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Endoscope ultrasonique

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Description

[0001] The present invention relates to an ultrasonic endoscope.

[0002] USP 5,690,656 discloses "Method and apparatus for creating abdominal visceral anastomoses".

[0003] Yamanouchi et al. (Journal of Nippon Medical School 2002; 69(5)) discloses an intestine-intestinal system magnetic compression anastomosis which anastomoses, e.g., an oral-side intestine with an analis intestine by using a pair of magnets. When the pair of magnets are indwelled and attached to each other with wall surfaces of intestines sandwiched therebetween, the two intestinal wall layers sandwiched between the magnets are gradually led to avascular necrosis. At this time, the intestinal walls which are in contact with each other adhere to each other, and a hole is formed.

[0004] In the techniques of both of USP 5,690,656 and Yamanouchi et al., it is necessary to indwell a magnet within the body of the patient for several days in order to form a fistula by utilizing the magnetic force of the magnet. Here, there are some cases depending on the condition of the patient where some device or the like which may be affected by a magnetic force, is to be employed, and therefore the use of a magnet is not permitted to form a fistula.

[0005] Even if a magnet may be employed, it is necessary to control the position where the magnet is dropped after a fistula is formed.

[0006] Document US 2004/0082883 A1 discloses an ultrasonic endoscope which comprises a rigid tip end section at a distal end of an insertion instrument, wherein the rigid tip end section includes a main casing and separable head block. The main casing includes a front compartment in which an ultrasonic transducer is inserted. Further, lens fitting portions rise obliquely from left and right sides of downslope wall portions, which are attached on a rear section of the front compartment and inclined toward the rear end side of the rigid tip end section. These lens fitting portions comprise apertures for fitting illumination light diffuser lenses. The main casing further includes a tubular neck portion which is formed on the basal side of the lens fitting portions and is structured with three steps. Here, the separable head block comprises an observation window behind which an objective lens is arranged. An outlet passage is formed by a semi-circular groove, which is formed on the inner side of the separable head block, and a semi-circular groove of the tubular neck portion of the main casing. This outlet passage is connected to the outlet opening of the biopsy channel.

[0007] Meanwhile, in the conventional ultrasonic endoscope, the ultrasonic observation image and optical observation image are not arranged with respect to each other in viewpoint, and therefore when these images are compared with each other, it is in some cases difficult to recognize the members to be observed.

[0008] The present invention has been proposed as a solution to the above-described drawbacks and the object thereof is to provide an ultrasonic endoscope that provides an ultrasonic observation image and an optical observation image in which a member to be observed can be easily confirmed as these images are viewed for comparison.

[0009] According to an aspect of the present invention, there is provided an ultrasonic endoscope including: an elongated insertion section having a distal end and a proximal end; and an operation section provided at the proximal end of the insertion section. The insertion section includes a distal end hard portion having a distal end surface at the distal end, wherein an ultrasonic transducer, a forceps channel opening portion and an object lens are arranged in a straight line along a direction perpendicular to an axial direction of the insertion section.

[0010] The invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic view showing various kinds of organs (ducts) in which an endoscopic system according to the embodiment of the present invention is used;

FIG. 2 is a schematic view showing an endoscopic system according to the embodiment of the present invention;

FIG. 3 is a schematic perspective view showing a distal end of an insertion section of an ultrasonic endoscope in the endoscopic system according to the embodiment;

FIG. 4 is a schematic partial cross-sectional view showing a distal end of an over-tube in the endoscopic system according to the embodiment;

FIG. 5 is a schematic perspective view showing a state in which a coil is separated from an inner tube of the over-tube in the endoscopic system according to the embodiment;

FIG. 6 is a schematic view showing a T-bar indwelling device in the endoscopic system according to the embodiment;

FIG. 7 is a schematic perspective view showing a needle structure and a cord-like member and a core portion of an electric scalpel structure of the T-bar indwelling device in the endoscopic system according to the embodiment;

FIG. 8 is a schematic perspective view showing the cord-like member, a bar and the core portion of the electric scalpel structure of the T-bar indwelling device in the endoscopic system according to the embodiment;

FIG. 9 is a schematic cross-sectional view showing a state in which the electric scalpel structure is set in the needle structure of the T-bar indwelling device in the endoscopic system according to the embodiment;

FIG. 10 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to form a puncture in a choledoch duct (a second duct) from an intestine duodenum (a first duct) with a needle tube in the needle structure of the T-bar indwelling device and then the bar is discharged into the choledoch duct.

FIG. 11 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to push an inner wall of the choledoch duct with the bar of the T-bar indwelling device arranged in the choledoch duct so that the choledoch approaches the intestinal duodenum;

FIG. 12 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to approach the choledoch duct to the Intestinal duodenum and then the coil of the over-tube pierces the intestinal duodenum and the choledoch duct;

FIG. 13 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to cause the coil of the over-tube to pierce the intestinal duodenum and the choledoch duct and then the coil is separated from the inner tube of the over-tube;

FIG. 14 is a schematic view showing a state where the endoscopic system according to the embodiment is used to energize the bar of the T-bar indwelling device and a fistula is formed on an inner side of the coil;

FIG. 15 is a schematic view showing a state where the endoscopic system according to the embodiment is used to form the fistula and then a basket forceps is inserted into the choledoch duct from the fistula to acquire a calculus by a basket portion;

FIG. 16 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to form the fistula and then the fistula which is no longer necessary is to be closed by using a clip;

FIG. 17 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to form the fistula and then the fistula which is no longer necessary is closed by using the clip;

FIG. 18 is a schematic view showing a state in which the endoscopic system according to the embodiment is used to anastomose a stomach with a jejunum of a small intestine;

[0011] The best mode for carrying out the present invention will be described hereinafter with reference to the accompanying drawings.

[0012] The embodiment will now be explained in conjunction with FIGS. 1 to 18.

[0013] FIG. 1 schematically shows a stomach S, an intestine duodenum D, a jejunum of a small intestine (which will be mainly referred to as a jejunum hereinafter) J, a gall bladder G, a choledoch duct C and others. Further, there may be conducted a fistulectomy which performs fistulation by anastomosing various organs (ducts), e.g., the intestine duodenum (a first duct) D with the choledoch duct (a second duct) C and the stomach (the first duct) S with the jejunum (the second duct) J. Here, a description will be mainly given as to a case where a fistula is formed between the intestine duodenum D and the choledoch duct C in order to flow bile of the choledoch duct C into the intestinal duodenum D.

