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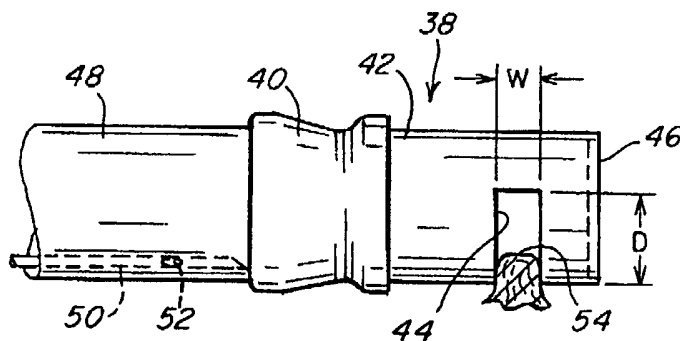
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(54) Title: ENDOSCOPE CAP



(57) Abstract: An endoscope cap that is mountable to the distal end of an endoscope. The endoscope cap may be configured to facilitate positioning of the endoscope at a desired location within a patient for performing a surgical procedure. The cap is particularly suitable for endoscopic surgical procedures within the gastrointestinal tract of a human, such as treatment of obesity by narrowing and/or disabling the pyloric sphincter. The cap may be provided with a groove or opening that is dimensioned to receive the particular tissue or muscle, such as the pyloric sphincter. The groove or opening

may extend across the cap body so that the groove or opening is positioned transverse to the longitudinal axis of an endoscope. The cap may have an internal cavity that is in communication with the groove or opening. The cap may receive a portion of the tissue or muscle through the groove or opening and within the internal cavity. The endoscope cap may be configured to allow forward viewing through the endoscope beyond the cap. In this regard, a transparent wall or lens may be provided at the distal end of the cap to provide forward viewing beyond the distal end of the cap.



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ENDOSCOPE CAP

Field of the Invention

[0001] The present invention relates to endoscopes and, more particularly, to a cap adapted for attachment to the distal end of an endoscope.

Discussion of Related Art

[0002] Endoscopes are known devices that may be employed for intraluminal surgical procedures. An endoscope may include optical systems that allow a surgeon to visually maneuver the device through a patient and observe areas of interest from outside the patient. One or more channels may be provided to allow the introduction of tools for performing a surgical procedure. Endoscope caps or covers may be mounted to the distal ends of endoscopes. Examples of endoscope caps include U.S. Pat. Nos. 4,794,911 (Okada) and U.S. Pat. No. 6,689,051 (Nakada).

[0003] In Okada, an end cap includes internal threads that engage external threads on the distal end of an endoscope to secure the end cap to the endoscope. The distal end of the cap is provided with observation and illumination windows that are arranged to abut and be aligned with the cover glass of the observation and illumination optical systems of the endoscope.

[0004] Nakada discloses an endoscope hood having a cap part and a mounting part. An endoscope end is received within the interior of the mounting part such that the hood is frictionally retained on the endoscope. The distal end of the cap part of the hood is open to be pressed onto a mucous membrane. Applying a vacuum draws the membrane into a cavity where the membrane can be resected.

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Summary of the Invention

[0005] In one illustrative embodiment of the invention, an endoscope cap is provided for positioning an endoscope at a pyloric sphincter of an individual. The endoscope cap comprises a cap body that is constructed and arranged to be mounted to a distal end of the endoscope. The cap body includes a pyloric capture portion that is constructed and arranged to be placed onto the pyloric sphincter to position the distal end of the endoscope at the pyloric sphincter.

[0006] In another illustrative embodiment of the invention, an endoscope cap is provided for capturing tissue or muscle of an individual. The endoscope cap comprises a cap body that is constructed and arranged to be mounted to a distal end of an endoscope. The cap body includes a capture portion that is constructed and arranged to endoscopically capture the tissue or muscle of the individual. The cap body also includes a transparent end wall disposed at a distal end of the capture portion to allow forward viewing through the endoscope beyond the cap body to facilitate positioning of the capture portion at the tissue or muscle.

[0007] In a further illustrative embodiment of the invention, a method of positioning an endoscope at the pyloric sphincter of an individual is provided. The method comprises acts of: (a) providing an endoscope with an endoscope cap mounted at a distal end thereof, the endoscope cap being constructed and arranged for placement onto the pyloric sphincter; (b) inserting the endoscope through a natural body opening and into the gastrointestinal tract of the individual to locate the endoscope cap adjacent the pyloric sphincter; and (c) placing the endoscope cap onto at least a portion of the pyloric sphincter to position the distal end of the endoscope at the pyloric sphincter.

