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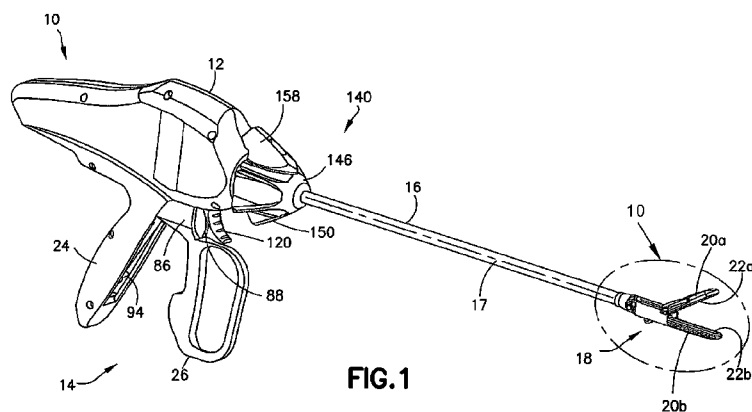
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[Continued on next page]

(54) Title: SURGICAL DEVICE



(57) Abstract: In accordance with one aspect of the disclosure, a surgical device includes: a handle portion including a movable handle; an elongated tubular portion extending distally from the handle portion; a first jaw having a first engagement surface; a second jaw having a second engagement surface, wherein at least the first jaw moves between open and closed configurations, wherein the jaws are arranged to receive tissue therebetween when open and to exert force on tissue when in the closed configuration; and a drive assembly operates to drive at least the first jaw to transition the jaws between the open and closed configurations, wherein the drive assembly actuates by the movable handle that has an initial position and at least first and second preset positions, wherein in the first preset position the jaws exert a first clamping force and in the second preset position the jaws exert a second clamping force that is greater than the first clamping force. In accordance with another aspect of the disclosure, a surgical device for treatment of parenchyma includes: a handle portion including a movable handle; an elongated tubular portion extending distally from the handle portion, the elongated tubular portion having a transverse cross-sectional dimension at least at a distal region not exceeding 12 millimeters; a first jaw at a distal portion of the device having a first engagement surface; a second jaw at the distal portion of the device having a second engagement surface, wherein at least the first jaw is movable to transition the jaws between an open and closed configurations, wherein the jaws are arranged

[Continued on next page]

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to receive parenchyma therebetween when open and to exert force on the tissue via the first and second engagement surfaces when in the closed configuration without causing blunt dissection of the parenchyma, wherein the first and second jaws in the closed configuration have a transverse cross-sectional dimension not exceeding 12 millimeters.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US15/66381

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61B 17/00, 17/28, 17/32 (2016.01)

CPC - A61B 17/07207, 17/29, 17/320092

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)

IPC(8) Classification(s): A61B 17/00, 17/072, 17/28, 17/29, 17/32, 18/14, 19/00 (2016.01)

CPC Classification(s): A61B 17/068, 17/07207, 17/29, 17/320092, 18/1445

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 practicable, search terms used)

PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data): end effector, medical, surgical, surgery, slot, groove, channel, cam, position, compress, press, clamp, seal, sever, divide, cut, different, multiple, handle, hand, grip, trigger, arcuate, curved, non-linear, contoured, follower

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/0276738 A1 (ETHICON ENDO-SURGERY, INC) September 18, 2014 ; figures 1, 5-7; paragraphs [0007], [0065], [0076]	1-8, 11-19, 29, 31
X	US 2011/0230880 A1 (CHOJIN E. M. et al.) September 22, 2011; figures 1, 2; paragraphs [0038], [0042]	1, 21, 22
X ---	US 2010/0274244 A1 (HEARD D. N.) October 28, 2010; figures 1-3, 8A, 8B; paragraphs [0043], [0044]	1, 9, 10, 17, 18, 27 ---
Y	US 2012/0172873 A1 (ARTALE R. C. et al.) July 5, 2012; figures 1, 3B; paragraphs [0051], [0053]	20
Y	US 2008/0234725 A1 (GRIFFITHS J. R.) September 25, 2008; abstract; figure 3	23
Y	US 2011/0082494 A1 (KERR D. E. et al.) April 7, 2011; paragraphs [0031], [0037]	24
Y	US 2013/0296848 A1 (ALLEN J. D. et al.) November 7, 2013; paragraphs [0050], [0054]	25, 26
Y	US 5,906,630 A (ANDERHUB O. E. et al.) May 25, 1999; abstract; column 3, lines 10-20, claim 9	28

☐ 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 application or patent 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

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/US15/66381

-Continued from Box No. III Observations where unity of invention is lacking-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-33 are directed toward a surgical device including: the movable handle has an initial position and at least first and second preset positions, wherein in the first preset position the jaws exert a first clamping force on tissue and in the second preset position the jaws exert a second clamping force on tissue, wherein the second clamping force is greater than the first clamping force.

Group II: claims 34-42 are directed toward a surgical device comprising: the drive assembly includes a cam with a nonlinear groove and a pin engageable with the groove, wherein the groove and pin are positioned within the handle portion, and movement of the movable handle causes relative movement of the arm and groove.

Group III: claims 43-53 are directed toward surgical device comprising: a window of light transmitting material disposed at the handle portion, wherein the window has a viewing surface extending at least partially along a first plane; a light source at the handle portion operatively arranged with the window so as to transmit light through the material of the window along an axis extending substantially parallel to a first plane; and a reflection surface arranged in the window along a second plane transverse to the first plane, wherein the reflection surface is configured at a first angle with respect to the axis to reflect the light toward the viewing surface at an angle of incidence less than a critical angle to enable the light to escape the viewing surface.

