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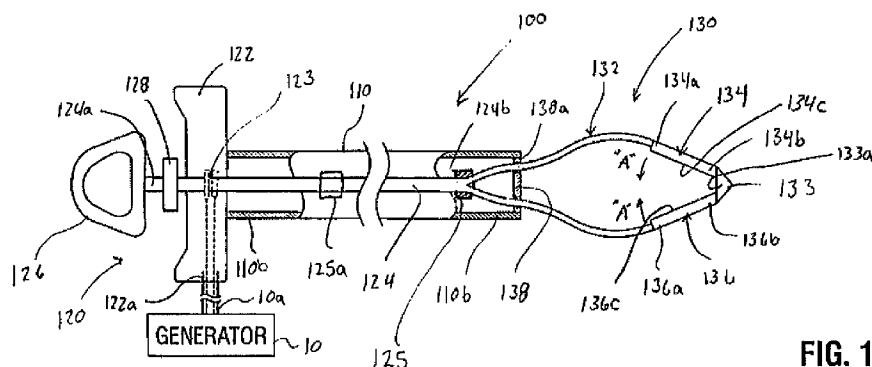


FIG. 1

(57) Abstract: A device and system for removing tissue such as polyps is provided and includes a tubular member having proximal and distal ends, a snare portion operably extending from within the distal end of the tubular member and including first and second electrodes configured to treat tissue therebetween, the snare portion further including a cutting member for severing the treated tissue. The tissue removal device may further include a handle portion operatively extending from within the proximal end of the tubular member. The handle portion may be configured for operable engagement by a user and the cutting member may extend between distal ends of the first and second electrodes.

POLYP REMOVAL DEVICE AND METHOD OF USE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application Serial No. 61/063,158, titled "Endoscopic flexible loop for gastrointestinal polypectomy and mucosal resection using ligasure™ sealing technology", by Wexner et al., filed January 31, 2008, which is incorporated by reference herein.

BACKGROUND

Technical Field

[0002] The present disclosure relates to devices and methods for the removal of internal tissue and, more particularly, to snare-type devices including a pair of electrodes for treating tissue prior to excision.

Background of Related Art

[0003] A polyp is an abnormal growth of tissue projecting from a mucous membrane. A polyp that is attached to the surface of the mucous membrane by a narrow elongated stalk is said to be pedunculated. If no stalk is present, the polyp is said to be sessile. Polyps are commonly found in the colon, stomach, nose, urinary bladder and uterus. Polyps may also form elsewhere in the body where mucous membranes exist, for example, the cervix and small intestine.

[0004] The surgical procedure for removing a polyp is generally referred to as a "polypectomy". Polypectomys are generally endoscopic or laparoscopic procedures performed through the oral or anal cavities. When the location of the polyp permits, the polypectomy may be performed as an open procedure. Conventional polypectomys are completed using various apparatus and techniques known in the art.

[0005] As noted above, there are two forms of polyps, sessile and pedunculated. The stalkless or sessile polyps are generally removed using electrical forceps. For example, the excess tissue projecting from the mucous membrane is cauterized and torn from the tissue wall. Pedunculated polyps, or those with stalks, tend to be larger with a greater blood supply. The size and shape of pedunculated polyps typically do not lend themselves to being removed using traditional forceps. Unlike sessile polyps, polyps with a stalk cannot simply be grasped in the jaw members of an electrosurgical forceps and be torn from the tissue wall. Instead, the polypectomy is performed using a surgical snare device.

[0006] Conventional snare devices are configured with a snare for looping over the distal end of a hanging polyp and tightening securely around the stalk of the polyp. By constricting the snare, and selectively applying energy to the snare, the device may cauterize or seal the polyp at the stalk as the polyp is severed from the tissue wall. Conventional snare devices may be configured for monopolar or bipolar use. Excising a polyp using a conventional snare device typically involves cutting or otherwise separating the polyp from the tissue wall as the snare device is activated and

constricted about the stalk of the polyp. In this manner, the polyp is cauterized as the snare passes through the tissue.

SUMMARY

[0007] Disclosed is a device configured for removing polyps. In one embodiment, the polyp removal device includes a tubular member having proximal and distal ends, a snare portion operably extending from within the distal end of the tubular member and including first and second electrodes configured to seal tissue therebetween, the snare portion further including a cutting member for severing the sealed tissue. The polyp removal device may further include a handle portion operatively extending from within the proximal end of the tubular member. The handle portion may be configured for operable engagement by a user. The cutting member may extend between distal ends of the first and second electrodes.

[0008] The polyp removal device may be configured to grasp the stalk of a polyp between the first and second electrodes. The first and second electrodes may be hingedly attached to the cutting member. The snare portion may be configured to be retracted within the tubular member. The snare portion may be retracted within the tubular member upon retraction of the handle portion relative to the base portion.

[0009] A system including the polyp removal device may further include an electrosurgical generator. The electrodes may be electrically connected to the electrosurgical generator. The distal end of the tubular member may include a spacer member for preventing the first and second electrodes from contacting one another.

Alternatively, at least one of the first and second electrodes may include a spacer mounted thereon for preventing contact between the first and second electrodes.

[0010] Also provided is a polyp removal device including a tubular member having proximal and distal ends, a handle portion operatively extending from the proximal end of the tubular member, and a snare portion slidably supported within the lumen of the tubular member and operably extending from the distal end of the tubular member, the snare portion including first and second electrodes operably mounted thereto for sealing tissue therebetween, wherein at least one of the first and second electrodes includes at least one spacer mounted thereon for preventing contact between the first and second electrodes. The snare portion of the polyp removal device may be retractable with the tubular member.

[0011] Additionally provided is a method of removing a polyp. The method includes the steps of providing a polyp removal device including, a tubular member having proximal and distal ends, a snare portion slidably supported within the lumen of the tubular member and operably extending from the distal end of the tubular member, the snare portion including first and second electrodes operably mounted thereto for sealing tissue therebetween, wherein at least one of the first and second electrodes includes at least one spacer mounted thereon for preventing contact between the first and second electrodes, extending the snare portion relative to the tubular member, looping the snare portion about a portion of a polyp, retracting the snare portion relative to the tubular member to capture the portion of the polyp between the first and second electrodes, and activating the first and second electrodes.