[0014] An endoscopic system 10 shown in FIG. 2 is provided with an ultrasonic endoscope 12, an over-tube 14 and a T-bar indwelling device 16. The T-bar indwelling device 16 is endoscopically used together with the ultrasonic endoscope 12.

[0015] The ultrasonic endoscope 12 includes an elongated insertion section 22, an operation section 24 provided at a proximal end of the insertion section 22, and a universal cord 26 extended from the operation section 24. The insertion section 22 is provided with a distal end hard portion 32, a bending portion 34 and a flexible tube portion 36. The bending portion 34 can be curved in a desired direction by swiveling a bending operation knob 24a of the operation section 24. The flexible tube portion 36 is bent in accordance with a shape of a biomedical duct. A forceps channel 38 (see FIG. 3) is inserted into a part from the insertion section 22 to the operation section 24. A proximal end of the forceps channel 38 is provided at the operation section 24. A forceps tap 38b is arranged in an opening portion (a forceps opening) of the forceps channel 38 on the proximal end side.

[0016] As shown in FIG. 3, an electronic convex type ultrasonic transducer 42 for ultrasonic observation, a distal end opening portion 38a of the forceps channel 38 and an object lens 44 for optical observation are arranged on a distal end surface of the distal end hard portion 32. Although not shown, an illumination lens from which light for optical observation exits is also arranged on the distal end surface of the distal end hard portion 32.

[0017] Therefore, the ultrasonic endoscope 12 has an ultrasonic observing function of performing ultrasonic observation of an object and an optical observing function of effecting optical observation. A distance with which ultrasonic observation of an object can be performed varies depending on a frequency given to the ultrasonic transducer 42, but it is, e.g., approximately 20 mm to 70

mm from a contact surface on which the ultrasonic transducer 42 comes into contact with a biomedical tissue.

[0018] The ultrasonic transducer 42, the distal end opening portion 38a of the forceps channel 38 and the object lens 44 are arranged in alignment along a direction perpendicular to an axial direction of the insertion section 22. In particular, the distal end opening portion 38a of the forceps channel 38 is arranged on a substantially central axis of the distal end hard portion 32 (the insertion section 22), and the ultrasonic transducer 42 and the object lens 44 are arranged at symmetrical positions with respect to the distal end opening portion 38a of the forceps channel 38. That is, the distal end opening portion 38a is arranged at a central part between the object lens 44 and the ultrasonic transducer 42.

[0019] As shown in FIG. 4, the over-tube 14 is formed into a double structure. The over-tube 14 is provided with an outer tube 52, an inner tube 54 and a coil (a coil needle) 56. It is preferable for the coil 56 to have insulating properties, and it is more preferable for the coil 56 to be formed of a bioabsorbable material. Furthermore, the coil 56 may be formed of a shape-memory material. The coil 56 is arranged at a distal end of the inner tube 54. A spiral groove 54a is formed on an inner peripheral surface at the distal end of the inner tube 54. Therefore, the coil 56 is detachably engaged with (screwed in) the spiral groove 54a on the inner peripheral surface at the distal end of the inner tube 54 by friction.

[0020] As shown in FIG. 5, a proximal end of this coil 56 is rounded in order to prevent a puncture from being formed in the inner tube 54 when the coil 56 is engaged with the spiral groove 54a of the inner tube 54. On the other hand, a distal end of the coil 56 protruding with respect to the distal end of the inner tube 54 is formed into a needle-like shape.

[0021] As shown in FIG. 4, the outer tube 52 is movable with respect to the inner tube 54, and can cover the coil 56 at the distal end of the inner tube 54 when the insertion section 22 of the endoscope 12 is inserted into a body cavity.

[0022] As shown in FIG. 6, the T-bar indwelling device 16 is provided with an outer sheath (a main body) 62, a tubular needle structure 64 and an electric scalpel structure 66. The needle structure 64 is movable in an inner cavity of the outer sheath 62. Moreover, the electric scalpel structure 66 is movable in an inner cavity of the needle structure 64. Since insertion into the forceps channel 38 of the endoscope 12 is required, an external diameter of the outer sheath 62 is slightly smaller than a bore diameter of the forceps channel 38, and the outer sheath 62, the needle structure 64 and the electric scalpel structure 66 are formed to be longer than a length of the forceps channel 38.

[0023] As shown in FIGS. 6 and 7, the needle structure 64 is provided with a needle tube 72, a flexible tube (an inner sheath) 74 and a needle slider 76. The needle tube 72 is fixed at a distal end of the flexible tube 74, and the needle slider 76 is fixed at a proximal end of the flexible tube 74.

[0024] As shown in FIGS. 6 and 8, the electric scalpel structure 66 includes a rod-like bar (a member (an evagination member) larger than a cord-like member 84) 82, the cord-like member (thread) 84, a core portion 86 and a core slider 88. The bar 82 is fixed at a distal end of the cord-like member 84, and a distal end of the core portion 86 is fixed at a proximal end of the cord-like member 84. In particular, the distal end of the cord-like member 84 is fixed at the center of the bar 82. Therefore, when the cord-like member 84 is pulled, a relationship between the bar 82 and the cord-like member 84 becomes a substantially-T-like form. Further, a length of the bar 82 is formed to be smaller than an internal diameter of the coil 56. The core portion 86, the cord-like member 84 and the bar 82 have electroconductivity. Furthermore, the core slider 88 which is a connector of an electrode is fixed at a proximal end of the core portion 86. Therefore, a high-frequency current can be flowed through the core slider 88, the core portion 86, the cord-like member 84 and the bar 82.

[0025] Moreover, before use of the T-bar indwelling device 16, as shown in FIG. 9, the bar 82 and the cord-like member 84 are fixed in a state where they are held in the needle tube 72. The core portion 86 is used as a pusher for the bar 82. Therefore, when the core slider 88 is moved forward, the core portion 86 moves and the bar 82 is pushed out from a distal end of the needle tube 72.

[0026] Additionally, the distal end of the needle tube 72 in the needle structure 64 can be switched between a state where it protrudes from a distal end of the outer sheath 62 and a state where it is retracted into the distal end of the outer sheath 62 by an operation of the needle slider 76. Further, before the bar 82 is pushed out from the distal end of the needle tube 72, the electric scalpel structure 66 moves together with the needle structure 64.

[0027] A function of the endoscopic system 10 according to this embodiment will now be described.