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Brief Description of the Drawings

[0008] Various embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

[0009] Figure 1 is a side elevation view of an endoscope cap according to an illustrative embodiment of the invention.

[00010] Figure 2 is a distal end view of the endoscope cap of Figure 1.

[00011] Figure 3 is a sectional view of the endoscope cap of Figures 1 and 2 taken along section line 3-3 of Figure 2.

[0010] Figure 4 is a side elevation view of the endoscope cap of Figures 1-3 mounted on the distal end of an endoscope.

[0011] Figure 5 is a side elevation view of an endoscope cap according to another illustrative embodiment of the invention shown mounted to an endoscope and placed on the pyloric muscle of an individual with a needle in a retracted condition.

[0012] Figure 6 is a side elevation view of the endoscope cap of Figure 5 with the injection needle in a deployed condition engaging the pyloric muscle.

Description of Illustrative Embodiments

[0013] The invention is directed to an endoscope cap that is mountable to the distal end of an endoscope. The endoscope cap may be configured to facilitate positioning of the endoscope at a desired location within a patient for performing a surgical procedure. The cap is particularly suitable for endoscopic surgical procedures within the gastrointestinal tract of a human.

[0014] For ease of understanding, and without limiting the scope of the invention, the endoscope cap is described below particularly in connection with a surgical procedure involving a pyloric sphincter. More particularly, the endoscope cap may be employed with an

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endoscope to facilitate surgical treatment of obesity which involves narrowing or disabling the pyloric sphincter to reduce the rate of gastric emptying. For example, one or more sutures and/or a bulking agent may be placed into the pyloric sphincter to narrow the sphincter opening. Alternatively or additionally, a medication or drug may be injected into the pyloric sphincter to disable or alter the function of the muscle. It should be understood, however, that the endoscope cap is not so limited and may be employed in other endoscopic procedures as would be apparent to one of skill in the art.

[0015] The cap may be configured to capture or be placed on a particular tissue or muscle, such as a sphincter muscle, within the patient. The cap may be provided with a groove or opening that is dimensioned to receive the particular tissue or muscle. In one embodiment for capturing the pyloric sphincter of an adult human, the groove is configured with a width having a range of about 3mm to 6mm and a depth having a range of about 6mm to 8mm. However, it is to be appreciated that the cap is not limited to a groove or opening with this particular size, as the cap may employ a groove or opening having any suitable size and/or shape for capturing or being placed on a particular tissue or muscle.

[0016] The groove or opening may extend across the cap body so that the groove or opening is positioned transverse to the longitudinal axis of an endoscope. In one embodiment, the groove is configured to be perpendicular to the longitudinal axis when mounted to the endoscope. It is to be appreciated that the cap is not limited to a groove or opening with this particular orientation, as the cap may employ a groove or opening having any suitable orientation for capturing or being placed on a particular tissue or muscle.

[0017] The cap may have an internal cavity that is in communication with the groove or opening. The cap may receive a portion of the tissue or muscle through the groove or opening and within the internal cavity. For a defined tissue or muscle such as the pyloric sphincter, the cap may be placed onto the tissue or muscle without the use of a vacuum to draw the tissue or muscle into the cavity. However, it is to be appreciated that the cap may be configured to apply a vacuum to a portion of tissue or muscle, if desired, to draw it into the cavity.

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[0018] The cap may have a tubular configuration and the groove or opening may extend at least 180° circumferentially about the cap. In one embodiment, the cap has a cylindrical body with a diameter of about 11mm, although other cap shapes and/or sizes are contemplated as would be apparent to one of skill in the art.

[0019] The endoscope cap may be configured to allow forward viewing through the endoscope beyond the cap. In this regard, a transparent wall or lens may be provided at the distal end of the cap to provide forward viewing beyond the distal end of the cap. Although forward viewing through the cap may be desirable, it is not a required feature for each embodiment of the endoscope cap.

[0020] In one illustrative embodiment shown in FIGS. 1-4, an endoscope cap 10 includes a capture portion 14 configured to capture or to be placed on a desired tissue or muscle. In this regard, when mounted to an endoscope, the cap facilitates the positioning of the endoscope at the particular tissue or muscle.