[0012] The method may further include the steps of partially advancing the snare portion relative to the tubular member, retracting the tubular member and the snare portion relative to the polyp and severing the polyp from surrounding tissue.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] 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.

[0014] FIG. 1 is a partial cross-sectional, top plan view of a polyp removal device according to an embodiment of the present disclosure, shown in a first or extended position;

[0015] FIG. 2 is a partial cross-sectional top plan view of the polyp removal device of FIG. 1, shown in a partially retracted position;

[0016] FIG. 3 is a partial cross-sectional top plan view of the polyp removal device of FIG. 1, shown in a retracted position;

[0017] FIG. 4 is a cross-section end view of the polyp removal device of FIGS. 1-3 taken along line 4-4 of FIG. 3;

[0018] FIG. 5 is a partial cross-section top plan view of an alternative embodiment of a polyp removal device according to the present disclosure in a completely retracted position;

[0019] FIG. 6 is a partial top plan view of the distal end of the polyp removal device of FIGS. 1-4, in a first or extending position about a polyp;

[0020] FIG. 7 is a partial top plan view of the distal end of the polyp removal device of FIG. 6, in a retracted position about a polyp; and

[0021] FIG. 8 is a partial top plan view of the distal end of the polyp removal device of FIGS. 6 and 7, in a partially advanced position about a polyp;

[0022] FIG. 9 is a partial top plan view of the distal end of the polyp removal device of FIGS. 6-8, as the stalk of the polyp is being severed; and

[0023] FIG. 10 is a partial top plan view of another illustrative embodiment of a polyp removal device of the present disclosure, in a retracted position about a polyp.

DETAILED DESCRIPTION OF EMBODIMENTS

[0024] The foregoing summary, as well as the following detailed description will be better understood when read in conjunction with the appended figures. For the purpose of illustrating the present disclosure, various embodiments are shown. It is understood, however, that the present disclosure is not limited to the precise arrangement and instrumentalities shown.

[0025] As shown in the drawings and described throughout the following description, as is traditional when referring to relative positioning on an object, the term "proximal" refers to the end of the apparatus that is closer to the user and the term "distal" refers to the end of the apparatus that is further from the user.

[0026] Referring to FIGS. 1-4, an embodiment of the presently disclosed polyp removal device is shown therein and is generally designated as polyp removal device 100. Polyp removal device 100 includes an elongated tubular member 110, a handle portion 120 extending proximally from tubular member 110, and a snare portion or assembly 130 operably engaged with handle portion 120 and extending distally from within elongated tube 110. Polyp removal device 100 may be any suitable length and size for accessing various locations throughout the body. Device 100 may be configured for removal of suitable types of polyps of any size, or may be configured for general mucosal resection or removal of any suitable tissue mass. Preferably, polyp removal device 100 is configured for endoscopic, laparoscopic or transluminal insertion.

[0027] Referring initially to FIGS. 1-3, elongated tubular member 110 includes proximal and distal ends 110a, 110b. Proximal end 110a of tubular member 110 is operably coupled to handle portion 120. As will be described in further detail below, handle portion 120 may be integrally formed with tubular member 110. Alternatively, handle portion 120 may be releasably secured to tubular member 110, or may instead be securely affixed to tubular member 110. Tubular member 110 may be flexible, semi-rigid, or rigid and may be constructed of metal, alloy, plastic, polymers, or any other suitable material. Distal end 110b of tubular member 110 is configured to slidably receive a proximal end of snare portion 130.

[0028] Although the following description of the polyp removal device 100 will be described in the form of a snare-type device, the aspects of the present disclosure may be modified for use with alternative handle configurations, including a pistol grip style

device, mechanically and/or remotely actuated handles, other suitable types of devices or handle arrangements. As one example, polyp removal device 100 may be incorporated as a pistol grip style laparoscopic device like some of the LigaSure™ tissue fusion devices sold by Valleylab of Boulder, CO.

[0029] Still referring to FIGS. 1-3, handle portion 120 of polyp removal device 100 includes a base 122 coupled to proximal end 110a of tubular member 110, a connector shaft 124 extending through base 122, and a handle 126 operably coupled to a proximal end 124a of connector shaft 124. In one embodiment, base 122 of handle portion 120 may be securely affixed to proximal end 110a of tubular member 110 using adhesive, bonding, mechanical fasteners, welding or other suitable methods. Alternatively, base 122 may be releasably connected to tubular member 110 using mechanical fasteners, threaded engagement, friction fitting, bayonet connections, or the like. In this manner, snare portion 130 may be removed and replaced through proximal end 110a of tubular member 110. Base 122 of handle portion 120 may instead be integrally formed with proximal end 110a of tubular member 110. Handle 126 is configured for operable engagement by a user. Handle 126 may be knurled or may include a coating for facilitating engagement by a user.

[0030] Base 122 of handle portion 120 is further configured for operable engagement with a generator 10. Base 122 defines a connection port 122a for receiving an electrical cord 10a extending from generator 10. Electrical cord 10a extends from connection port 122a through base 122 and is operably coupled to first and second electrodes 134, 136 of snare portion 130. Electrical cord 10a may be

directly coupled to first and second electrodes 134, 136. Alternatively, electrical cord 10a may couple with a coupling member 123 mounted to shaft 124. In this manner, coupling member 123 electrically couples generator 10 with first and second electrodes 134, 136 along shaft 124. Generator 10 may include any suitable generator configured to selectively provide energy to electrodes 134, 136. For example, radiofrequency energy, either monopolar or bipolar may be provided to electrodes 134, 136. In other embodiments, ultrasonic, microwave, or laser energy may be provided. Depending on the energy modality utilized, snare 130 and/or electrodes 134, 136 may have to be reconfigured in order to handle the different types of energy.

[0031] In an embodiment where radiofrequency energy is utilized, to increase safety, bipolar radiofrequency energy is preferred because the energy will travel between first and second electrodes 134, 136 instead of between the snare 130 and some remote return pad. In one particular embodiment, generator 10 takes the form of a battery-powered generator that is integral with, or releasably coupled to, polyp removal device 100. In this example, electrical cord 10a is not needed. Generator 10 may also be configured to monitor the electrical properties of the tissue maintained between first and second electrodes 134, 136 and signal to the clinician when conditions have been met that are suitable for sealing of tissue.