[0028] As shown in FIG. 2, the over-tube 14 having a double structure is fit on the insertion section 22 of the ultrasonic endoscope 12. Furthermore, in the over-tube 14, the inner tube 54 is retracted into the outer tube 52 in advance. At this time, the entire coil 56 engaged with the distal end of the inner tube 54 is pulled in toward the proximal end side apart from the distal end of the outer tube 52. In this state, the insertion section 22 of the endoscope 12 and the distal end of the over-tube 14 are led to the intestinal duodenum D from the oral route.

[0029] The ultrasonic transducer 42 of the ultrasonic endoscope 12 is brought into contact with an inner wall of the intestinal duodenum D. Moreover, a position of the choledoch duct C is confirmed based on an ultrasonic image obtained by transducing the ultrasonic transducer 42 of the ultrasonic endoscope 12.

[0030] The needle tube 72 of the T-bar indwelling device 16 is pulled in toward the proximal end side apart from the distal end of the outer sheath 62. Additionally, the outer sheath 62 of the T-bar indwelling device 16 is

protruded from the distal end of the insertion section 22 of the endoscope 12 through the forceps tap 38b of the forceps channel 38 and the distal end opening portion 38a of the forceps channel 38 in the ultrasonic endoscope 12. The needle slider 76 of the T-bar indwelling device 16 is operated to protrude the distal end of the needle tube 72 from the outer sheath 62.

[0031] Further, the needle tube 72 pierces a wall portion of the intestinal duodenum D and also pierces a wall surface of the choledoch duct C. That is, the distal end of the needle tube 72 exists in the choledoch duct C. In this state, the core slider 88 is moved toward a front side. Then, as shown in FIG. 10, the bar 82 is pushed out from the distal end of the needle tube 72 by the core portion 86 and falls in the choledoch duct C. That is, the bar 82 is arranged in the choledoch duct C. In this state, the needle slider 76 is moved to pull the distal end of the needle tube 72 into the outer sheath 62. Therefore, the needle tube 72 is removed from the wall surfaces of the choledoch duct C and the intestinal duodenum D.

[0032] In this state, the core slider 88 is pulled toward an operator's hand side with respect to the outer sheath 62. Therefore, the bar 82 fixed at the distal end of the cord-like member 84 is pulled toward the operator's hand side. Then, as shown in FIG. 11, an inner wall of the choledoch duct C is pushed toward the intestinal duodenum D side by using the bar 82 so that an outer wall of the choledoch duct C is appressed against an outer wall of the intestinal duodenum D.

[0033] Here, the outer tube 52 of the over-tube 14 is moved toward the proximal end side with respect to the inner tube 54. Then, the coil 56 is exposed to the outer tube 52. The inner tube 54 is rotated in a predetermined direction (a first direction) in a state where it covers an outer peripheral surface of the insertion section 22 of the endoscope 12. Then, as shown in FIG. 12, the coil 56 pierces the wall surface of the intestinal duodenum D and the inner wall of the choledoch duct C from the needle-like distal end thereof. When the distal end of the coil 56 reaches the inside of the choledoch duct C, the inner tube 54 is rotated in a second direction which is opposite to the first direction. Then, engagement between the coil 56 and the spiral groove 54a on the inner peripheral surface of the inner tube 54 at the distal end is released. Therefore, as shown in FIG. 13, the coil 56 is indwelled in a state where the outer wall of the intestinal duodenum D is appressed against the outer wall of the choledoch duct C.

[0034] Furthermore, a high-frequency power supply (not shown) is electrically disposed to the core slider (a connector) of the T-bar indwelling device 16. A high-frequency current is flowed through the core slider 88, the cord-like member 84 and the bar 82 from the high-frequency power supply. Therefore, as shown in FIG. 14, an opening is first formed on the wall surface of the choledoch duct C which is in contact with the bar 82, and an opening is then formed on the wall surface of the intestinal duodenum D which is appressed against the wall surface of the choledoch duct C. That is, a fistula F is formed between the choledoch duct C and the intestinal duodenum D.

[0035] The coil 56 is gradually absorbed into a living body with time and eventually disappears if it is formed of a bioabsorbable material. For example, when the coil 56 disappears, the fistula F is formed by conglutination of the choledoch duct C and the intestinal duodenum D. In other words, the intestinal duodenum D is anastomosed with the choledoch duct C. Therefore, it is possible to avoid leakage of bile into an abdominal cavity caused due to separation of the wall surface of the choledoch duct C from the wall surface of the intestinal duodenum D, and bile in the choledoch duct C flows toward the intestinal duodenum D side through the fistula F.

[0036] Moreover, if the coil 56 has insulating properties, safety is assured even though the bar 82 is brought into contact with the coil 56 at the time of application of a high-frequency current. Additionally, when the coil 56 is formed of a shape-memory material, the shape of the coil 56 is changed to be more compactly wound by utilizing characteristics of the shape-memory material when the coil 56 is exposed to a body temperature. At this time, since the choledoch duct C and the intestinal duodenum D are to be more closely appressed against each other by utilizing characteristics of the shape-memory material, a danger of leakage of bile into an abdominal cavity is reduced, thus facilitating formation of the fistula.

[0037] A description will be given on a technique of taking out a calculus CO in a biliary tract B toward the intestinal duodenum D side through the fistula (a bypass) F formed from the biliary tract B (a generic term of a gall bladder, a cystic duct, an intrahepatic bile duct, a hepatic portal region bile duct and a choledoch duct) to the intestinal duodenum D by using a side-view endoscope 90 and a basket forceps 92 as shown in FIG. 15.

[0038] In this case, the basket forceps 92 is inserted into a forceps channel (not shown) of the endoscope 90. Moreover, a basket portion 94 of the basket forceps 92 is inserted into the biliary tract B from the fistula F. The calculus CO is held in the basket portion 94 to be taken out from the fistula F. Additionally, the calculus CO is discharged to the intestinal duodenum D. Alternatively, this calculus CO is collected through the endoscope 12 while being held in the basket portion 94.

[0039] After removing such a calculus CO, when the fistula F is not required, as shown in FIGS. 16 and 17, the fistula F can be endoscopically closed from the intestinal duodenum D side by using a clip 96. When the fistula F is closed, it is possible to avoid complications such as choledochitis which occurs due to inflow of an intestinal juice into the biliary tract B. Further, the clip 96 naturally falls in the intestinal duodenum D.

[0040] As described above, according to the present invention, the following matters can be said.