[0021] As illustrated, the capture portion 14 may include a body wall 24 that is substantially tubular and forms an internal cavity. An opening 26 communicating with the internal cavity is provided on the side of the capture portion along the body wall 24 adjacent the distal end 22 of the capture portion 14. As shown, the opening 26 may be elongated to extend circumferentially about the body wall 24 at least 180°. However, it is to be appreciated that the opening may extend about the capture portion by any suitable amount for the particular procedure as would be apparent to one of skill in the art.

[0022] In the illustrative embodiment, the capture portion 14 includes an end wall 28 connected to the body wall 24 at the distal end 22 of the capture portion 14. As shown, the end wall 28 may be oriented transversely relative to the body wall 24 such that the end wall 28 and a portion of the body wall adjacent the opening 26 define a groove 30 communicating with the internal cavity of the capture portion 14.

[0023] In one illustrative embodiment, the groove 30 is dimensioned for placement onto the pyloric sphincter, which is an annular muscle located between the stomach and the intestines. The placement of the groove 30 onto the pyloric sphincter positions the sphincter

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within the internal cavity of the capture portion 14 allowing a surgeon to perform an endoscopic procedure on the pyloric sphincter. In one embodiment, the groove has a width W from approximately 3mm to approximately 6mm and a depth D from approximately 6mm to approximately 8mm. A groove of this configuration is particularly suited to be placed on the pyloric sphincter of an a human adult which has a width of approximately 3mm and a height of approximately 6mm. It is to be appreciated that the groove or opening may be configured to have any size and/or shape suitable for placement on or receipt of any particular tissue or muscle as would be apparent to one of skill in the art.

[0024] In one embodiment, the body wall of the capture portion has a cylindrical configuration. The end wall 28 may be circular and have a diameter corresponding to that of the body wall 24 to which it is connected. In one illustrative embodiment for capturing a pyloric sphincter, the capture portion has a diameter of approximately 11mm. It should be understood, however, that the capture portion may be configured to have any size and/or configuration suitable for the particular application as would be apparent to one of skill in the art.

[0025] The end wall 28 may serve as a blocking member to limit travel of an endoscopic tool from an attached endoscope. Such a blocking feature may be desirable for precisely determining the relative position of an endoscopic tool deployed from the end of an endoscope, such as an injection needle for example.

[0026] It may be desirable to configure the endoscope cap to provide a surgeon with forward viewing beyond the distal end of the cap to facilitate positioning of the endoscope in the patient. In one illustrative embodiment, the end wall 28 is transparent to facilitate viewing of objects beyond the distal end 22 of the capture portion 14 from the end of an endoscope attached to the cap 10. The end wall may include a lens to enhance visualization of the surgical site. However, it is to be appreciated that forward viewing through the cap is not a required feature for each embodiment of the endoscope cap.

[0027] In one embodiment, the end wall 28 of the capture portion 14 is a separate component secured to the body wall 24, preferably using a suitable adhesive or by heat seal.

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It is not a requirement, however, that the body wall 24 and end wall 28 comprise separate elements secured together. The end wall 28 and body wall 24 could be integrally formed together from molded plastic, for example. The use of separate elements, however, allows for selection of particular material characteristics for each of the elements, such as the above-described transparency desired for the end wall 28.

[0028] In one embodiment, the capture portion may be formed from a relatively rigid material, such as a rigid plastic. However, it is to be appreciated that the capture portion may be formed from any suitable material and using any suitable fabrication process apparent to one of skill in the art.

[0029] In the illustrative embodiment, the endoscope cap includes an endoscope attachment portion 12 for attaching the capture portion to an endoscope. As shown in FIG. 3, the endoscope attachment portion 12 may have a tubular configuration with an internal cavity and an open end 16 for receiving a distal end portion of an endoscope 18 (FIG. 4).

[0030] In one illustrative embodiment, the attachment portion 12 may be formed from a flexible plastic material capable of being stretched to receive the capture portion 14. It is contemplated that the attachment portion 12 may include reinforcement, such as strips or bands of a material, embedded in the resilient plastic, or located adjacent a surface of the attachment portion 12, to strengthen the attachment portion 12 against tearing. The use of a flexible plastic material for the endoscope facilitates a releasable friction-fit engagement between the attachment portion 12 and an endoscope.

