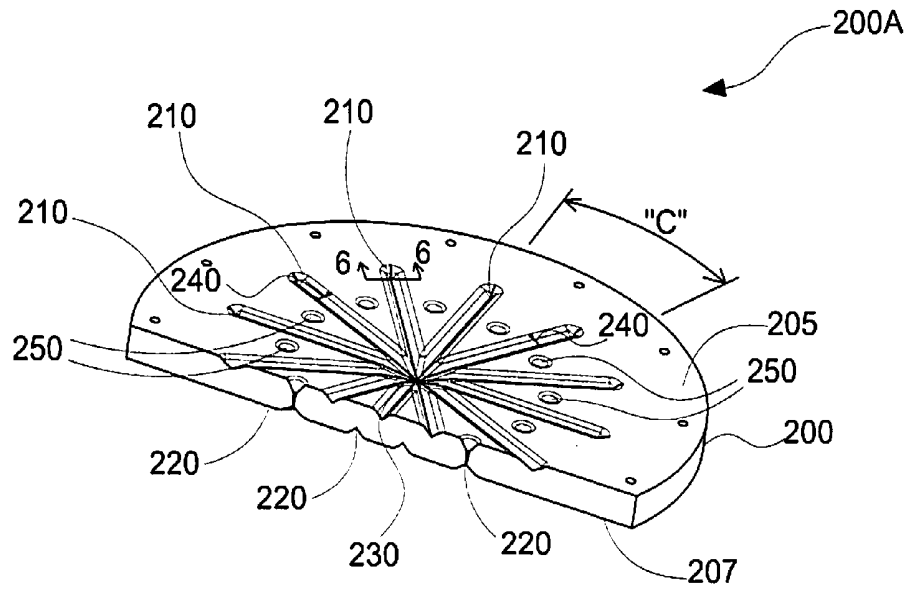


FIG. 5

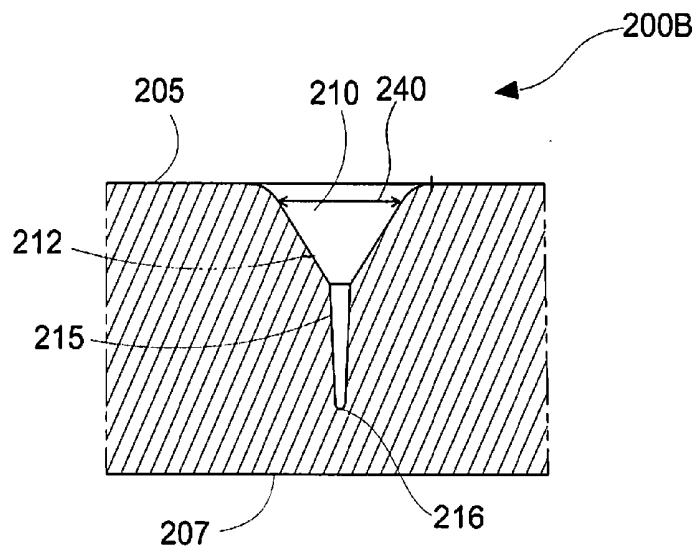


FIG. 6

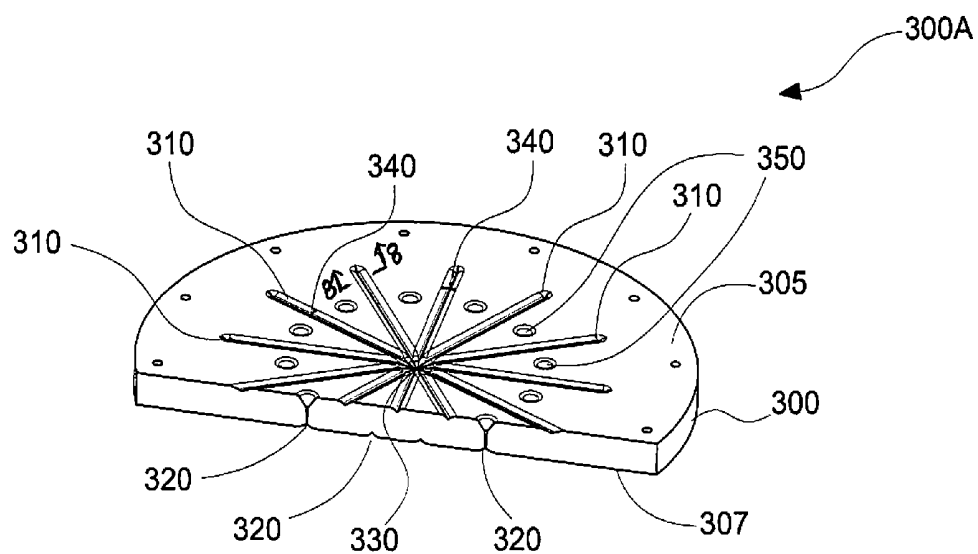


FIG. 7

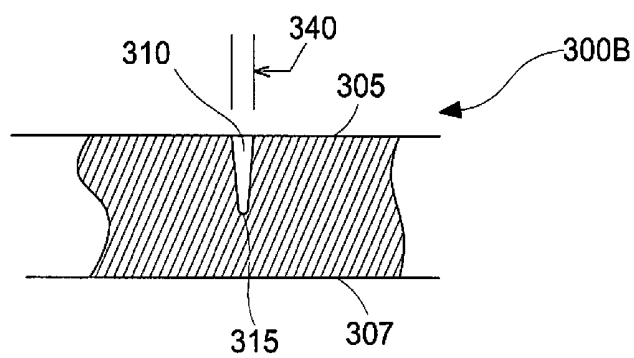


FIG. 8

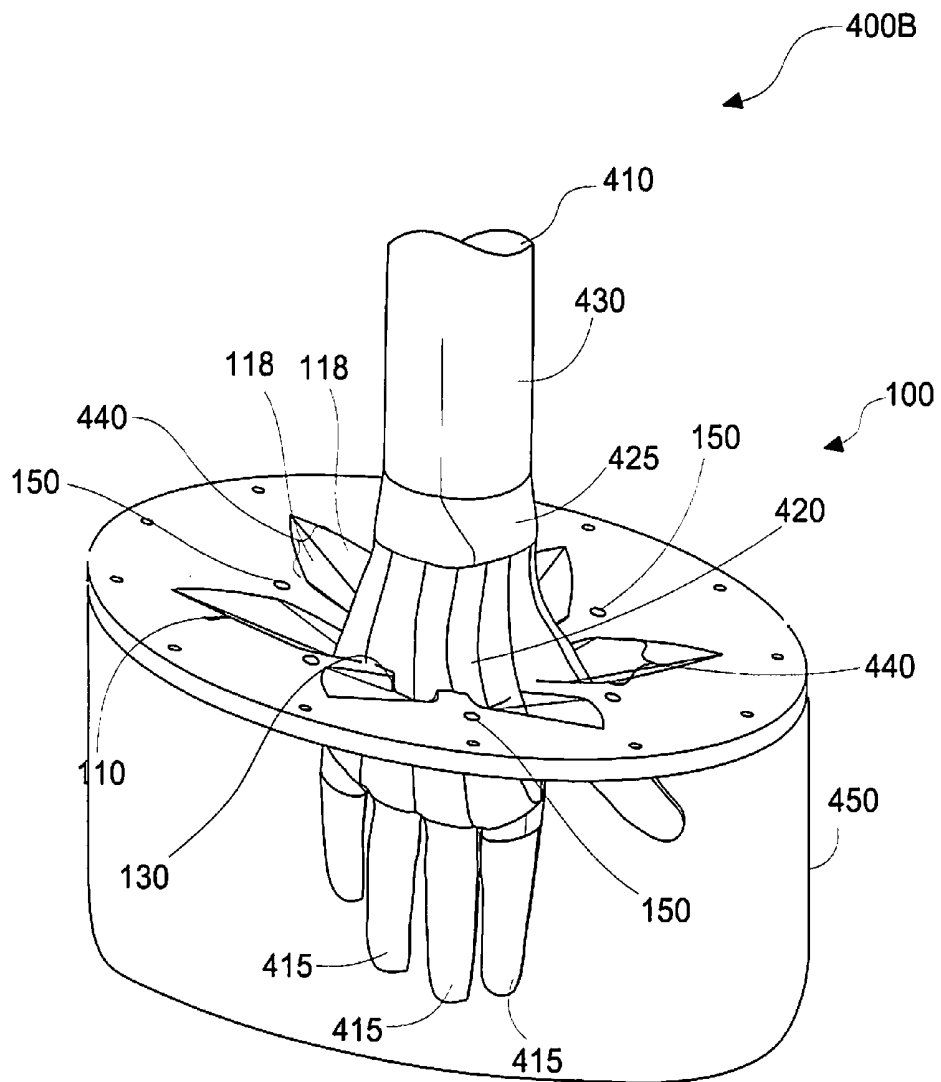


FIG. 9

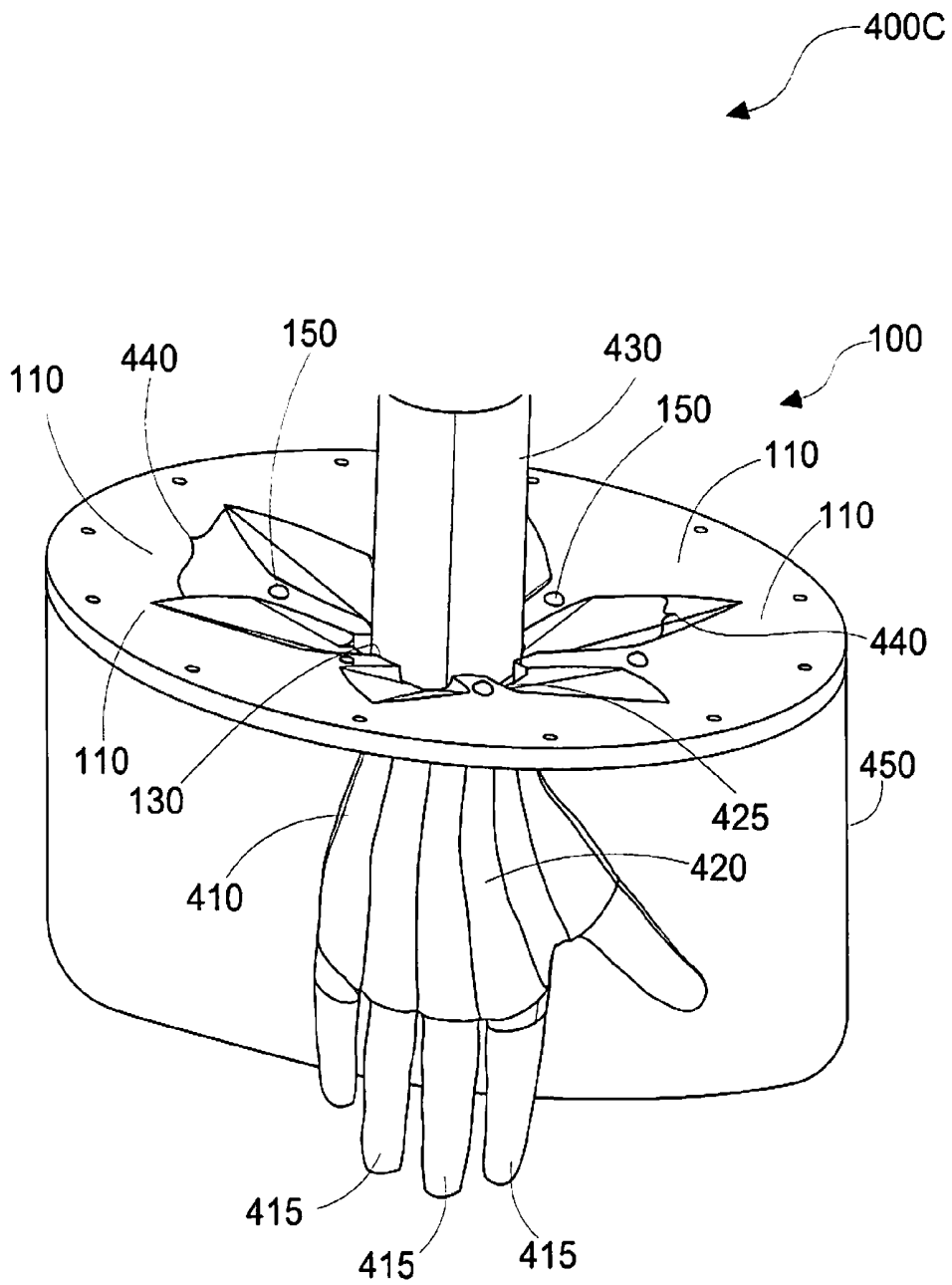


FIG. 10

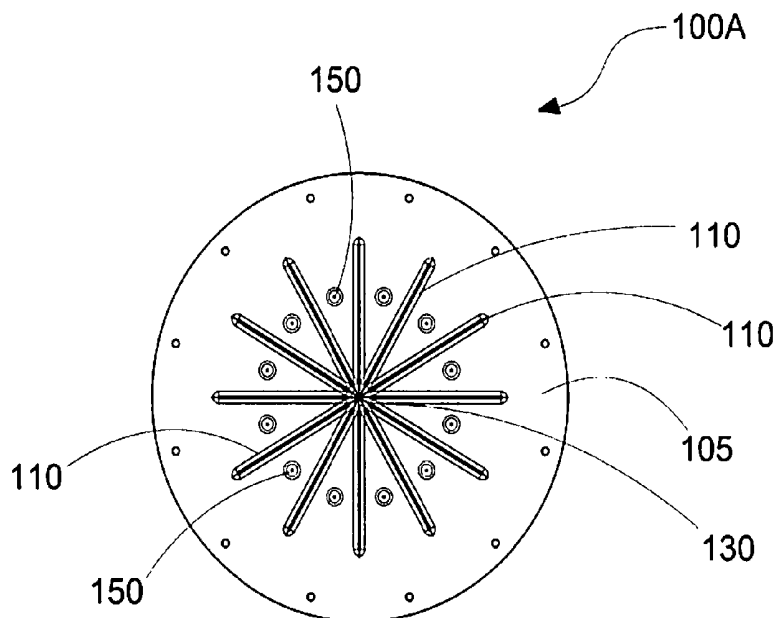


FIG. 11

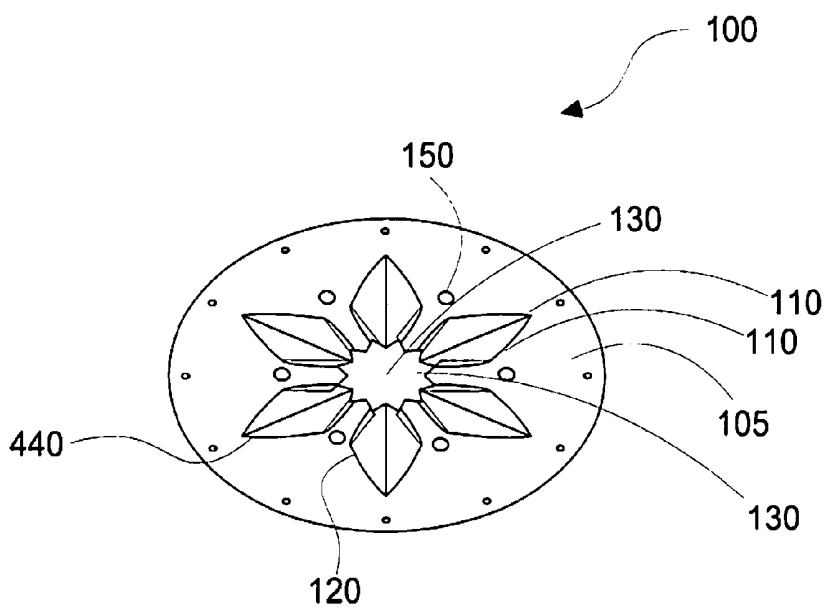


FIG. 12

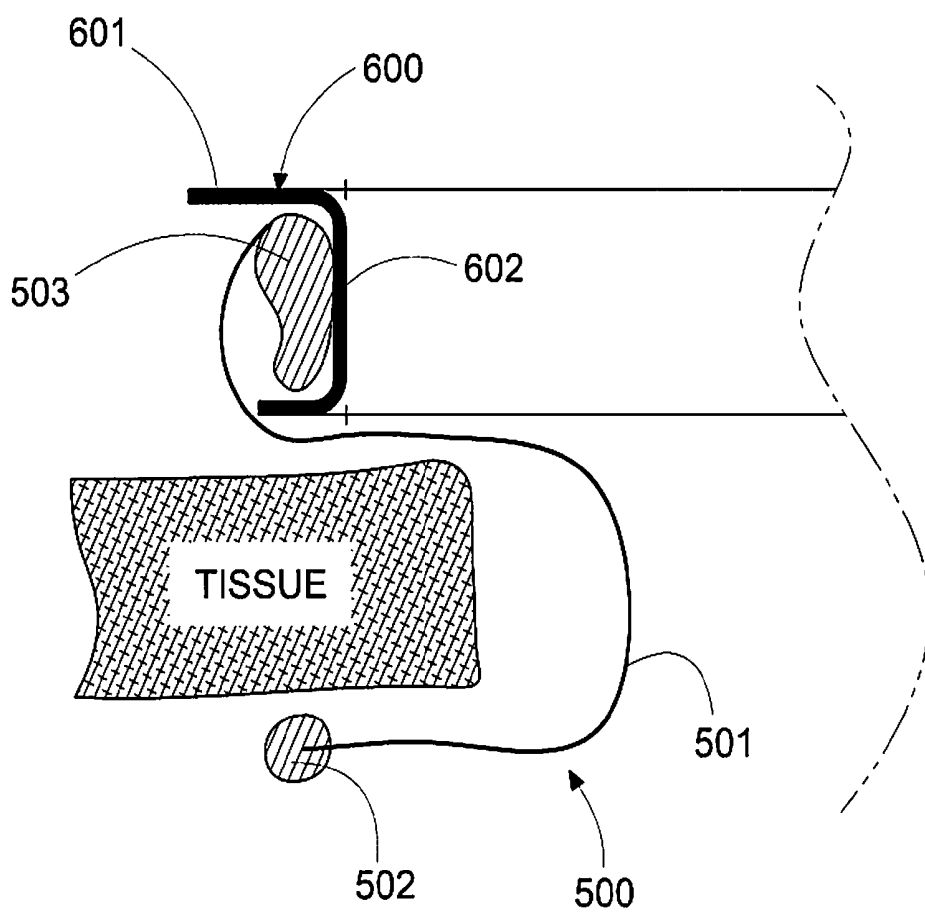


FIG. 13

PLEATED SEAL FOR SURGICAL HAND OR INSTRUMENT ACCESS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] 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

[0002] 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

[0003] 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.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] 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 there-

through for reception of a surgical instrument or hand, wherein the seal body has a pleated configuration.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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

[0018] 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:

[0019] 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 dis-

closure, including a pleated seal having a plurality of first and second channels on respective first top and second bottom sides of the pleated seal;

[0020] 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;

[0021] FIG. 3 is a perspective view in partial cross-section illustrating the second side of the pleated seal and the second channels;

[0022] 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;

[0023] 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;

[0024] 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;

[0025] 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;

[0026] 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;

[0027] FIGS. 9-10 are perspective views illustrating introduction of a patient's arm through the pleated seal body;

[0028] FIGS. 11-12 are top plan views of the seal in closed and open positions respectively; and

[0029] 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

[0030] 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.

[0031] 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.

[0032] 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.

[0033] A surgical site may include an opening or incision in a patient or a natural orifice through which a surgical procedure may be performed.

[0034] 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 100A 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 100A. The laparoscopic sealing cover or plug 100A 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 100A, as discussed below in further detail.

