

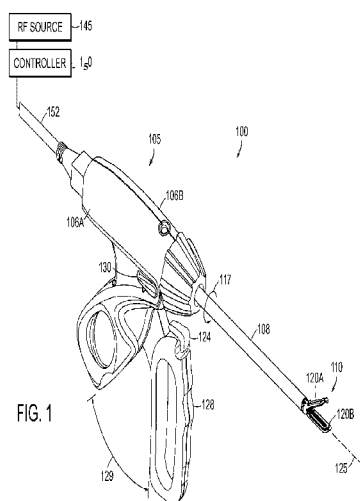


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[Continued on nextpage]

- (54) Title: SURGICAL INSTRUMENT COMPRISING AN ARTICULATABLE END EFFECTOR



- (57) Abstract: An electrosurgical instrument can comprise a handle, a shaft, and an end effector, wherein the end effector can be rotatably coupled to the shaft by an articulation joint. The instrument can further comprise a drive member and the articulation joint can comprise flexible support members which can be configured to support the drive member. The instrument can further comprise supply wires electrically coupled to electrodes in the end effector and a wire tensioning device configured to prevent the supply wires from accumulating slack within the articulation joint. The drive member can comprise a plurality of flexible layers wherein some of the layers can be comprised of an electrically insulative material and other layers can be comprised of an electrically conductive material which is in electrical communication with a cutting member in the end effector and/or electrodes positioned within the end effector. A surgical instrument can comprise a handle and an end effector, wherein the end effector can comprise first and second jaws which can be opened and closed in order to capture tissue therebetween. The surgical instrument can further comprise a shaft extending between the handle and the effector and means for articulating the end effector relative to the shaft. The articulating means can comprise a portion of the shaft which is rotatable about a first axis in order to articulate the end effector about a second axis. In at least one embodiment, the shaft can comprise a first portion including a cam and a second portion including a cam follower, wherein the rotation of the second portion and the interaction of the cam and cam follower can cause the second portion to pivot relative to the first portion.

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**Declarations under Rule 4.17:**

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(h))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(hi))

**Published:**

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) **Date of publication of the international search report:**  
23 August 2012

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2011/043008

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A61B18/14  
ADD.

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 practicable, search terms used)

EPO-Internal , WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	wo 2009/149234 AI (ETHICON ENDO SURGERY INC [US] ; NOBIS RUDOLPH H [US] ; CONLON SEAN P [US] 10 December 2009 (2009-12-10) the whole document	1-48
X	<p>-----</p> <p>US 2009/138003 AI (DEVILLE DEREK DEE [US] ET AL) 28 May 2009 (2009-05-28)</p> <p>abstract; figures 13-28</p> <p>paragraph [0003]</p> <p>paragraph [0058] - paragraph [0073]</p> <p>paragraph [0119] - paragraph [0138]</p> <p>paragraph [0114] - paragraph [0115] ;</p> <p>figures 1-11</p> <p>-----</p> <p style="text-align: center;">-/-</p>	1-7

☒ 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

Date of the actual completion of the international search

27 June 2012

Date of mailing of the international search report

06/07/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
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Molina Silvestre, A

# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2011/043008

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>EP 1 915 953 AI (TYCO HEALTHCARE [US] )  30 April 2008 (2008-04-30)  abstract; figures 1-4, 16-20  paragraph [0001]  paragraph [0010] - paragraph [0021]  paragraph [0033] - paragraph [0037]  paragraph [0047] - paragraph [0052]  paragraph [0056]  paragraph [0060]  paragraph [0066] - paragraph [0071]  -----</p>	8-12
X	<p>US 2005/006431 AI (SHELTON FREDERICK E [US] ET AL SHELTON IV FREDERICK E [US] ET AL) 13 January 2005 (2005-01-13)  abstract; figures 1-12  paragraph [0006]  paragraph [0022] - paragraph [0075]  -----</p>	18-22
X	<p>W0 2008/020964 A2 (CAMBRIDGE ENDOSCOPIC DEVICES I [US] ; LEE WOOJIN [US] ; CHAMORRO ANDRES) 21 February 2008 (2008-02-21)  abstract; figures 1-5  page 1, lines 10-16  page 2, lines 6-8  page 3, lines 2-10  page 5, line 23 - page 6, line 12  page 7, line 27 - page 19, line 9  -----</p>	23-28
X	<p>EP 1 749 479 AI (GANDINI MARCO [IT] )  7 February 2007 (2007-02-07)  abstract; figures 1-10  paragraph [0001]  paragraph [0020] - paragraph [0032]  paragraph [0033] - paragraph [0045]  -----</p>	29-48
A	<p>US 2007/073341 AI (SMITH KEVIN W [US] ET AL) 29 March 2007 (2007-03-29)  the whole document  -----</p>	1-48

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2011/043008

### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

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 fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search 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 and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

## 1. claims: 1-7

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint and an end effector having two jaw members and an electrode, the instrument further comprising a drive member comprising first and second flexible layers.

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## 2. claims: 8-12

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the joint rotatably connects two shaft portions and wherein the shaft portions have detents and notches.

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## 3. claims: 13-17

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the instrument further comprises a conductor and a spring with a specific configuration that is mounted to the conductor.

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## 4. claims: 18-22

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the instrument further comprises an articulation actuator and an articulation drive member coupled in a specific way to achieve rotation of a distal shaft portion about an axis.

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## 5. claims: 23, 24

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the handle comprises a socket, the shaft comprises a ball and the joint pivotably couples the handle and the shaft.

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## 6. claims: 25-28

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Surgical instrument comprising a handle with a trigger, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the instrument further comprises an articulation actuator and two articulation drivers coupled in a specific way to achieve lateral movement of the end effector.

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## 7. claims : 29-38

Surgical instrument comprising a handle, a trigger -not necessarily part of the handle-, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the shaft comprises a specific rotatable structure with a cavity and wherein the instrument further comprises an articulation actuator and an articulation member extending through the cavity to achieve rotation of shaft portions and wherein the instrument further comprises a power switch .

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## 8. claims : 39-47

Surgical instrument comprising a handle, a trigger -not necessarily part of the handle-, a shaft, an articulation joint, a drive member -not necessarily having flexible layers- and an end effector having two jaw members and an electrode, wherein the shaft comprises a specific cam-based structure with a cavity and wherein the instrument further comprises an articulation actuator, a spine and an articulation member extending through the cavity to achieve articulation of shaft portions and wherein the instrument further comprises a power actuator.

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## 9. claim: 48

Surgical instrument comprising a handle, a shaft, an articulation actuator, wherein the shaft comprises a specific cam-based structure with a cavity and wherein the instrument further comprises an articulation actuator, a spine and an articulation member extending through the cavity to achieve articulation of shaft portions and wherein the instrument does not necessarily have a trigger, a drive member or an end effector.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US201 1/043008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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