[0032] Still referring to FIGS. 1-3, connector shaft 124 includes an elongated tubular shaft including proximal and distal ends 124a, 124b. Proximal end 124a is configured for operable engagement with handle 126. Handle 126 may be securely affixed, releasably coupled, or integrally formed with proximal end 124a of connector

shaft 124. Handle portion 120 may further include a stop member 128 positioned about connector shaft 124 between base 122 and handle 126. Stop member 128 prevents complete retraction of connector shaft 124 past base 122. Proximal end 124a may be configured to securely retain stop member 128, or instead, may include grooves or indents 128a for selectively positioning stop member 128 thereabout. In this manner, adjustment of stop member 128 reduces or increases the amount of extension of snare portion 130. Alternatively, stop member 128 may be configured to selectively engage distal end 124a of connector shaft 124 through the incorporation of a mechanical fastener or the like (not shown). Distal end 124b of connector shaft 124 is operably coupled to snare portion 130. Distal end 124b may be permanently coupled, releasably coupled or integrally formed with snare portion 130.

[0033] Snare portion 130 includes a snare 132 formed of a loop of rigid or semi-rigid wire or flexible band. Snare 132 may be constructed of metal, polymer or other suitable material. In the illustrated embodiment, snare 132 is non-conductive; however, snare 132 may be conductive or partially conductive. Coupled to snare 132 in any suitable manner near a distal end 130b of snare portion 130 are first and second electrodes 134, 136. As discussed above, first and second electrodes 134, 136 are electrically coupled to generator 10 to receive electrosurgical energy therefrom. First and second electrodes 134, 136, which may be of any suitable construction, each include at least a tissue contacting surface 134c, 136c. In some embodiments, first and second electrodes 134, 136 are each formed from a tissue contacting surface 134c, 136c and an insulative body portion. Tissue contacting surfaces 134c, 136c may include any configuration suitable for treating tissue, including hatching, grooves and

detents (not shown). In one embodiment, generator 10, first and second electrodes 134, 136, and tissue contacting surfaces 134c, 136c, are all configured for sealing tissue.

[0034] Positioned between first and second electrodes 134, 136 is a connection member 133. Distal ends 134b, 136b of first and second electrodes 134, 136, respectively, are coupled to connection member 133. First and second electrodes 134, 136 and connection member 133 are configured such that in a first or extended position, proximal ends 134a, 136a of first and second electrodes 134, 136, respectively, are substantially spaced from one another. As will be discussed in further detail below, this configuration opens snare 132 to facilitate the looping of snare 132 over a polyp "P" (FIG. 6) and the positioning of first and second electrodes 134, 136 about stalk "S" of polyp "P".

[0035] First and second electrodes 134, 136 and connection member 133 are further configured such that as proximal end 130a of snare portion 130 is retracted within distal end 110b of tubular member 110, proximal ends 134a, 136a of first and second electrodes 134, 136, respectively, are approximated towards each other, in the direction of arrows "A" (FIG. 1). In this manner, first and second electrodes 134, 136 and connection member 133 act like a jaw assembly, thereby compressing stalk "S" of polyp "P" between first and second electrodes 134, 136. To prevent first and second electrodes 134, 136 from contacting one another, distal end 110b of tubular member 110 may include a spacer member 138 through which snare 132 may extend. Spacer member 138 spans distal end 110b of tubular member 110 and includes a pair of

apertures 138a through which snare 132 is received. Apertures 138a are spaced such that upon retraction of proximal end 130a of snare portion 130 within tubular member 110, proximal end 134a, 136a of first and second electrodes 134, 136 are approximated towards one another. Apertures 138a are further configured to prevent first and second electrodes 134, 136 contacting one another. Release of proximal end 130a of snare portion 130 from within distal end 110b of tubular member 100 permits proximal ends 134a, 136a of first and second electrodes 134, 136 to approximate away from one another and eventual return to their initial position.

[0036] In an alternative embodiment, one or both of first and second electrodes 134, 136 may include one or more spacers 134d, 136d (FIG. 5) formed on respective proximal ends 134a, 136a. Spacers 134d, 136d are configured to prevent contact between first and second electrodes 134, 136.

[0037] Connection member 133 extends between first and second electrodes 134, 136 and is configured to maintain distal ends 134b, 136b of first and second electrodes 134, 136, in a spaced relationship throughout the tissue excising procedure. As described above, in a first or extended position, proximal ends 134a, 136a of first and second electrodes 134, 136 are maintained in a substantially spaced apart relationship. This configuration facilitates positioning of snare 132, and first and second electrodes 134, 136 in particular, about stalk "S" of a polyp "P" (FIG. 6). Distal ends 134b, 136b of first and second electrodes 134, 136 are coupled to connection member 133 in a manner that permits pivoting, hinging, or flexing of first and second electrodes 134, 136 relative to connection member 133 as snare 132 is constricted about stalk "S"

of polyp "P". First and second electrodes 134, 136 and/or connection member 133 may be formed of flexible material, or may instead include a hinge mechanism or any other suitable configuration capable of permitting first and second electrodes 134, 136 to pivot, hinge, or flex relative to connection member 133. In the event that proximal ends 134a, 136a of first and second electrodes 134, 136 are approximated away from one another by the configuration of connection member 133, snare 132 may provide the spring force to maintain proximal ends 134a, 136a substantially spaced apart when polyp removal device 100 is in a first or extended position.

[0038] Connection member 133 further includes at least a first sharpened surface 133a. First sharpened surface 133a is formed between distal ends 134b, 136b of first and second electrodes 134, 136 and may be configured to sever stalk "S" of polyp "P" after proper sealing of the tissue. In addition, or alternatively, the outer surface of connection member 133 may be sharpened to facilitate excising of polyp "P".

[0039] Referring now to FIGS. 1-3 and 6-8, one embodiment of the operation of polyp removal device 100 will be described. Initially, distal end 110b of tubular member 110 is inserted into a patient. As discussed above, introduction of polyp removal device 100 may be accomplished through an endoscopic or laparoscopic port, or may be inserted transluminally through the mouth or anus. To facilitate insertion of tubular member 110 into the body, in one embodiment (FIG. 5), snare portion 130a is completely retracted within tubular member 110.