[0035] 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 100A. 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 100A (or along the entire radius of the laparoscopic sealing cover or plug 100A). Instead, the first and second channels 110, 120 extend about $\frac{3}{4}$ of the radius of the laparoscopic sealing cover or plug 100A. 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.

[0036] 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 100A, 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 100A while enabling the laparoscopic sealing cover or plug 100A to accommodate stretching and deformation during passage of an instrument or a clinician's hand and arm.

[0037] 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.

[0038] 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 100A inadvertently tearing.

[0039] 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 100A 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 100A) 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 100A) 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 100A to the bottom surface of the laparoscopic sealing cover or plug 100A. 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 100A, be open. Alternatively, in other embodiments, the openings 150 may, in a rest position of the laparoscopic sealing cover or plug 100A, be closed so as to provide a zero seal when an instrument is not present therethrough. In such an embodiment, the laparoscopic sealing cover or plug 100A 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 100A 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).

[0040] The laparoscopic sealing cover or plug 100A 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 100A 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.

[0041] 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.

[0042] 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, rela-

tively wider V-shaped segment adjacent the respective top and bottom surfaces of the seal 200 and a second, relatively narrower segment extending therefrom further 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 100A. The more narrow segment 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.

[0043] FIG. 7 illustrates a top perspective view of a laparoscopic sealing cover or plug 300A, according to another exemplary embodiment of the present disclosure. The laparoscopic sealing cover or plug 300A is similar to the embodiments previously described hereinabove—however, in this embodiment, the channels define a slight taper or elongate V-shape, e.g., almost substantially linear in configuration, and terminating at apex 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 300A is in a rest position). These different channel configurations may further increase the flexibility and structural integrity of the laparoscopic sealing cover or plug 300A.

[0044] FIGS. 9-10 illustrate an arm 410 extending through the laparoscopic sealing cover or plug, e.g., the laparoscopic sealing cover or plug 200A 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 100A is selectively attachable/detachable to a housing 450 in order to form a hand or instrument access assembly.

[0045] 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.

[0046] FIGS. 11-12 illustrate such accordion-like deformation 440. FIG. 11 is a top view 500A of the laparoscopic

sealing cover or plug **200** in a closed, rest configuration. FIG. **12** is a top view **500B** 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**.

[0047] 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.

[0048] 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 retraction 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.

[0049] 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.

[0050] 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.

[0051] 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 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.
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 extend partially along the radius of the seal.
6. The hand or instrument access assembly according to claim 1, wherein one end of each of the plurality of first channels and one end of each of the plurality of second channels converge at the opening.
7. The hand or instrument access assembly according to claim 1, wherein, 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.
8. The hand or instrument access assembly according to claim 1, wherein the seal is formed of foam.
9. The hand or instrument access assembly according to claim 8, wherein the seal is formed of a monolithic piece of foam.
10. The hand or instrument access assembly according to claim 1, wherein the housing is a wound retractor.
11. The hand or instrument access assembly according to claim 10, 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.
12. The hand or instrument access assembly according to claim 11, wherein the housing further comprises a stiffening ring that assists with maintaining the proximal ring in a circular shape, the seal mounting directly to the stiffening ring.
13. The hand or instrument access assembly according to claim 1, wherein the opening is closed in a rest position so as to prevent the escape of insufflation gas therethrough when no hand or instrument is inserted.
14. The hand or instrument access assembly according to claim 1, wherein the seal body has one or more additional openings for sealed reception of an instrument therethrough.

15. The hand or instrument access assembly according to claim 14, wherein at least a portion of the one or more additional openings are molded so as to be closed until reception of an instrument therethrough tears the material to fully form the opening.

16. The hand or instrument access assembly according to claim 14, wherein at least a portion of the one or more additional openings include a pre-formed slit that, in a rest position, is closed.

17. 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.

18. 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;

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.

* * * * *

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		
[标]发明人	GOLEBIESKI KEVIN FURNISH GREG MORRIS BENJAMIN JOHNSON WAYNE		
发明人	GOLEBIESKI, KEVIN FURNISH, GREG MORRIS, BENJAMIN JOHNSON, WAYNE		
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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。