[0041] The coil 56 of the over-tube 14 can be readily screwed into a biomedical tissue by rotating the inner tube 54 in a periaxial direction in a state where the coil

56 is attached to the spiral groove 54a of the inner tube 54. Furthermore, the coil 56 screwed in the biomedical tissue can be readily separated from the inner tube 54 by just rotating the inner tube 54 in an opposite direction., Therefore, the wall surface of the intestinal duodenum D can be integrated with the wall surface of the choledoch duct C by a simple operation.

[0042] The ultrasonic transducer 42 for ultrasonic observation, the distal end opening portion 38a of the forceps channel 38 and the object lens 44 for optical observation are arranged in alignment, and the ultrasonic transducer 42 and the object lens 44 are arranged at the substantially symmetrical positions with respect to the distal end opening portion 38a of the forceps channel 38. Therefore, visual points of an ultrasonic observation image and an optical observation image can be matched with each other. Therefore, the bar 82 or the cord-like member 84 of the T-bar indwelling device 16 can be easily confirmed when comparing an ultrasonic observation image with an optical observation image.

[0043] Moreover, since the distal end opening portion 38a is arranged at a position of the central axis of the distal end hard portion 32 of the insertion section 22 of the endoscope 12, a puncture can be made in a part close to the center of the coil 56 of the over-tube 14 by using the needle tube 72 of the T-bar indwelling device 16. Additionally, when forming a fistula by using the bar 82 of the T-bar indwelling device 16, the central axis of the coil 56 (the inside of the coil 56) can be readily pierced.

[0044] An endoscopic approach can be made from the intestinal duodenum D side to connect the wall surface of the intestinal duodenum D with the wall surface of the choledoch duct C through the fistula F allowing these parts to communicate with each other. Therefore, when, e.g., occlusion (stricture) occurs in the choledoch duct C for some reason, the fistula F can be easily formed to discharge bile in the choledoch duct C to the intestinal duodenum D.

[0045] It is to be noted that the description has been given as to the case where the intestinal duodenum D is anastomosed with the choledoch duct C in this embodiment, but it is also preferable to anastomose the stomach S with the jejunum J by the same function as that described in the embodiment when stricture St occurs in the intestinal duodenum D and a food hardly passes because of this stricture St as shown in FIG. 18. Then, the food can directly pass to the jejunum J of the small intestine from the stomach S, thereby improving QOL (Quality Of Life) of a patient.

Claims

1. An ultrasonic endoscope (12) comprising:

an elongated insertion section (22) having a distal end and a proximal end; and
an operation section (24) provided at the proximal end of the insertion section,
wherein the insertion section includes a distal end hard portion (32) having a distal end surface at the distal end,
characterized in that:

the distal end surface of the distal end hard portion (32) including an ultrasonic transducer (42), a forceps channel opening portion (38a) and an object lens (44) arranged in a straight line along a direction perpendicular to an axial direction of the insertion section (22).

2. The ultrasonic endoscope (12) according to claim 1, **characterized in that** the forceps channel opening portion (38a) is arranged on a central axis of the distal end hard portion (32).

3. The ultrasonic endoscope (12) according to claim 1 or 2, **characterized in that** the forceps channel opening portion (38a) is disposed between the ultrasonic transducer (42) and the object lens (44).

4. The ultrasonic endoscope (12) according to one of claims 1 to 3, wherein the ultrasonic transducer (42) and the object lens (44) are arranged at symmetrical positions with respect to the forceps channel opening portion (38a).

5. The ultrasonic endoscope (12) according to one of claims 1 to 4, wherein the ultrasonic transducer (42) is an electronic convex type ultrasonic transducer.

6. The ultrasonic endoscope (12) according to claim 5, wherein the ultrasonic transducer (42) protrudes distally from the distal end surface along the straight line on which the ultrasonic transducer (42), the forceps channel opening portion (38a), and the object lens (44) are arranged.

Patentansprüche

1. Ultraschallendoskop (12), das umfasst:

einen langgestreckten Einführabschnitt (22), der ein distales Ende und ein proximales Ende hat; und
einen Betätigungsabschnitt (24), der an dem proximalen Ende des Einführabschnitts vorgesehen ist,
wobei der Einführabschnitt einen harten distalen Endabschnitt (32) umfasst, der eine distale Endoberfläche an dem distalen Ende hat,
dadurch gekennzeichnet, dass:

die distale Endoberfläche des harten dista-

len Endabschnitts (32) einen Ultraschallwandler (42), einen Zangenkanalöffnungsabschnitt (38a) und ein Objektiv (44) umfasst, das in einer geraden Linie entlang einer Richtung senkrecht zu einer axialen Richtung des Einführabschnitts (22) angeordnet ist.

2. Ultraschallendoskop (12) gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Zangenkanalöffnungsabschnitt (38a) auf einer zentralen Achse des harten distalen Endabschnitts (32) angeordnet ist.

3. Ultraschallendoskop (12) gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Zangenkanalöffnungsabschnitt (38a) zwischen dem Ultraschallwandler (42) und dem Objektiv (44) angeordnet ist.

4. Ultraschallendoskop (12) gemäß einem der Ansprüche 1 bis 3, wobei der Ultraschallwandler (42) und das Objektiv (44) an symmetrischen Positionen bezüglich des Zangenkanalöffnungsabschnitts (38a) angeordnet sind.

5. Ultraschallendoskop (12) gemäß einem der Ansprüche 1 bis 4, wobei der Ultraschallwandler (42) vom Typ eines konvexen elektronischen Ultraschallwandlers ist.

6. Ultraschallendoskop (12) gemäß Anspruch 5, wobei der Ultraschallwandler (42) von der distalen Endoberfläche entlang der geraden Linie in distaler Richtung hervorsteht, auf der der Ultraschallwandler (42), der Zangenkanalöffnungsabschnitt (38a) und das Objektiv (44) angeordnet sind.

Revendications

1. Endoscope à ultrasons (12) comprenant :

une section d'insertion allongée (22) comportant une extrémité distale et une extrémité proximale ; et
une section d'actionnement (24) prévue au niveau de l'extrémité proximale de la section d'insertion,
dans lequel la section d'insertion comprend une partie rigide (32) d'extrémité distale ayant une surface d'extrémité distale à l'extrémité distale, **caractérisé en ce que** :

la surface d'extrémité distale de la partie rigide (32) d'extrémité distale comprenant un transducteur à ultrasons (42), une partie (38a) d'ouverture de canal opérateur et un objectif (44) agencés en ligne droite le long d'une direction perpendiculaire à une direction axiale de la section d'insertion (22).

2. Endoscope à ultrasons (12) selon la revendication 1, **caractérisé en ce que** la partie (38a) d'ouverture de canal opérateur est agencée sur un axe central de la partie rigide (32) d'extrémité distale.