[0031] As shown, the capture portion 14 of endoscope cap 10 includes a proximal end 20 connected to the endoscope attachment portion 12. As indicated above, the attachment portion 12 stretches outwardly when it is received onto the capture portion 14. The stretching of the attachment portion 12 creates compressive force between the attachment portion 12 and the capture portion 14 to facilitate a friction-fit engagement for maintaining the connection between the attachment portion 12 and the capture portion 14. The attachment portion 12 and the capture portion 14 may be further secured to each other, such as by use of a suitable adhesive or by heat-sealing the attachment portion 12. It is to be understood, however, that

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the attachment portion need not be fabricated from a resilient or stretchable material to provide a friction fit connection to either the endoscope or the capture portion. It is also contemplated that the attachment portion may be configured to employ other suitable attachment features for the capture portion and/or the endoscope as would be apparent to one of skill in the art. For example, the attachment portion may employ a threaded connection between the capture portion and/or the endoscope.

[0032] It is not a requirement, however, that the attachment portion 12 and the capture portion 14 comprise separate elements secured together. The attachment portion and the capture portion could be integrally formed together from molded plastic, for example. The use of separate elements, however, allows for selection of particular material characteristics for each of the elements, such as the above-described resiliency and flexibility for the attachment portion. Further, the attachment portion is not a required component of the endoscope cap as the capture portion may be configured to be directly mounted to an endoscope using any suitable arrangement apparent to one of skill in the art including, but not limited to, a friction-fit or a threaded connection.

[0033] As shown in FIG. 1, the capture portion 14 of cap 10 may include a plurality of nub-like formations 32 on the exterior surface of body wall 24. As shown, the formations 32 extend over at least one-half of the circumference of the body wall 24 in substantial alignment with the opening 26 in the body wall 24. Arranged in this manner, the formations 32 can contact a surface of the gastrointestinal tract wall when the cap is placed over the pylorus and function like a knurled surface to promote frictional engagement between the cap 10 and the gastrointestinal tract. The frictional engagement between the formations 32 and the gastrointestinal tract wall serves to retain the cap 10 in a desired position with respect to the pyloric sphincter. It is to be understood, however, that nub-like formations or a knurled surface are not required for the cap.

[0034] As shown in FIG. 4, the endoscope cap 10 is attached to an endoscope 18. As described above, a distal end portion of the endoscope 18 is slidably received in the internal cavity of the endoscope attachment portion 12 through the open end 16. As shown by the outward bulging of the attachment portion 12 adjacent the end 16, the attachment portion 12

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may be dimensioned to create an interference fit between the endoscope 18 and the inner surface of the attachment portion 12. Compressive forces created by the interference increases friction tending to maintain the engagement between the endoscope and the endoscope attachment portion 12.

[0035] In another illustrative embodiment shown in FIGS. 5 and 6, an endoscope cap 38 includes an endoscope attachment portion 40 and a capture portion 42. The attachment portion 40 and capture portion 42 of cap 38 may be configured in a manner similar to the endoscope cap 10 of FIGS. 1-4. As shown in FIGS. 5 and 6, however, the capture portion 42 includes a groove 44 that is located at a distance from an end wall 46 of the cap 38. In this manner, the relative position of the groove and the end wall may be varied to correspond to the particular endoscopic tool and/or surgical procedure.

[0036] The endoscope cap 38 may be releasably mounted to the end of an endoscope 48. As shown in phantom in FIGS. 5 and 6, an endoscopic tool 50 may be slidably housed within a tool channel of the endoscope 48 in a manner well known in the art, such that no further description is necessary. In one embodiment, the endoscopic tool 50 includes an injection needle with an opening 52 located at a distance from the distal end of the needle for delivering a substance, such as medication, a drug or bulking agent, into body tissue that is penetrated by the needle. The injection needle 50 is shown in FIG. 5 in a retracted condition in which the needle is contained within the endoscope 48. It should be understood that the invention is not limited in scope to the use of an injection needle as the endoscopic tool 50 deployed from the endoscope 48. In other embodiments, the endoscopic tool 50 may be a suturing device, a hole punching device similar to devices used to pierce ears, or a device for placing an anchor such as a screw anchor.