[0040] Once distal end 110b of tubular member 110 is positioned near a polyp "P" to be removed, snare portion 130 is extended distally by advancing handle 126 of

handle portion 120 relative to base 122. The spring-like configuration between first and second electrodes 134, 136 and connection member 133 results in proximal ends 134a, 136a of first and second electrodes 134, 136 approximating away from each other as handle 126 is advanced and proximal end 130a of snare portion 130 is released from tubular member 110. The separating of proximal ends 134a, 136a of first and second electrodes 134, 136 opens snare 132 and facilitates positioning of snare 132 about stalk "S" of polyp "P". Once snare 132 positioned such that stalk "S" is received between first and second electrodes 134, 136, handle 126 may be retracted or, in the alternative, tubular member 110 may be advanced to constrict snare 132 about stalk "S". As proximal end 130a of snare portion 130 is received within distal end 110b of tubular member 110 through spacer member 138, proximal ends 134a, 136a of first and second electrodes 134, 136 are approximated towards one another, thereby capturing stalk "S" of polyp "P" therebetween. Other methods of approximating first and second electrodes 134, 136 towards one another are contemplated by the present invention. For example, another instrument separate from polyp removal device 100 may be utilized.

[0041] Continued retraction of snare portion 130 within tubular member 110 causes first and second electrodes 134, 136 to compress stalk "S" of polyp "P". Once the clinician is satisfied stalk "S" is sufficiently received between first and second electrodes 134, 136, generator 10 may be activated to treat the tissue between first and second electrodes 134, 136. Alternatively, and as discussed above, generator 10 may include a system for monitoring the electrical properties of the tissue between first and second electrodes 134, 136. Once a predetermined condition has been satisfied, preferably, a condition suitable to promote tissue sealing, generator 10 signals to the

clinician that the tissue is ready to be sealed, at which point, generator 10 may automatically provide electrosurgical energy to tissue contacting surfaces 134c, 136c, or the clinician may activate generator 10 to provide the energy to seal the tissue. Electrosurgical energy is provided to tissue contacting surfaces 134c, 136c until the tissue of stalk "S" is properly sealed. Electrosurgical energy may be provided at a range of frequencies, over a variable duration, and may be continuous or intermittent, depending of the type of tissue being treated and the thickness of the tissue. Furthermore, the monitoring function may include for a signal to denote that the sealing is finished and that severing of the polyp "P" may take place.

[0042] In some embodiments, in order to effectively seal larger vessels (or tissue) two predominant mechanical parameters should be accurately controlled - the pressure applied to the vessel (tissue) and the gap distance between the electrodes - both of which are affected by the thickness of the sealed vessel. More particularly, accurate application of pressure may be important to oppose the walls of the vessel; to reduce the tissue impedance to a low enough value that allows enough electrosurgical energy through the tissue; to overcome the forces of expansion during tissue heating; and to contribute to the end tissue thickness, which is an indication of a good seal. It has been determined that a typical fused vessel wall is preferably between 0.001 and 0.006 inches. Below this range, the seal may shred or tear and above this range the lumens may not be properly or effectively sealed.

[0043] With respect to smaller vessels, the pressure applied to the tissue tends to become less relevant, whereas the gap distance between the electrically conductive surfaces becomes more significant for effective sealing. In other words, the chances of

the two electrically conductive surfaces touching during activation increases as vessels become smaller.

[0044] As mentioned above, at least one electrode, e.g., 134, may include a stop member 134d that limits the movement of the two opposing electrodes 134, 136 relative to one another. Stop member 134d may extend from the tissue contacting surface 134c a predetermined distance according to the specific material properties (e.g., compressive strength, thermal expansion, etc.) to yield a consistent and accurate gap distance "G" during sealing (Fig. 5). In one embodiment, the gap distance between opposing tissue contacting surfaces 134c, 136c during sealing ranges from about 0.001 inches to about 0.006 inches and, preferably, between about 0.002 and about 0.003 inches. The non-conductive stop members 134d, 136d may be molded onto electrodes 134, 136 (e.g., overmolding, injection molding, etc.), stamped onto electrodes 134, 136 or deposited (e.g., deposition) onto electrodes 134, 136. For example, one technique involves thermally spraying a ceramic material onto the surface of the electrodes 134, 136 to form the stop members 134d, 136d, respectively. Several thermal spraying techniques are contemplated that involve depositing a broad range of heat resistant and insulative materials on various surfaces to create stop members 134d, 136d for controlling the gap distance between electrically conductive surfaces 134c, 136c.

[0045] It has also been found that the pressure range for assuring a consistent and effective seal may be between about 3 kg/cm² to about 16 kg/cm² and, preferably, within a working range of 7 kg/cm² to 13 kg/cm². Manufacturing an instrument that is capable of providing a closure pressure within this working range has been shown, in

some embodiments, to be effective for sealing arteries, tissues and other vascular bundles.

[0046] As can be appreciated, controlling the compressive force between with first and second electrodes 134, 136 as snare portion 130 is retracted may facilitate and assure consistent, uniform and accurate closure pressure about the tissue within the desired working pressure range of about 3 kg/cm² to about 16 kg/cm² and, preferably, about 7 kg/cm² to about 13 kg/cm². By controlling the intensity, frequency and duration of the electrosurgical energy applied to the tissue, the user can either cauterize, coagulate/desiccate, seal and/or simply reduce or slow bleeding.

[0047] In one embodiment, by controlling the force applied to handle 126, the resulting tension in snare portion 130 may be adjusted, which, in turn, regulates the overall pressure between electrodes 134, 136 to within the above-identified desired sealing range. A sensor 125 may be employed to accomplish this purpose and may be mechanically coupled to handle portion 120 and/or snare portion 130. A visual or audible indicator (not shown) may be operably coupled to handle portion 120, snare portion 130 and/or sensor 125 to provide visual, audible or tactile feed back to the user to assure that the clamping pressure is within the desired range prior to activation of the instrument.