3. Endoscope à ultrasons (12) selon la revendication 1 ou 2, **caractérisé en ce que** la partie (38a) d'ouverture de canal opérateur est disposée entre le transducteur à ultrasons (42) et l'objectif (44).

4. Endoscope à ultrasons (12) selon l'une quelconque des revendications 1 à 3, dans lequel le transducteur à ultrasons (42) et l'objectif (44) sont agencés au niveau de positions symétriques par rapport à la partie (38a) d'ouverture de canal opérateur.

5. Endoscope à ultrasons (12) selon l'une quelconque des revendications 1 à 4, dans lequel le transducteur à ultrasons (42) est un transducteur à ultrasons de type convexe électronique.

6. Endoscope à ultrasons (12) selon la revendication 5, dans lequel le transducteur à ultrasons (42) fait saillie de manière distale depuis la surface d'extrémité distale le long de la ligne droite sur laquelle le transducteur à ultrasons (42), la partie (38a) d'ouverture de canal opérateur et l'objectif (44) sont agencés.

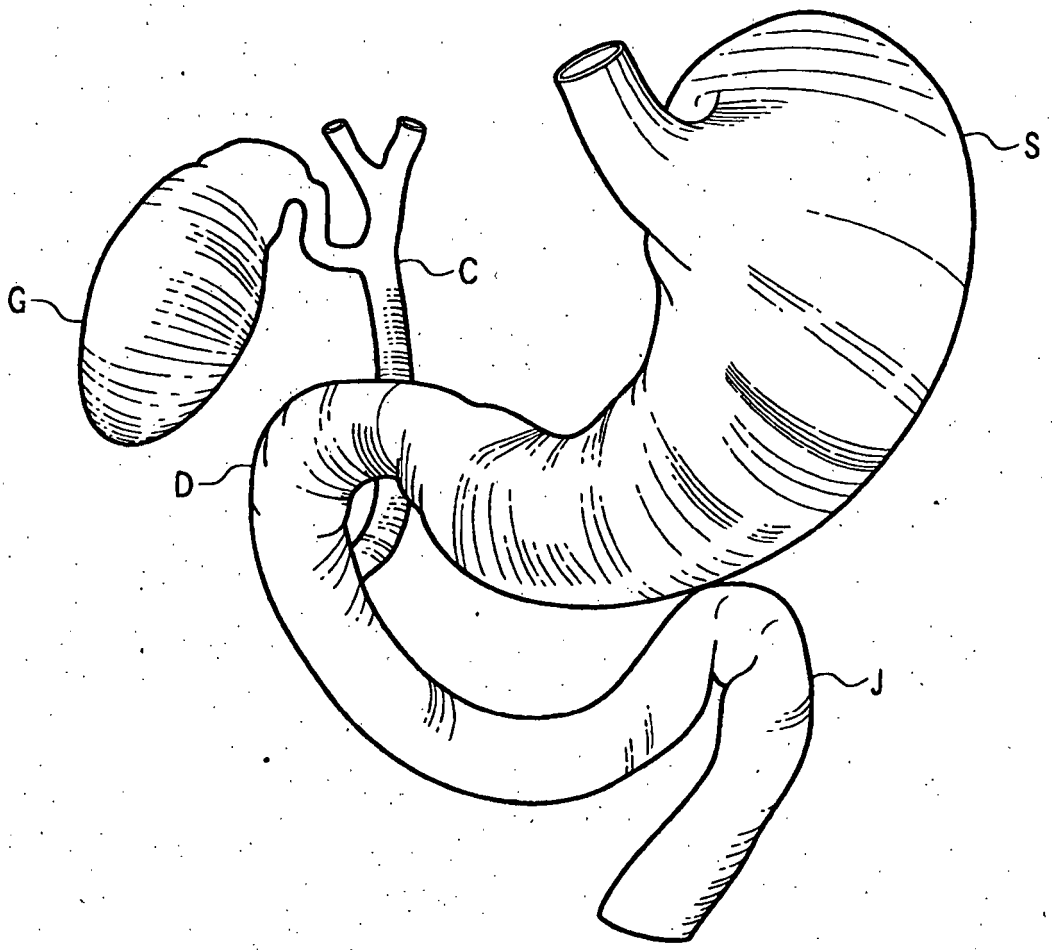

FIG. 1

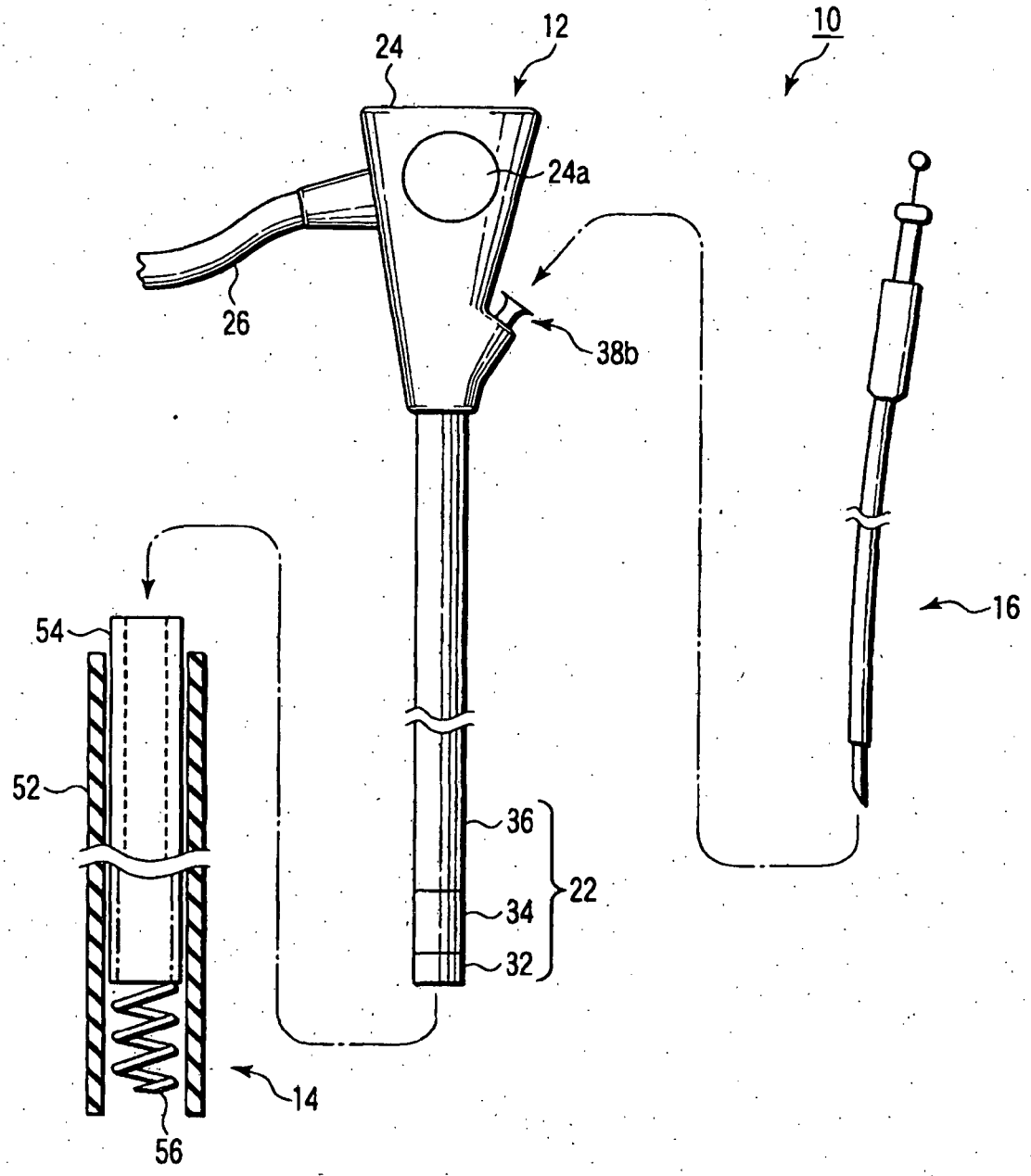

FIG. 2

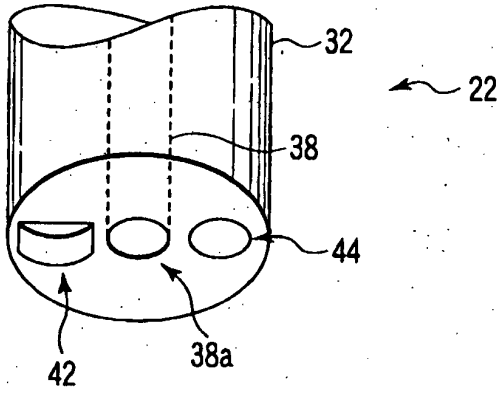

FIG. 3

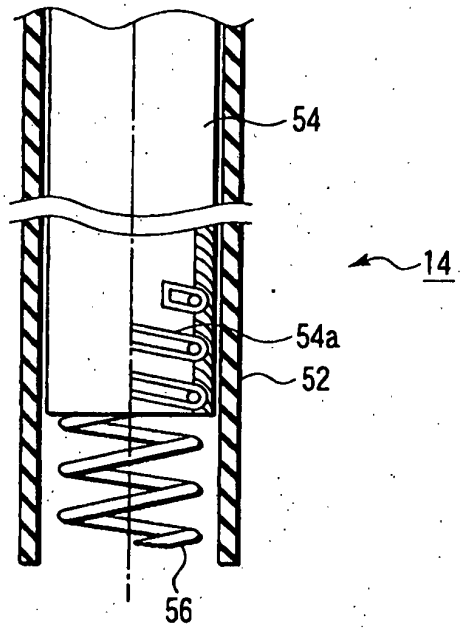

FIG. 4

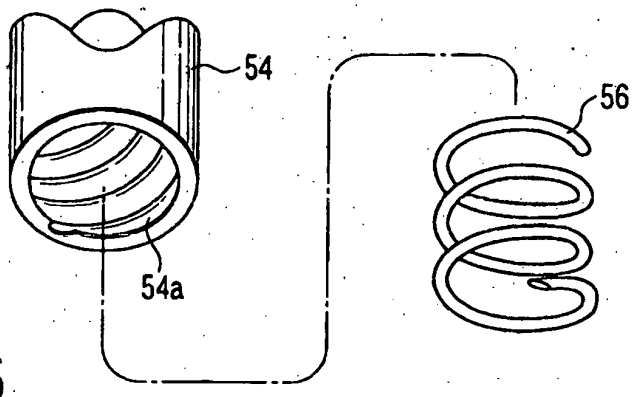

FIG. 5

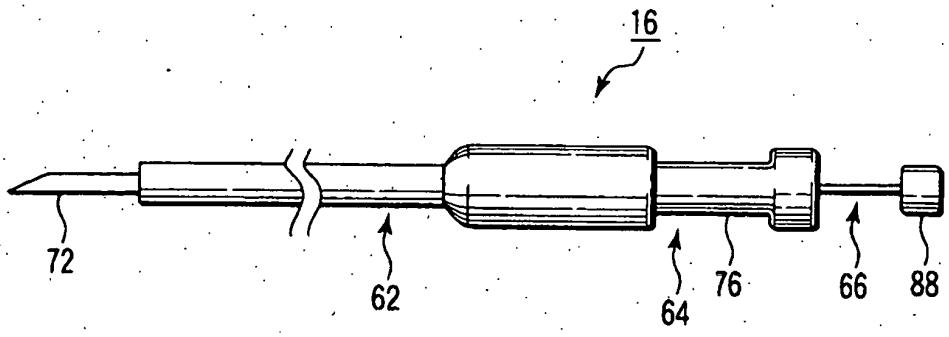

FIG. 6

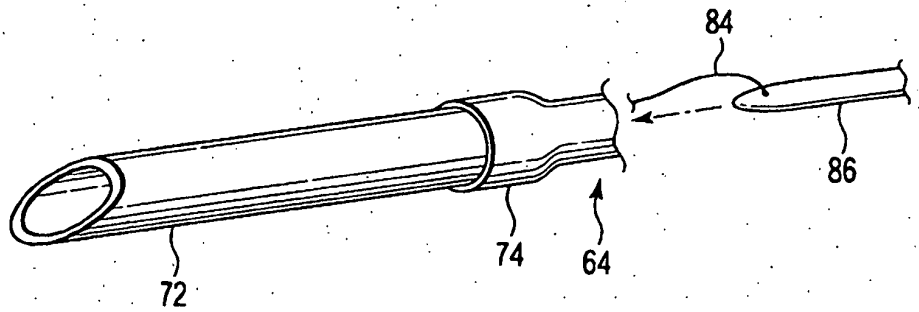

FIG. 7

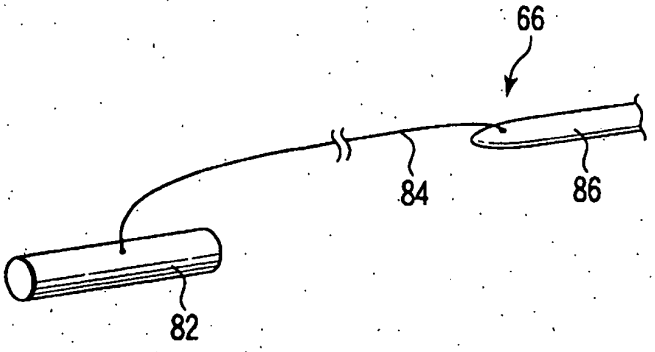

FIG. 8

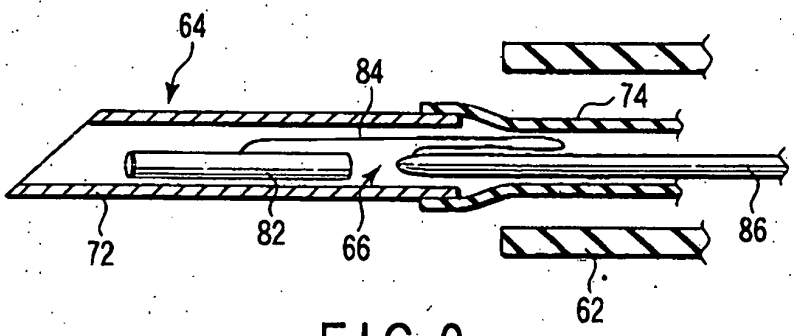

FIG. 9

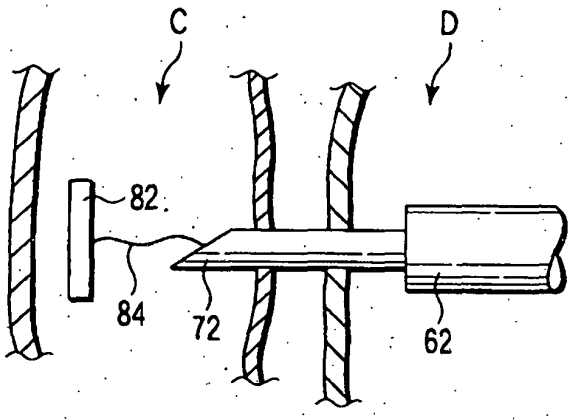

FIG. 10

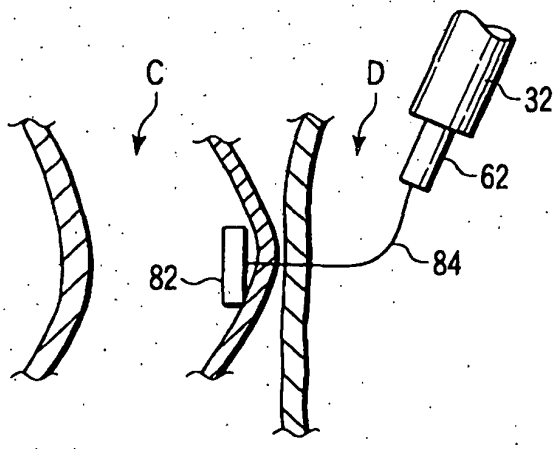

FIG. 11

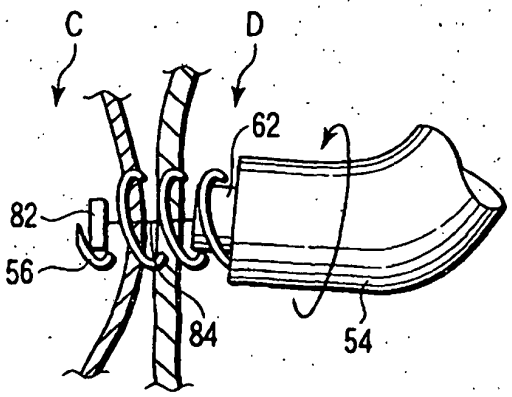

FIG. 12

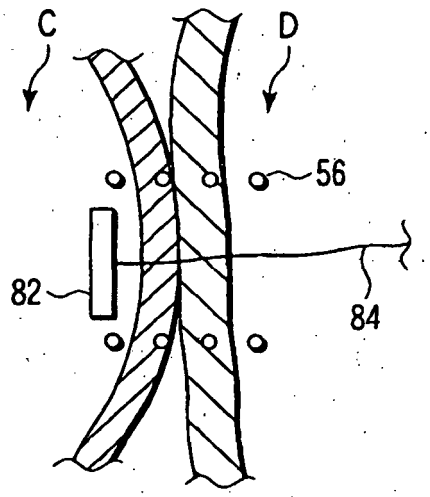