[0037] As shown in FIGS. 5 and 6, according to one illustrative embodiment of a surgical procedure, the endoscope cap 38 is placed onto a portion of the pyloric sphincter 54 of an individual. As described above, the pyloric sphincter 54 is an annular muscle that is located between the stomach and the intestines. As shown, the groove 44 provided on the capture portion of the cap is placed onto the pyloric sphincter 54 such that the sphincter 54 is inserted into the internal cavity of the cap.

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[0038] As shown in FIG. 6, the needle 50, or other endoscopic tool as discussed above, is deployed from the endoscope 38 into the internal cavity of the capture portion 42 until the distal end of the tool 50 contacts the end wall 46 of cap 38. As illustrated, the distance between the distal end of the injection needle 50 and the needle opening 52 may be approximately equal to the distance between the end wall 46 and the center of the capture groove 44 of the cap 38. As a result, the opening 52 in the injection needle 50 will be located at the groove 44 of cap 38 when the distal end of the injection needle 50 contacts the end wall 46. This arrangement ensures that the needle opening 52 will be embedded in the pyloric sphincter 54. The end wall 46 and groove 44 of capture cap 38, therefore, provide a targeting function for precision placement of the injection needle 50, or other endoscopic tool, with respect to the pyloric sphincter 54, thereby promoting reliable treatment of the pyloric sphincter.

[0039] It should be understood that the foregoing description of various embodiments of the invention are intended merely to be illustrative thereof and that other embodiments, modifications, and equivalents of the invention are within the scope of the invention recited in the claims appended hereto.

[0040] What is claimed is:

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Claims

1. An endoscope cap for positioning an endoscope at a pyloric sphincter of an individual, the endoscope cap comprising:
a cap body that is constructed and arranged to be mounted to a distal end of the endoscope, the cap body including a pyloric capture portion that is constructed and arranged to be placed onto the pyloric sphincter to position the distal end of the endoscope at the pyloric sphincter.
2. The endoscope cap according to claim 1, wherein the pyloric capture portion has a groove that is adapted to receive a portion of the pyloric sphincter.
3. The endoscope cap according to claim 2, wherein the groove has a width of 3mm to 6mm.
4. The endoscope cap according to any one of claims 2 to 3, wherein the groove has a depth of 6mm to 8mm.
5. The endoscope cap according to any one of claims 2 to 4, wherein the pyloric capture portion extends in a longitudinal direction between proximal and distal ends thereof, the groove extending across the pyloric capture portion in a direction transverse to the longitudinal direction.
6. The endoscope cap according to claim 5, wherein the groove extends across the pyloric capture portion in a direction perpendicular to the longitudinal direction.
7. The endoscope cap according to any one of claims 5 to 6, wherein the pyloric capture portion includes a body wall extending in the longitudinal direction between the proximal and distal ends thereof, the groove being disposed across the body wall.

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8. The endoscope cap according to any one of claims 2 to 7, wherein the pyloric capture portion has an internal cavity and the groove includes an opening extending circumferentially about the body wall and communicating with the internal cavity.

9. The endoscope cap according to claim 8, wherein the pyloric capture portion is adapted to receive the portion of the pyloric sphincter through the opening and within the internal cavity.

10. The endoscope cap according to any one of claims 7 to 9, wherein the body wall has a tubular configuration.

11. The endoscope cap according to claim 10, wherein the opening extends at least 180° circumferentially about the body wall.

12. The endoscope cap according to any one of claims 8 to 11, wherein the cap body includes an end wall disposed at the distal end of the pyloric capture portion.

13. The endoscope cap according to claim 12, wherein the end wall is transparent to provide forward viewing through the end wall beyond the distal end of the pyloric capture portion to facilitate positioning of the pyloric capture portion at the pyloric sphincter.

14. The endoscope cap according to any one of claims 12 to 13, wherein the end wall is constructed and arranged to limit travel of an endoscopic tool that is extended from the distal end of the endoscope into the internal cavity of the pyloric capture portion.

15. The endoscope cap according to any one of claims 12 to 14, wherein the groove is positioned relative to the end wall by a predetermined distance corresponding to a feature of the endoscopic tool.

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16. The endoscope cap according to any one of claims 12 to 15, wherein the groove is spaced away from the end wall with a portion of the body wall disposed therebetween.

17. The endoscope cap according to any one of claims 12 to 16, wherein the groove is located at the end wall.

18. The endoscope cap according to any one of claims 1 to 17, wherein the cap body includes an endoscope attachment portion constructed and arranged to be releasably attached to the distal end of an endoscope, the endoscope attachment portion being disposed at a proximal end of the pyloric capture portion.