[0048] Alternatively, handle portion 120 may incorporate a spring mechanism 125a configured to prevent excessive force being applied to snare portion 130, thereby preventing overcompression of the tissue between first and second electrodes 134, 136. Spring mechanism 125a may include a compression spring (not shown) that deforms once the force applied to handle 126 exceeds the force necessary to accomplish

effective sealing between first and second electrodes 134, 136. In an alternative embodiment, snare portion 130 may instead be advanced and retracted through the rotation of handle 126. In this manner, handle portion 120 may include a torque mechanism, e.g., torque wrench or the like, (not shown) which is precisely set to measure the torque (rotational force) applied to snare portion 130 so the closure pressure between electrodes 134, 136 will fall within the desired pressure range.

[0049] Once the tissue of stalk "S" is sealed, handle 126 is partially advanced to extend a length of snare portion 130 from tubular member 110, thereby approximating proximal ends 134a, 136a of first and second electrodes, respectively, away from each other and exposing sealed stalk "S" to first sharpened surface 133a of connection member 133. While maintaining snare portion 130 relative to tubular member 110, tubular member 110 is retracted relative to polyp "P", thereby causing the engagement of stalk "S" with first sharpened surface 133a of connection member 133. Continued retraction of tubular member 110 causes the complete severing of stalk "S" (see Fig. 9).

[0050] When using polyp removal device 110, the likelihood of excessive bleeding is greatly reduced because the tissue is completely sealed prior to being cut. Using polyp removal device 110 further reduces the likelihood of creating an open wound that is susceptible to infection. In addition, the utilization of bipolar energy to seal a polyp or other tissue is safer than monopolar, e.g., because of less thermal and energy spread, thereby reducing the likelihood of perforations.

[0051] With reference now to FIG. 10, an alternative embodiment of the present disclosure is shown generally as polyp removal device 200. Polyp removal device 200 is substantially similar to polyp removal device 100 and will, therefore, only be described

as relates to the differences therebetween. Snare portion 230 includes first and second electrodes 234, 236 and a connection member 233. Extending between first and second electrodes 234, 236 and connection member 233 are extension members 235, 237, respectively. Extension member 235, 237 permit first and second electrodes 234, 236 to be spaced further apart from one another in a second or sealing condition. In this manner, polyp removal device 200 may be used to excise larger polyps having a larger stalk.

[0052] Various changes in form, detail and operation of the polyp removal devices of the present disclosure may be made without departing from the spirit and scope of the present disclosure.

What is claimed is:

1. A tissue removal system, comprising:
a tubular member having proximal and distal ends;
a snare portion operably extendable from the distal end of the tubular member
and including first and second electrodes configured to treat tissue therebetween, the
snare portion further including a cutting member positioned between the first and
second electrodes for severing the treated tissue.
2. The tissue removal system of claim 1, further comprising a handle portion
operatively coupled to the proximal end of the tubular member.
3. The tissue removal system of claim 2, wherein the handle portion is
configured for operable engagement by a user.
4. The tissue removal system of claim 1, wherein the cutting member is
configured to only cut when pulled in a proximal direction.
5. The tissue removal system of claim 1, wherein the tissue is a polyp and
the first and second electrodes are configured to grasp a stalk of the polyp.
6. The tissue removal system of claim 2, wherein the first and second
electrodes are hingedly attached to the cutting member.
7. The tissue removal system of claim 1, wherein the snare portion is
configured to be retracted within the tubular member.

8. The tissue removal system of claim 1, wherein the first and second electrodes are each formed from a tissue contacting surface and an insulative body portion.

9. The tissue removal system of claim 1, further including an electrosurgical generator.

10. The tissue removal system of claim 9, wherein the first and second electrodes are electrically coupled to the electrosurgical generator and the generator is configured to deliver energy to the first and second electrodes in a bipolar manner.

11. The tissue removal system of claim 1, wherein the distal end of the tubular member includes a spacer member for preventing the first and second electrodes from contacting one another.

12. The tissue removal system of claim 1, wherein at least one of the first and second electrodes includes a spacer mounted thereon for preventing contact between the first and second electrodes.

13. A tissue removal system, comprising:
a generator configured to generate and deliver energy to a tissue removal device, the tissue removal device comprising:
a tubular member having proximal and distal ends;
a handle portion operatively extending from the proximal end of the tubular member;

a snare portion slidably supported within the tubular member and configured to extend from the distal end of the tubular member, the snare portion including first and second electrodes operably mounted thereto for receiving energy from the generator for treating tissue therebetween;

a cutting member positioned between the first and second electrodes and configured to sever the treated tissue; and

wherein at least one of the first and second electrodes includes at least one spacer mounted thereon for preventing contact between the first and second electrodes.

14. The tissue removal system of claim 13, wherein the snare portion is formed from a non-conductive material.

15. The tissue removal system of claim 13, wherein the energy is selected from the group consisting of radiofrequency, ultrasonic, microwave, and laser.

16. A method of removing tissue, comprising:

providing a tissue removal device including a snare portion, first and second electrodes operably mounted thereto, and a cutting member positioned between the first and second electrodes;

extending the snare portion to surround a tissue mass of a body;

retracting the snare portion to capture the tissue mass between the first and second electrodes;

delivering energy to the first and second electrodes; and

further retracting the snare portion to sever the tissue mass from the body.

17. The method of claim 16, wherein delivering energy to the first and second electrodes further includes sealing the tissue mass.

18. The method of claim 17, further comprising:
monitoring electrical properties of the tissue mass during energy delivery;
detecting a predetermined condition; and
signaling that the tissue mass is ready to be severed.