FIG. 13

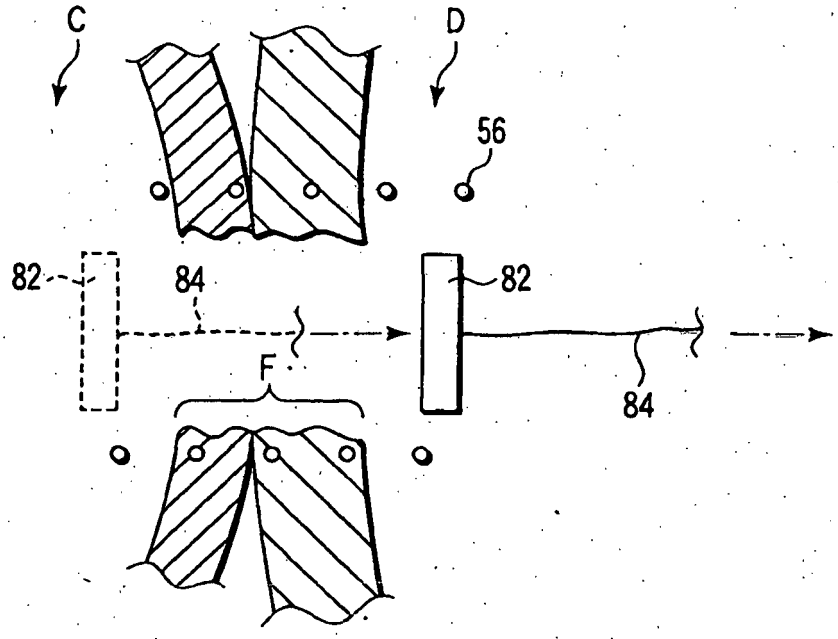

FIG. 14

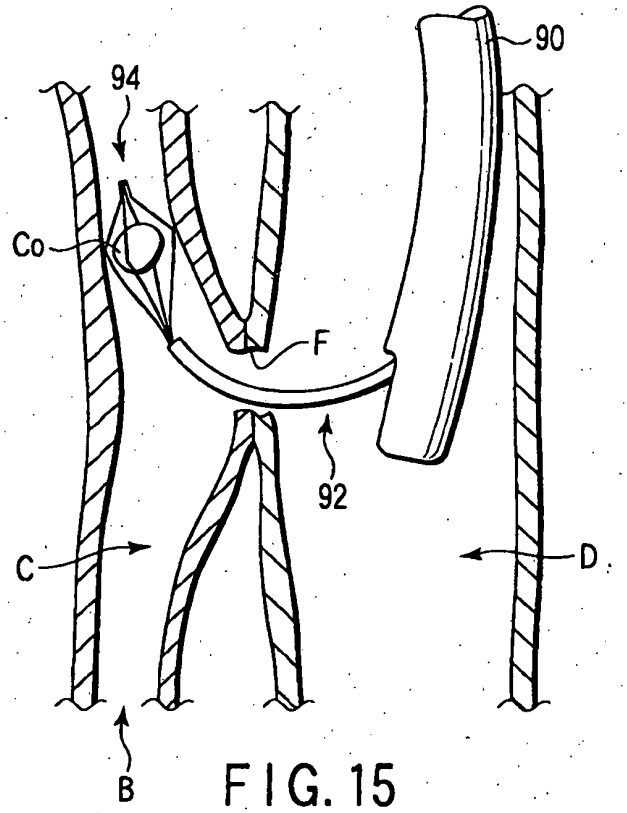

FIG. 15

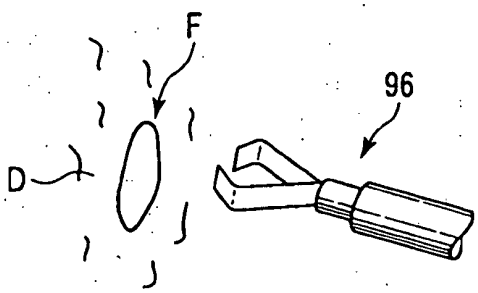

FIG. 16

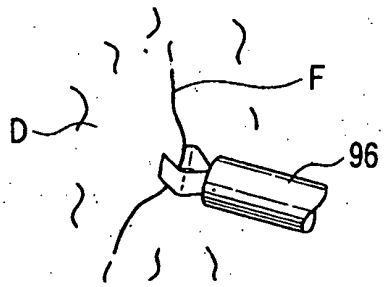

FIG. 17

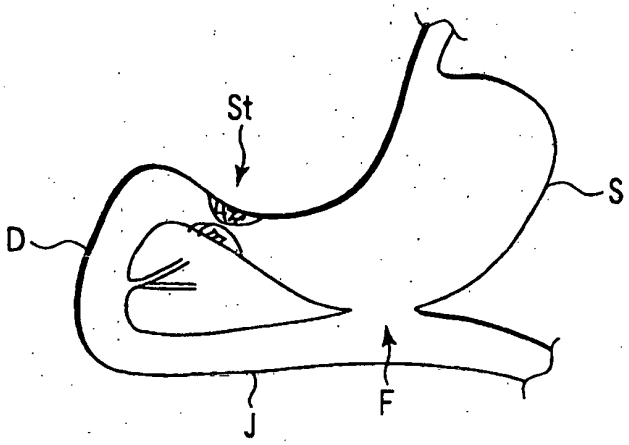

FIG. 18

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US P5690656 A **[0002] [0004]**
- US 20040082883 A1 **[0006]**

Non-patent literature cited in the description

- **YAMANOUCHI et al.** discloses an intestine-intestinal system magnetic compression anastomosis which anastomoses. *Journal of Nippon Medical School,* 2002, vol. 69 (5 **[0003]**

专利名称(译)	超声波内窥镜		
公开(公告)号	EP1894514B1	公开(公告)日	2015-08-05
申请号	EP2007016469	申请日	2007-08-22
[标]申请(专利权)人(译)	奥林巴斯医疗株式会社		
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当前申请(专利权)人(译)	奥林巴斯医疗系统股份有限公司.		