Group IV: claims 54-102 are directed toward surgical device for treatment of parenchyma comprising: the elongated tubular portion having a transverse cross-sectional dimension at least at a distal region not exceeding 12 millimeters.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include a surgical device comprising: a movable handle (which is not present in Groups II, III); and a drive assembly operable to drive at least the first jaw to transition the first and second jaws between the open configuration and the closed configuration, wherein the drive assembly is actuable by the movable handle, (which is not present in Groups III-IV) wherein at least the first jaw is movable to transition the first jaw and the second jaw between an open configuration and a closed configuration, wherein the first jaw and the second jaw are arranged to receive tissue therebetween when in the open configuration and to exert force on the tissue via the first engagement surface and the second engagement surface when in the closed configuration (which is not present in Group III) and the movable handle has an initial position and at least first and second preset positions, wherein in the first preset position the jaws exert a first clamping force on tissue and in the second preset position the jaws exert a second clamping force on tissue, wherein the second clamping force is greater than the first clamping force (which is not present in Groups II-IV).

The special technical features of Group II include a surgical device comprising: wherein at least the first jaw is movable to transition the first jaw and the second jaw between an open configuration and a closed configuration, wherein the first jaw and the second jaw are arranged to receive tissue therebetween when in the open configuration and to exert force on the tissue via the first engagement surface and the second engagement surface when in the closed configuration; (which is not present in Group III) and a drive assembly operable to drive at least the first jaw to transition the first and second jaws between the open configuration and the closed configuration, wherein the drive assembly is actuable by the movable handle, (which is not present in Groups III-IV) and the drive assembly includes a cam with a nonlinear groove and a pin engageable with the groove, wherein the groove and pin are positioned within the handle portion, and movement of the movable handle causes relative movement of the arm and groove (which is not present in Groups I, III-IV).

The special technical features of Group III include a surgical device comprising: a window of light transmitting material disposed at the handle portion, wherein the window has a viewing surface extending at least partially along a first plane; a light source at the handle portion operatively arranged with the window so as to transmit light through the material of the window along an axis extending substantially parallel to a first plane; and a reflection surface arranged in the window along a second plane transverse to the first plane, wherein the reflection surface is configured at a first angle with respect to the axis to reflect the light toward the viewing surface at an angle of incidence less than a critical angle to enable the light to escape the viewing surface (which is not present in Groups I, II, IV).

The special technical features of Group IV include a surgical device comprising: including a movable handle; (which is not present in Group II, III) wherein at least the first jaw is movable to transition the first jaw and the second jaw between an open configuration and a closed configuration, wherein the first jaw and the second jaw are arranged to receive parenchyma therebetween when in the open configuration and to exert force on the tissue via the first engagement surface and the second engagement surface when in the closed configuration (which is not present in Group III) without causing blunt dissection of the parenchyma, wherein the first and second jaws in the closed configuration have a transverse cross-sectional dimension not exceeding 12 millimeters; and a first electrode carried by the first jaw, and the first jaw has a length exceeding 30 millimeters, and the second jaw has a length exceeding 30 millimeters; inserting the first and second jaws through a trocar cannula having a diameter not exceeding 12 millimeters; applying energy to the first electrode to seal the parenchyma; and sealing the parenchyma with energy from the first electrode; the elongated tubular portion having a transverse cross-sectional dimension at least at a distal region not exceeding 12 millimeters. (which is not present in Groups I-III).

-Continued Within the Next Supplemental Box-

-Continued from Previous Supplemental Box-

The common technical features of Groups I-IV include a surgical device comprising: a handle portion including a movable handle; an elongated tubular portion extending distally from the handle portion; a first jaw having a first engagement surface; a second jaw having a second engagement surface, wherein at least the first jaw is movable to transition the first jaw and the second jaw between an open configuration and a closed configuration, wherein the first jaw and the second jaw are arranged to receive tissue therebetween when in the open configuration and to exert force on the tissue via the first engagement surface and the second engagement surface when in the closed configuration; and a drive assembly operable to drive at least the first jaw to transition the first and second jaws between the open configuration and the closed configuration, wherein the drive assembly is actuatable by the movable handle.

These common technical features are disclosed by US 2014/0276738 A1 (ETHICON) a surgical device (figure 1) comprising: a handle portion (22; figure 1) including a movable handle (pivoting trigger 24); an elongated tubular portion (sheath 32) extending distally from the handle portion (as shown); a first jaw (42) having a first engagement surface (50; figure 3); a second jaw (44) having a second engagement surface (52; figure 3), wherein at least the first jaw is movable to transition the first jaw and the second jaw between an open configuration and a closed configuration (the first jaw is movable relative to the second jaw between an open and closed position; paragraph [0007]), wherein the first jaw and the second jaw are arranged to receive tissue therebetween when in the open configuration and to exert force on the tissue via the first engagement surface and the second engagement surface when in the closed configuration (the first jaw is movable relative to the second jaw between an open and closed position to compress tissue intermediate the first and second jaw in the closed position; paragraph [0007]); and a drive assembly (extension arm 125 including slot 113; figures 5-7; paragraph [0076]) operable to drive at least the first jaw to transition the first and second jaws between the open configuration (to control actuated position of jaws between an open position when trigger is in the unactuated position; paragraph [0076]) and the closed configuration, wherein the drive assembly is actuatable by the movable handle (jaws may be in a closed position when trigger is in the second actuated position; paragraph [0076]).

Because the common technical features are disclosed by ETHICON, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I-IV lack unity.