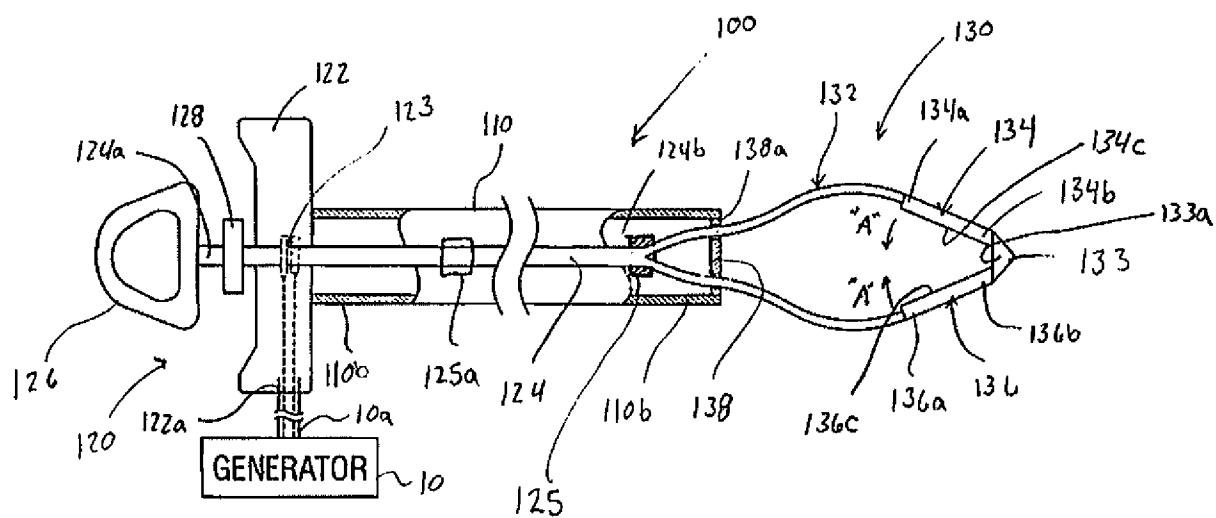


FIG. 1

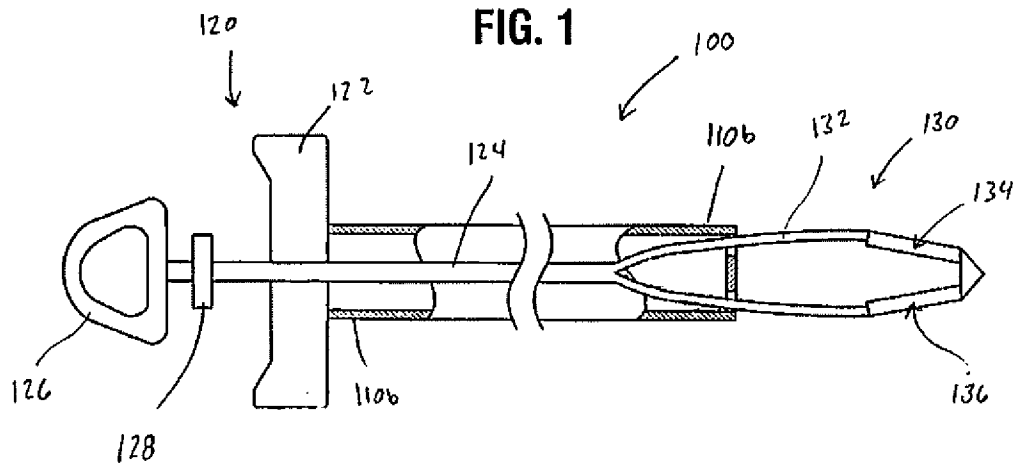


FIG. 2

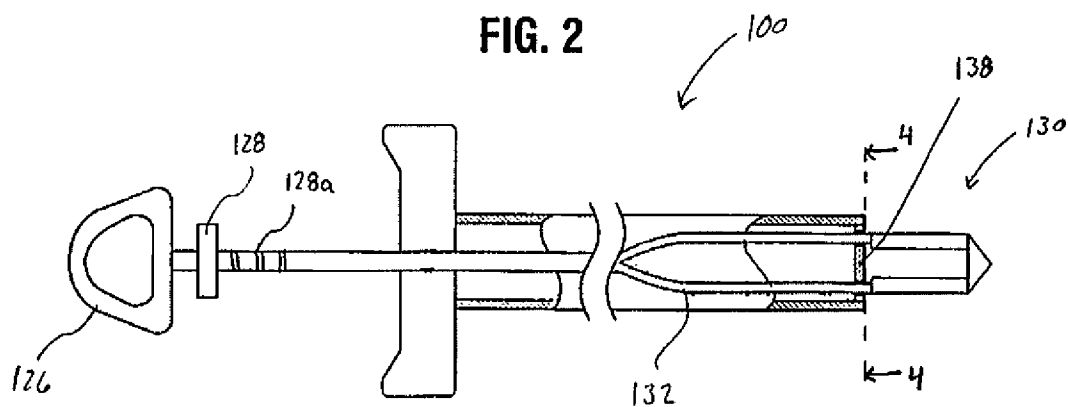


FIG. 3

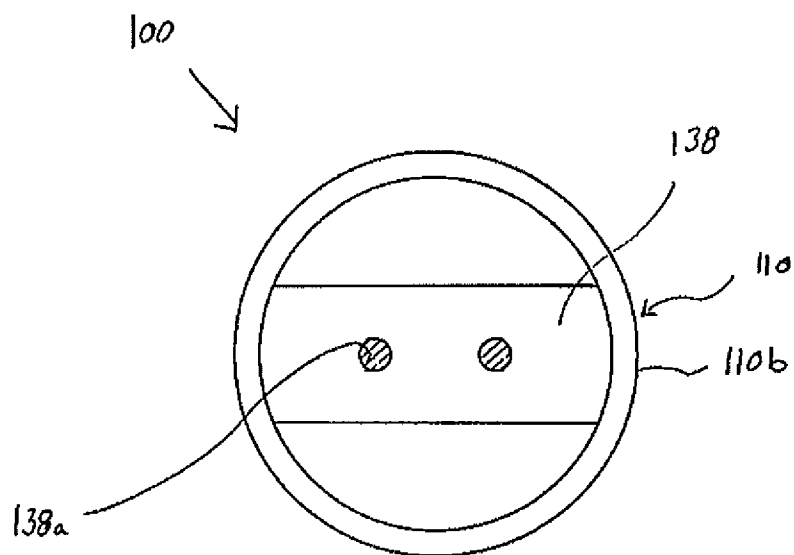