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发明人	SATO, MASATOSHI KAJI, KUNIHIDE SUZUKI, TAKAYUKI SHIONO, JUNJI MIKKAICHI, TAKAYASU MIZUNUMA, AKIKO		
IPC分类号	A61B1/018 A61B8/12 A61F2/958		
CPC分类号	A61B1/00082 A61B1/00179 A61B1/018 A61B1/31 A61B8/12 A61B8/4416 A61B8/445 A61B17/00491 A61B17/068 A61B17/1114 A61B17/221 A61B17/3478 A61B2017/00278 A61B2017/00818 A61B2017/00876 A61B2017/0417 A61B2017/06052 A61B2017/0649 A61B2017/1103 A61B2017/1117 A61B2017/1139 A61B2017/3425		
优先权	11/511197 2006-08-28 US		
其他公开文献	EP1894514A3 EP1894514A2		
外部链接	Espacenet		

摘要(译)

超声波内窥镜（12）包括细长的插入部分（22）和操作部分（24）。细长插入部分（22）具有远端和近端。操作部分（24）设置在插入部分的近端。插入部分包括远端硬质部分（32），远端硬质部分（32）在远端具有远端表面，远端硬质部分的远端表面包括超声换能器（42），钳子通道开口部分（38a）和物镜（44）在直线上。

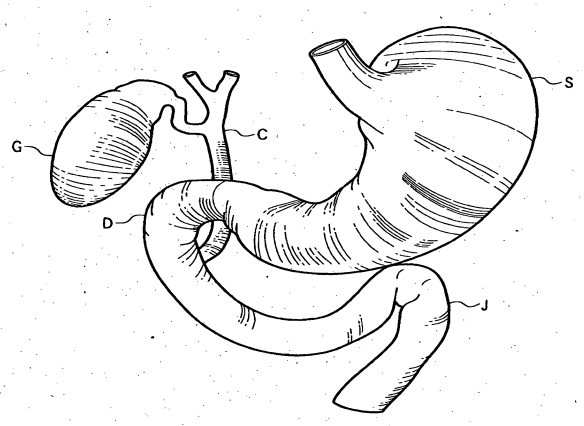

FIG. 1