19. The endoscope cap according to claim 18, wherein the endoscope attachment portion is adapted for frictional engagement with the endoscope.

20. The endoscope cap according to any one of claims 18 to 19, wherein the endoscope attachment portion is flexible.

21. The endoscope cap according to any one of claims 1 to 20, in combination with the endoscope, the endoscope cap being mounted to the distal end of the endoscope.

22. An endoscope cap for capturing tissue or muscle of an individual, the endoscope cap comprising:

a cap body that is constructed and arranged to be mounted to a distal end of an endoscope, the cap body including a capture portion that is constructed and arranged to endoscopically capture the tissue or muscle of the individual; and

a transparent end wall disposed at a distal end of the capture portion to allow forward viewing through the endoscope beyond the cap body to facilitate positioning of the capture portion at the tissue or muscle.

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23. The endoscope cap according to claim 22, wherein the capture portion has an opening that is adapted to receive the tissue or muscle.

24. The endoscope cap according to claim 23, wherein the capture portion extends in a longitudinal direction between proximal and distal ends thereof, the opening extending across the capture portion in a direction transverse to the longitudinal direction.

25. The endoscope cap according to claim 24, wherein the opening extends across the capture portion in a direction perpendicular to the longitudinal direction.

26. The endoscope cap according to any one of claims 24 to 25, wherein the capture portion includes a body wall extending between the proximal and distal ends thereof, the opening being disposed across the body wall.

27. The endoscope cap according to any one of claims 23 to 26, wherein the capture portion has an internal cavity and the opening communicates with the internal cavity.

28. The endoscope cap according to claim 27, wherein the capture portion is adapted to receive the tissue or muscle through the opening and within the internal cavity.

29. The endoscope cap according to any one of claims 26 to 28, wherein the opening extends circumferentially about the body wall and forms a groove.

30. The endoscope cap according to any one of claims 26 to 29, wherein the body wall has a tubular configuration.

31. The endoscope cap according to any one of claims 26 to 30, wherein the opening extends at least 180° circumferentially about the body wall.

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32. The endoscope cap according to claim 27, wherein the end wall is constructed and arranged to limit travel of an endoscopic tool that is extended from the distal end of the endoscope into the internal cavity of the pyloric capture portion.

33. The endoscope cap according to claim 32, wherein the opening is positioned relative to the end wall by a predetermined distance corresponding to a feature of the endoscopic tool.

34. The endoscope cap according to claim 27, wherein the opening is spaced away from the end wall with a portion of the body wall disposed therebetween.

35. The endoscope cap according to claim 27, wherein the opening is located at the end wall.

36. The endoscope cap according to any one of claims 22 to 35, wherein the cap body includes an endoscope attachment portion constructed and arranged to be releasably attached to the distal end of an endoscope, the endoscope attachment portion being disposed at a proximal end of the capture portion.

37. The endoscope cap according to claim 36, wherein the endoscope attachment portion is adapted for frictional engagement with the endoscope.

38. The endoscope cap according to any one of claims 36 to 37, wherein the endoscope attachment portion is flexible.

39. The endoscope cap according to any one of claims 22 to 38, in combination with the endoscope, the endoscope cap being mounted to the distal end of the endoscope.

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40. A method of positioning an endoscope at the pyloric sphincter of an individual, the method comprising acts of:

(a) providing an endoscope with an endoscope cap mounted at a distal end thereof, the endoscope cap being constructed and arranged for placement onto the pyloric sphincter;

(b) inserting the endoscope through a natural body opening and into the gastrointestinal tract of the individual to locate the endoscope cap adjacent the pyloric sphincter; and

(c) placing the endoscope cap onto at least a portion of the pyloric sphincter to position the distal end of the endoscope at the pyloric sphincter.

41. The method according to claim 40, wherein the endoscope cap has a groove and act (c) includes receiving the portion of the pyloric sphincter in the groove.

42. The method according to claim 41, wherein the groove has a width of 3mm to 6mm.

43. The method according to any one of claims 41 to 42, wherein the groove has a depth of 6mm to 8mm.

44. The method according to any one of claims 41 to 43, wherein the endoscope cap extends in a longitudinal direction between proximal and distal ends thereof, the groove extending across the endoscope cap in a direction transverse to the longitudinal direction.