FIG. 4

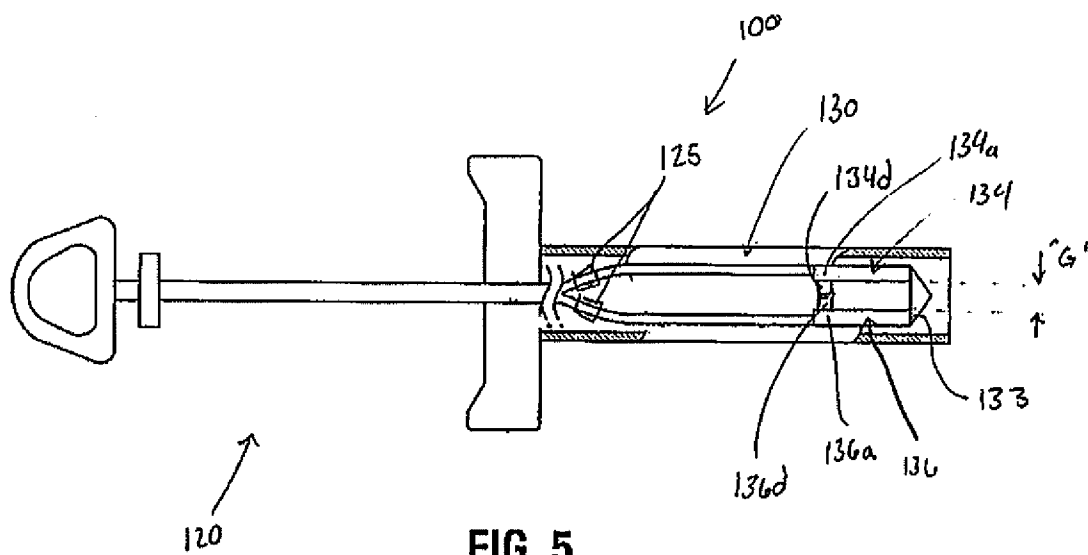
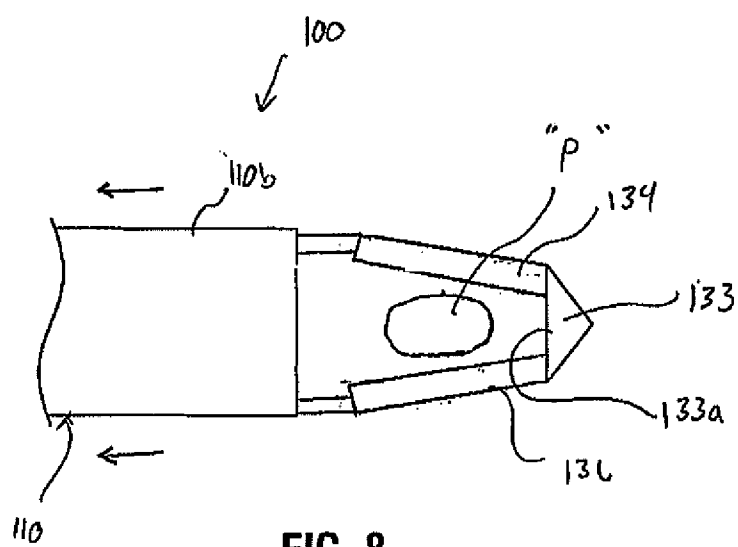
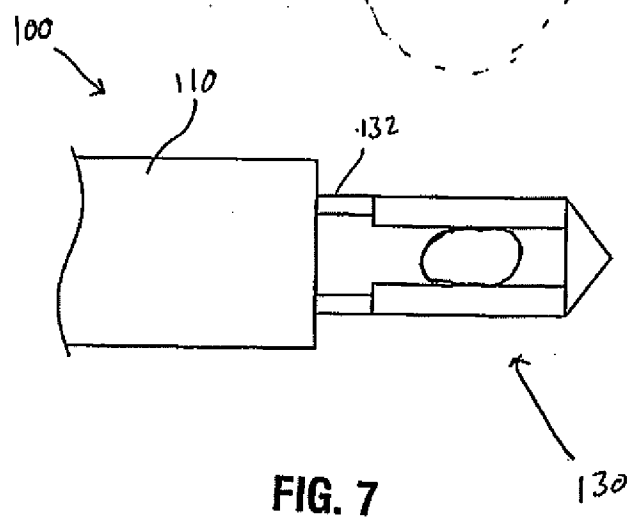
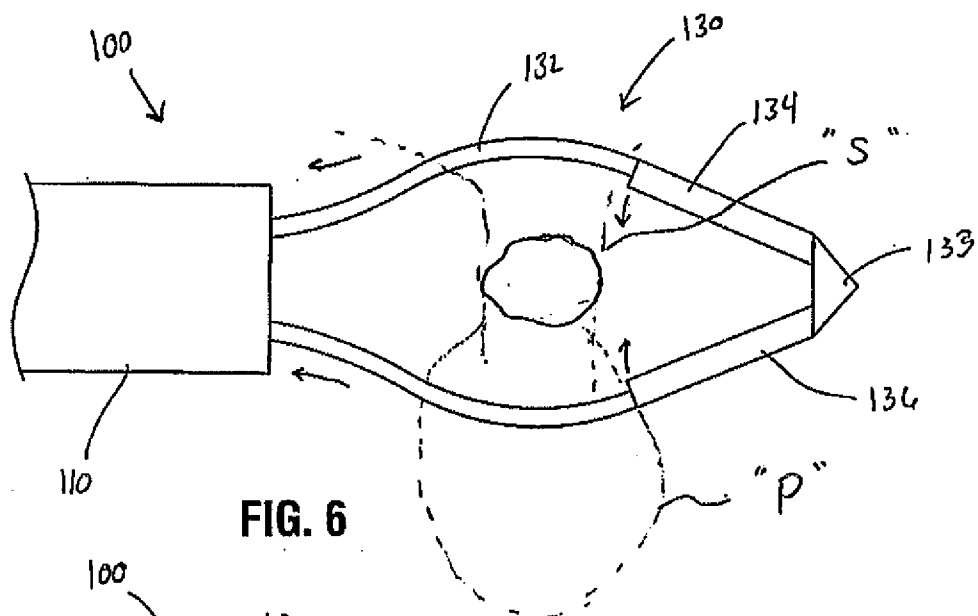