45. The method according to any one of claims 41 to 44, wherein the groove extends across the endoscope cap in a direction perpendicular to the longitudinal direction.

46. The method according to any one of claims 41 to 45, wherein the endoscope cap includes a body wall extending between the proximal and distal ends thereof, the groove being disposed across the body wall.

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47. The method according to any one of claims 41 to 46, wherein the endoscope cap has an internal cavity and the groove includes an opening extending circumferentially about the body wall and communicating with the internal cavity.

48. The method according to claim 47, wherein the endoscope cap includes a transparent end wall disposed at the distal end thereof, and act (b) includes positioning the endoscope cap at the pyloric sphincter by viewing the gastrointestinal tract beyond the distal end of the endoscope cap through the transparent end wall.

49. The method according to any one of claims 47 to 48, wherein act (c) includes receiving the portion of the pyloric sphincter through the opening and within the internal cavity.

50. The method according to any one of claims 47 to 49, further comprising act (d) of extending an endoscopic tool from the distal end of the endoscope into the internal cavity.

51. The method according to claim 50, wherein the endoscope cap includes an end wall disposed at the distal end thereof, and act (d) includes limiting travel of the endoscopic tool with the end wall.

52. The method according to any one of claims 50 to 51, wherein the endoscopic tool includes a suturing device, and wherein act (d) includes placing a suture in the portion of the pyloric sphincter.

53. The method according to any one of claims 50 to 51, wherein the endoscopic tool includes an injection needle having a distal tip and a needle opening for delivery of a substance, the needle opening being located at a distance spaced away from the distal tip, and wherein act (d) includes injecting a substance into the pyloric sphincter through the needle opening.

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54. The method according to any one of claims 50 to 51, wherein the endoscopic tool includes a hole punching device, and wherein act (d) includes punching a hole in the portion of the pyloric sphincter.

55. The method according to any one of claims 50 to 51, wherein the endoscopic tool includes an anchor placement device, and wherein act (d) includes placing an anchor in the portion of the pyloric sphincter.

56. The method according to any one of claims 40 to 55, further comprising an act of narrowing and/or disabling the pyloric sphincter.

57. The method according to any one of claims 56, wherein the pyloric sphincter is narrowed and/or disabled to treat obesity.