FIG. 5



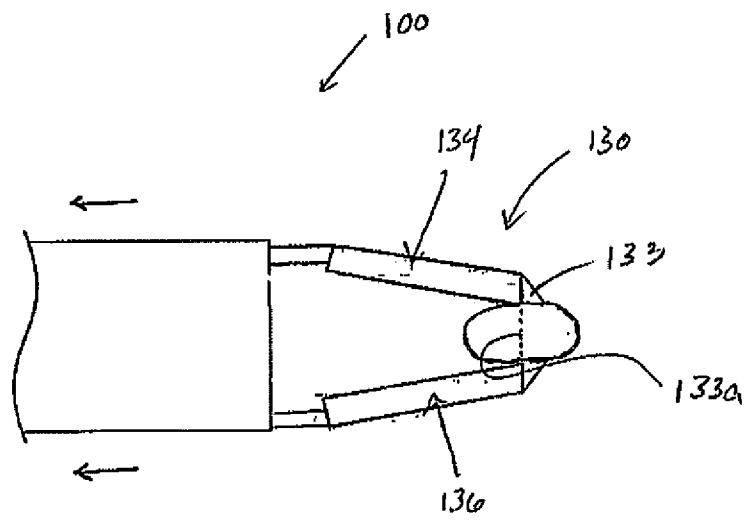


FIG. 9

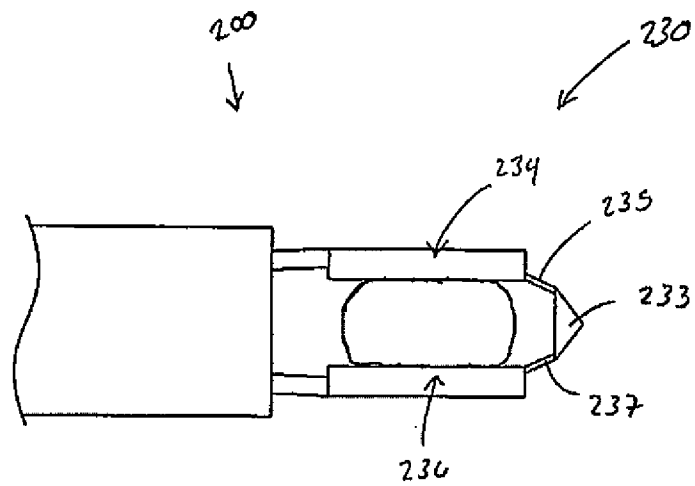


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/032690

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B18/14 A61B17/32

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)
A61B

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 493 320 A (TREAT MICHAEL R [US]) 15 January 1985 (1985-01-15)	1-5,7, 9-11,13, 15
Y	figures 3-6 -----	6,8,14
X	EP 0 467 501 A (EVEREST MEDICAL CORP [US]) 22 January 1992 (1992-01-22) figures 1-4 column 4, line 58 - column 5, line 12 -----	1-5,7, 9-13,15
X	US 5 026 371 A (RYDELL MARK A [US] ET AL) 25 June 1991 (1991-06-25) figures 1,2 column 3, line 56 - column 4, line 2 ----- -/--	1-5,7,9, 10,12, 13,15

☒ 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 document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or 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

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

3 June 2009

Date of mailing of the international search report

16/06/2009

Name and mailing address of the ISA/

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Fax: (+31-70) 340-3016

Authorized officer

Cornelissen, P

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/032690

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 078 716 A (DOLL LARRY F [US]) 7 January 1992 (1992-01-07) figures 4-5c column 7, line 1 - line 7 column 7, line 62 - column 8, line 14 -----	1-5, 7-10,12, 13,15
Y	US 2 054 149 A (CHARLES WAPPLER FREDERICK) 15 September 1936 (1936-09-15) figure 4 -----	6
A	US 2007/198011 A1 (SUGITA NORIYUKI [JP]) 23 August 2007 (2007-08-23) figures 7-9 -----	12,13
Y	US 6 773 432 B1 (CLAYMAN RALPH V [US] ET AL) 10 August 2004 (2004-08-10) figures 2,3 -----	8,14
A	US 4 503 855 A (MASLANKA HARALD [DE]) 12 March 1985 (1985-03-12) figures 1-3 column 3, line 54 - column 4, line 65 -----	1-12
A	GB 1 490 585 A (WOLF GMBH RICHARD) 2 November 1977 (1977-11-02) the whole document -----	1-15
A	DE 25 14 501 A1 (STORZ KARL) 21 October 1976 (1976-10-21) the whole document -----	1-15
A	WO 93/21845 A (HEMOSTATIC SURGERY CORP [US]; EGGERS PHILIP E [US]) 11 November 1993 (1993-11-11) the whole document -----	1-15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/032690

Box No. II 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. ☒ Claims Nos.: 16-18
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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).

Box No. III 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 allsearchable 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 reportcovers 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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/032690

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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专利名称(译)	息肉清除装置和使用方法		
公开(公告)号	EP2244649A1	公开(公告)日	2010-11-03
申请号	EP2009708287	申请日	2009-01-30
[标]申请(专利权)人(译)	柯惠有限合伙公司		
申请(专利权)人(译)	泰科医疗集团LP		
当前申请(专利权)人(译)	泰科医疗集团LP		
[标]发明人	REGADAS SERGIO F P		
发明人	REGADAS, SÉRGIO, F. P.		
IPC分类号	A61B18/14 A61B17/32 A61B17/3205 A61B17/221 A61B18/00 A61B18/18 A61B18/20		
优先权	61/063158 2008-01-31 US 12/363086 2009-01-30 US		
其他公开文献	EP2244649B1		
外部链接	Espacenet		

摘要(译)

提供了一种用于移除组织（例如息肉）的装置和系统，其包括具有近端和远端的管状构件，从管状构件的远端内可操作地延伸的圈套部分，并包括构造成在其间处理组织的第一和第二电极，圈套部分还包括用于切断处理过的组织的切割构件。组织去除装置还可包括手柄部分，其可操作地从管状构件的近端内延伸。手柄部分可构造成用于可由使用者接合，并且切割构件可在第一和第二电极的远端之间延伸。