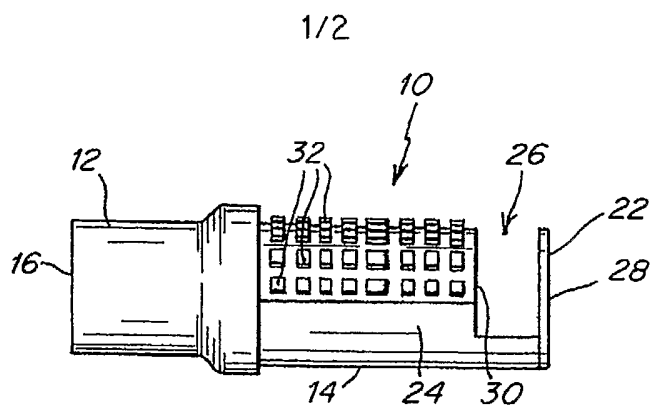


Fig. 1

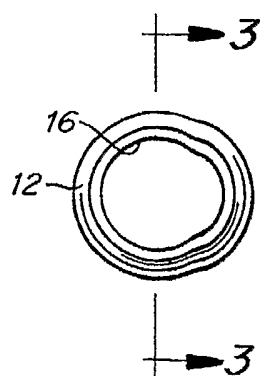


Fig. 2

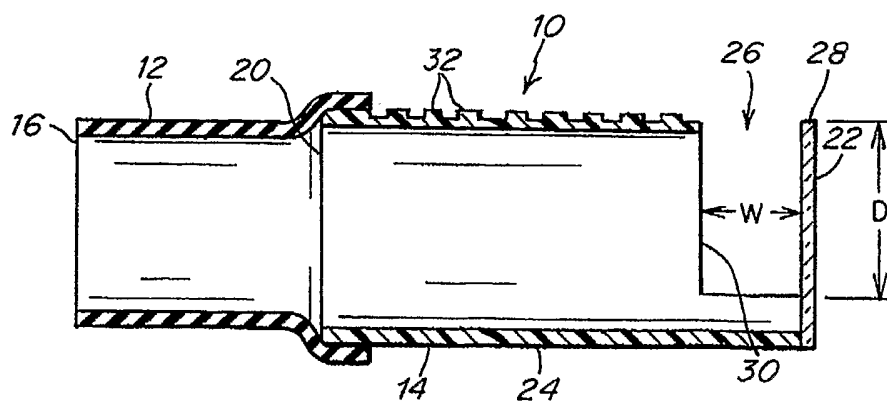
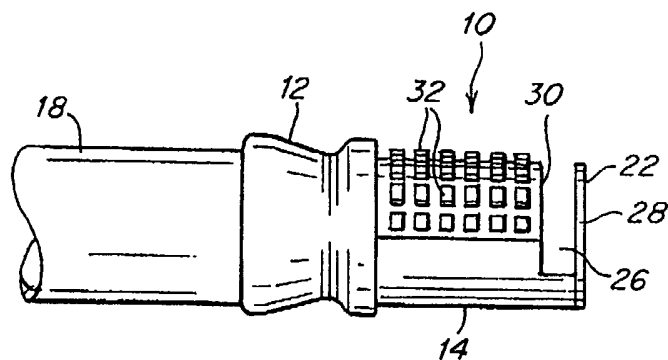
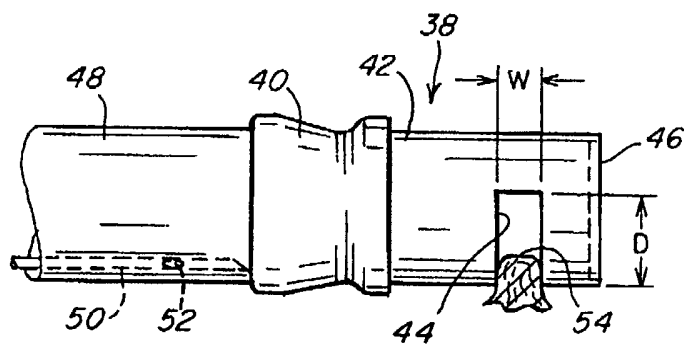
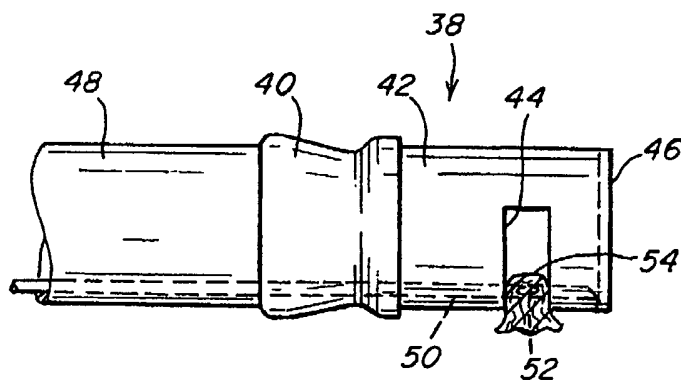


Fig. 3

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*Fig. 4**Fig. 5**Fig. 6*

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2005/037330

A. CLASSIFICATION OF SUBJECT MATTER
A61B1/012 A61B1/273

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/127767 A1 (FLEENER RICHARD P ET AL) 1 July 2004 (2004-07-01) paragraphs '0007! - '0018!, '0036! - '0043!, '0049!; claims 1-4, 6-17; figures 1-4	1-39
X	WO 2004/069056 A (HASHIBA, KIYOSHI) 19 August 2004 (2004-08-19) page 5, line 8 - line 17 page 7, line 3 - line 35; claims 1, 3, 14-16; figures 3, 7-12 ----- -/--	1, 2, 5-10, 12-30, 32-39



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

23 February 2006

Date of mailing of the international search report

07/03/2006

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Rick, K

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2005/037330

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 365 340 A (* QUEEN MARY AND WESTFIELD COLLEGE) 20 February 2002 (2002-02-20) page 4, line 24 - page 5, line 10 page 6, line 19 - page 7, line 11 page 7, line 21 - page 8, line 2; figures 1,2,7,8 -----	1,2,5,6, 8-12,15, 17,21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/037330

Box 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.: 40-57
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 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 all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2005/037330

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2004127767	A1	01-07-2004	NONE	
WO 2004069056	A	19-08-2004	AU 2003206511 A1	30-08-2004
GB 2365340	A	20-02-2002	NONE	